

Highly Active Antiretroviral Therapy and Increased Use of Contraceptives Among HIV-Positive Women During Expanding Access to Antiretroviral Therapy in Mbarara, Uganda

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The vast majority of the world's 15 million women who are HIV infected live in developing countries in which sexual contact is the primary mode of HIV transmission.¹ This pattern is typified in Uganda, where 46% of the estimated 1 million adults who are HIV infected are women of reproductive age. The now-famous "Uganda approach" to the HIV/AIDS epidemic known as ABC (abstinence, being faithful, and condom use) has been the foundation of HIV prevention activities in Uganda. More recently, the ABC strategy has been expanded to include voluntary counseling and testing, prevention of mother-to-child transmission, and improved access to antiretroviral therapy and HIV care and support services.²

Although Uganda was one of the first countries in sub-Saharan Africa to begin providing access to antiretroviral therapy, only recently have concerted global efforts made no-cost highly active antiretroviral therapy (HAART) more widely available. The increased access has been dramatic; in 2000, it was estimated that only 1000 Ugandans were receiving HAART compared with an estimated 64000 at the end of 2005.² Currently, 51% of the Ugandans who are HIV positive and in need of HAART are receiving therapy.³ This increase in access has led to dramatic reductions in morbidity and mortality among those receiving treatment.⁴⁻⁷

In addition to the anticipated clinical effects, HAART use may influence the sexual and reproductive behaviors of women who are HIV infected.⁸⁻¹⁰ Earlier research suggested that in the absence of treatment, women who were HIV infected were less sexually active compared with women who were HIV negative, because of higher morbidity.^{11,12} The health improvements associated with the use of HAART are anticipated to increase sexual activity because of

Objectives. We investigated whether the prevalence of contraceptive use among women who are HIV positive varied according to use of highly active antiretroviral therapy (HAART) in Mbarara, Uganda.

Methods. We used data from a cross-sectional survey of 484 women who were HIV positive (18–50 years) and were attending Mbarara University's HIV clinic, 45% of whom were receiving HAART. Multivariate logistic regression was used to investigate the association between HAART use and contraceptive use. Data were collected between November 2005 and June 2006.

Results. Overall, 45% of the women were sexually active in the previous 3 months. Of these, 85% reported using contraceptive methods, with 84% reporting use of barrier contraceptive methods. Women receiving HAART were more than twice as likely to use contraceptive methods (adjusted odds ratio [AOR]=2.64; 95% confidence interval [CI]=1.07, 6.49) and more than 3 times as likely to use barrier contraceptive methods (AOR=3.62; 95% CI=1.54, 8.55) than were women not receiving HAART.

Conclusions. Our findings support the need for increased attention to better integration of reproductive health and HIV and AIDS services for women who are HIV positive. (*Am J Public Health.* 2009;99:340–347. doi:10.2105/AJPH.2007.129528)

improved health status⁸ and perceptions of reduced infectivity¹³; however, the empirical evidence remains unclear.

The few available studies suggest a high rate of sexual abstinence among women who are HIV positive, with no association between sexual activity and HAART use.⁹ Among sexually active women, the same study reported that women receiving HAART were more likely to practice protected sexual intercourse (i.e., using condoms) than were women not receiving therapy.⁹ This result is consistent with findings from European cohorts of men and women who are HIV positive¹⁴⁻¹⁶ but in contrast to findings from American studies that have shown that among men who have sex with men (MSM) and among injection drug users, rates of practicing unprotected sexual intercourse were higher among HAART users than among non-HAART users.¹⁷ The most recent and extensive meta-analysis concluded that the prevalence

of unprotected sexual intercourse, mostly among MSM, was similar among those receiving HAART and among those not receiving HAART.¹⁸

Beyond measuring the prevalence of unprotected sexual intercourse, information on the potential effect of HAART on contraceptive use among women who are HIV positive is particularly lacking. Uganda has one of the highest fertility rates (i.e., total fertility rate of 6.7 births per women) and lowest rates of contraceptive use in the world.¹⁹ Over the last 2 decades, Uganda's fertility rate may have reached a plateau or even decreased in some regions and subpopulations before widespread HAART access. One of the factors associated with the decrease was the high prevalence of HIV and the associated 25% to 40% reduction in fertility among women who were HIV positive.^{20,21} The combined effect of increased mortality among women who were HIV positive

in Uganda and the reduction in fertility resulted in approximately 700 000 fewer births between 1980 and 2000.²¹ This decline in births has been ascribed to increased fetal death reduced conception, and excess mortality among women of reproductive age who were HIV positive.^{11,20}

Although fertility rates may be declining in response to the HIV/AIDS epidemic, the effect of increasing access to HAART on sexual and reproductive behaviors and its implications are not well understood. A recent pilot study suggested that women receiving HAART were nonsignificantly more likely to use contraceptive methods.⁹ Information about contraceptive use may be particularly timely and relevant because recent evidence suggests that Ugandan women receiving HAART are more likely to report wanting children or wanting more children¹⁰ and thus may be less likely to use contraceptive methods.^{22,23}

Given the close relation between heterosexual transmission of HIV and the incidence of pregnancy, information about the sexual and reproductive behaviors of women receiving HAART constitutes a critical component of comprehensive initiatives aimed at improving the quality of life of women who are HIV infected, including sexual and reproductive health.

We sought to determine whether the prevalence of contraceptive use among women who were HIV positive varied according to use of HAART, during a critical period of expanding access to antiretroviral therapy in Mbarara, Uganda. The subobjectives were to (1) determine the types of contraceptive methods used by women who were HIV positive, distinguishing primarily between use of barrier contraceptive methods (i.e., male and female condoms) and use of hormonal methods (i.e., Depo-Provera injections [Pfizer Inc, New York, NY], oral contraceptive pills, an intrauterine device, and Norplant [Wyeth Pharmaceuticals, Madison, NJ]), and (2) determine whether the prevalence of use of barrier contraceptive methods varied according to use of HAART. We hypothesized that given reports of increased fertility desires, women receiving HAART would be less likely to use contraceptive methods overall and less likely to use barrier contraceptive methods. The analysis was conducted within the conceptual framework proposed by Kaida et al.,⁸ which adapted

Bongaarts and Potter's²⁴ proximate determinants of fertility framework to frame the underlying mechanisms through which HAART may influence fertility of women who are HIV infected.²⁵ In this analysis, we focused on the proximate determinant relating to the use of effective contraception.

METHODS

Study Design

This analysis was based on data collected from a cross-sectional survey of 501 women who were HIV positive, aged 18 to 50 years, and attending a university-based HIV clinic in Mbarara in western Uganda.

Study Setting

Mbarara Regional Referral Hospital is located in Mbarara District, which is in southwestern Uganda. Mbarara is 265 km from the capital city, Kampala. This regional referral hospital is also the teaching hospital for Mbarara University of Science and Technology. The hospital serves a population of approximately 1.1 million people. At the end of 2006, the HIV prevalence in the region was estimated at 10%.²

Housed within the Mbarara Regional Referral Hospital is the Mbarara University HIV clinic, the Immune Suppression Syndrome Clinic. The Immune Suppression Syndrome Clinic started in 1998 with only 5 patients and currently serves more than 13 000 registered patients, 65% of whom are women. The clinic offers comprehensive HIV care services, including provision of HAART, free of charge. Approximately 35% of the clinic's population is currently receiving HAART.

Most patients who present at the Immune Suppression Syndrome Clinic are referred through the Routine Testing and Counseling Program at Mbarara Regional Referral Hospital. Through this program, all patients seeking medical care at Mbarara Regional Referral Hospital are tested for HIV, and patients can opt not to receive their results. If a patient chooses to receive her or his results and is HIV positive, she or he is referred to the Immune Suppression Syndrome Clinic. Once registered at the Immune Suppression Syndrome Clinic, patients undergo clinical staging and CD4 cell testing and are asked to return in 1 month.

Patients who are eligible to commence HAART are placed on a registry and sent to pretreatment counseling. Generally, the clinic sets monthly and 3-month follow-up visit appointments for HAART patients and non-HAART patients, respectively.

Eligibility Criteria

Women who were HIV positive, aged 18 to 50 years, attending the Immune Suppression Syndrome Clinic, and competent to give consent were eligible to participate in the study. We considered women to be HAART users if they had been taking HAART medications continuously for 9 months or longer. We considered women to be non-HAART users if they had never taken HAART, except for vertical transmission prophylaxis.

Data Collection

Participants attending the Immune Suppression Syndrome Clinic were consecutively approached by a research assistant to assess eligibility and interest before requesting consent. Because non-HAART users attend the clinic less frequently than do HAART users, non-HAART users were oversampled by asking potential participants about their HAART status during the screening process. After determining eligibility and consent, participants received a 20- to 30-minute interviewer-administered structured interview in either English or Runyankole (the dominant regional language). The Runyankole questionnaire was translated from the original English version into Runyankole and then back-translated into English to ensure consistency between the 2 versions. The questionnaire was pilot-tested among 40 women and was administered either before or after the patient's clinical encounter.

Approximately 15 women were interviewed daily by 3 trained research assistants over 8 months from November 2005 to June 2006. The questionnaire assessed sociodemographic characteristics; HIV/AIDS history, diagnosis, and treatment; sexual, reproductive, and contraceptive practices; and fertility desires. We conducted a medical record review to confirm HAART history and to obtain clinical data, including World Health Organization stage of disease and CD4 cell count. The medical record was considered the referent measure for

inconsistencies between self-reported and medical record data.

Measurement of Contraceptive Use

The primary outcome was self-reported use of contraceptive methods in the previous 3 months. Subanalyses investigated differences in the types of contraceptive methods used and distinguished between barrier and hormonal methods. All analyses of contraceptive use were restricted to nonpregnant women who reported being sexually active in the previous 3 months.

The key explanatory variable was HAART use (confirmed via medical record review). HAART use was defined as use of 1 of 3 antiretroviral medications, in either a nevirapine- or an efavirenz-based regimen, continuously for at least 9 months.

Statistical Analysis

We computed the prevalence of contraceptive use among our study population. Univariate analyses assessed the relation between contraceptive use and HAART use, as well as survey covariates. Differences in contraceptive use between groups were reported with the Pearson χ^2 test (for categorical covariates) or the Student *t* test (for continuous variables). The association between contraceptive use and HAART use was reported with a crude odds ratio (OR) and a 95% confidence interval (CI).

We used multivariate logistic regression to measure the presence and strength of the association between HAART use and the likelihood of using contraceptive methods, after we controlled for the effect of covariates. After testing for collinearity (with the Spearman rank correlation) and interaction, all covariates with significant associations ($P < .10$) in the univariate analysis were included in the final model to obtain adjusted ORs and 95% CIs.

Because a high proportion of cases were missing values for CD4 cell count (30%) and this variable was highly colinear with HAART use ($\rho = -0.62$; $P < .001$), CD4 cell count was excluded from the multivariate model.

All statistical tests were 2-sided and were considered significant at $\alpha = .05$. The data were analyzed with SAS, version 9.1 (SAS Institute Inc, Cary, NC).

RESULTS

Recruitment

A total of 538 women were approached for participation, and 501 consented, completed the questionnaire, and underwent a medical record review (response rate=93%). Seventeen women reported being currently pregnant and were excluded from this analysis, yielding 484 participants. Of these, 219 were HAART users (45%), with a median duration of HAART use of 15 months (interquartile range=11–25 months).

Baseline Characteristics

Distributions of baseline characteristics are presented in Table 1, by HAART use status and overall. As shown, the average age was 34 years (SD=7.1 years). Overall, the majority of the women had a primary school education or less (68%), belonged to the Kiga or Nkole tribe (81%), and were Christian (88%). Only 39% of the women were married, and 66% had a monthly household income of less than 80 000 Uganda shillings (approximately US \$50). Only 14% of the women reported wanting more children, and the mean number of lifetime live births was 3.4 (SD=2.1). Most of the women had advanced HIV disease, with 63% presenting in disease stage 3 or 4 with a mean CD4 cell count of 305 cells/mm³ (SD=250).

More than half of our study population (55%) was sexually abstinent over the previous 3 months. Abstinence was significantly higher among HAART users (62%) compared with nonusers (50%; $P < .05$).

Prevalence of Contraceptive Use

Of the sexually active women, 85% (184 of 216) reported using any type of contraceptive method in the previous 3 months. As shown in Table 2, of the 184 sexually active women reporting use of contraceptive methods, 84% reported using barrier contraceptive methods, primarily the male condom. Almost 30% reported using hormonal contraceptive methods, with injections being the most common hormonal method. Only 5% reported having undergone surgical sterilization. Very few women reported use of traditional forms of contraceptive methods, including the rhythm method and withdrawal. Note that these values do not add up to 100% because a woman may

have reported use of more than 1 contraceptive method. Indeed, women reported a high degree of dual contraceptive use; more than half (57%) of the women using hormonal contraceptive methods also reported use of barrier contraceptive methods. Similarly, 40% of the women who had undergone surgical sterilization and 60% of those using other methods were also using barrier contraceptive methods.

Contraceptive Use

Univariate analysis. Table 3 shows the unadjusted associations between baseline characteristics and contraceptive use among currently sexually active women. As shown, women receiving HAART were significantly more likely to report using contraceptives compared with women not receiving HAART (OR=2.51; 95% CI=1.03, 6.11). Women who reported not wanting more children also were significantly more likely to report using contraceptive methods (OR [AOR]=2.63; 95% CI=1.17, 5.89). None of the other measured covariates showed a significant association with contraceptive use.

Adjusted analysis. In the adjusted analysis, HAART users remained significantly more likely to use contraceptive methods compared with nonusers (adjusted OR [AOR]=2.64; 95% CI=1.07, 6.49; Table 3). Similarly, not wanting more children also remained strongly associated with contraceptive use (AOR=2.80; 95% CI=1.23, 6.38).

Barrier Contraceptive Method Use

Univariate analysis. Table 4 shows the unadjusted associations between baseline characteristics and use of barrier contraceptive methods (primarily the male condom) among currently sexually active women. As shown, women receiving HAART, women with higher education, women in disease stage 3 or 4, and women who did not want more children were significantly more likely to report using barrier contraceptive methods.

Adjusted analysis. In the adjusted analysis, HAART users remained significantly more likely to use barrier contraceptive methods compared with nonusers (AOR=3.62; 95% CI=1.54, 8.55; see Table 4). Similarly, not wanting more children also remained strongly associated with using barrier contraceptive methods (AOR=2.66; 95% CI=1.27, 5.59). Neither education nor

TABLE 1—Characteristics of Highly Active Antiretroviral Therapy (HAART) Users and Nonusers Among HIV-Positive Women: Mbarara, Uganda, November 2005–June 2006

	HAART Users (n = 219)	Non-HAART Users (n = 265)	Overall (N = 484)	<i>P</i> ^a
Sociodemographic variables				
Age, y, mean (SD)	36.2 (6.5)	32.7 (7.2)	34.3 (7.1)	<.001
Education, no. (%)				<.001
Primary school or less	120 (55)	211 (80)	331 (68)	
Secondary school and higher	99 (45)	54 (20)	153 (32)	
Tribe, no. (%)				.004
Kiga/Nkole	189 (86)	201 (76)	390 (81)	
Other	30 (14)	64 (24)	94 (19)	
Religion, no. (%)				.15
Christian	197 (90)	226 (85)	423 (87)	
Muslim or other	22 (10)	38 (14)	60 (12)	
Marital status, no. (%)				.26
Currently married	79 (36)	109 (41)	188 (39)	
Not currently married	140 (64)	156 (59)	296 (61)	
Monthly household income, UGX, no. (%)				.02
0–20 000	63 (29)	97 (37)	160 (33)	
20 001–80 000	68 (31)	92 (35)	160 (33)	
>80 000	88 (40)	76 (29)	164 (34)	
Lifetime live births, mean (SD)	3.3 (2.0)	3.4 (2.1)	3.4 (2.1)	.73
Lifetime live births, no. (%)				.89
0–1	37 (17)	49 (18)	86 (18)	
2–4	120 (55)	144 (54)	264 (55)	
≥5	62 (28)	72 (27)	134 (28)	
No. of household members excluding patient, mean (SD)	4.8 (3.1)	4.0 (2.8)	4.4 (2.9)	.008
HIV-related variables				
Most recent CD4 cell count, ^b cells/mm ³ , mean (SD)	211 (193)	438 (262)	305 (250)	<.001
CD4 cell count, ^b cells/mm ³ , no. (%)				<.001
<50	38 (19)	6 (4)	44 (13)	
50–199	78 (40)	9 (6)	87 (26)	
200–499	66 (33)	80 (58)	146 (43)	
≥500	16 (8)	44 (32)	60 (18)	
World Health Organization disease stage				<.001
1 or 2	18 (8)	160 (60)	178 (37)	
3 or 4	201 (92)	105 (40)	306 (63)	
Sexual and reproductive behavior variables				
Sexually active in the previous 3 mo, no. (%)				.007
Yes	83 (38)	133 (50)	216 (45)	
No (Abstinent)	136 (62)	132 (50)	268 (55)	
Wants more children, no. (%)				.95
Yes	31 (14)	37 (14)	68 (14)	
No	187 (85)	227 (86)	414 (86)	

Note. UGX = Uganda shilling.

^aDifferences between groups are reported with the Pearson χ^2 test (for categorical variables) or Student *t* test (for continuous variables).

^bThirty percent (147 of 484) of the patients were missing data for CD4 cell count.

TABLE 2—Types of Contraceptive Methods Used by Sexually Active HIV-Positive Women Who Used Contraceptives in the Previous 3 Months (N = 184): Mbarara, Uganda, November 2005–June 2006

	Frequency	%
Barrier methods	150	82
Female condom	3	2
Male condom	150	82
Hormonal methods	51	28
Implant	1	1
Injection	43	23
Intrauterine device	1	1
Oral contraceptive pill	6	3
Permanent methods	10	5
Female sterilization or hysterectomy	10	5
Other methods	10	5
Lactating	2	1
Rhythm method	2	1
Withdrawal	3	2
Other methods	3	2

Note. Values do not add up to 100% because a woman may have reported use of more than 1 method.

stage of disease was significantly associated with barrier contraceptive use in the adjusted analysis.

DISCUSSION

In contrast to our hypothesis, we found that women receiving HAART were significantly more likely to use contraceptive methods overall and more likely to use barrier contraceptive methods compared with women not receiving HAART. These findings are consistent with those of a recent pilot study suggesting that contraceptive use was higher among HAART users compared with nonusers.⁹ We also found a strong relation between not wanting more children and contraceptive use, which has been reported frequently in the literature.^{22,23} Interestingly, other measured socio-demographic variables and HIV-related variables were not significantly associated with contraceptive use.

TABLE 3—Odds Ratios (ORs) of Variables Associated With Contraceptive Use Among Sexually Active HIV-Positive Women (N = 216) Within the Previous 3 Months: Mbarara, Uganda, November 2005–June 2006

	Unadjusted OR (95% CI)	AOR (95% CI)
Highly active antiretroviral therapy use		
No (Ref)	1.00	1.00
Yes	2.51 (1.03, 6.11)	2.64 (1.07, 6.49)
Sociodemographic variables		
Age (per additional year)	0.98 (0.93, 1.04)	...
Education		
Primary school or less (Ref)	1.00	...
Secondary school and higher	2.61 (0.96, 7.12)	...
Tribe		
Kiga/Nkole (Ref)	1.00	...
Other	1.06 (0.43, 2.61)	...
Religion		
Christian (Ref)	1.00	...
Muslim or other	0.76 (0.25, 2.33)	...
Marital status		
Not currently married (Ref)	1.00	...
Currently married	1.22 (0.54, 2.75)	...
Household income, UGX		
≥ 80 001 (Ref)	1.00	...
20 001–80 000	1.31 (0.52, 3.30)	...
0–20 000	0.79 (0.32, 1.93)	...
No. of household members, excluding participant (per additional household member)	1.17 (0.95, 1.42)	...
HIV-related variables		
CD4 cell count, ^a cells/mm ³		
< 50	0.86 (0.02, 4.12)	...
50–199	2.87 (0.51, 16.00)	...
200–499	2.07 (0.55, 7.78)	...
≥ 500 (Ref)	1.00	...
World Health Organization stage		
1 or 2 (Ref)	1.00	...
3 or 4	1.71 (0.80, 3.64)	...
Sexual and reproductive behavior variables		
No. of lifetime live births		
0–1	0.46 (0.15, 1.36)	...
2–4	0.88 (0.34, 2.28)	...
≥ 5 (Ref)	1.00	...
Wants more children		
Yes (Ref)	1.00	1.00
No	2.63 (1.17, 5.89)	2.80 (1.23, 6.38)

Note. AOR = adjusted odds ratio; CI = confidence interval; UGX = Uganda shilling. Data based on women who reported sexual activity within the previous 3 months.

^aThirty-four percent (73 of 216) of the patients were missing data for CD4 cell count.

The possible reasons for our findings likely relate to the conditions under which HAART is available in Mbarara. For instance, until recently, access to HAART was highly limited, making recent scale-up efforts highly valued. Study participants receiving HAART may recognize the value of the medication and be more likely to focus on their health and well-being, thus choosing to limit childbearing, at least in the immediate future.¹⁰ This claim was supported by our findings that only 14% of the study participants wanted any more children. In addition, women receiving HAART have more regular contact with health care professionals as a function of the clinical follow-up that is required to monitor the health of individuals receiving therapy. As part of the routine follow-up, women are educated about HIV transmission and counseled to avoid pregnancy. Our findings suggest that these health education efforts are influencing reproductive decision-making. Condoms are available for free at the Immune Suppression Syndrome Clinic and may be more likely distributed to patients receiving HAART during routine follow-up visits, particularly because they visit the clinic more often than do individuals not receiving HAART.

Reproductive decision-making may change as women receive HAART for longer periods. The trends observed here may reflect what happens in the context of recent and rapid scale-up to HAART in a region with a generalized HIV epidemic. Length of time receiving HAART was not incorporated into this analysis because of our relatively small sample size and because we were missing the full spectrum of HAART use that would be important for such an analysis. Namely, we had a narrow time range of HAART use (median = 15 months; interquartile range = 11–25 months) and excluded women who had been using HAART for less than 9 months. Future studies should, however, adjust for the lengths of time HAART is administered to assess changes in sexual and reproductive behaviors over time.

Our study population reported high rates of sexual abstinence, with more than half of the women reporting being sexually abstinent over the previous 3 months, and HAART users were significantly more likely to report sexual abstinence compared with nonusers. The high rates of sexual abstinence we observed were higher than in the general female population of

TABLE 4—Odds Ratios (ORs) of Variables Associated With Use of Barrier Contraceptive Methods Within the Previous 3 Months Among Sexually Active HIV-Positive Women (N = 216): Mbarara, Uganda, November 2005–June 2006

	Unadjusted OR (95% CI)	AOR (95% CI)
Highly active antiretroviral therapy use		
No (Ref)	1.00	1.00
Yes	4.20 (2.04, 8.67)	3.62 (1.54, 8.55)
Sociodemographic variables		
Age (per additional year)	1.01 (0.96, 1.06)	...
Education		
Primary school or less (Ref)	1.00	1.00
Secondary school and higher	1.98 (0.99, 3.97)	1.57 (0.73, 3.38)
Tribe		
Kiga/Nkole (Ref)	1.00	...
Other	0.91 (0.46, 1.83)	...
Religion		
Christian (Ref)	1.00	...
Muslim or other	0.94 (0.42, 2.12)	...
Marital status		
Not currently married (Ref)	1.00	...
Currently married	0.95 (0.49, 1.82)	...
Household income, UGX		
≥ 80 001 (Ref)	1.00	...
20 001–80 000	0.87 (0.44, 1.73)	...
0–20 000	1.11 (0.52, 2.35)	...
No. of household members, excluding participant (per additional household member)	1.07 (0.94, 1.22)	...
HIV-related variables		
CD4 cell count, ^a cells/mm ³		
< 50	1.56 (0.35, 6.84)	...
50–199	2.42 (0.65, 9.02)	...
200–499	1.36 (0.49, 3.77)	...
≥ 500 (Ref)	1.00	...
World Health Organization stage		
1 or 2 (Ref)	1.00	1.00
3 or 4	2.42 (1.33, 4.42)	1.24 (0.61, 2.52)
Sexual and reproductive behavior variables		
No. of lifetime live births		
0–1	0.76 (0.32, 1.84)	...
2–4	0.95 (0.47, 1.92)	...
≥ 5 (Ref)	1.00	...
Wants more children		
Yes (Ref)	1.00	1.00
No	2.25 (1.15, 4.35)	2.66 (1.27, 5.59)

Note. AOR = adjusted odds ratio; CI = confidence interval; UGX = Uganda shilling. Data based on women who reported sexual activity within the previous 3 months.

^aThirty-four percent (73 of 216) of the patients were missing data for CD4 cell count.

Uganda¹⁹ but comparable to those reported by other female populations with HIV infection.^{9,26} Note that the abstinence reported here may not be deliberate abstinence but rather situational abstinence (i.e., the women had no partners). This may be particularly the case for this population, given the high proportion of women who have been widowed (30%). Additional research should further explore the prevalence of and reasons and implications for sustained situational abstinence. Uganda may be a particularly good setting for such research in the context of the overarching ABC approach to HIV/AIDS prevention.

Among sexually active women, we found high rates of current contraceptive use (85%). This rate was substantially higher than was the reported contraceptive prevalence rate in the general female population of Uganda (23%).¹⁹ Part of the difference in the rates may be explained by the high use of barrier contraceptive methods, primarily the male condom; 70% of the sexually active women reported using barrier methods in the previous 3 months. The high rates of condom use are in contrast with the low rates of use of other family planning methods, including hormonal contraceptive methods; only 28% of the sexually active women reported using any hormonal family planning methods.

In Uganda, condom use is not traditionally considered a family planning method but rather a means of preventing HIV transmission. Thus, the high rates of use may reflect efforts to prevent HIV transmission rather than pregnancy. Although we did not examine reasons for condom use, others have reported that one way Ugandan women who are HIV positive have encouraged their husbands to use condoms is by promoting their effectiveness as a family planning method rather than primarily as a means to prevent HIV transmission.²⁷ Because our results indicated that women receiving HAART were more likely to use contraceptive methods in general and barrier contraceptive methods in particular, integrating family planning and HIV treatment services may offer an important opportunity to influence pregnancy and HIV transmission risk behaviors.

Limitations

First, the cross-sectional nature of this analysis precluded us from determining causality;

however, the findings offer important information on the association between HAART use and contraceptive use, which may have important implications for policy and programming. Second, reporting bias was possible because women may have falsely reported using contraceptives because they had been educated about HIV transmission and counseled to avoid pregnancy. If HAART users were more likely than were nonusers to falsely report using contraceptives, then our effect estimates likely would have been somewhat inflated. During the data collection process, we took precautions against reporting bias by including standardized questions regarding contraceptive use and having non-clinic staff conduct the interviews. Third, our operational definition of HAART use was restricted to women who used HAART continuously for at least 9 months. During the data collection period, 11% of the female patients at the Immune Suppression Syndrome Clinic had been receiving HAART for less than 9 months, and 3% had used HAART at some point but were not currently receiving an antiretroviral treatment regimen. As such, our results may not apply to these women. Furthermore, the requirement of continuous use of HAART was not intended to reflect levels of adherence to the treatment regimen. Although we did not include a measure of adherence, separate analyses from this cohort suggested that the population had excellent (95%–100%) adherence²⁸ with little variance. Thus, our definition of HAART use was unlikely to be confounded by a measure of adherence.

Our findings were strengthened by the consideration of a population of women who were HIV positive and receiving HAART and clinical care free of charge. As such, we were able to minimize the influence of having the means to pay for access to treatment services. The Mbarara Immune Suppression Syndrome Clinic is 1 of 3 clinics in the area providing free access to HAART. Treatment access has expanded so that very few, if any, people are turned away. Therefore, it is reasonable to consider these results generalizable to the larger female population in Mbarara who know that they are HIV infected and are seeking medical care.

Conclusions

Our study showed that provision of HAART was associated with higher rates of contraceptive use overall and barrier contraceptive methods in particular. Given that barrier contraceptive methods prevent the transmission of both HIV and pregnancy, and that the use of dual protection was common, our findings reinforced the message that reproductive health services should be better integrated with HIV/AIDS prevention, treatment, and care services through comprehensive programming. Longitudinal studies should be conducted to elucidate further the potentially time-sensitive relation between HAART use and contraceptive use to inform policy and programming aimed at designing better-quality sexual and reproductive health services for women who are HIV positive that support their right to be sexually active and achieve their fertility goals, while minimizing the risk of HIV transmission. ■

About the Authors

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Contributors

I. Andia and A. Kaida prepared the first draft of the article, incorporated revisions, and prepared the final draft. M. Maier, N. Emenyonu, and L. Pepper assisted with the study, analyses, and interpretation. A. Kaida and D. Guzman completed the statistical analyses. D. R. Bangsberg and R. S. Hogg originated the study, and D. R. Bangsberg supervised the study.

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Human Participant Protection

All participants provided informed consent, and all procedures were approved by the Faculty of Medicine Research and Ethics Committee and the Institutional Ethics Review Board of Mbarara University, the Uganda National Council on Science and Technology, and the University of California, San Francisco, Committee on Human Subjects.

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