The impact of antenatal HIV diagnosis on postpartum reproductive behaviour in Northern Tanzania

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ABSTRACT

With HIV testing increasingly offered as a routine part of antenatal care in Africa, many women will discover they are HIV-positive during pregnancy. It is therefore important to examine the impact of HIV diagnosis on *postpartum* reproductive behaviour, to tailor antenatal counselling to positive women's needs. This is the first study to provide adjusted measures of the effect of diagnosis on postpartum reproductive behaviour. A baseline survey of 5284 antenatal clients enquired about reproductive behaviour before HIV testing/counselling. HIV results were linked to survey answers. Fifteen months later, a follow-up survey collected information on postpartum reproductive behaviour, and in-depth interviews explored attitudes to childbearing and HIV. HIV diagnosis caused a downward adjustment in childbearing desires, but did not affect *short-term* desires, in contrast to findings from previous studies. Qualitative research uncovered major factors discouraging childbearing post-diagnosis, but also factors pushing women to *continue* childbearing. Implications for antenatal counselling are discussed.

Keywords: HIV/SRH service integration, PMTCT, reproductive intentions, Tanzania

INTRODUCTION

In Mwanza region, Tanzania, HIV prevalence among women of reproductive age is 7% [1], and antenatal-based surveillance estimates have yielded an even higher prevalence of 9% [2]. HIV-positive women therefore make up a sizeable proportion of pregnant women, all of whom will be in need of antiretroviral prophylaxis to prevent mother-to-child transmission. Yet over a quarter of pregnancies are unplanned in the region [3], and some estimates suggest unplanned pregnancy rates could be even higher in HIV-positive women [4]. Meeting the reproductive and contraceptive needs of HIV-positive women will help avoid further unintended pregnancies, which in turn will help reduce the need for costly PMTCT treatments, and ultimately reduce the number of HIV-positive births [5-7]. Meeting these needs requires a thorough understanding of HIV-infected women's reproductive behaviour and intentions, and in particular the impact of HIV diagnosis on this behaviour.

For many women in Africa, HIV diagnosis is increasingly occurring during antenatal care. This is the case in Tanzania, where provider-initiated HIV testing is now routinely offered as part of antenatal care in clinics with appropriate facilities, with the aim of identifying women in need of PMTCT. The great majority of pregnant women in Mwanza region have never had an HIV test before, which means that many of them will discover they are HIV-positive during pregnancy. In order to adequately address the reproductive and contraceptive needs of these women after diagnosis, it is therefore important to understand the specific impact of antenatal HIV diagnosis on reproductive behaviour, and more particularly on *postpartum* reproductive behaviour. This will help inform HIV and contraceptive counselling guidelines for use during antenatal and postpartum care following HIV diagnosis.

HIV is now recognised as a key factor to be taken into account in reproductive health policies in sub-Saharan Africa, and in the past 5 years, the interface between HIV, childbearing and contraception has received increasing attention from researchers and policy-makers in Africa and the international community [8-12]. Several studies in sub-Saharan Africa have examined the impact of HIV diagnosis on reproductive behaviour [4, 13-17], but few have looked specifically at the impact of *antenatal* diagnosis on *postpartum* reproductive behaviour [18-22]. Of the few studies that have, none have taken into account baseline differences in reproductive behaviour between HIV-positive and negative women *prior* to HIV testing. Yet there is strong evidence from numerous studies (including this one) that HIV-positive and negative women have significant differences in reproductive behaviour and intentions even before diagnosis, mediated by both biological and behavioural mechanisms [23-35]. Research that does not take these baseline differences

into account risks over- or underestimating the effect of HIV diagnosis on childbearing and contraceptive behaviour. This study bridges this gap by investigating the differences in reproductive behaviour and intentions between HIV- and HIV+ women after HIV testing, controlling for pre-test differences in behaviours and desires. It is also the first study to combine quantitative and qualitative methods in this context.

METHODS

In 2008, a baseline survey of 5284 pregnant women was carried out in 15 antenatal clinics offering HIV testing in two districts of Mwanza region, which encompassed highly urbanised areas such as Mwanza City (the second largest town in Tanzania) as well as remote rural areas. The 15 clinics surveyed represented all government clinics offering HIV testing in the catchment area at the time, and all women attending these clinics during the survey period were interviewed. Our study therefore comprised a complete sample of antenatal clients in the catchment area during the study period.

All pregnant women attending the clinics during the study period were invited to participate, subject to their informed consent. Nurses in each clinic were trained to administer a standardised survey questionnaire to clients as they waited for their routine HIV test. The questionnaire collected information about socio-demographic characteristics, past reproductive and contraceptive behaviour, future childbearing and contraceptive intentions. Respondents were asked whether they agreed to be contacted 15 months later for a follow-up interview and health check. If they agreed, their contact details were recorded on a separate form linked to their questionnaire by an anonymous study number. After the baseline interview, respondents underwent HIV testing and counselling, and subject to their consent, their HIV result was linked to their survey answers using the same anonymous study number.

Fifteen months later, a follow-up survey was conducted on the baseline respondents who agreed to be contacted and who had accepted HIV testing at baseline (so knew their HIV status), in order to collect data on postpartum reproductive behaviour and intentions. The follow-up data was then linked to respondents' baseline data using the same study numbers. During the follow-up survey period, in-depth interviews were conducted with a sub-sample of 25 respondents from the follow-up survey (chosen using a mix of purposive and theoretical sampling), to further explore feelings around childbearing, contraception and HIV.

The survey data was analysed in STATA. Using multivariate linear, logistic and Cox regression models, we first examined baseline differences in reproductive behaviour between HIV+ and HIV- respondents before they knew their status. Taking into account these baseline differences, we then determined the effect of HIV *diagnosis* on postpartum reproductive behaviour outcomes. Results are adjusted for clustering at the clinic level. The qualitative data was analysed using elements of grounded theory, with the help of NVivo qualitative analysis software.

RESULTS

Study sample

A total of 5284 pregnant women participated in the baseline survey, 5133 of whom agreed to an HIV test that day. HIV status was subsequently determined for 5121 women. HIV prevalence was 8.9%. The mean age of the sample was 25, and respondents had a mean parity of 1.9 children. 26.2% of women had ever used family planning. For the follow-up survey, 2166 (45%) out of the 4850 baseline respondents who consented to participate in the follow-up were successfully contacted. Women followed up tended to be more rural than those lost to follow-up, but after adjusting for type of place of residence, no significant differences in baseline characteristics were identified between those lost to follow-up and those followed up. Respondents were a median 10 months postpartum at follow-up. 34% of women reported having used family planning at some point during the postpartum period.

Differences by HIV status before testing

Amongst women who had never tested for HIV, HIV-positive women were found to differ from their HIV-negative counterparts before testing with regard to several reproductive characteristics (table 1). After adjusting for other factors, HIV-positive women had on average 0.3 fewer children than HIV-negative women, probably due to effects described in other studies: biological effects of HIV such as reduced fecundity, and behavioural effects of undiagnosed HIV infection, such as reduced frequency of sexual

intercourse due to illness, relationship instability, or suspicion of HIV infection. Previous birth interval was also significantly longer in HIV-positive women compared to HIV-negative women, by nearly 10 months.

HIV-positive respondents were significantly more likely to have used family planning (FP) in the past (p=0.017). The association of HIV status with past FP use may be confounded by frequency of sexual activity (making highly sexually active women more likely both to have used FP and to have acquired HIV). Alternatively, the association could be causal: women who *suspect* they are HIV+ may want to avoid pregnancy by using FP. Another hypothesis is that women in unstable partnerships (often at higher risk of HIV infection) are more likely to use FP to avoid getting pregnant by that particular man, if they do not see the relationship lasting. Interestingly, HIV-positive respondents were also slightly more likely to want to stop childbearing than their negative counterparts, although this was only borderline significant at the 95% confidence level (p=0.046). This suggests some HIV-positive women may have *suspected* they were infected, and altered their childbearing intentions in response. Such a phenomenon has been found in other African studies [17, 32, 34, 36].

Table 1. Summary of associations of HIV status with reproductive outcomes

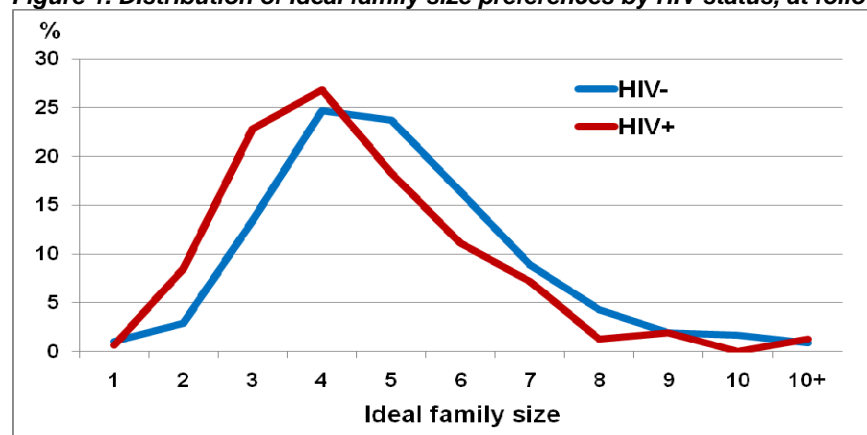|	Crude OR, HR or difference for HIV+ compared to HIV-*	Adjusted** OR, HR or difference for HIV+ compared to HIV-*	Adjusted p-value
Baseline reproductive behaviour in never-tested (before antenatal HIV test)			
Difference in parity	0.04 (-0.19-0.27)	-0.30 (-0.48--0.12)	0.003
Difference in length of last birth interval	16.22 (8.58-23.87)	9.58 (4.50-14.66)	0.001
Odds ratio of FP ever use	1.63 (1.24-2.13)	1.43 (1.07-1.90)	0.017
Odds ratio of wanting another child before testing	0.74 (0.59-0.92)	0.73 (0.54-0.99)	0.046
Postpartum childbearing outcomes			
Odds ratio of negative pregnancy outcome	1.30 (0.85-1.98)	1.27 (0.82-1.98)	0.262
Hazard ratio of repeat pregnancy	0.73 (0.43-1.26)	0.76 (0.40-1.45)	0.406
Childbearing intentions			
Odds ratio of wanting another child	0.50 (0.37-0.68)	0.51 (0.33-0.79)	0.006
Difference in ideal family size	-0.84 (-1.13--0.56)	-0.66 (-0.89--0.43)	<0.001
Odds ratio of wanting a child within 2 years	1.17 (0.49-2.78)	0.94 (0.34-2.57)	0.897
FP use and unmet need in the follow-up period			
Hazard ratio of FP use during follow-up period	1.33 (1.00-1.78)	1.25 (0.93-1.69)	0.145
Hazard ratio of hormonal method use during the follow-up period	0.95 (0.74-1.23)	0.92 (0.73-1.15)	0.451
Hazard ratio of condom use during the follow-up period	1.85 (0.91-3.79)	1.72 (0.85-3.49)	0.134
Hazard ratio of tubal ligation during the follow-up period	1.25 (0.46-3.42)	0.66 (0.22-1.95)	0.454
Hazard ratio of stopping FP during the follow-up period	1.28 (0.64-2.59)	1.21 (0.58-2.51)	0.607
Odds ratio of unmet need at follow-up	0.64 (0.44-0.93)	0.61 (0.42-0.91)	0.018
Future FP intentions			
Odds ratio of intending to use FP in the future	0.97 (0.68-1.40)	1.09 (0.59-2.00)	0.773
Odds ratio of intending to have a tubal ligation in the future	1.45 (0.82-2.59)	1.56 (0.61-3.96)	0.323
Fertility inhibitors in the postpartum period			
Hazard ratio of menses resumption	1.00 (0.80-1.24)	0.96 (0.79-1.16)	0.645
Hazard ratio of resuming sexual activity	0.84 (0.73-0.96)	0.83 (0.72-0.97)	0.019

* Baseline category is always HIV-. Odds ratios, hazard ratios and differences compare HIV+ to HIV-. Shaded rows denote non-significant factors.
** Adjusted for: socio-demographic characteristics, differences by HIV status at baseline in the case of postpartum reproductive outcomes, and where appropriate past FP use, baseline childbearing and FP intentions, and time-varying reproductive factors during follow-up (return of menses, sexual activity resumption

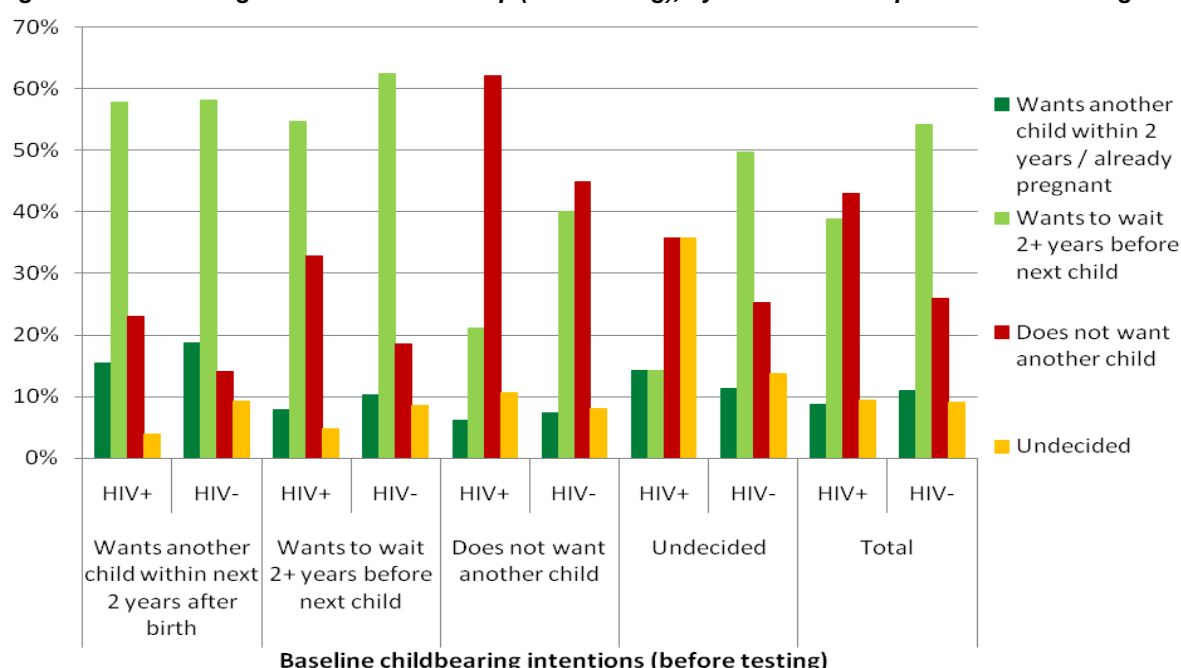### The impact of HIV diagnosis on childbearing intentions at follow-up

Having identified these differences before testing, we were able to adjust for them in subsequent analyses in order to determine the effect of HIV *diagnosis* on reproductive behaviour. The strongest effect of HIV diagnosis on reproductive behaviour in the postpartum period was on childbearing intentions (table 1). After adjusting for socio-demographic factors and baseline differences by HIV status such as parity, ideal family size was significantly lower in HIV-positive women, as illustrated in figure 1. HIV-positive respondents desired on average 0.7 fewer children than their HIV-negative counterparts.

Figure 1. Distribution of ideal family size preferences by HIV status, at follow-up after diagnosis

HIV diagnosis also had a significant effect on desire for another child: after adjusting for baseline factors, including parity and pre-test childbearing intentions, HIV-positive women had half the odds of wanting another child compared to HIV-negative respondents (table 1). This association was much stronger than the association between childbearing intentions and HIV status before testing, and represents the net effect of *diagnosis* on childbearing intentions, regardless of the previous influence of undiagnosed infection. When we look at changes in intentions between before and after diagnosis (figure 2), HIV diagnosis appears to decrease childbearing intentions both by encouraging women who at baseline wanted to stop childbearing to stick to their intentions (whereas HIV-negative women were very likely to decide they wanted another child by follow-up), and by discouraging women who wanted another child before testing from having one. HIV diagnosis does not seem to affect short-term childbearing intentions, since the proportion wanting a child within 2 years at follow-up was very similar for HIV-positive and negative women in all baseline categories. This was confirmed in a multivariate regression on intended birth interval at follow-up: odds of wanting a child within 2 years were non-significantly different for HIV-positive and negative respondents (table 1).

Figure 2. Childbearing intentions at follow-up (after testing), by HIV status and pre-test childbearing intentions

Factors influencing childbearing after diagnosis: qualitative findings

In the in-depth interviews, several factors were found to strongly discourage HIV-positive women from childbearing. The most frequently voiced concern of HIV-positive respondents regarding childbearing was the increased health risk associated with pregnancy for HIV infected women:

> *The community know that if a person with the virus gets pregnant and bears a child, her health condition deteriorates and she dies. Considering the condition I have, how would I live if I bear another child?* (Respondent 8, 35 years old)

Respondents had particular concerns about loss of blood, which they perceived as more severe for HIV-positive women:

> *R: Now what makes me not become pregnant [is that] I tell myself that during delivery I'll bleed a lot. Now maybe... for instance, if I bleed, then I'll die prematurely.*
> I: You thought that you'd die prematurely?
> *R: Yeah, it is better I stopped [childbearing].* (Respondent 16, 30 years old)

Respondents were also heavily influenced by the advice they had been given by their healthcare providers, which was largely directive and dissuasive of them having more children, despite a strong shift in global policy and advocacy towards a reproductive rights-based approach to reproductive counselling for HIV-positive women (refs), as exemplified here:

> *When I got tested and was found to be infected, the nurse advised me not to bear children anymore: 'if you continue bearing children, you keep on losing strength through bleeding'. People would be very worried [if an HIV infected woman continued childbearing]. They might say: 'This person will die upon delivery' [...] So my worry in bearing children is the nurse advised me that when you bear children, your health keeps deteriorating...that is my worry. I might give birth and die on the same day.* (Respondent 6, 31 years old)

Concerns around orphaning future children were brought up by some HIV-positive respondents, especially if their children were still young, as they could not take care of themselves:

> *I do not intend to add another child given the current situation. [...] If you continue bearing children, who will take care of your youngest children if you happen to die today? You'll leave them in suffering. You know, a child without a mother experiences so much difficulty if they are young. If they are grown up... fifteen, ten years old, it is somehow better. If you die and leave a two or one-year old child, they cannot last long... They'd just die. There'll be little care available.* (Respondent 6, 31 years old, 5 children)

HIV-positive respondents insisted on the importance of investing their energy in taking care of the children they already had, rather than further 'increasing the burden'. In comparison to these concerns, worries of mother-to-child transmission were surprisingly rare, likely due to improvements in PMTCT treatment. In fact, the only respondents who voiced any worries related to MTCT were HIV-negative women, who were perhaps less informed on PMTCT and its efficacy.

Despite the general consensus among the in-depth interview respondents that it was preferable to stop childbearing if diagnosed HIV-positive, we know from the survey results that many women continue to want more children after diagnosis. While only one HIV-positive woman in the in-depth interviews wanted more children after diagnosis, respondents nonetheless cited several factors that may encourage women to continue childbearing after diagnosis. There appears to be a common perception that HIV-positive women cannot get pregnant due to their illness, as illustrated in these excerpts:

> *If her condition does not indicate that surely she is suffering, they'd say: 'Wrong things are being said about this person, she is healthy. Had she been infected, why would she be pregnant?' Those who do not know much about it think that when you get infected, you become so sick and can't become pregnant, that you'd just be glued to a sickbed. If I become pregnant, these people wouldn't know that I'm HIV positive. Even if they knew that so and so has been infected, they'd doubt it: 'If so and so is suffering [from HIV], why is it that she's become pregnant? Mm, it is not true, these are mere rumours, so and so is healthy because she's become pregnant'.* (Respondent 16, 30 years old)

There is no way that a woman with HIV can become pregnant. Because as you are already sick there is no way, where will you get [the pregnancy]? You are already suffering, you have the viruses in the stomach, they are attacking you. (Respondent 19, 37 years old, HIV-)

This rumour could be capitalised on by HIV infected women, who may become pregnant to dispel rumours of their positive status. The strong societal and family pressure to have children may also push some infected women to have children, especially if they have few children, and if they have not disclosed their status. Childless women were described in extremely negative terms. While the community disapproved of HIV-positive women childbearing, the terminology used for them was rather one of pity than disdain. In contrast, the language used to describe childless women was often much more disparaging, as exemplified here:

R: A childless woman would be despised.
I: Why do you think this is the case?
R: I think this is a tradition with roots in the past - that a sterile person is worthless. The people still value this past tradition... any person who does not have a child, at some point will be regarded worthless. (Respondent 13, 32 years old, 3 children)

[A childless woman] feels awkward because she does not have a child while her fellows have children. If you asked a child: 'Would you bring me some drinking water?' you'd be told by their parent: 'Don't disturb him/her please, you left yours in a toilet [when you underwent abortion]'. (Respondent 12, 23 years old, 1 child)

Childlessness was usually portrayed as a disease, equated to barrenness and infertility, and it was rarely suggested that it might be a choice. In fact, the idea that it might be a choice induced even more disdain, due to a widespread association of voluntary childlessness (achieved through contraception or abortion) with prostitution and promiscuity. In contrast, childbearing was associated with a respect for family values and motherhood, and constituted a validation of marriage. Within this framework, childlessness was considered acceptable grounds for men to leave their wives, as alluded to by this respondent:

I: If a woman does not have children, how do you think the society will regard her?
R: They'd say: 'Gosh! This person doesn't bear children, she bears poop'.
I: What does 'she bears poop' mean?
R: If she bears poop [laughter]... of course, you know, in many homes, if someone gets married and does not bear children, this person would be gossiped about at home: 'Mr X, your wife bears poop! Every day she bears poop, we don't like her. It is better you find someone who can bear a child'. (Respondent 25, 41 years old, 8 children)

Given this strong pressure on women to bear children in order to ensure the stability of their marriage, it is hardly surprising that HIV-positive respondents who wanted to stop childbearing sometimes found it difficult to get their partner to accept it. This particular respondent felt coerced into continuing childbearing, and ended up using the injectable in secret to avoid pregnancy:

R: My partner forces that we have children, but I don't like it, given my condition [...] he wants to destroy me.
I: Why do you say he wants to destroy you?
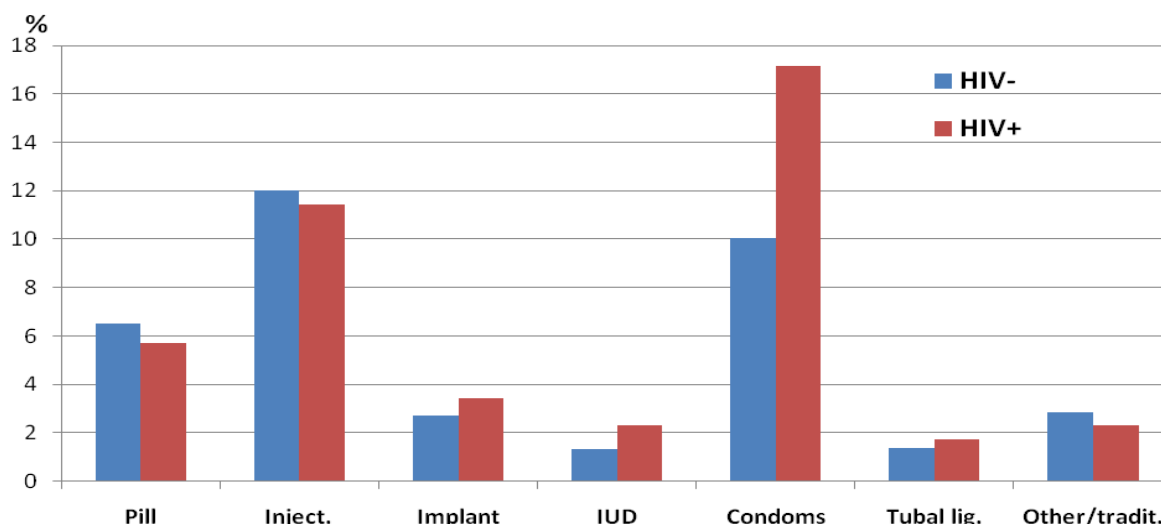*R: He destroys me because he'd want it by force... now how do I... I have no way out!* (Respondent 7, 39 years old, 2 children)

HIV-positive women face a near impossible task in trying to comply with societal and familial expectations of their conflicting roles as mothers and HIV-infected individuals. These expectations are likely to be particularly problematic for women who are diagnosed before they have had any children, when pressure to prove they are not barren is likely to be at its highest. Because the population in this study was from antenatal clinics, it was by definition not possible to interview childless women, but it is noteworthy that the only HIV-positive in-depth interview respondent who wished to continue childbearing was a 23 year-old who had just had her first child. In contrast, all other respondents had at least 2 children.

The impact of HIV diagnosis on contraceptive use and intentions in the postpartum period

HIV diagnosis had a much weaker effect on contraceptive behaviour, in comparison to its effects on childbearing intentions (table 1). After adjusting for other factors including HIV-positive women's higher past FP use before diagnosis, HIV-positive respondents displayed 25% higher hazards of contraceptive use in the postpartum period compared to their HIV-negative counterparts, but this did not reach significance (aHR=1.25, p=0.145). Breaking down contraceptive use into method type, it was apparent that the largest difference by HIV status was in condom use, which reached 17% in HIV-positive women postpartum, or 72% higher than in HIV-positive women (figure 3). In contrast, past condom use before diagnosis was much lower and similar in HIV+ and HIV- respondents, at 2%.

Figure 3. Proportions using contraception in the postpartum period, by method and HIV status

Contraceptive *intentions* at follow-up displayed no significant differences by HIV status, although intention to have a tubal ligation was non-significantly higher for HIV+ women (table 1), which is somewhat expected given that HIV infected respondents were more likely to want to stop childbearing.

Views on contraceptive use by HIV-positive women: qualitative findings

There was overwhelming support for condoms for HIV infected women, for their triple protection against HIV re-infection, STIs and pregnancy (although the latter was usually described as a bonus rather than a primary function of condoms). Condoms were generally preferred to hormonal methods, on the basis that hormonal methods offered no barrier against HIV and STIs (highlighting the lack of consideration of dual method use), and that hormonal methods may 'interact' with HIV and make women more ill, as explained by this respondent:

> *That medicine for family planning goes to the womb and affects it. Now one's body has already been affected with a virus that consumes blood, and that [family planning medicine] too makes use of blood... the injection makes you bleed... given that you're a sick person... Now what is all this for, given that you're advised to eat more fruits in order to increase blood so you may be healthy? On the contrary, you'd lose blood on a weekly basis. One becomes so pale and loses weight because she's lost a lot of blood. The medicines should be taken by someone who does not have the virus. I've heard this quite often mentioned.*
>
> (Respondent 4, 29 years old, HIV+)

Concerns over blood loss in HIV-positive women were widespread, both in the context of childbirth (as discussed previously) and of family planning use. Blood appears to have particular value to HIV-positive women, seemingly based on the understanding that HIV consumes blood, and that in order to maintain good health every effort should be made to minimise blood loss from other causes.

Impact of HIV diagnosis on postpartum abstinence and pregnancy rates

HIV-positive women had significantly lower hazards of resuming sexual activity during the follow-up period (aHR=0.83, p=0.019, see table 1), despite similar proportions of HIV+ and HIV- women married. This suggests that HIV-positive women may have been using abstinence as a HIV/STI transmission risk-reduction strategy, or as a way to avoid pregnancy (as was reported by an in-depth interview respondent). Indeed, pregnancy rates were 24% lower in positive women, although this was not significant (p=0.406).

DISCUSSION

Our study is the first to examine the effect of HIV diagnosis on postpartum reproductive behaviour, taking into account pre-testing differences by HIV status, and using mixed methods. We showed that after adjusting for pre-test differences, antenatal HIV diagnosis causes a downward adjustment in long-term childbearing intentions, nearly halving the odds of wanting another child. Lower childbearing desires following HIV diagnosis have been found in other African studies [4, 16-18]. However, findings from other studies have suggested that HIV diagnosis leads women to accelerate their pace of childbearing in the *short term* in a bid to reach an acceptable family size while they are still healthy, despite lower long-term desires [4, 13-14, 16]. In contrast, in our study HIV diagnosis did not affect short-term childbearing desires for HIV+ women, and did not cause an acceleration in the pace of childbearing. Indeed, repeat pregnancy rates were slightly lower in HIV+ women, and contraceptive use was slightly higher. We propose that this is a peculiarity of the postpartum period: HIV infected women diagnosed during pregnancy may not be so 'desperate' to have another child soon after diagnosis compared to the general population, as they may have fulfilled their short-term childbearing desires with their recent birth, and they may want to wait longer before their next child to let their body rest. This is plausible given their acute awareness of the health risks involved in an HIV-positive pregnancy.

The slightly lower pregnancy rates observed in HIV-positive respondents may also be partly a result of lower fecundity due to HIV infection, as well as their reported longer postpartum abstinence. Delayed resumption of sexual activity may be a conscious strategy to reduce the risk of HIV and STI transmission, but it may also be a consequence of HIV infected women's partners being disproportionately absent, or of reduced desire or ability to have sex due to HIV-related illness in the woman or her partner. However, if and when women resume sexual activity, pregnancy rates will likely rise. This is particularly relevant in the context of expanded ART access, as women may increase their sexual activity once they feel healthier on ART, as found in other studies [37-42], and the effect of antiretrovirals on counteracting HIV-induced subfecundity could lead to more unwanted pregnancies, especially if women were used to having difficulty getting pregnant. This highlights the need for a continuum of FP counselling from antenatal care into the extended postpartum period. Regardless of ART status, FP counselling will likely become increasingly important for HIV-positive women as time goes on, as they develop a higher demand for FP to meet their greater need for limiting births (as already visible in their higher demand for future tubal ligation).

The observed downward adjustment in childbearing desires after diagnosis was in spite of strong societal pressure to continue childbearing. This pressure is likely to be particularly strong for low parity women. In fact, in the in-depth interviews, the only HIV+ respondent who wanted more children was young and only had one child. Unfortunately we were not able to further explore this hypothesis, and future research could look at the specific reproductive needs of young, low parity HIV+ women and their partners. In contrast, for women who already had several children, economic worries, health concerns (compounded by counsellors' dissuasive advice against pregnancy), and the uncertain plight of existing children, prevailed over the desire to conform to societal norms. HIV infection remained at the forefront of their childbearing considerations, and this was true regardless of whether they were on ART, of their health status, and of their marital status. Given men's high childbearing desires, it was not always easy for women in relationships to convince their partner that they should stop childbearing (especially if they had not disclosed their status), and some women resorted to using FP secretly. Given the key role of partner disclosure in FP initiation, strategies for disclosure should continue to be discussed as part of the antenatal HIV counselling session.

HIV-positive women displayed slightly higher FP use postpartum than HIV-negative women, particularly condom use. However, dual method use was not considered a possibility (as confirmed in the quantitative analysis). Dual method use has been found to be very low in other African studies [15, 38, 43-44]. In light of the unpopularity of this strategy, rather than try to increase dual method use in HIV-positive women (with highly uncertain success), a more culturally acceptable strategy would be to promote condoms as a dual prevention method, which would also capitalise on the popularity of condoms as a postpartum contraceptive method in this population. Promoting condoms for contraception is especially important in a context where condoms are already difficult to negotiate, and women are very unlikely to use them if they are already using a hormonal method, regardless of the number of dual method use promotion talks they may have heard [45].

While the effect of antenatal HIV diagnosis on postpartum childbearing intentions is strong, other factors, particularly socio-demographic factors such as age and parity, still had a strong effect on childbearing intentions in the quantitative analysis. In the qualitative interviews, societal expectations around childbearing remained influential for low parity women even after diagnosis. Postpartum FP use also remained more strongly influenced by other factors than by HIV diagnosis, in particular menses resumption, past FP use and education, and partner's disapproval. This confirms results of previous studies that have highlighted the continuing influence of socio-demographic characteristics and societal attitudes to childbearing and FP, on reproductive behaviour even after a positive diagnosis [46].

In light of the numerous other factors that HIV-positive women had to consider, it is imperative that antenatal HIV counselling and any subsequent FP counselling be person-centred and reproductive rights-based, to take into account each woman's individual circumstances with regard to her marital status, status disclosure, FP attitudes, and wider societal expectations [47-48]. Other studies have shown that if counsellors display negative attitudes towards HIV-positive women childbearing and being sexually active, this may alienate women who want another child, as well as women who want to use FP to avoid pregnancy [49-50], potentially resulting in unwanted pregnancies and unnecessary risk-taking [50-53]. A woman's ability and willingness to discuss her pregnancy plans with her healthcare provider is pivotal to enabling her to access the services she requires. The obvious need to take HIV status into account when providing such tailored FP counselling underscores the rationale for integrating FP and HIV counselling.

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