Does Having Comprehensive HIV and AIDS Knowledge Affect the Risky Sexual Behaviour of Young People in Sub – Saharan Africa: Pooled Analysis of Demographic and Health Surveys

Kwamena Sekyi Dickson (kwamena-sekyi.dickson@stu.ucc.edu.gh)  
University of Cape Coast  https://orcid.org/0000-0002-3152-2317

Abdul-Aziz Seidu  
James Cook University

Kenneth Setorwu Adde  
University of Cape Coast Faculty of Social Sciences

Joshua Okyere  
University of Cape Coast Faculty of Social Sciences

Felicia Commey  
University of Ghana

Mawulorm Akpeke  
University of Cape Coast Faculty of Social Sciences

Abdul Wahab Atta Bashiru  
University of Cape Coast

Bright Opoku Ahinkorah  
University of Technology Sydney

Research

Keywords: Risky sexual behaviour, Young people, Comprehensive HIV and AIDS knowledge

DOI: https://doi.org/10.21203/rs.3.rs-197456/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. 
Read Full License
Abstract

**Background:** Risky sexual behaviours (RSB) include all those behaviours such as multiple sexual unions, inconsistent use of condoms, or having sex under the influence of stimulants which have a greater propensity to exacerbate an individual's vulnerability to unintended pregnancies and sexually transmitted infections including HIV/AIDS. This study explores the relationship between comprehensive knowledge on HIV and RSB among young people in sub-Saharan Africa (SSA).

**Methods:** Data for this study were obtained from the current Demographic and Health Surveys (DHS) conducted between 2010 and 2018 in 28 SSA countries. These countries were chosen because they had complete information on the variables of interest for both males and females. Both descriptive and inferential analyses were conducted.

**Results:** It was found that 54.4% of young women and 40.0% of young men engaged in RSB. This ranged from 16.1% in Lesotho to 91.6% in Sierra Leone among young women and 17.1% in Namibia to 80.5% in Sierra Leone among young men. We also found that young men [AOR=0.78, CI=0.73–0.84] and women [AOR=0.92, CI=0.87–0.98] who had comprehensive HIV and AIDS knowledge had lower odds of engaging in RSB compared to those who did not have comprehensive HIV and AIDS knowledge.

**Conclusion:** The study showed a low level of comprehensive knowledge on HIV/AIDS in SSA and a gap in the proportion of young males and females regarding comprehensive knowledge on HIV/AIDS. Risky sexual behaviour varied by sex. This reflected in a higher proportion of young females (54.5%) indulging in RSB as compared to young males (40.0%). Our findings also revealed that comprehensive knowledge of HIV/AIDS influences risky sexual behaviour of young people. Age, level of education, place of residence, wealth status, exposure to radio, television, and newspaper or magazine have a significant relationship with RSB. These findings infer the need for targeted messages and interventions for the various categories of young people in SSA with relevant information on comprehensive knowledge of HIV/AIDS.

**Background**

Generally, sexual behaviours can be seen from two dimensions: the dimension of protective sexual behaviour or risky sexual behaviour [1]. The former denotes those behaviours (i.e., consistent use of condom, abstinence and sexual fidelity) that shield an individual from sexually transmitted infections and unplanned pregnancies. This, in effect, makes risky sexual behaviours (RSB) to include all those behaviours such as multiple sexual unions, non-use or inconsistent use of condoms or having sex under the influence of stimulants which have a greater propensity to exacerbate an individual's vulnerability to unintended pregnancies and sexually transmitted infections including HIV/AIDS [2]. Thus, young people who engage in unprotected sex, as well as multiple sexual partnerships, are more likely to be at a higher risk gradient of the sexual behaviour continuum [1].
It is important to note that RSB among young people variates with the sex [3]. On one hand, males are more probable to engage in multiple sexual partnerships [4] on the other hand, females are more likely to engage in early sexual debut [5]. RSB continues to significantly differ by the educational level of the individual as well as their wealth quintile [6]. Given the multiplicity of factors influencing RSB, it poses a threat to the achievement of the 90-90-90 agenda for HIV [7], particularly for sub-Saharan Africa (SSA).

Evidence shows that the global prevalence of HIV stands at 35 million with 71% of those infected living within SSA [8] and about 1.8 million being young people aged 10–19 [9]. This high prevalence of HIV within the SSA region can partly be attributed to the RSBs of young people within the region, which is reinforced by insufficient or lack of comprehensive knowledge about HIV [10]. In this context, comprehensive knowledge on HIV encapsulates the knowledge that consistent use of condoms during sexual intercourse and having just one uninfected faithful partner can reduce the chances of getting HIV/AIDS virus, knowing that a healthy-looking person can have the HIV/AIDS virus, and rejecting the two most common local misconceptions about HIV/AIDS transmission or prevention (thus, mosquito bites can give HIV and HIV can be gotten from witchcraft and supernatural means) [11–13]. The absence of such knowledge exacerbates and reinforces RSB among young people.

Despite the potential of comprehensive knowledge on HIV to explain RSBs among young people in SSA, there is a paucity of empirical studies on the subject. Empirically, there haven't been studies that explored the role of comprehensive knowledge on HIV in explaining RSBs among young people in SSA, thereby presenting a significant gap in the literature for which the study seeks to fill. The present study draws on an analysis of DHS data of 28 countries within the sub-region to explore comprehensive knowledge on HIV and RSB among young people. The findings of this study can inform appropriate, research-based policies that will facilitate targeted messages and interventions for the various categories of young people in SSA with relevant information on comprehensive knowledge of HIV/AIDS.

**Methods**

**Data source**

Data for this study were obtained from the current Demographic and Health Surveys (DHS) conducted between January 1, 2010, and December 31, 2018, in 28 SSA countries. These countries were chosen because they had complete information on the variables of interest for both young males and females. DHS is a nationwide survey that is carried out across low and middle-income countries every five-years [14]. The survey is representative of each of these countries and focuses on key health indicators. For this study, women’s files (IR) and males (MR) files were used, and these files contain the responses of women aged 15–49 and men aged 15–59 respectively. Details of the sampling approach have been described in previous studies [14, 15]. In this study, the sample size consisted of young women (22,350) and young men (16,810) aged 15–24 who had complete information on all the variables of interest and had ever had sexual intercourse. We relied on the Strengthening the Reporting of Observational Studies in Epidemiology’ (STROBE) statement in conducting this study and writing the manuscript.
Variables

Outcome variable

The outcome variable employed for this study was risky sexual behaviour. This was derived from ‘the number of other sexual partners’ and ‘condom used during last sex with the most recent partner’ [16–18]. The number of other sexual partners’ variable was originally coded as 1 = “1 or more” and 0 = “0” and condom use during last sex with most recent partner variable was coded 1 = 1 “no” and 0 = 0 “yes”. These were recoded as 1 = “Risky” and 0 = “Not risky”. An index was created with all the “risky” and “not risky” answers with scores ranging from 0 to 2. The score 0 1 was labelled as “not risky” and 2 was labelled as “risky”. A dummy variable was generated with ’0 and 1’ score being young people who either used a condom during last sex with a most recent partner and had zero other sexual partner and ‘2’ young people who had 1 or more other sexual partners and did not use a condom during their last sex with a most recent partner [17].

Independent variable

The independent variable used was comprehensive HIV and AIDS knowledge. It was defined as knowing that consistent use of condoms during sexual intercourse and having just one uninfected faithful partner can reduce the chance of getting AIDS virus; knowing that a healthy-looking person can have the AIDS virus; and rejecting the two most common misconceptions about AIDS transmission or prevention (thus, mosquito bites can give HIV and HIV can be gotten from witchcraft and supernatural means) [11–13]. Young people who knew that consistent use of condoms during sexual intercourse and having just one uninfected faithful partner can reduce the chance of getting AIDS virus, those who knew that a healthy-looking person can have the AIDS virus and those who rejected the two most common misconceptions about AIDS transmission or prevention were considered as having comprehensive HIV/AIDS knowledge and were given the code “1 = Yes”. Those who did not know that consistent use of condoms during sexual intercourse and having just one uninfected faithful partner can reduce the chance of getting AIDS virus, a healthy-looking person can have the AIDS virus and did not reject the two most common misconceptions about AIDS transmission or prevention were considered as not having comprehensive HIV/AIDS knowledge and were given the code “0 = No”.

Control variables

Apart from the main predictor variable (Comprehensive HIV and AIDS knowledge), eight control variables were considered in our study essentially due to their statistically significant relationship with RSB in erstwhile studies [16–18]. These variables were age (15–19, 20–24), wealth index (poorest, poor, middle, richer, richest), educational level (no education, primary, secondary, higher), place of residence (rural, urban), and mass media exposure (Television, Newspaper, and Radio) [not at all, less than once a week, at least once a week, almost once a week] (see Table 1).
Statistical analyses

Both descriptive and inferential analyses were conducted. The descriptive analysis involving the use of frequencies and percentages were used to describe the sample and also to portray the prevalence of risky sexual behaviour for each of the countries and the overall prevalence for all the countries for both males and females. Afterwards, a binary logistic regression model was used to assess the factors associated with RSB. Three models were fitted for both males and females. The model I contained comprehensive HIV and AIDS knowledge and its association with RSB. The second model controlled for the covariates and the final model was the complete model that controlled for the survey country. The results from the regression analysis were reported as odds ratios (ORs) and adjusted odds ratios (AORs) with their corresponding 95% confidence intervals (CIs). Statistical significance was pegged at $p < 0.05$. The choice of the reference categories was informed by previous studies and a priori. To check for correlation among the explanatory variables, a test for multicollinearity was done using the variance inflation factor (VIF) and the results showed no evidence of high collinearity among the explanatory variables for both males (mean VIF = 2.37) and females (mean VIF = 2.23). Sample weight ($v005/1,000,000$) was applied to correct for over and under-sampling while the SVY command was used to account for the complex survey design and generalizability of the findings. We conducted a different analysis for the sexes because the DHS data barely permits for amalgamation of the males and females recode files— the unique identification codes for merging male and female data files can conflict which can lead to loss of data [19]. All analyses were done with STATA version 14.2.

Ethical Approval

Ethical permissions are not required for this study since we used DHS datasets already publicly available. Institutions that commissioned, funded, or managed the surveys were responsible for ethical procedures. ICF international as well as an Institutional Review Board (IRB) in the respective country approved all the DHS surveys to ensure that the protocols comply with the U.S. Department of Health and Human Services regulations for the protection of human subjects. Data is available on https://dhsprogram.com/data/available-datasets.cfm.

Results

Background characteristics of respondents

Table 1 shows the background characteristics of young people. It was found that 57.3% and 44% of females and males respectively who were aged 15-19 engaged in risky sexual behaviours. With the place of residence, the majority of the young people were in urban areas (52.7% females, 59.4% males) were engaged in risky sexual behaviours. A greater proportion of the young people who had secondary education (58.6% females, 56.1% males) were engaged in risky sexual behaviours. The results further revealed that 28.7% and 23.4% of young women and young men respectively within the richest wealth
quintile were engaged in risky sexual behaviours. In terms of exposure to mass media, 45.0% of young women and 42.4% of young men do not watch television at all were engaged in risky sexual behaviours. Similarly, 64.2% and 68.9% of young women and men respectively who do not read newspapers engaged in risky sexual behaviours. Finally, 56.6% of young women and 49.7% of young men who do not have comprehensive HIV and AIDS knowledge engaged in risky sexual behaviours (see Table 1).
| Variable                  | Females |                      | Males |                      |
|--------------------------|---------|----------------------|-------|----------------------|
|                          | Frequency | Proportion of risky sexual behaviour | Frequency | Proportion of risky sexual behaviour |
|                          | N = 22,350 |                       | N = 16,810 |                       |
| Age                      |          |                      |       |                      |
| 15–19                    | 11,065   | 52.1                 | 7,108 | 46.2                 |
| 20–24                    | 11,235   | 47.9                 | 9,702 | 53.8                 |
| Place of residence       |          |                      |       |                      |
| Urban                    | 12,462   | 52.7                 | 8,488 | 59.4                 |
| Rural                    | 9,888    | 47.3                 | 8,322 | 40.6                 |
| Level of education       |          |                      |       |                      |
| No education             | 1,386    | 7.9                  | 781   | 7.9                  |
| Primary                  | 5,554    | 27.0                 | 4,305 | 30.7                 |
| Secondary                | 13,463   | 58.6                 | 10,286| 56.1                 |
| Higher                   | 1,947    | 6.5                  | 1,438 | 5.3                  |
| Wealth status            |          |                      |       |                      |
| Poorest                  | 2,433    | 12.1                 | 1,877 | 15.5                 |
| Poorer                   | 3,182    | 15.7                 | 2,554 | 17.6                 |
| Middle                   | 4,085    | 19.7                 | 3,248 | 20.9                 |
| Richer                   | 5,381    | 23.8                 | 3,996 | 22.6                 |
| Richest                  | 7,269    | 28.7                 | 5,135 | 23.4                 |
| Frequency of watching television |         |                      |       |                      |
| Not at all               | 9,040    | 45.0                 | 5,236 | 42.4                 |
| Less than once a week    | 3,616    | 16.9                 | 3,360 | 19.0                 |
| At least once a week     | 7,441    | 30.9                 | 6,874 | 34.0                 |
| Almost once a week       | 2,253    | 7.2                  | 1,340 | 4.6                  |
| Frequency of reading newspaper or magazine |         |                      |       |                      |
## Variable

| Variable                      | Females | Males |
|------------------------------|---------|-------|
| Not at all                   | 13,878  | 9,341 |
| Less than once a week        | 4,323   | 3,722 |
| At least once a week         | 3,873   | 3,607 |
| Almost once a week           | 276     | 140   |
| **Frequency of listening to radio** |         |       |
| Not at all                   | 7,070   | 3,474 |
| Less than once a week        | 5,262   | 3,449 |
| At least once a week         | 9,303   | 9,291 |
| Almost once a week           | 715     | 596   |
| **Comprehensive knowledge of HIV and AIDS** |         |       |
| No                           | 11,796  | 8,495 |
| Yes                          | 10,554  | 8,315 |

### Prevalence of RSB among young men and women in SSA

In Fig. 1, the prevalence of RSB among young men and women in SSA is presented. It was found that 54.4% of young women and 40.0% of young men were engaged in RSB. This ranged from 16.1% in Lesotho to 91.6% in Sierra Leone among young women. With young men, it ranged from 17.1% in Namibia to 80.5% in Sierra Leone (see Fig. 1).

### Logistic regression analysis results on RSB among young men and women in SSA

Table 2 shows the logistic regression analysis results on RSB among young women in SSA. It was found that young women from Sierra Leone [AOR=5.66, CI=4.41–7.27], Mali [AOR=1.99, CI=1.42 – 2.79] and Liberia [AOR=1.40, CI=1.11 – 1.77] had higher odds of engaging in RSB while young women from Lesotho [AOR=0.10, CI=0.07 – 0.13] had the lowest odds of engaging in RSB compared with those from Benin. The study also showed that young women who have comprehensive HIV and AIDS knowledge [AOR=0.92, CI=0.87–0.98] had lower odds of engaging in RSB compared to those who do not have comprehensive HIV and AIDS knowledge. It was also found that young women in the richest [AOR=0.74, CI=0.65 – 0.84], and richer [ AOR=0.88, CI=0.79 – 0.99] wealth quintile, those with a higher level of
education [AOR=0.74, CI=0.62–0.88], those who listen to radio at least once a week [AOR=0.88, CI=0.82–0.96], less than once a week [AOR=0.88, CI=0.82–0.96] and those who watch television less than once a week [AOR=0.74, CI=0.65–0.84] and at least once a week [AOR=0.74, CI=0.65–0.84] had lower odds of engaging in RSB compared to those in the poorest wealth quintile, those with no formal education and those who do not listen to radio nor watch television at all respectively.

Table 3 shows the logistic regression analysis results on RSB among young males in SSA. It was found that young men in Sierra Leone [AOR=2.53, CI=1.98–3.23] and Congo DR [AOR=1.45, CI=1.16–1.82] had higher odds of engaging in RSB compared with those from Benin, with those from Lesotho having lower odds [AOR=0.09, CI=0.07–0.12]. We also found that young men who have comprehensive HIV and AIDS knowledge had lower odds [AOR=0.78, CI=0.73–0.84] of engaging in RSB compared to those who do not have comprehensive HIV and AIDS knowledge. It was also found that young men aged 20-24 [AOR=0.86, CI=0.80–0.92], those in the richest [AOR=0.51, CI=0.44–0.59] and richer wealth quintile [AOR=0.69, CI=0.61–0.78], those with primary [AOR=0.83, CI=0.70–0.99], secondary [AOR=0.57, CI=0.48–0.69], and a higher level of education [AOR=0.44, CI=0.35–0.55], those who listen to radio at almost once a week [AOR=0.62, CI=0.36–1.06], those who read the newspaper almost once a week [AOR=0.78, CI=0.61–0.99] and those who watch television at least once a week [AOR=0.74, CI=0.67–0.82] had lower odds of engaging in RSB compared to those aged 14-19, those with no formal education, those in the poorest wealth quintile, those who do not listen to radio, read newspaper nor watch television at all respectively. Nonetheless, young men in rural areas [AOR=1.25, CI=1.14–1.37] had higher odds of engaging in RSB compared with those in urban areas.
| Variable                                      | Model 1                   | Model 2                   | Model 3                   |
|-----------------------------------------------|---------------------------|---------------------------|---------------------------|
|                                               | OR[95%CI]                 | AOR[95%CI]                | AOR[95%CI]                |
| **Comprehensive knowledge of HIV and AIDS**   |                           |                           |                           |
| No                                            | Ref                       | Ref                       | Ref                       |
| Yes                                           | 0.73*** (0.69–0.77)       | 0.79*** (0.75–0.84)       | 0.92** (0.87–0.98)        |
| Age                                           |                           |                           |                           |
| 15–19                                         | Ref                       | Ref                       | Ref                       |
| 20–24                                         | 0.86*** (0.82–0.92)       | 0.98 (0.92–1.04)          |                           |
| **Place of residence**                        |                           |                           |                           |
| Urban                                         | Ref                       | Ref                       | Ref                       |
| Rural                                         | 0.89** (0.83–0.95)        | 1.13** (1.05–1.21)        |                           |
| **Level of education**                        |                           |                           |                           |
| No education                                  | Ref                       | Ref                       | Ref                       |
| Primary                                       | 0.67*** (0.60–0.77)       | 1.17* (1.02–1.34)         |                           |
| Secondary                                     | 0.74*** (0.66–0.84)       | 0.91 (0.79–1.04)          |                           |
| Higher                                        | 0.62*** (0.53–0.73)       | 0.74** (0.62–0.88)        |                           |
| **Wealth status**                             |                           |                           |                           |
| Poorest                                       | Ref                       | Ref                       | Ref                       |
| Poorer                                        | 0.96 (0.87–1.06)          | 0.96 (0.86–1.07)          |                           |
| Middle                                        | 0.97 (0.88–1.07)          | 0.95 (0.85–1.06)          |                           |
| Richer                                        | 0.91 (0.82–1.01)          | 0.88* (0.79–0.99)         |                           |
| Richest                                       | 0.72*** (0.65–0.81)       | 0.74*** (0.65–0.84)       |                           |
| **Frequency of watching television**          |                           |                           |                           |
| Not at all                                    | Ref                       | Ref                       | Ref                       |
| Less than once a week                         | 0.91* (0.84–0.99)         | 0.99 (0.90–1.08)          |                           |
| At least once a week                          | 0.80*** (0.74–0.86)       | 0.86** (0.79–0.94)        |                           |

*p < 0.05  **p < 0.01  ***p < 0.001, Ref = Reference Category

OR = Odds Ratio, AOR = Adjusted Odds Ratios
| Variable                                      | Model 1 | Model 2 | Model 3 |
|----------------------------------------------|---------|---------|---------|
|                                              | OR[95%CI] | AOR[95%CI] | AOR[95%CI] |
| Almost once a week                           | 0.45*** (0.40–0.51) | 0.74*** (0.65–0.84) |       |
| **Frequency of reading newspaper or magazine** |         |         |         |
| Not at all                                   | Ref     | Ref     |         |
| Less than once a week                        | 0.67*** (0.62–0.72) | 0.88** (0.82–0.96) |       |
| At least once a week                         | 0.66*** (0.61–0.72) | 0.83*** (0.75–0.90) |       |
| Almost once a week                           | 0.67** (0.50–0.90) | 0.86 (0.64–1.15) |       |
| **Frequency of listening to radio**          |         |         |         |
| Not at all                                   | Ref     | Ref     |         |
| Less than once a week                        | 1.16*** (1.08–1.26) | 0.94 (0.86–1.02) |       |
| At least once a week                         | 1.08* (1.01–1.15) | 0.95 (0.88–1.03) |       |
| Almost once a week                           | 0.95 (0.79–1.14) | 0.92 (0.77–1.11) |       |
| **Survey country**                           |         |         |         |
| Benin                                        | Ref     |         |         |
| Burundi                                      | 0.35*** (0.26–0.45) |         |       |
| Cameroon                                     | 0.32*** (0.25–0.42) |         |       |
| Chad                                         | 0.35*** (0.22–0.57) |         |       |
| Comoros                                      | 0.58* (0.35–0.96) |         |       |
| Congo                                        | 0.57 *** (0.45–0.71) |         |       |
| Congo DR                                     | 0.98 (0.79–1.22) |         |       |
| Cote d’voire                                 | 0.52*** (0.42–0.65) |         |       |
| Ethiopia                                     | 0.38*** (0.28–0.51) |         |       |
| Gabon                                        | 0.32*** (0.25–0.42) |         |       |
| Ghana                                        | 1.25 (0.98–1.60) |         |       |
| Gambia                                       | 0.58** (0.39–0.87) |         |       |
| Guinea                                       | 0.98 (0.75–1.30) |         |       |

*p < 0.05 **p < 0.01 ***p < 0.001, Ref = Reference Category

OR = Odds Ratio, AOR = Adjusted Odds Ratios
| Variable    | Model 1 OR[95%CI] | Model 2 AOR[95%CI] | Model 3 AOR[95%CI] |
|------------|------------------|-------------------|-------------------|
| Kenya      | 0.31*** (0.25–0.40) |                   |                   |
| Lesotho    | 0.10*** (0.07–0.13) |                   |                   |
| Liberia    | 1.40** (1.11–1.77)  |                   |                   |
| Malawi     | 0.20*** (0.16–0.24) |                   |                   |
| Mali       | 1.99*** (1.42–2.79) |                   |                   |
| Mozambique | 0.41*** (0.33–0.51) |                   |                   |
| Namibia    | 0.23*** (0.19–0.29) |                   |                   |
| Niger      | 0.15*** (0.08–0.31) |                   |                   |
| Nigeria    | 0.68*** (0.55–0.84) |                   |                   |
| Rwanda     | 0.26*** (0.20–0.33) |                   |                   |
| Sierra Leone | 5.66*** (4.41–7.27) |                   |                   |
| Senegal    | 0.33*** (0.22–0.58) |                   |                   |
| Togo       | 0.42*** (0.33–0.54) |                   |                   |
| Uganda     | 0.40*** (0.32–0.50) |                   |                   |
| Zimbabwe   | 0.42*** (0.33–0.54) |                   |                   |

*p < 0.05 **p < 0.01 ***p < 0.001, Ref = Reference Category

OR = Odds Ratio, AOR = Adjusted Odds Ratios
Table 3
Logistic regression analysis results on Risky sexual behaviour among young males in SSA

| Variable                          | Model 1 OR[95%CI] | Model 2 AOR[95%CI] | Model 3 AOR[95%CI] |
|----------------------------------|-------------------|--------------------|--------------------|
| **Comprehensive knowledge of HIV and AIDS** |                   |                    |                    |
| No                               | Ref               | Ref                | Ref                |
| Yes                              | 0.58*** (0.54–0.61) | 0.66*** (0.61–0.71) | 0.78*** (0.73–0.84) |
| **Age**                          |                   |                    |                    |
| 15–19                            | Ref               | Ref                | Ref                |
| 20–24                            | 0.84*** (0.78–0.89) | 0.86*** (0.80–0.92) |                    |
| **Place of residence**           |                   |                    |                    |
| Urban                            | Ref               | Ref                | Ref                |
| Rural                            | 1.01 (0.93–1.10)  | 1.25*** (1.14–1.37) |                    |
| **Level of education**           |                   |                    |                    |
| No education                     | Ref               | Ref                | Ref                |
| Primary                          | 0.50*** (0.42–0.59) | 0.83* (0.70–0.99)  |                    |
| Secondary                        | 0.51*** (0.43–0.60) | 0.57*** (0.48–0.69) |                    |
| Higher                           | 0.36*** (0.29–0.45) | 0.44*** (0.35–0.55) |                    |
| **Wealth status**                |                   |                    |                    |
| Poorest                          | Ref               | Ref                | Ref                |
| Poorer                           | 0.84** (0.75–0.95) | 0.85** (0.76–0.96) |                    |
| Middle                           | 0.76*** (0.68–0.85) | 0.74*** (0.66–0.84) |                    |
| Richer                           | 0.74*** (0.66–0.83) | 0.69*** (0.61–0.78) |                    |
| Richest                          | 0.62*** (0.55–0.71) | 0.51*** (0.44–0.59) |                    |
| **Frequency of watching television** |                   |                    |                    |
| Not at all                       | Ref               | Ref                | Ref                |
| Less than once a week            | 0.62*** (0.57–0.69) | 0.78*** (0.71–0.87) |                    |
| At least once a week             | 0.55*** (0.51–0.61) | 0.74*** (0.67–0.82) |                    |

*p < 0.05 **p < 0.01 ***p < 0.001, Ref = Reference Category, OR = Odds Ratio, AOR = Adjusted Odds Ratios
| Variable                                      | Model 1 OR[95%CI] | Model 2 AOR[95%CI] | Model 3 AOR[95%CI] |
|----------------------------------------------|-------------------|--------------------|--------------------|
| Almost once a week                           | 0.35*** (0.30–0.42) | 0.78* (0.61–0.99)  |
| **Frequency of reading newspaper or magazine**|                   |                    |                    |
| Not at all                                   | Ref               | Ref                |                    |
| Less than once a week                        | 0.73*** (0.67–0.80) | 0.85** (0.77–0.95) |
| At least once a week                         | 0.82*** (0.75–0.90) | 0.91 (0.82–1.00)   |
| Almost once a week                           | 0.55* (0.32–0.94)  | 0.78* (0.61–0.99)  |
| **Frequency of listening to radio**          |                   |                    |                    |
| Not at all                                   | Ref               | Ref                |                    |
| Less than once a week                        | 0.88** (0.79–0.97) | 0.79*** (0.72–0.87) |
| At least once a week                         | 0.95 (0.87–1.04)  | 0.81*** (0.73–0.90) |
| Almost once a week                           | 0.73** (0.58–0.91) | 0.62 (0.36–1.06)   |
| **Survey country**                           |                   |                    |                    |
| Benin                                        | Ref               |                    |                    |
| Burundi                                      | 0.34*** (0.24–0.48) |                    |                    |
| Cameroon                                     | 0.27*** (0.21–0.35) |                    |                    |
| Chad                                         | 0.81 (0.59–1.13)  |                    |                    |
| Comoros                                      | 0.38*** (0.27–0.53) |                    |                    |
| Congo                                        | 0.41*** (0.33–0.51) |                    |                    |
| Congo DR                                     | 1.45** (1.16–1.82) |                    |                    |
| Cote d’voire                                 | 0.29** (0.23–0.37) |                    |                    |
| Ethiopia                                     | 0.40*** (0.31–0.52) |                    |                    |
| Gabon                                        | 0.21*** (0.16–0.28) |                    |                    |
| Ghana                                        | 0.75* (0.57–0.98)  |                    |                    |
| Gambia                                       | 0.46*** (0.34–0.63) |                    |                    |
| Guinea                                       | 0.47*** (0.35–0.62) |                    |                    |

*p < 0.05 **p < 0.01 ***p < 0.001, Ref = Reference Category, OR = Odds Ratio, AOR = Adjusted Odds Ratios
| Variable      | Model 1 OR[95%CI] | Model 2 AOR[95%CI] | Model 3 AOR[95%CI] |
|--------------|------------------|-------------------|-------------------|
| Kenya        | 0.17*** (0.14–0.21) |                   |                   |
| Lesotho      | 0.09*** (0.07–0.12) |                   |                   |
| Liberia      | 0.72** (0.56–0.92)  |                   |                   |
| Malawi       | 0.14*** (0.11–0.17) |                   |                   |
| Mali         | 0.80 (0.59–1.09)    |                   |                   |
| Mozambique   | 0.53*** (0.42–0.67) |                   |                   |
| Namibia      | 0.11*** (0.09–0.15) |                   |                   |
| Niger        | 0.36** (0.19–0.66)  |                   |                   |
| Nigeria      | 0.38*** (0.29–0.48) |                   |                   |
| Rwanda       | 0.21*** (0.15–0.30) |                   |                   |
| Sierra Leone | 2.53*** (1.98–3.23) |                   |                   |
| Senegal      | 0.21*** (0.14–0.31) |                   |                   |
| Togo         | 0.25*** (0.19–0.33) |                   |                   |
| Uganda       | 0.35*** (0.27–0.44) |                   |                   |
| Zimbabwe     | 0.13*** (0.10–0.16) |                   |                   |

*p < 0.05 **p < 0.01 ***p < 0.001, Ref = Reference Category, OR = Odds Ratio, AOR = Adjusted Odds Ratios

**Discussion**

This present study explored the relationship between comprehensive knowledge on HIV/AIDS and RSB among young people in SSA. We found that a higher proportion of young people do not have comprehensive knowledge of HIV/AIDS. Similarly, [13] and [20] also found that comprehensive knowledge of HIV/AIDS was low among young people. We also observed a gender differential in the proportion of comprehensive knowledge on HIV/AIDS. Specifically, a higher proportion of young males appeared to have comprehensive knowledge of HIV/AIDS than their female counterparts. This corroborates the findings of [13] who also observed that female youth are less likely to have comprehensive knowledge of HIV than their male counterparts.

We also realized that young people with comprehensive knowledge of HIV/AIDS had a lower likelihood of engaging in RSB. This is consistent with previous studies [see 11, 21-26]. This could be attributed to the fact that comprehensive knowledge of HIV/AIDS equips young people with essential information in
decision making regarding their sexual behaviours. There is, therefore, a need for pragmatic steps to be taken for interventions targeted at young females to help increase their awareness and knowledge on HIV/AIDS.

Whereas 54 out of young 100 young females indulge in RSB, 40 out of 100 young males indulge in RSB. With a range of 17.1% (Lesotho) and 91.6% (Sierra Leone) among young women while that of young men was 16.1% (Namibia) and 80.5% (Sierra Leone) in SSA. This could be attributed to the fact that the proportion of males knowing about comprehensive HIV/AIDS is higher than that of their female counterparts [13]. This could also be attributed to the fact that the proportion of females with no formal education in the current study far outweighs that of their male counterparts. Education has been shown to be a key factor in a comprehensive knowledge of HIV/AIDS [11]. This finding, however, contradicts that of [27] who argued that male youth indulge more in RSB than female youth. Nonetheless, the high prevalence of RSB recorded could be as a result of societal norms in various SSA countries which encourages RSB. For instance, in Kenya and Ghana, having multiple sexual partners is accepted especially among men [17].

Young women from Sierra Leone, Mali and Liberia were more likely to engage in RSB than their counterparts from Lesotho and Benin. This could be attributed to early initiation of sex among females in some parts of Africa like Sierra Leone, Mali and Liberia due to early marriages or possibly due to females having older sexual partners [28]. This results in a shift in the power dynamic in a sexual relationship and as such young women being unable to negotiate for safe sex. This corroborates the argument of [29] that women are the most vulnerable group to not using condoms due to forced sex/sexual violence or resistance of their sex partner. Similarly, young men from Sierra Leone and Congo are more likely to indulge in RSB as compared to their counterparts from Lesotho and Benin. A possible explanation is a higher level of curiosity to indulge in sex among males from Sierra Leone and Congo. It could also be a result of having multiple sexual partners as opined by [17].

We realized that a high proportion of young people aged 15-19 years indulge in RSB as compared to those aged 20-24 years. We also observed that RSB was highest among young people with no formal education (69% females, 64.4% males). However, the proportion of young people that engaged in RSB decreases as the level of education goes higher. This finding could be attributed to the fact that as the level of education of an individual increase, one is expected to have a higher exposure to comprehensive sexual education, hence less engagement in RSB [11,25].

With regards to the place of residence, most of the young people who engaged in RSB were in rural areas (58.2 % females, 46.6% males) as compared to their counterparts living in the urban areas (51.5% females, 33.5% males). This was also confirmed by our regression analysis. Similar results were found in studies conducted by [22, 23] who explained that urban residents were more likely to have higher comprehensive knowledge of HIV/AIDS compared to those living in rural areas and as such, engages less in risky sexual behaviours. One reason for the rural-urban variation in RSB could be that, in urban areas,
there is a higher level of formal education compared to rural areas which often translates to a good occupation, income and access to information such as the importance of using a condom [11, 12, 28].

Our study also found that young women in the richest and Richer wealth quintile, those with a higher level of education were less likely of engaging in RSB compared to their counterparts in the poorest wealth quintile and those with no formal education. Similarly, young men aged 20-24, those with primary, secondary, and a higher level of education, those in the richest and richer wealth quintile were less likely to indulge in RSB as compared to their counterparts who are aged 14-19, those with no formal education, and those in the poorest wealth quintile. With regards to wealth, our finding is rather contradictory to what was found in studies conducted by [30, 31, 32]. However, our findings on education affirm that of [11] who argued that comprehensive HIV/AIDS knowledge has a significant relationship with an increasing level of education. Our findings on education also coincide with studies done in Botswana [33], Ethiopia [11], and Ghana [34].

Young people who listened to radio at least once a week, less than once a week and those who watch television less than once a week, and at least once a week had a lower likelihood of engaging in RSB as compared to their counterparts who do not listen to radio nor watch television at all. This affirms the findings of [24] and [26] who are of the view that young women who listen to radio or watch television are more likely to have information on HIV/AIDS than those who do not.

**Strength and limitations**

The strength of our findings is rooted in the sample size of 22,350 females and 16,810 males yielding comparable samples across 28 countries. Nonetheless, there are several limitations to this research worth noting. DHS data are based on self-report and the survey methodology did not allow for the measurement of actual behaviour. Thus, given the possibility of social desirability bias, these data may not be entirely accurate representations of risky sexual behaviour.

**Conclusion**

The study showed a low level of comprehensive knowledge on HIV/AIDS in SSA and a gap in the proportion of young males and females regarding comprehensive knowledge on HIV/AIDS. This reflected in a higher proportion of young females indulging in RSB as compared to young males. Our findings also revealed that comprehensive knowledge of HIV/AIDS influences the risky sexual behaviour of young people. On average 54.4% of young women and 40.0% of young men were engaged in RSB. Age, level of education, place of residence, wealth status, listening to radio, watching television, and frequency of reading newspaper or magazine shown to have a significant relationship with RSB. Specifically, young people aged 15-19 years, those with no formal education, residing in rural areas, poorest wealth quintiles and those who do not listen to radio nor watch television at all. These findings infer there is a need for targeted messages and interventions for the various categories of young people in SSA with relevant information on comprehensive knowledge of HIV/AIDS.
**Abbreviations**

AOR: Adjusted odd ratio.

DHS: Demographic and Health Survey

Ref: Reference category

RSB: Risky Sexual Behaviour

SSA: sub-Saharan Africa

**Declarations**

**Ethics approval and consent to participate**

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Consent for publication**

Not applicable.

**Availability of data and materials**

All datasets are available online after submitting a concept note to [www.dhsprogram.com.data/available-dataset.cfm](http://www.dhsprogram.com.data/available-dataset.cfm)

**Competing interest**

The authors declare that they have no competing interests.

**Funding**

This study received no funding.

**Authors contribution**

KSD conceived the study, had full access to the data and performed the initial analysis. AAS interpreted the data and review the methods. JO, FC, KSA, MA, AWAB drafted the first draft of the manuscript. BOA, KSD, AAS and KSA reviewed and drafted the second draft of the manuscript. All authors reviewed the manuscript for intellectual content and agreed and approved the final manuscript.

**Acknowledgements**
We acknowledge Measure DHS for providing us with the data upon which the findings of this study were based.

References

1. Ajayi AI, Okeke SR. Protective sexual behaviours among young adults in Nigeria: influence of family support and living with both parents. *BMC public health*, 2019;19(1), 983.

2. Tadesse G, Yakob B. Risky sexual behaviors among female youth in Tiss Abay, a semi-urban area of the Amhara Region, Ethiopia. *PLoS One*, 2015; 10(3), e0119050

3. Odimegwu C, Somefun OD, Chisumpa VH. Regional differences in positive sexual behaviour among youth in sub-Saharan Africa. *Journal of biosocial science*, 2019;51(2), 254-272.

4. Doyle AM, Mavedzenge SN, Plummer ML, Ross DA. The sexual behaviour of adolescents in sub-Saharan Africa: patterns and trends from national surveys. *Tropical Medicine & International Health*, 2012;17(7), 796-807.

5. Amo-Adjei J, Tuoyire DA. Timing of sexual debut among unmarried youths aged 15-24 years in Sub-Saharan Africa. *Journal of biosocial science*, 2018;50(2), 161.

6. Maonga BB, Gondwe TS, Machira, K. Determinants of risky sexual behavior among the youth in Malawi. ICF. 2018

7. UNAIDS data 2017. *Programme on HIV/AIDS*. 2017; 1-248.

8. UNICEF. Global and regional trends - UNICEF DATA. 2019. Retrieved from https://data.unicef.org/topic/hivaids/global-regional-trends/

9. United Nations Children's Fund. For Every Child, End AIDS. In: Seventh stocktaking report. New York: The United Nations Children's Fund. p. 2016. https://data.unicef.org/wp-content/uploads/2016/12/HIV-and-AIDS-2016- Seventh-Stocktaking-Report.pdf.

10. Dimbuene ZT, Defo BK. Fostering accurate HIV/AIDS knowledge among unmarried youths in Cameroon: Do family environment and peers matter? BMC Public Health.2011; 11: 348.

11. Minet TH, Eyasu HT, Simon AG, Afewerki WT, Henok KA, Russom, T. Associates of Comprehensive HIV/AIDS Knowledge and Acceptance Attitude among Male Youth Aged 15-24: Comparison Study among Ivory Coast, Cameroon, and Gabon. *J AIDS Clin Res*, 2016; 7(618), 2.

12. Ochako R, Ulwodi, D, Njagi P, Kimetu S, Onyango A. Trends and determinants of Comprehensive HIV and AIDS knowledge among urban young women in Kenya. *AIDS research and therapy*, 2011;8(1), 11.

13. Oginni AB, Adebajo SB, Ahonsi BA. Trends and determinants of comprehensive knowledge of HIV among adolescents and young adults in Nigeria: 2003-2013. *African journal of reproductive health*, 2017;21(1), 26-34.

14. Corsi DJ, Neuman M, Finlay JE, Subramanian SV. Demographic and health surveys: a profile. *International journal of epidemiology*, 2012; 41(6), 1602-1613.
15. Seidu AA, Darteh EKM, Kumi-Kyereme A, Dickson KS, Ahinkorah BO. Paid sex among men in sub-Saharan Africa: Analysis of the demographic and health survey. *SSM-population health*, 2019;100459.

16. Uchudi J, Magadi M, Mostazir M. A multilevel analysis of the determinants of high-risk sexual behaviour in sub-Saharan Africa. *Journal of Biosocial Science*, 2012; 44(3), 289–311.

17. Darteh EKM, Dickson KS, Amu H. Understanding the Socio-demographic Factors Surrounding Young Peoples’ Risky Sexual Behaviour in Ghana and Kenya. *Journal of Community Health*, 2020;45(1), 141-147.

18. Seidu AA, Ahinkorah BO, Ameyaw EK, Darteh EKM, Budu E, Iddrisu H, Nartey EB. Risky sexual behaviours among school-aged adolescents in Namibia: secondary Data analyses of the 2013 Global school-based health survey. *Journal of Public Health*, 2019; 1-11.

19. Amo-Adjei J, Darteh EK. Drivers of young people’s attitudes towards HIV/AIDS stigma and discrimination: evidence from Ghana. *African journal of reproductive health*, 2013;17(4), 51-59.

20. Badru T, Mwaisaka J, Khamofu H. et al., HIV comprehensive knowledge and prevalence among young adolescents in Nigeria: evidence from Akwa Ibom AIDS indicator survey, 2017. *BMC Public Health*, 2020; 20 (45). https://doi.org/10.1186/s12889-019-7890-y

21. Silas J, Jacobstein R, Curtis C, Spieler J, Radloff S, Wong, et al. Poverty and risky sexual behaviours: Evidence from Tanzania. *International Journal of Gynecology and Obstetrics*, 2013;121(1), S9–S15.

22. Mulu W, Bayeh A, Mulat Y. Knowledge, attitude and practices on HIV/AIDS among students of Bahir Dar University. *Science Journal of Public Health* 2014;2: 78-86.

23. Terán CC, Gorena UD, González BC, Alejos FB, Ramírez RO. Knowledge, attitudes and practices on HIV/AIDS and prevalence of HIV in the general population of Sucre, Bolivia. *The Brazilian journal of infectious diseases*, 2015; 19: 369-375.

24. Khan R, Bilal, A, Siddiqui SH. Knowledge about HIV and discriminatory attitudes toward people living with HIV in Pakistan: *DHS WORKING PAPERS*, No. 134. Rockville: ICF.2017

25. Adrienne ML, Wilson NL. Schooling, Wealth, Risky Sexual Behaviour, and HIV/AIDS in Sub-Saharan Africa. *The Journal of Development Studies*, 2019;55:10, 2177-2192, DOI: 10.1080/00220388.2018.1493195.

26. Sarosh I, Sidra M, Asma Z, Rubeena Z, Muhammad ZZ, Florian F. Determinants of overall knowledge of and attitudes towards HIV/AIDS transmission among ever-married women in Pakistan: evidence from the Demographic and Health Survey 2012–13. *BMC Public Health*.2019; https://doi.org/10.1186/s12889-019-7124-3.

27. Aichele SR, Borgerhoff MM, James S, Grimm K. Attitudinal and behavioral characteristics predict high risk sexual activity in rural Tanzanian youth. *PLoS One*, 2014; 9: e99987.

28. Aoife MD, Sue NM, Plummer ML, Ross DA. The sexual behaviour of adolescents in sub-Saharan Africa: patterns and trends from national surveys. *Tropical Medicine and International Health*.2012; doi:10.1111/j.1365-3156.2012.03005. x. 17(7) 796-807
29. Ha ND, Diep NN, Hoa QTN, Anh TN, Hiep DN, Thanh PB, Thao BTV, Khiet TL, Dung TN, Cuong TN, Linh GV, Giang TV, Bach XT, Carl AL, Roger CMH, Cyrus SHH. Patterns of Risky Sexual Behaviors and Associated Factors among Youths and Adolescents in Vietnam. *International Journal of Environmental Research and Public Health*. 2020; doi:10.3390/ijerph17061903.

30. Awusabo-Asare, K & Annim, S. K. (2008). “Wealth status and risky sexual behaviour in Ghana and Kenya.” *Applied Health Economics and Health Policy*, 2008; 6 (1) 27–39.

31. Kongnyuy EJ, Wiysonge CS, Mbu RE, Nana P, Kouam L. (2006). Wealth and sexual behaviour among men in Cameroon,” *BMC International Health and Human Rights*, 2006; 6(11).

32. Yifru B, Asres B. A Meta-Analysis of Risky Sexual Behaviour among Male Youth in Developing Countries. 2015; [https://doi.org/10.1155/2015/580961](https://doi.org/10.1155/2015/580961)

33. Majelantle RG, Keetile M, Bainame K, Nkawana P. Knowledge, opinions and attitudes towards HIV and AIDS among Youth in Botswana. *Journal of Global Economics*. 2014; 2(1) 1-7

34. Nketiah AE, Afful MG. A review of HIV/AIDS awareness and knowledge of preventive methods in Ghana. *African Journal of Reproductive Health*, 2013; 17: 69-82.

**Figures**
Figure 1

Prevalence of RSB among young people in SSA