

# **Annotated Bibliography: Reproductive Health Care Needs and Experiences of HIV-Infected Women**

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## **Introduction**

This publication is a compilation of select journal articles related to the reproductive healthcare needs of HIV positive women and men from 1993 through 2007. The bibliography was developed by reviewing major journals of public health, medicine, sociology, and psychology on *MEDLINE/PubMed*, a service of the US national Library of Medicine and the National Institutes of Health. The biographical entries are organized alphabetically by author under major topic areas. The major topic areas are: clinical factors, contraceptive use, decision making, reproductive needs, and trends. Each journal article is electronically linked to *PubMed*, a publisher's web site or an actual report via the web.

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## I. Clinical Factors

**Blair JM, Hanson DL, Jones JL, et al. Trends in pregnancy rates among women with human immunodeficiency virus. [Obstetrics and Gynecology](#). 2004;103(4):663-668.**

The objective of this study was to describe factors associated with pregnancy and trends in pregnancy rates among women with human immunodeficiency virus (HIV) before and after the release of U.S. Public Health Service Guidelines for the Use of Zidovudine and the Increased Availability of Highly Active Antiretroviral Therapy. The study participants included human immunodeficiency virus (HIV)-infected women aged 15 to 44 years who were enrolled in the Adult/Adolescent Spectrum of HIV Disease Project, a medical records cohort study of HIV-infected persons conducted in more than 100 U.S. health care facilities. Among 8,857 women, there were 1,185 incident pregnancies during 21,617 person-years of follow-up from 1992 through 2001. Pregnancy rate at enrollment was 16%; thereafter, an average of 5.5% of women became pregnant annually. Pregnancies were more likely to occur in women aged 15 to 24 years (adjusted rate ratio [RR] 9.2; 95% confidence interval [CI] 7.4, 11.3) and 25 to 34 years (adjusted RR 4.0; 95% CI 3.3, 4.9) than in women aged 35 to 44 years. Pregnancies were less likely to occur in women with a history of acquired immunodeficiency syndrome (AIDS)-opportunistic illness (adjusted RR 0.4; 95% CI 0.3, 0.5) or a CD4 count below 200 cells/ $\mu$ L and no opportunistic illness (adjusted RR 0.6; 95% CI 0.5, 0.7) than in women with HIV but not AIDS. Higher rates of pregnancy were observed for women prescribed highly active antiretroviral therapy (adjusted RR 1.3; 95% CI 1.0, 1.6) than women prescribed other regimens of antiretroviral therapy. There were significantly higher rates of pregnancy during 1997 through 2001. The increase in pregnancy rates during the era of widespread use of highly active antiretroviral therapy illustrates the continued need for comprehensive prevention and treatment services.

**Brocklehurst P, French R. The association between maternal HIV infection and perinatal outcome: a systematic review of the literature and meta-analysis. [British Journal of Obstetrics and Gynecology](#). 1998;105(8):836-848.**

To investigate the association between maternal HIV infection and perinatal outcome by a systematic review of the literature and meta-analysis. Appropriate publications were identified using electronic and hand searching of relevant journals from 1983 to 1996. Studies were included in the review if they were prospective cohorts with pregnant women identified as being HIV-infected with a control group of pregnant women who were not infected with HIV. Methodological quality was assessed for each study. Data were extracted for pre-determined outcome measures. Sensitivity analyses were performed to explore the association between HIV infection and an adverse perinatal outcome for the following study characteristics: clinical setting (developed or developing countries), methodological quality (high or poor) and whether studies controlled for potential confounding. Thirty-one studies were eligible to be included in the review. The summary odds ratio of the risk of pre-defined adverse perinatal outcomes related to maternal HIV infection were as follows: spontaneous abortion 4.05 (95% CI 2.75-5.96); stillbirth 3.91 (95% CI 2.65-5.77); fetal abnormality 1.08 (95% CI 0.7-1.66); perinatal

mortality 1.79 (95% CI 1.14-2.81); neonatal mortality 1.10 (95% CI 0.63-1.93); infant mortality 3.69 (95% CI 3.03-4.49); intrauterine growth retardation 1.7 (95% CI 1.43-2.02); low birthweight 2.09 (95% CI 1.86-2.35) and pre-term delivery 1.83 (95% CI 1.63-2.06). Sensitivity analyses showed that the association between infant mortality and maternal HIV infection was stronger in studies conducted in developing countries when compared with developed countries [odds ratios (OR) 3.72 (95% CI 3.05-4.54) and 8.6 (95% CI 0.53-141.05), respectively]; studies of higher methodological quality compared with those of poorer quality [odds ratios 14.57 (95% CI 6.93-30.65) and 3.37 (95% CI 2.74-4.14), respectively] and studies which had used restriction or matching to control for potential confounding factors compared with those that had not [OR 11.60 (95% CI 5.71-23.58) and 3.35 (95% CI 2.73-4.12), respectively]. The findings of this review have implications for women infected with HIV who are planning a pregnancy or who find themselves pregnant. There appears to be an association, although not strong, between maternal HIV infection and an adverse perinatal outcome. This relationship may be due to bias including uncontrolled or residual confounding. There does, however, appear to be a real and large increase in the risk of infant death in developing countries associated with maternal HIV infection, especially so when there has been an attempt to control for confounding.

**Cohan D. Perinatal HIV: Special Considerations. [Topics in HIV Medicine](#). 2003; 11(6):200-213.**

The percentage of AIDS cases among women - particularly women of color - in the United States is increasing yearly. Despite this increase, there has been a relatively steady decline in the number of AIDS cases occurring perinatally. Regardless of the reasons HIV-infected couples choose to become pregnant, studies indicate that providing support, such as contraceptive counseling and assisted reproduction techniques, can improve the health outcome in the face of HIV-related challenges. Issues specific to antiretroviral therapy, including viral resistance, pregnancy outcomes, and adverse fetal effects, complicate the treatment of perinatal HIV. Postpartum care is yet another area that requires special consideration when supporting HIV-infected parents and children. The growing body of data on pregnancy and HIV may indicate a rising commitment to research of and support for the unique challenges HIV-infected families face. This article was adapted from an IAS–USA interactive, case based program, Cases on the Web, in November 2003.

**Cotter AM, Garcia AG, Duthely ML, et al. Is antiretroviral therapy during pregnancy associated with an increased risk of preterm delivery, low birth weight, or stillbirth? [Journal of Infectious Diseases](#). 2006;193(9):1195-1201.**

Data on complications of pregnancy associated with antiretroviral therapy are limited. Some small studies have demonstrated an increased preterm delivery rate, but a recent retrospective United States multi-site study did not concur with these findings. This study's objective was to investigate whether antiretroviral therapy was associated with adverse pregnancy outcome at a single site. Using prospectively gathered data, women were identified who were determined to be human immunodeficiency virus positive before or during pregnancy who sought care at the prenatal clinic and who gave birth at the University of Miami/Jackson Memorial Medical Center from 1990 through 2002. The

outcome measures were preterm delivery, low birth weight, and stillbirth. The cohort included 999 women who received antiretroviral therapy during pregnancy (monotherapy in 492, combination therapy without a protease inhibitor [PI] in 373, and combination therapy with a PI in 134) and 338 women who did not receive therapy. After adjustment for possible confounders, only combination therapy with a PI was associated with an increased risk of preterm delivery, compared with any other combination (odds ratio, 1.8 [95% confidence interval, 1.1–3.0]). There were no differences in rates of low birth weight and stillbirth, regardless of therapy. Compared with monotherapy and combination therapy without a PI, only combination therapy with a PI was associated with an increased risk of preterm delivery.

**Desgrees du Lou A, Msellati P, Ramon R. et al. HIV-1 infection and reproductive history: a retrospective study among pregnant women, Abidjan, Côte d'Ivoire, 1995-1996. [International Journal of STD and AIDS](#). 1998;9(8):452-456.**

The aim of this paper is to determine the differences of fertility between HIV-1 infected and uninfected women in Abidjan, Côte d'Ivoire, using data available in an observational study conducted in 1995 and 1996 in 2 antenatal care centres in the district of Yopougon, Abidjan, within an intervention programme to reduce mother-to-child HIV-1 transmission (DITRAME project, ANRS 049). Fertility indicators have been constructed from retrospective data on pregnancies and births, and univariate and multivariate analyses have been performed on these indicators and stratified by age groups to compare HIV-1 positive and HIV-negative populations. The main outcome measures were the number of pregnancies, the number of miscarriages, the risk of miscarriage and the proportion of primigravida. Four thousand, three hundred and ninety-six women agreed to HIV testing: 12.1% were found to be HIV-1 infected. HIV-1 positive women had significantly fewer pregnancies than HIV-negatives in age-groups 25-29 ( $P=0.05$ ) and 30-34 ( $P=0.008$ ). The risk of having had at least one abortion or stillbirth was significantly higher for HIV-1 infected women than for HIV-negatives ( $OR=1.28$ , 95%  $CI: 1.02- 1.60$ ), when controlling for social and demographic factors. This study suggests that HIV-1 infection has deleterious consequences on female fertility, with lower fertility rates and more frequent adverse pregnancy outcomes. Family planning and antenatal care services should consider antenatal HIV counseling and testing in women in areas of high HIV prevalence.

**D'Ubaldo C, Pezzotti P, Rezza G, et al. Association between HIV-1 infection and miscarriage: a retrospective study. [AIDS](#). 1998;12(9):1087-1093.**

To determine the role of HIV-1 infection on miscarriage, we compared the obstetric histories of a cohort of HIV-1-infected and uninfected Italian women. Retrospective study. The study participants were women (with at least one reproductive event) with HIV-1 infection or HIV-1-negative sharing the same exposure modalities; all women were attending a network of 16 infectious disease units in 12 Italian cities. Trained interviewers used a standard questionnaire to collect information on obstetric history [i.e., number of pregnancies, pregnancy outcome (live birth, spontaneous or induced abortion) and time of occurrence of these events (i.e., year of birth)]. The association between spontaneous abortion and HIV-1 status at the time of pregnancy was evaluated. The analysis included 272 women and accounted for 480 pregnancies (217 in HIV-infected

women, 132 in uninfected women and 131 in women with undefined HIV status) and 60 miscarriages (23 in HIV-infected women, 22 in uninfected women and 15 in women with undefined HIV status). We estimated an adjusted odds ratio of 1.67 between spontaneous abortion and HIV-1 infection. We observed a 67% increase in risk of spontaneous abortion among HIV-1-infected women compared with HIV-1-negative women. This result should be considered in the counseling and management of women with HIV-1 infection who are of reproductive age.

**Glynn JR, Buve A, Carael M, et al. Decreased fertility among HIV-1-infected women attending antenatal clinics in three African cities. [Journal of the Acquired Immune Deficiency Syndromes](#). 2000;25(4):345-352.**

Population HIV prevalence estimates rely heavily on sentinel surveillance in antenatal clinics (ANCs), but because HIV reduces fertility, these estimates are biased. To aid interpretation of such data, we estimated HIV-associated fertility reduction among pregnant women in ANCs in Yaoundé (Cameroon), Kisumu (Kenya), and Ndola (Zambia). Data collection followed existing HIV sentinel surveillance procedures as far as possible. HIV prevalence among the women was 5.5% in Yaoundé, 30.6% in Kisumu, and 27.3% in Ndola. The birth interval was prolonged in HIV-positive multiparous women compared with HIV-negative multiparous women in all three sites: adjusted hazard ratios of pregnancy were 0.84 (95% confidence interval [CI]: 0.62-1.1) in Yaoundé, 0.82 (95% CI: 0.70-0.96) in Kisumu, and 0.74 (95% CI: 0.61-0.90) in Ndola, implying estimated reductions in the risk of pregnancy in HIV-positive women of between 16% and 26%. For primiparous women, the interval between sexual debut and birth was longer in HIV-positive women than in HIV-negative women in all sites, although the association was lost in Ndola after adjusting for age and other factors. Consistent results in different study sites help in the development of standard methods for improving ANC-based surveillance estimates of HIV prevalence. These may be easier to devise for multiparous women than for primiparous women.

**Lee LM, Wortley PM, Fleming PL, et al. Duration of human immunodeficiency virus infection and likelihood of giving birth in a Medicaid population in Maryland. [American Journal of Epidemiology](#). 2000;151(10):1020-1028.**

The objective of this study was to examine the effect of duration of human immunodeficiency virus (HIV) infection on a woman's likelihood of giving birth. Using longitudinal data from the Maryland State Human Immunodeficiency Virus Information System and a retrospective cohort design, the authors compared 1,642 women with acquired immunodeficiency syndrome (AIDS) to 8,443 uninfected women enrolled in the Medicaid program between 1985 and 1995. The decade before AIDS diagnosis was divided into four 2.5-year periods. Proximity to AIDS diagnosis served as a proxy for duration of infection. An extension of the Cox model was used to estimate the relative risk for giving birth, with adjustment for covariates and repeated outcomes. The average number of births per 100 person-years was 6.0 for HIV-infected women and 11.1 for uninfected women (adjusted relative risk = 0.63; 95% confidence interval (CI): 0.57, 0.68). Accounting for duration of infection, the adjusted relative risks for birth among HIV-infected women, as compared with uninfected women, were 0.85 (95% CI: 0.71, 1.03), 0.74 (95% CI: 0.63, 0.86), 0.55 (95% CI: 0.47, 0.64), and 0.45 (95% CI: 0.38,

0.55) for successive 2.5-year periods before AIDS diagnosis. Demographic characteristics, contraception, abortion, fetal loss, or drug use could not fully explain the reductions. These results suggest that HIV-infected women experience a progressive reduction in births years before the onset of AIDS. This may compromise estimation of HIV prevalence and interpretation of time trends from serosurveillance of pregnant women.

**Massad LS, Springer G, Jacobson L, et al. Pregnancy rates and predictors of conception, miscarriage and abortion in US women with HIV. [AIDS](#). 2004; 18(2):281-286.**

The objective of the study was to determine frequency and outcomes of pregnancy in US women with HIV before and after introduction of highly active antiretroviral therapy (HAART). The study design was a prospective cohort study at six US centers. HIV seropositive and at-risk seronegative women reported pregnancy outcomes at 6-month intervals during the period 1 October 1994 to 31 March 2002. Outcomes were tabulated and pregnancy rates calculated. Logistic regression defined outcome correlates. Pregnancy rates were 7.4 and 15.2 per 100 person-years in seropositive and seronegative women, respectively ( $P < 0.0001$ ). Among seropositives, 119 (36%) pregnancies ended in live birth, six (2%) in stillbirth, 126 (36%) in abortion, 83 (24%) in miscarriage, 16 (5%) in ectopic pregnancy, and two (1%) in other outcomes ( $P =$  nonsignificant versus seronegatives). Independent baseline correlates of conception in seropositives included younger age [odds ratio (OR), 1.20; 95% confidence interval (CI), 1.16-1.23], prior abortion (OR, 1.79; 95% CI, 1.25-2.63), lower HIV RNA levels (OR, 1.30; 95% CI, 1.10-1.54 for each log decrease), and being unmarried (OR, 1.59; 95% CI, 1.02-2.44). Baseline antiretroviral use at baseline was linked to lower conception risk (OR, 0.34; 95% CI, 0.49-0.98 for mono- or combination therapy; OR, 0.34; 95% CI, 0.03-4.28 for HAART). Abortion was less likely during the HAART era, (OR, 0.68; 95% CI, 0.35-1.33 during the early HAART era; OR, 0.46; 95% CI, 0.23-0.90 during the later HAART era, compared with before HAART). Women with HIV were less likely to conceive than at-risk uninfected women, but pregnancy outcomes were similar. Abortion became less common after the introduction of HAART.

**Nakayiwa S, Abang B, Packer L, et al. Desire for children and pregnancy risk behavior among HIV-infected men and women in Uganda. [AIDS and Behavior](#). 2006;10(Suppl. 4):S95-S104.**

To identify ways to improve prevention of mother-to-child transmission (PMTCT) of HIV, we conducted a cross-sectional study of 1,092 HIV-infected men and women attending an AIDS support organization in Jinja, Uganda, between October 2003 and June 2004. Pregnancy risk behavior was defined as having sex without contraceptive or condom. Overall, 42% of participants were sexually active, 33% practiced pregnancy risk behavior, and 18% desired more children. Men were almost four times more likely to want more children than the women (27% vs. 7%). Among those practicing pregnancy risk behavior, 73% did not want more children and were at high risk for unwanted pregnancies. Although 81% knew that mother-to-child transmission of HIV could be prevented, only 22% believed that an HIV-infected woman who received PMTCT therapy could still deliver an HIV-infected child. Lack of MTCT information, having



attended the program for  $\leq 2$  years and desire for children were independently associated with pregnancy risk behavior. PMTCT and other HIV prevention and care programs should ensure provision of family planning for HIV-infected populations who do not want to become pregnant.

**Ross A, Morgan D, Lubega R, et al. Reduced fertility associated with HIV: the contribution of pre-existing subfertility. [AIDS](#). 1999;13(15):2133-2141.**

HIV-1 infection is associated with lower fertility among women in sub-Saharan Africa and this association is not explained by the frequency of sexual intercourse, illness, knowledge of HIV status or infection with other sexually transmitted diseases. Women with fertility problems are at increased risk of marital instability and, therefore, HIV infection; consequently, pre-existing subfertility among HIV-infected women may contribute to the association. This study examines the relationship between HIV-1 infection and the incidence of recognised pregnancy and the role of low gravidity prior to seroconversion in rural Uganda. A group of 176 women (80 HIV infected and 96 uninfected) were enrolled into an HIV-1 natural history cohort and invited to attend 3-monthly clinic appointments. Data from clinic visits were analysed to assess the independent effects of HIV infection and age, lactation, illness, reported frequency of sexual intercourse and sexually transmitted diseases (STD) on the risk of pregnancy in the following 3 months. The number of previous pregnancies was recorded at enrolment, and the effect of gravidity was examined for the subgroup of women who were uninfected at enrolment or who enrolled within 2 years of their estimated seroconversion date. During follow-up, 124 pregnancies were observed in 83 women beginning in the 3 months following 47 (7.0%) of 669 visits made by HIV-infected women and 77 (9.5%) of 812 visits by HIV-negative women ( $P = 0.12$ ). Adjusting for age, lactation, illness, STD and the reported frequency of sexual intercourse, the estimated reduction in the risk of pregnancy associated with HIV infection was 47% [95% confidence interval (CI) 18-66]. Pre-existing low gravidity was strongly associated with a reduced incidence of pregnancy (odds ratio 0.39; CI 0.19-0.81). Additionally, adjusting for low gravidity reduced the estimate of the effect of HIV infection by almost a half, to 25% (95% CI-57-29). Low gravidity prior to seroconversion accounts for almost 50% of the observed association between HIV infection and lowered incidence of pregnancy, after adjusting for age, lactation, illness, STD and the frequency of sexual intercourse.

**Stein E, Handelsman E, Matthews R. Reducing perinatal transmission of HIV: early diagnosis and interventions during pregnancy. [Journal of Midwifery and Women's Health](#). 2000;45(2):122-129.**

This article reviews the New York State regulations regarding expedited testing of newborns for exposure to HIV. Included is a review of statistics as well as the medical and obstetric management of HIV positive pregnant women, including route of delivery. The professional responsibility of midwives, physicians, and other clinicians regarding maternal and neonatal health care is emphasized, especially in states without expedited testing.

**Williams CD, Finnerty JJ, Newberry YG, et al. Reproduction in couples who are affected by human immunodeficiency virus: Medical, ethical, and legal considerations. [American Journal of Obstetrics and Gynecology](#). 2003;189(2):333-341.**

There has been a transformation in the treatment of human immunodeficiency virus from the treatment of complications that define acquired immune deficiency syndrome to the maintenance of long-term health, with an expanding number of antiretroviral medications. Because human immunodeficiency virus infection now is considered to be a chronic disease, couples will be seen in greater numbers for preconception counseling. The ethical and legal implications, including the relevance of the Americans with Disability Act, are complex but support the assistance with reproduction of couples who are affected by human immunodeficiency virus in many instances. All couples who are affected by human immunodeficiency virus, whether fertile or infertile, who want to have genetically related offspring should be seen preconceptionally for counseling and testing. Intensive education involves a multidisciplinary approach to ensure that a couple is fully informed. Determination of whether to offer treatment should be based on the same criteria that are applied to couples who are affected by other chronic diseases. Medical treatment is dependent on the unique circumstances of each couple. In general, the affected partner(s) should be treated aggressively with antiretrovirals and then serum; if applicable, semen testing is required to document undetectable concentrations of human immunodeficiency virus (<50-100 copies/mL).

## **II. Contraceptive Use**

**Belzer M, Rogers AS, Camarca M, et al. Contraceptive choices in HIV infected and HIV at-risk adolescent females. [Journal of Adolescent Health](#). 2001;29(3, Suppl. 1):93-100.**

The purpose of the study was to describe reported contraception use in HIV infected and HIV uninfected but at-risk female adolescents, and determine associations with the reported consistent use of effective contraception methods, including its association with pregnancy. HIV infected and at-risk female youth, aged 13-18 years, who were sexually active and reporting no intention to become pregnant, were included in the study. Contraception use data from three consecutive visits (approximately 6 months apart) were used. Ninety-four percent of HIV infected and 89% of at-risk subjects reported choosing a main contraception method with demonstrated efficacy when used consistently. Approximately 50% chose partner condoms. HIV infected youth were more likely to report 100% partner condom use in the past 3 months (73% vs. 46%; OR 3.3; 95% CI: 1.7-5.6). At-risk youth were 2.5 times more likely than HIV infected subjects to report using nothing (95% CI: 1.1-5.8). Slightly more than half (56%) demonstrated the consistent reporting of effective methods (CREM) of contraception. In multivariate analysis, HIV infection (OR 4.0; 95% CI: 2.2-8.2) and African-American race (OR 2.7; 95% CI: 1.1-6.6) were significantly associated with CREM. Subjects reporting

inconsistent or unreliable contraception use had higher 1-year pregnancy rates than CREM subjects (32% vs. 14%;  $p = .002$ ). Only half of HIV infected and at-risk youth reported using effective contraception consistently, despite its availability. Additionally, regardless of reported contraceptive use, the rates of unplanned pregnancy were unacceptably high.

**Drey EA, Darney PD, Louie B, et al. HIV sentinel surveillance among women seeking elective pregnancy termination, San Francisco. [Sexually Transmitted Diseases](#). 2005;32(9):590-592.**

The objective of this study was to measure HIV prevalence, HIV incidence, and risk factors for infection among women seeking elective pregnancy termination in San Francisco. The authors conducted a cross-sectional survey comprising a consecutive sample of women seeking elective pregnancy termination in San Francisco's county hospital from August 2002 to July 2003. Demographic and risk behavior information was abstracted from routine clinic records. HIV testing was conducted on blood specimens collected for other purposes after removing identifying information. Based on 11 HIV-positives among 1,992 tested, HIV prevalence among women seeking pregnancy termination was 0.55% (95% confidence interval [CI], 0.28-0.99). One recent HIV seroconversion was detected for an annual incidence of 0.11% per year (95% CI, 0.23-0.88). In addition, risk factors significantly associated with HIV infection included sex with a known HIV-positive man, history of an abnormal Pap smear, history of genital herpes infection, history of trichomoniasis, and age 25 to 29 years. Women electing pregnancy termination can serve as a sentinel population to track trends in the HIV epidemic. However, barriers remain to wider implementation of the approach as a surveillance tool.

**Hopkins K, Barbosa RM, Knauth DR, et al. The impact of health care providers on female sterilization among HIV-positive women in Brazil. [Social Science and Medicine](#). 2005;61(3):541-554.**

This paper explores the reproductive preferences and outcomes of HIV-positive women in two cities in Brazil. We used three types of data, all drawn from women who delivered in public sector hospitals: (1) clinical records of 427 HIV-positive women; (2) pre- and postpartum in-depth interviews with 60 HIV-positive women; and (3) a prospective survey carried out among 363 women drawn from the general population. The HIV-positive samples were collected on women who had prenatal care between July 1999 and June 2000, and the general population survey was conducted with women who started prenatal care between April 1998 and June 1999. Among the women in the clinic sample, we found dramatic differences in the proportion sterilized postpartum: 51% in Sao Paulo vs. 4% in Porto Alegre, compared to 3.4% and 1.1%, respectively, of women in the general population. Our qualitative data suggest that HIV-positive women in this study had strong preferences to have no more future children and that female sterilization was the preferred way to achieve this end. Therefore, we conclude that the large difference in rates is mainly due to HIV-positive women's differential access to sterilization in the two settings. In-depth interviews revealed that women in Sao Paulo were often encouraged by clinic staff to be sterilized postpartum. In contrast, HIV-positive women in Porto Alegre clinics were not offered sterilization as an option and those who requested it were

repeatedly put off. The striking difference found in the frequency with which doctors provide postpartum sterilization to seropositive women in our study sites deserves attention and discussion in the respective medical communities. At the higher level of national policy on reproductive rights, there may be grounds for reopening discussion about the norms regarding postpartum procedures, and for devoting far more resources to expanding contraceptive options.

**Magalhães J, Amaral E, Giraldo PC, et al. HIV infection in women: impact on contraception. [Contraception](#). 2002;66(2):87-91.**

A study was performed to evaluate the impact of knowledge of HIV infection (diagnosis) on contraception information and choices for HIV infected women. A questionnaire was given to 140 HIV infected women. Most of the studied population included young women with a low educational level. A significant increase in the knowledge of contraceptive methods was observed after diagnosis of being HIV infected. The data suggested that the women who received information had never received it before, or that the diagnosis created a stronger motivation to listen to the counseling offered. A significant increase in the use of contraceptive methods was also found, especially male condoms and tubal ligation. Total number of children had a strong impact on contraceptive method at the time of interview. Only 5 of 23 HIV infected women who had no children used hormonal contraceptives, while 15 of 23 preferred condom use, and 3 of 23 chose not to use any contraceptive method. Tubal ligation was performed in approximately 9% of the women who had only one child. However, 12.4% of the sexually active HIV infected women were still not using any contraceptive method at the time of the interview. A combined method (male condom plus another contraceptive) was used by only 27% of sexually active HIV infected women, despite health service counseling. In conclusion, the realization of being HIV infected had a strong impact on contraceptive practice among these women. It is expected that HIV and family planning clinics will address HIV infected women's needs and be prepared to integrate contraception and gynecological care.

**Massad LS, Evans CT, Wilson TE, et al. Contraceptive use among U.S. women with HIV. [Journal of Women's Health](#). 2007;16(5):657-666.**

To describe trends in and correlates of use of contraception and sterilization among women with the human immunodeficiency virus (HIV). This was a longitudinal cohort study of HIV-infected and uninfected women at risk for pregnancy, including structured questions on contraceptive use every 6 months. Proportions of women using contraception were calculated. Multivariate generalized estimating equation models were applied, and correlates of use were determined using logistic regression. Sterilization was assessed using a Kaplan-Meier plot. Across 26,832 visits among 2784 women from 1994 to 2005, barrier methods were used at 30.5%–36.3% of visits, sterilization at 21.8%–26.5%, hormones at <10%, and no contraception at >30%. Dual use of barrier and hormones or barrier and spermicide was uncommon. In multivariable analysis, HIV serostatus was not correlated with barrier use (OR 1.10, 95% CI 0.96-1.26,  $p = 0.18$  compared with no method), but hormonal contraception was less likely in women with HIV (OR 0.73, 95% CI 0.60-0.89,  $p = 0.002$ ). Among HIV-seropositive women, barrier use was more likely among women who had been pregnant (OR 1.37, 95% CI 1.03- 1.83,

$p = 0.03$ ) and among those with higher CD4 lymphocyte counts (OR 1.10, 95% CI 1.04-1.16,  $p = 0.0006$ ), whereas hormone use was linked to higher CD4 counts (OR 1.12, 95% CI 1.03-1.23,  $p = 0.01$ ). HAART use was not associated with barrier or hormone use. HIV serostatus was linked to sterilization in Cox analysis (HR 1.32, 95% CI 0.89-1.94,  $p = 0.17$ ). Underuse of highly effective contraception and barriers leaves women with HIV at risk for unintended pregnancy and disease transmission.

**Mitchell HS, Stephens E. Contraception choice for HIV positive women. [Sexually Transmitted Infections](#). 2004;80(3):167-173.**

UNAIDS/WHO estimates that 42 million people are living with HIV/AIDS worldwide and 50% of all adults with HIV infection are women predominantly infected via heterosexual transmission. Women with HIV infection, like other women, may wish to plan pregnancy, limit their family, or avoid pregnancy. Health professionals should enable these reproductive choices by counseling and appropriate contraception provision at the time of HIV diagnosis and during follow up. The aim of this article is to present a global overview of contraception choice for women living with HIV infection including effects on sexual transmission risk.

**Stanwood NL, Cohn SE, Heiser JR, et al. Contraception and fertility plans in a cohort of HIV-positive women in care. [Contraception](#). 2007;75(4):294-298.**

The aim of this study was to examine determinants of contraceptive use, desired future childbearing and sterilization regret among HIV-positive women. One hundred eighteen HIV-positive women, age 18-46, receiving care at a university HIV clinic completed a survey on their reproductive history in 2004. We reviewed their medical records for contraception, antiretroviral medications and HIV/AIDS disease markers. We performed descriptive analysis of population characteristics and logistic regression to assess predictors of their desire to have future children. Subjects had a median age of 37 years and had been diagnosed with HIV for a mean of 9.2 years; 55% had AIDS. Most (68%) subjects were currently monogamous and 29% were abstinent. Forty-seven percent had been sterilized and of those who were sexually active but not sterilized, 90% were using reversible contraception. One third of subjects desired future childbearing, including 12% of those who had been previously sterilized. In a multivariate analysis, predictors of desire for future childbearing were younger age, not being on HIV medication, higher current CD4 cell count and having a relationship duration of less than 2 years. HIV-positive women have reproductive patterns similar to those of HIV-negative women, with most having borne children and many wanting children in the future. A substantial proportion has been sterilized and express sterilization regret. Potent antiretroviral therapy has greatly improved the outlook for HIV-infected women, even those with an AIDS diagnosis. Many HIV-positive women want to have children and would benefit from preconception counseling and counseling about reversible methods of contraception.

### **III. Decision Making**

**Bedimo AL, Bessinger R, Kissinger P. Reproductive choices among HIV-positive women. [Social Science and Medicine](#). 1998;46(2):171-179.**

The objective of this study was to describe the characteristics of HIV-positive women who become pregnant, who choose to get sterilized, and who have an elective abortion after an HIV diagnosis. All HIV-infected women between the ages of 14 and 35 years (N = 403) who were enrolled in the HIV Outpatient Program in New Orleans, U.S.A., between 1987 and 1995 were included in the study. Medical records were abstracted for reproductive outcomes and demographic and medical characteristics. The mean age of the participants was 25.8 years, 83% were African American, 71% were single, 20% had a history of IV drug use, and 35% had a history of non-IV drug use at entry. Mean follow-up time was 2.9 years. The overall incidence of pregnancy subsequent to HIV diagnosis was 6.3% per person-year of observation. Twenty-four percent of the population underwent a sterilization procedure subsequent to HIV diagnosis, and 25% of the women who became pregnant subsequent to diagnosis had an induced abortion. Factors associated with subsequent pregnancy in multivariate analysis included young age and a history of sexual assault. Factors associated with subsequent sterilization in multivariate analysis were CD4 count over 200, having one or more living children, and not living with a family member. Factors associated with subsequent abortion included being White and non-single. Sexual assault history and living with a sex partner were associated with abortion at the  $p < 0.1$  level. The study concludes that HIV-infected women tend to have lower rates of pregnancy and higher rates of sterilization and abortion than their uninfected counterparts. Counseling messages that are culturally sensitive, non-coercive, and that take into consideration the complexities of the decision-making process should be standardized for all HIV-infected women so that they can make informed decisions.

**Bedimo-Rung AL, Clark RA, Dumestre J, et al. Reproductive decision-making among HIV-Infected women. [Journal of the National Medical Association](#). 2005; 97(10):1403-1410.**

The objective of the study was to describe factors related to reproductive decision-making among HIV-infected women. A sample of HIV-infected women (N=104) who received care at an HIV clinic in the southern United States were interviewed about their reproductive decision-making. Women who became pregnant subsequent to HIV diagnosis were compared to women who did not become pregnant, and women who underwent a sterilization procedure subsequent to HIV diagnosis were compared to women who did not get sterilized. Compared to women who did not get pregnant after receiving an HIV diagnosis, women who became pregnant were more likely to be young, single, diagnosed earlier in the epidemic and to have more recently used a noninjecting drug. Among women who did not get pregnant, 63% reported their diagnosis greatly affected that decision. Having a partner who wants more children was not associated with pregnancy. Compared to women who did not get sterilized after learning their HIV status, women who did get sterilized tended to be Baptist and already had a prior live birth. Neither a woman's desire nor her partner's desire for more children was associated with sterilization. HIV is an important influence on HIV-infected women's reproductive

choices, regardless of the decision being made. Reproductive counseling by HIV care providers' needs to be sensitive to all the issues faced by these women.

**Chen JL, Phillips KA, Kanouse DE, et al. Fertility desires and intentions of HIV-positive men and women. [Family Planning Perspectives](#). 2001;33(4):144-152 & 165.**

HIV-positive men and women may have fertility desires and may intend to have children. The extent of these desires and intentions and how they may vary by individuals' social and demographic characteristics and health factors is not well understood. Interviews were conducted from September through December 1998 with 1,421 HIV-infected adults who were part of the HIV Cost and Services Utilization Study, a nationally representative probability sample of 2,864 HIV-infected adults who were receiving medical care within the contiguous United States in early 1996. Overall, 28-29% of HIV-infected men and women receiving medical care in the United States desire children in the future. Among those desiring children, 69% of women and 59% of men actually expect to have one or more children in the future. The proportion of HIV-infected women desiring a child in the future is somewhat lower than the overall proportion of U.S. women who desire a child. The fertility desires of HIV-infected individuals do not always agree with those of their partners: As many as 20% of HIV-positive men who desire children have a partner who does not. Generally, HIV-positive individuals who desire children are younger, have fewer children and report higher ratings of their physical functioning or overall health than their counterparts who do not desire children, yet desire for future childbearing is not related to measures of HIV progression. HIV-positive individuals who expect children are generally younger and less likely to be married than those who do not. Multivariate analyses indicate that black HIV-positive individuals are more likely to expect children in the future than are others. While HIV-positive women who already have children are significantly less likely than others both to desire and to expect more births, partner's HIV status has mixed effects: Women whose partner's HIV status is known are significantly less likely to desire children but are significantly more likely to expect children in the future than are women whose partner's HIV status is unknown. Moreover, personal health status significantly affects women's desire for children in the future but not men's, while health status more strongly influences men's expectations to have children. The fact that many HIV-infected adults desire and expect to have children has important implications for the prevention of vertical and heterosexual transmission of HIV, the need for counseling to facilitate informed decision-making about childbearing and childrearing, and the future demand for social services for children born to infected parents.

**Craft SM, Delaney RO, Bautista DT, et al. Pregnancy decisions among women with HIV. [AIDS and Behavior](#). 2007;11(6):927-935.**

Nearly 80% of women currently infected with HIV are of childbearing age. As women of childbearing age continue to be at risk of contracting HIV, there will be an increased need for choices about whether or not to have biological children. The purpose of this exploratory study was to investigate the influence of partners, physicians, and family members on pregnancy decisions, as well as the impact of HIV stigma on these decisions. Results indicated that most women chose not to become pregnant since learning their HIV diagnosis and the woman's age at the time of diagnosis is significantly associated

with this decision. Additional factors included fear of transmitting HIV to their child, personal health-related concerns, and desire to have children. Women with a procreative inclination were more likely to choose to become pregnant which outweighed social support and personal health concerns. Implications and suggestions for future research are noted.

**De Bruyn M. Safe abortion for HIV-positive women with unwanted pregnancy: a reproductive right. [Reproductive Health Matters](#). 2003;11(22):152-161.**

About 2.5 million women who become pregnant each year worldwide are HIV-positive. UNAIDS recommends that HIV-positive women should be able to control their fertility and to prevent HIV transmission perinatally if they decide to have children. Yet a literature review on these matters found that termination of pregnancy for HIV-positive women receives very little attention. This paper describes the difficulties faced by HIV-positive women in obtaining safe, legal, affordable abortion services. It shows that voluntary HIV counseling and testing for women seeking induced abortions and post-abortion care may not be provided. HIV-positive women want to avoid pregnancy for the same reasons as other women, but they also do not want to infect their partners through unprotected sex, worry about effects of pregnancy and childbirth on their own health, or about infecting a child and the child's future care. Little research has been done on whether HIV positive women have a greater risk of morbidity following unsafe abortions than HIV-negative women, but evidence suggests they might. Studies in Zimbabwe and Thailand show that when information and access to legal pregnancy termination are lacking, HIV-positive women may be prevented from terminating a pregnancy. The paper concludes that it is essential for women living with HIV/AIDS to be able to exercise their right to decide whether and when to have children.

**Ezeanolue EE, Wodi AP, Patel R, et al. Sexual behaviors and procreational intentions of adolescents and young adults with perinatally acquired human immunodeficiency virus infection: experience of an urban tertiary center. [Journal of Adolescent Health](#). 2006;38(6):719-725.**

To assess sexual knowledge, behaviors, and procreational intentions of adolescents and young adults with perinatally acquired human immunodeficiency virus (PNA HIV) infection. Increasingly, children with PNA HIV infection survive to adolescence and become sexually active. Understanding their procreational intentions could aid in designing reproductive health and secondary prevention programs. A cross-sectional survey of adolescents and young adults with PNA HIV infection at an urban tertiary center was conducted. From June 2003 through September 2004, participants completed a questionnaire that inquired about their sexual knowledge and behaviors. Participants aware of their diagnoses also completed items regarding procreational intentions. Seventy-four percent (57/77) of eligible participants completed the survey. Thirty-three percent (19/57) of participants reported having had penile-vaginal intercourse, 89.4% of them after learning of their HIV status. Fifty percent (5/10) of sexually active female participants had been pregnant. Among the 50 participants who were aware of their diagnosis, 70% (n = 35) expressed intent to have children. A majority of those aware of the risk of maternal-to-child transmission (MTCT) (71.1%) expressed intent to procreate. Participants who perceived MTCT as low were more likely to express intent to procreate



than those who perceived the risk of MTCT as high. Adolescents with PNA HIV infection are becoming sexually active and express intent to have children. This has important implications for secondary prevention of HIV infection. These adolescents need innovative intervention programs offering reproductive health education including procreational choices and considerations.

**Heard I, Sitta R, Lert F, et al. Reproductive choice in men and women living with HIV: evidence from a large representative sample of outpatients attending French hospitals (ANRS-EN12-VESPA Study). [AIDS](#). 2007;21(Suppl. 1):S77-S82.**

In France, the third decade of the HIV epidemic is characterized by a lower age among women who have been recently infected with HIV. This study analysed factors associated with the desire for a child in a sample of heterosexual women and men of reproductive age living with HIV. Individuals of reproductive age within the VESPA study were included in the analysis. Desire for a child was analysed according to reproductive potential, cultural aspects and HIV-related health condition (CD4 cell count, plasma HIV load and being on treatment). A total of 555 women and 699 men who self-identified as heterosexual and did not report a medical diagnosis of infertility, were included in the analysis. Among them, 33% of the women and 20% of the men stated that they expected to have children in the future. In multivariate analysis, significant predictors of the desire for a child included factors associated with reproductive potential (younger age, already being a parent, regular relationship), the HIV status of the regular partner and ethnicity (African origin). HIV-related health status did not affect reproductive intentions among men and women. For both men and women, reproductive potential, ethnicity and partner's HIV status influenced the desire for a child, whereas the person's own clinical condition in relation to HIV had low impact. Reproductive counseling integrated into HIV care should take into account cultural aspects in order to help people living with HIV examine issues of parenthood.

**Kirshenbaum SB, Hirky AE, Correale J, et al. "Throwing the dice": Pregnancy decision-making among HIV-positive women in four U.S. cities. [Perspectives on Sexual and Reproductive Health](#). 2004;36(3):106-113.**

Although AIDS-related deaths among U.S. women have decreased, the number of HIV-positive women, especially of reproductive age, has increased. A better understanding of the interaction between HIV and family planning is needed, especially as antiretroviral medications allow HIV-positive women to live longer, healthier lives. Qualitative methods were used to examine pregnancy decision-making among 56 HIV-positive women in four U.S. cities. Biomedical, individual and socio-cultural themes were analyzed in groups of women, categorized by their pregnancy experiences and intentions. Regardless of women's pregnancy experiences or intentions, reproductive decision-making themes included the perceived risk of vertical transmission, which was often overestimated; beliefs about vertical transmission risk reduction strategies; desire for motherhood; stigma; religious values; attitudes of partners and health care providers; and the impact of the mother's health and longevity on the child. Most women who did not want children after their diagnosis cited vertical transmission risk as the reason, and most of these women already had children. Those who became pregnant or desired children after their diagnosis seemed more confident in the efficacy of risk reduction strategies

and often did not already have children. Future studies may help clarify the relationship between factors that influence pregnancy decision-making among HIV-positive women. HIV-positive and at-risk women of childbearing age may benefit from counseling interventions sensitive to factors that influence infected women's pregnancy decisions.

**Klein J, Peña JE, Thornton MH. Understanding the motivations, concerns, and desires of human immunodeficiency virus 1–serodiscordant couples wishing to have children through assisted reproduction. [Obstetrics and Gynecology](#). 2003;101(5 Part 1):987-994.**

To survey the attitudes of human immunodeficiency virus (HIV)–serodiscordant couples interested in assisted reproduction and better characterize their motivations for reproducing. A prospectively designed questionnaire and open-ended interview of 50 consecutive HIV-serodiscordant couples interested in undergoing assisted reproduction to avoid transmission of virus were studied. Demographic characteristics and attitudes regarding beginning a family were obtained. By design, males were HIV seropositive (age,  $38.0 \pm 5.4$  years, range 26–51 years) and healthy. Women were HIV seronegative (age,  $34.5 \pm 5.1$  years, range 24–45 years). Most couples were married (44 of 50) and in long-term relationships (duration of relationship,  $8.9 \pm 4.9$  years, range 1–20 years). Before presentation, nine of 50 couples had conceived and delivered a child (three of nine instances with knowledge of paternal HIV status). Previous timed intercourse occurred in 8% of couples (four of 50). Six individuals stated they would proceed with timed intercourse if no other alternatives existed. Forty-eight percent said they would prefer artificial insemination with donor sperm in lieu, if assisted reproduction failed or were unavailable. Forty-three percent of respondents would pursue “posthumous conception” if cryopreserved sperm or embryos were available in the event of the partner’s death. Most couples discussed the possibility of single parenting (45 of 50; 90%) or the possibility for adoptive parenting (29 of 50; 58%). Couples were aware of risk, and 92% (46 of 50) understood that their child might contract HIV. Human immunodeficiency virus–serodiscordant couples are actively seeking reproductive assistance and often consider or practice unsafe measures to achieve pregnancy. Reproductive issues and concerns unique to these couples need to be addressed before treatment.

**McCreary LL, Ferrer LM, Ilgan PR, et al. Context-based advocacy for HIV-positive women making reproductive decisions. [Journal of the Association of Nurses in AIDS Care](#). 2003;14(1):41-51.**

As the number of HIV-positive women of childbearing age continues to rise, and treatments available to manage HIV become more accessible, the issue of HIV-positive women’s reproductive decision making is gaining importance for nurses in AIDS care. Nurses and other health professionals care for these women as they decide whether to bear children. The decision whether to have children is complex and influenced by a number of individual and societal factors, creating an ethical tension between the interests of HIV-positive women and those of society. This article proposes a six-step, context-based advocacy process for nurses and other health professionals who interact with HIV-positive women of childbearing age. The advocacy process described is grounded in a review of literature on HIV/AIDS, factors influencing HIV-positive women’s reproductive choices, and nursing advocacy. The proposed advocacy process

enables nurses to support women's self-determination and decision making in a way that is informative and empowering.

**Ogilvie GS, Palepu A, Remple VP, et al. Fertility intentions of women of reproductive age living with HIV in British Columbia, Canada. [AIDS](#). 2007;21 (Suppl. 1):S83-S88.**

We undertook a study to examine the fertility intentions and reproductive health issues of women living with HIV in a broad-based sample in British Columbia, Canada. Between November 2003 and December 2004, we invited women with HIV at all HIV clinics and AIDS service organizations in the province of British Columbia, Canada, to complete the survey instrument 'Contraceptive Decisions of HIV-positive Women'. Logistic regression analysis was conducted to calculate adjusted odds ratios to identify factors that may be significant predictors of the intention of women living with HIV to have children. Of the 230 surveys completed, 182 women (79.1%) were of reproductive age ( $\leq 44$ ), and 25.8% of women living with HIV indicated an intention to have children. In multivariate modeling, non-aboriginal ethnicity, younger age and having a regular partner were associated with an increased likelihood of reporting the intention to have children in the future. In this study, we found that the predictors of fertility intention of women with HIV were age, ethnicity and marital status. Women who were HIV-positive described an intention to have children at levels approaching those among the general population and regardless of their clinical HIV status. Public policy planners and health practitioners need to consider and plan for the implications of increased numbers of women with HIV who may choose to have children.

**Paiva V, Santos N, Franca-Junior I, et al. Desire to have children: gender and reproductive rights of men and women living with HIV: A challenge to health care in Brazil. [AIDS Patient Care and Sexually Transmitted Diseases](#). 2007;21(4):268-277.**

Links between HIV/AIDS care and reproductive health, including fertility options for people living with HIV (PLWH), have not been sufficiently addressed by health care providers. Moreover, few studies have addressed men in this regard. To describe attitudes toward parenthood and identify factors associated with desire to have children among men and women living with HIV a cross-sectional study involving a sample of 533 women and 206 men (bisexual and heterosexual) attending two reference sexually transmitted disease (STD)/AIDS centers in São Paulo, Brazil. Participants answered a standardized questionnaire. Desire to have children as the study outcome was compared between men and women and associated factors searched for in multivariable regression analysis. In contrast to previous studies conducted in developed countries, desire to have children in this sample was more frequent among men than among women and it was reported by 27.9% of participants (50.1% of men versus 19.2% of women). Women were more likely to anticipate doctors' strong opposition to PLWH getting pregnant and men reported lower information level about HIV/mother-to-child transmission (MTCT). Bisexual men were more likely to desire to have biologic children. Male gender, younger age, having no children, living with 1–2 children, and being in a heterosexual partnership were independently associated with desire to have children. Regardless of gender, the childless as well as the youngest should be regarded as groups to be particularly targeted

by counseling, to be provided with objective information about reproductive rights and options. Further research is warranted to address the desire for children among strictly homosexual men.

**Silverman NS, Rohner DM, Turner BJ. Attitudes toward health-care, HIV infection, and perinatal transmission interventions in a cohort of inner-city, pregnant women. [American Journal of Perinatology](#). 1997;14(6):341-346.**

The objective of this article is to explore attitudes of an inner-city, pregnant cohort about general and HIV-related prenatal care. Responses to an interview at initial prenatal care enrollment were compared using Chi-square and Fisher's exact tests. Of 75 women, drug users (51%) were more likely to say that they would defer initiating prenatal care ( $P = 0.03$ ) and to minimize the risk of drug or alcohol use to the fetus ( $P = 0.04$ ). Most (85%) viewed pregnancy as inappropriate for HIV infected women and primarily drug users ( $P = 0.06$ ) would abort if HIV infected. Over half thought HIV transmission occurred most times or always. Only 20% had heard of a drug to reduce this risk, but 95% would take such a therapy. These inner-city, pregnant women disapproved of pregnancy if HIV infected and thought the risk of transmission was high. They knew little of how to reduce this risk but nearly all would accept a drug to prevent transmission.

**Smits AK, Goergen CA, Delaney JA, et al. Contraceptive use and pregnancy decision-making among women with HIV. [AIDS Patient Care and Sexually Transmitted Diseases](#). 1999;13(12):739-746.**

HIV is a growing epidemic among women in the United States. This study seeks to determine if knowledge of HIV infection and of the benefits of prenatal zidovudine (ZDV) to decrease vertical HIV transmission is related to decisions about pregnancy planning, contraceptive and condom use, and pregnancy termination among noninjection drug using (IDU) women with HIV. Eighty-two HIV-infected women were interviewed about their pregnancy decisions, contraceptive and condom use, and pregnancy outcome. Data was verified by structured chart review where available. Awareness of HIV infection or knowledge of the benefits of prenatal ZDV use did not significantly influence pregnancy planning, contraceptive choice, use of contraception, or consideration of pregnancy termination. Condom use was extremely low (14.6% consistent use), the majority of pregnancies (68.0%) were unplanned, contraceptive use was low (50.9%), and few pregnancies were terminated (6.3%). Women on Medicaid were significantly less likely than women with private or no insurance to terminate their pregnancy (2/20, 10% vs. 3/5, 60%,  $p = 0.04$ , two-tailed Fisher's exact test). Most women (70.0%) reported the most important reason for carrying the pregnancy to term was the desire for a child. In conclusion, among women in this non-IDU, Midwestern cohort, knowledge of HIV infection was not associated with decisions to plan a pregnancy, use contraception if not planning pregnancy, or terminate an unplanned pregnancy.

**Sowell RL, Murdaugh CL, Addy CL, et al. Factors influencing intent to get pregnant in HIV-infected women living in the southern USA. [AIDS Care](#). 2002; 14(2):181-191.**

This descriptive study sought to identify factors that influence HIV-infected women's intent to get pregnant. Interviews were conducted with a convenience sample of  $n = 322$  HIV-infected women at risk for pregnancy. Participants were predominantly African-American (84.4%), single (57.9%), and ranged in age from 17 to 48 years. Forty per cent ( $n = 128$ ) of the women had been pregnant since becoming HIV-positive. Potential factors influencing intent to get pregnant that were examined included demographic characteristics, HIV-related factors and personal beliefs and attitudes. In simple logistic regression models, younger age, increased motivation for child bearing, decreased perceived threat of HIV, decreased HIV symptomatology, higher traditional gender role orientation, and greater avoidance coping were all associated with greater intent to get pregnant. Following a model selection procedure, motivation for child bearing (OR = 16.05, 95% CI 7.95, 30.41) and traditional sex roles (OR = 4.49, 95% CI 1.44, 13.55) were significantly associated with greater intent to get pregnant. Traditional gender role orientation and motivation for childbearing are significant factors in predicting intent to get pregnant among HIV-infected women. These factors, as well as other non HIV-related factors, need to be routinely assessed by health care providers in developing plans of care for HIV-infected women.

**Stephenson JM, Griffioen A. The effect of HIV diagnosis on reproductive experience. Study Group for the Medical Research Council Collaborative Study of Women with HIV. [AIDS](#). 1996;10(14):1683-1687.**

To compare rates of reproductive events before and after HIV diagnosis in a cohort of women with HIV infection, and to consider the impact of HIV diagnosis on the outcome of pregnancy. Observational cohort study of 503 women recruited from 15 genitourinary medicine/HIV clinics in Britain and Ireland. The 503 women had 580 pregnancies before diagnosis of HIV infection and 202 after HIV diagnosis. Using date of birth, date of HIV diagnosis, the outcome of all lifetime pregnancies and date of each outcome, age-specific rates (per 100 women-years) of pregnancy, miscarriage, termination and live-birth were calculated before HIV diagnosis, and separately after HIV diagnosis. Rates after HIV diagnosis were age-standardized for comparison with rates before HIV diagnosis. Rates were also calculated separately by ethnic group and HIV transmission group. In women aged 20-34 years, the age-adjusted live-birth rate fell by 44% from 10.2 [95% confidence interval (CI), 9.2-11.2] per 100 women-years before HIV diagnosis to 5.7 (95% CI, 4.3-7.1) after diagnosis. Most of the decline reflected an increase in termination rate from 3.5 (95% CI, 2.9-4.1) before HIV diagnosis to 6.3 (95% CI, 4.7-7.9) after diagnosis. A decline in live-births together with a rise in termination after HIV diagnosis was a consistent finding across age and ethnic groups. However, black African women had the smallest reduction in live-births, despite the greatest increase in termination, because the pregnancy rate increased after HIV diagnosis in this group. Diagnosis of HIV infection in women has a substantial impact in reducing live-birth rates. These findings have important implications for expanding HIV testing in women. They highlight the need for

better understanding of reproductive decision-making in the context of HIV infection and better contraceptive support for HIV-infected women and their partners.

**Stuart GS, Castano PM, Sheffield JS, et al. Postpartum sterilization choices made by HIV-infected women. [Infectious Diseases in Obstetrics and Gynecology](#). 2005; 13(4):217-222.**

To assess if HIV-infected women made different choices for postpartum sterilization after implementation of the Pediatric AIDS Clinical Trials Group protocol 076 (November 1, 1994) compared to before implementation. A retrospective cohort study in which medical records were reviewed to obtain demographic, obstetric and HIV-related data from January 1993 through December 2002. HIV-infected women who completed a pregnancy by birth or abortion were divided into two comparison groups: “Pre-076” and “Post-076”. The primary outcome was sterilization by postpartum tubal ligation. Forty-two women (74%) in the Pre-076 group chose sterilization compared to 139 of 310 women (45%) in the Post-076 group (unadjusted OR 3.44, 95% CI 1.83, 6.47). Seventy-one percent of women younger than 21 years of age in the Pre-076 Group chose sterilization compared with only 35% of women younger than 21 years in the Post-076 group ( $p = 0.0136$ ). Similarly, 78% of primiparous women chose sterilization after their first pregnancy in the Pre-076 group, compared to 14% in the Post-076 group ( $p < 0.001$ ). Since the implementation of PACTG 076 protocol in November 1994, fewer HIV-infected women chose postpartum sterilization. The typical woman who now chooses postpartum sterilization is less likely to be young or primiparous than those who chose sterilization before PACTG Protocol 076 implementation.

**Thackway SV, Furner V, Mijch A, et al.. Fertility and reproductive choice in women with HIV-1 infection. [AIDS](#). 1997;11(5):663-667.**

To measure fertility and birth rates and to describe the reproductive histories of women diagnosed with HIV-1 infection in Australia. The medical records of 294 women with HIV-1 infection in four states of Australia were reviewed. Expected fertility and birth rates were calculated using national statistics. In the study population, 152 (52%) women had at least one pregnancy prior or subsequent to HIV-1 diagnosis. At maternal HIV-1 diagnosis, 71 (24%) women had a total of 106 children aged under 15 years. During the study period, 246 women were aged 15-44 years and 58 (23%) of these became pregnant after HIV-1 diagnosis. Women whose exposure to HIV-1 was injecting drug use were twice as likely to become pregnant and more likely to have multiple pregnancies than women who did not report injecting drug use. The annual general fertility rate was 30 per 10,000 compared with 63 per 10,000 for the Australian female population (aged 15-44 years), and the birth rate in women with HIV-1 infection was one-half that of the general female population. Of pregnancies confirmed after HIV-1 diagnosis, 47% were voluntarily terminated, a rate more than double that of the general population. All multiple terminations were among women whose exposure to HIV-1 was injecting drug use. Fertility and birth rates among women with HIV-1 infection are lower than the general population and the rate of termination higher. The results of this study provide a basis for the management of women with HIV-1 infection who are considering pregnancy.

**Thornton AC, Romanelli F, Collins JD. Reproduction decision making for couples affected by HIV: a review of the literature. [Reproduction Decision Making](#). 2004; 12(2):61-67.**

Medical issues faced by HIV-affected couples include transmission risks between partners and between mother and child, as well as the technologies and procedures available to reduce those risks. Assisted reproductive techniques discussed are artificial insemination, in vitro fertilization, intracytoplasmic sperm injection, self-insemination, and timed intercourse. It is important that physicians be aware of reproductive options available to couples affected by HIV and be prepared to engage in nonjudgmental dialogue with patients. This review is the result of a literature search performed to identify useful information to counsel HIV-serodiscordant and HIV-seroconcordant couples facing decisions on reproduction.

**van Benthem BH, de Vincenzi I, Delmas MC, et al. Pregnancies before and after HIV diagnosis in a European cohort of HIV-infected women. [AIDS](#). 2000; 14(14):2171-2178.**

Because most HIV-infected women are of reproductive age, we investigated whether their reproduction planning was affected by their HIV diagnosis. The European women study is a prospective, multicentre cohort of 485 HIV-infected women with a known interval of seroconversion. The incidence of pregnancy was measured with person-time methods. Generalized estimating equation analysis was used to determine risk factors for pregnancy and pregnancy outcomes. In 449 women, the age-adjusted incidence of pregnancies decreased from 8.6 before HIV diagnosis to 8.2 and 6.0 per 100 person-years in 0-4 and over 4 years after HIV diagnosis, respectively ( $P = 0.14$ ). The proportion of induced abortions increased from 42% before to 53% after HIV diagnosis ( $P < 0.05$ ). The risk of spontaneous abortion did not increase as a result of HIV infection. Since 1995, the proportion of births increased ( $P = 0.009$ ), whereas that of induced abortions decreased ( $P = 0.01$ ) compared with earlier years. An increased risk of pregnancy after HIV diagnosis was found in northern and central European women compared with southern European women; there was a lower risk in single women than in women with a steady partner. Of all pregnant women, single women, women between 15 and 25 years of age, and women with multiple partners were at increased risk for induced abortion both before and after HIV diagnosis. The incidence of pregnancy decreased with HIV disease progression. Pregnancies after HIV diagnosis appear to be related largely to social and cultural attitudes. The number of induced abortions was high before HIV diagnosis and it significantly increases thereafter.

**Van Leeuwen E, Prins JM, Jurriaans S, et al. Reproduction and fertility in human immunodeficiency virus type-1 infection. [Human Reproduction Update](#). 2007; 13(2):197-206.**

Human immunodeficiency virus type-1 (HIV-1) affects mostly men and women in their reproductive years. For those who have access to highly active antiretroviral therapy (HAART), the course of HIV-1 infection has shifted from a lethal to a chronic disease. As a result of this, many patients with HIV-1 consider having offspring, as do other patients of reproductive age with chronic illnesses. This article summarizes the current

knowledge on the presence of HIV in the male and female genital tract, the effects of HIV-1 infection and HAART on male and female fertility and the results of various assisted reproduction techniques (ART) in HIV-1-infected men and women who wish to have offspring.

**Wesley Y. Desire for children among black women with and without HIV infection. [Journal of Nursing Scholarship](#). 2003;35(1):37-43.**

To determine the relationship among self-esteem, self-efficacy, and desire for children, and to contrast these concepts between black women with and without HIV infection. A nonrandom sample of 98 black women, 52 HIV positive and 46 HIV negative, recruited from an American inner-city health center, completed four questionnaires: the Rosenberg Self-Esteem Scale, the General Self-Efficacy Subscale, a modified Index of Parenthood Motivation, and a background information sheet. Data were analyzed using descriptive statistics, zero-order correlations, and multiple regression techniques. Increased self-esteem and self-efficacy were positively correlated with desire for children in both HIV infected and uninfected black women. No significant difference in the intensity of desire for children was found between uninfected black women and HIV-infected black women. The combination of age, number of previous abortions, and strength of religious belief was a better predictor of desire for children than was self-esteem and self-efficacy. Variables other than HIV status were significantly correlated with desire for children among these low-income black women with and without HIV infection.

**Williams HA, Watkins CE, Risby JA. Reproductive decision-making and determinants of contraceptive use in HIV-infected women. [Clinical Obstetrics and Gynecology](#). 1996;39(2):333-343.**

Perinatal transmission and reproductive decisions of HIV-infected women can be categorized in statistical and epidemiological terms. These reports and figures, however, do little to fully explain the complexities of human relationships, life experiences, personal and cultural influences, and situational and environmental variables that impact on the HIV-infected woman regarding reproductive decision-making. It is only with genuine attempts to understand the woman's perspective and the dynamic and unique variables that influence reproductive decision-making, as well as maintaining a non-judgmental and culturally sensitive perspective, can we hope to assist women, and society as a whole, in coming to terms with the complexities of HIV and reproductive decision-making. Further study is needed to identify factors that influence reproductive decision-making in HIV-infected women. The determinants of contraceptive use regarding demographic factors, barriers to contraceptive use, and factors that contribute to successful contraceptive use in this population must be understood if efforts to reduce the number of unplanned pregnancies are to be successful. More conclusive data are needed on the safety and efficacy of oral contraceptives in HIV-infected women as well as data that describe the effects of longer acting hormonal contraceptives such as levonorgestrel implants (Norplant; Wyeth-Ayerst, Philadelphia, PA) and injectable medroxyprogesterone acetate (Depo Provera; Upjohn Company, Kalamazoo, MI). More research is needed to determine the effects of patient education and counseling and closer follow-up on effective long-term contraception in HIV-infected women.



#### **IV. Reproductive Needs**

**Allen S, Serufilira A, Gruber V, et al. Pregnancy and contraception use among urban Rwandan women after HIV testing and counseling. [American Journal of Public Health](#). 1993;83(5):705-710.**

This study examined hormonal contraceptive use and pregnancy in urban Rwandan women, following human immunodeficiency virus (HIV) antibody testing and counseling. A sample of 1458 childbearing urban Rwandan women aged 18 to 35 years was tested and followed for 2 years. At enrollment, 17% of 998 HIV-negative women and 11% of 460 HIV-positive women were pregnant, and 17% vs 23%, respectively, were using hormonal contraceptives. One year later, half of the HIV-positive and one third of the HIV-negative hormonal-contraceptive users had discontinued use. The 2-year incidence of pregnancy was 43% in HIV-positive and 58% in HIV-negative women. HIV-positive women with fewer than four children were more likely to become pregnant than those with four or more; this association persisted in multivariate analyses but was not noted among HIV-negative women. At the end of the study, over 40% of non-users said that they would use hormonal contraception if it was provided at the study clinic, but 40% of HIV-positive women desired more children. Research is needed to identify the practical and psychosocial obstacles to effective long-term contraception among HIV-positive women. HIV counseling programs must specifically address the issue of childbearing.

**da Silveira Rossi A, Fonsechi-Carvasan GA, Makuch MY, et al. Factors associated with reproductive options in HIV-infected women. [Contraception](#). 2005;71(2005): 45-50.**

A cross-sectional study was conducted in Campinas, Brazil, in HIV-infected women to evaluate factors associated with reproductive practices. A total of 112 HIV-infected women, 13 to 45 years old, with previous sexual experience were included in the study. Three groups were compared: pregnant women aware of their infection before current pregnancy, sterilized women who had made their reproductive choice after serodiagnosis and women using any reversible contraceptive method. Fisher's Exact Test and multivariate correspondence analysis were used in the statistical analysis. Among women interviewed, 23% were pregnant, 18% had been sterilized and 59% were using a reversible contraceptive method. Being younger was associated with reproductive practices that preserved the possibility of having a child. Reversible contraceptive users had fewer pregnancies and more often reported a desire to have children compared to the other groups. Partner's desire for parenthood was associated with pregnant and sterilized women. The clinical condition of the women and their partners, the serologic status of partner nor counseling about contraceptive choices influenced reproductive practices.

**De Vincenzi I, Jadand C, Couturier E, et al. Pregnancy and contraception in a French cohort of HIV-infected women. [AIDS](#). 1997;11(3):333-338.**

The objective of this study is to describe the impact of HIV diagnosis on contraception, incidence of pregnancy and live-births among HIV-infected women in France. Follow-up of women included in a French cohort of HIV-infected adults (SEROCO). In 17 hospital-

based units and one private practitioners' network in the Paris area and south-east region of France, 412 HIV-infected women (volunteers) were enrolled from 1988 to 1993, shortly after HIV diagnosis (median, 3 months), and followed for a median of 3 years. The main outcome measures were incidence and outcome of pregnancy, proportions of women sexually active and methods of contraception. The incidence of pregnancy decreased significantly from 20.4 per 100 person-years in the year preceding HIV diagnosis to 7.9 per 100 person-years after HIV diagnosis ( $P < 0.001$ ), whereas the proportion of pregnancies voluntarily interrupted doubled (63 versus 29%). The proportion of women who were sexually inactive increased from 5% before HIV diagnosis to 20% thereafter. During follow up, 80% of sexually active women were using contraceptive methods. The study supports an association between the discovery of HIV infection and a decrease in the proportion of women who are sexually active, a decrease in the incidence of pregnancy in general and live-births in particular, and an increase in the proportion of pregnancies voluntarily interrupted. Nevertheless, 24% of the women became pregnant and around 20% of sexually active women were not using any contraception. The high rate of voluntary abortion may indicate that many of these pregnancies were unplanned and could have been prevented.

**Frodsham LC, Boag F, Barton S, et al. Human immunodeficiency virus infection and fertility care in the United Kingdom: demand and supply. [Fertility and Sterility](#). 2006;85(2):285-289.**

The purpose of this study was to collect data on the demand and provision of fertility care in HIV-infected couples in the United Kingdom and data on the etiology of subfertility in this population. A postal questionnaire survey and audit of causes of infertility in HIV-infected women. Seventy-four Human Embryology and Fertilisation Authority-registered assisted conception units (ACUs) and 294 genitourinary medicine (GUM) clinics in the United Kingdom were sent questionnaires. The participants consisted of 65 HIV-infected women attending the Research Clinic at the Chelsea and Westminster ACU. Number of ACUs treating HIV-infected patients and number of GUM clinics receiving requests for referral, as well as the etiology of subfertility in HIV-infected women attending our clinic. Response rates from ACUs and GUM clinics were 93% and 63%, respectively. Fourteen ACUs (20%) were treating HIV-infected men; of these, seven (10%) performed sperm washing, but only two (3%) tested sperm for HIV after processing, before use. Nine units (13%) treated HIV-infected women, but only three ACUs (4%) had separate laboratories for handling potentially infected gametes or embryos. Of the 15,211 patients registered in 81 GUM clinics, 4% of the men and 16% of the women had requested advice on conceiving. An audit of the Chelsea and Westminster HIV fertility clinic demonstrated a 40% prevalence of tubal factor infertility in HIV-infected women. Demand is high, and set to increase, but current suboptimal practice in some centers is placing unaffected partners and the unborn child at risk of seroconversion.

**Gray RH, Wawer MJ, Serwadda D, et al. Population-based study of fertility in women with HIV-1 infection in Uganda. [Lancet](#). 1998;351(9096):98-103.**

To assess the effects of HIV-1 and other sexually transmitted infections on pregnancy, we undertook cross-sectional and prospective studies of a rural population in Rakai district, Uganda. Four thousand eight hundred and thirteen sexually active women aged 15-49

years were surveyed to find out the prevalence of pregnancy by interview and selective urinary human chorionic gonadotropin tests. The incidence of recognised conception and frequency of pregnancy loss were assessed by follow-up. Samples were taken to test for HIV-1 infection, syphilis, and other sexually transmitted diseases. At time of survey 757 (21.4%) of 3544 women without HIV-1 infection or syphilis were pregnant, compared with 46 (14.6%) of 316 HIV-1-negative women with active syphilis, 117 (14.2%) of 823 HIV-1-positive women with no concurrent syphilis, and 11 (8.5%) of 130 women with both syphilis and HIV-1 infection. The multivariate adjusted odds ratio of pregnancy in HIV-1-infected women was 0.45 (95% CI 0.35-0.57); the odds of pregnancy were low both in HIV-1-infected women without symptoms (0.49 [0.39-0.62]) and in women with symptoms of HIV-1-associated disease (0.23 [0.11-0.48]). In women with concurrent HIV-1 infection and syphilis the odds ratio was 0.28 (0.14-0.55). The incidence rate of recognised pregnancy during the prospective follow-up study was lower in HIV-1-positive than in HIV-1-negative women (23.5 vs. 30.1 per 100 woman-years; adjusted risk ratio 0.73 [0.57-0.93]). Rates of pregnancy loss were higher among HIV-1-infected than uninfected women (18.5 vs. 12.2%; odds ratio 1.50 [1.01-2.27]). The prevalence of HIV-1 infection was significantly lower in pregnant than in non-pregnant women (13.9 vs. 21.3%). Pregnancy prevalence is greatly reduced in HIV-1-infected women, owing to lower rates of conception and increased rates of pregnancy loss. HIV-1 surveillance confined to pregnant women underestimates the magnitude of the HIV-1 epidemic in the general population.

**Hankins C, Tran T, Lapointe N, et al. Sexual behavior and pregnancy outcome in HIV-infected women. Canadian Women's HIV Study Group. [Journal of the Acquired Immune Deficiency Syndromes and Human Retrovirology](#). 1998;18(5): 479-487.**

Sexual behavior and pregnancy outcome data for 392 HIV-infected women were analyzed. During the 6 months before study entry, 71.2% (279 of 392 women) were sexually active. In multivariate regression, women with baseline CD4+  $\geq 200/\mu\text{l}$  were more likely than women with CD4+  $< 200/\mu\text{l}$  to be sexually active (adjusted odds ratio [OR] = 1.75; 95% confidence interval [CI], 1.06-2.88;  $p = .03$ ). Consistent condom use was reported with 58.4% (149 of 255) of steady male partners and 65.7% (23 of 35) of casual partners. Overall, 90.3% of 279 sexually active women were using contraception. Among women aged between 15 and 44 years ( $n = 320$ ), the incidence of pregnancy in the year before HIV diagnosis was 27.5 per 100 person-years (PY) (95% CI, 22.1-33.9) compared with 8.3/100 PY (95% CI, 6.8-10.2) in the time since HIV diagnosis ( $p < .001$ ). The incidence of therapeutic termination of pregnancies conceived in the 20 weeks before HIV diagnosis (10.6/100 PY) was more than triple that after diagnosis (3.1/100 PY;  $p = .001$ ). After publication of results of zidovudine prophylaxis of mother-to-child transmission, pregnancy rates did not increase, but the incidence of therapeutic abortion dropped from 4.3/100 PY to 1.4/100 PY ( $p = .009$ ). Knowledge of sexual behavior, including pregnancy frequency and outcome, can assist in tailoring counseling for HIV-infected women concerning sexual and reproductive health.

**Heard I, Potard V, Costagliola D, et al. Contraceptive use in HIV-positive women. [Journal of the Acquired Immune Deficiency Syndromes](#). 2004;36(2):714-720.**

The objective was to describe contraceptive use in women with HIV infection in France over the past decade. The study included 575 sexually active women of reproductive age, who knew the serologic status of their steady partners. It is part of a prospective observational study initiated in 1993 that was designed to investigate the gynecologic status of HIV-infected women. Women answered a standardized questionnaire about contraceptive use and sexual activity at each semiannual visit. Multivariate models were used to investigate parameters associated with the use of contraceptive methods. Contraceptive use was reported in 91% of the visits of women with an HIV-seronegative partner and 69% of women with an HIV-seropositive partner ( $P=0.0001$ ). Consistent condom use was higher in serodiscordant couples than in seroconcordant couples (odds ratio [OR]=6.1, 95% CI=0.1-0.2,  $P<0.001$ ). The use of oral contraception and intrauterine devices was higher in seroconcordant than in serodiscordant couples (OR=2.1, 95% CI=1.5-2.9,  $P<0.001$ ). Among women with an HIV-seronegative partner, the use of oral contraception and intrauterine devices decreased after the introduction of highly active antiretroviral therapy in 1998 ( $P=0.02$ ) and was higher in couples with inconsistent condom use (OR=2.0, 95% CI=1.3-3.3). These data emphasize that contraception counseling should include a discussion on reproductive issues as well as transmission of HIV and other sexually transmitted infections, taking into account the partner's serostatus.

**Levin L, Henry-Reid L, Murphy DA, et al. Incident pregnancy rates in HIV infected and HIV uninfected at-risk adolescents. [Journal of Adolescent Health](#). 2001;29(3S):101-108.**

The purpose of the study was to compare pregnancy incidence between HIV infected and HIV uninfected adolescents over a 3-year period and to characterize factors that differentiate pregnant from nonpregnant HIV infected females. Female adolescents enrolled in Reaching for Excellence in Adolescent Care and Health (REACH), a national cohort study, and nonpregnant at baseline comprised the sample ( $n = 345$ ). Subject information on pregnancy, risk behavior, and psychosocial characteristics was obtained through interview, chart review, physical examination and laboratory data collected every 3 months. Incident pregnancy rate was analyzed using Cox proportional hazards modeling; the predictors of incident pregnancy were evaluated using repeated measures analysis. Ninety-four pregnancies were identified over 3 years. No significant difference in pregnancy incidence was detected between HIV infected and uninfected females (20.6 and 28.4 per 100 person-years, respectively,  $p = .16$ ). However, for adolescents with living children at entry, HIV infected females were significantly less likely to become pregnant than HIV uninfected (HR = .45;  $p = .03$ ). Among HIV infected adolescents, significant predictors of incident pregnancy were older age ( $p = .01$ ) and not using hormonal contraception ( $p = .00$ ), whereas increased spiritual hope and passive problem-solving capacity were protective against pregnancy ( $p = .02$ , and  $.05$ , respectively). Multivariate analysis revealed pregnancy prior to study entry to be predictive for (OR = 3.0; 95% CI: 1.2–7.7), and increased spiritual hope to be protective (OR = .4; 95% CI: .2–.9) against incident pregnancy in HIV infected females without the hormonal contraceptive variable in the model. The pregnancy rate is high in this study population.

Further research is needed into its determinants and attenuating factors, particularly the role of spiritual elements, to design better contraceptive services and reproduction-related education targeting high-risk youth.

**Lindsay MK, Grant J, Peterson HB, et al. The impact of knowledge of human immunodeficiency virus serostatus on contraceptive choice and repeat pregnancy. [Obstetrics and Gynecology](#). 1995;85(5 Part 1):675-679.**

The objective of the study was to examine relationships among human immunodeficiency virus (HIV) serostatus, postpartum contraceptive choice, and the rate of repeat pregnancy within a short interval. This retrospective cohort study was performed in 83 seropositive and 218 seronegative women identified from an inner-city prenatal population undergoing routine voluntary HIV antibody screening from July 1987 through June 1989. Postpartum contraceptive choices and rate of repeat pregnancies were compared based on HIV serostatus. Seropositive women were significantly more likely than seronegative women to undergo tubal sterilization (27 versus 15%; odds ratio [OR] 2.9, 95% confidence interval [CI] 1.5-5.9). This relationship persisted after controlling for age, race, marital status, and parity by logistic regression modeling (adjusted OR 2.9, 95% CI 1.4-5.9). Seropositive women were significantly less likely than seronegative women to select oral contraceptives (34 versus 68%; OR 0.2, 95% CI 0.1-0.4), a relationship that persisted after controlling for age, race, marital status, parity, and foam and condom use (adjusted OR 0.2, 95% CI 0.1-0.5). Seropositive women were significantly more likely than seronegative women to select foam and condoms as their primary method of contraception (30 versus 15%; OR 2.4, 95% CI 1.2-4.5), a relationship that did not persist after controlling for age, race, marital status, and parity (adjusted OR 0.7, 95% CI 0.4-1.3). The risk of repeat pregnancy was slightly lower in seropositive versus seronegative women (34 versus 44%; OR 0.7, 95% CI 0.4-1.3). Most repeat pregnancies among seropositive and seronegative women were unplanned (90 and 82%, respectively). There was a relationship between the method of postpartum contraception and HIV serostatus, but no significant difference in repeat pregnancy rates associated with choice of method.

**Manigart Y, Rozenberg S, Barlow P, et al. ART outcome in HIV-infected patients. [Human Reproduction](#). 2006;21(11):2935-2940.**

To assess assisted reproductive technique (ART) outcome in couples affected by human immunodeficiency virus (HIV). Intrauterine insemination (IUI), IVF and ICSI were performed in 85 couples affected by HIV between January 2000 and June 2005. In 33 of the 85 couples, women were HIV positive-the clinical pregnancy rate (CPR) and cancellation rate (CR) after 34 IUI cycles were, respectively, 25 and 18%. The CPR after 26 IVF and 30 ICSI cycles were, respectively, 37.5 and 18.8% with CRs of 38.5 and 46.7%, respectively. In 38 couples, men were infected-the CPR and CR after 85 IUI cycles were, respectively, 14.7 and 20%; 62 ICSI cycles were performed leading to CPR of 23.4% with a CR of 25%. In 14 couples, the two partners were infected: none of the four IUI cycles carried out was successful (CR, 20%); the CPR and CR after 35 ICSI cycles were, respectively, 12.5% with 31%. All children born had a negative HIV test. In couples affected by HIV, an acceptable pregnancy rate was obtained. The worst results were obtained when both partners were infected. The CR was elevated among HIV-infected couples.

**Minkoff H. Human immunodeficiency virus and infertility services: the glass is half full. [Fertility and Sterility](#). 2006;85(2):290-292.**

Human immunodeficiency virus-infected couples have demonstrated a strong desire to be parents. Despite the willingness of some reproductive endocrinologists to provide services to them, a number of barriers to access still confront infertile HIV-infected individuals.

**Murphy DA, Mann T, O'Keefe Z, et al. Number of pregnancies, outcome expectancies, and social norms among HIV-infected young women. [Health Psychology](#). 1998;17(5):470-475.**

In this descriptive study, researchers examined pregnancies, sexually transmitted diseases (STDs), and sexual behaviors among 67 HIV-infected young women, as well as the women's outcome expectancies and peer and partner norms regarding pregnancy. Many of the women (69%) had been pregnant; 42% had been pregnant at least once since learning their HIV status, with 71% choosing to carry to term, resulting in 25% (N = 5) of the babies infected. The women had positive outcome expectancies related to pregnancy, which were significantly correlated with peer and partner social norms. Lack of knowledge regarding infant transmission, high rates of STDs, and inconsistent condom use all indicate a need for improved intervention regarding pregnancy and decision-making. Suggestions for better methods of providing information to HIV+ young women are provided.

**Nebie Y, Meda N, Leroy V, et al. Sexual and reproductive life of women informed of their HIV seropositivity: a prospective cohort study in Burkina Faso. [Journal of the Acquired Immune Deficiency Syndromes](#). 2001;28(4):367-372.**

In the context of the DITRAME-ANRS 049 research program that evaluated interventions aimed at reducing mother-to-child transmission of HIV (MTCT) in Bobo-Dioulasso (Burkina Faso), Voluntary HIV counseling and testing (VCT) services were established for pregnant women. HIV-infected women were advised to disclose their HIV serostatus to their male partners who were also offered VCT, to use condoms to reduce sexual transmission, and to choose an effective contraception method to avoid unwanted pregnancies. This study aimed at assessing how HIV test results were shared with male sexual partners, the level of use of modern contraceptive methods, and the pregnancy incidence among these women informed of the risks surrounding sexual and reproductive health during HIV infection. From 1995 to 1999, a quarterly prospective follow-up of a cohort of HIV-positive women. Overall, 306 HIV-positive women were monitored over an average period of 13.5 months following childbirth, accounting for a total of 389 person-years. The mean age at enrollment in the cohort was 25.1 (standard deviation, 5.2 years). In all, 18% of women informed their partners, 8% used condoms at each instance of sexual intercourse to avoid HIV transmission, and 39% started using hormonal contraception. A total of 48 pregnancies occurred after HIV infection was diagnosed, an incidence of 12.3 pregnancies per 100 person-years. Pregnancy incidence was 4 per 100 person-years in the first year of monitoring and this rose significantly to 18 per 100 person-years in the third year. The only predictor of the occurrence of a pregnancy after

HIV diagnosis was the poor outcome of the previous pregnancy (stillbirth, infant death). Severe immunodeficiency and change in marital status were the only factors that prevented the occurrence of a pregnancy after HIV diagnosis. Our study shows a poor rate of HIV test sharing and a poor use of contraceptive methods despite regular advice and counseling. Pregnancy incidence remained comparable with the pregnancy rate in the general population. To improve this situation, approaches for involving husbands or partners in VCT and prevention of MTCT interventions should be developed, evaluated, and implemented.

**Panozzo L, Bategay M, Friedl A, et al. High risk behaviour and fertility desires among heterosexual HIV-positive patients with a serodiscordant partner--two challenging issues. [Swiss Medical Weekly](#). 2003;133(7-8):124-127.**

The objective of this study was to evaluate fertility intentions and condom use among HIV-positive persons. Multicentre study based on anonymous data collection (questionnaire). One hundred and fourteen questionnaires providing complete information were evaluated. 45% of HIV-positive women and 38% of HIV-positive men expressed the desire for children. Irrespective of this wish, half the study participants felt that health care providers would not sufficiently address their concerns regarding relationship, sexuality and fertility intentions. In HIV-discordant heterosexual couples, consistent condom use was mentioned by 73% of respondents. Among study participants no significant relationship between HAART, viral load and inconsistent condom use was found. In contrast, information on condom use obtained from the Swiss HIV Cohort Study (SHCS), where the information is obtained by interview, gave higher estimates (88%) of consistent condom use. A significant proportion of HIV-infected individuals express a wish for parenthood. Issues related to fertility intentions and sexual relations need to be addressed more frequently by health care providers. Non-anonymous data collection on condom use may underestimate high risk behaviour.

**Sauer MV. American physicians remain slow to embrace the reproductive needs of human immunodeficiency virus-infected patients. [Fertility and Sterility](#). 2006; 85(2):295-297.**

Nearly 1 million Americans are infected with HIV. Most are living well and enjoying productive lives. Yet few programs in the United States permit unrestricted access to assisted reproduction for HIV-seropositive patients. Some of these individuals have conventional problems causing infertility. Many others are attempting to minimize viral transmission to their spouse or offspring. European centers remain far ahead of those in the United States in advancing techniques and offering services to safeguard the uninfected while providing effective, affordable care to the HIV-seropositive patient.

**Terriou P, Auquier P, Chabert-Orsini V, et al. Outcome of ICSI in HIV-1-infected women. [Human Reproduction](#). 2005;20(10):2838-2843.**

Since 2001, French law has permitted the use of assisted reproductive technology in human immunodeficiency virus (HIV)-1 infected women under strict conditions. This report describes a preliminary series of seropositive women who underwent assisted reproduction treatment at our facility. To minimize contamination of culture media,

equipment, and therefore of male gametes and embryos, we chose to perform ICSI in all cases. The outcome of ICSI was compared with the outcome in an age-matched group of non-HIV-1-infected women. Since several previous reports have indicated that HIV infection may be associated with a decrease in spontaneous fertility, our goal was also to assess the fertility status of the HIV-1-infected women entering our ICSI programme. The French law governing the use of assisted reproduction protocols in HIV-1-infected women was strictly applied. The inclusion criteria were absence of ongoing disease, CD4(+) count  $>200$  cells/mm<sup>3</sup>, and stable HIV-1 RNA level. Since mean age at the time of ICSI was higher in HIV-1-infected women than in the overall group of non-HIV-1-infected women, we compared outcome data in HIV-1-infected women (group I) to a group of non-HIV-1-infected women matched with regard to age and follicle retrieval period (group II) as well as to the overall group of women who underwent ICSI at our institution (group III). A total of 66 ovarian stimulations was performed in 29 HIV-1-infected women. The percentage of cancelled cycles was higher in infected women than in matched controls (15.2 versus 4.9%,  $P < 0.05$ ). The duration of ovarian stimulation (13.3 versus 11.7 days,  $P < 0.05$ ) and amount of recombinant FSH injected (2898 versus 2429 IU,  $P < 0.001$ ) were also higher in infected women. The number of retrieved oocytes, mature oocytes, and embryos obtained as well as embryo quality was similar in all groups. The fertilization rate was higher in infected women than in matched controls (67 versus 60%,  $P < 0.01$ ). The pregnancy rate was not significantly different between groups I and II (16.1 versus 19.6%) in spite of the fact that the number of embryos transferred was purposefully restricted in the HIV-1-infected group to minimize multiple pregnancy (2.0 versus 2.4, not significant). The results of this preliminary series of ICSI cycles in HIV-1-infected women indicate that optimal ovarian stimulation is slightly more difficult to achieve than in matched seronegative women. However, when criteria for oocyte retrieval were fulfilled, ICSI results were similar to those of age-matched controls.

**Wilson TE, Koenig L, Ickovics J, et al. Contraception use, family planning, and unprotected sex: few differences among HIV-infected and uninfected postpartum women in four US states. [Journal of the Acquired Immune Deficiency Syndromes](#). 2003;33(5):608-613.**

To describe pregnancy intentions and contraceptive use among a postpartum sample of women with and at risk for HIV infection, 258 HIV-seropositive and 228 HIV-seronegative women were recruited from prenatal clinics in 4 US states between June 1996-November 1998. Participants completed interviews at 24-40 weeks' gestation and at 6 months postpartum. At the 6-month interview, 78% of women reported vaginal sex, and 2% were pregnant. Among those not pregnant, 86% said that there was no likelihood of a pregnancy in the next 6 months. Condom use was reported by 68% of sexually active women; 65% of users reported consistent use. Those with HIV were more likely to report condom use, more likely to report condom use consistency, and less likely to report use of oral contraceptives than women without HIV ( $P < 0.05$ ). In multivariate analysis, inconsistent condom use was associated with postpartum alcohol use (odds ratio [OR] 2.80; 95% CI = 1.34-5.84), with the respondent stating that a pregnancy would not be emotionally upsetting (OR 3.06; 95% CI = 1.41-6.59) and reporting an intention to terminate a pregnancy if one were to occur (OR 3.47; 95% CI = 1.58-7.60). HIV-seropositive women who had at least 1 child with HIV infection were less likely than



seronegative women to report inconsistent condom use (OR 0.15; 95% CI = 0.03-0.76). Few differences were detected in reproductive behaviors as a function of HIV serostatus, although both cohorts engaged in unprotected sex. Counseling to decrease sexual risk behaviors should begin prior to or early in the postpartum period and include discussion of both reproductive and disease transmission issues.

**Wilson TE, Massad LS, Riester KA, et al. Sexual, contraceptive, and drug use behaviors of women with HIV and those at high risk for infection: results from the Women's Interagency HIV Study. [AIDS](#). 1999;13(5):591-598.**

The objective of the study was to document the sexual and contraceptive practices of women with HIV infection or who are at risk for infection. Data on the baseline behaviors of 561 HIV-negative and 2,040 HIV-positive women were collected as part of the Women's Interagency HIV Study (WIHS). WIHS is a multisite, longitudinal study following the natural history of HIV infection among women in the United States. Each participant contributed an interviewer administered, self-report interview including questions on sexual and contraceptive behavior. Women with HIV were less likely to report heterosexual activity in the previous 6 months (65% HIV-positive, 76% HIV-negative). Among sexually active women, there were no differences in the proportion of those reporting vaginal (97% HIV-positive, 98% HIV-negative) or anal sex (12% HIV-positive, 10% HIV-negative), although women with HIV were less likely to report cunnilingus (41% HIV-positive, 70% HIV-negative) and fellatio (48% HIV-positive, 57% HIV-negative). Of women with HIV, 63% always used condoms during vaginal sex (versus 28% HIV-negative), with lower rates reported during other sexual activities. Crack, cocaine, or injecting drug use, reported by 27% of HIV-positive and 35% of HIV-negative women, was associated with inconsistent condom use, independent of serostatus. HIV-positive women who reported using condoms and another contraception method were less consistent condom users (57% consistent versus 67%). The prevalence of sexual risk behavior in this sample suggests that, although women with HIV exhibit lower levels of sexual risk behavior than uninfected women, many have not been successfully reached with regard to implementing safer behaviors. These findings have implications for more widespread and effective behavioral intervention efforts.

**Zutlevics T. Should ART be offered to HIV-serodiscordant and HIV-seroconcordant couples: an ethical discussion? [Human Reproduction](#). 2006;21(8):1956-1960.**

Increasingly, fertility clinics are offering their services to human immunodeficiency virus (HIV)-serodiscordant couples where the woman is seropositive. In the case of HIV-seroconcordant couples, there remains a general reluctance to provide treatment. This attitude to seroconcordant couples is reminiscent of that once widely held towards serodiscordant couples when the risk of vertical transmission rates in pregnant women was greater than 1–2%. Due to recent advances in HIV clinical care and assisted reproduction technique (ART) procedures directed at reducing the risk of viral transmission during gamete transfer, where good healthcare is available, the current risk rate has fallen to 1–2%. This article deals with the ethical arguments of those who remain opposed to offering HIV-serodiscordant and HIV-seroconcordant couples access to ART.

Until these arguments have been addressed, clinics providing ART to such couples cannot be assured that their practices are ethical.

### V. Trends

**Brogly SB, Watts DH, Ylitalo N, et al. Reproductive health of adolescent girls perinatally infected with HIV. [American Journal of Public Health](#). 2007; 97(6):1047-1052.**

We sought to describe the reproductive health of adolescent girls perinatally infected with HIV. We estimated the incidence of first pregnancy, genital infections, and abnormal cervical cytology for 638 girls aged 13 years and older in the Pediatric AIDS Clinical Trials Group protocol 219C. Thirty-eight girls became pregnant, for a first pregnancy rate of 18.8/1000 person-years; 7 of these girls had additional pregnancies (95% confidence interval [CI] =13.3, 25.7). Thirty-two pregnancies resulted in live births. All girls received antiretroviral therapy during pregnancy. One infant was HIV infected, 29 were uninfected, and 2 had unknown infection status, for a rate of mother-to-child transmission of HIV in infants with known infection status of 3.3% (95% CI=0.1, 18.6). Condylomata and trichomoniasis were the most frequent genital infections. Forty-eight (47.5%) of 101 girls with Papanicolaou test examinations had abnormal cervical cytology, including atypical cells of undetermined significance (n=18), low-grade squamous intraepithelial lesions (SIL; n=27), and high-grade SIL (n=3). Many abnormalities persisted despite intervention. Pregnancy rates were lower and cervical abnormalities were higher than among non-HIV-infected adolescents. These findings underscore the importance of Papanicolaou tests and promotion of safer sexual practices in this population.

**Chu SY, Hanson DL, Jones JL, et al. Pregnancy rates among women infected with human immunodeficiency virus. [Obstetrics and Gynecology](#). 1996;87(2):195-198.**

The objective of this study is to examine pregnancy rates among women infected with human immunodeficiency virus (HIV). We used data from an ongoing survey of medical records of 3,915 women who were 15-44 years of age, infected with HIV, and who received care between January 1990 and August 1994 in more than 90 clinics, hospitals, and private practices in 11 United States cities. At enrollment, 570 (14%) of these women were pregnant. Pregnancy rates at entry varied significantly ( $P<0.05$ ) by age in years (15-19 [47%], 20-24 [30%], 25-29 [18%], 30-34 [11%], 35-39 [5%], 40-44 [2%]); clinical status (with AIDS opportunistic illness [3%], without AIDS opportunistic illness [17%]); and race-ethnicity (white [12%], black [17%], Hispanic [8%], Asian [0%], Native American [30%]) but not by mode of exposure (injecting drug use [10%], heterosexual contact [15%], and blood transfusion [12%]). After enrollment, 5.8% of women became pregnant each year. New pregnancies were significantly less likely to occur among women with an AIDS opportunistic illness (adjusted rate ratio 0.4, 95% confidence interval [CI] 0.2-0.6), and significantly more likely to occur among women who were less than 25 years of age (adjusted rate ratio 8.3, 95% CI 5.3-13.2) and who were black (adjusted rate ratio 1.6, 95% CI 1.2-2.1). Among women who were pregnant at enrollment or during observation, 12% were pregnant more than once. High rates of pregnancy at entry to medical care among HIV-infected women stress the importance of

counseling and voluntary testing at routine obstetric-gynecological practice. In some groups, rates of new pregnancies remain high; standard HIV care for women should include family planning services and assurance that if a woman chooses to practice contraception, contraceptives will be available and affordable.

**Pulver WP, Glebatis D, Wade N, et al. Trends from an HIV seroprevalence study among childbearing women in New York State from 1988 through 2000: a valuable epidemiologic tool. [Archives of Pediatric and Adolescent Medicine](#). 2004;158(5): 443-448.**

Women in New York State are heavily affected by the human immunodeficiency virus (HIV) epidemic. New York has had the largest number of births to HIV-infected pregnant women in the United States. Data collected as part of the Survey of Childbearing Women have been valuable for assessing the impact of the disease on the women of New York. The objective of this study was to assess HIV prevalence trends among childbearing women in New York State. An unlinked HIV seroprevalence study was conducted among all women residing in and giving birth in New York State from 1988 through 2000. Trend and cohort analyses were conducted. The main out measure was HIV prevalence, defined as the number of HIV-positive specimens divided by the total number of HIV-positive and HIV-negative specimens, by geographic region, racial/ethnic group, and maternal age cohort. Trends indicated a steady decline in HIV prevalence in New York State. New York City had a 49% decrease in prevalence between 1988 through 1989 and 1999 through 2000, and the rest of the state showed a 24% decline. However, birth cohort analysis indicated different patterns in trend by subpopulation, with some groups experiencing little or no decline. This study reports on the only statewide population-based HIV prevalence data currently available for childbearing women; these data have been a valuable tool for monitoring trends, targeting resources, and evaluating programs and policies.

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