

Gender Differences in Sexual Practices and Sexually Transmitted Infections among Adults in Lima, Peru

ABSTRACT

Objectives. This study examined the prevalences of antibodies to *Treponema pallidum*, *Chlamydia trachomatis*, and herpes simplex virus type 2 in a sample of Peruvian adults.

Methods. Among adults seeking health certification in Lima, Peru, 600 were randomly selected to undergo interviews and serologic testing.

Results. Men's reported mean lifetime number of partners (10.6) far exceeded women's (1.1), yet antibody to sexually transmitted infection pathogens among sexually experienced participants was 2.8 times more prevalent among women than among men. Among men, female sex workers accounted for 37% of recent partners, and only sex with female sex workers while using condoms less than half of the time was independently associated with antibody (odds ratio = 3.6, 95% confidence interval = 1.5, 8.8). Among women, number of partners was associated with any sexually transmitted infection antibody, while intercourse before 18 years of age was associated with *C. trachomatis* antibody. At every level of perceived risk, sexually transmitted infection antibody was more frequent among women.

Conclusions. Men having unprotected sex with female sex workers had the greatest risk of acquiring infections and (by inference) of transmitting them to women. (*Am J Public Health*. 1996;86:1098-1107)

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Introduction

Determinants of risk of sexually transmitted infections, including human immunodeficiency virus (HIV) infection and sexually transmitted infection distribution patterns, include a complex set of ecological and behavioral factors.¹ Behavioral determinants of sexually transmitted infection include current and lifetime number of sexual partners, age at first intercourse, frequency of intercourse, types of sexual practices (e.g., vaginal, anal, and oral intercourse), patterns of sexual partner recruitment, and rate of acquisition of new partners.² Population variance in the rate of acquiring new partners and partner networking patterns further determine rates of propagation of sexually transmitted infections in a population, while selection of partners from a high-risk group strongly influences individual disease risk.³ In industrialized countries, behavioral surveys have provided important insights to help guide public health intervention for preventing sexually transmitted infections.⁴⁻⁸ However, the extent to which such behavioral variables actually correlate with objective measures of sexually transmitted infections has not been assessed in population-based behavioral surveys or compared by gender.

The aims of this study were to define sexual practices reported by people seeking required pre-employment health certification in Lima, Peru; to determine the age-specific prevalence of serum antibodies to various sexually transmitted infection pathogens; and to assess the relationship of demographic and behavioral survey variables to the prevalence of objective serologic markers for sexually transmitted

infections. This report concerns frequency and type of sexual practices and level of perceived risk of sexually transmitted infections, as well as the relationship of these variables to sexually transmitted infection seroprevalence.

Methods

Study Population and Design

This cross-sectional survey, conducted in Lima, Peru, between September 1991 and January 1992, involved subjects recruited from two municipal health centers, Nuestra Señora de la Paz and Municipalidad San Martín de Porras, both located in low socioeconomic neighborhoods of northern Lima. Two of every 10 men and women between 18 and 50 years of age who sought either preemployment or routine annual worker health certification were selected by block randomization from consecutive clinic attendees until 300 men and 300 women were enrolled. Health regulations required such

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examinations for many categories of blue-collar workers, including factory workers and food handlers, as well as university applicants. Patients paid approximately \$2 for the evaluation (but the study paid for the evaluation of study participants). Routine required serologic testing for syphilis in these clinics made blood collection for further serologic tests feasible.

Each study subject completed an anonymous, self-administered questionnaire concerning sociodemographics, medical history, sexual behaviors (lifetime experience and experience during the previous year), contraceptive history, and perception of sexually transmitted infection risk.

After pretesting of the questionnaire, solicitation of open-ended comments from participants in focus groups (two with men and two with women), and in-depth interviews with five men and five women, the final questionnaire was developed in a language and format appropriate for low-literate subjects. To facilitate responses, trained interviewers read and explained each question to each participant, and participants recorded responses on their own questionnaires. After pretest counseling, 15 cm³ of venous blood were obtained.

Laboratory Procedures and Data Analysis

Sera were tested for antibody to *Treponema pallidum* (Venereal Disease Research Laboratory test and fluorescent treponemal antibody-absorption test), *Chlamydia trachomatis* (a microimmunofluorescent assay titer of 1:16 or higher was considered positive),^{9,10} herpes simplex virus type 2 (HSV-2; Western blot assay),¹¹⁻¹³ human T-cell lymphotropic virus I (HTLV-I), and HIV type 1 (HIV-1). Antibodies to HIV and HTLV-I were detected by enzyme-linked immunosorbent assay (Abbott Laboratories, Chicago, Ill, and Genetic Systems Inc, Seattle, Wash); persistently reactive sera were confirmed by Western blot (Dupont de Nemours, Geneva, Switzerland).¹⁴

Since sexual behavioral risk factors for sexually transmitted infections may differ by gender,¹⁵ we analyzed men and women separately. Statistical tests¹⁶ included chi-square tests for differences between proportions, Mantel-Haenszel tests for linear trends, analyses of variance for differences between group means, and multivariate logistic regression analyses to assess the relationship between sexually transmitted infections, sexual behaviors, and sociodemographic characteristics. Factors significant in univariate analyses

TABLE 1—Sociodemographic Characteristics and Medical History of the Study Population: 600 Adults in Lima, Peru

	Men (n = 300)	Women (n = 300)	P ^a
Age, y, no. (%)			.01
< 20	70 (23.7)	81 (27.6)	
21-30	184 (62.4)	146 (49.8)	
31-40	30 (10.2)	48 (16.4)	
> 40	11 (3.7)	18 (6.1)	
Age, y, ±SD	25.1 ± 6.3	25.9 ± 7.7	.1 ^b
Marital status, no. (%)			.02
Single, never married	234 (78.0)	216 (72.2)	
Married	46 (15.3)	43 (14.4)	
Cohabitant	16 (5.3)	21 (7.0)	
Divorced	4 (1.3)	17 (5.7)	
Widower	0 (0.0)	2 (0.7)	
Education, no. (%)			< .001
Elementary (completed fewer than 6 grades)	13 (4.3)	35 (11.7)	
High school (completed 6-11 grades)	167 (55.7)	133 (44.6)	
University/technical (completed more than 11 grades)	120 (40.0)	130 (43.6)	
Mean education, y	11.6	11.2	.04 ^b
Occupation, no. (%)			.5
Unemployed	90 (30.1)	102 (34.1)	
Student	77 (25.8)	62 (20.7)	
Unskilled	121 (40.5)	123 (41.1)	
Skilled	11 (3.6)	12 (4.0)	
Church attendance, no. (%)			.001
Once a week or more	62 (20.8)	99 (33.1)	
Less than once a week	236 (79.2)	200 (66.9)	
Blood transfusion history, no. (%)	8 (2.7)	19 (6.3)	.08
Past history of sexually transmitted infections, no. (%)			
Urethritis	40 (13.4)	...	
Vaginal discharge	...	106 (35.6)	
Genital ulcer	57 (19.0)	45 (15.1)	.2
Blood test (positive) for syphilis	9 (3.0)	8 (2.7)	.8
Circumcision, no. (%)	17 (5.7)	...	

Note. Totals vary for some variables because of occasionally missing values.

^aP values concern differences between men and women; chi-square tests were used unless otherwise stated.

^bStudent's *t* test.

entered the multivariate models and remained in the final model if they increased significantly ($P < .05$) the predictive power of the model.

Results

Of 693 eligible subjects, 93 (13%) refused participation. Refusal was unrelated to gender or place of enrollment. Place of birth and religion were nearly identical for men and women: 56% were born in Lima, 29% were born in the highlands, 10% were born on the coast, and 5% were born in jungle regions; 83% were Catholic, and the remainder were

Protestant or without a religion. Table 1 compares other sociodemographic and medical history characteristics by gender. Most of the subjects were less than 30 years of age, with men being somewhat younger than women. Three quarters had never married. Women had less education, attended church more regularly, and more often had received blood transfusions. Both genders commonly reported a past history compatible with sexually transmitted infections.

Sexual Behavior

The type of first sexual partner differed strikingly by gender. The first

TABLE 2—Proportion of Study Participants Who Were Sexually Experienced and Their Lifetime Number of Partners, Sexual Activity, and Number of Partners during the Previous Year, by Age and Gender

Sexual Behavior Variable	Men, Age, y					Women, Age, y				
	<21 (n = 70)	21–25 (n = 124)	26–30 (n = 60)	>30 (n = 41)	All (n = 295)	<21 (n = 81)	21–25 (n = 100)	26–30 (n = 46)	>30 (n = 66)	All (n = 293)
Sexually experienced, lifetime, % ^a	87.1	97.6	96.7	100	95.3	42.0	69.0	78.3	95.5	68.9
Lifetime no. partners, %										
0	13.6	2.7	3.7	0.0	5.2	58.0	32.0	21.7	4.6	31.5
1	27.3	8.8	3.7	8.1	12.2	29.6	43.3	50.0	49.2	41.9
2	7.6	8.8	3.7	2.7	6.7	7.4	17.5	19.6	20.0	15.6
3	9.1	10.6	14.8	2.7	10.0	2.5	4.1	4.3	13.8	5.9
4	10.6	19.5	3.7	10.8	13.0	1.2	2.1	0.0	6.2	2.4
5–10	16.7	27.4	10.7	45.9	30.0	1.2	1.0	4.3	4.6	2.4
More than 10	15.2	22.1	29.6	29.7	23.0	0.0	0.0	0.0	1.5	0.3
Lifetime no. partners, mean ± SD	6.0 ± 9.8	9.9 ± 14.2	14.9 ± 27.1	14.7 ± 19.9	10.6 ± 17.7	0.6 ± 1.0	1.0 ± 1.0	1.3 ± 1.2	2.2 ± 2.4	1.2 ± 1.6
Lifetime no. partners, median	3	4	8	7	5	0	1	1	1	1
Missing data, lifetime, %	5.7	8.9	10.0	9.8	8.5	0.0	3.0	0.0	1.5	1.4
Sexually active in previous year, % ^a	79.4	93.7	93.2	100	90.9	38.3	55.1	60.9	84.4	57.8
No. partners in previous year, %										
0	20.6	6.3	6.8	0.0	9.0	61.7	44.9	39.1	15.6	42.2
1	38.2	27.7	37.3	50.0	35.4	33.3	49.0	54.3	76.6	51.6
2	11.8	23.2	18.6	21.1	19.1	3.7	5.1	4.3	3.1	4.2
3–4	16.2	23.2	20.3	10.5	19.1	1.2	1.0	2.2	3.1	1.7
More than 4	13.2	19.5	16.9	18.4	17.3	0.0	0.0	0.0	1.6	0.3
No. partners in previous year, mean ± SD	2.6 ± 5.2	3.9 ± 4.8	3.7 ± 5.2	3.2 ± 4.5	3.4 ± 4.9	0.4 ± 0.6	0.6 ± 0.6	0.7 ± 0.7	1.1 ± 1.3	0.7 ± 0.8
No. partners in previous year, median	1	2	2	1.5	2	0	1	1	1	1
Missing data, previous year, %	2.9	9.7	1.7	7.3	6.1	0.0	2.0	0.0	3.0	1.4

^aChi-square test: $P < .01$ for men, $P < .001$ for women; Mantel-Haenszel test for linear trend: $P < .05$ for men, $P < .001$ for women.

partner was a spouse for 28% of women but only 0.4% of men, a “beloved or exclusive partner” for 62% of women but only 32% of men, a friend for 35% of men and 4% of women, an unknown partner for 7% of men and 3% of women, and a female sex worker for 21% of men. Table 2 summarizes lifetime sexual experience, as well as sexual activity during the previous year, by age and gender. Overall, 95% of men and 69% of women reported sexual experience ($P < .01$); the greatest differences involved those less than 21 years old. Data on numbers of partners were missing more often for men than for women (perhaps because it was harder

for men than for women to remember such data, since men reported more partners). The mean lifetime numbers of sexual partners were 10.6 for men and 1.2 for women ($P < .001$); the mean lifetime number of partners for women, standardized to the age distribution of the men, was 1.13. Of those 30 years of age or younger, men reported approximately 10 times more partners than did women within each age category. The overall percentages reporting 5 or more partners were 53% for men and 3% for women, an 18-fold difference. For those 30 years of age or younger, 5 or more sexual partners were reported by 49% of men and 2% of

women, a 27-fold difference. Sexual experience during the previous year was reported by 91% of men and 58% of women ($P < .001$). Multiple partners within the past year were reported by 56% of men and 6% of women, a ninefold difference. Five or more partners during the past year were reported by 51 men and 1 woman.

In terms of sex during the past year, men were asked to report both the total number of sex partners and the number of these partners who were female sex workers. As shown in Table 3, men reporting sex with a female sex worker during the year reported an average of

three times as many partners as men not reporting sex with a female sex worker. Female sex workers accounted for 37% of all partners reported by men, including 59% of partners reported by men reporting sex with a female sex worker, and 85% of partners of men who reported sex with a female sex worker and less than four partners during the year. Of 599 reported female partners who were not female sex workers, 245 (41%) were exposed to a man who had sex with a female sex worker during the year.

Table 4 summarizes additional data on sexual histories and practices for sexually experienced men and women. Mean age of first intercourse was 3 years younger for men than for women, although 32% of women had not yet had intercourse. Of these sexually experienced participants, 59% of men reported ever having had sex with a female sex worker, while 162 men (57%) and 12 women (6%) reported sex in exchange for money, food, gifts, or drugs. Of the 4 women who reported sex in exchange for money, 3 reported only 1 partner during the past year and 1 reported 10 partners during the past year. Thirty men (11%) reported sex with other men; of these men, only the 4 reporting receptive anal intercourse acknowledged being homosexual; the remaining 26 reported sex with both genders. Similar proportions of men and women reported sex during menses, but the proportion of men reporting engaging in insertive anal sex with women or receiving oral sex from women considerably exceeded the proportion of women reporting receiving anal sex and performing oral sex, respectively. No woman acknowledged oral sex or anilingus with other women. Fifty-eight percent of the men and 30% of the women had ever used condoms ($P < .0001$). The fact that men performed insertive anal sex, received oral sex, and used condoms more often with female sex workers than with other women (as detailed later) may help explain these gender discrepancies.

Table 5 provides details on sexual behavior during the previous year for men and women who were sexually active during the year. Casual sex (sex with someone other than either the regular partner or a female sex worker) was reported by 72% of men but only 12% of women. Casual sex was related to not having a regular partner as well as to gender: casual sex during the previous year was reported by 114 (60%) of 190

TABLE 3—Men's Reported Total Number of Sex Partners and Number of Female Sex Worker (FSW) Partners during the Previous Year

Total No. Partners during Previous Year	No. Men ^a	Total No. Partners	No. FSW Partners
Less than 4 partners			
Men reporting sex with FSW	44	98	83
Men not reporting sex with FSW	152	210	0
4 or more partners			
Men reporting sex with FSW	51	503	273
Men not reporting sex with FSW	18	144	0
Total			
Men reporting sex with FSW	95	601	356
Men not reporting sex with FSW	170	354	0

^aComplete data were available on 265 of 274 men who reported sex during the previous year.

TABLE 4—Sexual Behavior among Sexually Experienced Participants, by Gender

	Men	Women
Age at first intercourse, y, no. (%)		
≤ 14	58 (20.6)	14 (6.9)
15–17	143 (50.7)	50 (24.5)
≥ 18	81 (28.7)	140 (68.6)
Age at first intercourse, mean ± SD*	16.2 ± 2.3	19.2 ± 3.6
Sex with female sex worker, no. (%)	166 (58.5)	...
Exchange of sex for money, food, gifts, or drugs,** no. (%)	162 (56.8)	12 (5.9)
Same-sex experience ever, no. (%)	30 (10.5)	...
Insertive anal sex, no. (%)	138 (48.2)	...
With opposite sex	114 (40.1)	...
With same sex	4 (1.4)	...
Both	19 (6.7)	...
Receptive anal sex,* no. (%)	4 (1.4)	60 (29.3)
Performed oral sex,* no. (%)	145 (50.9)	48 (23.4)
With opposite sex	142 (49.8)	48 (23.4)
With same sex	0 (0.0)	0 (0.0)
Both	3 (1.1)	0 (0.0)
Received oral sex,** no. (%)	163 (57.3)	83 (40.7)
With opposite sex	143 (50.2)	83 (40.7)
With same sex	5 (1.8)	0 (0.0)
Both	15 (5.3)	0 (0.0)
Performed anilingus,*** no. (%)	33 (11.7)	9 (4.4)
With opposite sex	32 (11.3)	9 (4.4)
With same sex	0 (0.0)	0 (0.0)
Both	1 (0.4)	0 (0.0)
Received anilingus, no. (%)	12 (4.2)	11 (5.5)
With opposite sex	10 (3.5)	11 (5.5)
With same sex	2 (0.7)	0 (0.0)
Both	0 (0.0)	0 (0.0)
Sex during menses, no. (%)	132 (46.3)	91 (44.4)
Condom use ever,* no. (%)	166 (58.2)	61 (29.8)

Note. Sample sizes for individual items varied.

* $P < .0001$ (Student's *t* test); ** $P < .001$; *** $P < .05$.

men and 16 (10%) of 166 women with a regular partner vs 80 (99%) of 81 men and 5 of 5 women without a regular partner.

Of men sexually active during the past year, 37% reported sex with a female sex worker during the year, including 52

TABLE 5—Types of Partners, Risky Practices, and Condom Use during the Previous Year among Men and Women Who Were Sexually Active during the Previous Year

	Men		Women		P
	No.	%	No.	%	
Type of partner					
Regular partner	191	70.2	166	97.1	< .001
Casual partner*	195	71.7	21	12.3	< .001
Female sex worker	100	36.6	...		
Risky practices					
Insertive anal sex	99	36.3	...		
Receptive anal sex	1	0.4	33	19.3	< .001
Sex during menses	97	35.8	70	41.2	.3
Alcohol before sex	170	62.0	75	43.9	< .001
Drugs before sex	5	1.8	0	0.0	NS
Condom use in previous year					
With regular partner					
Ever	74	38.9	41	24.7	.004
More than half of the time	20	10.5	6	3.6	.012
Always	7	3.7	4	2.4	NS
With casual partners ^a					
Ever	94	48.9	5	23.8	.028
More than half of the time	33	17.2	1	4.8	NS
Always	17	8.9	0	0.0	NS
With female sex worker					
Ever	71	71.0	...		
More than half of the time	39	39.0	...		
Always	28	28.0	...		
Any condom use last year	149	54.4	44	25.7	< .001

Note. Sample sizes for individual items varied. NS = nonsignificant.

*All partners other than regular partners or female sex workers.

(27%) of 190 with and 47 (58%) of 81 without a regular partner ($P < .001$). Thirty-six percent of men reported insertive anorectal sex, including 47% of men who reported sex with a female sex worker during the year and 31% of those who did not ($P < .01$). Receptive anal sex was reported by only 19% of women. Alcohol use before sex was significantly more common for men (62%) than for women (44%), and this too was associated with risky sex. For example, casual sex was reported by 83% of men who consumed alcohol sometimes or more often before sex and 68% of men who did not do so ($P = .02$); the corresponding rates for women were 25% and 10% ($P < .01$). However, for men with only one type of partner, the differences were less striking: alcohol before sex was reported by 11 of 44 men (25%) who had sex only with female sex workers, by 8 of 33 men (24%) who had sex only with casual partners, and by 12 of 75 men (16%) who had sex only with a regular partner ($P = .18$ for regular partner vs casual partner or female sex worker).

The higher rate of condom use reported by men was also strongly related

to type of partner; men were least likely to report use of condoms with a regular partner, more likely to report use with casual partners, and most likely to report use with a female sex worker. However, of men reporting sex with a female sex worker during the previous year, only 28% always used a condom during such sex. Men were significantly more likely than women to report condom use with regular or casual partners.

Prevalence of Sexually Transmitted Infections in Relation to Behavioral Risk Factors

The prevalences of antibodies among sexually experienced men and women, respectively, were as follows: *T. pallidum*, 1.8% and 1.5% ($P = .8$); *C. trachomatis*, 2.8% and 14.1% ($P < .001$); HSV-2, 7.7% and 21.5% ($P < .001$), and any of these three pathogens, 11.9% and 33.2% ($P < .001$). Only one man was HIV seropositive, and he also had a reactive fluorescent treponemal antibody-absorption test. Only one woman was seropositive for HTLV-I, a pathogen not always sexually transmitted. Therefore, further analyses focused on factors associated

with antibodies to *T. pallidum*, *C. trachomatis*, or HSV-2.

Univariate Analyses

Increasing age was significantly correlated with increasing prevalence of antibody to sexually transmitted disease pathogens, as indicated in Figure 1. The relationship of increasing age to increasing prevalence of antibody was limited to HSV-2, whereas the higher antibody prevalence in women than in men was seen for both HSV-2 and *C. trachomatis*.

Figure 2 shows the association of number of partners with prevalence of antibody to *C. trachomatis*, HSV-2, and *T. pallidum* (and with any of these three sexually transmitted infections) in men and women. The prevalences of antibody to HSV-2, to *C. trachomatis*, and to any of the three sexually transmitted infection pathogens were several times higher among women than among men after stratification for number of partners. Table 6 summarizes factors associated with serum antibody to any of the three sexually transmitted infection pathogens among sexually experienced participants, excluding the four men self-identified as homosexual. Among men, factors associated with sexually transmitted infection seropositivity included age, currently married or cohabiting with partner, more than 20 lifetime sex partners, ever having had sex with female sex workers, and having performed or received anilingus. Factors not associated included place of enrollment, place of birth, education, religion, church attendance, age at first intercourse, alcohol consumption before sex, sex during menses, sexual practices other than those mentioned, history of ever using condoms, and circumcision status.

Among women, factors associated with sexually transmitted infection seropositivity included age, age under 18 years at first intercourse, increasing lifetime numbers of sexual partners, consumption of alcoholic beverages sometimes or more often prior to sexual intercourse, sex during menses, history of a partner with a sexually transmitted infection, and lack of education above elementary school (6 years of education). Factors not significantly associated included place of enrollment, place of birth, marital status, religion, church attendance, sexual practices (receptive anal intercourse, performed or received oral sex, performed or received anilingus), and history of ever using condoms.

Multivariate Analyses

Multivariate analysis by stepwise logistic regression used all factors found associated with sexually transmitted infection seropositivity by univariate analysis. After adjustment for age, men who had had more than 20 sex partners (adjusted odds ratio [OR] = 3.8, 95% confidence interval [CI] = 1.4, 10.6) showed an increased association with sexually transmitted infection seropositivity (model A). However, with a derived variable of frequency of sex with female sex workers, classified as never or seldom vs sometimes or more often, together with frequency of condom use in those circumstances, a stronger correlation emerged in the multivariate analysis (model B). Only history of sex with female sex workers sometimes or more often while using condoms less than half of the time was significantly associated with sexually transmitted infections (adjusted OR = 3.6, 95% CI = 1.5, 8.8). Adjustment for sexual orientation (any vs no homosexual experience) did not modify the results.

Among women, after adjustment for age, sexually transmitted infection seropositivity was associated with age of first sexual intercourse under 18 years (OR = 2.0, 95% CI = 1.0, 4.1; $P = .05$) and with lifetime number of sexual partners (with the odds ratio for sexually transmitted infection seropositivity and one partner set at 1.0, the odds ratios were 2.7 [95% CI = 1.2, 5.9] for two partners and 4.3 [95% CI = 1.7, 11.1] for three or more partners). Further analysis of the association with age of first intercourse showed that 15 (23%) of 64 women who initiated sexual activity before 18 years of age and only 13 (9%) of 140 women who initiated sexual activity at 18 years of age or later had antibody to *C. trachomatis* (OR = 3.0, 95% CI = 1.3, 6.7); this association persisted after adjustment for age and lifetime number of partners (OR = 2.4, 95% CI = 1.1, 5.7). In contrast, number of partners, but not age of first intercourse, was related to HSV-2 antibody among women.

Perception of Risk

Table 7 highlights differences between sexually experienced men and women in perceived risk of sexually transmitted infections in relation to objective evidence of such infections (defined by a reactive serologic test for one or more sexually transmitted infections). Fewer women than men perceived any risk, yet at every level of perceived risk, objective

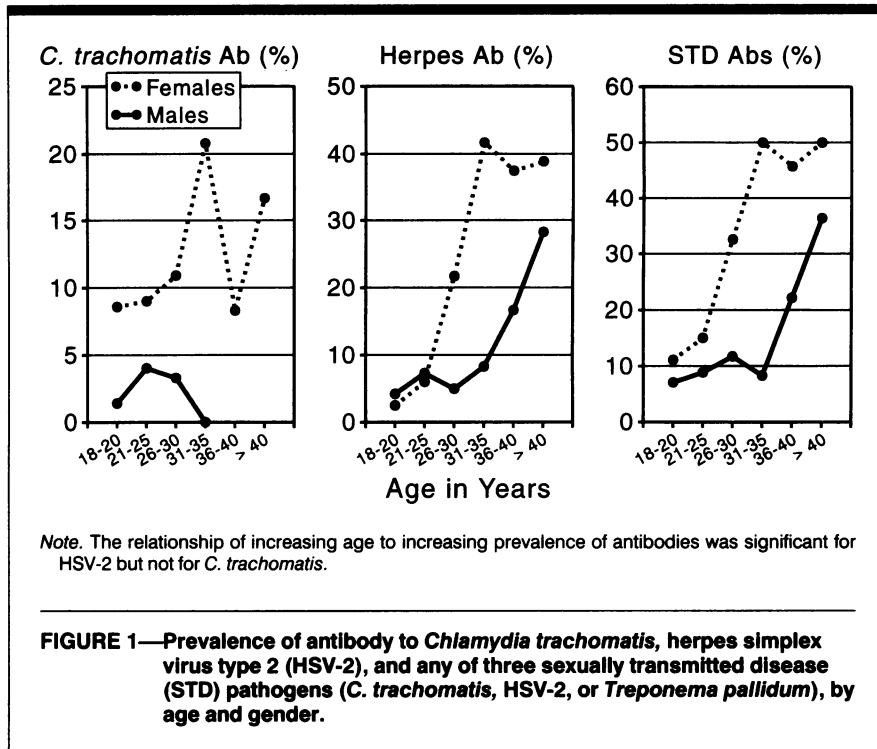


FIGURE 1—Prevalence of antibody to *Chlamydia trachomatis*, herpes simplex virus type 2 (HSV-2), and any of three sexually transmitted disease (STD) pathogens (*C. trachomatis*, HSV-2, or *Treponema pallidum*), by age and gender.

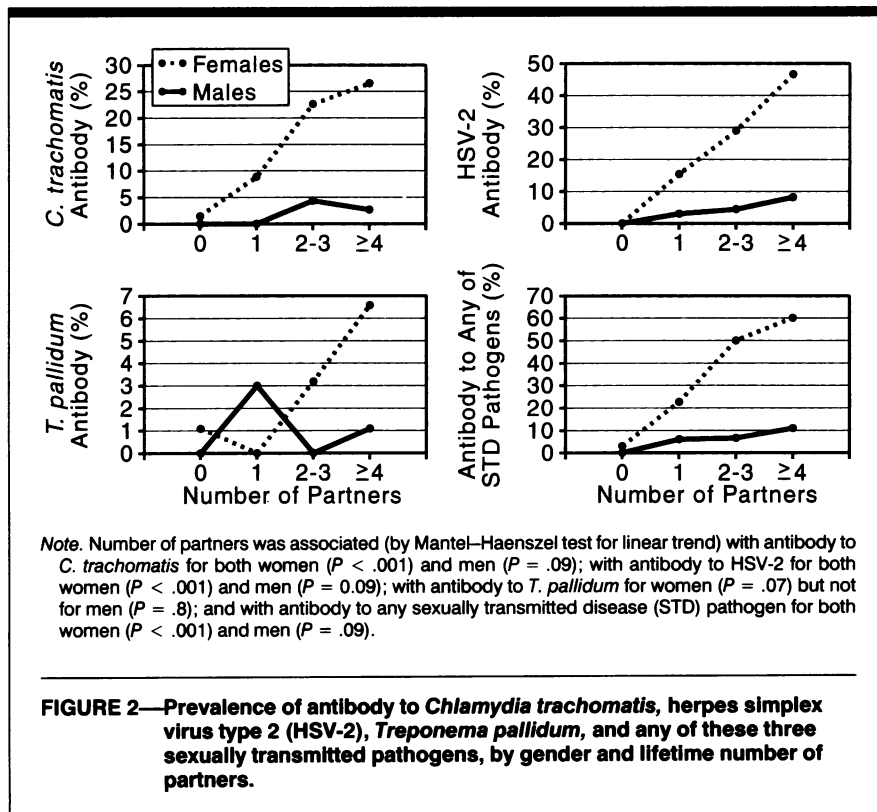


FIGURE 2—Prevalence of antibody to *Chlamydia trachomatis*, herpes simplex virus type 2 (HSV-2), *Treponema pallidum*, and any of these three sexually transmitted pathogens, by gender and lifetime number of partners.

evidence of sexually transmitted infections was significantly higher for women than for men. The prevalence of objective evidence increased significantly with level of perceived risk among women, but the increase was not significant for men. After adjustment for level of perceived risk, the

odds ratio for objective evidence of sexually transmitted infections and female gender was 3.9 (relative to male gender). For women, logistic regression analysis adjusting for age and lifetime number of partners showed that level of perceived risk of sexually transmitted infections was

TABLE 6—Factors Associated with Serum to Antibody *Treponema pallidum*, *Chlamydia trachomatis*, or Herpes Simplex Virus Type 2

	Subjects with Antibody, %	Odds Ratio	95% Confidence Interval
Men			
Age, y			
18–25	8.4	1.0	...
26–35	10.1	1.2	0.4, 3.4
36–50	27.6	4.2	1.4, 12.1
Marital status			
Not married	8.6	1.0	...
Married/cohabiting	18.0	2.3	1.0, 5.2
No. partners			
1–10 (n = 194)	6.7	1.0	...
11–20 (n = 34)	8.8	1.3	0.2, 5.3
> 20 (n = 29)	24.1	4.4	1.4, 13.6
Sex with female sex worker			
No/seldom	8.5	1.0	...
Sometimes or more often	16.5	2.1	0.9, 4.9
Performed anilingus			
No	9.3	1.0	...
Yes	21.9	2.7	1.1, 7.0
Received anilingus			
No	10.0	1.0	...
Yes	30.0	3.8	0.9, 15.7
Women			
Age, y			
18–25	20.4	1.0	...
26–35	45.6	3.3	1.5, 7.1
36–50	48.8	3.7	1.6, 8.7
Education			
Elementary	51.7	1.0	...
More than elementary	30.1	0.9	0.2, 1.0
Age at first intercourse, y			
≥ 18	25.2	1.0	...
< 18	48.4	2.7	1.5, 5.0
No. partners			
1 (n = 123)	22.8	1.0	...
2 (n = 45)	44.4	2.7	1.2, 6.0
≥ 3 (n = 32)	62.5	5.7	2.3, 14.2
Alcohol before sex			
No/seldom	29.3	1.0	...
Sometime or more often	60.9	3.8	1.5, 9.2
Sex during menses			
No	27.2	1.0	...
Yes	40.7	1.8	1.0, 3.3
Partner with sexually transmitted infection (ever)			
No	31.1	1.0	...
Yes	62.5	3.7	1.3, 10.6

independently associated with history of such infections (OR = 2.9, 95% CI = 1.6, 5.3) and history of such infections in a partner (OR = 3.6, 95% CI = 1.1, 12.2). For men, the same analysis showed that level of perceived risk of sexually transmitted infections was independently associated with history of such infections (OR = 2.8, 95% CI = 1.5, 5.3) and with

history of sex with a female sex worker (OR = 2.5, 95% CI = 1.3, 4.9).

Discussion

This study of a random sample of young adults undergoing preemployment, preuniversity, or routine annual worker examinations in Lima shows striking differ-

ences between men and women in reported sexual behaviors. The age-standardized mean lifetime number of sexual partners was 9.4 times greater for men. Among those with sexual experience, mean age of onset of intercourse was 3 years younger for men, 59% of whom acknowledged previous sex with female sex workers, (37% within the past year). Eleven percent of sexually experienced men acknowledged prior same-sex contact; nearly all such men identified themselves as heterosexual but could be described as "behaviorally bisexual."

The prevalence of antibody to *T. pallidum* was much lower than that of antibody to HSV2 and to *C. trachomatis*, especially in women. Syphilis is common in many populations but seldom more common than genital herpes or chlamydial infection; in Peru, female sex workers had been routinely screened for syphilis and, for many years, had been given prophylactic treatment, whereas there had been no screening for *C. trachomatis* at the time of this study. Multivariate analyses showed that antibody to any of three sexually transmitted infection pathogens was related to number of partners among women and to unprotected sex with female sex workers among men. Despite far more reported risk behaviors among men and lower perceived risk among women, objective serologic evidence of antibody to HSV-2 and such evidence of antibody *C. trachomatis* were approximately three and five times more prevalent among women.

This higher prevalence could be due to a greater efficiency of transmission of HSV-2 and *C. trachomatis* to women, as has been noted for many sexually transmitted infections.¹⁷ Early onset of sexual activity in women was associated with antibody to *C. trachomatis*, independent of age and number of lifetime sex partners. Cervical ectopy is more common in young women than in older women, and ectopy may increase susceptibility to certain sexually transmitted infection pathogens such as *C. trachomatis*.¹⁸ Serological evidence of curable sexually transmitted infections (e.g., chlamydial infection) in men may underestimate lifetime experience with such infections because earlier detection and treatment and milder manifestations in men may attenuate appearance or persistence of antibody.¹⁰ However, HSV-2 is rarely treated in Lima, is not curable, and is not known to produce a detectable antibody response more often in women than in men, yet antibody to HSV-2 also is more prevalent among

women. A higher age-specific prevalence of antibody to HSV-2 in women than in men has also been reported in San Francisco¹⁹ and in the US National Health and Nutrition Examination Survey.^{20,21} Because HSV-2 causes chronic, recurrent infection, transmission of HSV-2 in the population may be less dependent than many other sexually transmitted infections of shorter duration on frequent partner change, based on current models of sexually transmitted infection transmission dynamics.^{22,23}

Population-based studies of sexual behavior have been lacking in Latin America, and little is known about the population prevalence and pattern of the distribution of sexually transmitted infections, apart from HIV-1²⁴⁻²⁶ and HTLV-I.^{27,28} Previous studies of sexual behavior in Peru involved selected groups, such as school-aged youth and university students.^{29,30} Reported high-risk behaviors included frequent partner change, homosexual experience for men, and heterosexual anal sex for both men and women. Recent population-based surveys of sexual behavior in industrialized countries⁴⁻⁸ provided results differing greatly from the results of our study in certain respects. In surveys conducted in both Britain and France,^{4,5} twice as many men as women reported multiple partners during the previous year, in contrast with the nine-fold difference found in this study. The recent landmark study of US men and women 18 to 59 years of age showed that the median numbers of sex partners after 18 years of age were six for men and two for women.⁸ For those less than 35 years of age in Britain, the proportion of men reporting five or more lifetime partners was less than twice the proportion for women, in contrast to the 27-fold difference between men and women found in our study for participants 30 years of age or younger.⁴

Morris³¹ recently addressed possible reasons for the fact that the number of female sex partners reported by men on sexual surveys often exceeds the number of male partners reported by women. She observed, in the US General Social Survey, that this anomaly was largely attributable to the 10% of men and women reporting the greatest number of partners (the "telling tail" of the distribution of reported number of partners). In our analyses, as shown in Table 2, approximately 10% of subjects (23% of men, only 1 woman) reported a lifetime number of partners greater than 10. The male-female ratio of reported lifetime

TABLE 7—Number and Percentage of Sexually Experienced Participants with Objective Serologic Evidence of Antibody to Any of Three Sexually Transmitted Pathogens in Relation to Level of Perceived Risk of Sexually Transmitted Infections

	Perception of Risk			<i>P</i> ^a
	None, No. Reactive/ Total (%)	Low, No. Reactive/ Total (%)	High, No. Reactive/ Total (%)	
Men	11/115 (9.6)	15/142 (10.6)	4/24 (16.7)	.4
Women	32/119 (26.9)	25/69 (36.2)	10/16 (62.5)	< .01

^aMantel-Haenszel test for linear trend comparing perceived risk as none, low, or high.

number of partners was 8.8 among all subjects, falling to 3.5 after those with more than 10 partners had been excluded. Similarly, 58.5% of men reported past sex with a female sex worker; after these men had been excluded, the mean lifetime number of sex partners for the remaining men who denied sex with a female sex worker fell from 10.6 to 4.4, and the ratio of the mean lifetime number of partners reported by these men to the mean number reported by all women fell to 3.4 (an effect similar to that resulting from exclusion of those with more than 10 partners). Only 103 men reported 10 or fewer partners and denied sex with a female sex worker; the ratio of the mean lifetime number of partners reported by these men to the mean number reported by women was 2.9. Further exclusion of the small number of additional men who reported sex with other men did not further lower this ratio. Approximately 12% of subjects (including 24.6% of men and only 1 woman) reported 4 or more partners during the previous year. The lone woman in this category reported 10 partners during the year and received money for sex, apparently representing the one female sex worker in the sample. The male-female ratio of reported number of partners during the previous year was 4.8 among all subjects; this ratio decreased to 2.3 after all subjects reporting 4 partners or more during the previous year had been excluded, to 2.8 after all men reporting sex with a female sex worker during the year had been excluded, and to 2.1 after both all subjects reporting fewer than 4 partners and all additional men reporting sex with a female sex worker had been excluded.

Thus, like Morris, we found that the anomaly between the numbers of sex partners reported by men and by women was less marked for partners during the

past year than for lifetime numbers of partners, perhaps indicating more accurate reporting during the past year. Although exclusion of those with the highest numbers of partners also reduced this anomaly, Table 2 shows that, in contrast with the General Social Survey data from the United States, the distributions of the numbers of partners reported by men and women in this Lima sample differ not only in the upper tail of the distribution but throughout the distribution, both for lifetime number of partners and for partners during the past year. Sex with female sex workers clearly accounted for a substantial portion of the higher numbers of partners reported by men in Lima, an important difference from the US and European data. In France⁵ and in the US General Social Survey,³¹ only about 3% of men reported sex with a female sex worker in the previous 5 years, as compared with 37% during the previous year in our study. Other Latin American studies^{32,33} also found that men commonly report sex with a female sex worker. However, in Lima, even after men reporting sex with a female sex worker had been excluded, the remaining men reported an average of about three times as many partners as did women. It seems unlikely that the small mean age difference (0.8 years) between men and women in the sample contributed substantially to the residual anomaly. It is unclear whether this residual anomaly represents overreporting of total partners by men, underreporting by men of the proportion of partners who were female sex workers or other men, underreporting of total partners by women, or a sample bias. Gender-specific reporting bias is of particular concern. It is certainly possible, and perhaps likely, that men overreport and women underreport numbers of sexual partners and that this tendency is exagger-

ated in Peru or in Latin America in general. Attempts to reduce these problems in the present study included survey instrument pretesting, interviewer training and self-coding of the questionnaire, and collection of data concerning sexual behavior not only for the lifetime of the subject but also during the previous year.

The reason that sexual behavior reported by men and women in Lima differs more than in industrialized countries may reflect not only cultural differences in attitudes toward and patterns of sexual behavior but also a relatively lower social status of women in Peru and the lower socioeconomic status of participants in this study. This study sample overrepresented men and women of lower socioeconomic status who work in a range of unskilled jobs and must obtain or renew health certificates, and the sample reflects this job-seeking or employed segment of Lima's population and students seeking university admission. Although the 87% voluntary participation in this study might have resulted in some loss of generalizability (external validity), this would not compromise the internal validity of associations observed between behaviors and infection among participants. The unique availability of objective sexually transmitted infection seroprevalence data further supports the validity of behavioral data: of 110 men and women who denied sexual experience, none had antibody to HSV-2, and only 3 of 95 women had antibody to *C. trachomatis* (2 women) or *T. pallidum* (1 woman).

By concurrently providing survey data on sexual practices and serology on sexually transmitted infection, this study uniquely provides insight into behavioral risk factors for exposure to sexually transmitted infection pathogens, identifying behaviors, and population subgroups important for transmitting infection. The cross-sectional study design could not differentiate between actual age effects and possible cohort effects on the relationship between age and sexually transmitted infection experience.

The relatively and paradoxically low perception of sexually transmitted infection risk among women, as compared with men, may reflect not only their less risky sexual behavior but also the relatively asymptomatic nature of sexually transmitted infections in women and the nonspecificity of any infection-related symptoms that they have experienced (e.g., vulvovaginal discharge), leaving them less aware of their risk of infection.

The rate of spread of sexually transmitted pathogens within a population depends not only on the mean rate of change of sexual partners in the population but also on the variance in the rate of change within the population.²² Sexually transmitted infections spread fastest within populations characterized by widely varying rates of partner change. Subgroups having very high rates of partner change, or "core groups," contribute disproportionately to transmission of sexually transmitted infections.²³ This survey demonstrates with compelling clarity that although women with more than one lifetime partner are at increased risk for sexually transmitted infections in Lima, it is men with large numbers of casual partners, particularly those who repeatedly have sex with female sex workers without using condoms, who serve collectively as the important core group for the transmission of sexually transmitted infection pathogens to the larger population of women. This survey did not directly demonstrate that sexually transmitted disease seroprevalence in women was related to sex with men who also had sex with female sex workers. However, the survey showed that sexually transmitted disease seroprevalence in men was related to unprotected sex with female sex workers, and that 44% of the female partners during the past year who were not sex workers were reported by men who also had sex with female sex workers during the past year. Such men represent an important "bridge population" for spreading infection from female sex workers to other women. Data from the General Social Survey were used to suggest that a subset of men with high numbers of recent partners also contributed disproportionately to the spread of sexually transmitted diseases,³⁴ although sex with female sex workers has been much less common among men in US surveys. In addition, the relatively high proportion of men in this study and in other Latin American surveys who were behaviorally bisexual^{35,36} could put many Latin American women at risk of HIV.³⁶ The British and French surveys and the recent US surveys⁶⁻⁸ showed substantially lower proportions of men who acknowledged sex with other men.

The higher frequency of risky sexual behavior of men, the probably higher efficiency of male-to-female than female-to-male transmission of many sexually transmitted infections, and the tendency for women to have sex with older men (who may have accumulated chronic or

recurrent sexually transmitted infections, such as HSV-2 or HIV) combine to make the per exposure risk of sexually transmitted infection much higher for women than for men in the Latin American setting. Even monogamous women who believe that they are at low risk can incur a substantial risk of sexually transmitted infections.

These results highlight the importance of preventive programs for women to promote delayed onset of sexual activity, awareness of partners' risky sexual behavior, and skills to negotiate condom use with partners. For men, preventive programs should strongly emphasize condom use, especially with female sex workers or casual partners. Although these data cannot be widely generalized, the model for sexually transmitted infection transmission between female sex workers and clients who do not use condoms, and from such men to women having low rates of partner change, can be further explored in studies using sexual behavior surveys in conjunction with serologic testing for sexually transmitted infections. □

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