

# HIV status disclosure to male sexual partners and predictors among young women living with HIV in rural Uganda: a cross-sectional study

Edward Kumakech<sup>1</sup>, Deo Benyumiza, Marvin Musinguzi, Wilfred Inzama, Ebong Doryn, James Okello, Lydia Kabiri, Vanja Berggren and Jasper Watson Ogwal-Okeng

*Ther Adv Reprod Health*

2025, Vol. 19: 1–24

DOI: 10.1177/  
26334941251317079

© The Author(s), 2025.  
Article reuse guidelines:  
sagepub.com/journals-  
permissions

## Abstract

**Background:** In 2020 in sub-Saharan Africa, 25% of new human immunodeficiency virus (HIV) infections occurred among young women (15–24 years). In Uganda, the HIV prevalence is three times higher among young women at 2.9% compared to 0.8% among their male counterparts. HIV status disclosure is a gateway to preventive services.

**Objectives:** We set out to estimate the prevalence of HIV status disclosure to current male partners, and the predictors among the adolescent girls and young women living with HIV (AGYWHLHIV) in a semi-rural northern Uganda.

**Design:** In a cross-sectional study design, a consecutive sample of the AGYWHLHIV was recruited from six antiretroviral therapy clinics between November 2022 and April 2023.

**Methods:** Participants were administered an interviewer-guided questionnaire. They were asked whether they have ever disclosed their HIV status to their current male partners. They were also asked about their socio-demographics, sexual and reproductive health profiles, knowledge and perceptions of dual protection, and safer conception methods for AGYWHLHIV. Percentages to estimate prevalence, Chi-square tests to assess associations, simple and multivariate modified Poisson regression to identify predictors at  $p < 0.05$  and 95% confidence intervals (CI) were considered.

**Results:** Overall, 423 participants with a median age of 22 (IQR 4) years participated in the study. The prevalence of HIV status disclosure to the current male partners was found at 73.3% (95% CI 69.0–77.5). The predictors for HIV status disclosure were found to include the women's knowledge of their HIV status (APR 1.1 [95% CI 1.0–1.2],  $p$  0.032), knowledge of their male partner's HIV status (APR 0.8 [95% CI 0.7–0.9],  $p$  0.003), and the male partners' disclosure of their HIV status to the women (APR 0.7 [95% CI 0.5–0.9],  $p < 0.016$ ).

**Conclusion:** About three-fourths of the AGYWHLHIV in semi-rural northern Uganda disclosed their HIV status to their male partners. The predictors of disclosure included the women's knowledge of their HIV status, knowledge of their male partner's HIV status, and the male partner's reciprocal disclosure of their HIV status. To enhance disclosure rates, post-test, and disclosure counseling for both individuals and couples is recommended as part of the routine HIV testing, treatment, and care programs.

Correspondence to:

**Edward Kumakech**  
Department of Nursing,  
Faculty of Nursing and  
Midwifery, Lira University,  
P.O. Box 1035, Lira, 256,  
Uganda  
[ekumakech@lirauni.ac.ug](mailto:ekumakech@lirauni.ac.ug)

**Deo Benyumiza**  
Department of Midwifery,  
Faculty of Nursing and  
Midwifery, Lira University,  
Lira, Uganda

**Marvin Musinguzi**  
Department of Community  
Health, Faculty of Public  
Health, Lira University,  
Lira, Uganda

**Wilfred Inzama**  
Department of Obstetrics  
and Gynecology, Faculty of  
Medicine, Lira University,  
Lira, Uganda

**Ebong Doryn**  
**James Okello**  
Department of Obstetrics  
and Gynecology, Lira  
Regional Referral Hospital,  
Lira, Uganda

**Lydia Kabiri**  
Department of Nursing,  
School of Health Sciences,  
College of Health  
Sciences, Makerere  
University, Kampala,  
Uganda

**Vanja Berggren**  
Department of  
Neurobiology, Care  
Sciences and Society,  
Karolinska Institutet,  
Huddinge, Stockholm,  
Sweden

**Jasper Watson**  
**Ogwal-Okeng**  
Department of  
Pharmacology, Faculty of  
Medicine, Lira University,  
Lira, Uganda

## Plain language summary

### HIV status disclosure to male sexual partners and the predictors.

The world is still experiencing many new HIV infections among young women including adolescent girls. Adolescent girls and young women are more affected than boys and

men. Women and girls can get to know of their HIV status because of the HIV counseling and testing during preconception, antenatal, and postnatal care aimed at preventing the transmission of the infection to their babies. Beside that, it is important that women who know their status disclose their HIV status to their male sexual partners so that both partners can seek medical treatments for prevention of the transmission if one partner remained uninfected or for treatment of both partners if both of them are infected. This research estimated the proportion of adolescent girls and young women living with HIV who have disclosed their HIV status to their current male sexual partners and the factors that influence disclosure. To answer the above objectives, we asked 423 adolescent girls and young women living with HIV in rural Uganda whether they disclosed their HIV status to their current male sexual partners. We also collected information about the women's sociodemographic characteristics, sexual and reproduction related perceptions and behaviors. The research findings reveal that 73.3% of the adolescent girls and young women disclosed their HIV status to their current male sexual partners. The factors that were found to have influenced disclosure were the women's knowledge of their HIV status, the male partners disclosing their HIV status to the women, the women's age at initiation of sexual activity and the women's years of experience in sex. In conclusion, this research conducted in rural Uganda found that not all sexually active young women living with HIV disclose their HIV status to their male sexual partners. Disclosure is influenced by the woman's knowledge of her HIV status, reciprocal disclosure by the male sexual partner, the woman's age at initiation of sexual activity and her years of experience in sexual matters. The research calls for couple testing and disclosure counseling.

**Keywords:** adolescent girls and young women, HIV status disclosure, predictors, prevalence, Uganda

Received: 4 April 2024; revised manuscript accepted: 7 January 2025.

## Introduction

The high human immunodeficiency virus (HIV) burden among young women in sub-Saharan Africa (SSA) is a significant concern. Despite representing only 10% of the population in SSA, adolescent girls and young women aged 15–24 years (AGYW) accounted for 25% of new HIV infections in 2020.<sup>1</sup>

Moreover, in SSA, many sexually active adolescent girls and young women living with HIV (AGYWLHIV) do not disclose their HIV status to their partners (76%–100%) or fail to use protection (35%–55%), primarily due to fear of stigma and discrimination.<sup>2,3</sup> Previous studies conducted among women living with HIV (WLHIV) in Canada and East Africa found that WLHIV feared disclosing their HIV status to their male sexual partners to avoid the existing gendered power imbalances in sexual

relationships such as violence, and rejection or abandonment.<sup>3–5</sup> Other antecedents to women's nondisclosure of their HIV status to their male sexual partners include women's low educational attainment, poverty, and fear of being blamed for unfaithfulness which are culturally constructed injustices against women in many SSA settings<sup>5,6</sup>

The high risk for sexual transmission of HIV among discordant couples involving AGYWLHIV is an obvious consequence of nondisclosure of HIV status, with studies reporting transmission rates ranging from 0.0007 to 0.0082 per coital act.<sup>7,8</sup> The risk for sexual transmission of HIV remains in discordant partnerships even when the HIV-infected partner is on antiretroviral therapy (ART), thus undermining the “Undetectable = Untransmissible” (U = U) principle in situations of late ART initiation and inconsistent adherence and all of which are influenced, in part, by mutual

disclosure within the partnership.<sup>9,10</sup> Other potential consequences of HIV status non-disclosure would be delayed entry into the HIV testing, treatment, and care for the sexual partners and missed opportunities for partner support to the partner living with HIV.<sup>5</sup>

While people living with HIV have the right to keep their status private, disclosing HIV status within the context of sexual and reproductive health is crucial for adopting preventive measures against HIV and other sexually transmitted infection's transmissions and unintended pregnancies. It contributes to the broader goal of preventing new infections and controlling the spread of the virus. This is important because when couples become aware of their respective HIV statuses, they are more likely to adopt consistent condom use and engage in safer sexual practices,<sup>11</sup> utilize pre-exposure prophylaxis (PrEP),<sup>12</sup> adopt post-exposure prophylaxis (PEP),<sup>13-15</sup> use dual protection methods,<sup>16</sup> and consider safer conception methods,<sup>17</sup> thereby reducing the risk of transmission within their relationships and beyond.

To improve HIV disclosure rates to male sexual partners, the World Health Organization (WHO) recommended several programs and policies for WLHIV. First is to link voluntary HIV counseling and testing (VCT) programs to intimate partner violence (IPV) care programs so that women who report barriers to HIV disclosure such as fear of IPV at VCT programs would be referred to IPV care programs in their communities. The second is to conduct cross-training of HIV and domestic violence staff.<sup>18</sup> Cross-training entails providing VCT staff with information on domestic violence so that they acquire the knowledge to identify and refer women who are at risk of IPV, thereby improving the chances of HIV status disclosure.<sup>18</sup> Third is to improve the HIV disclosure skills and self-efficacy among the WLHIV through practical counseling approaches such as role play, scenarios, and other behavioral rehearsal techniques.<sup>18</sup> Fourth is to develop support groups for WLHIV to provide ongoing support during their HIV disclosure process.<sup>18</sup> The fifth WHO programmatic and policy recommendation is to make use of mediators (the HIV counselor, health workers, trusted family members, or friends) to moderate or facilitate the HIV disclosure processes at the health facility or the couple's homes.<sup>18</sup> The sixth is to encourage couple counseling and testing for HIV instead of testing people in silos and this is thought

to help in bypassing the barriers to HIV disclosure. The seventh programmatic and policy recommendation is to develop or link WLHIV to women empowerment programs that address women's unfavorable gender norms and facilitate HIV disclosure to sexual partners.<sup>18</sup> The eighth programmatic and policy recommendation is to develop or link WLHIV to community-based programs for addressing HIV stigma and discrimination to encourage HIV disclosure.<sup>18</sup> The ninth programmatic and policy recommendation is to develop or link WLHIV to community-based programs that improve communication between partners or couples as they can lead to HIV status disclosure and better outcomes for WLHIV.<sup>18</sup> These WHO programmatic and policy recommendations for improving women's disclosure of their HIV status to sexual partners have been adapted by many developing countries including Uganda since 2004 and their implementation has been linked to the routine VCT, ART, and adherence counseling programs for persons living with HIV (PLHIV).

Despite the above WHO programmatic and policy recommendations to improve disclosure rates among WLHIV, the prevalence of HIV status disclosure to male sexual partners has remained sub-optimal among women in the developing world (average 52%; range: 16%–86%) compared to the developed world (average 71%; range: 42%–100%).<sup>5</sup> Among the studies in the developing countries that reported the prevalence of HIV status disclosure to current or steady male sexual partners, the average prevalence of disclosure was 49%, considerably less than the average prevalence reported from studies conducted in the developed world (79%).<sup>5</sup> Previous studies in Kampala and the regions of central and south-western Uganda reported the prevalence of HIV status disclosure as ranging from 34.6% to 73.1% among AGYW/LHIV attending ART clinics.<sup>19-21</sup> Previous studies in other SSA settings such as Ethiopia and Nigeria that investigated mixed-age and mixed-gender populations of PLHIV attending non-maternal healthcare programs reported the prevalence of HIV status disclosure among women as ranging from 54.7% to 89.3%.<sup>22-24</sup> Studies in other SSA settings such as Togo reported the prevalence of HIV status disclosure among mixed-age and mixed-gender populations of PLHIV attending non-maternal healthcare programs as ranging from 21% to 60.9%, but these studies did not disaggregate the disclosure rates by gender or age groups.<sup>25-28</sup>

Previous studies identified some of the predictors for HIV status disclosure among young women but were not explicit on how sexual and reproductive health aptitudes and desires influence disclosure. To exemplify, a systematic review and meta-analysis for the prevalence and predictors for HIV serostatus disclosure among HIV-positive women in the East African region found that WLHIV who knew their partner's serostatus, and held prior discussions about HIV testing with their male sexual partners were more likely to disclose their HIV serostatus to their male sexual partners compared to their counterparts who did not know their partner HIV status and did not hold prior discussions about HIV testing with their male sexual partners, respectively.<sup>29</sup> Similarly, previous antenatal clinic-based cross-sectional studies conducted among pregnant women in Ethiopia and Uganda receiving prevention of mother-to-child transmission (PMTCT) of HIV services found that pregnant women who had smooth sexual relationships, had planned their pregnancy, had sufficient knowledge of HIV prevention methods, and had ever practiced safer sex methods were more likely to disclose their HIV status to their male sexual partners compared to their counterparts who had violent sexual relationships, did not plan their pregnancies, had insufficient knowledge about HIV prevention methods, and did not practice safer sex methods, respectively.<sup>30–32</sup> Lastly, several ART clinic-based cross-sectional studies conducted among mixed-gender and mixed-age people receiving ART in East and West African countries found that people living with HIV who were members of anti-HIV support groups or clubs, and had no fears of social violence were more likely to disclose their HIV status to their sexual partners compared to their counterparts who were not members of anti-HIV support groups or clubs and were fearful of social violence, respectively.<sup>25–28</sup>

The previous studies on the prevalence of HIV status disclosure and the predictors among AGYWHLHIV in developing countries, particularly in SSA including Uganda, expose several noteworthy gaps that call for deeper exploration. Primarily, there is a conspicuous absence of studies that thoroughly investigated the intricate sexual and reproductive aptitudes associated with HIV status disclosure among the AGYWHLHIV. This gap calls for further research tailored to the sexual and reproductive aptitudes and desires of AGYWHLHIV, and how they influence their HIV status disclosure to their male sexual partners.

Furthermore, in SSA, the responsibility for initiating HIV status disclosure tends to fall on the women, even those who are younger, are new to sexual relationships, and are in less empowered positions. This tendency arises from the HIV prevention services that primarily target women and focus on PMTCT through interventions like dual protection for child spacing, safer conception, HIV testing and ART in pregnancy during antenatal care, postnatal care, and exclusive breastfeeding. These services position women to receive more information, education, and HIV prevention resources than men, who have fewer targeted HIV health services. Further research is therefore needed about HIV status disclosure in the context of the partner's sexual reproduction desires to support the use of safer conception and dual protection methods, aiming to prevent HIV transmission to both the sexual partners and future children.

### Specific objectives

We set out to determine the prevalence of HIV status disclosure and its sexual and reproductive predictors among AGYWHLHIV in semi-rural northern Uganda. The potential predictors of focus were the AGYWHLHIV's sexual and reproductive desires, sexual feelings, knowledge of their initial HIV status and that of their male sexual partners, and their knowledge, perceptions, and use of the dual protection and safer conception methods.

### Conceptual framework

There was no specific theoretical framework or model that was used to guide the study. Therefore, a conceptual framework was developed specifically for the study using the previous literature.<sup>19–32</sup> In the conceptual framework, we framed the construct of HIV status disclosure as a social and preventive health behavior. As a social and preventive health behavior, the HIV-infected partner's decision to disclose or not to disclose status would be an intricate balance of two tenets namely knowledge of and perceptions about the existing measures to maintain safer sexual life and reproductive health in the sexual partnerships. Specifically, disclosure is likely to be influenced by the woman's knowledge of, and perceived benefits of the dual protection and safer conception methods. More so, disclosure may be influenced by the perceptions around the advantages, barriers, or challenges of the dual protection and safer conception methods.

The woman's socio-demographic characteristics are also influential as they shape her social environment including exposure to and perceptions about the dual protection and safer conception methods, and hence her readiness to share her status. Sexual and reproductive health characteristics, like her age at sexual debut, years of sexual experiences, desire for children, and previous pregnancies or childbirths, also may influence her exposure to and perceptions about the dual protection and safer conception methods and ultimately her likelihood of disclosure.

This framework highlights the need for investigations into the complex interplay of personal, social, and sexual reproductive health-related factors that may influence women's decision to disclose their HIV status to their male partners.

## Methods

The reporting of this study conforms to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for cross-sectional studies.<sup>33</sup> The checklist is followed from the study title and abstract through discussion and other information such as funding.

### Study design

The study was a cross-sectional study.<sup>34</sup> Its primary focus was the quantitative estimation of the prevalence of HIV status disclosure (the outcome variable) and the sexual and reproductive health-related predictors (the exposure variables) among the AGYWHLHIV in semi-rural Uganda.

### Study area and setting

The study was conducted in Lira district and Lira city. It is located in northern Uganda. It is about 340 km from Kampala, the capital city of Uganda. By 2020, the HIV prevalence among people aged 15–49 in the area had reached 7.2%, and this surpassed the national average of 5.4%.<sup>35</sup> The participants were recruited from the ART clinics of six public health facilities within the study area, namely Lira Regional Referral Hospital, Lira University Hospital, Ober Health Center, Ogur Health Center, Amuca Health Center, and Barapwo Health Center. The ART clinics collectively served 1,771 AGYWHLHIV aged 15–24 as of September 2022.

### Study population

The study population comprised AGYWHLHIV aged 15–24. These were attending the ART clinics at public health facilities. The area had an estimated 28,000 PLHIV aged 15 and older.<sup>36</sup> This accounted for about 2% of the 1,400,000 PLHIV in Uganda.<sup>35</sup>

### Inclusion criteria

An AGYWHLHIV aged 15–24 was considered for inclusion in the study if she (a) had lived with HIV for one or more years, (b) reported ever being sexually active (i.e., having had sexual intercourse at least one time within the past 2 years), and (c) was a resident of Lira district or Lira city.

### Exclusion criteria

The sexually active AGYWHLHIV aged 15–24 years were excluded from the study if they were deaf or mute, and therefore could not communicate in the interviews and or if they were visibly too sick to withstand the study procedures.

### Sampling methods and participant recruitment

The study employed a stratified random sampling method.<sup>37</sup> Initially, a comprehensive list of the AGYWHLHIV was established from the ART clinic registers. This list was stratified by the three levels of public health facility namely regional referral hospital patients, health center level IV patients, and health center level III patients. Lastly, proportionate to size sampling comprising 182, 126, and 115 participants were recruited from the three strata, respectively (see Table 1).

### Data collection tool

The data collection tool was the questionnaire (Supplemental Appendix 1). It was specifically developed using the existing literature.<sup>19–32</sup> The questionnaire measured the exposure and the outcome variables.

The questionnaire was pre-tested on 10 young women from Lira University Hospital. Adjustments were made to the questionnaire items whose responses yielded limited or no variability.

The questionnaire items pulled from the previous literature<sup>19–32</sup> included the participant's socio-demographic characteristics namely the



**Table 1.** Socio-demographic characteristics of the study participants.

Socio-demographic characteristics	Frequency (f)	Percentages	Median (IQR)
Woman's age group in years			22 (4.0)
15–19	99	23.4	
20–24	324	76.6	
Woman's religion			
Catholic	184	43.5	
Anglican	159	37.6	
Muslim	50	11.8	
Others	30	7.1	
Woman's tribe			
Langi	389	91.9	
Acholi	16	3.8	
Itesot	13	3.1	
Others	5	1.2	
Woman's marital status			
Married	203	48.0	
Single or never married	134	31.7	
Divorced or separated	77	18.2	
Others	9	2.1	
Woman's level of education			
No formal education	28	6.6	
Primary school	230	54.4	
Secondary school	125	29.6	
Tertiary school	37	8.7	
Bachelors	3	0.7	
Woman's source of income			
Domestic remittances	129	30.5	
Subsistence agriculture	59	13.9	
Commercial farming	6	1.4	
Salary employment	74	17.5	
Non-agricultural enterprises	88	20.8	

(Continued)

**Table 1.** (Continued)

Socio-demographic characteristics	Frequency (f)	Percentages	Median (IQR)
Others	67	15.9	
Woman's monthly income level in USD			
<24	261	61.7	
24 or more	162	38.3	
Nature of residential address			
Rural area	80	18.9	
Suburb small town	176	41.6	
Municipality or medium town	72	17.0	
Large city	95	22.5	
Distance of residence from the nearest health facility in km			2.0 (2.0)
0–5	382	90.3	
6–10	35	8.3	
>10	6	1.4	
Woman's alcohol use			
Never	372	87.9	
Occasionally	40	9.5	
Weekly/weekends	9	2.1	
Daily	2	0.5	
Woman's tobacco use			
Never	420	99.3	
Occasionally	3	0.7	
Woman's additive drug use			
Never	420	99.3	
Energy drinks	2	0.5	
Herbs	1	0.2	
Woman's health facility of recruitment			
Regional referral hospital	182	43.0	
Health center IV	126	29.8	
Health center III	115	27.2	
AGYW/LHIV, adolescent girls and young women living with HIV; f, frequency; IQR, interquartile range; km, kilometers; USD, United States Dollars.			

participant's age, marital status, educational level, place of residence, religious affiliation, employment or occupation, monthly income, level of health facility for ART attendance, alcohol use, smoking status, parity, number of children, whether the woman has ever gotten pregnant in the past 1 year, woman's prior knowledge of her own and partner's initial HIV status before engaging in sexual relationships.<sup>6,38</sup> Additional items pulled from the previous literature<sup>19–32</sup> included the woman's years of living with HIV, knowledge of her initial HIV status and that of her current male sexual partner before their first sexual intercourse, whether the woman desires to bear children or get pregnant, and whether the woman fears HIV stigma, discrimination, or IPV.<sup>39</sup>

The questionnaire items the investigators developed specifically for this study included the woman's knowledge of the male partner's desire to bear children and his desired number of children, the woman's knowledge, perceptions, and ever use of the dual protection methods, the woman's knowledge and perceptions of safer conception methods for WLHIV. After pretesting, the items adjusted were the woman's number of male sexual partners and whether the woman fears HIV stigma, discrimination, IPV or relationship breakup upon disclosure of her HIV status to her male sexual partner.

The participants aged 15–17 years (legally minors) were equally asked whether they desired to bear children just like the adult participants (aged 18–24 years). This was because the investigators thought that the desire to bear children would negatively influence the woman's likelihood of disclosing her HIV-positive status to the male partners and vice versa in order not to scare away the male partner from their ongoing sexual relationships. In the context of developing countries including Uganda, younger WLHIV including teenage girls suffer many socio-economic consequences of HIV infection including school dropout, abandonment, and early marriages, and often aspire for pregnancy conceptions and child-births as a way of securing the social and economic support from their male partners.

#### *Data collection procedures*

Data were collected between the 20th of November 2022 and the 30th of April 2023. Data were collected by six female Research Assistants with health backgrounds, one each per ART

clinic. The local language (Langi) was used to collect the data. Questionnaires were administered by face-to-face interview. It took about 1 h to complete each questionnaire. The participant's responses (data) were recorded directly on the questionnaire in ink.

#### *Outcome variables*

The primary outcome was the woman's disclosure of her HIV status to the current male sexual partners. The secondary outcomes included (a) one-way disclosure of the HIV status of the current male sexual partner to the woman, (b) one-way nondisclosure of the HIV status of the woman to the current male sexual partner, (c) two-way disclosure of the HIV status of both partners, and (d) two-way nondisclosure of the HIV status of both partners. HIV status disclosure was regarded as the social and preventive health behavioral outcome of interest.

#### *Measures of the outcome variables*

To measure the woman's one-way disclosure of her HIV status to her current male sexual partners, she was asked whether her HIV status was disclosed to her current male sexual partners and the response options were yes (coded as 1) or no (coded as 0). She was also asked whether the current male sexual partner's HIV status was disclosed to her. The response options for this were similarly yes (coded as 1) or no (coded as 0). The above two items enabled the measurement of the prevalence of one-way disclosure, one-way nondisclosure, two-way disclosure, and two-way nondisclosure among the participants.

If one of the partner's HIV statuses was disclosed or undisclosed but not both, this was regarded as one-way disclosure or one-way nondisclosure. If both partners disclosed their HIV status to each other, this was regarded as a two-way disclosure. If neither of the partner's HIV status was disclosed to the other, this was regarded as a two-way nondisclosure.

The items to measure the above outcome variables are described in detail in the Supplemental Material (Appendix I which was the Questionnaire). The study adapted some of the above measures for HIV status disclosure, and nondisclosure from a previous study conducted in Uganda.<sup>40</sup>



### *Exposure factors and covariates*

The exposure factors and covariates for the study were (a) the woman's age at sexual debut, (b) the woman's years of sexual experience, (c) the woman's sexual activity level, (d) the woman's knowledge of her HIV status before meeting the current male partners, (e) the period of the woman's knowledge of her HIV status, (f) the woman's desire to bear children, (g) the male partner's desire to bear children, (h) the male partner's disclosure of his HIV status to the woman and hence the woman's knowledge of the HIV status of her male partner, (i) the woman's perceptions of the benefits of the dual protection methods, (j) the woman's knowledge of safer conception methods, (k) the woman's perceptions of the benefits of the safer conception methods, and (l) the woman's socio-demographic characteristics, particularly her age, religion, marital status, rural or urban residential address, distance from the nearest health facility, educational level, employment status or occupation, and her monthly income level.

The selection of the above exposure factors and the covariates particularly the sexual and reproductive health-related ones were informed by their plausible relationships to the HIV status disclosure behavior as they received limited consideration in the previous studies on HIV status disclosure among AGYW<sup>5,17,19–32</sup>. The specific measures for the exposure factors and the covariates in the questionnaire are presented along with the results in Tables 1–3. They are also presented in detail in the Supplemental Material (Appendix I which is the questionnaire). The study adapted some of the measures for the exposure factors and the covariates described in the questionnaire from a previous study conducted in Uganda.<sup>40</sup>

### *Sample size determination*

The sample size for the study was calculated using the Kish Leslie (1965) formula.<sup>41</sup> The calculation assumed the *Z* score at a 95% confidence interval of 1.96, the prevalence of HIV disclosure of 0.731 based on a similar previous study conducted in central Uganda,<sup>19</sup> and the precision of 0.05. This produced an unadjusted sample size of 303 participants. After 1.5 adjustments for design effect, the final sample size was 454 AGYW<sup>5</sup>.

### *Data management*

The data from the completed questionnaire were double-entered by two data clerks using EpiData Entry, Version 3.1, EpiData, Odense, Denmark. Generally, there was no missing at random data because the interviewers ensured all the applicable questionnaire items were responded to by all the participants. For not missing at random items arising from questionnaire items that were not applicable to some of the participants, they were uniquely coded and excluded from the specific analysis on an item-by-item basis. The double-entry validated dataset was exported from the EpiData to the IBM Statistical Package for Social Sciences (SPSS) Statistics for Windows version 29.0 Armonk, NY: IBM Corp., for statistical analysis.

### *Statistical analysis*

The categorization of each variable is shown in Tables 1 to 4. The participants' socio-demographic characteristics were summarized into frequency counts and percentages. Point estimates such as median and interquartile range (IQR) were calculated using descriptive statistics. The prevalence of HIV status disclosure was calculated from the univariate analysis (frequency counts and percentages). Bivariate analysis (Chi-square statistics) followed by the bivariate and multivariate modified Poisson regression analyses were performed to identify independent predictors for a woman's HIV status disclosure. Statistical significance at  $<0.05$  and a 95% confidence interval were considered for all statistical tests.

Multi-collinearity analyses among exposure factors and the covariates that were associated with the women's HIV status disclosure from the bivariate analysis were conducted and no multi-collinearity was found.

The potential predictors were selected for regression analysis based on their plausibility, more so their statistically significant associations with the outcome variable from the bivariate analysis. Eight potential predictors were entered into the bivariate and multivariate modified Poisson regression analyses. These included the woman's age at sexual debut, the woman's sexual activity level, the woman's knowledge of her initial HIV status, the male partner's disclosure and hence the woman's knowledge of his initial HIV status,

**Table 2.** The sexual and reproductive characteristics of the study participants.

Sexual and reproductive factors	Frequency (f)	Percentage (%)	Median (IQR)
Woman's age at sexual debut in years			16.9 [2.4]
6–14	53	12.5	
15–19	311	73.5	
20–24	59	14.0	
Woman's gravidity			1.1 [1.1]
Woman's parity			0.8 [1.0]
Woman's number of abortions			0.1 [0.4]
Woman's number of living children			0.8 [0.9]
Woman's perceived mode of HIV acquisition			
Mother-to-child transmission	153	36.2	
Later exposure (unprotected sex, need stick, etc.).	270	63.8	
Woman's method of discovery of her HIV status			
HIV testing at the health facility	306	72.3	
Blood donation testing	1	0.2	
Health outreach testing	8	1.9	
Self-testing	16	3.8	
Parental disclosure	92	21.8	
Woman's use of ART before meeting the current male sexual partners			8.0 [7.4]
Not on ART	120	28.4	
On ART	303	71.6	
Woman's sexual activity in the past 12 months			
Once or twice per year	66	15.6	
1–3 times per month	63	14.9	
Weekly or more	112	26.5	
Sexually inactive	182	43.0	
Woman's awareness of her initial HIV-positive status before meeting the current male sexual partners			
Unaware	388	91.7	
Aware	35	8.3	

(Continued)

**Table 2.** (Continued)

<b>Sexual and reproductive factors</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>	<b>Median (IQR)</b>
Woman's initial HIV status before meeting the current male sexual partners			
Negative	135	33.6	
Positive	267	66.4	
Woman's sexual experience before meeting the current male sexual partners			
Naïve	217	51.3	
Non-naïve sexual experience	206	48.7	
Duration of the sexual relationship with the current male partner			
0–1 year	192	45.4	
2 or more years	231	54.6	
Whether the male partner's initial HIV status was disclosed to the woman			
No	150	35.5	
Yes	273	64.5	
Initial HIV status of the current male sexual partner before meeting the AGYW/HIV			
Negative	199	66.6	
Positive	100	33.4	
Woman's period for the first sexual activity with the current male sexual partners			2.4 (2.4)
Within 1 year ago	192	45.4	
More than 1 year but within 5 years ago	172	40.7	
More than 5 years ago	59	13.9	
Woman's age in years at first sexual activity with the current male sexual partners			19.0 (2.6)
11–14	17	4.0	
15–19	223	52.7	
20–24	183	43.3	
Woman's desire to bear children			
No	47	11.1	
Yes	376	88.9	
Male sexual partner's desire to bear children			
No	11	3.4	
Yes	312	96.6	

*(Continued)*

**Table 2.** (Continued)

Sexual and reproductive factors	Frequency (f)	Percentage (%)	Median (IQR)
Whether the woman gets sexual feelings			
No	36	8.5	
Yes	387	91.5	
Whether a woman has gotten pregnant in the past 12 months			
No	323	76.3	
Yes	100	23.7	
Woman's knowledge of the dual protection methods.			
Condom (male) only	61	14.4	
Female contraceptives plus either condom. (male) or ARV for PrEP or PEP	71	16.8	
Don't know	291	68.8	
Woman's perceptions of the benefits of the dual protection methods			
No benefits perceived	28	6.6	
Some correct benefits perceived	336	79.4	
Not sure or have no idea	59	14.0	
Woman's knowledge of safer conception methods			
ARV for ART for AGWLHIV plus unprotected sex	94	22.2	
ARVs for PrEP or PEP for HIV-negative men plus unprotected sex respectively	107	25.3	
Artificial conception methods, for example, AI or IVF	24	5.7	
Not sure or have no idea	198	46.8	
Woman's perceptions of the benefits of safer conception methods			
No benefits perceived	108	25.5	
Correct benefits perceived	261	61.7	
Not sure or have no idea	54	12.8	
AGYWLHIV, adolescent girls and young women living with HIV; f, frequency; IQR, the interquartile range; km, kilometers; ART, antiretroviral therapy; ARV, antiretroviral drug; PrEP, pre-exposure prophylaxis; PEP, post-exposure prophylaxis; AI, artificial insemination; IVF, invitro fertilization.			

the male partner's initial HIV status, whether the woman has gotten pregnant in the past 1 year, whether the woman gets sexual feelings, the woman's knowledge of the safer conception methods, and the woman's perceptions of the safer conception methods.

Two variables were excluded from the multivariate modified Poisson regression model. They included the woman's sexual experience before meeting the current male partner and the woman's perceptions of the benefits of the dual protection methods. These two factors were excluded

**Table 3.** Associations between the socio-demographic, sexual, and reproductive factors and disclosure of HIV status to current male sexual partners.

Factors	Disclosure status		Statistics		
	No	Yes	$\chi^2$	df	p-Value
	(F (%))	(F (%))			
Woman's age in years			0.141	1	0.707
15–19	25 (22.1)	74 (23.9)			
20–24	88 (77.9)	236 (76.1)			
Mode of HIV acquisition			0.432	1	0.511
MTCT	38 (33.6)	115 (37.1)			
Later exposure	75 (66.4)	195 (62.9)			
Woman's age in years at sexual debut			11.316	2	<b>0.003*</b>
6–14.	16 (14.2)	37 (11.9)			
15–19	91 (80.5)	220 (71.0)			
20–24	6 (5.3)	53 (17.1)			
Woman's age in years at first sexual activity with the current male partner			0.153	2	0.926
Nov-14	5 (4.4)	12 (3.9)			
15–19	58 (51.4)	165 (53.2)			
20–24	50 (44.2)	133 (42.9)			
Woman's sexual experience before the current male partner			3.070	1	0.080
Naïve	50 (44.2)	167 (53.9)			
Non-naïve sexual experience.	63 (55.8)	143 (46.1)			
Woman's ART use before the current male partner			1.234	1	0.267
Not on ART	27 (23.9)	93 (30.0)			
On ART	86 (76.1)	217 (70.0)			
Woman's sexual activity in the past 1 year			13.753	3	<b>0.003*</b>
Once or twice per year	12 (10.7)	51 (16.5)			
1–3 times per month	26 (23.0)	86 (27.7)			
Weekly or more	45 (29.8)	137 (44.2)			
Sexually inactive	30 (26.5)	36 (11.6)			
Woman's initial HIV status			0.352	1	0.553
Negative	30 (30.6)	105 (34.5)			

(Continued)

**Table 3.** (Continued)

Factors	Disclosure status		Statistics		
	No (F (%))	Yes (F (%))	X <sup>2</sup>	df	p-Value
Positive	68 (69.4)	199 (65.5)			
Duration of the sexual relationship with the current male partner			0.358	1	0.550
0–1 year	54 (47.8)	138 (44.5)			
2 or more years	59 (52.2)	172 (55.5)			
Disclosure of the male partner's initial HIV status to the woman			45.696	1	<0.001*
No	70 (61.9)	80 (25.8)			
Yes	43 (38.1)	230 (74.2)			
Current male partner's initial HIV status			3.378	1	0.066
Negative	41 (77.4)	158 (64.2)			
Positive	12 (22.6)	88 (35.8)			
Whether the woman desires to bear children			1.902	1	0.168
No	17 (15.0)	30 (9.7)			
Yes	96 (85.0)	280 (90.3)			
Whether the male sexual partner's desire to father children			0.056	1	0.582
No	2 (2.9)	9 (3.5)			
Yes	66 (97.1)	246 (96.5)			
Whether the woman has gotten pregnant in the past 1 year			5.679	1	0.017*
No	96 (85.0)	227 (73.2)			
Yes	17 (15.0)	83 (26.8)			
Whether a woman gets sexual feelings			6.319	1	0.012*
No	16 (14.2)	20 (6.5)			
Yes	97 (85.8)	290 (93.5)			
Woman's knowledge of the dual protection methods			0.781	2	0.677
Condom (male) only.	16 (14.2)	45 (14.5)			
Female contraceptives plus either condom (male) or ARV for PrEP or PEP.	22 (19.5)	49 (15.8)			
None	75 (66.3)	216 (69.7)			

(Continued)



**Table 3.** (Continued)

Factors	Disclosure status		Statistics		
	No	Yes	$\chi^2$	df	p-Value
	(F (%))	(F (%))			
Woman's perceptions of the benefits of the dual protection methods			6.386	2	<b>0.041*</b>
No benefits perceived	13 (11.5)	15 (4.8)			
Correct benefits perceived	83 (73.5)	253 (81.7)			
Not sure or have no idea	17 (15.0)	42 (13.5)			
Woman's knowledge of safer conception methods			22.116	5	<b>&lt;0.001*</b>
ARV for ART for AGYWLHIV plus unprotected sex	15 (13.3)	79 (25.5)			
ARVs for PrEP or PEP for HIV-negative men plus unprotected sex respectively	19 (16.8)	88 (28.4)			
Artificial conception methods for example, AI or IVF	5 (4.4)	19 (6.1)			
Don't know	74 (65.5)	124 (40.0)			
Woman's perceptions of the benefits of safer conception methods			17.910	2	<b>&lt;0.001*</b>
No benefits perceived	43 (38.1)	65 (21.0)			
Correct benefits perceived	51 (45.1)	210 (67.7)			
Not sure or have no idea	19 (16.8)	35 (11.3)			
AGYWLHIV, adolescent girls and young women living with HIV; F, frequency count; %, percentage; ARV, antiretroviral drugs; PrEP, pre-exposure prophylaxis with antiretroviral drugs; PEP, post-exposure prophylaxis with antiretroviral drugs; ART, antiretroviral therapy with antiretroviral drugs; $\chi^2$ , Chi-square value; df, degree of freedom; Na, not applicable; AI, artificial insemination; IVF, invitro fertilization.					
*Bold values indicate statistical significance at $p < 0.05$ .					

from the multivariate regression analysis because of their insignificant associations with the women's HIV status disclosure from the bivariate analysis.

The modified Poisson regression analyses were ran at both bivariate and multivariate levels. For each analysis, models were built for estimating the main effect. The parameter estimation method of choice was hybrid with a robust variance estimator. The convergence criteria were specified as absolute change in parameter estimates with a minimum of 0.0001. The modified Poisson regression was also used in a previous study in Uganda for identifying factors associated with outcomes with high prevalence such as

pregnancy termination among women of reproductive age.<sup>42</sup>

## Results

### Response rate

A total of 423 AGYWLHIV out of the targeted 454 sample size were successfully recruited and participated in the study, giving an overall response rate of 93.2%. Thirty-one potential participants (6.8%) were invited but declined to participate in the study mainly because of their poor health status at the time of the study which could not allow them to withstand the study procedures. There were no statistically significant differences in the

**Table 4.** Predictors of HIV status disclosure to the current male sexual partners.

Predictor variables	p Value	CPR (95% CI)	p Value	APR (95% CI)
Woman's age in years at sexual debut				
6–14	<b>0.012*</b>	0.7 (0.6–0.9)	0.507	(0.8–1.2)
15–19	<b>&lt;0.001*</b>	0.7 (0.7–0.8)	0.991	(0.8–1.1)
20–24		1		1
Woman's sexual experience before meeting the current male sexual partner			Na	Na
Naïve sexually	0.082	(0.9–1.2)		
Non-naïve sexual experience		1		
Woman's sexual activity in the past 1 year				
Once or twice per year	<b>0.002*</b>	1.4 (1.1–1.9)	0.231	1.1 (0.9–1.4)
1–3 times per month	<b>0.006*</b>	1.4 (1.1–1.7)	0.229	1.1 (0.9–1.4)
Weekly or more	<b>0.007*</b>	1.3 (1.0–1.7)	0.351	1.1 (0.8–1.4)
Sexually inactive		1		1
Woman's initial HIV status before meeting the current male sexual partner.				
Negative	0.464	1.0 (0.9–1.1)	<b>0.032*</b>	1.1 (1.0–1.2)
Positive		1		1
Male partner's disclosure of his initial HIV status to the woman				
No	<b>&lt;0.001*</b>	0.6 (0.5–0.7)	<b>0.016*</b>	0.7 (0.5–0.9)
Yes		1		1
Male partner's initial HIV status				
Negative	<b>0.046*</b>	0.9 (0.8–0.9)	<b>0.003*</b>	0.8 (0.7–0.9)
Positive		1		
Whether the woman has gotten pregnant in the past 1 year				
No	<b>0.009*</b>	0.8 (0.7–0.9)	0.965	1.0 (0.9–1.1)
Yes		1		1
Whether the woman gets sexual feelings				
No	<b>0.049*</b>	0.7 (0.5–0.9)	0.284	0.8 (0.5–1.1)
Yes		1		1
Woman's perceptions of the benefits of dual protection methods			Na	Na
No benefits perceived	0.144	0.7 (0.5–1.1)		

(Continued)

**Table 4.** (Continued)

Predictor variables	<i>p</i> Value	CPR (95% CI)	<i>p</i> Value	APR (95% CI)
Some correct benefits perceived	0.526	1.0 (0.8–1.2)		
Not sure or have no idea		1		
Woman's knowledge of safer conception methods				
ARVs for ART for HIV-positive women plus unprotected sex	< <b>0.001*</b>	1.3 (1.1–1.5)	0.680	0.9 (0.8–1.1)
ARVs for PrEP or PEP for HIV-negative men plus unprotected sex	< <b>0.001*</b>	1.3 (1.1–1.5)	0.859	1.0 (0.8–1.1)
Artificial conception methods, for example, AI or IVF	<b>0.047*</b>	1.2 (1.0–1.5)	0.595	0.9 (0.7–1.1)
Don't know		1		1
Woman's perceptions of the benefits of safer conception methods				
No benefits perceived	0.560	0.9 (0.7–1.1)	0.747	0.9 (0.7–1.2)
Some correct benefits perceived	<b>0.039*</b>	1.2 (1.0–1.5)	0.218	1.1 (0.9–1.4)
Not sure or have no idea		1		1
<p>*Bold values indicate statistical significance at <math>p &lt; 0.05</math>.  1, reference category; AGYWHLIV, adolescent girls and young women living with HIV; AI, artificial intravaginal or intrauterine insemination; APR, adjusted prevalence ratio; ART, antiretroviral therapy; ARVs, antiretroviral drugs; CI, confidence interval; CPR, crude prevalence ratio; Na, not applicable because the variable was excluded from the multivariate regression model; IVF, invitro fertilization; PEP, post-exposure prophylaxis with antiretroviral drugs; PrEP, the pre-exposure prophylaxis with antiretroviral drugs; <i>p</i>-value, level of statistical significance.</p>				

socio-demographic characteristics of the AGYWHLIV who participated in the study and those who declined to participate in the study.

#### *Socio-demographic characteristics of the study participants*

The age of the participants ranges from 15 to 24 years with a median age of 22.0 (IQR 4.0) years. The socio-demographic characteristics of the participants are shown in Table 1. Most of the participants were adults aged 19–24 who were married (living with the current male partners), had attained a primary level of education, were low-income earners relying on domestic remittances, and resided within a 5-km radius of a public health facility.

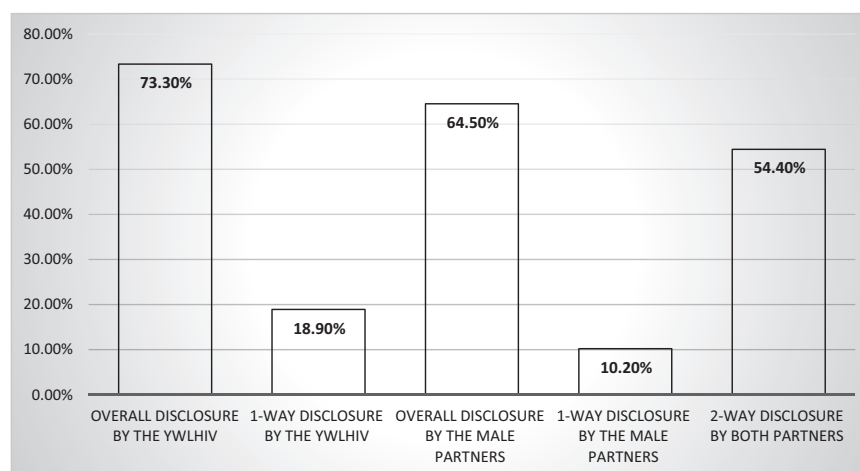
#### *Sexual and reproductive characteristics of the study participants*

The sexual and reproductive characteristics of the participants are shown in Table 2. The findings

indicate that all the participants were in active sexual relationships with a recent sexual activity reported within  $8.0 \pm 15.7$  days. The participants started sexual activity with their current male partners within  $2.4 \pm 2.4$  years at an age of  $19.0 \pm 2.6$  years, and 91.7% of them were unaware of their initial HIV status at the onset of the sexual relationships with the current male partners.

#### *Prevalence of HIV status disclosure*

The overall prevalence of disclosure of HIV status of the young women to their current male partners was found at 73.3% (95% CI: 69.0–77.5). Figure 1 shows the prevalence of the various forms of HIV status disclosure among the young women and their current male partners. The prevalence of one-way disclosure of the HIV status of young women to their current male partners was 18.9% (95% CI 15.1–22.6). The overall prevalence of disclosure of the HIV status of the current male partners to the young women was



**Figure 1.** Prevalence of HIV status disclosure among YWLHIV and their male partners. HIV, human immunodeficiency virus; YWLHIV, young women living with HIV.

64.5% (95% CI 59.9–69.0). Figure 1 further shows that the prevalence of one-way disclosure of the HIV status of the current male partners to the young women was 10.2% (95% CI 7.3–13.0). The specific prevalence of HIV status disclosure to the young women by the current male partners who knew they were initially HIV negative was higher (92.0% (95% CI 88.2–95.7)) but slightly lower (78% (95% CI 69.8–86.1)) among the current male partners who knew they were initially HIV positive. The prevalence of two-way disclosure of HIV status was 54.4% (95% CI 49.6–59.1) among the couples.

#### *Women's socio-demographic characteristics and their associations with their HIV status disclosure*

The findings from the bivariate analysis for the associations between the women's socio-demographic characteristics and their disclosure of their HIV status to their current male partners revealed four significant factors. First, the women who knew their initial HIV status were almost three times more likely to disclose their status compared to those who did not know their initial HIV status ( $X^2$  23.050, df 2,  $p < 0.001$ , statistically significant at  $p < 0.05$ ). Second, the longer the women were aware of their HIV status, the less likely they were to disclose their HIV status ( $X^2$  43.860, df 15,  $p$  0.029, statistically significant at  $p < 0.05$ ). Third, the women whose current male partners did not disclose their HIV status to them were also 30% less likely to disclose their HIV status ( $X^2$  47.262, df 1,  $p < 0.001$ ,

statistically significant at  $p < 0.05$ ). The fourth and last, the women who knew the HIV status of their current male partners were almost twice as likely to disclose their HIV status ( $X^2$  44.606, df 2,  $p < 0.001$ , statistically significant at  $p < 0.05$ ). The rest of the women's socio-demographic characteristics included in Table 1 had no statistically significant associations with their HIV status disclosure to their current male partners.

#### *Women's sexual and reproductive profiles and their associations with their HIV status disclosure*

The women's sexual and reproductive factors associated with disclosure of their HIV status to their current male partners are shown in Table 3. Several directions of associations were revealed. First, the women who debuted sexual activity at a younger age (<19 years) were significantly 30% less likely to disclose their HIV status compared to those who debuted sexual activity at an older age (20–24 years). Second, women who reported more frequent sexual activities were significantly less likely to disclose their HIV status compared to those who reported less frequent sexual activities. Third, women who had many years of sexual experience before meeting their current male partners were significantly less likely to disclose their HIV status compared to those who were sexually novices.

In the line of reproductive goals, women who desired to bear children were significantly less likely to disclose their HIV status compared to

their counterparts who did not desire children. Meanwhile, women who knew that their current male partners desired to bear children were significantly twice as likely to disclose their HIV status compared to those who did not know or were unsure. Conversely, women who conceived pregnancy in the past 1 year were significantly 20% less likely to disclose their HIV status compared to their counterparts who did not conceive pregnancy in the past 1 year. In addition, women who were not getting sexual feelings were significantly 30% less likely to disclose their HIV status compared to their counterparts who were getting sexual feelings. Finally, the women who correctly perceived some of the correct benefits of the dual protection methods and those who demonstrated correct knowledge of safer conception methods and a perception of their benefits were significantly twice more likely to disclose their HIV status compared to their counterparts who did not perceive any benefit of the dual protection methods and those who did not know about the safer conception methods, respectively.

#### *Predictors of women's disclosure of their HIV status to male partners*

The findings from the bivariate and multivariate modified Poisson regression analyses for independent predictors of women's disclosure of their HIV status to their current male partners are shown in Table 4. Three significant independent predictors of women's HIV status disclosure to the current male partners were identified. First was the women's knowledge of their initial HIV status whereby women who knew they were initially HIV negative were more likely to disclose their HIV status to their current male partners compared to those who knew they were initially HIV positive. The second significant independent predictor was the women's knowledge of their current male partner's HIV status whereby those who knew their current male partners were HIV negative were less likely to disclose their HIV status to them compared to those who knew their current male partners were HIV positive. The third and last significant independent predictor was the current male partner's disclosure of his HIV status to the women whereby the women who received disclosure of the current male partner's HIV status were also significantly more likely to reciprocally disclose their HIV status to them compared to those who did not receive disclosure of their current male partner's HIV status.

#### **Discussion**

This study conducted in semi-rural northern Uganda found a 73.3%, 18.9%, and 54.4% prevalence of overall disclosure, one-way disclosure by the young women, and two-way disclosure by both partners of each other's HIV status, respectively (Figure 1). The 73.3% overall prevalence of HIV status disclosure found among young women in northern Uganda is below the 100% expected disclosure rate. It is, however, higher than the 49% disclosure rate for developing countries.<sup>5</sup> It is also higher than the disclosure rate for other SSA settings such as South Africa, Tanzania, Nigeria, and Ethiopia.<sup>22–24,43,44</sup> The disclosure rates from northern Uganda are nonetheless consistent with the previous studies in central Uganda and south-western Uganda that also found a 73%–73.1%, 23.9%, and 48.7% prevalence of overall disclosure, one-way disclosure by the young women, and two-way disclosure by both partners, respectively.<sup>19,20</sup> The 73% or higher HIV disclosure rates highlight higher disclosure rates among young women in both semi-rural northern Uganda and central Uganda compared to the rate (52%) for other developing countries. The high disclosure rates demonstrated in this study are success stories for Ugandan young women. The success may imply that the existing HIV post-test counseling and disclosure counseling within the VCT and ART programs are reaching and having positive outcomes for young people. These programs, their services, and their integrated delivery approach should therefore be maintained and scaled up to other settings where they are not available.

This study in semi-rural northern Uganda also found that the male partner's disclosure of their HIV status to the young women was associated with a higher likelihood of reciprocal disclosure of the HIV status of the young women (Tables 3 and 4). This finding is consistent with the previous studies conducted in other SSA settings namely South Africa and Ethiopia.<sup>22,27,29,43</sup> A male partner's disclosure of his HIV status provides the opportunity and motivation for young women who already know their HIV status to compare whether they are concordant or discordant, and such comparison facilitates counter-disclosure of the women's HIV status. These findings support the current policy on couple counseling and testing for HIV, post-test, and continuous disclosure counseling for individuals and couples attending HIV testing, treatment, and care programs.<sup>45</sup>

This study also found that young women who know they are HIV negative are more likely to disclose their HIV status to their male partners compared to those who know they are HIV positive (Tables 3 and 4). This finding is consistent with previous studies conducted in the West African setting of Togo.<sup>28</sup> Previous studies have argued that disclosing an HIV-negative status is not as stigmatizing and challenging as disclosing an HIV-positive status due to fears of consequences like family misunderstandings, stigma, or loss of the relationships.<sup>45</sup> Policy and program-wise, this finding calls for more programmatic innovations to address stigma to improve disclosure rates among HIV-positive individuals.

Lastly, this study revealed that young women who knew their male partners were HIV negative (discordant) were less likely to disclose their HIV-positive status to them.<sup>19</sup> This finding concurs with the previous studies that found barriers to HIV-positive status disclosure such as fear of stigma and loss of the sexual partners (through separation or divorce) which affected disclosure.<sup>18,19,45</sup> Disclosing an HIV-positive status to a sexual partner can be challenging especially if the partner is HIV negative as it may lead to family misunderstandings such as blame for infidelity.<sup>45</sup> With disclosure counseling focusing on the advantages and benefits of HIV status disclosure such as receiving social care and support from the partner, young women who fear disclosing their HIV-positive status can be helped to disclose. Policy and program-wise, this finding further calls for the integration of disclosure screening, counseling, and support into the routine HIV treatment and care programs for PLHIV.

#### *Study strengths and limitations*

This study possesses many strengths. The first strength is the unique phenomenon and population it investigated, which were the sexual and reproductive factors among AGYWHLHIV in semi-rural SSA setting and how these factors predict the disclosure of their HIV status to their male partners. The large sample size and diverse subgroups of the AGYWHLHIV allows for the generalization of the study findings. Likewise, the use of the semi-structured questionnaire allowed for the standardization of the data collection.

The study was not without limitations. First, the study did not make use of any of the theoretical

frameworks for disclosure such as the disclosure process model (DPM). This affected investigations into the HIV status disclosure decision-making process, events, mediators, and outcomes. This limitation was minimized using a conceptual framework developed specifically for the study using the existing literature, statistical association and predictor analyses methods to identify the mediators (exposure factors and the covariates) associated with disclosure. Nonetheless, future studies preferably using qualitative methods should explore the HIV disclosure process using the DPM.

The use of the face-to-face interview data collection method for administering the questionnaire to the participants carried the risk of social desirability bias, particularly in relation to sensitive topics such as sexual and reproductive health behaviors.<sup>46</sup> This potential bias was minimized by engaging female research assistants with nursing and midwifery backgrounds who administered the questionnaire in private and confidential settings within the participating public health facilities. To further minimize the social desirability bias, the research assistants received comprehensive training on how to apply skillful probing and clarification techniques in interviews.

Another potential study limitation was the risk of measurement errors caused by participants having to recall their HIV status disclosure experiences, particularly for those who disclosed their status many years ago. To minimize this potential error, the research assistants received training on how to apply skillful probing and paraphrasing techniques in interviews.

Notably, there was no psychometric information for the questionnaire items adapted from the previous literature and those developed by the investigators. The assessment for the psychometric information was omitted because none of the questionnaire items were in the form of composite scale.

Furthermore, it is important to acknowledge that the study lacked data on some of the risk factors for HIV transmission such as the male partner's age and number of sexual partners which could have been accurately collected by including the male partners as co-participants. Future studies on disclosure dynamics that collect data from both the AGYWHLHIV and their male partners



are highly recommended. A study design of such nature will provide an opportunity for cross-validation and triangulation of the data.

Also missing in this study are data on the AGYWHLHIV's motivations for disclosing or fears for concealing their HIV status. To address these, future research studies on the motivations for status disclosure among the AGYWHLHIV preferably using qualitative or mixed-methods research approaches are highly recommended.

Given the absence of analyses for the predictors for nondisclosure of HIV status in this manuscript, future research studies should analyze the predictors for nondisclosure and preferably gather insights from both sides of the relationship to gain a more complete understanding of the HIV status nondisclosure dynamics in the SSA settings.

This current study's findings present more of the HIV status disclosure dynamics for lowly educated and low-income AGYWHLHIV in semi-rural settings of SSA. Therefore, the study is limited in representing the disclosure dynamics for purely urban settings where the AGYWHLHIV are more likely to be of higher educational attainment, higher income, self-reliant, and with access to various communication channels including the mobile phones and social media for disclosing their HIV status.

## Conclusion

The study reveals that the prevalence of HIV status disclosure to the current male partners among the AGYWHLHIV in semi-rural northern Uganda is as high as 73.3%. The predictors of disclosure included the women's knowledge of their HIV status, knowledge of their male partner's HIV status, and the male partner's disclosure of their HIV status. The high disclosure rate is a success story for Ugandan AGYWHLHIV. It underscores the need for further investigations into the disclosure process, mediators, and outcomes to inform future capacity-building initiatives for health workers in developing countries. The high disclosure rate further underscores the need for deeper qualitative exploration of the contextual factors facilitating HIV status disclosure among young women in Uganda whether it is derived from religious beliefs to save the life of the loved ones (partners) or the ongoing Uganda government and civil society's initiatives to recognize and

engage AGYWHLHIV as peer educators, HIV prevention activists, or champions in the fight against HIV/AIDS in Uganda.

To further provide opportunities and motivations for disclosure among AGYWHLHIV, health workers working in HIV counseling, testing, treatment, and care programs should counsel the male partners of AGYWHLHIV to test and also disclose their HIV status. Furthermore, innovative strategies that enable women, men, or couples who have tested for HIV can receive their test results and become knowledgeable about their status to disclose to each other are highly desirable.

Given the role of the male partner's HIV status disclosure in providing the opportunity and motivations for the AGYWHLHIV to counter-disclose their HIV status as revealed in this study, couple counseling and HIV testing should be a key component of all HIV testing, prevention, treatment, and care programs.

## Declarations

### *Ethics approval and consent to participate*

The study received ethical approval from the Gulu University Research Ethics Committee (approval number: GUREC-2022-309). Informed consents were obtained from all the participants before the start of the study. Participants under 18 years (minors) provided assent, along with informed consent from their parents or guardians. Informed consent and assent were obtained in the form of a written signature or thumbprint. The research assistants facilitated the signing of the informed consent. Each participant received a time compensation of 10,000 Ugandan shillings (equivalent to three U.S. dollars). Participants were informed of their right to withdraw from the study at any time and that their participation was voluntary. All the collected data were kept confidential and anonymous. All the study methods and procedures were performed in accordance with the Declaration of Helsinki and other relevant guidelines.

### *Consent for publication*

Not applicable.

### *Author contributions*

**Edward Kumakech:** Conceptualization; Funding acquisition; Methodology; Project administration; Resources; Supervision; Writing – original draft.

**Deo Benyumiza:** Investigation; Project administration; Software; Supervision; Writing – review & editing.

**Marvin Musinguzi:** Methodology; Resources; Supervision; Writing – review & editing.

**Wilfred Inzama:** Methodology; Resources; Software; Writing – review & editing.

**Ebong Doryn:** Investigation; Project administration; Supervision; Writing – review & editing.

**James Okello:** Methodology; Resources; Writing – review & editing.

**Lydia Kabiri:** Methodology; Resources; Writing – review & editing.

**Vanja Berggren:** Methodology; Resources; Writing – review & editing.

**Jasper Watson Ogwal-Okeng:** Methodology; Project administration; Resources; Writing – review & editing.

### Acknowledgements

We would like to acknowledge the study participants. Pre-Publication Support Service (PREPSS) that supported the development of this manuscript by providing author training as well as pre-publication peer-review and copy editing.

### Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported through a seed grant from the Centre for International Reproductive Health Training at the University of Michigan (CIRHTUM), the United State of America. The funder had no role in the design and conduction of this study.

### Competing interests

The authors declare that there is no conflict of interest.

### Availability of data and materials

All relevant data are within the manuscript and its supporting information files. Data are available upon reasonable request from the first author.

### ORCID iD

Edward Kumakech  <https://orcid.org/0000-0002-7237-7734>

### Supplemental material

Supplemental material for this article is available online.

### References

1. UNAIDS. *United Nations Programme on HIV/aids: UNAIDS data*. UNAIDS 2021. 2021, pp. 4–38.
2. Ssewanyana D, Mwangala PN, Van Baar A, et al. Health risk behaviour among adolescents living with HIV in Sub-Saharan Africa: a systematic review and meta-analysis. *Biomed Res Int* 2018; 2018: 7375831.;
3. Maeri I, El Ayadi A, Getahun M, et al. “How can I tell?” Consequences of HIV status disclosure among couples in eastern African communities in the context of an ongoing HIV “test-and-treat” trial. *AIDS Care* 2016; 28: 59–66.
4. Krüsi A, Ranville F, Gurney L, et al. Positive sexuality: HIV disclosure, gender, violence and the law—a qualitative study. *PLoS One* 2018; 13(8): e0202776.
5. World Health Organization. Gender dimensions of HIV status disclosure to sexual partners: rates, barriers and outcomes. *Geneva: WHO, Vol. 6*, pp. 312–316, <https://apps.who.int/iris/bitstream/handle/10665/42717/9241590734.pdf>. 2003, <https://iris.who.int/bitstream/handle/10665/42717/9241590734;jsessionid=B8BC51714A6D961622E7745A81FA0501?sequence=1> (accessed 21 August 2024).
6. Adeniyi OV, Ajayi AI, Selanto-Chairman N, et al. Demographic, clinical and behavioural determinants of HIV serostatus nondisclosure to sex partners among HIV-infected pregnant women in the Eastern Cape, South Africa. *PLoS One* 2017; 12(8): e0181730.
7. Wawer MJ, Gray RH, Sewankambo NK, et al. Rates of HIV-1 transmission per coital act, by stage of HIV-1 infection, in Rakai, Uganda. *J Infect Dis* 2005; 191(9): 1403–1409. <https://academic.oup.com/jid/article/191/9/1403/860169>.
8. Toska E, Zhou S, Laurenzi CA, et al. Predictors of secondary HIV transmission risk in a cohort of adolescents living with HIV in South Africa. *AIDS* 2022; 36(2): 267–76.
9. Curran K, Baeten JM, Coates TJ, et al. HIV-1 prevention for HIV-1 serodiscordant couples. *Curr HIV/AIDS Rep* 2012; 9(2): 160–170.
10. World Health Organization. Guidance on couples HIV testing and counselling including antiretroviral therapy for treatment

- and prevention in serodiscordant couples : recommendations for a public health approach. Geneva: World Health Organization, 2012, p. 66. <https://iris.who.int/handle/10665/44646>.
11. Conserve DF, Middelkoop K, King G, et al. Factors associated with HIV discussion and condom use with sexual partners in an underserved community in South Africa. *J Health Care Poor Underserved* 2016; 27(1): 131–144.
  12. Koss CA, Havlir DV, Ayieko J, et al. HIV incidence after pre-exposure prophylaxis initiation among women and men at elevated HIV risk: a population-based study in rural Kenya and Uganda. *PLoS Med* 2021; 18(2): 1–22.
  13. Krakower DS and Mayer KH. Pre-Exposure prophylaxis to prevent HIV infection: current status, future opportunities and challenges. *Drugs* 2015; 75(3): 243–2451.
  14. Moorhouse M, Bekker LG, Black V, Conradie F, et al. Guideline on the management of occupational and non-occupational exposure to the human immunodeficiency virus and recommendations for post-exposure prophylaxis: 2015 Update. *South Afr J HIV Med* 2015; 16(1): 1–14.
  15. Jin J, Sun R, Mu T, et al. Awareness and use of post-exposure prophylaxis for HIV prevention among men who have sex with men: a systematic review and meta-analysis. *Front Med (Lausanne)* 2022; 8(January): 1–10.
  16. Wall KM, Kilembe W, Vwalika B, et al. Optimizing prevention of HIV and unplanned pregnancy in discordant African couples. *J Womens Health* 2017; 26(8): 900–910.
  17. Mmeje O, Cohen CR and Cohan D. Evaluating safer conception options for HIV-serodiscordant couples (HIV-infected female/HIV-uninfected male): A closer look at vaginal insemination. *Infect Dis Obstet Gynecol* 2012; 2012: 587651.
  18. World Health Organization. HIV status disclosure to sexual partners: rates, barriers, and outcomes for women. Geneva: WHO, 2004, [https://iris.who.int/bitstream/handle/10665/42717/9241590734\\_summary.pdf;jsessionid=C45EC32B5DB802D487909C822BBAC834?sequence=2](https://iris.who.int/bitstream/handle/10665/42717/9241590734_summary.pdf;jsessionid=C45EC32B5DB802D487909C822BBAC834?sequence=2) (accessed 27 August 2024).
  19. Kavuma D, Kirwana VB and Taani M. Factors associated with HIV positive serostatus disclosure to sexual partners among sexually active young people on anti-retroviral therapy in central Uganda. *HIV/AIDS* 2023; 15: 293–311.
  20. Haberland SA, Nakigozi G, Gray RH, et al. Antiretroviral therapy availability and HIV disclosure to spouse in Rakai, Uganda: a longitudinal population-based study. *J Acquir Immune Defic Syndr* 2015; 69(2): 241–247.
  21. Bulterys MA, Sharma M, Mugwanya K, et al. Correlates of HIV status nondisclosure by pregnant women living with HIV to their male partners in Uganda: a cross-sectional study. *J Acquir Immune Defic Syndr* 2021; 86(4): 389–395.
  22. Alemayehu M, Aregay A, Kalayu A, et al. HIV disclosure to sexual partner and associated factors among women attending ART clinic at Mekelle hospital, Northern Ethiopia. *BMC Public Health* 2014; 14(1): 1–7.
  23. Shifraew MB, Shiferaew MT, Mitiku HZ, et al. HIV-positive status disclosure to sexual partner and associated factors among adult HIV-positive patients in debre markos town, 2019. *HIV/AIDS* 2021; 13: 571–579.
  24. Ebuanyi ID, Ogoina D, Ikuabe PO, et al. Prevalence pattern and determinants of disclosure of HIV status in an anti retroviral therapy clinic in the Niger Delta region of Nigeria. *Afr J Infect Dis* 2014; 8(2): 27–30.
  25. Genet M, Sebsibie G and Gultie T. Disclosure of HIV seropositive status to sexual partners and its associated factors among patients attending antiretroviral treatment clinic follow up at Mekelle Hospital, Ethiopia: a cross sectional study. *BMC Res Notes* 2015; 8(1): 4–9.
  26. Tegegne AS. Prevalence for the disclosure of HIV status to sexual partners and its determinants among adults under cART in Amhara Region, Northwest Ethiopia. *J Trop Med* 2022; 2022: 9941380.
  27. Gultie T, Genet M and Sebsibie G. Disclosure of HIV-positive status to sexual partner and associated factors among ART users in Mekelle hospital. *HIV/AIDS* 2015; 7: 209–214.
  28. Yaya I, Saka B, Landoh DE, et al. HIV status disclosure to sexual partners, among people living with HIV and AIDS on antiretroviral therapy at Sokodé regional hospital, Togo. *PLoS One* 2015; 10(2): 1–9.
  29. Mosisa G, Mulisa D, Oluma A, et al. HIV sero-status disclosure and associated factors among HIV positive women in East Africa: systematic review and meta-analysis. Implications for prevention of mother-to-child HIV transmission. *Front Public Health* 2022; 10: 919410.
  30. Tibebe NS, Rade BK, Kebede AA, et al. Disclosure of HIV status to sexual partner and its associated factors among pregnant women living with HIV attending prenatal care in Amhara

- Regional state Referral Hospitals, Ethiopia. *PLoS One* 2023; 18(1 January): 1–17.
31. Ambissa M, Sendo EG, Assefa Y, et al. HIV-positive status disclosure to a sexual partner and associated factors among HIV-positive pregnant women attending antenatal care in Dire Dawa, Ethiopia: a cross-sectional study. *PLoS One* 2021; 16: 1–12.
32. Batte A, Katahoire AR, Chimoyi A, et al. Disclosure of HIV test results by women to their partners following antenatal HIV testing: a population-based cross-sectional survey among slum dwellers in Kampala Uganda Health behavior, health promotion and society. *BMC Public Health* 2015; 15(1): 1–8.
33. Cuschieri S. The STROBE guidelines. *Saudi J Anaesth* 2019; 13: S31–S34.
34. Wang X and Cheng Z. Cross-sectional studies: strengths, weaknesses, and recommendations. *Chest* 2020; 158(1): S65–S71.
35. Uganda Ministry of Health. 2020 Uganda HIV–AIDS fact sheet, 6th Sept 2021, pp. 1–2. [http://library.health.go.ug/sites/default/files/resources/2020 Uganda HIV -AIDS fact sheet%2C 6th Sept 2021.pdf#:~:text=This fact sheet gives the status of the, is 5.4%25. The prevalence is higher among females \(2021, accessed 12 July 2022\)](http://library.health.go.ug/sites/default/files/resources/2020%20Uganda%20HIV%20AIDS%20fact%20sheet%206th%20Sept%202021.pdf#:~:text=This%20fact%20sheet%20gives%20the%20status%20of%20the%20prevalence%20is%20higher%20among%20females%20(2021),accessed%2012%20July%202022).
36. UNAIDS. Uganda developing subnational estimates of HIV prevalence and the number of people living WITH HIV Developing subnational estimates of HIV prevalence and the number of people living with HIV Developing subnational estimates of HIV prevalence and the number of people living with HIV from survey data [Internet], <https://www.epidem.org/sites/default/files/reports/Uganda.pdf> (2014, accessed 12 July 2022).
37. Elfil M and Negida A. Sampling methods in clinical research; an educational review. *Emerg* 2017; 5(1): 52.
38. Alhassan RK, Nutor JJ, Gyamerah A, et al. Predictors of HIV status disclosure among people living with HIV (PLHIV) in Ghana: the disclosure conundrum and its policy implications in resource limited settings. *AIDS Res Ther* 2023; 20(1): 84.
39. Kaida A, Patterson S, Carter A, et al. Contraceptive choice and use of dual protection among women living with HIV in Canada: priorities for integrated care. *Perspect Sex Reprod Health* 2017; 49(4): 223–236.
40. Felsher M, Szep Z, Krakower D, et al. “I don’t need prep right now”: a qualitative exploration of the barriers to prep care engagement through the application of the health belief model. *AIDS Educ Prev* 2018; 30(5): 369–381.
41. Charan J and Biswas T. How to calculate sample size for different study designs in medical research? *Indian J Psychol Med* 35(2): 121–126. doi: 10.4103/0253-7176.116232.
42. Mwebesa E, Nakafeero M, Guwatudde D, et al. Application of a modified Poisson model in identifying factors associated with prevalence of pregnancy termination among women aged 15 – 49 years in Uganda. *Afr Health Sci* 2022; 22: 100–107.
43. Kidman R and Violari A. Growing up positive: adolescent HIV disclosure to sexual partners and others. *AIDS Care* 2020; 32(12): 1565–1572.
44. Damian DJ, Ngahatila D, Fadhili H, et al. Factors associated with HIV status disclosure to partners and its outcomes among HIV-positive women attending Care and Treatment Clinics at Kilimanjaro region, Tanzania. *PLoS One* 2019; 14(3): 1–13.
45. Atwijukiire H, Nakidde G, Otwine AT, et al. Experiences of HIV positive serostatus disclosure to sexual partner among individuals in discordant couples in Mbarara City, Southwestern Uganda. *HIV/AIDS* 2022; 14: 231–242.
46. Edwards P. Questionnaires in clinical trials: guidelines for optimal design and administration. *Trials* 2010; 11: 2.