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# Screening for Cervical Cancer and Sexually Transmitted Diseases Among HIV-Infected Women

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## Abstract

**Background—**Women living with HIV infection are at higher risk for cervical cancer, an AIDS-defining diagnosis. We examined the prevalence of cervical cancer and sexually transmitted disease (STD) screening among human immunodeficiency virus (HIV)-infected women and factors associated with the receipt of Papanicolaou (Pap) tests.

**Methods—**We did a cross-sectional analysis of weighted data from a sample of HIV-infected adults receiving outpatient medical care. We used matched interview (report of Pap test) and medical record data (STD screenings) from HIV-infected women. We performed logistic regression to compute adjusted prevalence ratios and 95% confidence intervals for the association between demographic, behavioral, and clinical factors and receipt of Pap tests among HIV-infected women.

**Results—**Data were available for 2,270 women, who represent 112,894 HIV-infected women; 62% were African American, 17% were Hispanic/Latina, and 18% were white. Most (78%) reported having a Pap test in the past year. Among sexually active women ($n$= 1234), 20% reported sex without condoms, 27% were screened for gonorrhea, and 29% were screened for chlamydia. Being screened for STDs was less likely among women who did not have a Pap test in the past year (adjusted prevalence ratios 0.82, 95% confidence interval 0.77–0.87). Women who were ≥50 years of age and reported income above federal poverty level, no sexual activity, depression, no HIV care from an obstetrician/gynecologist, and no documented STD tests, were less likely to report a Pap test ($p < 0.05$).

**Conclusions—**Screening for cervical cancer and STDs among HIV-infected women is suboptimal. Clinical visits for Pap tests are an important opportunity for HIV-infected sexually active women to also receive STD screenings and counseling regarding condoms.

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**Author Disclosure Statement**

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## Introduction

An estimated 1.2 million people in the United States are living with human immunodeficiency virus (HIV) infection, and 296,000 (24.6%) of these are women.[1] Compared with HIV-uninfected women, HIV-infected women have a higher prevalence of human papilloma virus (HPV) infection,[2] are more likely to have high-risk oncogenic HPV subtypes (which are associated with 70% of cervical cancers),[3] and are more likely to develop invasive cervical cancer.[4] Level of immunosuppression, measured by CD4+ T-lymphocyte cell (CD4) count, is also associated with incidence of cervical cytologic abnormalities, with lower CD4 counts being associated with an increased risk of cervical abnormalities, including cancer.[5] Invasive cervical cancer has been an acquired immune deficiency syndrome (AIDS)-defining diagnosis since 1993,[6] and national recommendations for more frequent Papanicolaou (Pap) test screenings for HIV-infected women have been in place since 1995. Current clinical guidelines state that HIV-infected women should be screened for cervical cancer twice within the first year after HIV diagnosis, and if the results are normal, annually thereafter.[7] Yet previous reports show that between 19% and 47% of HIV-infected women did not report having the recommended Pap test in the previous 12–18 months.[8, 9] More recent analyses suggest that longer intervals for Pap tests may be appropriate for some HIV-infected women with serial negative Pap tests, based on low rates of high-grade cervical intraepithelial neoplasia.[10, 11]

The pelvic exam that occurs at the time of the Pap test is also an opportunity to screen for other sexually transmitted diseases (STDs) that may be diagnosed by collection of vaginal or cervical fluid. The Centers for Disease Control and Prevention (CDC) recommends at least annual screening for gonorrhea, chlamydia, and syphilis for all sexually active HIV-positive persons.[12] Therefore, determining the factors associated with receiving a Pap test may help inform more effective preventive services interventions for sexually active HIV-infected women.

Our objectives were to describe the prevalence of reported Pap tests and clinical documentation of STD screening tests in a diverse, national, probability sample of HIV-infected women and to examine the sociodemographic, behavioral, and clinical factors associated with not receiving Pap test screening in the previous year. This analysis builds upon previously published summaries[8, 9] of reported Pap test frequency by including contextual variables, such as sex without a condom, and STD screening, both of which have implications for exposure to HPV and the importance of cervical cancer screenings. This analysis also includes clinical information, including documented antiretroviral therapy (ART) prescriptions, plasma HIV RNA viral load, Pap tests received at the HIV care provider's facility, and viral suppression status abstracted from medical records. These analyses can inform the development of interventions to strengthen gynecologic preventive services, including Pap and STD screenings for HIV-infected women.

## Methods

The Medical Monitoring Project (MMP) is an ongoing HIV surveillance system with a three-stage sampling design to obtain nationally representative, annual cross-sectional

samples of HIV-infected adults receiving outpatient medical care for HIV in the United States.[13] For the 2009 and 2010 data collection cycles, U.S. states and territories were sampled, followed by facilities providing HIV care, and finally adults aged 18 years or older receiving at least one medical HIV care visit in participating facilities between January and April in 2009 or 2010. For state and territory samples, probability of selection was proportionate to AIDS prevalence; for provider samples, probability of selection was proportionate to HIV-infected patient census. Data were collected through face-to-face interviews and medical record abstractions from June 2009 to May 2011. The following surveillance jurisdictions participated in MMP: California, Chicago (Illinois), Delaware, Florida, Georgia, Houston (Texas), Illinois, Indiana, Los Angeles County (California), Michigan, Mississippi, New Jersey, New York, New York City (New York), North Carolina, Oregon, Pennsylvania, Philadelphia (Pennsylvania), Puerto Rico, San Francisco (California), Texas, Virginia, and Washington.

The number of facilities sampled in 2009 and 2010 was 603 and 582, respectively. Among those sampled, 461 and 474 facilities participated, resulting in a facility response rate of 76% and 81% for 2009 and 2010, respectively. Most of the HIV care facilities sampled were private practices (60%), followed by hospital-based facilities (30%) and community health centers (19%). The remainder were clinical research facilities (10%), state or local health department clinics (5%), community-based service organizations (4%), and Veterans Administration facilities (4%).

Of nearly 9,400 persons sampled per data collection year, completed interview and linked medical record abstraction data were available for 4,217 in 2009 and 4,474 in 2010. The adjusted patient response rate was 51% and 50% in 2009 and 2010, respectively; the average combined adjusted patient response rate was 51% for the two data collection years. Also, using information collected on all sampled facilities and 88% of sampled patients, we conducted an analysis to compare respondents and nonrespondents. Data were then weighted to adjust for nonresponse by using predictors of response, including facility size, facility type (public or private), patient race and ethnicity, time since HIV diagnosis, and age group. After weighting for probability of selection and nonresponse, the sample of 8,691 MMP participants were estimated to represent an average population of 431,915HIV-infected adults receiving medical care in the United States during the study period.

The CDC has determined MMP to be a nonresearch public health surveillance activity to guide disease control programs and policy, and MMP was approved by CDC.[14] Several participating states, territories, and facilities obtained local internal review board approval and informed consent from study participants as required by local entities. Eligible persons were invited to participate on a voluntary basis; participants could decline to answer any question or could stop study participation at any time.

There were 2,270 participants who met inclusion criteria: (1) were born and self-identified as a female; (2) were diagnosed as HIV-positive for at least one year; (3) responded yes or no to the Pap test question during the interview; and (4) completed a face-to-face interview and had medical record data abstracted from records during an outpatient visit or hospitalization during the 12 months before interview.

The primary outcome variable was receipt of a Pap test in the past year. All women were asked, “During the past 12 months, have you had a Pap smear?” Women who responded yes were categorized as reporting a Pap test in the past year; some Pap tests may have been obtained at a facility other than the HIV care facility. Sociodemographic variables included were age at interview in years, race/ethnicity, education, time since HIV diagnosis in years, and foreign birth. Participants were asked selected questions to determine if the following applied to them during the past year: had a lapse in continuous health or insurance coverage, lived at or below poverty level, were incarcerated, experienced homeless, and/or had any depression. The number and percentage of women in the United States meeting current poverty guidelines was determined using the U.S. Department of Health and Human Services poverty guidelines that corresponded to the year of interview.[15] Women were categorized as homeless if they lacked a fixed, regular, adequate nighttime residence (per Stewart B. McKinney Homeless Assistance Act, 42 U.S.C. §11301, et seq; 1987). Determination of depression in the past year prior to interview was categorized as no depression, other depression, or major depression, based on the algorithm from Kroenke.[16]

Reported behaviors in the past year included oral or vaginal sex without a condom with a male partner; binge drinking (four or more alcoholic drinks within one day); current smoking; and any drug use (noninjection and injection drugs), defined as drugs not used for medical purposes. The use of selected health care services was assessed by self-reported information and clinical data abstracted from medical records for the year prior to interview. Self-reported data indicating use of health care services in the past year included one-on-one conversations with a health care provider about ways to prevent HIV and STD transmission and receipt of HIV care from an obstetrician or gynecologist (OB/GYN).

### Clinical variables (medical record abstraction data)

Clinical data were abstracted from participants’ medical records for the year prior to interview and included plasma HIV RNA viral load (most recent viral suppression was defined as having a most recent HIV viral load result of undetectable or <200 copies/mL); prescription of ART; documentation of three or more CD4+ T-lymphocyte or HIV viral load tests; documentation of testing for chlamydia or gonorrhea at any anatomical site (pharyngeal, anorectal, urethral, cervical, lymph node, ocular), or of the urine, or not specified, and syphilis screening; and disease stage per CDC criteria [Stage 1: No AIDS and nadir CD4 ≥500 cells/μL (or CD4% ‡29); Stage 2: No AIDS and nadir CD4 200–499 cells/μ*L* (or CD4% 14- <29); and Stage 3: AIDS or nadir CD4 0–199 cells/μL (or CD4% <14)]. Medical charts were also reviewed to determine numbers of documented Pap tests obtained at the HIV care facility.

We examined the unweighted frequencies and weighted percentages of demographic and behavioral characteristics, health care services received, and clinical status indicators for HIV-infected women receiving medical care. We then calculated estimates of reported receipt of Pap tests in the past year by available variables. Modified Rao-Scott chi-squared tests were used to measure the bivariate association between each factor and receipt of a Pap test in the year prior to interview. We calculated unadjusted prevalence ratios (PRs) with 95% confidence intervals (CIs) in the HIV-infected population using logistic regression with

predicted marginal means. We used a multivariable logistic regression model with a significance level of <0.05 to determine the adjusted prevalence ratios (aPRs) for not receiving cervical cancer screening. We selected certain a priori variables, which were included in the initial model, and used a backward selection method to build the model and removed each factor from the full model that was not significant at $p < 0.05$. We also assessed two-way interactions between variables, with a cutoff of $p < 0.05$. The Hosmer-Lemeshow test of goodness of fit was performed to assess model stability.

Additional analyses were completed to compare any documentation in the medical records of receipt of Pap tests at the HIV care facility and the self-reported Pap tests received in the past year. The kappa statistic and the percentage agreement were computed to assess the agreement between the two estimates. A subanalysis of sexually active HIV-infected women in care was completed to examine the documentation of screening from the medical records for STDs (gonorrhea, chlamydia, and syphilis), stratified by receipt of Pap tests. All weighted analyses were performed using SURVEY procedures in SAS 9.3 (SAS Institute) and SAS-callable SUDAAN 10.0.1 (RTI International). The SAS and SUDAAN procedures included sampling weights and strata and cluster information to account for the complex survey design of MMP.

## Results

Of the 8,691 participants in the 2009–2010 MMP sample, 2,321 were female. Of the 2,321 female MMP participants, 51 (2.2%) women did not meet the criteria for inclusion in this analysis: 18 did not respond to the Pap test question; 31 were diagnosed less than one year before the interview, and 2 had an unknown date of HIV diagnosis. A total of 2,270 women were included in this analysis, representing 112,894 (CI 96,368–129,421) HIV-infected women receiving medical care in the United States.

The majority (72%) of women were aged 40 years and older at the time of the interview, were black or African American (62%), were diagnosed with HIV at least 10 years before the interview (53%), lived at or below poverty level (63%), and had continuous health or insurance coverage (72%). Table 1 has full details regarding the demographics and key behavioral findings of the analytic sample.

Over half (51%) of women reported some sexual activity with a male partner; 20% reported having sex without condoms. Less than half of all women had medical record evidence of being screened separately for gonorrhea (27%), chlamydia (29%), and syphilis (48%); only 19% had evidence of screening for all three—gonorrhea, chlamydia, and syphilis in the past 12 months. Less than 20% of women reported any drug use, and 41% currently smoked (data not shown). An estimated 31% reported depression symptoms.

In all, 78% of women reported receiving a Pap test and 77% reported receiving a pelvic examination in the 12 months before the interview (results not shown). Most women (70%) had medical record documentation of three or more CD4 or viral load tests in the previous 12 months (indicating regular HIV care), 88% were prescribed ART, and 69% were virally suppressed based on their most recent viral load. Most of the women had a diagnosis of

AIDS (67%) and reported either having had a one-on-one conversation(s) with a health care provider about HIV and STD prevention (49%) or HIV care from an OB/GYN (21%).

Results from the multivariate analysis indicated that women with the following characteristics and behaviors were less likely to have reported having had a Pap test in the past year: aged 50 years or older (aPR 0.88, 95% CI 0.81–0.96) compared with those aged 18–29 years; with income above federal poverty level (aPR 0.94, CI 0.90–0.99); who had no sexual activity in the past 12 months (aPR 0.93, CI 0.87– 0.98) compared with those who had any protected sex; and who reported any drug use in the past 12 months (aPR 0.91, CI 0.83–1.00). In addition, women who reported the following in the 12 months prior to interview were less likely to report a Pap smear during that period: depression other than major depression (aPR 0.88, CI 0.80–0.96) compared with women with no depression; having had conversations with a health care provider about HIV (aPR 0.94, CI 0.89–1.00); not having received HIV care from an OB/GYN (aPR 0.80, CI 0.75–0.85). Finally, women without medical record documentation of three or more CD4 or viral load tests and no medical evidence of being tested for gonorrhea, chlamydia, and syphilis in the past year were less likely to report having received a Pap smear (aPR 0.91, CI 0.86–0.96; and aPR 0.82, CI 0.77–0.87, respectively) (Table 2).

Self-reported data on Pap testing were compared with medical record Pap testing documentation at the HIV care facility. Although 78% (1,771/2,270) of women reported that they had a Pap test in the past year, only 795/1,771 (45%; CI 40.01–49.59) had medical documentation of receiving cervical cancer screening at the HIV care facility in the previous 12 months. The percentage positive agreement was 0.51, with a Kappa statistic = 0.20 (CI 0.17–0.24). Of the 1,234 sexually active, HIV-infected women, women who had medical documentation of gonorrhea, chlamydia, and syphilis screening in the past year were 2.7 times as likely to report having had a Pap test compared with those who did not have one in the past year (Fig. 1; last bar on chart).

## Discussion

Screening for cervical cancer and STDs was suboptimal for our sample of HIV-infected women, whose frequency of documented CD4 count measures are consistent with them having regular HIV care clinical visits. These HIV care visits were missed opportunities for Pap and STD preventive screening services and sexual health counseling with women. Our findings suggest that Pap tests and STD screening services should be strengthened among both women’s health providers and HIV care providers to ensure optimal health outcomes for women living with HIV. Clinical visits for Pap tests are an important opportunity for sexually active HIV-infected women to also receive reinforced messages about condom use during sex for prevention of ongoing HIV transmission and about prevention of an unplanned pregnancy.[18]

Women were more likely to have STD screenings if they reported having a Pap test. Several factors in our study were associated with being less likely to report a Pap test. Previous studies have shown that factors associated with not having regular Pap screenings among HIV-infected women include being U.S. born, having a low CD4 count, and having received

a pelvic exam most recently at a place other than a woman's usual source of HIV care.[8, 19] We believe that one of the challenges includes lack of Pap and STD screenings done by HIV primary care providers and lack of coordinated HIV and women's health care at one location for HIV-infected women.[19] Efforts to cross-train infectious disease providers (who disproportionately provide care for HIV-infected women) to perform Pap tests during visits or to partner with on-site OB/GYN providers might facilitate incorporation of recommended Pap screening, as well as STD screening, as part of a streamlined, user-friendly approach to routine care for women.

Women in our sample were even less likely to report Pap screening if they were age 50 or older, reported drug use or depression symptoms, or did not receive HIV care from an OB/GYN. However, Pap screening recommendations are different if women have had hysterectomies (which may account for some of the reported lower Pap rates among older women), and women with drug use and depression history are more likely to have challenges with health care access to receive preventive Pap and STD screening services. Other studies support the increased performance of Pap tests among OB/GYN providers and other providers who routinely perform Pap tests.[8, 19] Other national surveys of self-reported receipt of Pap tests among women in the general population have also shown that there is room for improvement toward the Healthy People 2020 goal (93% of females aged 21 to 65 years should receive Pap screening)[20] for all women. Although guidelines for the general population recommend Pap screening every three years for women aged 21–65 years without a hysterectomy, data from two national surveys found screening was suboptimal among U.S. women.[21, 22] Although routine Pap test screenings are also suboptimal among the general population of U.S. HIV-uninfected women, the higher risk of cervical cytologic abnormalities among HIV-infected women underscores that providing regular Pap tests for prevention of invasive cervical cancer remains a priority.

Sexually active women in our sample also did not always receive the recommended annual STD screenings, and 20% of women were sexually active without condoms. CDC recommends routine screening for certain STDs (e.g., syphilis, gonorrhea, and chlamydia) at least annually for all sexually active, HIV-infected persons. In our study, syphilis screening rates were higher, likely because it is a blood test and can be obtained with routine CD4 and viral load labs. Still, the gap in Pap/STD screening services represents an area that may be strengthened by systematically linking STD screenings with Pap test visits, sending invitations to women as reminders to schedule a visit for screenings, and providing community education and outreach for women.[23, 24] Ensuring that providers are aware of the most up-to-date screening recommendations may promote increased screenings for timely STD detection and treatment for HIV-infected women and encourage increased dialogue about sexual risk-reduction during routine clinical visits. These visits should include information and support for continued use of condoms and possibly discussions regarding pre-exposure prophylaxis to decrease the risk of HIV transmission, especially for HIV-infected women who may be sexually active with uninfected partners.[25]

This analysis is subject to several limitations. First, the analysis was limited to HIV-infected women who received HIV care in MMP outpatient facilities. The results of this study are not generalizable to women who are not in HIV care, who are less likely to have had a recent

Pap test. Therefore, our results may have overestimated the receipt of Pap tests among all HIV-infected women. Second, the Pap test estimates are based on self-report; our data show that the number of women self-reporting Pap tests was higher than the number with a clinically documented Pap test at their HIV care facility.[26] Clinical documentation abstracted for MMP is usually obtained from the sampled facilities where women receive HIV care, and some may have received care, including their Pap test, at other facilities. An ideal analysis would allow for a review of medically documented Pap tests at a facility that provides both HIV and gynecologic care for women. Third, our study is cross-sectional; whether the selected factors were causally associated with the receipt of Pap tests could not be assessed. Fourth, given the moderate response rate, there is a possibility of nonresponse bias. However, MMP used standard methods to mitigate potential nonresponse bias. Data were collected on facilities (HIV patient load) and all sampled patients (sex, age, race, length of time since diagnosis). We compared the characteristics of respondents and nonrespondents; based on the results of these analyses the data were weighted to minimize nonresponse bias.

Our study highlights suboptimal Pap and STD screening among HIV-infected women receiving medical care. Although HIV-infected women may experience barriers to accessing recommended preventive screenings, expanded health care coverage through the Affordable Care Act may present increased access for women and increased opportunities for providers to routinely screen (for reimbursement). [27, 28] Strategies to strengthen engagement of HIV-infected women in recommended Pap and STD screenings and risk-reduction counseling are warranted in an effort to provide early detection and treatment and to decrease unintended sexual transmission of HIV and unplanned pregnancies (for sexually active women). Developing interventions that build upon increased access opportunities with community outreach and reminders for Pap/STD screenings are important additional strategies for women and an important part of providing care for women living with HIV infection.

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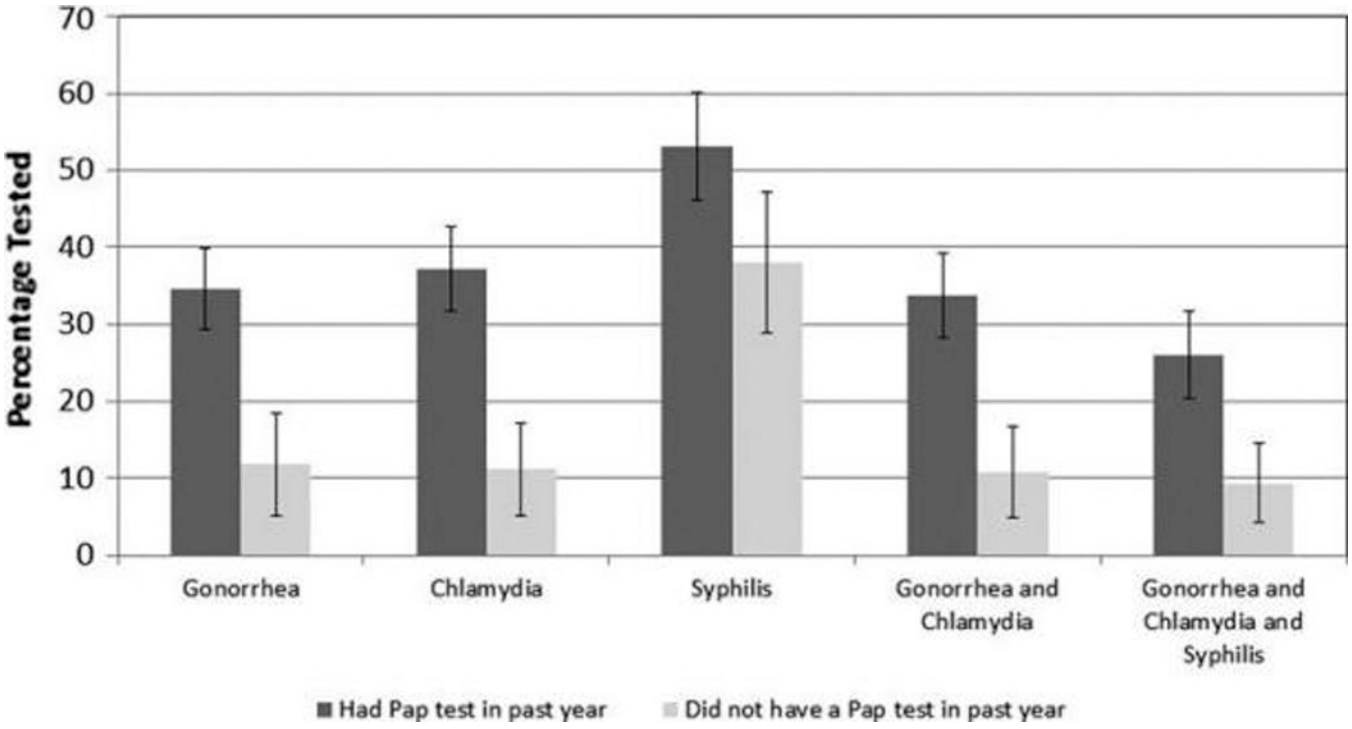


**FIG. 1.**

Prevalence of screening for gonorrhea, chlamydia, and syphilis among sexually active, HIV-infected women by receipt of Pap tests for women sampled in the Medical Monitoring Project, 2009–2010.

**Table 1**

Characteristics of HIV-Infected Women Receiving Medical Care by Receipt of Pap Test in the United States: Medical Monitoring Project, 2009–2010

| Characteristics | Total | | Had Pap test in past year | | Did not have a Pap test in past year | | *p* Value[a] |
|---|---|---|---|---|---|---|---|
| | *n* | Weighted % (95% CI) | *n* | Weighted % (95% CI) | *n* | Weighted % (95% CI) | |
| Total | 2270 | 100 | 1771 | 78.1 (74.5–81.6) | 499 | 21.9 (18.4–25.5) | |
| **Sociodemographic** | | | | | | | |
| Age at interview in years | | | | | | | <0.001 |
| 18–29 | 178 | 7.9 (6.2–9.7) | 154 | 8.6 (6.7–10.5) | 24 | 5.6 (2.9–8.2) | |
| 30–39 | 457 | 20.1 (17.7–22.4) | 378 | 21.6 (19.2–24.0) | 79 | 14.6 (11.2–18.0) | |
| 40–49 | 829 | 37.2 (34.2–40.2) | 648 | 37.5 (34.5–40.5) | 181 | 36.2 (30.3–42.0) | |
| 50+ | 806 | 34.8 (32.1–37.4) | 591 | 32.3 (29.1–35.4) | 215 | 43.7 (39.2–48.1) | |
| Race/ethnicity | | | | | | | 0.063 |
| Black, non-Hispanic | 1385 | 61.7 (53.4–70.0) | 1108 | 62.9 (54.8–71.0) | 277 | 57.5 (47.5–67.5) | |
| Hispanic/Latino[b] | 428 | 17.1 (9.8–24.4) | 332 | 17.4 (10.2–24.5) | 96 | 16.3 (7.3–25.2) | |
| White, non-Hispanic | 382 | 17.7 (14.0–21.3) | 271 | 16.2 (13.0–19.4) | 111 | 22.8 (16.0–29.6) | |
| Other[c] | 75 | 3.5 (2.3–4.7) | 60 | 3.5 (2.4–4.6) | 15 | 3.5 (1.1–5.8) | |
| Education attainment | | | | | | | 0.793 |
| <High school | 779 | 33.1 (30.8–35.3) | 605 | 32.7 (30.3–35.1) | 174 | 34.4 (28.3–40.4) | |
| High school diploma or GED | 710 | 30.8 (28.2–33.4) | 566 | 31.2 (28.3–34.0) | 144 | 29.4 (24.6–34.2) | |
| >High school | 779 | 36.1 (32.7–39.6) | 598 | 36.1 (32.7–39.6) | 181 | 36.2 (29.9–42.6) | |
| Length of time since HIV diagnosis | | | | | | | 0.907 |
| 1–4 years | 455 | 20.4 (18.4–22.5) | 358 | 20.2 (18.0–22.5) | 97 | 21.0 (17.4–24.6) | |
| 5–9 years | 591 | 26.7 (24.5–28.8) | 457 | 26.6 (24.4–28.9) | 134 | 26.9 (22.2–31.5) | |
| 10+ years | 1224 | 52.9 (50.3–55.5) | 956 | 53.1 (50.3–55.9) | 268 | 52.1 (47.3–56.9) | |
| Poverty level[*, d] | | | | | | | 0.038 |
| Above poverty level | 743 | 37.1 (33.5–40.6) | 562 | 35.6 (32.1–39.1) | 181 | 42.3 (36.4–48.3) | |
| At or below poverty level | 1428 | 62.9 (59.4–66.5) | 1138 | 64.4 (60.9–67.9) | 290 | 57.7 (51.7–63.6) | |
| Unknown | 99 | 4.8 (3.5–6.0) | 71 | 4.5 (3.2–5.8) | 28 | 5.9 (3.3–8.4) | |
| Uninsured or lapse in insurance[*, e] | | | | | | | 0.113 |
| No | 1640 | 71.6 (67.3–75.9) | 1260 | 70.7 (65.9–75.4) | 380 | 74.9 (69.9–79.8) | |

| Characteristics | Total | | Had Pap test in past year | | Did not have a Pap test in past year | | *p* Value[a] |
|---|---|---|---|---|---|---|---|
| | *n* | Weighted % (95% CI) | *n* | Weighted % (95% CI) | *n* | Weighted % (95% CI) | |
| Yes | 626 | 28.4 (24.1–32.7) | 509 | 29.3 (24.6–34.1) | 117 | 25.1 (20.2–30.1) | |
| Foreign born (country of birth other than United States or Puerto Rico) | | | | | | | 0.003 |
| No | 2012 | 88.5 (85.0–91.9) | 1546 | 87.2 (83.2–91.1) | 466 | 93.1 (89.6–96.5) | |
| Yes | 257 | 11.5 (8.1–15.0) | 224 | 12.8 (8.9–16.8) | 33 | 6.9 (3.5–10.4) | |
| Homeless[*, f] | | | | | | | 0.692 |
| No | 2075 | 91.9 (90.5–93.2) | 1617 | 92.0 (90.5–93.5) | 458 | 91.4 (88.7–94.1) | |
| Yes | 195 | 8.1 (6.8–9.5) | 154 | 8.0 (6.5–9.5) | 41 | 8.6 (5.9–11.3) | |
| Incarceration[*] | | | | | | | 0.729 |
| No | 2163 | 95.0 (93.9–96.2) | 1689 | 95.1 (93.8–96.4) | 474 | 94.7 (92.8–96.6) | |
| Yes | 107 | 5.0 (3.8–6.1) | 82 | 4.9 (3.6–6.2) | 25 | 5.3 (3.4–7.2) | |
| **Behaviors** | | | | | | | |
| Had sex without a condom with a male[*, g] | | | | | | | 0.010 |
| No sexual activity with a male | 1063 | 48.8 (46.6–51.0) | 789 | 46.8 (44.4–49.1) | 274 | 56.0 (49.9–62.2) | |
| Protected sex only | 699 | 30.9 (28.7–33.1) | 568 | 31.8 (29.5–34.1) | 131 | 27.8 (22.0–33.7) | |
| Any sex without a condom | 453 | 20.3 (18.0–22.5) | 370 | 21.4 (19.0–23.9) | 83 | 16.1 (12.4–19.8) | |
| Any drug use | | | | | | | 0.064 |
| No | 1859 | 81.5 (79.4–83.7) | 1472 | 83.1 (80.7–85.4) | 387 | 76.0 (69.5–82.5) | |
| Yes | 408 | 18.5 (16.3–20.6) | 297 | 16.9 (14.6–19.3) | 111 | 24.0 (17.5–30.5) | |
| **Depression** | | | | | | | |
| Depression | | | | | | | 0.003 |
| No depression | 1561 | 69.1 (66.4–71.9) | 1247 | 71.2 (68.3–74.0) | 314 | 61.7 (56.1–67.4) | |
| Other depression | 322 | 14.8 (13.0–16.5) | 234 | 13.2 (11.4–15.0) | 88 | 20.3 (15.4–25.2) | |
| Major depression | 357 | 16.1 (14.3–18.0) | 271 | 15.6 (13.7–17.6) | 86 | 18.0 (14.7–21.2) | |
| **Health services** | | | | | | | |
| Had 1:1 conversation with a health care professional about HIV and STD prevention[*] | | | | | | | 0.001 |
| No | 1087 | 51.3 (46.7–55.9) | 788 | 48.4 (43.7–53.1) | 299 | 61.7 (54.9–68.5) | |
| Yes | 1178 | 48.7 (44.1–53.3) | 978 | 51.6 (46.9–56.3) | 200 | 38.3 (31.5–45.1) | |
| Had HIV care from obstetrician/gynecologist[*] | | | | | | | <0.001 |

| Characteristics | Total | | Had Pap test in past year | | Did not have a Pap test in past year | | *p* Value[a] |
|---|---|---|---|---|---|---|---|
| | *n* | Weighted % (95% CI) | *n* | Weighted % (95% CI) | *n* | Weighted % (95% CI) | |
| No | 1757 | 79.2 (74.2–84.2) | 1287 | 75.0 (68.6–81.4) | 470 | 94.1 (91.7–96.5) | |
| Yes | 510 | 20.8 (15.8–25.8) | 481 | 25.0 (18.6–31.4) | 29 | 5.9 (3.5–8.3) | |
| CD4/viral load ≥3 * | | | | | | | <0.001 |
| No | 653 | 30.0 (26.6–33.4) | 465 | 27.5 (24.3–30.7) | 188 | 38.8 (32.7–45.0) | |
| Yes | 1609 | 70.0 (66.6–73.4) | 1302 | 72.5 (69.3–75.7) | 307 | 61.2 (55.0–67.3) | |
| Received gonorrhea screening * | | | | | | | <0.001 |
| No | 1632 | 73.4 (68.9–77.9) | 1184 | 68.3 (63.4–73.3) | 448 | 91.7 (87.5–95.8) | |
| Yes | 630 | 26.6 (22.1–31.1) | 583 | 31.7 (26.7–36.6) | 47 | 8.3 (4.2–12.5) | |
| Received chlamydia screening * | | | | | | | <0.001 |
| No | 1589 | 71.2 (66.9–75.5) | 1144 | 65.5 (60.9–70.2) | 445 | 91.5 (87.5–95.4) | |
| Yes | 673 | 28.8 (24.5–33.1) | 623 | 34.5 (29.8–39.1) | 50 | 8.5 (4.6–12.5) | |
| Received syphilis screening * | | | | | | | <0.001 |
| No | 1083 | 51.7 (45.4–58.0) | 792 | 48.7 (42.2–55.1) | 291 | 62.5 (55.4–69.6) | |
| Yes | 1179 | 48.3 (42.0–54.6) | 975 | 51.3 (44.9–57.8) | 204 | 37.5 (30.4–44.6) | |
| Received gonorrhea and chlamydia and syphilis screening * | | | | | | | <0.001 |
| No | 1797 | 80.8 (76.7–85.0) | 1338 | 77.2 (72.3–82.2) | 459 | 93.8 (90.9–96.6) | |
| Yes | 465 | 19.2 (15.0–23.3) | 429 | 22.8 (17.8–27.7) | 36 | 6.2 (3.4–9.1) | |
| **Clinical status and care** | | | | | | | |
| HIV disease stage *, *h* | | | | | | | 0.004 |
| Stage 1 | 160 | 7.9 (6.5–9.3) | 133 | 8.4 (6.7–10.1) | 27 | 6.0 (3.7–8.4) | |
| Stage 2 | 581 | 25.5 (23.2–27.8) | 473 | 26.9 (24.4–29.4) | 108 | 20.5 (16.3–24.7) | |
| Stage 3 | 1526 | 66.6 (64.2–69.0) | 1163 | 64.7 (62.1–67.4) | 363 | 73.4 (68.8–78.1) | |
| Prescribed ART * | | | | | | | 0.815 |
| No | 277 | 12.5 (10.9–14.2) | 213 | 12.5 (10.5–14.4) | 64 | 12.8 (10.2–15.5) | |
| Yes | 1993 | 87.5 (85.8–89.1) | 1558 | 87.5 (85.6–89.5) | 435 | 87.2 (84.5–89.8) | |
| Most recent viral load * | | | | | | | 0.338 |
| Most recent viral load >200 copies/mL | 715 | 31.2 (28.0–34.3) | 548 | 30.7 (27.5–33.9) | 167 | 32.7 (28.2–37.3) | |
| Most recent viral load undetectable or <200 copies/mL | 1555 | 68.8 (65.7–72.0) | 1223 | 69.3 (66.1–72.5) | 332 | 67.3 (62.7–71.8) | |

[*] Time period: In the past 12 months.

[a] *p*-Value based on the modified Rao-Scott chi-square test.

[b] Hispanics or Latinos might be of any race. Participants are classified in only one category.

[c] Includes: Asians, American Indians, Alaska Natives, Native Hawaiian and Other Pacific Islanders, and multiracial groups.

[d] Poverty guidelines as defined by the Department of Health and Human Services; the 2008 guidelines were used for patients interviewed in 2009 and 2009 guidelines were used patients interviewed in 2010.

[e] Health insurance coverage was considered continuous if there were no gaps in coverage during the past 12 months.

[f] The McKinney-Vento definition of homelessness categorizes persons as homeless if they lack a fixed, regular, adequate nighttime residence or if they have a steady nighttime residence.

[g] Defined as anal or vaginal sex with a male in the past 12 months.

[h] The stage of disease is based on the Centers for Disease Control and Prevention's surveillance case definition for HIV infection. Stages are defined as follows: Stage 1, no acquired immune deficiency syndrome (AIDS) and nadir CD4+ T-lymphocyte count ≥0.500× 109 cells/ L (or CD4% ≥29); Stage 2, no AIDS and nadir CD4 0.200–0.499 × 109 cells/L (or CD4% 14- <29); Stage 3, AIDS or nadir CD4 0–0.199 × 109 cells/L (or CD4% <14).

AIDS, acquired immunodeficiency syndrome; ART, antiretroviral therapy; CI, confidence interval; GED, General Educational Development test; HIV, human immunodeficiency virus; *n*, unweighted sample size; Pap, Papanicolaou test.

## Table 2

Crude and adjusted Prevalence Ratios for Having Had a Pap Test in the Past 12 Months by Selected Characteristics Among HIV-Infected Women in the United States

| Characteristics | *n*[a] | Weighted % reporting Pap testing(95% CI) | PR (95% CI) | *p* Value | aPR (95% CI) | *p* Value[b] |
|---|---|---|---|---|---|---|
| **Sociodemographic** | | | | | | |
| Age at interview in years | | | | <0.001 | | 0.001 |
| 18–29 | 154 | 84.6 (77.9–91.3) | Reference | | Reference | |
| 30–39 | 378 | 84.1 (80.6–87.5) | 0.99 (0.92–1.07) | | 0.99 (0.91–1.07) | |
| 40–49 | 648 | 78.7 (73.8–83.5) | 0.93 (0.85–1.02) | | 0.93 (0.85–1.02) | |
| 50+ | 591 | 72.5 (67.8–77.1) | 0.86 (0.78–0.94) | | 0.88 (0.81–0.96) | |
| Race/ethnicity | | | | 0.064 | | 0.242 |
| Black, non-Hispanic | 1108 | 79.6 (75.9–83.2) | Reference | | Reference | |
| Hispanic/Latino[c] | 332 | 79.2 (73.2–85.1) | 0.99 (0.93–1.07) | | 0.94 (0.87–1.01) | |
| White, non-Hispanic | 271 | 71.7 (65.5–77.9) | 0.90 (0.83–0.98) | | 0.96 (0.89–1.03) | |
| Other[d] | 60 | 78.3 (67.6–89.1) | 0.98 (0.86–1.12) | | 1.02 (0.92–1.12) | |
| Poverty level[*, e] | | | | 0.019 | | 0.029 |
| Above poverty level | 562 | 75.2 (70.9–79.6) | 0.94 (0.89–0.99) | | 0.94 (0.90–0.99) | |
| At or below poverty level | 1138 | 80.1 (76.5–83.7) | Reference | | Reference | |
| Unknown | 71 | 73.1 (62.3–84.0) | 0.91 (0.79–1.05) | | 0.95 (0.85–1.05) | |
| Foreign born (country of birth other than US or Puerto Rico) | | | | 0.002 | | – |
| No | 1546 | 76.9 (72.8–81.1) | 0.89 (0.82–0.95) | | – | |
| Yes | 224 | 86.8 (82.5–91.0) | Reference | | – | |
| **Behaviors** | | | | | | |
| Had sex without a condom with a male[*, f] | | | | 0.006 | | 0.031 |
| No sexual activity with a male | 789 | 74.7 (69.9–79.5) | 0.91 (0.85–0.96) | | 0.93 (0.87–0.98) | |
| Protected sex only | 568 | 80.2 (75.6–84.7) | 0.97 (0.91–1.04) | | 0.96 (0.90–1.02) | |
| Any sex without a condom | 370 | 82.5 (77.9–87.1) | Reference | | Reference | |
| Any non-injection drug use[*] | | | | 0.092 | | – |
| No | 1477 | 79.2 (76.0–82.5) | Reference | | – | |
| Yes | 292 | 72.6 (63.5–81.7) | 0.92 (0.82–1.03) | | – | |

| Characteristics | n[a] | Weighted % reporting Pap testing(95% CI) | PR (95% CI) | p Value | aPR (95% CI) | p Value[b] |
|---|---|---|---|---|---|---|
| Any drug use * | | | | 0.036 | | 0.031 |
| No | 1472 | 79.5 (76.4–82.7) | Reference | | Reference | |
| Yes | 297 | 71.5 (62.4–80.6) | 0.90 (0.80–1.01) | | 0.91 (0.83–1.00) | |
| **Depression** | | | | | | |
| Depression | | | | 0.006 | | 0.003 |
| No depression | 1247 | 80.6 (77.4–83.8) | Reference | | Reference | |
| Other depression | 234 | 70.0 (62.4–77.7) | 0.87 (0.78–0.97) | | 0.88 (0.80–0.96) | |
| Major depression | 271 | 75.8 (69.9–81.7) | 0.94 (0.88–1.00) | | 0.94 (0.89–1.00) | |
| **Health services** | | | | | | |
| Had 1:1 conversation with a health care professional about HIV and STD prevention * | | | | <0.001 | | 0.036 |
| No | 788 | 73.5 (68.4–78.6) | 0.89 (0.83–0.95) | | 0.94 (0.89–1.00) | |
| Yes | 978 | 82.7 (79.7–85.7) | Reference | | Reference | |
| Received HIV care from obstetrician/gynecologist * | | | | <0.001 | | <0.001 |
| No | 1287 | 73.9 (69.2–78.6) | 0.79 (0.74–0.84) | | 0.80 (0.75–0.85) | |
| Yes | 481 | 93.8 (91.4–96.2) | Reference | | Reference | |
| CD4/viral load ≥3 * | | | | <0.001 | | <0.001 |
| No | 465 | 71.7 (66.5–77.0) | 0.89 (0.83–0.95) | | 0.91 (0.86–0.96) | |
| Yes | 1302 | 80.9 (77.5–84.4) | Reference | | Reference | |
| Received gonorrhea, chlamydia, and syphilis screening * | | | | <0.001 | | <0.001 |
| No | 1338 | 74.7 (70.7–78.7) | 0.80 (0.76–0.85) | | 0.82 (0.77–0.87) | |
| Yes | 429 | 92.9 (89.4–96.4) | Reference | | Reference | |
| **Clinical status and care** | | | | | | |
| HIV disease stage[g] | | | | 0.008 | | – |
| Stage 1 | 133 | 83.2 (78.0–88.4) | Reference | | – | |
| Stage 2 | 473 | 82.3 (77.9–86.8) | 0.99 (0.91–1.08) | | – | |
| Stage 3 | 1163 | 75.8 (71.6–80.1) | 0.91 (0.83–1.00) | | – | |

Unadjusted prevalence ratios (PRs) adjusted prevalence ratios (aPRs) calculated based on predicted marginalmeans from multivariate logistic regression; data from Medical Monitoring Project, United States, 2009–2010. Dashes represent covariates excluded from the multivariable model because they were not significant at $p < 0.05$. These variables are foreign born; any non-injection drug use, and HIV disease stage.

* Time period: In the past 12 months.



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[a] *n* = Unweighted sample size.

[b] p-value based on the modified Rao-Scott chi-square.

[c] Hispanics or Latinos might be of any race. Participants are classified in only one category.

[d] Includes Asians, American Indians, Alaska Natives, Native Hawaiian and Other Pacific Islanders, and multiracial groups.

[e] Poverty guidelines as defined by the Department of Health and Human Services; the 2008 guidelines were used for patients interviewed in 2009 and 2009 guidelines were used patients interviewed in 2010.

[f] Defined as anal or vaginal sex with men in the past 12 months.

[g] The stage of disease is based on the Centers for Disease Control and Prevention's surveillance case definition for HIV infection. Stages are defined as follows: Stage 1, no acquired immune deficiency syndrome (AIDS) and nadir CD4+ T-lymphocyte count ≥0.500 ×109 cells/L (or CD4% ≥29); Stage 2, no AIDS and nadir CD4 0.200–0.499 × 109 cells/L (or CD4% 14- <29); Stage 3, AIDS or nadir CD4 0–0.199 × 109 cells/L (or CD4% <14).