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# Sexual and Gender-Based Violence and Vulnerability to HIV Infection in Uganda: Evidence from Multilevel Modelling of Population-Level HIV/AIDS Data

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**Abstract:** Background: Sexual and gender-based violence (SGBV) is highly prevalent in Uganda and its link with HIV infection and compromising access to HIV/AIDS services is known. However, current evidence is controversial. Most of the studies indicate a positive relationship but a few indicate otherwise. Moreover, there is no research examining the effects of community-level SGBV on HIV infection. Objectives: This research explores the association between SGBV and vulnerability to HIV infection. Methods: Multilevel binary logistic regression is applied to secondary data of Uganda AIDS Indicators Survey conducted in 2011. The survey data comprises 12,153 women and 9588 men. Results: SGBV significantly increases the likelihood of HIV infection, with victims having 34%, 1.34 [1.06–1.70] higher odds than non-victims. At the community level, wealth, and pre-sex alcohol abuse are important determinants. Conclusions: Vulnerability to the risk of HIV infection in Uganda is associated with individual-level and community factors. Effective HIV prevention policies need to pay attention to victims of SGBV using individual- and community-level strategies.

**Keywords:** Uganda; HIV/AIDS vulnerability; sexual and gender-based violence; multilevel modelling



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## 1. Introduction

In 2002, the World Health Organization (WHO) provided global estimates of violence which indicated that between 10–60 percent of women had suffered sexual and gender-based violence (SGBV) (Krug et al. 2002). In 2006, WHO provided more comprehensive evidence which indicated that the lifetime prevalence of SGBV was between 15–75 percent (Garcia-Moreno et al. 2006; see also World Health Organization (WHO) 2013). Although both women and men are affected by SGBV, women are most affected (Uganda Bureau of Statistics (UBOS) and Macro International Inc. 2007; World Health Organization (WHO) 2013) and most likely to bear the greatest consequences (e.g., Ellsberg et al. 2008). Sexual and gender-based violence is a social and health problem because of its social and health consequences (Krug et al. 2002).

Research evidence reveals that sexual violence by age shows gender disparities among young people aged 20–24 years old. For example, the prevalence of sexual violence among women aged 20–24 years was 20.1% (Igulot 2017). More recently, systematic review evidence shows adolescent girls and young women have an increased risk of unprotected sexual intercourse and HIV infection in Sub Saharan Africa (SSA) (Bajunirwe et al. 2020). A study on concurrence of HIV, gender-based violence, and substance use among youth in Kampala found the overall prevalence of sexual and gender violence (SGV) to be 31.7% and youth who practiced commercial sex work was 36%, while those who witnessed parental abuse were 61% (Swahn et al. 2021). Sexual violence among young people has been exacerbated by the COVID 19 pandemic. Qualitative research evidence shows that the lockdown in Uganda amplified inequalities and created conditions for different types of violence among young people (Parkes et al. 2020).

### 1.1. Global Perspective of Sexual and Gender-Based Violence

The United Nations defines violence against women as "any act of gender-based violence that results in, or is likely to result in, physical, sexual or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life" (United Nations 1993, p. 3). Sexual and gender-based violence takes three forms: physical, sexual, and psychological. Physically, SGBV may include being slapped, punched, kicked, and assaulted with a weapon. Sexually, SGBV may include forced sex, coerced sex, verbal threats, etc.; and psychologically, it may encompass acts such as being belittled, preventing a woman from seeing family and friends, intimidation, etc. Sexual violence generally affects women, and intimate partner violence affects women even more (Campbell 2008; Balogun et al. 2012; Cao et al. 2014).

The outcomes of SGBV can be physical trauma, psychological trauma, and fear and control (World Health Organization (WHO) 2013). Physical trauma may be in the form of musculoskeletal, soft tissue, and genital injury. Psychological trauma or stress may lead to a variety of mental disorders and substance abuse, while fear and control are associated with downstream consequences such as maternal and child health related problems, weight loss and loss of pregnancy, and sexual and reproductive health problems such as unwanted pregnancy and a sexually transmitted infection (STI) (World Health Organization (WHO) 2013). All forms of SGBV have the potential to cause more serious consequences such as disability or death (World Health Organization (WHO) 2013; Li et al. 2014).

### 1.2. Sexual and Gender-Based Violence in Uganda

Evidence from Uganda indicates that physical violence is widespread (Francisco et al. 2013; Ogland et al. 2014). Based on the Uganda Demographic and Health Survey (UDHS) for 2006, 60% of women experienced physical violence from the age of 15, and 34% of these had experienced it in the 12 months preceding the survey (Uganda Bureau of Statistics (UBOS) and Macro International Inc. 2007). Sexual violence is also common in Uganda (Kouyoumdjian et al. 2013) with 39% of 15–49-year-old women experiencing it (Uganda Bureau of Statistics (UBOS) and Macro International Inc. 2007). Intimate violence is equally documented, again with women experiencing it more than men. Among ever/currently married Ugandan women aged 15–49 years, 68% experienced it (Uganda Bureau of Statistics (UBOS) and Macro International Inc. 2007).

SGBV compromises women's ability to protect themselves from HIV infection (Ellsberg et al. 2008). There is evidence supporting the SGBV-HIV association. Evidence in the 1990s indicated that SGBV was linked to HIV infection (Van der Straten et al. 1998). Subsequently more evidence supporting the link between SGBV and HIV has emerged. Studies show that SGBV was associated with increased likelihood of HIV infection among women (Shamu et al. 2011; Bazargan-Hejazi et al. 2013; Hassen and Deyassa 2013; Li et al. 2014) and with reduced condom use (Francisco et al. 2013). The link between duration of experiencing SGBV and HIV has also been documented (Kouyoumdjian et al. 2013). But none of these studies addresses the effects of community-level SGBV on HIV vulnerability, which is the purpose of this research. Understanding the role of the community/societal environment (social norms, legal, policy, and institutional issues) is important because it increases vulnerability to SGBV by either increasing the likelihood of perpetration, victimization or failure to access justice (DeGue et al. 2012).

Rhode et al. define structural factors "as the space, whether social or physical, in which a variety of factors exogenous to the individual interact to increase vulnerability to HIV" (Rhodes and Simic 2005, p. 1).They identify several factors influencing vulnerability to HIV in a variety of ways including: trading activities and transport links; population movement and mixing; urban or neighbourhood deprivation and disadvantage; the role of macro-social change and political or economic transition; political, social and economic inequities in relation to ethnicity, gender and sexuality; the role of social stigma and discrimination in reproducing inequity and vulnerability; the role of policies, laws and

policing; and the role of complex emergencies such as armed conflict and natural disasters (Rhodes and Simic 2005).

Gupta et al. define structural factors as "physical, social, cultural, organisational, community, economic, legal, or policy aspects of the environment that impede or facilitate efforts to avoid HIV infection" (Gupta et al. 2008, p. 765). They identify factors such as marginalisation, migration such as in Southern Africa, level of income, sexual violence and being orphaned as factors that shape the context of vulnerability, increase the exposure of individuals to HIV risks or compromise their ability to protect themselves from HIV risk (Gupta et al. 2008).

### *1.3. Sexual and Gender-Based Violence and HIV/AIDS Services*

Besides increasing vulnerability to HIV infection, SGBV also affects uptake of proven HIV interventions (Karamagi et al. 2006; Ghanotakis et al. 2012). For example, qualitative research in Kenya revealed that SGBV affected women's utilization of antenatal care services including HIV testing (Hatcher et al. 2013). Similarly, SGBV has also been blamed for poor access to maternal health services including prevention of mother-to-child transmission of HIV (PMTCT) by Zimbabwean women because they had to get permission from their husbands (Shamu et al. 2011). Other studies have found that SGBV is associated with poor adherence to Antiretroviral therapy (ART) (Mugavero et al. 2006), increase in (HIV) viral load (Trimble et al. 2013), and reduced CD4 cells and detectable viral load (Schafer et al. 2012). On this basis, we can expect SGBV to impact on outcomes of HIV/AIDS treatment and other AIDS services.

This research is important because the majority of evidence reveals a positive SGBV-HIV association although some studies dissent (e.g., Harling et al. 2010 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0014257, accessed on 20 June 2022). In addition, most of the previous research is individualistic (Casey and Lindhorst 2009; DeGue et al. 2012); and according to social theory, practices of individuals are determined by both micro and macro structures (Casey and Lindhorst 2009). Given the gaps in the available evidence, this research aims to establish the influence of SGBV on vulnerability to HIV infection in Uganda. To achieve this aim, this research will pursue the following specific objectives:

1. To examine the association between individual and community-level sexual and gender-based violence and vulnerability to HIV infection in Uganda;
2. To identify factors that mediate the association between sexual and gender-based violence and HIV infection in Uganda;
3. To identify factors that mitigate vulnerability to HIV infection among victims of sexual and gender-based violence in Uganda.

## 2. Data and Methods of Analysis

### *2.1. Data*

This research is based on secondary data from the Uganda AIDS Indicators Survey conducted in 2011. The data comprises 12,153 women and 9588 men, from 11,340 households, of which 4329 were urban residents and 17,412 rural residents. The analysis presented here is restricted to 7909 women and men who were ever/currently married or in a relationship, aged 15–49 years (women) and 15–59 years (men) and who responded to the questions on SGBV. Analysis was further restricted to 98% (7784) cases that had results for an HIV test. Of these, 15.5% reported ever having experienced either forced or coerced sex.

### *2.2. Measurement of Sexual Violence*

All individuals who participated in the general survey and had ever been or were currently in a sexual relationship were eligible to answer the seven questions on SGBV. The questions on SGBV were embedded in the individual respondent questionnaire (see Page 215 of UAIS 2011 report). However, only one person was selected in a household (see UAIS 2011 for the selection method). The rationale for selecting one person was to

prevent other household members interviewed in the general survey from knowing that SGBV questions had been asked, which could have consequences including the likelihood of further violence. Because of this approach, respondents gain confidence, become open and easily disclose their experience (Garcia-Moreno et al. 2006).

This analysis considers six issues on SGBV reported in the final report of UAIS 2011. The first question sought to know whether a respondent had ever been forced to have sex. The follow up question established whether forced sex had happened in the 12 months preceding the survey. Respondents were also asked whether they had ever been coerced to have sex. This was also followed by a question on whether coercive sex had occurred in the 12 months before the survey. All these questions needed a yes, no, refused to answer or do not know response. Respondents were then asked to identify the perpetrator of the act e.g., husband, stranger, and so on. The last questions were related to reporting sexual violence. In these questions, respondents were asked whether they reported SGBV to the relevant authorities, mainly the police; and for those who did not report, they were asked to give their reasons why they did not report the abuse.

### 2.3. Methods

This analysis began by obtaining descriptive statistics from the main survey ($n$ = 21,741) and from the study sub sample ($n$ = 7784). Based on the known overlap between forceful and coercive sex (Garcia-Moreno et al. 2006; Ellsberg et al. 2008), the two variables were combined into a dichotomous variable—sexual violence. Analysis was then refined by fitting multilevel multivariate models with HIV positive as the outcome variable. Individuals were level 1 and survey areas (i.e., clusters) representing communities were level 2. For the analysis of community effects of SGBV, individual level measures of SGBV were used to derive community-level variables (see Appendix A for computation of community level variables). Community-level analysis then predicted the likelihood of individuals in communities with high prevalence of SGBV being infected with HIV compared to individuals in areas with low prevalence of SGBV. Lastly, factors associated with increased vulnerability to HIV infection for the 16% ($n$ = 1210/7784) victims of SGBV were identified.

### 2.4. Analysis

Modelling was based on the random intercepts (Tarling 2008, p. 114) expressed as:

$$y_{ij} = b_0 + b_1\, x_{1ij} + b_2 z_{2j} + u_{oj} + e_{ij}$$

where:

$y_{ij}$ = HIV positivity for an individual i, in a cluster j;
$b_0$ = Regression constant;
$b_1$ = Co-efficient of sexual violence and other individual-level covariates;
$x_{1ij}$ = Characteristics for an individual i, e.g., sexual violence, education, in a cluster j;
$b_2$ = Coefficient of cluster-level explanatory factors;
$z_{2j}$ = Characteristics of clusters e.g., wealth, cluster education, etc.;
$u_{oj}$ = Variation at community level;
$e_{ij}$ = Variation at individual level.

Two-level models were fitted sequentially using MLwiN. The aim of this step-by-step analysis was to be able to determine the effect of additional predictor variables in the model on the dependent variable. Analysis started by running a variance components model, in line with the recommendation by Rasbash et al. (2009). The second step included a model with only sexual violence. In the third step, potential socio-economic mediators/confounders were introduced. In the final model, socio-demographic variables were modelled. The selection of potential confounders/mediators included in the model was theoretically informed (Hair et al. 1998) and based on key determinants of HIV infection (e.g., Magadi and Desta 2011). This strategy enabled the effect of each successive block of

factors to be determined. To establish contextual effects, derived community level variables were fitted.

After obtaining initial results, analysis was refined further. In this approach, effects of interaction with gender and urban/rural residence were obtained. Interaction with gender and place of residence was undertaken because these concepts are very important in the construction of HIV vulnerability, and yet they are under-explored in SSA (Msisha et al. 2008). This analysis focussed on urban and rural areas because they represent physical spaces and networks for the spread of HIV (Kayeyi et al. 2009) and present different conditions which influence vulnerability to the risk of HIV infection (Fotso and Kuate-Defo 2005).
Random-Level Estimates

The following equation is used to estimate the community effect:

$$p = \frac{u_{oj}}{\left(u_{oj} + e_{ij}\right)} \quad (1)$$

where $p$ is the intra-cluster correlation, $e_{ij}$ is variation at level 1, which is represented by 3.29 (Rasbash et al. 2009; Tarling 2008) (for Logistic Regression) and $u_{oj}$ is variation at level 2. Community random variance estimates (shown in Table 3) were used to calculate the intra-cluster correlation coefficient.

## 3. Descriptive Findings

### *3.1. Prevalence of Sexual and Gender-Based Violence*

Table 1 shows prevalence of sexual violence in Uganda by forms of violence. In terms of gender, more women (23%) compared to men (8%) suffered SGBV. A notable proportion of SGBV was experienced in the 12 months preceding the survey. A lower proportion of women (37.3%) than men (44.5%) who were forced into sex experienced it within the last 12 months. In the same period, the proportion of women and men who suffered sexual coercion was 52.5% for women and 51.9% for men. Sexual violence was mainly perpetrated by intimate sexual partners. For women who had experienced SGBV, 70.6% said they suffered SGBV from their spouse compared to 40.4% of men. Nearly all (95.6% of women and 99.6% of men) of SGBV was not reported, and lack of reporting was mainly associated with shame or fear of consequences, which more women (47.1%) compared to victimised men (30%) identified.

There was a small or no difference in the prevalence of SGBV in terms of rural/urban place of residence. For example, there were as many people in rural areas as in urban areas who suffered recent forced sex (38.6% rural, 38.1% urban) and recent sexual coercion (51.7% rural, 55.1% urban). Similarly, perpetration of SGBV by spouses was the same at 62.9% in rural and 62.3% in urban areas. In both urban and rural areas, sexual violence was not reported to police with 96.8% rural victims and 96.2% urban victims not reporting. Fear of consequences of reporting SGBV or shame associated with it was the main reason cited by 41.3% rural victims and 46.5% urban victims for non-reporting.

**Table 1.** Prevalence of sexual violence by forms of violence, UAIS, 2011 ($n$ = 7784).

| Form/Characteristic | Women | | Men | | Rural | | Urban | |
|---|---|---|---|---|---|---|---|---|
| | % SV | Cases | % SV | Cases | % SV | Cases | % SV | Cases |
| **Sexual violence (forced or coerced)** | * | | * | | * | | * | |
| Yes | 23.0 | 939 | 8.1 | 304 | 15.5 | 976 | 17.7 | 268 |
| No | 77.0 | 3143 | 91.9 | 3438 | 84.5 | 5337 | 82.3 | 1245 |
| **Ever been forced [1] into sex?** | * | | * | | * | | * | |
| Yes | 15.0 | 611 | 3.2 | 119 | 8.9 | 561 | 12.2 | 169 |
| No | 85.0 | 3471 | 96.8 | 3624 | 91.1 | 5751 | 88.8 | 1344 |
| **Ever been forced into sex in the last 12 months?** | * | | * | | * | | * | |
| Yes | 37.3 | 227 | 44.5 | 53 | 38.6 | 216 | 38.1 | 64 |
| No | 62.7 | 382 | 55.5 | 66 | 61.4 | 344 | 61.9 | 104 |
| **Ever been coerced [2] into sex?** | * | | * | | * | | * | |
| Yes | 16.1 | 657 | 6.5 | 242 | 11.1 | 700 | 13.2 | 188 |
| No | 83.9 | 3426 | 93.5 | 3501 | 88.9 | 5612 | 86.8 | 1314 |
| **Ever been coerced into sex in the last 12 months?** | ns | | ns | | * | | * | |
| Yes | 52.5 | 341 | 51.9 | 124 | 51.7 | 357 | 55.1 | 108 |
| No | 47.5 | 308 | 48.1 | 115 | 48.3 | 334 | 44.9 | 88 |
| **What was the relationship to perpetrator?** | * | | * | | * | | * | |
| Spouse/partner | 70.6 | 520 | 40.4 | 103 | 62.9 | 491 | 62.3 | 132 |
| Other abuser | 29.4 | 217 | 59.6 | 152 | 37.2 | 290 | 37.7 | 80 |
| **Did you report SV to police?** | * | | * | | * | | * | |
| Yes | 4.4 | 32 | 0.4 | 01 | 3.2 | 25 | 3.8 | 08 |
| No | 95.6 | 700 | 99.6 | 258 | 96.8 | 755 | 96.2 | 203 |
| **Main reason not to report abuse** | * | | * | | * | | * | |
| No knowledge SV can be reported | 18.8 | 126 | 36.8 | 91 | 24.3 | 174 | 21.5 | 43 |
| No confidence in the police | 16.3 | 109 | 17.4 | 43 | 16.1 | 115 | 18.5 | 37 |
| Sexual violence is normal | 17.8 | 119 | 15.8 | 39 | 18.3 | 131 | 13.5 | 27 |
| Fear of consequences or shame | 47.1 | 315 | 30.0 | 74 | 41.3 | 715 | 46.5 | 93 |
| Total | 100 | 669 | 100 | 247 | 100 | 6312 | 100 | 200 |

[1] Causing an individual to have sex against their will by use of physical force. [2] Causing an individual to have sex against their will by use of non-forceful means such as pressure, intimidation, and manipulation. *—significant at 5% level base on Chi-Square. SV—sexual violence, ns—Not significant.

### 3.2. Prevalence of HIV

In the main survey, HIV prevalence was 7.3%, but it was 8.2% among women and 6.1% among men, and 8.8% in urban and 6.9% in rural areas (data not shown). In the study sample, HIV prevalence was 8.2%, but it was 10.9% in urban areas compared to 7.5% in rural areas. For gender, HIV prevalence was 8.9% in women compared to 7.3% in men. Prevalence was 16.4% among people with no education and 17.0% in those with incomplete primary education. Widowed residents of urban areas had prevalence of 31.6% compared to 20.0% among rural residents. Although overall HIV prevalence in the study sample seems higher than the overall survey sample, these rates are comparable to prevalence among the sample of all respondents in the survey who were ever/currently in a relationship.

There was a notable gender disparity in the association between SGBV and HIV vulnerability (Table 2). A significantly higher HIV prevalence was observed among women who had experienced SGBV (12.6%) compared to non-victims (7.8%), while there was a small significant difference between male victims and non-victims of SGBV (victims 6.6% vs. non-victims 7.4%). It appears that the overall higher HIV prevalence among those who experienced SGBV is driven by heightened vulnerability among women victims. There was also a noticeable difference in HIV prevalence in rural and urban areas of residence. Urban residents who had been forced to have sex in the 12 months preceding the survey had a higher prevalence of 21.9% compared to rural residents whose prevalence was 7.9%. In terms of perpetrators, compared to residents of rural areas, urban residents who sexually abused their intimates had a higher HIV prevalence of 15.9% among women, and 14.8% among men.

**Table 2.** HIV prevalence by forms of sexual violence, UAIS, 2011 ($n$ = 7784).

| Characteristic | Women | | Men | | Rural | | Urban | |
|---|---|---|---|---|---|---|---|---|
| | % HIV + | Cases | % HIV + | Cases | % HIV + | Cases | % HIV + | Cases |
| **Sexual violence (forced & coerced)** | * | | ns | | * | | * | |
| Yes | 12.6 | 939 | 6.6 | 305 | 10.1 | 976 | 14.6 | 268 |
| No | 7.8 | 3143 | 7.4 | 3437 | 7.0 | 5336 | 10.1 | 1245 |
| Total | 8.9 | 4082 | 7.3 | 3742 | 7.5 | 6312 | 10.9 | 1513 |
| **Ever forced to have sex?** | * | | ns | | ns | | * | |
| Yes | 12.3 | 611 | 5.9 | 119 | 9.1 | 561 | 18.3 | 169 |
| No | 8.3 | 3472 | 7.4 | 3623 | 7.3 | 5750 | 9.9 | 1344 |
| Total | 8.9 | 4083 | 7.3 | 3742 | 7.5 | 6311 | 10.9 | 1513 |
| **Forced sex in last 12 months?** | ns | | ns | | ns | | ns | |
| Yes | 11.9 | 227 | 9.4 | 53 | 7.9 | 215 | 21.9 | 64 |
| No | 12.3 | 382 | 3.0 | 66 | 9.6 | 344 | 15.4 | 104 |
| Total | 12.2 | 609 | 5.9 | 119 | 8.9 | 559 | 17.9 | 168 |
| **Ever coerced to have sex?** | * | | ns | | * | | ns | |
| Yes | 13.2 | 657 | 7.0 | 242 | 11.3 | 700 | 12.6 | 199 |
| No | 8.1 | 3425 | 7.3 | 3500 | 7.0 | 5612 | 10.6 | 1313 |
| Total | 8.9 | 4082 | 7.3 | 3740 | 7.5 | 6312 | 10.8 | 1513 |
| **Coerced in last 12 months?** | ns | | ns | | ns | | ns | |
| Yes | 13.5 | 341 | 8.9 | 124 | 11.8 | 357 | 13.9 | 108 |
| No | 13.0 | 308 | 5.2 | 115 | 10.4 | 334 | 11.4 | 88 |
| Total | 13.3 | 649 | 7.1 | 239 | 11.1 | 691 | 12.8 | 196 |
| **Relationship with perpetrator?** | ns | | ns | | ns | | ns | |
| Spouse/partner | 12.3 | 520 | 9.7 | 103 | 10.8 | 491 | 15.9 | 132 |
| Other | 11.5 | 217 | 5.8 | 152 | 8.1 | 289 | 12.7 | 80 |
| Total | 12.5 | 737 | 7.1 | 255 | 10.3 | 780 | 14.2 | 212 |
| **Did you report to police?** | ns | | ns | | ns | | ns | |
| Yes | 12.5 | 32 | 0.0 | 01 | 15.4 | 26 | 0.0 | 08 |
| No | 12.6 | 700 | 7.4 | 258 | 10.2 | 755 | 14.3 | 203 |
| Total | 12.6 | 732 | 7.4 | 259 | 10.3 | 781 | 13.7 | 211 |
| **Main reason not to report?** | ns | | ns | | ns | | ns | |
| No knowledge | 18.4 | 125 | 6.7 | 90 | 13.9 | 173 | 11.9 | 42 |
| No confidence | 11.0 | 109 | 7.0 | 43 | 7.8 | 115 | 16.2 | 37 |
| Normal | 12.1 | 119 | 10 | 40 | 9.2 | 131 | 11.1 | 27 |
| Fear/shame | 11.6 | 315 | 6.8 | 74 | 9.4 | 295 | 14.9 | 94 |
| Total | 12.5 | 668 | 7.3 | 247 | 10.2 | 714 | 14 | 200 |

*—Statistically significant, $p < 0.05$, ns—Not significant, $p > 0.05$ based on Chi Square.

### *3.3. Multilevel Findings*

#### 3.3.1. Individual-Level Findings

Table 3 shows results of HIV prevalence by SGBV. At this stage, potential mediating and confounding factors were controlled for. Three models were fitted—Model 1 for sexual violence only ($\chi^2$ (1 = 14.741, $p$ = 0.001), Model 2 controlled for socio-economic factors ($\chi^2$ (10 = 72.964, $p$ = 0.001) and Model 3 controlled for socio-behavioural factors ($\chi^2$ (22 = 252.514, $p$ = 0.001). All results are presented with 95% confidence intervals.

**Table 3.** HIV prevalence by sexual violence, UAIS, 2011 ($n$ = 7692).

| Response | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | OR | CI | OR | CI | OR | CI |
| **Fixed effects** | | | | | | |
| **Model 1: Sexual violence** | | | | | | |
| *Sexual violence (Ref: No)* | | | | | | |
| Yes | 1.61 | [1.29–2.00] * | 1.50 | [1.19–1.88] * | 1.34 | [1.06–1.70] * |
| **Model 2: Socio-demographic factors** | | | | | | |
| *Wealth status (Ref: Lowest quintile)* | | | | | | |
| Second | | | 0.91 | [0.68–1.20] | 0.87 | [0.65–1.15] |
| Middle | | | 1.02 | [0.76–1.36] | 0.97 | [0.73–1.31] |
| Fourth | | | 0.95 | [0.71–1.29] | 0.91 | [0.68–1.24] |
| Highest | | | 1.18 | [0.87–1.60] | 1.16 | [0.85–1.59] |

**Table 3.** *Cont.*

| Response | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | OR | CI | OR | CI | OR | CI |
| *Education (Ref: No education)* | | | | | | |
| Incomplete primary | | | 1.30 | [0.96–1.75] | 1.18 | [0.87–1.60] |
| Complete primary | | | 1.41 | [0.99–2.02] | 1.20 | [0.83–1.73] |
| Incomplete secondary | | | 1.14 | [0.79–1.64] | 1.00 | [0.69–1.45] |
| Complete secondary and higher | | | 0.59 | [0.35–0.99] * | 0.47 | [0.28–0.79] * |
| *Sex of respondent (Ref: Men)* | | | | | | |
| Women | | | 1.02 | [0.83–1.24] | 1.32 | [1.03–1.68] * |
| *Age of respondent (Ref: 45–59 years)* | | | | | | |
| 15–24 years | | | 0.40 | [0.29–0.54] * | 0.94 | [0.66–1.34] |
| 25–34 years | | | 0.86 | [0.66–1.12] | 1.16 | [0.87–1.55] |
| 35–44 years | | | 1.21 | [0.93–1.58] | 1.46 | [1.11–1.92] * |
| *Drunk with alcohol before sex (Ref: Not drunk)* | | | | | | |
| Drunk | | | 1.17 | [0.92–1.48] | 1.25 | [0.99–1.59] |
| Not applicable | | | 1.19 | [0.92–1.52] | 1.83 | [1.31–2.55] * |
| *Place of residence (Ref: Rural)* | | | | | | |
| Urban | | | 1.95 | [1.50–2.53] * | 1.78 | [1.37–2.32] * |
| **Model 3: Socio-sexual practices** | | | | | | |
| *Religious affiliation (Ref: Catholic)* | | | | | | |
| Protestant | | | 0.86 | [0.70–1.06] | 0.87 | [0.70–1.08] |
| Moslem | | | 0.64 | [0.47–0.88] * | 0.63 | [0.46–0.87] * |
| All others | | | 0.96 | [0.71–1.28] | 1.02 | [0.76–1.37] |
| *Gender of household head (Ref: Male)* | | | | | | |
| Female | | | 1.38 | [1.11–1.71] * | 1.14 | [0.90–1.45] |
| *Marital status (Ref: Never married)* | | | | | | |
| Married/living together | | | | | 2.53 | [1.61–3.99] * |
| Widowed | | | | | 5.18 | [2.95–9.08] * |
| Divorced/separated | | | | | 3.42 | [2.10–5.57] |
| *Total lifetime sex partners (Ref: 1 partner)* | | | | | | |
| 2–4 partners | | | | | 1.41 | [1.08–1.85] * |
| ≥5 partners | | | | | 2.57 | [1.86–3.54] * |
| Not applicable | | | | | 0.84 | [0.40–1.76] |
| *Condom use during unsafe sex (Ref: Not used)* | | | | | | |
| Used condoms | | | | | 3.35 | [2.51–4.46] * |
| Not applicable | | | | | 1.00 | [1.00–1.00] * |
| *HIV/AIDS related stigma (Ref: Low)* | | | | | | |
| Medium stigma | | | | | 1.36 | [1.08–1.70] * |
| High stigma | | | | | 1.78 | [1.38–2.30] * |
| **Random effect** | | | | | | |
| Cluster constant | 0.329 | (0.084 *) | 0.283 | (0.081 *) | 0.236 | (0.078 *) |
| Clusters | 470 | | 470 | | 470 | |
| Individuals | 7692 | | 7692 | | 7692 | |

OR—odds ratio, CI—confidence intervals, *—statistical significance at 95% confidence level, $p < 0.05$.

In Model 1 without any controls, the findings show that there was a significant association between SGBV and probability of HIV infection. The odds of having HIV were 1.61 [1.29–2.00] times higher for individuals with a history of SGBV in comparison with individuals without. We then introduced a range of socio-economic factors that are hypothesized to be operating in the background in Model 2 and compared victims and non-victims. Again, we find that having a history of SGBV increased the likelihood of having HIV infection by 49 percent; individuals who suffered SGBV had 1.49 [1.18–1.87] higher odds of having HIV than their counterparts of similar socio-economic characteristics who had not. In Model 3, we controlled for socio-sexual practices, but still we find that victims of SGBV were 1.34 [1.06–1.70] more likely to be infected, compared to non-victims of similar characteristics.

### 3.3.2. Community-Level Findings

Three analyses were performed: first, random level estimates of Table 3 were applied to the formula proposed by Tarling (2008) and others; second, a variance components model of SGBV (Figure 1) was fitted; and third, a model of community factors that controls for individual-level factors (Pickett and Pearl 2001) (Table 4) was fitted using MLwIN 2.33 (Rasbash et al. 2009).

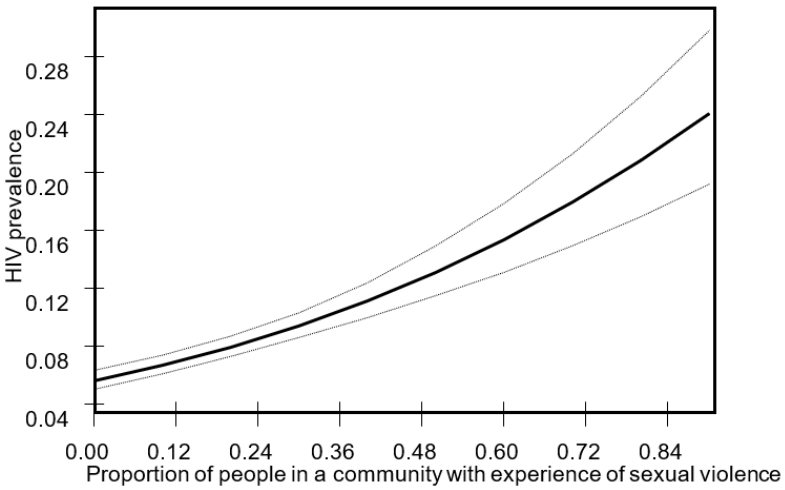


**Figure 1.** Increase in HIV prevalence in a community where a high proportion of people have experience of sexual violence ($n$ = 7784, cluster = 470) Uganda AIS, 2011.

**Table 4.** HIV prevalence by sexual violence and community-level factors after controlling for individual level effects, UAIS, 2011 ($n$ = 7784).

| Parameter | Model 2 [1] | | Model 3 [2] | | Model 4 | |
|---|---|---|---|---|---|---|
| | OR | CI | OR | CI | OR | CI |
| **Fixed effects** | | | | | | |
| Constant | 0.05 | [0.04–0.08] * | 0.01 | [0.00–0.02] * | 0.01 | [0.00–0.02] * |
| **Model 1: Sexual violence** | | | | | | |
| *Sexual violence (Ref: No)* | | | | | | |
| Yes | 1.47 | [1.17–1.85] * | 1.28 | [0.01–1.62] * | 1.19 | [0.93–1.52] |
| **Model 4: Community factors** | | | | | | |
| Community wealth | | | | | 1.07 | [1.01–1.13] * |
| Community education | | | | | 0.96 | [0.88–1.05] |
| Alcoholism at community level | | | | | 1.09 | [1.00–1.18] * |
| Formerly married at community level | | | | | 1.01 | [0.90–1.12] |
| Sexual violence at community level | | | | | 1.06 | [0.97–1.16] |
| Multiple sex partners at community level | | | | | 0.98 | [0.90–1.05] |
| Early sex at community level | | | | | 1.02 | [0.94–1.11] |
| Early marriage at community level | | | | | 0.97 | [0.81–1.15] |
| Condom use at community level | | | | | 1.14 | [0.98–1.33] |
| **Random effects** | | | | | | |
| Cluster constant | 0.316 | (0.083*) | 0.261 | (0.080*) | 0.242 | (0.078*) |
| Clusters | 470 | | 470 | | 470 | |
| Individuals | 7784 | | 7784 | | 7784 | |

[1] Household/individual wealth status, educational attainment, sex of respondent, age of respondent, rural/urban place of residence, alcoholism. [2] Religion, gender of household head, current marital status, multiple sexual partners and condom use during unsafe sex. OR—odds ratio, CI—confidence intervals, *—statistical significance at 95% confidence level, $p < 0.05$.

These results show that controlling for important background factors, the coefficient reduced from 0.090 (i.e., 9.0%) when only sexual violence is included in the model to 0.069 in the final model, which means that 6.9% of the total unexplained variation in HIV vulnerability can be attributed to unobserved community effects.

Community-Level Sexual and Gender-Based Violence

Using a model with only community-level SGBV, Figure 1 shows that there exists a significant positive relationship between community level SGBV and HIV infection; an increase in the proportion of people in the community who have experienced SGBV is associated with an exponential increase in HIV prevalence. From this evidence, we conclude that there is an association between SGBV and HIV infection at both micro and macro levels.

Controlling for Individual-Level Factors

In the third and final step of investigating community effects, we fit a model of community-level factors and control for individual-level factors (Table 4). Findings demonstrate that SGBV still remains positive with an Odds Ratio of 1.47 [1.17–1.85] but becomes insignificant after controlling for community factors, with an Odds Ratio of 1.25 [0.93–1.52], pointing to the importance of these factors.

### 3.3.3. Determinants of HIV Vulnerability among Victims of SGBV

Individual-Level Factors

We compare victims and non-victims of SGBV. Four models were fitted separately for victims and non-victims. Table 5 presents results of the final Model.

**Table 5.** Comparative analysis of HIV prevalence between victims and non-victims of sexual violence, UAIS, 2011 ($n$ = 1196, victims; and $n$ = 6588, non-victims).

| Parameter | No Sexual Violence Group | | Sexual Violence Group | |
|---|---|---|---|---|
| | OR | CI | OR | CI |
| **Fixed effects** | | | | |
| **Model 1: Socio-economic status** | | | | |
| *Wealth status (Ref: Lowest quintile)* | | | | |
| Second | 0.87 | [0.64–1.18] | 0.62 | [0.31–1.23] |
| Middle | 0.91 | [0.66–1.26] | 0.84 | [0.42–1.68] |
| Fourth | 0.93 | [0.66–1.29] | 0.77 | [0.38–1.54] |
| Highest | 1.02 | [0.72–1.44] | 1.33 | [0.67–2.67] |
| *Education (Ref: No education)* | | | | |
| Incomplete primary | 1.47 | [1.03–2.10] * | 0.67 | [0.36–1.24] |
| Complete primary | 1.73 | [1.14–2.62] * | 0.38 | [0.17–0.88] * |
| Incomplete secondary | 1.32 | [0.87–2.00] | 0.49 | [0.22–1.07] |
| Complete secondary & higher education | 0.82 | [0.46–1.45] | 0.15 | [0.04–0.53] * |
| **Model 2: Scio-demographic factors** | | | | |
| *Place of residence (Ref: Rural)* | | | | |
| Urban | 1.67 | [1.25–2.24] * | 2.08 | [1.23–3.53] * |
| *Gender of household head (Ref: Male)* | | | | |
| Female | 1.26 | [0.96–1.65] | 0.89 | [0.55–1.45] |
| *Current marital status (Ref: Never married)* | | | | |
| Married/living together | 4.30 | [2.58–7.17] * | 1.04 | [0.45–2.42] |
| Widowed | 7.64 | [4.11–14.23] * | 3.11 | [1.07–9.04] * |
| Divorced/separated | 5.02 | [2.88–8.76] * | 2.14 | [0.87–5.27] |
| *Sex of respondent (Ref: Men)* | | | | |
| Women | 1.10 | [0.84–1.44] | 2.81 | [1.48–5.34] * |
| **Model 3: Sexual practices** | | | | |
| *Condom use during unsafe sex (Ref: No)* | | | | |
| Used condoms | 3.72 | [2.71–5.10] * | 2.26 | [1.16–4.39] * |
| Not applicable | 2.20 | [1.53–3.15] * | 0.89 | [0.46–1.74] |
| *Multiple sexual partners (Ref: 1 partner)* | | | | |
| 2–4 partners | 1.29 | [0.95–1.73] | 2.42 | [1.22–4.81] * |
| ≥5 partners | 2.19 | [1.54–3.11] * | 6.09 | [2.83–13.07] * |
| Not applicable | 0.79 | [0.36–1.73] | 2.18 | [0.33–14.32] |
| **Random effects** | | | | |
| Cluster constant | 0.293 | (0.099 *) | 0.439 | (0.281) |
| Clusters | 470 | | 404 | |
| Individual | 6588 | | 1196 | |

OR—odds ratio, CI—confidence intervals, *—statistical significance at 95% confidence level, $p < 0.05$.

Table 5 shows that three key factors determine the vulnerability of victims of SGBV to HIV i.e., having multiple sexual partners, residing in an urban area and female gender. There are important gender differences. Female victims of SGBV had 2.81 [1.48–5.34] times higher odds of being infected with HIV than male counterparts of similar characteristics, while for non-victims of SGBV, the gender difference was not significant. With respect to multiple sexual partners, whereas victims of SGBV who had 2–4 lifetime sexual partners had 2.42 [1.22–4.81] times higher odds of being infected; non-victims were not significantly affected, with 1.29 [0.95–1.73] odds when compared individuals who had one lifetime sexual partner. Similarly, in comparison with individuals who had only one partner, victims with $\geq$5 lifetime sexual partners had higher odds of being infected of 6.09 [2.83–13.07], while non-victims had 2.19 [1.54–3.11]. Victimized individuals who resided in urban areas were also more likely than non-victims to have a higher prevalence of HIV. Victims residing in urban areas had 2.08 [1.23–3.53] times higher odds of being infected than rural counterparts, while non-victims residing in urban areas had a lower odds ratio of 1.67 [1.25–2.24] times.

Important differences in the determinants of HIV prevalence between victims and non-victims of SGBV are evident with respect to educational attainment and marital status. The elevated HIV risk associated with primary education is only evident among non-victims, while the protective effect of higher educational attainment is evident among victims of SGBV but not among non-victims. For instance, among victims of SGBV, those who have completed secondary education or higher have 85% lower odds of HIV infection (i.e., odds lower by a factor of 0.15) compared to those with no education; but there is no evidence of a significant difference among non-victims of SGBV who have secondary or higher education compared to those with no education. With respect to marital status, the elevated risk of HIV infection among those who are currently or previously married compared to those who were never married is greater for non-victims than for victims. There is no evidence of a significant difference among victims who are currently married and those never married, yet currently married non-victims have more than four times higher odds of HIV infection than their never married counterparts.

#### 3.3.4. Community-Level Factors

We explored community-level factors also associated with vulnerability for victims of SGBV. We fitted three models: Model 1 had sexual violence factors such as forced sex, coerced sex, etc.; Model 2 contained individual-level social and demographic factors; while Model 3 had community-level covariates.

Community wealth was associated with vulnerability to HIV infection among victims of SGBV. We found that victims who live in communities with a higher proportion of people who are wealthy or live in wealthy-categorized households were more likely to be infected with HIV than victims who lived in areas with a lower proportion of wealthy people. However, these findings were not conclusive. None of the other community factors controlled for were conclusive either, possibly due to the small sample size.

## 4. Discussion

### *4.1. SGBV and HIV among Currently or Ever Married Individuals*

This analysis began by establishing the prevalence of SGBV among ever/currently married or cohabiting individuals. Sexual violence is 3 times higher among women than men. However, the prevalence of forced sex in the 12 months preceding the survey among men who ever experienced sexual violence was higher among men than women who also experienced sexual violence and had similar other social characteristics. The prevalence of coerced sex in the 12 months preceding the survey among those who ever experienced sexual coercion was similar among women and men. In terms of rural/urban place of residence, prevalence of SGBV was slightly higher in urban compared to rural areas. However, there were no other important differences. Findings on the overall prevalence of SGBV in this research were higher than those reported in previous Ugandan research (Kouyoumdjian et al. 2013; Ogland et al. 2014).

The increased prevalence of SGBV in Uganda is likely due to a mix of factors including controlling practices of men, especially for unempowered women (Kwagala et al. 2013), persistence of attitudes normalizing SGBV among both women and men (Koenig et al. 2003; Uthman et al. 2009; Antai 2011) and the negative reaction of men to the increased status of some women following Uganda's policies of empowerment for women since the 1990s.

Among women, 70.6% of SGBV was committed by intimate partners compared to 40.4% among men. This finding is consistent with the majority of evidence showing that most SGBV among women is committed by sexual partners (Campbell 2002, 2008; Balogun et al. 2012; Cao et al. 2014). As with all crime, SGBV in Uganda is supposed to be reported to the police as a first step in access to justice. However, nearly all SGBV was not reported. This is not surprising, given that access to justice in Uganda, especially by women, is generally poor due to a cocktail of reasons including illiteracy, a male-dominated and corrupt judicial system, and lack of money to facilitate access (Kane et al. 2005).

This analysis also established the prevalence of HIV to be 7.3% in the main sample, 8.2% in the sub sample and 11.1% among those sexually abused, suggesting that HIV prevalence was highest among sexually abused respondents. These findings were generally expected as reported in previous research (Shamu et al. 2011; Hassen and Deyassa 2013; Li et al. 2014).

In the multilevel modelling, it emerged that victims of SGBV were 34% more likely to be infected with HIV at individual-level. The association between community-level SGBV and HIV infection was also examined. The results revealed that living in a community with a higher proportion of victims of SGBV was associated with an increase in HIV prevalence. The SGBV-HIV association at the community level was tested by running a model of community-level covariates while controlling for individual-level factors. It was found that a positive association between community SGBV and HIV infection was still observed, after controlling for other community- and individual-level covariates.

### *4.2. Determinants of HIV among Victims of SGBV*

The most important determinants of HIV vulnerability among victims of SGBV were multiple sexual partnerships, sex of respondent and living in an urban area. Victims of SGBV with two or more sexual partners were 2–6 times more likely to be infected with HIV than non-victims who also practiced multiple sexual partnerism. In terms of gender, female respondents were nearly three times more likely to be infected with HIV compared to female non-victims. In terms of place of residence, victims who reside in urban areas were twice more vulnerable to HIV infection than non-victims who also lived in urban areas. High prevalence of HIV among sexually abused people, especially those living in urban areas, is likely due to the well-recognized disadvantage associated with some residents of urban areas (Van Donk 2006; Madise et al. 2012; Magadi 2013).

These factors are already associated with increased vulnerability to the risk HIV infection. For example, multiple sexual partners have already been linked to vulnerability to HIV infection (Pettifor et al. 2004; Magadi and Desta 2011) and among migrants (Cassels and Katz 2013). Multiple sexual partners are known to increase the likelihood of women being infected with HIV (Francisco et al. 2013) by 6%, each time they have sex with an additional partner (Adair 2008); while high prevalence of HIV among sexually abused people resident in urban areas has been reported in Ethiopia (Hassen and Deyassa 2013). Evidence from the present research confirms that SGBV increases vulnerability to HIV infection in Uganda, and that this vulnerability is amplified among women, urban residents and those with multiple partners.

### *4.3. Effects of Community-Level Factors*

Community wealth and pre-sex alcoholism were community-level factors explaining the association between SGBV and HIV infection. Once these factors were controlled for, the effect of SGBV on HIV infection ceased to be significant. People living in communities with a higher proportion of individuals or households belonging to the wealthiest 40%

households, and those living in areas with a higher proportion of people who engage in pre-sex alcoholism, were more vulnerable to HIV infection. Pre-sex alcoholism is likely to contribute to SGBV (Fisher et al. 2007; Zablotska et al. 2009) and subsequent HIV risk. In addition, the analysis revealed a total of 6.9% unexplained variance in HIV among victims of SGBV, a similar finding to that found in a study on attitudes of women towards SGBV (Uthman et al. 2009).

### *4.4. Factors That Reduce HIV Vulnerability among Victims of SGBV*

Individual- and community-level educational attainment lowers the likelihood of sexually abused people becoming infected with HIV. Victims of SGBV who had completed primary, secondary or higher education were less likely to be infected with HIV, all compared to individuals with no educational attainment but who also suffered sexual abuse. After controlling for the influence of community factors, the effect of individual-level educational attainment persisted. This effect contrasts with the case of non-victims of SGBV where both incomplete and completed primary education is associated with increased vulnerability. These findings suggest that the known benefits of higher educational attainment apply particularly to victims of SGBV.

## 5. Conclusions

The first objective of this research was to examine the association between SGBV and vulnerability to HIV infection in Uganda. The findings show that HIV prevalence is higher among victims of SGBV compared to the general population. In the refined analysis, victims of SGBV had 34% higher odds of HIV infection compared to non-victims with similar socio-economic characteristics. The findings support available evidence reported earlier, demonstrating that SGBV is associated with greater vulnerability to HIV infection. This higher vulnerability was associated with being a female, having multiple sexual partners and living in urban areas.

The final objectives were to identify individual- and community-level factors that mediate the association between SGBV and HIV infection in Uganda, and to identify factors that mitigate vulnerability to HIV infection among victims of SGBV in Uganda. The research reveals that higher educational attainment substantially reduces the vulnerability of victims of SGBV to HIV infection in Uganda.

These findings offer new insights into our understanding of vulnerability to HIV infection and portend a lot of implications. Efforts to effectively prevent HIV infection among victims of SGBV in Uganda need to focus on the practice of multiple sexual partnerism. In the long run, issues of gender and rural-urban inequalities also need to be addressed. Above all, policies need to support young people to attain higher education, especially completing secondary and higher education.

The interpretation of these findings should be considered in the context of the following strengths. First, the research used objective biomarkers of HIV, which allowed for accurate prediction of the association between SGBV and being infected with HIV; and second, as nationally representative research, these findings are generalisable to Uganda and possibly elsewhere. However, the research had the following potential limitations.

First, as a cross sectional research, causality could not be verified; second, only data on forced and coerced sex which was available in the Uganda AIDS Indicator Survey data for 2011 was used. This limited our ability to determine the relationship between SGBV and HIV positive status beyond forced and coerced sex. For example, the effects of physical and psychological violence in increasing vulnerability to the risk of HIV infection would have been useful. Nevertheless, we believe that it is forceful and coercive sex that ultimately increases vulnerability to the risk of HIV infection; third, since there was no access to relevant data, it was not possible to determine the stability of these findings across time and countries. Lastly, this data was collected 12 years ago when the policy context was different. This has the potential to affect the application of these findings. However, the findings are still relevant, especially for young people given the worsening development

indicators in Uganda. For example, only 38% of young people in Uganda complete primary school and only 27% are enrolled in secondary school. Being out of school is a recipe for sexual and gender-based violence and HIV infection.

Future research needs to pay attention to the areas highlighted above. Research needs to investigate the relationship between HIV infection and SGBV broadly encompassing forced sex, coerced sex, physical violence, and psychological violence. Secondly, there is need to examine the relationship between HIV infection and SGBV using the latest data and from different contexts. Such research would need to examine the impact of COVID 19 on the association between SGBV and HIV infection among adolescents and young people. Lastly, there is need for research on the relationship between HIV infection, SGBV and school dropout among adolescents, young people, and youth.

Despite the potential weaknesses in this research, we are confident that it makes an important contribution to the better understanding of the HIV epidemic in Uganda. This is the first study as far as we know to use nationally representative data and advanced multilevel modelling to demonstrate the influence of urban place of residence and community-level factors in increasing the vulnerability of victims of SGBV to the risk of HIV infection in Uganda. This research further provides strong evidence showing the effect of higher educational attainment in reducing the vulnerability of victims of SGBV to the risk of HIV infection in Uganda.

Given the current high school dropout rates in Uganda, it is imperative to undertake strategic action that will ensure better educational outcomes and attainment for adolescents, young people and youth across the education system in Uganda, and perhaps in other countries where adolescents and young people are not receiving good education to prevent HIV and SGBV among them, especially in the female population.

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**Institutional Review Board Statement:** The research protocols were developed collaboratively by all institutions involved in the survey. They were then reviewed and approved by the Science and Ethics Committee of Uganda Virus Research Institute, ICF Macro's Institutional Review Board, Centres for Disease Control and Prevention in Atlanta, and by the Ethics and Science Committee of Uganda National Council of Science and Technology.

**Informed Consent Statement:** All women and men age 15–59 years who were either permanent residents of the households in the sample or visitors present in the household on the night before the survey were eligible for interviews. Their consent was sought before the interview. The consent emphasized confidentiality, anonymity, benefits of the research, rights of the respondent and contact information of the principal researcher to contact in case of any concerns about the research. All household members age 15–59 who were interviewed were asked to voluntarily provide a blood sample for testing for HIV and syphilis. Blood samples were also requested from all children under age 5 for HIV testing. Informed consent was obtained by the laboratory technicians who explained the procedure and confidentiality of the data. The laboratory technicians asked permission to store left-over blood samples for future unspecified tests. Respondents were given a card containing contact information of three principal investigators and the chair of the ethics committee whom they could contact in case they had questions or wanted to complain. The laboratory technicians sought consent from parents or guardians of children under 5 years and those aged 15–17 years.

**Data Availability Statement:** The Uganda AIDS Indicator Survey 2011 data is freely available and can be accessed through this web link https://dhsprogram.com/data/available-datasets.cfm (accessed on 1 January 2022).

**Conflicts of Interest:** The author has no conflict of interest to declare.

## Abbreviations and Acronyms

| | |
|---|---|
| AIDS | Acquired Immuno Deficiency Syndrome |
| ART | Antiretroviral therapy |
| CD4 | Cluster of Differentiation 4, a type of white blood cells |
| HIV | Human Immuno Virus |
| PMTCT | Prevention of Mother to Child Transmission of HIV |
| SGBV | Sexual and Gender Based Violence |
| SGV | Sexual and Gender Violence |
| STI | Sexually Transmitted Infection |
| SSA | Sub Saharan Africa |
| UAIS | Uganda AIDS Indicator Survey |
| UBOS | Uganda Bureau of Statistics |
| UN | United Nations |
| WHO | World Health Organisation |

## Appendix A

**Table A1.** Recoding of derived community-level variables for data of UAIS, 2004–2005 and 2011.

| Variable | Individual-Level Coding | Community-Level Coding |
|---|---|---|
| Wealth status | 1 = Lowest<br>2 = Second<br>3 = Middle<br>4 = Fourth<br>5 = Highest | 1–3 = 0<br>4–5 = 1 |
| Education | 1 = No education<br>2 = Incomplete primary<br>3 = Complete primary<br>4 = Incomplete secondary<br>5 = Complete secondary & higher education | 1–3 = 0<br>4–5 = 1 |
| Age at first sex | 0 = <15<br>1 = 16–17<br>2 = 18–19<br>3 = >20 | 3 = 0<br>0–2 = 1 |
| Age at first marriage | 0 = <15<br>1 = 16–17<br>2 = 18–19<br>3 = >20 | 3 = 0<br>0–2 = 1 |
| Marital status | 0 = Never been in union<br>1 = Married/living with someone<br>2 = Widowed<br>3 = Divorced/separated | 0–1 = 0<br>2–3 = 1 |
| Drunk with alcohol | 0 = Not drunk<br>1 = Drunk | 0 = 0<br>1 = 1 |
| Lifetime partners | 0 = 1 partner<br>1 = 2–4 partners<br>2 = >5 partners | 0 = 0<br>1–2 = 1 |
| Comprehensive HIV/AIDS knowledge | 0 = No knowledge<br>1 = Lowest<br>2 = Medium<br>3 = Highest | 0–2 = 0<br>3 = 1 |
| Condom use at last risky sex | 0 = No<br>1 = Yes | 0 = 0<br>1 = 1 |
| Prevalence of sexually transmitted infections—genital ulcer | 0 = No genital<br>1 = Reported genital ulcer | 0 = 0<br>1 = 1 |
| Can a woman ask her husband to use a condom if he has STI | 0 = No<br>1 = Yes | 0 = 0<br>1 = 1 |

## References


Adair, Timothy. 2008. HIV status and age at first marriage among women in Cameroon. *Journal of Biosocial Science* 40: 743–60. [CrossRef] [PubMed]

Antai, Diddy. 2011. Traumatic physical health consequences of intimate partner violence against women: What is the role of community-level factors? *BMC Women's Health* 11: 56. [CrossRef] [PubMed]

Bajunirwe, Francis, Daniel Semakula, and Jonathan Izudi. 2020. Risk of HIV infection among adolescent girls and young women in age-disparate relationships in sub-Saharan Africa. *AIDS* 34: 1539–48. [CrossRef]

Balogun, Mary O., Eme T. Owoaje, and Olufunmilayo I. Fawole. 2012. Intimate partner violence in south western Nigeria: Are there rural-urban differences? *Women & Health* 52: 627–45.

Bazargan-Hejazi, Shahrzad, Sarah Medeiros, Reza Mohammadi, Jonhnny Lin, and Koustuv Dalal. 2013. Patterns of intimate partner violence: A study of female victims in Malawi. *Journal of Injury & Violence Research* 5: 38–50.

Campbell, Jacquelyn C. 2002. Health consequences of intimate partner violence. *The Lancet* 359: 1331–36. [CrossRef]

Campbell, Jacquelyn C. 2008. The intersection of intimate partner violence against women and HIV/AIDS: A review. *International Journal of Injury Control and Safety Promotion* 15: 221–31. [CrossRef]

Cao, YuPing, ShiChang Yang, GuoQiang Wang, and YaLin Zhang. 2014. Socio-demographic characteristics of domestic violence in china: A population case-control study. *Journal of Interpersonal Violence* 29: 683–706. [CrossRef]

Casey, Erin A., and Taryn P. Lindhorst. 2009. Toward a multi-level, ecological approach to the primary prevention of sexual assault prevention in peer and community contexts. *Trauma, Violence, & Abuse* 10: 91–114.

Cassels, Susan, and David A. Katz. 2013. Seroadaptation among men who have sex with men: Emerging research themes. *Current HIV/AIDS Reports* 10: 305–13. [CrossRef]

DeGue, Sarah, Melissa K. Holt, Greta M. Massetti, Jennifer L. Matjasko, Andra Teten Tharp, and Linda Anne Valle. 2012. Looking ahead toward community-level strategies to prevent sexual violence. *Journal of Women's Health* 21: 1–3. [CrossRef] [PubMed]

Ellsberg, Mary, Henrica AFM Jansen, Lori Heise, Charlotte H. Watts, and Claudia Garcia-Moreno. 2008. Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: An observational study. *The Lancet* 371: 1165–72. [CrossRef]

Fisher, Joseph C., Heejung Bang, and Saidi H. Kapiga. 2007. The association between HIV infection and alcohol use: A systematic review and meta-analysis of African studies. *Sexually Transmitted Diseases* 34: 856–63. [CrossRef] [PubMed]

Francisco, Leilani, Tanya Abramsky, Ligia Kiss, Lori Michau, Tina Musuya, Deanna Kerrigan, Dan Kaye, and Charlotte Watts. 2013. Violence against Women and HIV Risk Behaviors in Kampala, Uganda Baseline Findings from the SASA! Study. *Violence against Women* 19: 814–32. [CrossRef] [PubMed]

Fotso, Jean-Christophe, and Barthelemy Kuate-Defo. 2005. Measuring socioeconomic status in health research in developing countries: Should we be focusing on households, communities or both? *Social Indicators Research* 72: 189–237. [CrossRef]

Garcia-Moreno, Claudia, Henrica A. Jansen, Mary Ellsberg, Lori Heise, and Charlotte H. Watts. 2006. Prevalence of intimate partner violence: Findings from the WHO multi-country study on women's health and domestic violence. *The Lancet* 368: 1260–69. [CrossRef]

Ghanotakis, Elena, Dean Peacock, and Rose Wilcher. 2012. The importance of addressing gender inequality in efforts to end vertical transmission of HIV. *Journal of the International AIDS Society* 15 S2: 17385. [CrossRef]

Gupta, Geeta Rao, Justin O. Parkhurst, Jessica A. Ogden, Peter Aggleton, and Ajay Mahal. 2008. Structural approaches to HIV prevention. *The Lancet* 372: 764–75. [CrossRef]

Hair, Joseph F., William C. Black, Barry J. Babin, Rolph E. Anderson, and Ronald L. Tatham. 1998. *Multivariate Data Analysis*, 5th ed. Upper Saddle River: Prentice Hall, vol. 5, pp. 207–19.

Harling, Guy, Wezi Msisha, and S. V. Subramanian. 2010. No association between HIV and intimate partner violence among women in 10 developing countries. *PLoS ONE* 5: e14257. [CrossRef]

Hassen, Fatuma, and Ngussie Deyassa. 2013. The relationship between sexual violence and human immunodeficiency virus (HIV) infection among women using voluntary counselling and testing services in south wollo zone, Ethiopia. *BMC Research Notes* 6: 271. [CrossRef]

Hatcher, Abigail M., Patrizia Romito, Merab Odero, Elizabeth A. Bukusi, Maricianah Onono, and Janet M. Turan. 2013. Social context and drivers of intimate partner violence in rural Kenya: Implications for the health of pregnant women. *Culture, Health & Sexuality* 15: 404–19.

Igulot, Patrick. 2017. Vulnerability and Risk to HIV Infection in Uganda: Multilevel Modelling of Uganda AIDS Indicator Survey Data. Doctoral dissertation, University of London, London, UK.

Kane, Minneh, Joseph Oloka-Onyango, and Abdul Tejan-Cole. 2005. Reassessing customary law systems as a vehicle for providing equitable access to justice for the poor. Paper presented at Arusha Conference, "New Frontiers of Social Policy", Arusha, Tanzania, December 12–15.

Karamagi, Charles AS, James K. Tumwine, Thorkild Tylleskar, and Kristian Heggenhougen. 2006. Intimate partner violence against women in eastern Uganda: Implications for HIV prevention. *BMC Public Health* 6: 284. [CrossRef] [PubMed]

Kayeyi, Nkomba, Ingvild F. Sandøy, and Knut Fylkesnes. 2009. Effects of neighbourhood-level educational attainment on HIV prevalence among young women in Zambia. *BMC Public Health* 9: 310. [CrossRef] [PubMed]

Koenig, Michael A., Tom Lutalo, Feng Zhao, Fred Nalugoda, Fred Wabwire-Mangen, Noah Kiwanuka, Jennifer Wagman, David Serwadda, Maria Wawer, and Ron Gray. 2003. Domestic violence in rural Uganda: Evidence from a community-based study. *Bulletin of the World Health Organization* 81: 53–60.

Kouyoumdjian, Fiona G., Liviana M.Calzavara, Susan J. Bondy, Patricia O'Campo, David Serwadda, Fred Nalugoda, Joseph Kagaayi, Godfrey Kigozi, Maria Wawer, and Ron Gray. 2013. Intimate partner violence is associated with incident HIV infection in women in Uganda. *AIDS* 27: 1331–38. [CrossRef]

Krug, Etienne G., James A. Mercy, Linda L. Dahlberg, and Anthony B. Zwi. 2002. The world report on violence and health. *The Lancet* 360: 1083–88. [CrossRef]

Kwagala, Betty, Stephen Ojiambo Wandera, Patricia Ndugga, and Allen Kabagenyi. 2013. Empowerment, partner's behaviours and intimate partner physical violence among married women in Uganda. *BMC Public Health* 13: 1112. [CrossRef]

Li, Ying, Caitlin M. Marshall, Hilary C. Rees, Annabelle Nunez, Echezona E. Ezeanolue, and John E. Ehiri. 2014. Intimate partner violence and HIV infection among women: A systematic review and meta-analysis. *Journal of the International AIDS Society* 17: 18845. [CrossRef]

Madise, Nyovani J., Abdhalah K. Ziraba, Joseph Inungu, Samoel A. Khamadi, Alex Ezeh, Eliya M. Zulu, John Kebaso, Vincent Okoth, and Matilu Mwau. 2012. Are slum dwellers at heightened risk of HIV infection than other urban residents? Evidence from population-based HIV prevalence surveys in Kenya. *Health & Place* 18: 1144–52.

Magadi, Monica Akinyi. 2013. The disproportionate high risk of HIV infection among the urban poor in sub-Saharan Africa. *AIDS and Behavior* 17: 1645–54. [CrossRef]

Magadi, Monica, and Muluye Desta. 2011. A multilevel analysis of the determinants and cross-national variations of HIV seropositivity in sub-Saharan Africa: Evidence from the DHS. *Health & Place* 17: 1067–83.

Msisha, Wezi M., Saidi H. Kapiga, Felton J. Earls, and S. V. Subramanian. 2008. Place matters: Multilevel investigation of HIV distribution in Tanzania. *AIDS* 22: 741. [CrossRef] [PubMed]

Mugavero, Michael, Jan Ostermann, Kathryn Whetten, Jane Leserman, Marvin Swartz, Dalene Stangl, and Nathan Thielman. 2006. Barriers to antiretroviral adherence: The importance of depression, abuse, and other traumatic events. *AIDS Patient Care & STDs* 20: 418–28.

Ogland, Grimonet Emmanuelle, Xiaohe Xu, John P. Bartkowski, and Curtis P. Ogland. 2014. Intimate Partner Violence against Married Women in Uganda. *Journal of Family Violence* 29: 869–79. [CrossRef]

Parkes, Jenny, Simone Datzberger, Colleen Howell, L. Knight, J. Kasidi, T. Kiwanuka, Rehema Nagawa, Dipak Naker, and Karen Devries. 2020. *Young People, Inequality and Violence during the COVID-19 Lockdown in Uganda*. London: UCL Institute of Education.

Pettifor, Audrey E., Ariane Van der Straten, Megan S. Dunbar, Stephen C. Shiboski, and Nancy S. Padian. 2004. Early age of first sex: A risk factor for HIV infection among women in Zimbabwe. *Aids* 18: 1435–42. [CrossRef]

Pickett, Kate E., and Michelle Pearl. 2001. Multilevel analyses of neighbourhood socioeconomic context and health outcomes: A critical review. *Journal of Epidemiology & Community Health* 55: 111–22.

Rasbash, Jon, Fiona Steele, William J. Browne, and Harvey Goldstein. 2009. *A User's Guide to MLwiN, v2.10*. Bristol: Centre for Multilevel Modelling, University of Bristol.

Rhodes, Tim, and Milena Simic. 2005. Transition and the HIV risk environment. *BMJ* 331: 220–23. [CrossRef]

Schafer, Katherine R., Julia Brant, Shruti Gupta, John Thorpe, Christopher Winstead-Derlega, Relana Pinkerton, Kathryn Laughon, Karen S Ingersoll, and Rebecca Dillingham. 2012. Intimate partner violence: A predictor of worse HIV outcomes and engagement in care. *AIDS Patient Care and STDs* 26: 356–65. [CrossRef]

Shamu, Simukai, Naeemah Abrahams, Marleen Temmerman, Alfred Musekiwa, and Christina Zarowsky. 2011. A systematic review of African studies on intimate partner violence against pregnant women: Prevalence and risk factors. *PLoS ONE* 6: e17591. [CrossRef]

Swahn, Monica H., Rachel Culbreth, Katherine E. Masyn, Laura F. Salazar, Jennifer Wagman, and Rogers Kasirye. 2021. The intersection of alcohol use, gender-based violence and HIV: Empirical findings among disadvantaged service-seeking youth in Kampala, Uganda. *AIDS and Behavior* 25: 3106–14. [CrossRef]

Tarling, Roger. 2008. *Statistical Modelling for Social Researchers: Principles and Practice*. London: Taylor & Francis.

Trimble, Debra D., Angeles Nava, and Judith McFarlane. 2013. Intimate partner violence and antiretroviral adherence among women receiving care in an urban Southeastern Texas HIV clinic. *Journal of the Association of Nurses in AIDS Care* 24: 331–40. [CrossRef] [PubMed]

Uganda Bureau of Statistics (UBOS), and Macro International Inc. 2007. *Uganda Demographic and Health Survey, 2006*. Calverton and Kampala: DHS.

United Nations. 1993. *General Assembly Declaration on the Elimination of Violence against Women*. A/RES/48/104. New York: United Nations.

Uthman, Olalekan Abdulrahman, Tahereh Moradi, and Stephen Lawoko. 2009. The independent contribution of individual-, neighbourhood-, and country-level socioeconomic position on attitudes towards intimate partner violence against women in sub-Saharan Africa: A multilevel model of direct and moderating effects. *Social Science & Medicine* 68: 1801–9.

Van der Straten, Ariane, Rachel King, Olga Grinstead, Eric Vittinghoff, Antoine Serufilira, and Susan Allen. 1998. Sexual coercion, physical violence, and HIV infection among women in steady relationships in Kigali, Rwanda. *AIDS and Behaviour* 2: 61–73. [CrossRef]

Van Donk, Mirjam. 2006. "Positive" urban futures in sub-Saharan Africa: HIV/AIDS and the need for ABC (A Broader Conceptualization). *Environment and Urbanization* 18: 155–75. [CrossRef]

World Health Organization (WHO). 2013. *Global and Regional Estimates of Violence against Women: Prevalence and Health Effects of Intimate Partner Violence and Non-Partner Sexual Violence*. Geneva: World Health Organization.

Zablotska, Iryna B., Ronald H. Gray, Michael A. Koenig, David Serwadda, Fred Nalugoda, Godfrey Kigozi, Nelson Sewankambo, Tom Lutalo, Fred Wabwire Mangen, and Maria Wawer. 2009. Alcohol use, intimate partner violence, sexual coercion and HIV among women aged 15–24 in Rakai, Uganda. *AIDS and Behavior* 13: 225–33. [CrossRef]