

# A Case-Control Study of Factors Associated with HIV Infection among Black Women

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**Objective:** To identify social, behavioral and epidemiologic factors associated with HIV infection among HIV-infected and HIV-uninfected black women residing in North Carolina.

**Design:** A case-control study conducted in August 2004 in North Carolina.

**Methods:** Cases were 18–40-year-old women with HIV infections diagnosed from 2003–2004. Controls were 18–40-year-old, HIV-negative heterosexually active women recruited from HIV testing sites. Five focus group discussions were also conducted with women not participating in the case-control study.

**Results:** Multivariate analyses of 31 cases and 101 controls showed that HIV-positive women were more likely to receive public assistance [adjusted odds ratio (aOR) 7.3; 95% confidence interval (CI) 2.1, 26.0], to report a history of genital herpes infection (aOR 10.6; 95% CI 2.4, 47.2), and were less likely to have discussed a variety of sexual and behavioral issues relevant to risk of HIV infection with their male partners (aOR 0.6; 95% CI 0.4, 0.8). Focus group participants indicated that financial and social demands created competing challenges for making HIV prevention a priority.

**Conclusions:** Inadequate communication between black women and their sexual partners may create barriers to sexual and behavioral risk reduction. A multidimensional approach that addresses both biological factors such as herpes infection and socioeconomic factors may be needed to reduce HIV transmission in this population.

**Key words:** HIV transmission ■ black women ■ herpes

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## INTRODUCTION

The human immunodeficiency virus (HIV) epidemic in the United States increasingly affects black women.<sup>1,2</sup> During 2000–2003, women accounted for 28% of new HIV/AIDS diagnoses, 69% of which were among non-Hispanic black women.<sup>1</sup> Heterosexual transmission now surpasses injection drug use as the most commonly reported mode of transmission among U.S. women.<sup>1</sup> Furthermore, surveillance data indicate that the proportion of newly diagnosed HIV infections among black women is growing in the southern region of the United States.<sup>3</sup> Among 18–40-year-old women in North Carolina in 2003, the HIV infection rate for black women was 14 times higher than that for white women (Figure 1).<sup>4</sup> Few epidemiologic studies have investigated risk factors for HIV transmission among black women in the United States, and even fewer studies have been conducted among black women in the south. In August 2004, the North Carolina Department of Health (NCDOH) invited the Centers for Disease Control and Prevention (CDC) to assist in an epidemiologic investigation among black women in North Carolina with a recent diagnosis of HIV infection to evaluate risk factors for transmission. We conducted a case-control study to examine the epidemiologic, behavioral and social differences between HIV-positive women (cases) and HIV-negative women (controls). The results of our investigation underscore the need for a multidimensional approach to reduce HIV infection among sexually active black women.

## METHODS

### Sampling

We reviewed NCDOH HIV surveillance data from 1998–2004 to help characterize trends in the HIV epidemic in North Carolina. We also reviewed contact tracing records that North Carolina disease intervention specialists (NCDIS) use to track partners of HIV-infected persons. For sexually transmitted disease and HIV surveillance, NCDOH categorizes the state into seven regions.<sup>4</sup> We recruited study participants from the two regions that accounted for most of the reported HIV cases among women in North Carolina. Cases and controls were 18–40-year-old black women self-identified as heterosexual, residing in the cities of Raleigh, Durham and Charlotte and surrounding rural areas. Cases were women receiving a diagnosis of HIV infection between January 2003 and August 2004. Controls were HIV negative and were tested for HIV infection between August and October 2004 at community HIV testing sites. We also attempted to interview the HIV-positive male sexual partners of cases to assess male partner risk and similarities or differences in male-female perceptions about the relationship. We recruited approximately three controls for each case.

During the same study period, we conducted focus group discussions with black women not participating in the case-control study to help discern perceptions about HIV risks and about barriers to sexual risk reduction among black women. Community-based organizations (CBOs) in Raleigh, Durham and Charlotte assisted in selecting eligible participants for focus group discussions on selected HIV-related topics. Criterion-based purposeful sampling was used to select focus group participants who could provide in-depth information about the topics of interest. This investigation occurred in the context of an emergency public health action and was exempted from institutional review board approval. All

participants were apprised of the purpose of the investigation. Informed consent was obtained from all participants, and participation was voluntary.

### DATA COLLECTION

Trained interviewers used standardized questionnaires to collect epidemiologic, behavioral, socioeconomic and demographic data for the 12-month period preceding either the date of diagnosis for the cases and for their male partners, or the date of interview for the controls. The questionnaire elicited information about sexual behaviors, HIV risk behaviors, drug use, sexually transmitted disease (STD) history and level of communication with sexual partners. At the conclusion of the interview, open-ended questions were asked to obtain study participants' opinions about behaviors that place black women at risk for HIV infection and to solicit recommendations for reducing HIV transmission among black women in North Carolina.

Focus groups were composed of female college students (unknown HIV status) aged 18–24 (one group), HIV-positive women aged 18–24 and 25–40 (two groups), and HIV-negative women aged 18–24 and 25–40 (two groups). Focus group discussions lasted approximately 90 minutes, and were audiotaped and transcribed verbatim. Led by the same moderator, all of the focus group discussions used an open-ended discussion guide that covered three domains of inquiry: relationship expectations and communication between men and women; facilitators and barriers to safe sexual practices; and attitudes toward HIV testing, including its perceived impact on relationships with sexual partners.

### DATA ANALYSIS

Dichotomous variables were analyzed by using the Chi-squared test or Fisher's exact test. Continuous variables were analyzed by using Student's t test. Associations in univariate analysis significant to  $p \leq 0.10$  were

**Table 1. Social characteristics of HIV-positive and HIV-negative young black women—North Carolina, 2003–2004**

	HIV-Positive Women (n=31) Number (%)	HIV-Negative Women (n=101) Number (%)	p	Univariate Analyses OR (95% CI)
Unemployed*	22 (71)	38 (38)	<b>&lt;0.01</b>	<b>4.0 (1.7, 10.0)</b>
Receiving Public Assistance*	24 (77)	52 (51)	<b>0.01</b>	<b>3.2 (1.3, 8.2)</b>
Substance Use in Past 12 Months				
Alcohol	21 (68)	72 (71)	0.70	0.8 (0.4, 2.0)
Marijuana	14 (45)	41 (41)	0.65	1.2 (0.5, 2.7)
Cocaine/crack*	5 (16)	5 (5)	<b>0.05</b>	<b>3.7 (1.0, 13.7)</b>
Receipt of Money, Drugs, Gifts or Shelter for Sex* <sup>11</sup> (36)		15 (15)	<b>0.01</b>	<b>3.2 (1.3, 7.9)</b>
History of Male Partner Incarceration*	25 (81)	60 (59)	<b>0.04</b>	<b>2.8 (1.1, 7.6)</b>
Suspicion of Male Partner Bisexual Activity*	11 (37)	21 (21)	0.09	2.2 (0.9, 5.2)

\* Included in multivariate model

included in a multivariate stepwise logistic regression model. Associations with  $p \leq 0.05$  in multivariable analysis were considered significant. Multivariable models using forward-selection and backward-elimination stepwise techniques resulted in the same set of significant correlates. All data were analyzed by using SAS (version 8; Cary, NC). Focus group discussions were coded and analyzed to identify themes by using AnSWR: Analysis Software for Word-based Records.<sup>5</sup>

**RESULTS**

From January 2003 to August 2004, 208 HIV infections were reported to the NCDOH from among 18–40-year-old black women residing in the Raleigh and Charlotte regions. Of these 208 potential cases, 97 (47%) were excluded: 63 had received an HIV diagnosis before 2003, 13 could not be located by NCDIS, 12 received a diagnosis outside the state, five were deceased and four were too ill to be interviewed. Of the remaining 111 women, 31 (28%) agreed to participate in the study, 58 (52%) could no longer be located or did not respond to inquiries and 22 (20%) refused participation. A total of 101 controls were recruited from HIV testing sites at local health departments and medical clinics (n=87), at an apartment complex (n=9), at a pharmacy (n=3) and at a church (n=2). Seven (23%) cases reported learning they were HIV infected during prenatal screening.

Among the 31 cases, 15 (48%) identified a male sexual partner whom she believed was the likely source of her HIV infection and who was confirmed HIV positive according to NCDIS records. Of these male partners, six (40%) were located and agreed to be interviewed. Of the 16 remaining women, nine (56%) had partners who were never located, five (31%) had partners who refused HIV testing and two (12%) had unknown partners.

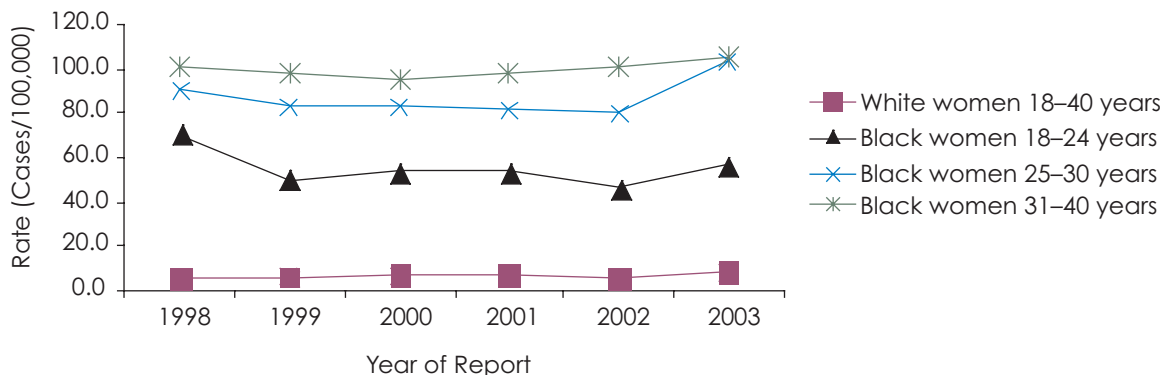
Characteristics of cases and controls are described in the tables. In both groups, the median age was 27, and most participants were unmarried and had monthly incomes of

<\$900/month. There were no significant differences in the median age of sexual debut, the median number of pregnancies and the frequencies of: 1) having had any STD diagnosed  $\geq 1$  during their lifetime, 2) having unprotected vaginal intercourse, or 3) undergoing previous HIV testing. Although 25 (81%) cases and 86 (88%) controls had been tested previously for HIV infection and most had a history of an STD, the majority [18 (58%) cases and 72 (71%) controls] felt they were unlikely or very unlikely to contract HIV. Most participants [28 (90%) cases and 96 (95%) controls] reported that they were likely or very likely to discuss willingness to use condoms with their partner; 12 (39%) cases and 38 (38%) controls asked a man to use a condom all the time during sex. Thirteen (42%) cases and 29 (29%) controls reported ever being forced or frightened into sex.

In the univariate analysis, cases were significantly more likely than controls to be unemployed; to be receiving public assistance [e.g., Women, Infants and Children program (WIC); food stamps; Social Security income]; to have had  $\geq 20$  lifetime sexual partners; to have reported a history of genital herpes infection or pelvic inflammatory disease (PID) during their lifetime; to have used crack/cocaine; to have received money, shelter or drugs in exchange for sex; and to have had  $\geq 1$  male sexual partner with a history of incarceration. Cases were significantly less likely than controls to have discussed sexual and behavioral history issues with their male partners. Sexual and behavioral history issues included a discussion of either the cases' or their partners': 1) number of past sexual partners, 2) number of current sexual partners, 3) HIV status, 4) STD history, 5) drug use history, and 6) incarceration history.

In the multivariate analysis, three associations remained statistically significant. Cases were more likely to be receiving public assistance (aOR 7.3; 95% CI 2.1, 26.0), were more likely to have had a history of genital herpes infection during their lifetime (aOR 10.6; 95% CI 2.4, 47.2), and were less likely to have discussed a variety of sexual and behavioral history issues

**Figure 1. Rates of HIV infection among black and white women by age—North Carolina, 1998–2003**



with their male partners (aOR 0.6; 95% CI 0.4, 0.8).

According to NCDIS records, three of the six male partners who agreed to an interview had been previously named by another male as a sexual partner; however, during the interview, only one reported male-to-male sexual contact activity. None of the male partners interviewed reported injection drug use. Twenty-two (71%) of the HIV-positive women thought they were infected by a steady partner. The most common reason given for not using condoms with that partner was that they trusted him. Only one-third of the HIV-positive women characterized the relationship with their steady partner as mutually monogamous.

The most frequent responses study participants provided to open-ended questions on the questionnaire to explain why black women engage in behaviors that place them at risk for HIV infection were low self-esteem (22%), alcohol and drug use (20%), a feeling of invincibility (18%), and financial dependence on male sexual partners (14%). The most frequent strategies study participants proposed to reduce HIV transmission among black women in North Carolina included increasing HIV education and awareness (64%); introducing HIV and STD educational activities in elementary and middle schools (38%); increasing condom availability and usage (17%); and integrating culturally appropriate, focused HIV education and prevention messages into media and popular culture (13%). Similar

responses at comparable frequencies were collected during the focus group interviews.

Thirty-two women participated in five focus group discussions. With the exception of the group of HIV-positive women aged 26–40 years, focus group participants indicated that a lack of concern for oneself contributed to HIV infection among black women. Focus group participants reported that the most common factors leading black women to ignore or compromise safe sex practices were: 1) having low self-esteem; 2) seeking validation, love and confirmation about their desirability; and 3) wanting to please a man. Women in the 18–26-year-old focus groups also reported that an additional factor was an inability to believe that HIV infection was something that could happen to them. Focus group participants reported that women's financial dependence on male sexual partners to help provide basic needs for themselves and their children makes it difficult to insist on fidelity, condom use and testing for HIV infection. They related that these competing financial and social demands created challenges for making prevention of HIV infection and other health-related issues a high priority.

Focus group participants also indicated that prevention messages and activities need to reach youth before initiation of sexual activity. Participants suggested that in addition to using media and popular culture to educate youth, emphasis should be placed on illustrating

**Table 2. Sexual/behavioral characteristics of HIV-positive and HIV-negative young black women—North Carolina, 2003–2004**

	HIV-Positive Women (n=31) No. (%)	HIV-Negative Women (n=101) No. (%)	p	Univariate Analyses OR (95% CI)
Mean (Median; Range) Age at Sexual Debut* (Years)	14.5 (14.0; 6–21)	15.5 (16.0; 5–22)	0.10	—
Lifetime Sexual Partners				
≤5	8 (26)	48 (48)	referent	referent
6–19	11 (35)	34 (34)	0.20	1.9 (0.7, 5.3)
≥20*	12 (39)	19 (19)	<b>0.01</b>	<b>3.8 (1.3, 10.7)</b>
Type of Sexual Activity in Past 12 Months				
Unprotected vaginal sex*	30 (97)	83 (83)	0.07	6.5 (0.8, 50.9)
Unprotected oral sex	21 (68)	58 (57)	0.31	1.6 (0.7, 3.6)
Unprotected anal sex	6 (19)	13 (13)	0.37	1.6 (0.6, 4.7)
Sex during Menses	9 (29)	24 (24)	0.55	1.3 (0.5, 3.2)
Lifetime History of Sexually Transmitted Disease (STD)				
Any STD	23 (74)	65 (64)	0.31	1.6 (0.6, 3.9)
Herpes*	9 (29)	6 (6)	<b>&lt;0.01</b>	<b>6.8 (2.2, 21.1)</b>
PID*	6 (19)	6 (6)	<b>0.03</b>	<b>3.8 (1.1, 12.8)</b>
Gonorrhea	9 (29)	21 (21)	0.34	1.6 (0.6, 3.9)
Chlamydia	9 (29)	40 (40)	0.29	0.6 (0.3, 1.5)
Trichomonas	7 (23)	33 (33)	0.33	0.6 (0.2, 1.6)
Syphilis	4 (13)	5 (5)	0.12	3.0 (0.7, 11.8)
Hepatitis	2 (7)	2 (2)	0.22	3.5 (0.5, 26.2)
Genital warts	3 (10)	7 (7)	0.61	1.4 (0.3, 5.9)

\* Included in multivariate model

the “real” causes and effects of HIV infection. When asked about the importance of HIV testing, most women indicated that HIV testing should be offered during routine gynecological visits to make testing easier to obtain. Women in one group commented that they would undergo HIV testing only if it was medically necessary, such as during pregnancy.

**DISCUSSION**

The increased rate of HIV infection observed among black women in North Carolina mirrors national trends; notably that socioeconomically disadvantaged black women in the rural south are increasingly and disproportionately affected by the HIV/AIDS epidemic. This investigation highlights population-specific public health and psychosocial issues and raises concerns that warrant action.

We found high rates of HIV risk behaviors in both HIV-positive and HIV-negative sexually active black women in North Carolina. In particular, the frequency of having had ≥1 STD, early age of sexual debut and the frequency of unprotected intercourse were similar in both groups. Although most women reported they were willing to discuss condom use with their partners, less than half had consistently asked a man to use a condom, and almost all had had unprotected vaginal intercourse in the past year. Focus group participants also cited having low self-esteem as one of the most common factors leading to unsafe sex practices; this deserves particular attention as young women with low self-esteem have significant barriers to negotiating condom use in relationships.<sup>6</sup> Despite these data, the majority of women perceived themselves to be at low risk for acquiring HIV infection. These findings suggest that existing HIV-prevention strategies are ineffective for or are not reaching this population.

Although high-risk behaviors were commonly reported in both groups, the three statistically signifi-

cant differences identified during multivariate analysis provide insights into the development of prevention strategies for these black women. We found that a history of genital herpes was strongly associated with diagnosis of HIV infection. This finding is consistent with data reported from a study of sub-Saharan African women in four urban populations, suggesting that the biological factors fueling heterosexual HIV transmission among black women on these two continents might be similar.<sup>7</sup> Our data are limited because we did not establish whether genital herpes infection preceded HIV infection, although evidence suggests that genital herpes is often acquired at a younger age than HIV.<sup>8</sup> Our finding reiterates the importance of integrating and maintaining services for the diagnosis and prevention of STDs and HIV among persons at risk for HIV infection, as reported by others.<sup>9,10</sup>

We also found statistically significant higher rates of public assistance among women with an HIV diagnosis. Although HIV-infected women were also significantly more likely to have exchanged drugs, money and/or gifts for sex, this association was not maintained in multivariate analysis. HIV is a disease often linked to poverty, and previous studies suggest that economic disparities contribute to the HIV epidemic among black women.<sup>11,12</sup> Most study participants in our study were from low-income households; and both our quantitative and qualitative data indicated that within this limited sample of women, the need to secure essential commodities (e.g., food, shelter) was of higher priority than that of ensuring their health and protecting themselves against HIV infection. Poverty alone cannot fully explain this increased HIV risk, however, as it is often a proxy for other psychological and social stressors that contribute to the deterioration of family and community values, and to inadequate prioritization of health issues.

Last, we found that HIV-positive women were less likely to discuss a variety of HIV risk behaviors with

**Table 3. Discussion of sexual/behavioral history issues among HIV-positive and HIV-negative young black women—North Carolina, 2003–2004**

Likely/Very Likely to Discuss the Following Issues with Male Sexual Partners	HIV-Positive Women (n=31) Number (%)	HIV-Negative Women (n=101) Number (%)	p	Univariate Analyses OR (95% CI)
Number of past sexual partners	10 (32)	66 (65)	<0.01	0.2 (0.1, 0.6)
Number of current sexual partners	14 (45)	72 (71)	0.01	0.3 (0.1, 0.8)
HIV status	18 (58)	90 (89)	<0.01	0.2 (0.1, 0.4)
STD history	19 (61)	83 (82)	0.02	0.3 (0.1, 0.8)
Drug use history	18 (58)	86 (85)	<0.01	0.2 (0.1, 0.6)
Incarceration history	21 (68)	89 (88)	0.01	0.3 (0.1, 0.7)
Mean (median; range) number of above issues discussed*	3.2 (3.0; 0-6)	4.8 (5.0; 0-6)	<0.01	—

\* Included in multivariate model

their male sexual partners. Empowering black women to discuss sexual histories with their male partners could facilitate willingness of both men and women to disclose details about sexual behavior, sexual preferences, and HIV or STD status. Improving dialogue in relationships may also allow partners to frequently assess levels of commitment, as well as reinforce perceived trust, an issue which often influences condom usage decisions within the relationship. Encouraging women to communicate openly with their partners may provide them with the information they need to reduce their risk of acquiring HIV. Therefore, strategies to improve communication within sexual relationships should be explored and developed.

The young age of study participants at sexual debut suggests that HIV prevention messages designed for black women may more effectively reach at-risk women if they are introduced earlier—first at home by their parents or other family members, and through age-appropriate institutions such as schools, youth media, church groups and youth community organizations. Furthermore, because many HIV-positive women were unaware of their HIV status until after presentation for prenatal care and because some focus group participants confirmed that they would not voluntarily seek HIV testing, integrating routine HIV testing and prevention messages in medical settings for sexually active persons, such as reproductive health and STD clinics, may facilitate better HIV prevention and early diagnosis.

Our findings are subject to several limitations. First, the low number of potential cases choosing to participate may have introduced a selection bias that limits the generalizability of our findings. Second, the results may not be applicable to all at-risk black women in North Carolina, particularly those of higher socioeconomic status. Third, we were unable to adequately assess many of the complex sociocultural factors that likely influence HIV risk in this population. Fourth, we could neither demonstrate causality in the associations between HIV and a history of herpes nor clarify the relationship between receipt of public assistance and HIV serostatus. Last, because only a few HIV-positive male partners were interviewed in this investigation, we were unable to adequately describe the role of male partner risk in HIV transmission among black women in North Carolina. Since many heterosexual women are often unaware of their sexual partner's risk for HIV,<sup>13</sup> the contribution of male partner risk to HIV transmission in women is important to understand. It is possible that male bisexuality contributes to the HIV rates in black women. Since bisexual activity may make some men unwilling to openly discuss HIV risk behavior or sexual identity,<sup>14,15</sup> this group warrants further exploration.

In summary, this investigation supports the need for a multidimensional approach to reduce HIV infection in black women in North Carolina. It is important to

ensure that existing HIV prevention interventions are accessible to black women living in disadvantaged areas of the urban and rural south. Also, more resources and prevention strategies are needed to help address underlying causes of HIV transmission in black women such as poverty and partner risk behavior. On the basis of our investigation, we believe that halting the spread of HIV among southern black women will require HIV prevention strategies and programs that are better designed to: 1) improve communication between sexual partners about HIV and STD risk; 2) encourage mutual monogamy; 3) facilitate access to HIV and STD testing, treatment and preventive services; and 4) reach younger at-risk women with comprehensive risk-reduction messages and strategies that include abstinence, condom use, age-appropriate sexual education and promotion of delayed sexual debut. Finally, improving the long-term economic status of disadvantaged southern black women will not only benefit their immediate quality of life but will also permit them to place a higher priority on their medical well-being, which includes addressing health issues such as HIV infection.

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