

High rate of unintended pregnancies after knowing of HIV infection among HIV positive women under antiretroviral treatment in Kigali, Rwanda

Kimiyo Kikuchi¹, Naomi Wakasugi², Krishna. C. Poudel^{1,*}, Kayako Sakisaka^{1,3}, Masamine Jimba¹

¹Department of Community and Global Health, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan;

²Graduate School of Life and Environmental Sciences, University of Tsukuba, Ibaragi, Japan;

³Faculty of Policy Studies, Chuo University, Tokyo, Japan.

Summary

More than 90% of pediatric AIDS results from the transmission of the virus through HIV positive pregnant mothers to their children. However, little has been known about factors associated with unintended pregnancies after knowing their HIV seropositive status, or contraceptive use among HIV positive women under antiretroviral treatment (ART). We investigated thus factors associated with unintended pregnancies after knowing seropositive status, and also factors associated with the non-use of contraceptives among HIV positive women under ART. We carried out a cross-sectional study in Kigali, Rwanda in 2007. A total of 565 HIV positive women under ART were interviewed. We examined the associated factors of unintended pregnancies or non-use of contraceptives using logistic regression analysis. Among all the respondents ($n = 565$), 132 women became pregnant after knowing their HIV seropositive status. Among them, 82 (62.7%) got pregnant unintentionally. Those who had two or more children (adjusted OR, 3.83) were more likely to get pregnant unintentionally. Meanwhile, among all, 263 had sexual intercourse during the last three months. Of them, 85 women did not use any contraceptives. Those who did not agree that 'HIV positive children can survive as long as HIV negative children' (adjusted OR, 2.28), and those who 'can always ask partner to use a condom' (adjusted OR, 9.83), were more likely to use contraceptives. This study suggests that HIV positive women under ART need special support to avoid unintended pregnancies especially those who have two or more children. Moreover, interventions are also needed to improve women's understanding of the prognosis of pediatric AIDS, and condom-use negotiation skills.

Keywords: HIV/AIDS, mother-to-child transmission, contraceptive, unintended pregnancy, Rwanda

1. Introduction

Approximately 33 million people were living with HIV/AIDS in the world in 2008 (1). Although HIV prevalence seemed to be globally stabilized in 2007, Sub-Saharan Africa still remains the hardest hit area (2).

Rwanda is a country with a 9.92 million population (2008), and its gross national income per capita was 410 US dollars in 2008 (3). Total fertility rate was 5.9 in 2007, and the contraceptive prevalence was 17.4% between 2000 and 2006 (4). Available contraceptives are the pill, injection, condoms, IUD, norplant, and sterilization (5). As for the statistics related to HIV/AIDS, HIV prevalence among the 15-49 years old population was estimated at around 2.8% [2.4-3.2%] in 2007 (6). HIV prevalence among 15-24 years old pregnant women was 9.8% in 2001 in Kigali, the capital city of Rwanda (5). HIV prevalence in 0-14 year olds accounted for 14% of the total number of people living

*Address correspondence to:

Dr. Krishna. C. Poudel, Department of Community and Global Health, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan.
e-mail: krishna@m.u-tokyo.ac.jp

with HIV/AIDS in Rwanda (6).

More than 90% of pediatric AIDS results from the transmission of HIV from HIV positive women to their children (2). Thus, unintended pregnancy of HIV positive women who know their seropositive status is considered one of the most important issues to be addressed immediately to prevent transmission of the virus (7). The prevention of unintended pregnancies among HIV positive women is emphasized in the four-pronged strategy for preventing mother-to-child transmission of HIV developed by the United Nations. In addition, it has been reported to be a more essential and more cost effective approach to reduce pediatric AIDS than use of antiretroviral drugs for HIV positive pregnant women (8). Nevertheless, the rate of unintended pregnancies after knowing HIV seropositive status is considerable in some countries. In Cote d'Ivoire, for example, around 50% of pregnancies that occurred after knowing of their HIV seropositive status were unintended (9). In Uganda, more than 93% of women under ART who got pregnant during the follow-up period, expressed not wanting or not planning to have more children (10). While these studies indicated the importance of preventing unintended pregnancies, they did not explore its related factors. Such information would be useful to design specific interventions that aim to reduce unintended pregnancies among this population. However, only a few studies have been conducted on this important issue.

Accordingly, using contraceptives is one of the important practices for HIV positive women to prevent unintended pregnancies. For this, we also need to identify factors associated with the non-use of contraceptives among HIV positive women. Previous studies have reported several factors that were associated with the non-use of contraceptives among HIV positive women. Such factors included: no formal education, desire to have children, not knowing the prevention of mother-to-child transmission (PMTCT) program (10), religion, infertility (11), a lack of trust in condoms as protection, and the male partner's refusal to use condoms (12). However, little has been known about the relationship between the non-use of contraceptives and perception of mother-to-child transmission (MTCT) such as prognosis of pediatric AIDS, or self-efficacy of condom use.

The objective of this study was to investigate the factors associated with unintended pregnancies or the non-use of contraceptives after knowing of seropositive status among HIV positive women under ART, to which an increase of pediatric AIDS would contribute.

2. Methods

2.1. Study design and site

We conducted a cross sectional study from 25th July

to 17th August in 2007 in two health centers, Kinyinya and Kimironko in Kigali. In these two centers, Médecins Sans Frontières (MSF) Belgium intervened from 2002 to 2007 and scaled up ART for HIV positive people. Since the beginning of the ART program in 2002, 2,039 patients have started ART through these two centers as of 2006.

2.2. Participants

The participants of this study were HIV positive women under ART, who visited the two health centers during the study period. Inclusion criteria were women aged between 20-49 years old who were not pregnant on the interview day, to determine past pregnancies post HIV diagnosis. A total of 565 women attending the clinics during the study period met the inclusion criteria and we recruited all of them.

2.3. Questionnaire survey

We conducted face-to-face interviews using a structured questionnaire, which was developed based on the UNAIDS general population survey (13) and other previous studies (10,14-17). We developed the questionnaire first in English and then translated it into Kinyarwanda (the official language in Rwanda). It was then translated back into English. After that, we pre-tested the questionnaire on 45 participants and revised it accordingly.

2.4. Data collection

We collected socio-demographic data such as age, religion, marital status, job, education, and duration of ART. As for pregnancy related information, we asked participants about their pregnancy experience, the number of living children, history of children's death, past history of pregnancy after knowing of seropositive status (excluding the cases in which seropositive status was detected during the pregnancy), reason and intention of all the pregnancies after knowing of seropositive status, desire to have children, and experiences of receiving counseling. As for reasons of pregnancy, we categorized them as unintended pregnancy and intended pregnancy based on whether the woman's pregnancy was either mistimed or unwanted at the time of conception or not (18).

We measured MTCT knowledge using four questions such as, 'whether they know that HIV can be transmitted from mother to child at delivery', 'through breast milk' or 'during pregnancy', and 'whether HIV positive women on ART might deliver an HIV positive child'. We categorized the participants into two groups: those who have a high MTCT knowledge, and others. Those who gave correct answers to all the four questions were categorized as having a 'high

MTCT knowledge' and the others are those who did not give correct answers. To assess their perception of the prognosis of pediatric AIDS, we asked 'whether they agree that HIV positive children can survive as long as HIV negative children'.

To measure the non-use of contraceptives, we first asked the participants about the frequency of their male condom use (never, sometimes, always) in the past three months as it is the most common contraceptive method. For those who answered "sometimes" or "never", we asked whether they had used any other contraceptives in the past three months such as the pill, injection, condoms, IUD, norplant, and sterilization. Then we defined women who did not use any contraceptive methods recently as those who do not use contraceptives. We also asked about the self-efficacy of condom use, the belief that one is capable of asking their partner to use a condom, and its frequency (never, sometimes, and always).

We recruited six qualified nurses as interviewers. The first author gave one-day training to all interviewers and then they undertook a three-day pre-test trial. After the pre-test, they collected data. We conducted the survey in isolated spaces to ensure the personal privacy of respondents. Interviews were completed within 25-30 minutes after their informed consents were obtained. During the survey, the first author supervised interviewers and had a meeting with them to give them feedback. The study was approved by the Ethical Committee of the University of Tokyo

(approval number: 1669). We also obtained written permission to conduct this study from the Treatment and Research of AIDS Center (TRAC) in Rwanda.

2.5. Data analysis

We examined the associated factors of unintended pregnancies or non-use of contraceptives using logistic regression analysis. In our multivariate analysis, we included all the variables which were significant in bivariate logistic regression analysis at $p < 0.25$ as recommended by Katz (19). We also entered other variables which were associated with unintended pregnancies or non-use of contraceptives in previous studies. Statistical significance was set at a $p < 0.05$ level.

3. Results

3.1. Socio-economic characteristics

As shown in Table 1, the median age of the participants was 35.8 (S.D. = 6.3) years old. Regarding religion, 307 (54.3%) were Protestant, 162 (28.7%) were Catholic and 22 (3.9%) were Muslim. Among all the respondents ($n = 565$), 312 (55.2%) were widowed, separated or divorced, and 222 (39.3%) were married or cohabiting. Regarding their job, only 58 (10.3%) had regular or irregular jobs with wages. Those who had formal school education for at least 1 year were 369 (65.3%). The

Table 1. Socio-economic variables of the respondents ($n = 565$)

Variables	<i>n</i>	%
Number of respondents		
Kimironko health center	291	51.5
Kinyinya health center	274	48.5
Socio-economic variables		
Age (Median: 35.8 (S.D. = 6.3) years old)		
< 35	279	49.4
≥ 35	286	50.6
Religion		
Protestant	307	54.3
Catholic	162	28.7
Muslim	22	3.9
Other	74	13.1
Marital status		
Widowed/separated/divorced	312	55.2
Married/cohabiting	222	39.3
Single	31	5.5
Have paid jobs (yes)	58	10.3
Formal education of women* (yes)	369	65.3
Under ART years (Median: 1.9 (S.D. = 1.2) years)		
< 2	228	40.4
≥ 2	329	58.2
Cannot remember	8	1.4
Sero-status related variables		
Partner's sero-status among married and cohabiting women† ($n = 222$)		
Positive	155	69.8
Negative	43	19.4
Don't know	24	10.8

* Formal education = primary or secondary; † Excluded widowed, separated, divorced, and single, not applicable = 343.

median duration of receiving ART was 1.9 (S.D. = 1.2) years. Among those married and cohabiting participants ($n = 222$), 155 (69.8%) mentioned that their partner was seropositive.

3.2. Pregnancy related history

As for the history of pregnancy in the past (Table 2), 535 (94.7%) had ever been pregnant. The median number of children was 2.5 (S.D. = 1.8), and 273 (48.3%) experienced the death of a child. Of the total, 132 (23.4%) got pregnant after knowing their HIV seropositive status. The median number of these pregnancies was 1.1 (1-5 times). These pregnancies occurred within 4.8 years on average (1-17 years). Of 132 who got pregnant after knowing of seropositive status, 82 (62.1%) got pregnant unintentionally and 112 (84.8%) received PMTCT. The main reasons for unintended pregnancies were: 'their partner did not want to use a condom' (26.8%), 'their partner's desire to have children' (17.1%), and 'a condom was torn' (15.9%). On the contrary, 34 (25.8%) got pregnant intentionally after

knowing their seropositive status. The main reasons for intended pregnancies were: 'having no children' (44.1%), and 'had a few children' (20.6%).

Regarding the experience of receiving counseling in any facility after knowing of their seropositive status up until the day of interview, 369 (65.3%) received counseling about 'method of contraception', 324 (57.3%) received counseling about 'how to discuss with partner about family planning', 318 (56.3%) received counseling about 'how to get the contraceptives'. Of the total, 67 (11.9%) desired having more children.

3.3. Knowledge and perception

Regarding knowledge of the transmission routes of HIV from mother-to-child (Table 3), 551 (97.5%) knew about delivery and breast-feeding routes, and 473 (83.7%) knew about HIV transmission during pregnancy. However, only 367 (65%) knew that 'ART does not always prevent transmission of HIV'. Of the total, 315 (55.8%) chose all the correct answers. As for the perception, 240 (42.5%) thought that 'HIV positive

Table 2. Pregnancy experience ($n = 565$)

Variables	<i>n</i>	%
Variables related to pregnancy in her life		
Ever experienced pregnancy (yes)	535	94.7
Number of living children (Median: 2.5 (S.D. = 1.8))		
≥ 2	389	68.8
< 2	176	31.2
Ever experienced the death of a child (yes)	273	48.3
Variables related to pregnancy after knowing of seropositive status		
Ever got pregnant after knowing of seropositive status		
Yes	132	23.4
No	433	76.6
Number of pregnancies after knowing of seropositive status (Median: 1.1 (S.D. = 0.8))		
0	433	76.7
1	97	17.2
≥ 2	35	6.2
Reason of pregnancy after knowing of seropositive status*	132	
Unintended pregnancy ($n = 82$)		
Partner did not want to use condoms	22	26.8
Partner wanted children	14	17.1
Condom was torn	13	15.9
Did not want children, but did not use any contraceptive method	10	12.2
Did not know how to practice family planning	3	3.7
Rape	1	1.2
Not mentioned	19	23.2
Intended pregnancy ($n = 34$)		
Had no children	15	44.1
Had only a few children	7	20.6
Desire for male/female children	4	11.8
Desire for non-infected children	3	8.8
Not mentioned	5	14.7
No answer ($n = 16$)	16	
Received counseling after knowing of sero-positive status on		
HIV transmission from mother to baby through pregnancy	504	89.2
Method of contraceptives	369	65.3
How to discuss with partner about family planning	324	57.3
How to get the contraceptives	318	56.3
Desire to have more children (yes)	67	11.9

* 433 participants who did not have experience of pregnancy after knowing of sero-positive status were excluded. The participants who knew their HIV-positive status during the pregnancy were not included.

Table 3. Knowledge, perception and related behaviors (n = 565)

Variables	n	%
HIV related knowledge		
Know HIV can be transmitted from mother to baby at delivery	551	97.5
Know HIV can be transmitted from mother to baby through breast milk	551	97.5
Know HIV can be transmitted from mother to baby during pregnancy	473	83.7
Know HIV positive women under ART might deliver HIV positive babies	367	65.0
All correct answers	315	55.8
Not all correct answers	250	44.2
Perception		
Think HIV positive babies can survive as long as HIV negative babies (yes)	240	42.5
Self-efficacy		
Can ask partner to use condoms (n = 222)*		
Always	121	54.5
Sometimes	40	18.0
Never	61	27.5
Sexual behavior		
Had sexual intercourse during the last three months (yes)	263	46.5
Used condoms among those who had sexual intercourse during the last three months (n = 263)†		
Always	157	59.7
Sometimes or never	106	40.3
Used a contraceptive method among those who did not always use condoms (n = 106)‡		
Always	21	19.8
Sometimes or never	85	80.2

* The participants who were widowed, separated, divorced, or single were excluded (n = 343); † The participants who did not have sexual intercourse during the last three months were excluded (n = 302); ‡ The participants who did not have sexual intercourse during the last three months or who always used condoms were excluded (n = 459).

children can survive as long as HIV negative children'.

3.4. Self-efficacy

For self-efficacy of condom use among the 222 married or cohabiting women (Table 3), 121 (54.5%) stated that 'they can always ask partner to use a condom' and 40 (18.0%) stated that 'they can sometimes ask partner to use a condom'.

3.5. Use of contraceptives

Among all the respondents, 263 (46.5%) had sexual intercourse during the last three months (Table 3). Of the 263, 106 (40.3%) did not use condoms consistently, and of the 106, 85 (80.2%) did not use other contraceptive methods (those who always used at least one contraceptive methods were 178). These 85 participants were categorized as the group of non-users of contraceptives.

3.6. Factors associated with unintended pregnancy

Table 4 shows the factors associated with unintended pregnancy among women who had gotten pregnant after knowing their sero-positive status. Among 132 women who got pregnant after knowing their sero-positive status, 116 women who responded with a reason for the pregnancy are the subjects of this table. As the table shows, the multivariate analysis indicated that the participants who have two or more children (adjusted OR, 3.83; 95% CI, 1.30-11.30) were more

likely to get pregnant unintentionally after knowing of their seropositive status.

3.7. Factors associated with contraceptive use

Table 5 shows the factors associated with contraceptive use among all participants. As this table shows, the multivariate analysis indicated that the participants who did not agree that 'HIV positive children can survive as long as HIV negative children' were more likely to use contraceptives than those who agreed to it (adjusted OR, 2.28; 95% CI, 1.12-4.63). Compared to the participants who can never ask partner to use a condom, those who 'can always ask partner to use a condom' (adjusted OR, 9.83; 95% CI, 4.28-22.61), and 'can sometimes ask partner to use a condom' (adjusted OR, 11.12; 95% CI, 4.89-25.29) were more likely to use contraceptives.

4. Discussion

Our study is one of the few which focused on unintended pregnancies of HIV positive women under ART, one of the urgent issues of HIV/AIDS. Our study revealed that almost two-thirds of HIV positive women pregnancies, after knowing their seropositive status, were unintended, and a considerable number of women who had sexual intercourse during the last three months had not consistently used contraceptives. Our findings also suggested that the number of their living children was significantly associated with their unintended pregnancies. Moreover, we demonstrated

Table 4. Factors associated with unintended pregnancy after knowing of sero-positive status (n = 116)[†]

Variables	Unintended pregnancy after knowing of seropositive status		Crude OR (95% CI)	Adjusted OR [#] (95% CI)
	Yes (n = 82) (n (%))	No (n = 34) (n (%))		
Socio-economic variables				
Age (years old)				
≥ 35	27 (79.4)	7 (20.6)	1.89 (0.73-4.90)	1.63 (0.60-4.42)
< 35	55 (67.1)	27 (32.9)		
Religion				
Protestant	42 (70.0)	18 (30.0)	1.99 (0.58-6.86)	2.11 (0.54-8.21)
Catholic	25 (75.8)	8 (24.2)	0.78 (0.08-8.04)	0.66 (0.62-7.09)
Muslim	4 (80.0)	1 (20.0)	1.34 (0.51-3.53)	1.43 (0.52-3.93)
Other	11 (61.1)	7 (38.9)		
Have paid jobs				
Yes	2 (100)	0 (0)	--	--
No	80 (70.2)	34 (29.8)		
Formal education of women				
No	29 (74.4)	10 (25.6)	1.31 (0.55-3.12)	1.41 (0.56-3.55)
Yes	53 (68.8)	24 (31.2)		
Under ART years [‡]				
< 2	50 (70.4)	21 (29.6)	1.00 (0.44-2.28)	1.15 (0.45-2.90)
≥ 2	31 (70.5)	13 (29.5)		
Number of children				
≥ 2	74 (75.5)	24 (24.5)	3.85 (1.37-10.88)*	3.83 (1.30-11.30)
< 2	8 (44.4)	10 (55.6)		

* $p < 0.05$; [†] Total number of women who got pregnant after knowing of seropositive status was 132, but we excluded 16 participants who did not answer; [‡] 1 participant was excluded because she could not remember the answer; [#] Adjusted for age, religion, marital status, have paid job, formal education, under ART years, and number of children.

that understanding the prognosis of pediatric AIDS, and 'self-efficacy for asking condom use' were associated with their use of contraceptives.

4.1. Unintended pregnancy

We found a positive association between unintended pregnancies and having two or more children. In this study, we categorized pregnancies as "unintended" when women did not use contraceptives without an intention to have children or could not use contraceptives although she wanted to use them. WHO revealed that there were high unintended pregnancies among Rwandans reporting that an "unmet need of family planning" led to 37.9% of these unintended pregnancies in 2000-2006 in Rwanda, which is the second highest rate in the world, following 39.5% in the Lao People's Democratic Republic (4). Our study demonstrated that the unintended pregnancy rate of HIV positive women was also high, and was even higher than the national average. One of the hypotheses we can suppose from the results is that an HIV positive woman had to accept non-use of contraceptives due to their poor circumstances. As our result showed, 97.6% of women who got pregnant after knowing their seropositive status did not have paid jobs due to difficulty of finding work or/and keeping a job, and found it hard to live without a partner's support. According to the in-depth interviews of HIV positive women, which were conducted separately from this study by the first author, a considerable number of women responded that because they needed to rely on their partner to make a living for

their family, they had to accept their partner's request for sexual behavior without using contraceptives, thus resulting in unintended pregnancy (20). If the number of children increased, then the more they needed their partner's financial support. These results may indicate the importance of economic independence of HIV positive women from their partners to avoid unintended pregnancies.

4.2. Contraceptive use

As for contraceptive use, it was positively associated with 'not agree that HIV positive children can survive as long as HIV negative children'. This result suggests that those who understood the prognosis of pediatric AIDS were more likely to use contraceptives. In other words, a correct understanding about what will happen to HIV positive children seems to restrain HIV positive women from getting pregnant, and as a result, it might reduce the number of pediatric AIDS cases. A previous study showed that concern over a child's future care could be a deterrent factor for pregnancy (14). However, the association between an understanding of the prognosis of pediatric AIDS and the non-use of contraceptives which our study revealed has not been shown in previous studies. Having a correct understanding of the prognosis of pediatric AIDS should be emphasized in the family planning counseling of HIV positive women. At the same time, it requires further investigation into what makes women believe that HIV positive children can survive as long as HIV negative children even though many HIV positive women are faced with their

Table 5. Factors associated with non-use of contraceptives among women who had sexual intercourse within three months (n = 263)

Variables	Use of contraceptives within three months		Crude OR (95% CI)	Adjusted OR [#] (95% CI)
	Yes (n = 178) (n (%))	No (n = 85) (n (%))		
Socio-economic variables				
Age (years old)				
≥ 35	74 (75.5)	24 (24.5)	1.81 (1.04-3.16)	1.42 (0.71-2.82)
< 35	104 (63.0)	61 (37.0)		
Religion				
Protestant	94 (67.6)	45 (32.4)	1.76 (0.83-3.74)	1.22 (0.46-3.23)
Catholic	56 (71.8)	22 (28.2)	0.46 (0.10-2.24)	0.60 (0.10-3.42)
Muslim	9 (81.8)	2 (18.2)	0.82 (0.45-1.51)	0.73 (0.34-1.54)
Other	19 (54.3)	16 (45.7)		
Marital Status				
Widowed/separated/divorced	41 (73.2)	15 (26.8)	1.51 (0.50-4.54)	0.67 (0.15-3.01)
Married/cohabiting	129 (66.8)	64 (33.2)	0.74 (0.38-1.43)	0.60 (0.26-1.39)
Single	8 (57.1)	6 (42.9)		
Have paid job				
Yes	15 (60.0)	10 (40.0)	0.69 (0.30-1.61)	1.28 (0.41-3.97)
No	163 (68.5)	75 (31.5)		
Formal education of women				
No	62 (67.4)	30 (32.6)	0.98 (0.57-1.68)	0.99 (0.49-2.00)
Yes	116 (67.8)	55 (32.2)		
Under ART years [†]				
≥ 2	83 (66.9)	41 (33.1)	1.02 (0.61-1.72)	0.86 (0.44-1.69)
< 2	91 (67.4)	44 (32.6)		
Pregnancy related variables				
Number of children				
≥ 2	121 (67.2)	59 (32.8)	0.94 (0.54-1.64)	0.74 (0.32-1.72)
< 2	57 (68.7)	26 (31.3)		
Ever experienced the death of a child				
Yes	93 (73.2)	34 (26.8)	1.64 (0.97-2.77)	1.61 (0.82-3.16)
No	85 (62.5)	51 (37.5)		
Counseling experiences after knowing sero-positive status on				
How to discuss with partner about family planning				
No	63 (61.2)	40 (38.8)	1.62 (0.96-2.74)*	1.28 (0.67-2.43)
Yes	115 (71.9)	45 (28.1)		
Desire to have children				
No	149 (68.7)	68 (31.3)	1.28 (0.66-2.50)	1.77 (0.65-4.79)
Yes	29 (63.0)	17 (37.0)		
HIV knowledge related variables				
All correct	98 (68.5)	45 (31.5)	1.09 (0.65-1.83)	1.27 (0.67-2.43)
Not all correct	80 (66.7)	40 (33.3)		
Perception related variables				
Think HIV positive babies can survive as long as HIV negative babies [‡]				
No	104 (73.2)	38 (26.8)	1.72 (1.00-2.93)*	2.28 (1.12-4.63)
Yes [†]	67 (61.5)	42 (38.5)		
Self-efficacy variables				
Can ask their partner to use condom				
Always	125 (86.8)	19 (13.2)	6.39 (3.25-12.55)*	9.83 (4.28-22.61)
Sometimes	18 (36.0)	32 (64.0)	11.70 (5.51-24.82)*	11.12 (4.89-25.29)
Never	35 (50.7)	34 (49.3)		

* $p < 0.05$; [†] 4 participants were excluded because they could not remember the answer; [‡] 12 participants were excluded because they did not respond to this question; [#] Adjusted for age, religion, marital status, have paid job, formal education, under ART years, number of children, experienced death of children, counseling experience, desire to have children, MTCT knowledge, 'HIV positive babies can survive as long as HIV negative babies', and can ask their partner to use a condom.

child's death. In our study, almost half of the women who had ever gotten pregnant had experienced a child's death (48.3%).

Furthermore, we found a strong negative association between the non-use of contraceptives and the level of high self-efficacy, that they can always/sometimes ask their partner to use condoms. Though the number of

applicable respondents for this question was low, a high significance shows the importance of self-efficacy for contraceptive use. Previous studies also suggested that encouraging women to raise their self-efficacy might be positively related to their contraceptive use (21,22). Initiation of the practical skills for condom negotiation should be included in the family planning counseling of

HIV positive women.

In contrast, the desire to have children was not found to be a predictor of the non-use of contraceptives, although a study in Uganda showed a significant association between them (10). Our results might indicate that women do not use contraceptives, regardless of whether they desire to have children or not. In other words, it implies that there exists a high number of unintended pregnancies. In fact this study showed a very high unintended pregnancy rate (62.7%) among those who had gotten pregnant after knowing their seropositive status.

This study has some limitations. First, traditional contraceptive methods such as the extension of breast-feeding which might restrain ovulation and the utilization of the safety period were not included. We examined only the cases of modern contraceptive methods which need the user's strong willingness to prevent pregnancy for utilization. Therefore, in our study, contraceptive users reflected that they had real intentions to prevent pregnancy. Second, the possibility of recall bias should be considered to measure whether women had the intention of pregnancy at the moment of sexual behavior when they got pregnant. However, getting pregnant is such a significant event that women usually can remember whether they had the intention of getting pregnant or not. Our results, thus, might not be strongly affected by the possibility of this limitation. Finally, our results might not be generalized to all HIV positive women because we selected our participants using a convenient sampling method. However, most of the women in our study sites had appointments at monthly intervals. With this, we assume that most of the women who met our criteria were included in our study.

In conclusion, this study suggests that HIV positive women under ART need special support to avoid unintended pregnancies especially those who have two or more children. Moreover, interventions are also needed to improve an understanding of the prognosis of pediatric AIDS and condom-use negotiation skills among HIV positive women, because these factors were associated with the non-use of contraceptives.

Acknowledgements

This study was conducted with the cooperation of the Kinyinya health center, Kimironko health center and Médecins Sans Frontières (MSF) Belgium. We also gratefully acknowledge Dr. John. M. Rwibasira, King Faysal Hospital for his warm support.

References

1. UNAIDS. Report on the global AIDS epidemic 2008. Geneva, Switzerland, UNAIDS, 2009.
2. UNAIDS. World Health Organization: AIDS epidemic

- update 2007. Geneva, Switzerland, UNAIDS, 2008.
3. World Bank. Data & Statistics 2008. <http://web.worldbank.org> (accessed December 18, 2010).
4. World Health Organization. World health statistics 2009. Geneva, Switzerland, World Health Organization, 2009.
5. The Treatment and Research AIDS Center. Protocole de prevention de la transmission du virus de l'immuno-deficience humaine de la mere a l'enfant au Rwanda. Kigali, Rwanda, TRAC, 2005.
6. UNAIDS. Report on the global AIDS epidemic 2008. Geneva, Switzerland, UNAIDS, 2009.
7. World Health Organization. Strengthening linkages between family planning and HIV: Reproductive choices and family planning for people living with HIV. <http://www.who.int/reproductivehealth/publications/en/> (accessed December 18, 2010).
8. Sweat MD, O'Reilly KR, Schmid GP, Denison J, de Zoysa I. Cost-effectiveness of nevirapine to prevent mother-to-child HIV transmission in eight African countries. *AIDS*. 2004; 18:1661-1671.
9. Desgrées-Du-Loù A, Msellati P, Viho I, Yao A, Yapi D, Kassi P, Wellfens-Ekra C, Mandelbrot L, Dabis F; Ditrane Study Group. Contraceptive use, protected sexual intercourse and incidence of pregnancies among African HIV-infected women. DITRAME ANRS 049 Project, Abidjan 1995-2000. *Int J STD AIDS*. 2002; 13:462-468.
10. Beyeza-Kashesya J, Kaharuza F, Mirembe F, Neema S, Ekstrom AM, Kulane A. The dilemma of safe sex and having children: Challenges facing HIV sero-discordant couples in Uganda. *Afr Health Sci*. 2009; 9:2-12.
11. Raine T, Minnis AM, Padian NS. Determinants of contraceptive method among young women at risk for unintended pregnancy and sexually transmitted infections. *Contraception*. 2003; 68:19-25.
12. Bedimo AL, Bennett M, Kissinger P, Clark RA. Understanding barriers to condom usage among HIV-infected African American women. *J Assoc Nurses AIDS Care*. 1998; 9:48-58.
13. UNAIDS. UNAIDS general population survey tools. <http://www.emro.who.int/> (accessed December 18, 2010).
14. de Bruyn M. Safe abortion for HIV-positive women with unwanted pregnancy: A reproductive right. *Reprod Health Matters*. 2003; 11:152-161.
15. Sayles JN, Pettifor A, Wong MD, MacPhail C, Lee SJ, Hendriksen E, Rees HV, Coates T. Factors associated with self-efficacy for condom use and sexual negotiation among South african youth. *J Acquir Immune Defic Syndr*. 2006; 43:226-233.
16. Walter EB, Royce RA, Fernández MI, DeHovitz J, Ickovics JR, Lampe MA; Perinatal Guidelines Evaluation Project group. New mothers' knowledge and attitudes about perinatal human immunodeficiency virus infection. *Obstet Gynecol*. 2001; 97:70-76.
17. Dyer SJ. The value of children in African countries: Insights from studies on infertility. *J Psychosom Obstet Gynaecol*. 2007; 28:69-77.
18. Santelli J, Rochat R, Hatfield-Timajchy K, Gilbert BC, Curtis K, Cabral R, Hirsch JS, Schieve L; Unintended Pregnancy Working Group. The measurement and meaning of unintended pregnancy. *Perspect Sex Reprod Health*. 2003; 35:94-101.
19. Katz MH. *Multivariable analysis: A practical guide for clinicians*. Cambridge University Press, Cambridge, UK, 2006.

20. Kikuchi K, Wakasugi N, Paudel KC, Muganda RJ, Jimba M. Why unintended pregnancies of HIV positive women do not disappear? Unintended pregnancy of HIV positive women in Rwanda. Poster session presented at the 15th International Conference on AIDS and STIs in Africa. Dakar, 2008.
21. Barta WD, Kiene SM, Tennen H, Abu-Hasaballah KS, Ferrer R. The idiographic study of inconsistent condom use behavior of persons living with HIV. *AIDS Care* 2007; 19:1058-1064.
22. Basen-Engquist K, Parcel GS. Attitudes, norms, and self-efficacy: A model of adolescents' HIV-related sexual risk behavior. *Health Educ Q.* 1992; 19:263-277.

(Received September 4, 2011; Revised November 28, 2011; Accepted November 29, 2011)