ORIGINAL RESEARCH ARTICLE

Fertility desires and condom use among HIV-positive women at an antiretroviral roll-out program in Zimbabwe

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ABSTRACT

As access to anti-retroviral therapy (ART) increases in sub-Saharan Africa, fertility and contraception patterns are likely to change. Two hundred HIV-positive women at an ART roll-out site in Zimbabwe responded to a questionnaire on fertility desires and condom use. Ten women (5%) reported planning a pregnancy in the next year, comprising 0% of women not yet eligible for ART, 8.22% of women on the waitlist for ART, and 4.17% of women on ART. Younger age, fewer living children, and higher quality of life were individually associated with intended pregnancy in the next year; however in multivariate analysis only the association with higher quality of life remained significant. Reported ever use of condoms was relatively low (46.5%) and condom use varied by neither ART status nor by fertility desires. In conclusion, our data demonstrates fertility desires among HIV-positive women in Zimbabwe correlate with higher perceived quality of life (*Afr. J. Reprod. Health* 2010; 14[2]: 27-35).

RÈSUMÈ

Les désirs de la fécondité et l'emploi des préservatifs chez les femmes séro-positives au cours d'un programme de la présentation publique de la thérapie antirétrovirale au Zimbabwe. Au fur et à mesure que l'accès à la thérapie antirétrovirale (TAR) s'accroît en Afrique sub-saharéenne, il y a la possibilité que les tendances de la fécondité et de la contraception se modifient. Deux cent femmes séropositives qui se sont présentées dans le lieu de la présentation publique de TAR au Zimbabwe ont répondu à un questionnaire sur les désirs de la fécondité et l'emploi des préservatifs. Dix femmes (5%) ont indiqué quelles désiraient être enceintes dans l'année qui venait, y compris le 0% des femmes qui n'avaient pas encore droit à la TAR, 82% des femmes sur la liste d'attente pour la TAR et 4,17% des femmes qui suivent la TAR. Le plus jeune âge, peu d'enfants vivants et une qualité de vie élevée ont été individuellement associés à la grossesse voulue dans l'année suivante. Néanmoins, dans l'analyse multifactorielle, seule l'association ayant une qualité de vie plus élevée est restée significative. Le nombre des femmes qui ont indiqué n'avoir jamais utilisé les préservatifs était relativement bas (46,5%) et l'emploi des préservatifs n'a varié ni par la TAR ni par les désirs de la fécondité. En conclusion, nos données ont démontré que les désirs pour la fécondité chez les femmes séropsitives au Zimbabwe est en corrélation avec la qualité de vie élevée perçue (*Afr. J. Reprod. Health* 2010; 14[2]: 27-35).

KEYWORDS: Antiretroviral therapy, fertility desires, condom use, quality of life.

INTRODUCTION

Of the 33 million people living with HIV/AIDS worldwide, 67% live in sub-Saharan Africa (SSA)[1], creating an unparalleled burden of disease on the region. Southern Africa has borne a disproportionate share of this disease burden, experiencing 35% of global HIV infections and 38% of AIDS deaths in 2007[1]. In Zimbabwe, an estimated 21.1% of women and 14.5% of men aged 15-49 are HIV-positive, with the highest prevalence at 35.5% among women aged 30-34[2]. Sexual transmission is the primary means of HIV infection in Zimbabwe, followed by vertical transmission[2], and the effects of the HIV epidemic have been particularly profound on women and men of reproductive age and their reproductive lives.

The consequences of the HIV/AIDS epidemic on fertility desires have been documented prior to public anti-retroviral therapy (ART) roll-out programs in SSA; however, the impact of increased access to ART on women's fertility desires remains largely unclear [3,4,5,6]. Qualitative studies have shown that being HIV-positive often makes women feel that they should avoid pregnancy despite their desire to have another child, often due to concerns over their health status or how their community may react[3,5]. Among our cohort of HIV positive women in Zimbabwe, being on ART was associated with higher quality of life[7], which is likely to make women feel healthier and more optimistic about their future. This, in turn, may make them feel more secure in their ability to bear and care for a child and therefore more likely to desire a pregnancy. As ART can substantially increase life expectancy[8], longer reproductive life spans for women will yield more opportunity for both planned and unplanned pregnancies. These effects of ART will impact individual women, as they consider and plan for their future childbearing, as well as communities and public health programs, as the demand for prevention of mother-to-child transmission (PMTCT) and family planning services changes[8].

One anticipated outcome of increased fertility desires among HIV positive women may be decreased rates of condom use. While less condom use may enable women to achieve desired pregnancies, it may also increase rates of sexual HIV transmission. This effect may be somewhat offset by lowered viral load among those on ART. Rates of condom use remain low in Zimbabwe, particularly within marriage. While 22% of married women and 64% of married men surveyed in the 2006 Zimbabwe Demographic and Health Survey (DHS) report ever use of condoms, only 1.4% of married women and 4.3% of married men report current use of condoms[2]. Previous studies in Zimbabwe have documented women's and men's feelings of the inappropriateness of condom use within marriage[9,10] yet for HIV-positive women, condoms provide a dual role of HIV transmission prevention and contraception. Theoretically, without the need for contraception, those women who were previously using condoms for dual protection may have little incentive to use condoms with their partners, which may then potentially increase sexual HIV transmission and reinfection. Therefore, while increased access to ART may increase fertility desires, it may also decrease condom use, presenting a complex dilemma to public health programs in SSA.

In this cohort of HIV-positive Zimbabwean women attending a national ART roll-out site, we hypothesize that HIV positive women on ART will be more likely than women not yet on ART to have higher quality of life and also more likely to plan a pregnancy in the next year. We additionally sought to perform an explorative analysis of the factors associated with condom use to elicit any relationships between access to ART, fertility desires, and reported use of condoms.

METHODS

Two hundred study participants were recruited between June and August 2007 at the Opportunistic Infections Clinic at the Chitungwiza Regional Hos-

pital, 25 km from Harare. The study was designed to examine quality of life outcomes, results published elsewhere[7]. Eligibility for the study included age over 18 years, being HIV positive, and speaking English, Shona, or Ndebele. Trained interviewers administered a one-hour questionnaire and study nurses obtained blood samples and assessed for HIV-related symptoms. The Stanford University Institutional Review Board and the Medical Research Council of Zimbabwe approved the study.

All statistical analyses were carried out using SAS version 9.1 (Cary, North Carolina). ANOVA or Fisher's Exact tests were used when testing categorical variables, Wilcoxon rank sum test for ordinal variables, and student t-test for continuous variables. All variables significant in univariate analysis were added to the multivariate logistic regression model. These regression analyses excluded seven women older than 50 years.

The Medical Outcomes Study-HIV (MOS-HIV) QOL questionnaire was used to measure perceived health-related quality of life[11], which has been validated in Zimbabwe[12]. Fertility desire was assessed with the question "Do you plan to get pregnant or have a child in the next twelve months?" Condom use was assed by asking "Have you ever used condoms?"

RESULTS

General characteristics

In the cross-sectional study of 200 HIV-positive women, 31 (15%) were not eligible for ART (Group 1), 73 (37%) were eligible for ART but had not yet started due to drug shortages (Group 2), and 96 (48%) were on ART (Group 3). The ages of the women ranged from 22 to 69 years, with a median of 35. The majority (70%) had completed at least some secondary schooling. Thirty-seven percent of the women were married, 20.5% were divorced, and 41% were widowed. Over half (54.5%) of the women reported some form of employment, either formal or self-employment.

The three groups of women were similar in most baseline socio-demographic characteristics, including education level, marital status, employment, economic status as measured by household commodities, household members, and religion (all $p>0.05$) with only mean age differing (Group 1=34.2 years, Group 2=35.2, and Group 3=36.4; $p = 0.0029$). Predictably, clinical characteristics differed between the three groups. As expected, the ART treatment group had the lowest (pre-treatment) baseline CD4 counts (medians Group 1=386, Group 2=353, and Group 3=176; $p<0.0001$) and highest current CD4 counts (medians Group 1=315, Group 2=145, and Group 3=327; $p<0.0001$). The mean number of AIDS-related symptoms reported at baseline was highest in the treated group and lowest in the ineligible group ($p<0.0001$), but current reported AIDS-related symptoms were lowest in the treated group ($p=0.053$) (data not shown; see results published elsewhere)[7].

Quality of life

The mean quality of life scores on the MOS-HIV QOL questionnaire were 37% in Group 1, 38% in Group 2, and 52% in Group 3 ($p<0.0001$). The domain scores, except for social function, were generally highest in Group 3 as well (data not shown; see results published elsewhere)[7].

Fertility desires

The women reported a median number of three pregnancies and the median age of sexual debut was 19 years. Women who were eligible for ART were more likely to indicate planning a pregnancy in the next year than their non-eligible cohort: 0% of Group 1, 8.22% (n=6) of Group 2, and 4.17% (n=4) of Group 3 ($p>0.05$, Table 1). There were no significant differences in ever use of family planning methods, pregnancy history, or sexual history between the three groups of women (all $p>0.05$; Table 1). In logistic regression, younger age, having fewer living children, and higher perceived health-related quality of life were all independently associated with planning a pregnancy in the next year (all $p<0.05$), although in multivariate analysis only quality of life remained significantly associated with planning a pregnancy ($p<0.05$;

Table 1. Reproductive and sexual health characteristics by ART groups, mean (SD) or percent (n).

Variable	Entire cohort (n=200)	G1: No ART, not eligible (n=31)	G2: No ART but eligible (n=73)	G3: On ART (n=96)	*p*-value
Family Planning					
Percent ever used family planning	93.00 (186)	87.10 (27)	94.52 (69)	93.75 (90)	0.38[a]
Percent ever used the following:					
Pills/tablets	74.00 (148)	77.42 (24)	69.86 (51)	76.04 (73)	0.60[a]
Injectables (Depo)	28.50 (57)	22.58 (7)	27.40 (20)	31.25 (30)	0.67[a]
Condoms	46.50 (93)	45.16 (14)	49.32 (36)	44.79 (43)	0.84[a]
IUD/loop	2.50 (5)	3.23 (1)	2.74 (2)	2.08 (2)	0.85[a]
Withdrawal	1.00 (2)	0	0	2.08 (2)	0.65[a]
Tubal ligation	0.50 (1)	0	1.37 (1)	0	0.52[a]
Norplant	1.00 (2)	3.23 (1)	1.37 (1)	0	0.14[a]
Traditional	0.50 (1)	3.23 (1)	0	0	0.16[a]
Percent planning pregnancy in the next year[b]	5.00 (10)	0	8.22 (6)	4.17 (4)	0.21[a]
Pregnancy History					
Percent ever pregnant	99.00 (198)	100.00	98.63 (72)	98.96 (95)	1.00[a]
No. of pregnancies	3.24 (1.75)	3.35 (1.70)	3.07 (1.81)	3.34 (1.72)	0.57
No. of living children	2.47 (1.57)	2.32 (1.33)	2.29 (1.52)	2.65 (1.67)	0.28
Sexual History					
Age at sexual initiation	19.19 (2.95)	18.94 (2.92)	18.79 (2.73)	19.56 (3.09)	0.22
No. of sexual partners in last year	0.60 (0.66)	0.81 (0.91)	0.58 (0.5)	0.54 (0.67)	0.14
No. of lifetime sexual partners	3.36 (9.67)	5.45 (14.55)	2.47 (4.95)	3.35 (10.39)	0.36
Percent ever treated for STI	64.50 (129)	67.74 (21)	63.01 (46)	64.58 (62)	0.92[a]

[a]*P*-values calculated for three-way comparisons between G1, G2, and G3 using Fisher's Exact test, two-sided; all others tested with ANOVA, two sided
[b]When excluding women out of reproductive age (age ≥50), the percent planning pregnancy in the next year are: G1 0.00%, G2 8.33% (n=6), G3 4.82% (n=4), p=0.27.

Table 2).

Condom use

In the entire cohort, less than half (47%) reported ever-use of condoms, though 93% reported ever use of some method of family planning, of which oral contraceptives, or "pills or tablets", (74%) were the most popular method (Table 1). When comparing the group of women reporting ever use of condoms vs. those who did not, younger women, being currently married, living with current husband/partner, religion, longer duration since HIV diagnosis (years), greater total number of disclosures, greater percent of disclosure of HIV status to current husband / partners, ever use of any form of family planning, and greater number of sexual partners in the past year correlated with condom use (all $p<0.05$; Table 3). Percent condom use did not vary significantly by ART group, num-

Table 2. Logistic regression modeling of correlates of intended pregnancy in the next year

	Univariate Analysis		Multivariate Analysis	
Variable	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value
Age, continuous	0.89 (0.79, 0.99)	0.032	0.88 (0.76,1.02)	0.090
Currently married	0.57 (0.16, 2.04)	0.39	--	--
Number of living children	0.47 (0.24, 0.91)	0.026	0.57 (0.27,1.20)	0.14
Number of pregnancies	0.66 (0.40, 1.11)	0.12	--	--
Ever used condom	1.78 (0.49, 6.50)	0.39	--	--
Duration since HIV diagnosis (in years)	0.85 (0.55, 1.31)	0.46	--	--
ART status, category	1.17 (0.47, 2.88)	0.74	--	--
Duration of ART (in months)	0.26 (0.041, 1.64)	0.15	--	--
No. of self-reported AIDS-related illnesses in last year, category	0.87 (0.68, 1.11)	0.25	--	--
No. of medically-assessed symptoms in last week at baseline, category	0.99 (0.92, 1.06)	0.67	--	--
Quality of life (QOL) mean score	1.05 (1.002, 1.10)	0.039	1.06 (1.007,1.12)	0.027
Depression, category	0.98 (0.88, 1.10)	0.75	--	--

ber of pregnancies, nor percent ever treated for STIs (Table 3). Of the total ten women in our cohort who reported planning a pregnancy in the next year, six (6.5%) of them reported ever use of condoms as opposed to four (3.7%) who denied ever use of condoms (p=0.52).

DISCUSSION

The 2006 Zimbabwe DHS found that 16% of women between 15-49 desired another child in the next two years[2]. Our study demonstrates that HIV positive women may have lower fertility desires than the general population, as only 5.0% of our cohort (n=10) indicated desiring another child in the next year.

All ten of the women desiring to become pregnant in the next year were either awaiting treatment initiation or taking ART, however proportionally the group that was ineligible for ART was the smallest. Increases in fertility desires after initiation of ART have been seen elsewhere. One study in eastern rural Uganda found that while 3.2% of HIV positive women wanted more children before starting ART, it grew to 6.7% after 24 months of ART[6]. A cross-sectional study in western rural Uganda found that women on ART were more likely to desire pregnancy but less likely to be pregnant in the last three years than women not yet on ART[13]. A study in South Africa found that a much greater proportion (26%) of HIV positive women on ART indicated wanting another child after a median of 11 of months on ART[14].

The South African cohort's fertility desires were associated with longer duration of ART[14], which one might anticipate, as increased duration of ART treatment may confer greater health and quality of life benefits, making women feel more enabled to have another child. While our data did not demon-

Table 3. Cohort characteristics by condom use, mean (SD) or percent (n)

Variable	**Entire cohort** (n=200)	**G1: Ever used condoms** (n=93)	**G2: Not used condoms** (n=107)	***p*-value**
Socio-demographic Measures				
Age	36.41 (8.32)	33.84 (6.86)	38.65 (8.84)	<0.0001
Marital Status, percent				<0.0001[a]
Currently married	37.00 (74)	56.99 (53)	19.63 (21)	
Divorced/separated	20.50 (41)	15.05 (14)	25.23 (27)	
Widowed	41.00 (82)	25.81 (24)	54.21 (58)	
Single/never married	1.00 (2)	1.08 (1)	0.93 (1)	
Cohabitating	0.50 (1)	1.08 (1)	0.00	
Percent living with husband or boyfriend	29.50 (59)	48.39 (45)	13.08 (14)	<0.0001[a]
Religion				0.053 [a]
Catholic/Anglican/Methodist	37.19 (74)	27.96 (26)	45.28 (48)	
Pentecostal churches	35.68 (71)	43.01 (40)	29.25 (31)	
Apostolic	18.09 (36)	19.35 (18)	16.98 (18)	
Other/Traditional/No religion	9.04 (18)	9.68 (9)	8.49 (9)	
Clinical Measures				
ART status				0.83 [a]
Ineligible	15.50 (31)	15.05 (14)	15.89 (17)	
Eligible but awaiting ART	36.50 (73)	38.71 (36)	34.58 (37)	
On ART	48.00 (96)	46.24 (43)	49.53 (53)	
Duration since HIV diagnosis (years)	1.56 (1.97)	2.40 (2.42)	1.58 (1.38)	0.014
Duration since ART initiation (months)	--	15.77 (10.01)	14.08 (8.64)	0.60
No. of self-endorsed AIDS-related illnesses in last year (out of 12)	5.46 (2.72)	5.32 (2.85)	5.58 (2.60)	0.48
Psychosocial Measures				
Total number of disclosures	4.16 (2.48)	4.69 (2.60)	3.70 (2.29)	0.0052
Percent disclosed to current husband or partner	78.38 (87)	85.71 (60)	65.85 (27)	0.018 [a]
SSQ14 Depression score (out of 48)	28.44 (9.28)	28.02 (9.19)	28.79 (9.38)	0.56
MOS HIV QOL (out of 100)	44.60 (16.02)	45.66 (14.78)	43.69 (17.04)	0.38
Family Planning				
Percent ever used family planning	93.00 (186)	100.00	86.92 (93)	<0.0001[a]
Percent planning pregnancy in the next year	5 (10)	6.45 (6)	3.74 (4)	0.52 [a]
Pregnancy History				
No. of pregnancies	3.24 (1.75)	3.17 (1.65)	3.30 (1.84)	0.72
No. of children alive	2.47 (1.57)	2.30 (1.26)	2.61 (1.79)	0.42
No. of miscarriages/abortions	0.36 (0.63)	0.43 (0.73)	0.29 (0.52)	0.32
Sexual History				
Age at sexual initiation	19.19 (2.95)	19.24 (3.10)	19.14 (2.82)	0.82
No. of sexual partners in last year	0.60 (0.66)	0.84 (0.45)	0.39 (0.74)	<0.0001
No. of lifetime sexual partners	3.36 (9.67)	2.62 (4.79)	4.00 (12.44)	0.91
Percent ever treated for STI	64.50 (129)	66.67 (62)	62.62 (67)	0.56 [a]

[a]P-values calculated with Fisher's Exact test, two-sided; all others tested with Student t-test, two sided.

strate duration on ART to be significantly correlated with fertility desires, the mean duration of 14 months may be too short to demonstrate its full effects on fertility desires.

Additionally in this South African study, median age was significantly younger ($p < 0.001$), by four years, for those women desiring another child[14], an association that we also found in our cohort in univariate analysis. With every year increase in age, the odds of a woman desiring another child in the coming year was 0.89 ($p=0.03$; Table 2).

We find it unsurprising that younger women may feel more desire to have and care for a child than their older counterparts. This factor may also be mediated by the number of children the women currently have, a variable which was also significantly associated with intended pregnancy in the next year (OR 0.47, $p=0.02$; Table 2). Neither of these variables remained statistically significant in the multivariate analysis. This is likely because they measure a common concept, as younger women are more likely to have fewer children than their older counterparts simply due to their younger age and therefore more likely to desire another child.

In our cohort, higher perceived quality of life was the only significant predictive factor in multivariate analysis of positive fertility desire. Though our cohort was small and the cross-sectional data cannot demonstrate causality, from these associations we infer that ART may increase women's fertility desires, potentially as a result of its positive impact on perceived quality of life[7]. As ART improves women's qualify of life, they may feel healthier and more optimistic, and are more likely to feel secure in pursuing additional pregnancies. We anticipated that those women on ART would have the highest rate of intended pregnancies within the next year, however we found similar rates among women on ART and those on a waitlist for ART. While those women eligible but on a waitlist for ART would not yet have received the ART-induced health improvements of their peers who began treatment, we suggest that being on the waitlist for ART may make the women optimistic about their future quality of life and ability to pursue a pregnancy. Anticipation of receiving life-extending therapy, as well as seeing their peers' health improve on treatment, may improve these women's outlook on their health and future, including childbearing desires. Ultimately, the total number of women reporting intended pregnancies in the next year was so low (n=10) that caution is required in interpreting this analysis.

Unexpectedly, condom use was low among this cohort of HIV-positive, above-average educated women. Although all the women in the cohort knew their HIV status and lived in a peri-urban environment in which they had contact with health workers and regular exposure to health prevention messages, only 46.5% reported having ever used condoms. In contrast, 74% reported having ever used oral contraceptives, indicating perhaps that the vast majority of these women do not use condoms for contraception. The condom usage rates are nonetheless higher among these women than the 20.1% of Zimbabwean women of reproductive age who reported ever use of condoms in the 2006 DHS[2].

Reported ever use of condoms did not vary by ART group nor by intended pregnancy in our cohort. A major limitation of our study is that we failed to measure current or near future intended condom use, which is more informative regarding behavior for intended pregnancy. Previous studies have shown that advocating for condom use as a contraceptive method rather than a means of preventing HIV transmission is more effective at initiating and maintaining condom use within partnerships[5,16]. If HIV-positive women are actively seeking to conceive, however, they may only use condoms intermittently for HIV transmission prevention or forgo their use altogether. In light of this, HIV transmission prevention programs targeted towards positive women who may seek pregnancy will require nuanced messages to promote continued condom use.

In our study, factors significantly asso-

ciated with ever use of condoms were: younger age, being currently married, living with husband/partner, religion (Catholic, Anglican, or Methodist women were less likely to have ever used condoms), longer duration since HIV diagnosis, greater number of HIV status disclosures, disclosure to current husband / partner, and greater number of sexual partners in the past year. Most interestingly, currently married women were more likely to have ever used condoms than their widowed or divorced peers. Our ability to infer from this finding is limited by the measure of "ever use", rather than current use, but we suggest two possibilities. Women who have ever used condoms were on average five years younger than those women who had not ever used condoms ($p<0.0001$). In this cohort, currently married women were on average 3.5 years younger than their non-married counterparts. The younger women may have benefited from greater exposure to condom promotion, resulting in greater condom usage before or within marriage. Alternatively, condom promotion programs may be more effectively targeting married than divorced or widowed women. In either case, it is clear that barriers remain for HIV-positive women to use condoms. Integration of contraceptive and condom promotion in ART programs may help address some of the barriers to condom use[8].

In conclusion, our study indicates that some women on ART or waiting to initiate ART desire fertility in the future, potentially mediated through greater perceived quality of life. While our data did not detect any differences in condom use based on fertility desires, it is plausible that women desiring pregnancy may forego condom use in order to increase chances of conception. In light of these effects, we anticipate that as ART programs expand to provide more women with therapy, greater integration between PMTCT, family planning, and STI prevention services will be needed to provide these women with comprehensive care.

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REFERENCES

1. UNAIDS. *Report on the global AIDS epidemic 2008. Geneva, Switzerland:* Joint United Nations Programme on HIV/AIDS; 2008.
2. Central Statistical Office (CSO) [Zimbabwe] and Macro International Inc. *Zimbabwe Demographic and Health Survey 2005-06.* Calverton, Maryland: CSO and Macro International Inc., 2007, pp. 47-107.
3. Cooper D, Harries J, Myer L, Orner P, Bracken H and Zweigenthal V. "Life is still going on": Reproductive intentions among HIV-positive women and men in South Africa. *Soc. Sci. Med.* 2007; 65(2): 274-283.
4. Hoffman IF, Martinson FE, Powers KA, Chilongozi DA, Msiska ED, Kachipapa EI, Mphande CD, Hosseinipour MC, Chanza HC, Stephenson R and Tsui AO. The year-long effect of HIV_positive test results on pregnancy intentions, contraceptive use, and pregnancy incidence among Malawian women. *J. Acquired Immune Def. Synd.* 2008; 47(4): 477-483.
5. Feldman R and Maposhere C. Safer sex and reproductive choice: findings from "positive women: voices and choices" in Zimbabwe. *Reprod. Health Matters* 2003; 11(22): 162-173.
6. Homsy J, Bunnell R, Moore D, King R, Malamba S, Nakityo R, Glidden D, Tappero J and Mermin J. Reproductive intentions and outcomes among women on antiretroviral therapy in rural Uganda: a prospective cohort study. *PLoS One* 2009; 4(1): e4149.
7. Patel R, Kassaye S, Gore-Felton C, Wyshak G, Kadzirange Go, Woelk G, Katzenstein D. Quality of life, psychosocial health, and antiretroviral therapy among HIV-positive women in Zimbabwe. *AIDS Care;* 21(12): 1517-27.
8. Myer L and Akugizibwe P, Impact of HIV Treatment Scale-Up on Women's Reproductive Health Care and Reproductive Rights in Southern Africa, *J.*

Acquired Immune Def. Synd. 2009, 52(1): S52-S53.
9. Callegari L, Harper CC, van der Straten A, Kamba M, Chipato T and Padian NS. Consistent condom use in married Zimbabwean women after a condom intervention. *Sexually Trans. Dis.* 2008; 35(6): 624-630.
10. Adetunji J, Condom use in marital and nonmarital relationships in Zimbabwe, *Intl. Fam. Plann. Perspectives,* 2000*,* 26(4):196-200.
11. Wu AW, Revicki DA, Jacobson D and Malitz FE. Evidence for reliability, validity and usefulness of the Medical Outcomes Study HIV Health Survey (MOS-HIV). *Quality Life Res.* 1997; 6(6): 481-493.
12. Taylor TN, Dolezai C, Tross S and Holmes WC. Reliability and validity of two HIV/AIDS-specific quality of life instruments adapted for use in HIV-positive Zimbabweans. *AIDS Care* 2009; 21(5): 598-607.
13. Maier M, Andia I, Emenyonu N, Guzman D, Kaida A, Pepper L, Hogg R, and Bangsberg DR. Antiretroviral therapy is associated with increased fertility desire, but not pregnancy or live birth, among HIV+ women in an early HIV treatment program in rural Uganda. *AIDS Behavior* 2009; 13 (Supplement 1): 28-37.
14. Myer L, Morroni C and Rebe K, Prevalence and Determinants of Fertility Intentions of HIV-Infected Women and Men Receiving Antiretroviral Therapy in South Africa, *AIDS Patient Care and STDs,* 2007, 21(4):278-285.
15. Williamson NE, Liku J, McLoughlin K, Nyamongo IK and Nakayima F. A qualitative study of condom use among married couples in Kampala, Uganda. *Reprod. Health Matters* 2006; 14(28): 89-98.
16. Chimbiri AM, The condom is an 'intruder' in marriage: evidence from rural Malawi, *Soc. Sci. Med.* 2007, 64(5): 1102-1115.