

HETEROSEXUALLY TRANSMITTED HUMAN IMMUNODEFICIENCY VIRUS INFECTION AMONG PREGNANT WOMEN IN A RURAL FLORIDA COMMUNITY

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Abstract Background. In the United States, an increasing proportion of women infected with the human immunodeficiency virus (HIV) live in nonmetropolitan areas. Little is known, however, about the risk factors for HIV transmission in women outside large cities.

Methods. We interviewed and tested 1082 (99.8 percent) of 1084 consecutive pregnant women who registered for prenatal care at a public health clinic in western Palm Beach County, Florida. This rural agricultural area of about 36,000 people is known to have a high prevalence of HIV infection.

Results. The seroprevalence of HIV was 5.1 percent (52 of 1011 women). Black women who were neither Haitian nor Hispanic had the highest rate of infection (8.3 percent [48 of 575]). Only 4 of 1009 women (0.4 percent) reported ever injecting drugs, and the 4 were HIV-seronegative; however, 14 of 43 users of "crack" cocaine (33 percent) had HIV infection. At prenatal registration, 131 of 983 women (13 percent) tested positive for gonorrhea, chlamydial infection, or syphilis. By multivariate

logistic-regression analysis, HIV infection was found to be independently associated with having used crack cocaine (odds ratio, 3.3; $P < 0.001$), having had more than two sexual partners (odds ratio, 4.6; $P < 0.001$), being black but neither Hispanic nor Haitian (odds ratio, 11; $P < 0.001$), having had sexual intercourse with a high-risk partner (odds ratio, 5.6; $P < 0.001$), and testing positive for syphilis (odds ratio, 3.1; $P = 0.015$). Nevertheless, 11 of the 52 HIV-infected women (21 percent) reported a total of only two to five sexual partners and no known high-risk partners, had never used crack cocaine, and had no positive tests for sexually transmitted disease.

Conclusions. In the rural community we studied, most of the women with HIV infection acquired it through heterosexual contact. The increasing seroprevalence of HIV and the increasing incidence of syphilis and use of crack cocaine mean that other women may be at similar risk of acquiring heterosexually transmitted HIV infection. (N Engl J Med 1992;327:1704-9.)

IN the United States, women account for an increasing number and percentage of the cases of the acquired immunodeficiency syndrome (AIDS) among adults.¹ Data through 1991 indicate that 84 percent of the women with AIDS were of reproductive age (15 to 44 years old), and almost three fourths of them were black (53 percent) or Hispanic (21 percent). Although slightly more than half the cases in women were among users of injection drugs, the proportion in women who reported heterosexual contact with high-risk partners increased from 29 percent in 1986 to 34 percent in 1991. In addition, although most cases among women were reported from metropolitan areas with populations of more than 1 million, the proportion reported from smaller cities and rural areas increased from 22 to 27 percent during the same period (Fleming P, Centers for Disease Control and Prevention: personal communication). Little is known, however, about the risk factors for human immunodeficiency virus (HIV) infection in women in nonmetropolitan communities. This information is needed to understand the evolving epidemic and to develop effective strategies for prevention.

The western portion of Palm Beach County, Flor-

ida, is a rural agricultural area of about 36,000 people, located southeast of Lake Okeechobee. More than half the year-round population are black Americans, and about one quarter are Hispanic.² Each year about 10,000 men from Jamaica and other islands of the West Indies migrate to this area to harvest and process sugar cane between October and March.³ Approximately 8000 other migrant workers, both men and women, come from other parts of the United States to work in the area's sugar-cane and vegetable fields between August and May (Fong M: personal communication).

The prevalence of HIV infection in this community has been estimated through seroepidemiologic studies and AIDS case surveillance.^{4,5} In 1986 a population-based survey of 877 randomly selected adult residents of Belle Glade, the largest of the four towns in western Palm Beach County, found an HIV seroprevalence of 3.6 percent among men and 2.8 percent among women. From July 1982 through December 1991, 472 cases of AIDS and 331 deaths due to AIDS (70 percent of the reported cases) were reported from western Palm Beach County; 136 (30 percent) of the 448 cases of AIDS in adults occurred among women.

Because of the high seroprevalence of HIV in western Palm Beach County, the Florida State Department of Health and Rehabilitative Services, the Palm Beach County Public Health Unit, and the Centers for Disease Control and Prevention began a collaborative project in 1987 to establish HIV-prevention programs and to study both risky behavior and the success of these programs in preventing further transmission of the virus. As part of this project, we examined demographic and behavioral

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risk factors for HIV infection among pregnant women attending a local prenatal clinic.

METHODS

All pregnant women who registered for prenatal care at the main public health clinic in western Palm Beach County between May 17, 1989, and July 31, 1991, were eligible for this cross-sectional study. During registration, each prenatal patient was offered confidential counseling and testing for HIV infection. The women were also asked if they would like to participate in this study. Those who volunteered and signed a consent form were interviewed by a counselor using a standardized form and were then tested for HIV. The half-hour interview was incorporated into the registration for prenatal care and included questions about sociodemographic characteristics, obstetrical history, knowledge about AIDS, sexual and contraceptive practices, and drug use. Information obtained during the interview was used to tailor the counseling to the patient. Two weeks after counseling and testing, each woman received her HIV serologic results confidentially, along with further counseling. If a counselor was not available when a woman registered for prenatal care, a counselor contacted her shortly after registration to offer HIV counseling and testing and to ask about study participation.

After the women were enrolled in the study, their clinic charts were reviewed for the results of tests for syphilis, gonorrhea, and chlamydial infection performed at registration and during the previous five years. Serologic testing for syphilis included the rapid-plasma-reagin test and the microhemagglutination assay for *Treponema pallidum*. Women were considered to have serologic evidence of syphilis if both the rapid-plasma-reagin test and the microhemagglutination assay were positive. *Neisseria gonorrhoeae* was cultured on a modified Martin-Lewis medium, and *Chlamydia trachomatis* antigen was identified by enzyme immunoassay (Abbott, Chicago). The clinic charts of the women enrolled in the study were also reviewed for the results of urinary drug screening, which was undertaken for almost all the prenatal care patients attending the clinic between January 1, 1990, and July 31, 1991, as part of another study and as part of routine clinical care. This screening included tests for amphetamines, barbiturates, and metabolites of cocaine, marijuana, and opiates.

The data included in this report relate to HIV type 1 (HIV-1) infection. Serologic tests for HIV were performed at the Miami Branch Laboratory of the Department of Health and Rehabilitative Services. All serum samples were tested for HIV-1 antibody by an enzyme immunoassay (Abbott). Positive results on enzyme immunoassay were confirmed with either indirect immunofluorescence (Virion, Morristown, N.J.) or Western blotting (Dupont, Wilmington, Del., and Biorad, Hercules, Calif.) for HIV-1. A positive result on Western blotting was defined as the presence of at least three bands reactive to the core protein (p24), polymerase protein (p31), or envelope proteins (gp41 and gp120/160) of HIV-1.

Statistical associations between HIV seropositivity and categorical variables were tested by either Pearson's chi-square test or Fisher's exact test. Associations with continuous variables were analyzed by the Wilcoxon rank-sum test. Variables that were significantly associated with HIV infection on univariate analysis were then analyzed with stepwise logistic-regression models.

RESULTS

From May 1989 through July 1991, 1082 (99.8 percent) of 1084 consecutive women registering for prenatal care consented to participate in this study. Of these 1082 women, 1052 (97 percent) were enrolled in the study at registration for prenatal care, and the remaining 30 (2.8 percent) were enrolled later during pregnancy. Information from the second enrollment of 46 women (4.3 percent) who were pregnant twice during the study was not included. Also, the results of HIV testing were not available for 25 study participants at the time of this analysis. Thus, information

from 1011 women who registered for the first time during the study period and whose test results were available was analyzed for this report.

All but 6.1 percent of the women were black, Hispanic, or of Haitian descent (Table 1). Almost 70 percent were 25 years of age or younger. About two thirds were born in the United States, and another 20 percent in Mexico; almost 85 percent had lived in the community for at least the previous year. In addition, almost 70 percent had completed fewer than 12 years of school, and 84 percent were unemployed at the time of the interview. Of the 863 women who knew their incomes, 794 (92 percent) were members of households with annual incomes of less than \$10,000.

The overall HIV seroprevalence was 5.1 percent (52 of 1011 women). Black women who were neither Hispanic nor Haitian had the highest rate of infection (8.3 percent [48 of 575]) (Table 1). Most (58 percent) of the HIV-infected women were 25 years of age or younger. Women born in the United States were more likely to be infected than those born in Haiti, Mexico, or another country. Also, increasing HIV prevalence was associated with increasing duration of residence in the community.

Almost 90 percent of the women knew that HIV

Table 1. Demographic Characteristics of Women Attending a Prenatal Clinic, According to HIV Status.

CHARACTERISTIC	WOMEN IN CATEGORY	HIV-SERO-POSITIVE WOMEN	P VALUE
	number (percent)		
Race or ethnic group (n = 1008)*			
White, non-Hispanic	56 (5.6)	0	
Black, non-Hispanic	575 (57.0)	48 (8.3)	<0.001†
Hispanic	319 (31.6)	2 (0.6)	
Haitian	53 (5.3)	2 (3.8)	
Other	5 (0.5)	0	
Age — yr (n = 1007)			
≤19	383 (33.6)	11 (3.3)	
20–24	305 (30.3)	13 (4.3)	0.016‡
25–29	188 (18.7)	17 (9.0)	
≥30	176 (17.5)	11 (6.2)	
Place of birth (n = 997)			
United States	682 (68.4)	48 (7.0)	<0.001†
Mexico	197 (19.8)	1 (0.5)	
Haiti	69 (6.9)	2 (2.9)	
Other	49 (4.9)	0	
Residence in community — yr (n = 999)			
<1	158 (15.8)	5 (3.2)	
1–5	204 (20.4)	5 (2.5)	<0.001‡
6–15	220 (22.0)	10 (4.5)	
≥16	417 (41.7)	32 (7.7)	
Marital status (n = 1007)			
Currently married	295 (29.3)	3 (1.0)	<0.001†
Single, never lived with man	367 (36.4)	16 (4.4)	
Single, has lived with man	267 (26.5)	24 (9.0)	
Separated, divorced, or widowed	78 (7.7)	9 (11.5)	
No. of pregnancies (n = 1003)			
1	317 (31.6)	8 (2.5)	0.002‡
2 or 3	380 (37.9)	22 (5.8)	
4 or 5	206 (20.5)	11 (5.3)	
≥6	100 (10.0)	10 (10.0)	

*There were missing responses in some categories. The category "Black, non-Hispanic" does not include women who identified themselves as Haitian.

†By Pearson's chi-square test for heterogeneity.

‡By the Wilcoxon rank-sum test for trend in the prevalence of HIV antibodies.

transmission could occur through sexual contact, by sharing needles, or during pregnancy. Only 5 percent thought that HIV could be transmitted by casual contact. Infected and uninfected women did not differ significantly in their knowledge and attitudes about HIV infection.

One fourth of the women reported having sexual intercourse before 15 years of age (Table 2). The median length of the sexually active period was five years. The prevalence of HIV infection increased steadily with decreasing age at first sexual intercourse and with increasing length of the sexually active period and increasing number of sexual partners (Table 2). The median age at first sexual intercourse was 15 years among the women with HIV infection, as compared with 16 years among the uninfected women ($P < 0.001$). The mean and median numbers of sexual partners the women had had were 27 and 5, respectively, for HIV-seropositive women and 5 and 2 for HIV-seronegative women ($P < 0.001$); however, the seropositive women were significantly older than the seronegative women (median age, 25 vs. 22 years; $P = 0.016$). Although women who reported having exchanged sex for drugs or money were more likely to have HIV infection than those who did not, only 24 (2.4 percent) of the 1011 women reported this type of behavior.

Almost 60 percent of the women had used birth-control pills for contraception (Table 2), and about 50 percent had used condoms, 8 percent the withdrawal method, 8 percent spermicide, and 4 percent intra-

uterine devices. HIV infection was not associated with any of these contraceptive methods, except condoms. As compared with uninfected women, women with HIV infection were more likely to have used condoms ($P = 0.004$), but only 1 (2.8 percent) of the 36 HIV-infected women who reported using condoms had used them during 80 percent or more of sexual contacts. Furthermore, for users of oral contraceptives HIV infection was not related to duration of use.

Approximately 14 percent of the women reported having used an illicit drug, including 137 (14 percent) who had used marijuana, 43 (4.3 percent) who had used "crack" cocaine, and 5 (<1 percent) who had used heroin (Table 3). Only one of the five women who had used heroin and none of the four who had injected drugs had HIV infection. However, one third of the 43 women who had used crack cocaine were infected. In addition, 49 percent (21 of 43) of the users of crack cocaine had exchanged sex for money or drugs, and 42 percent (18 of 43) had a history of vulvar lesions, as compared with less than 1 percent and 5 percent, respectively, of those who had never used crack cocaine. Of the 24 women who had exchanged sex for money or drugs, 21 (88 percent) were users of crack cocaine. The mean and median numbers of sexual partners these 21 women had had were 119 and 50, respectively, and the range was 10 to 800.

Of the 52 women with HIV infection, 34 (65 percent) had one or more of the following characteristics: more than five sexual partners altogether (23 women), more than two sexual partners per year of sexual activity (8), a history of exchanging sex for money or drugs (7), sexual contact with a high-risk partner (23), and use of crack cocaine (14). In addition, one infected woman had a history of transfusion between 1977 and March 1985. The remaining 17 HIV-infected women (33 percent) reported that they had had two to five sexual partners, but also reported never having exchanged sex for money or drugs, never having had sexual contact with a partner known to be at high risk, and never having used crack cocaine.

At prenatal registration, HIV-seropositive women were approximately three times more likely to test positive for *N. gonorrhoeae*, *C. trachomatis*, or syphilis than HIV-seronegative women (Table 4). In addition, when the results of prenatal tests and tests performed during the previous five years were combined, almost half the HIV-infected women (49 percent) tested positive for one or more of the three diseases, as compared with about one fifth (19 percent) of the uninfected women.

At prenatal registration, the 43 women who reported having used crack cocaine were seven times more likely to be positive for gonorrhea (11 percent vs. 1.5 percent, $P = 0.004$) and five times more likely to be positive for syphilis (21 percent vs. 4.2 percent, $P < 0.001$) than those who reported never having used crack cocaine. During prenatal registration and during the previous five years, 44 percent of the crack users were positive on one or more of the tests (gonor-

Table 2. Sexual Behavior of Women Attending a Prenatal Clinic, According to HIV Status.

VARIABLE	WOMEN IN CATEGORY		HIV-SERO-POSITIVE WOMEN	P VALUE
	number (percent)			
Age at first sexual intercourse — yr (n = 1008)				
≤13	128 (12.7)	14 (10.9)		
14-16	478 (47.4)	25 (5.2)		<0.001*
17-19	280 (27.8)	12 (4.3)		
≥20	122 (12.1)	1 (0.8)		
No. of sexual partners (n = 1010)				
1	363 (35.9)	1 (0.3)		<0.001*
2	174 (17.2)	6 (3.4)		
3	145 (14.4)	7 (4.8)		
4	94 (9.3)	9 (9.6)		
≥5	234 (23.2)	29 (12.4)		
No. of men who fathered children (n = 644)				
1	307 (47.7)	7 (2.3)		<0.001†
2	248 (38.5)	20 (8.1)		
≥3	89 (13.8)	12 (13.5)		
Ever exchanged sex for drugs or money (n = 1010)				
Yes	24 (2.4)	7 (29.2)		<0.001‡
No	986 (97.6)	45 (4.6)		
Ever used oral contraceptives (n = 990)				
Yes	588 (59.4)	30 (5.1)		0.797‡
No	402 (40.6)	22 (5.5)		

*By the Wilcoxon rank-sum test for trend in the prevalence of HIV antibodies.

†By Pearson's chi-square test for heterogeneity.

‡By Fisher's exact test.

Table 3. Risk Factors among Women Attending a Prenatal Clinic, According to HIV Status.*

RISK FACTOR	WOMEN IN	HIV-SERO-	P VALUE†
	CATEGORY	POSITIVE WOMEN	
	number (percent)		
HIV-infected sexual partner (n = 969)‡			
Yes	17 (1.8)	16 (94.1)	<0.001
No	952 (98.2)	33 (3.5)	
Sexual partner from pattern II country (n = 1011)§			
Yes	98 (9.7)	9 (9.2)	0.056
No	913 (90.3)	43 (4.7)	
History of vulvar lesion (n = 1009)			
Yes	64 (6.3)	8 (12.5)	0.014
No	945 (93.7)	44 (4.7)	
Use of crack cocaine (n = 1008)			
Yes	43 (4.3)	14 (32.6)	<0.001
No	965 (95.7)	37 (3.8)	
Use of intravenous drugs (n = 1009)			
Yes	4 (0.4)		0.809
No	1005 (99.6)	52 (5.2)	
History of transfusion (n = 1008)			
Yes	21 (2.1)	3 (14.3)	0.089
No	987 (97.9)	49 (5.0)	

*In addition to the risk factors shown, 4 women, including 1 who was HIV-seropositive, had had a bisexual partner, and 16, including 2 who were HIV-seropositive, had had a sexual partner who had injected drugs.

†By Fisher's exact test.

‡Of the 17 HIV-infected women with known infected partners, 16 had tested positive for HIV before enrollment in this study.

§Pattern II countries are those in which most reported cases of HIV infection are among heterosexuals and the male-to-female ratio is approximately 1 to 1.

rheal culture, chlamydial-antigen test, and syphilis serologic test), as compared with 20 percent of all other women ($P < 0.001$).

Of the 17 HIV-seropositive women who had had two to five sexual partners, never exchanged sex for money or drugs, had no sexual contact with a partner known to be at high risk, and never used crack cocaine, 6 (35 percent) tested positive for at least one of these three sexually transmitted diseases during prenatal registration or the previous five years, but the remaining 11 (65 percent) had no positive tests.

From January 1990 to July 1991, 606 (84 percent) of 724 women were screened for drugs during prenatal registration. Of these 606 women, 27 (4.5 percent) tested positive: 14 (2.3 percent) for marijuana, 11 (1.8 percent) for cocaine, 2 (0.3 percent) for benzodiazepines, and 1 (0.2 percent) for barbiturates. Four (36 percent) of the 11 women who tested positive for cocaine denied having used the drug, and 5 (36 percent) of the 14 women who tested positive for marijuana denied having used marijuana.

By multivariate logistic-regression analysis, the five independent predictors of HIV infection in these women were having used crack cocaine (odds ratio, 3.3; $P < 0.001$), having had more than two sexual partners (odds ratio, 4.6; $P < 0.001$), being black but neither Hispanic nor Haitian (odds ratio, 11; $P < 0.001$),

having had sexual intercourse with a high-risk partner (odds ratio, 5.6; $P < 0.001$), and testing positive for syphilis in the prenatal examination (odds ratio, 3.1; $P = 0.015$) (Table 5).

DISCUSSION

In this study, 52 (5.1 percent) of 1011 pregnant women attending a rural public health clinic in Florida had HIV infection. Epidemiologic evidence suggests that most of these women were infected through heterosexual contact. By univariate analysis, several factors were significantly associated with HIV infection, including age at first sexual intercourse, duration of sexual activity, number of sexual partners, number of pregnancies, sex with an HIV-infected partner, and history of a vulvar lesion. In contrast, other known risk factors for HIV infection, such as the use of injection drugs and a history of transfusion between 1977 and March 1985, were infrequently reported and not significantly associated with HIV infection.

AIDS surveillance data suggest that heterosexual contact has recently become the principal mode of HIV transmission among adults in this community. Before 1989, 49 (64 percent) of the 77 women given a diagnosis of AIDS in western Palm Beach County reported having used intravenous drugs, and 16 (21 percent) reported sexual contact with a high-risk partner. In contrast, from 1989 to 1991 only 19 (32 percent) of the 59 women given a diagnosis of AIDS in this community reported injecting drugs, whereas 36 (61 percent) reported high-risk sexual contact.

Several recent trends suggest that women of reproductive age in other nonmetropolitan communities may also be at increased risk for HIV infection. A

Table 4. Positive Test Results for Selected Sexually Transmitted Diseases among Women Attending a Prenatal Clinic, According to HIV Status.

TEST*	HIV-SERO-POSITIVE WOMEN (N = 52)	HIV-SERO-NEGATIVE WOMEN (N = 959)	P VALUE
	no. positive/no. tested (%)		
Prenatal			
<i>N. gonorrhoeae</i> culture	3/43 (7)	14/839 (2)	0.046
Chlamydia immunoassay	7/36 (19)	71/769 (9)	0.051
RPR and MHA-TP	11/47 (23)	36/914 (4)	<0.001
Any STD test†	19/51 (37)	112/932 (12)	<0.001
Previous 5 yr			
<i>N. gonorrhoeae</i> culture	8/31 (26)	51/438 (12)	0.029
Chlamydia immunoassay	4/11 (36)	31/188 (17)	0.106
RPR and MHA-TP	4/24 (17)	22/442 (5)	0.038
Prenatal and previous 5 yr			
<i>N. gonorrhoeae</i> culture	10/46 (22)	64/881 (7)	0.002
Chlamydia immunoassay	11/36 (31)	98/799 (12)	0.004
RPR and MHA-TP	11/48 (23)	48/925 (5)	<0.001
Any STD test†	25/51 (49)	183/940 (19)	<0.001

*RPR indicates rapid-plasma-reagin test, MHA-TP microhemagglutination assay for *T. pallidum*, and STD sexually transmitted disease.

†The denominator for this category includes women who had a culture for *N. gonorrhoeae*, an enzyme immunoassay for *C. trachomatis* antigen, or a rapid-plasma-reagin test and microhemagglutination assay for *T. pallidum*, and the numerator is the number of these women who tested positive for one or more of the three tests.

Table 5. Factors Associated with HIV Infection among 1011 Women Attending a Prenatal Clinic.*

RISK FACTOR	MULTIVARIATE ODDS	
	PREVALENCE	RATIO (95% CI)
	%	
Use of crack cocaine	4	3.3 (1.3-7.9)
More than 2 sexual partners	47	4.6 (1.6-14)
Black, neither Hispanic nor Haitian	57	1.1 (2.6-50)†
Sexual intercourse with high-risk partner	12	5.6 (2.7-11)
Positive prenatal RPR and MHA-TP	5	3.1 (1.3-7.3)

*All predictor variables are dichotomous. CI denotes confidence interval, RPR rapid-plasma-reagin test, and MHA-TP microhemagglutination assay for *T. pallidum*. The following variables were evaluated but were not significant predictors in the stepwise logistic-regression model ($P > 0.05$): age; marital status; place of birth; gravidity; employment; age at first sexual intercourse; vulvar lesion; payment for sex; length of sexual activity; frequency of sexual intercourse; number of cohabitating relationships; length of residence in community; marijuana use; history of transfusion; results of any of the three prenatal tests for sexually transmitted disease; and results of tests performed at prenatal registration and during the previous five years, including tests for *N. gonorrhoeae* and *C. trachomatis*, the rapid-plasma-reagin test, the microhemagglutination assay, and tests for any of these three sexually transmitted diseases.

†The upper limit of the 95 percent confidence interval was increased because data on two of the four HIV-infected nonblack women were excluded from the multiple regression analysis because they were incomplete.

relatively high seroprevalence of HIV in childbearing women has been reported in rural areas in several states.⁶ Among black childbearing women who lived in rural areas in 1989, slightly more than 10 per 1000 had HIV infection in New York, about 7 per 1000 in Connecticut and Florida, and 3.5 per 1000 in South Carolina. In addition, crack-cocaine use has increased in some communities outside large metropolitan areas.⁷ Furthermore, between 1985 and 1989 the incidence of primary and secondary syphilis in the United States increased 61 percent, from 11.4 to 18.4 cases per 100,000 persons.⁸ In many areas, the increase was largest in cities, but in Georgia the 91 percent increase in Atlanta (from 108.1 to 206.7 cases per 100,000) was overshadowed by a 214 percent increase in the rest of the state (from 13.9 to 43.6 cases per 100,000). During the same five-year period, the incidence of syphilis among black women in the United States increased 176 percent, from 35.8 to 98.7 cases per 100,000.

In this and several other studies, a history of multiple sexual partners was an independent predictor of HIV infection in women.⁹⁻¹¹ However, about one fifth (21 percent) of the HIV-infected women in this study had sexual histories that were unremarkable as compared with those of other groups of women in the United States. In 1988 and 1989, surveys of national samples of adults found that the mean number of sexual partners for women was 3.3.¹² In a study of the sexual behavior of college women in 1989, 52 percent reported having had two to five sexual partners, and 21 percent reported six or more partners.¹³ In a study of women attending family-planning clinics in 1987, 13 percent reported three or more sexual partners in the preceding year, 12 percent a history of a sexually

transmitted disease, and 6 percent a high-risk partner.¹⁴ These studies suggest that in communities with a high seroprevalence of HIV, like this Florida community, a sizable proportion of all women of reproductive age are at high risk for infection through heterosexual transmission.

In this study, a positive serologic test for syphilis was independently associated with HIV infection. Gonorrhea and chlamydial infections were not significantly associated with HIV infection in the multivariate analysis. In contrast, a study of HIV seroconversion among prostitutes in Nairobi, Kenya, found that HIV infection was independently associated with genital ulcers, most probably due to *Haemophilus ducreyi*, and with chlamydial infections, but not with serologic evidence of syphilis.¹⁵ In another study of prostitutes in Kinshasa, Zaire, HIV seroconversion was associated with gonorrhea, chlamydial infections, and trichomonas, but not with genital ulcers, in the multivariate analysis.¹⁶ These studies suggest that sexually transmitted diseases are risk factors for HIV infection in women, but the association of each of these diseases with HIV infection is not well defined.

Crack cocaine is probably associated with HIV infection because crack users are more likely to have unprotected heterosexual contact with persons with HIV infection, other sexually transmitted diseases, or both.^{10,17-21} In this study, crack users had significantly more sexual partners and were more likely to have exchanged sex for money or drugs and to test positive for a sexually transmitted disease than women who had not used crack. Marijuana use was also associated with these risk factors, but its association was not as strong as that of crack-cocaine use.

Information about the association between HIV infection and the use of oral contraceptives is inconsistent. In the study of Nairobi prostitutes the use of oral contraceptives was independently associated with an increased risk of HIV seroconversion.¹⁵ In contrast, the study of prostitutes in Zaire, a study of women attending family-planning clinics in Nairobi, and a study of U.S. prostitutes found no association between HIV infection and the use of oral contraceptives.^{16,22,23} In addition, an Italian study of the female sexual partners of HIV-infected men suggested that women who use oral contraceptives may have less risk of infection than those who do not use this method.²⁴ In the present study, HIV infection was not associated with having used oral contraceptives and was not related to the duration of use.

The role of migrant farmworkers in the epidemic in western Palm Beach County in the early 1980s is unknown, since information from the period is limited. The prevalence of HIV infection in the migrant farmworkers is probably relatively low, however, because annually since 1985 the Jamaican Ministry of Health has tested the 8000 or more men who apply to work in southern Florida as sugar-cane cutters. Only about 0.1 percent of these men have been found to be infect-

ed, and they are not permitted to migrate to the United States (Figueroa P: personal communication). In addition, a study of HIV infection among U.S. migrant farmworkers suggests that seroprevalence is probably less than 1 percent among the other seasonal workers in the sugar-cane and vegetable fields of western Palm Beach County.²⁵

This study provides information for developing prevention strategies in this and similar communities. Sexually active persons in high-prevalence communities should be encouraged to use condoms during every sexual encounter, even in steady, long-term relationships, unless both partners have tested negative for HIV antibody and remain monogamous. Adolescents should be educated about HIV infection and other sexually transmitted diseases before sexual activity begins. Women of reproductive age in these communities should be offered counseling and testing for HIV infection and other sexually transmitted diseases. Drug rehabilitation programs should also be made available to people who have used cocaine. Furthermore, partner notification should be an integral part of prevention programs for sexually transmitted diseases, including HIV infection. Finally, educational programs should emphasize how HIV is transmitted in the community and how each person can help prevent further transmission.

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