

Under-reporting of partnership concurrency among married men and women in rural Uganda

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Abstract:

There is an intense debate about whether concurrent partnerships are a primary driver of the high rates of HIV in Southern and Eastern Africa. One of the key limitations to testing whether concurrency affects HIV transmission is the misreporting of concurrent partnerships. Previous studies, however, have lacked biomarker data to back these claims. That is the objective of this study. Using longitudinal data from two HIV surveillance sites in rural Uganda, we assess the sensitivity of self- and partner-reported concurrency among married men and women who seroconvert while their spouse remains HIV-negative. We find evidence that underreporting of concurrency is high, particularly among women. Without addressing measurement error in reported concurrency it will be difficult, if not impossible, to empirically test the effect of partnership concurrency on HIV transmission.

Extended Abstract:

Background

Partnership concurrency is defined as two overlapping sexual partnerships, where sex with one partner occurs in-between two acts of intercourse with another partner [1]. It is hypothesized that partnership concurrency is an important driver of the large generalized HIV epidemics in eastern and southern Africa. Its effect is thought to operate via the elevated viral load shortly after seroconversion and by creating a more connected network through which the virus can spread more efficiently [2]. Concurrency effects have been demonstrated repeatedly in simulation studies [2]–[4], but it has been difficult to establish the association between concurrency and the propagation of HIV in empirical studies [5]–[8]. Under- or misreporting of partnership concurrency has been proposed as one of several possible reasons for the lack of empirical support [9], and a couple of studies indeed suggest that women in particular under-report (overlapping) sexual partnerships [10], [11]. None of the previous studies had biomarker data to back these claims, and that is the objective of this study.

Using longitudinal data from two HIV surveillance sites in rural Uganda, we assess reported partnership concurrency in recent seroconverters who are married with a seronegative partner. Because HIV transmission in these populations primarily –if not exhaustively– occurs via sexual intercourse [12], all seroconverters in a union with a seronegative partner must have had an extra-marital partner from whom they acquired HIV. This subset of seroconverters is used to assess the sensitivity of self-reported and partner-reported partnership concurrency, which can be estimated as the fraction of first seroconverters with a reported extra-marital partner during the seroconversion interval.

Data and methods

The data come from two rural open-cohort HIV surveillance surveys in southwestern Uganda: the Kyamulibwa General Population Cohort (GPC) in Kalungu (formerly Masaka) district, and the Rakai Community Cohort Study (RCCS) in Rakai district. The Kyamulibwa GPC covers a population of around 11,000 residents 13 years and older, and has been conducting annual population-based serological surveys since 1989 (bi-annual since 2012) [13]. The population covered by the RCCS is approximately 16,000 adults between 15 and 49 years of age, and serosurveys are conducted every 12 to 16 months [14].

Measures of concurrency

Sexual behavior interviews are conducted during the same fieldwork visit as the HIV testing. In the Kyamulibwa GPC, residents are asked about the number of sexual partners in the preceding 12 months, and since our study is restricted to individuals who were married for over one year, it is possible to identify respondents who reported any instance of partnership concurrency over the past year. In the RCCS, partnership concurrency is measured indirectly, via the dates of first and last sex for up to four sexual partners in the last 12 months. Any overlap in partnership start and end dates is an instance of partnership concurrency, and we use this information to create a binary indicator for partnership concurrency in the last year.

Sensitivity of Concurrency

The data used in this analysis is restricted to men and women who are in seroconcordant HIV negative unions and subsequently seroconvert. Men and women whose partner also seroconverts in the same survey interval are excluded from the analysis because it is not possible to determine who seroconverted first, and therefore, to determine with certainty which of the two spouses must have had an extra-marital partnership. We isolate

first seroconvertors, because the second seroconvertor in a dyad may have acquired HIV from his or her spouse. The fraction of seroconvertors who self-report partnership concurrency thus give an estimate of the sensitivity of concurrency reporting in married individuals. Whereas these data allow us to identify false negative reports of partnership concurrency, they do not provide an opportunity to isolate false positive concurrency reports.

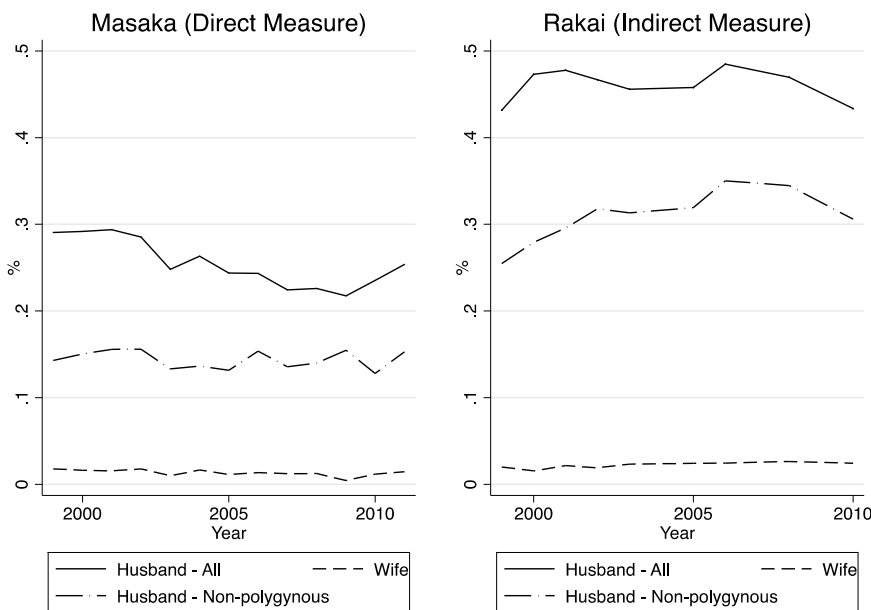
Prior research has suggested that to improve on individual self-reports of concurrency, we should also take into account if their spouse suspects that the index spouse is engaging in concurrency [15]. In Rakai, respondents are asked if they think their marital partner has other sexual partnerships, and can respond with yes, no, or that they are uncertain or do not know. This measure can be used to calculate the sensitivity of self-reported concurrency combined with whether their spouse suspects they have concurrent partners. Together, we calculate the sensitivity of three different measure of concurrency:

- (1) Self-report concurrency
- (2) Self-reported concurrency + spouse reports that the index has concurrent partners
- (3) Self-reported concurrency + spouse reports that the index has concurrent partners + spouse reports that they are uncertain whether the index spouse has concurrent partners

Preliminary results

Figure 1 shows the cumulative 12-month prevalence of concurrency among men and women in both study sites. Men’s concurrency prevalence is shown for all men, and then only for non-polygynous men. Further descriptive statistics of the analytical dataset will be presented in the full version of the paper.

Figure 1: Cumulative prevalence of concurrency in the last 12 months among married men and women by study site approach



To assess the sensitivity of concurrency reports, we follow 3,284 seroconcordant negative married couples in Masaka, and 8,938 seroconcordant negative married couples in Rakai, and identify when one spouse seroconverts while the other remains HIV-negative. In Masaka, 46 women and 46 men seroconverted with an HIV-negative spouse, and in Rakai 74 women and 100 men seroconverted while their spouse was still HIV-negative.

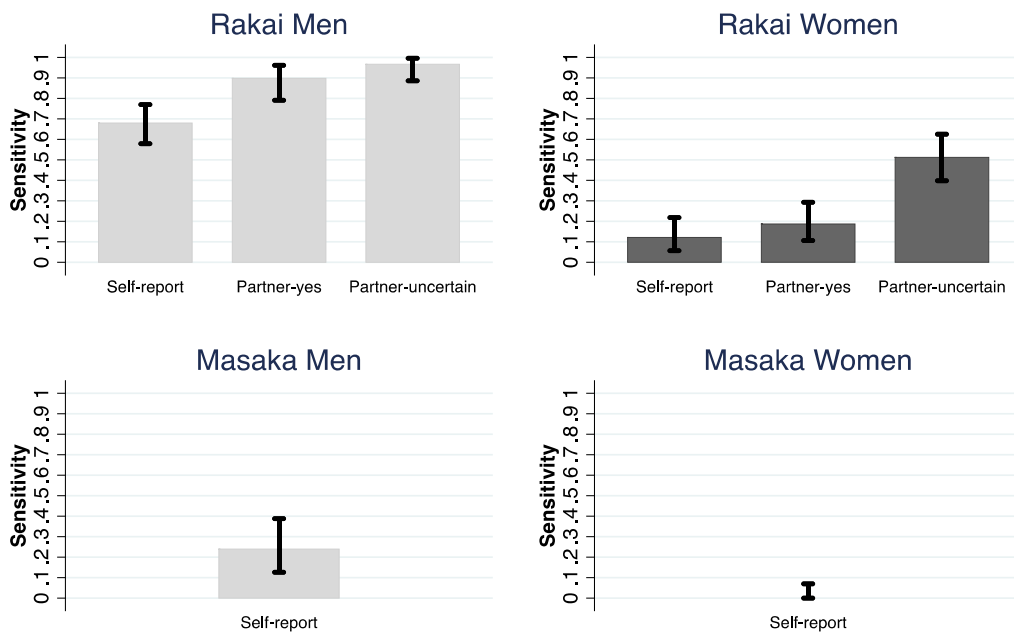
In this sub-population of men and women who are known to have had a concurrent partnership, the sensitivity of reported concurrency is very low (Figure 2). The extreme case of this is among women in Masaka, where none of the women that seroconverted first self-reported concurrency. The sensitivity is higher in Rakai compared to Masaka for both men and women.

Women were less likely to report their concurrency than men, supporting previous work that has found that women are more likely to underreport sensitive sexual partnerships [10]. However, we do not find evidence that married men overreport their sexual partnerships; even in Rakai, with the highest sensitivity of self-reports, only 68% of men who seroconverted and must have had a concurrent partner actually reported concurrency.

Upcoming work

In the full paper we will discuss in more detail the results for spouses' reports of their partner's concurrency. We will also test the sensitivity of our findings to the time-period in which concurrency was reported. Concurrent behavior was reported for the previous 12 months, but there was often greater than 12 months between survey rounds during which seroconversion may have occurred. We will test the sensitivity of our findings to also include reports of concurrency in previous and in subsequent survey rounds.

Figure 2: Sensitivity of concurrency reports among men and women seroconverting first



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Discussion

We find evidence that there is a large underreporting of concurrency among married men and women who were known to have a concurrent partnership. Moreover, we find that the vast majority of women who were known to have concurrent partnerships did not report their concurrent partners

We also find large differences in the level of sensitivity between Masaka and Rakai. One possible explanation for this difference is due to differences in the sensitivity of indirect and direct measure of concurrency. However, both the direct and indirect approaches have measurement error. While reported dates of first and last sex are thought to be moderately to very reliably reported [16], and partner's generally agree on reported dates of first and last sex [17], the indirect approach suffers from reporting errors, including missing data, date heaping, and recall error [18]–[21]. There is also evidence that some partners reported using the direct approach were left out when respondents answered questions using the indirect approach [22], and underreporting using the indirect approach is particularly high for non-marital partners [21]. However, social desirability bias is thought to be greater with the direct approach [18], [23]. Aside from one notable attempt to develop a new measure of concurrency that takes into account uncertainty in reported concurrency [15], all concurrency research is subject to substantial measurement error from one or both of these approaches.

Varying levels of sensitivity between the two site could also be driven by critical differences in the survey methodology and study site population. For example, the Rakai study respondents come to an interview center set up within a village, while in Masaka interviewers go from household to household, where there may be a greater likelihood of someone overhearing responses.

It is only possible to assess the sensitivity of concurrency measurement among men and women who seroconverted while their spouse was HIV-negative. Men and women who seroconvert may be different in important ways from the broader population. It is possible that men and women who seroconverted report their concurrency behaviors differently than men and women who engaged in concurrency but did not become HIV-positive. In addition, we are only looking at concurrency reports among married men and women. Previous research has suggested married couples are more reliable in reporting concurrency than unmarried men and women [19], [21]. It is therefore possible that sensitivity of concurrency reports is the same, or even lower, among unmarried men and women.

Implications

. The extraordinarily high level of underreporting among women reveals important challenges to testing the concurrency hypothesis. Women's seroconversions may be falsely attributed to their spouse if they misreport their own concurrency. As a result, any empirical test of concurrency is likely to overstate the onward transmission attributed to men's concurrent partnerships.

Without addressing the large measurement error in reported concurrency it will be difficult, if not impossible, to test the effect of concurrency on HIV transmission. These findings reveal the important limitations of using self-reported sexual behaviors in understanding the role of concurrent partnerships.

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