Social Sciences & Humanities Open 7 (2023) 100475

Contents lists available at ScienceDirect

Social Sciences & Humanities Open

journal homepage: www.sciencedirect.com/journal/social-sciences-and-humanities-open

Regular Article

Education level, students' knowledge and attitude towards STIs in selected secondary schools in Kisoro municipality, Western Uganda

Sam Mutabazi, Josephine Esaete *, Edward Kansiime

Department of Science Technical and Vocational Education, Makerere University, Uganda

ARTICLE INFO

Keywords:
Adolescents
Beliefs
Health education
Sexual health
Understanding

ABSTRACT

Understanding sexually transmitted infections (STIs) is crucial for preventing their spread, especially among secondary school students who, as adolescents, are more vulnerable to STIs. However, the lack of information on secondary students' knowledge of STIs hampers development of health education programmes for secondary schools. The objective of this study was to establish the students' knowledge about STIs and HIV/AIDS, and their attitudes towards prevention of STIs. Data were collected using a cross-sectional survey design in which respondents filled out a structured questionnaire. The results demonstrate a knowledge gap among Ordinary- and Advanced-level students regarding the types, symptoms, causes, and prevention of STIs. The main conclusion is that education level partially explains the association between knowledge of types of STIs and HIV/AIDS, as well as attitude towards prevention. To reduce disparity in knowledge, continued sensitization of students about STIs and HIV/AIDS is recommended.

1. Introduction

Human health is one of the most important factors influencing economic development in any economy (Ratna, 2019, pp. 221–230). It has gained increased attention internationally in scientific and policy arenas. For a long time, health has been defined as "the absence of disease" and approached by focusing on the pathogenesis or mechanisms that cause diseases. In 1978, in the Alma-Ata Declaration, the World Health Organization (WHO) redefined the concept of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". This change in health concept illustrates the shift in focus from disease-causing factors to factors supporting human health and well-being (Lauwers et al., 2020). In this context, and only recently, little attention has been paid to the knowledge, perception, and attitudes of young people toward human health. One of the key areas in human health that affects adolescents of school-going age is sexually transmitted infections (STI).

Sexually transmitted infections (STIs) are spread through sexual contact. They include Syphilis, Gonorrhoea, Chlamydia, Hepatitis B, Herpes Simplex virus (HSV or herpes), Human Immunodeficiency Virus (HIV), Human Papillomavirus (HPV), as well as Trichomoniasis (Bae & Lee, 2022; Buder et al., 2019). The disease burden from STIs is enormous; nearly 374 million people suffer from them yearly (Fu et al., 2022; WHO, 2021). Although STIs are not lethal, they have debilitating effects. For instance, gonorrhoea, syphilis, and herpes are linked to increased chances of contracting HIV (Rowley et al., 2016; Mbita et al., 2022). At the same time, mother-to-child transmission of STIs can result in stillbirth, neonatal death, and premature birth, among others (Lakshminarayana et al., 2022; Wang et al., 2019). Human Papilloma Virus (HPV) infection causes cervical cancer; the fourth most common cancer among women globally (Bray et al., 2018), and most Hepatitis B victims die due to liver cirrhosis and hepatocellular carcinoma (GBD, 2019; Ling et al., 2021). On the other hand, gonorrhoea and Chlamydia cause pelvic inflammatory disease (PID) and infertility in women (Haggerty et al., 2020; Ravel et al., 2020). However, the prevalence of STIs and HIV/AIDS varies by age group, with adolescents being the most affected (Vallejo-Ortega et al., 2022), implying that increasing STI awareness among adolescents is critical in controlling its spread.

Education, in many respects, increases knowledge of STIs and HIV/AIDS and helps to mitigate the spread. It also prevents new infections because knowledgeable persons can make informed decisions about their sexual life. Higher levels of education (measured by years of schooling) account for better cognitive skills and comprehension of information that can help to mitigate the spread of STI and HIV/AIDS (Cho et al., 2011; Lövdén et al., 2020; USAID, 2010; Vandemoortele & Delamonica, 2000). According to UNESCO (2015) and de Neve et al.

* Corresponding author.
E-mail address: esaete@gmail.com (J. Esaete).

https://doi.org/10.1016/j.ssaho.2023.100475
Received 3 October 2022; Received in revised form 15 February 2023; Accepted 12 March 2023
Available online 21 March 2023

(2015), there is a correlation between the time spent in school and reduction in STI and HIV/AIDS infection. As students advance in their education, they become aware and knowledgeable about STIs and HIV/AIDS and are likely to adopt protective measures such as abstinence, use of condoms, testing, discussing the devastating effects of the diseases and thus reducing the infection rates.

Although education can help to reduce and prevent STIs and HIV/AIDS infections, some scholars have reported a negative relationship between level of education and HIV/AIDS spread, implying that a knowledgeable population is still vulnerable to infections (Iqbal et al., 2019; Khan et al., 2019). Other studies have reported a positive relationship between education and the spread of STIs and HIV/AIDS (Vandemoortele & Delamonica, 2000) suggesting that increase in the level of education increases the likelihood of STIs and HIV/AIDS infections. This view suggests that education level, acquisition of wealth and improved wellbeing make people engage in sex with multiple partners. Other studies have revealed that adolescents get involved in sex while still at school (Young et al., 2018; Behulu et al., 2019). The opposing findings, combined with the scarcity of studies, particularly on secondary school adolescents, imply that our understanding of the relationship between students' knowledge and attitudes toward STIs and HIV/AIDS is limited. Students' knowledge and attitudes towards STI and HIV/AIDS is critical in informing secondary school health education programmes because adolescents make up a substantial proportion of the global population affected by STIs and HIV/AIDS (Bekker & Hosek, 2015; UNICEF, 2021).

This study examined the influence of education level on students' knowledge and attitudes towards STIs and HIV/AIDS infections in selected secondary schools in Kisoro Municipality, Uganda. The overall objective was to gain a deeper understanding of student's knowledge of STIs in order to support and strengthen health promotion programmes in secondary schools and thus help to prevent the spread of STIs among adolescents. The specific objective was to establish students' knowledge and awareness about STIs and HIV/AIDS and their attitudes towards prevention of the disease.

The study has answered the following questions: What do secondary school students in Kisoro Municipality know about STIs and HIV/AIDS? How does students' knowledge influence their attitudes towards the diseases? What is the relationship between education level and attitudes towards the disease? The next section of this paper provides the theoretical background that underpins the study followed by an overview of the secondary school system in Uganda. Methods of data collection and analysis are then described and results presented. The paper ends with a discussion, conclusions and recommendations which include contribution to knowledge, implications for policy and future research.

2. Theoretical background

This paper is underpinned by Vygotsky's (1978) theory of constructivism, which states that knowledge acquisition occurs through social interactions involving new experiences and understanding incorporated into existing knowledge structures. According to the theory, interactions between students and more informed peers or adults translates into effective learning, which in the context of this paper, helps to prevent the spread of STI and HIV/AIDS. In a school setting, this implies that high school students at Advanced level would be more knowledgeable about STIs and HIV/AIDS than their peers in the lower classes. According to the Zone of Proximal Development (ZPD) principle, an individual learns more successfully when interacting with the more knowledgeable people. This principle presupposes that students in the lower classes would learn from those in the upper classes. In this paper, the lower classes are referred to as Ordinary (O) level while the upper classes are Advanced (A) level. The social context of learning, on the other hand, is dependent on an individual's developmental stage, implying that the same environment can have different effects on students' knowledge. In addition, students' behaviour when it comes to sharing STI and HIV/AIDS information, influences students' knowledge of STIs and HIV/AIDS.

However, students' attitudes and, ultimately, behaviour are influenced by their knowledge of STIs and HIV/AIDS (Kuete et al., 2016; Schrader & Lawless, 2004). This is related to the Theory of Planned Behaviour (TPB), which states that intention toward a specific behaviour is determined by three factors, one of which is attitude (Ajzen, 1985). Although the relationship between knowledge and attitude is complex, there is evidence that knowledge influences attitudes which in turn affects behaviour (Khamisa et al., 2020; Zhang & Chung, 2021). Similarly, attitude influences knowledge acquisition because what a person considers important attracts attention. As a result, knowledge of STIs and HIV/AIDS is associated with positive attitudes towards the disease whereas lack of understanding induces negative attitudes (Cui et al., 2021; Griffiths et al., 2010).

3. An overview of secondary school education in Uganda

Pre-primary or nursery education is the first stage of organized instruction in Uganda (The World Bank, 2012). The primary school system lasts seven years, during which children sit for the Primary Leaving Examinations (PLE), after which students enter secondary school education, which is divided into lower secondary education (Ordinary or 'O' level), at the end of which students sit a national examination to obtain the Uganda Certificate of Education (UCE). Students who pass the UCE continue on to two years of Advanced level secondary education ('A' level) and take a national examination, which results in the award of the Uganda Advanced Certificate of Education (UACE). Students who pass 'A' level examinations proceed to university or other institutions of higher learning. After any of the three levels (PLE, UCE and UACE), learners can opt for Technical and Vocational Education and Training (TVET) indicated by broken arrows in Fig. 1.

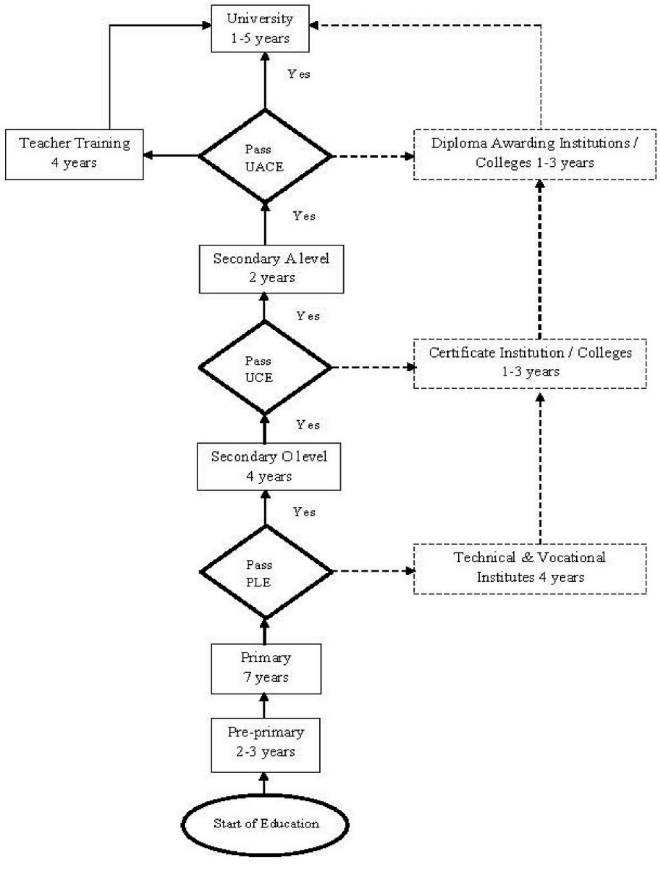

Fig. 1. Levels of the education system in Uganda. *Source: Authors.*

4. STIs and HIV/AIDS education

In Uganda, knowledge of STIs and HIV/AIDS among adolescents has been majorly through the Presidential Initiative on AIDS Strategy for Youth (PIASCY) that was launched in 2002. Under the PIASCY initiative, the headteacher or a designated member of staff speaks to the children about HIV/AIDS at every school assembly and the teachers are required to follow up the topical discussions in class and during co-curricular activities. PIASCY initiative promotes abstinence until marriage as a strategy for preventing HIV/AIDS infections and spread. However, the initiative has been criticized for putting emphasis on abstinence at the expense of strategies such as use of condoms and being faithful (Cohen, 2004; Okware et al., 2005).

Although PIASCY was expanded from primary to secondary schools, teachers, school nurses, matrons provided information on STIs and HIV/AIDS through guidance and counselling of the students (Kihumuro et al., 2021; Kimera et al., 2019) alongside peer learning, and broadcasts on television and radio (Boateng et al., 2022; Keto et al., 2020). Dissemination of STI and HIV/AIDS information varied in the schools because the messages were selectively delivered through weekly class meetings, during extra-curricular club meetings such as Youth Alive Uganda, the World Starts With Me, StraightTalk and the school general assembly (de Haas, 2017). In addition, sexual and reproductive health information was integrated into subjects such as Biology and Religious Education (de Haas et al., 2017).

5. Study area and methods

The study was carried out in selected secondary schools in Kisoro municipality (29° 41′ 3.59″ E and 1° 17′ 3.60″ S) in western Uganda. Kisoro district is bordered by the Democratic Republic of Congo (DRC) to the west, Kabale district to the east, Kanungu district to the north and Rwanda to the south. The district has 33 secondary schools with a student population of 10,337 (Kisoro District Education office records, 2022).

The study adopted a cross-sectional survey design in which a structured questionnaire was administered to the respondents. This design enabled concurrent data collection on all the variables hence making it possible to answer the research questions within the shortest possible time and with minimum resources (Spector, 1992). Based on the number of students, four out of nine secondary schools were purposively sampled. Kisoro Municipality Education records indicated that there were a total of 1015 students in Senior 3 (S3) and Senior 5 (S5) (Municipal DEOs office, 2017). Out of these, a sample of 278 students was selected following Krejcie and Morgan's (1970) sample size table. Due to the difference in the number of students per class, a proportionate sampling procedure was used to select the students in each school (Etikan & Bala, 2017).

6. Data collection procedures, quality control and ethical considerations

Data were collected using a closed-ended self-administered questionnaire (SAQ); (see Appendix 1) adapted from Folasayo et al. (2017). Section A gathered data on the demographic characteristics of the respondents while Section B gathered information on students' knowledge of STIs (types of STIs, causes, transmission routes, preventive symptoms and practices). Section C sought information on students' attitudes towards STIs and HIV/AIDS measured on a three-point Likert scale (Agree, Don't know, and Disagree).

To ascertain the validity and reliability of the data collection instrument in the social survey, a questionnaire was peer reviewed by experts for alignment of items to the objectives of the study and ambiguous questions re-phrased for clarity. Twenty copies of the questionnaire were pre-tested and the Cronbach's alpha coefficient of reliability of 0.85 was computed. A generally accepted rule is that an α of 0.6–0.7 indicates an acceptable level of reliability, and 0.8 or greater indicates a high coherence and internal consistency in the questions administered (Taber, 2018). Therefore, based on the Cronbach's alpha coefficient of reliability computed above, the questionnaire was deemed suitable for the purpose of the study. Prior to administering the questionnaire, permission was sought from the head teachers of the schools; in conformity with the ethical principle of informed consent. In addition, the purpose of the study was discussed with the students and only willing students participated in the study.

7. Data analysis

Responses from the questionnaire copies were coded and entered in SPSS version 23 to create a data file and later used for analysis. 'Yes' and 'No' responses for items 6, 13, 19, 41 and 44 were reverse coded (see Appendix 1). A chi-square test (Nihan, 2020; Sharpe, 2015)) was used to evaluate the association of knowledge and attitude of 'O' and 'A' level students, where sample sizes was small, Fishers test was used instead because it assesses the significance of a difference between the proportions of two groups (Bower, 2003). For all tests, $p < 0.05$ was considered statistically significant.

8. Results

Out of 278 students (183 'O' level and 95 'A' level) 139 were female (91 'O' level and 48 'A' level) and 139 male (92 'O' level and 47 'A' level) aged between 15 and 19 years. The majority of the students had some knowledge about Gonorrhoea ('O' = 95.1%, 'A' = 98.9%), Syphilis ('O' = 97.8, 'A' = 95.8%) and HIV ('O' = 91.3%, 'A' = 90.5%) as STIs. More than 50% of 'O' and 'A' level students did not know Chlamydia as an STI. The level of education was significantly associated with students' knowledge of Hepatitis B ($\chi2 = 10.0$; $p = 0.007$) and the 'O' level student were more knowledgeable (14.2%) than 'A' level students (3.2%) (Table 1a).

Although more than 80% of A and O level students knew that HIV/STI was transmitted through sexual intercourse, blood transfusion, sharing needles and from mother to child, 19.1% and 18.9% of 'O' and 'A' level students respectively stated that some types of STIs were transmitted through kissing. However, there was no significant association of level education and students' knowledge of STIs and HIV/AIDS spread (Table 1b).

'O' level students stated that the symptoms of STIs included pain while passing out urine (94.5%), swelling of sexual organs causing failure to urinate (84.2%), discharge from the penis and vagina (mentioned by 78.1% and 77.6% respectively). A similar trend was revealed by 'A' level students as follows: pain while passing out urine (92.6%), swelling of sexual organs causing failure to urinate (78.9%), discharge from the penis and vagina (mentioned by 73.7% and 72.6% respectively). There was a significant relationship in the way 'O' (52.2%) and 'A' level (32.3%) students linked ulcers in the sexual organs to symptoms of STIs ($\chi2 = 12.62$; $p = 0.002$). In addition, more (12.7%) 'O' level than 'A' level students claimed that people with STIs may not display symptoms. This was significantly associated with the level of education ($\chi2 = 7.45$; $p = 0.024$) (Table 1c).

Table 1d shows knowledge that use of condoms during sexual intercourse reduced chances of getting STIs ('O' level = 92.3%, 'A' level = 93.7%), having sex with multiple partners increased chances of being infected with STIs ('O' level = 87.4%, 'A' level = 94.7%), sexual abstinence was the most effective means of avoiding STIs ('O' = 89.1%; A = 92.6%). There was a significant association between level of education and percentage of 'A' level (21.1%) and 'O' level (37.7%) students' knowledge about use of contraceptive pills for reducing spread of STIs ($\chi2 = 19.7$; $p < 0.001$.

Although the percentages show that bacteria did not cause STIs, students in 'O' level (28.4%) were more likely to mention bacteria as a cause than students in 'A' level (18.9%) and the differences were

Table 1a
Students' knowledge of types of STIs.

Types of STIs		Level of Education						Chi-square/Fishers test	p
		Ordinary level		Advanced level		Total			
		n	%	n	%	n	%		
Gonorrhoea	No	2	1.1	1	1.1	3	1.1	3.849[b]	0.135
	Don't know	7	3.8	0	0.0	7	2.5		
	Yes	174	95.1	94	98.9	268	96.4		
Syphilis	No	2	1.1	3	3.2	5	1.8	1.752[b]	0.520
	Don't know	2	1.1	1	1.1	3	1.1		
	Yes	179	97.8	91	95.8	270	97.1		
Genital herpes	No	35	19.1	11	11.6	46	16.5		
	Don't know	81	44.3	44	46.3	125	45.0	2.701	0.260
	Yes	67	36.6	40	42.1	107	38.5		
Trichomoniasis	No	84	45.9	40	42.1	124	44.6		
	Don't know	91	49.7	52	54.7	143	51.4	0.740	0.691
	Yes	8	4.4	3	3.2	11	4.0		
Tuberculosis	No	138	75.4	75	78.9	213	76.6		
	Don't know	33	18.0	17	17.9	50	18.0	1.442	0.486
	Yes	12	6.6	3	3.2	15	5.4		
Asthma is not STI	No	14	7.7	8	8.4	22	7.9		
	Don't know	39	21.3	15	15.8	54	19.4	1.223	0.543
	Yes	130	71.0	72	75.8	202	72.7		
HIV/AIDS	No	7	3.8	7	7.4	14	5.0		
	Don't know	9	4.9	2	2.1	11	4.0	2.684	0.274
	Yes	167	91.3	86	90.5	253	91.0		
Chlamydia	No	69	37.7	32	33.7	101	36.3		
	Don't know	106	57.9	61	64.2	167	60.1	1.583	0.441
	Yes	8	4.4	2	2.1	10	3.6		
Hepatitis B	No	75	41.0	52	54.7	127	45.7		
	Don't know	82	44.8	40	42.1	122	43.9	10.013	0.007
	Yes	26	14.2	3	3.2	29	10.4		
Hepatitis C	No	69	37.7	41	43.2	110	39.6		
	Don't know	105	57.4	53	55.8	158	56.8	3.095	0.213
	Yes	9	4.9	1	1.1	10	3.6		

Table 1b
Students' knowledge of STIs and HIV/AIDS transmission routes.

Routes of transmission		Level of Education						Chi-square/Fishers test	p
		Ordinary level		Advanced level		Total			
		n	%	n	%	n	%		
Sexual intercourse	No	0	0.0	3	3.2	3	1.1	5.336	0.053
	Don't know	4	2.2	1	1.1	5	1.8		
	Yes	179	97.8	91	95.8	270	97.1		
Blood transfusion	No	18	9.8	8	8.4	26	9.4		
	Don't know	13	7.1	5	5.3	18	6.5	0.540	0.785
	Yes	152	83.1	82	86.3	234	84.2		
Sharing needles	No	13	7.1	6	6.3	19	6.8		
	Don't know	8	4.4	2	2.1	10	3.6	1.015	0.602
	Yes	162	88.5	87	91.6	249	89.6		
Sharing food	No	149	81.4	82	86.3	231	83.1		
	Don't know	24	13.1	6	6.3	30	10.8	3.230	0.199
	Yes	10	5.5	7	7.4	17	6.1		
Sharing clothes e.g. pants	No	67	36.6	42	44.2	109	39.2		
	Don't know	26	14.2	11	11.6	37	13.3	1.571	0.456
	Yes	90	49.2	42	44.2	132	47.5		
Infected mother to child	No	12	6.6	7	7.4	19	6.8		
	Don't know	16	8.7	5	5.3	21	7.6	1.151	0.573
	Yes	155	84.7	83	87.4	238	85.6		
Kissing	No	102	55.7	63	66.3	165	59.4		
	Don't know	46	25.1	14	14.7	60	21.6	4.314	0.116
	Yes	35	19.1	18	18.9	53	19.1		

statistically significant ($\chi 2 = 11.16$; $p = 0.004$). The general trend shows that more 'A' level (81.1%) than 'O' level (72.1%) students were aware that parasites did not cause STIs ($\chi 2 = 6.663$; $p = 0.024$). 'A' and 'O' level students' knowledge of viruses and mosquitoes as causes of STIs in humans varied. Nearly all students agreed that viruses caused STIs while over 70% did not link mosquitoes to the spread of STIs (Fig. 2a and b). In addition, more 'O' level students attributed STIs to poor hygiene of women (70.5%) than 'A' level (61.1%) and poor hygiene of men ('O' level = 60.1%) and ('A' level = 50.5%). The claim that poor hygiene of men ($\chi 2 = 11.531$; $p = 0.003$) and women ($\chi 2 = 6.924$; $p = 031$) caused

Table 1c
Students' knowledge of the symptoms of STIs.

Symptoms of STIs		Level of Education						Chi-square/Fishers test	p
		Ordinary level		Advanced level		Total			
		n	%	n	%	n	%		
Ulcers in the sexual organs	No	31	16.9	31	32.6	62	22.3		
	Don't know	56	30.6	33	34.7	89	32.0	12.620	0.002
	Yes	96	52.5	31	32.6	127	45.7		
Pain while passing out urine	No	4	2.2	3	3.2	7	2.5		
	Don't know	6	3.3	4	4.2	10	3.6	0.668	0.778
	Yes	173	94.5	88	92.6	261	93.9		
Swelling of sexual organs causing failure to urinate	No	11	6.0	6	6.3	17	6.1		
	Don't know	18	9.8	14	14.7	32	11.5	1.520	0.468
	Yes	154	84.2	75	78.9	229	82.4		
Discharge from the penis	No	12	6.6	10	10.5	22	7.9		
	Don't know	28	15.3	15	15.8	43	15.5	1.417	0.492
	Yes	143	78.1	70	73.7	213	76.6		
Discharge from the vagina	No	14	7.7	10	10.5	24	8.6		
	Don't know	27	14.8	16	16.8	43	15.5	0.978	0.613
	Yes	142	77.6	69	72.6	211	75.9		
Itching around the vagina/tip of the penis	No	12	6.6	10	10.5	22	7.9		
	Don't know	33	18.0	20	21.1	53	19.1	1.962	0.375
	Yes	138	75.4	65	68.4	203	73.0		
Lower abdominal pain	No	45	24.6	20	21.1	65	23.4		
	Don't know	43	23.5	33	34.7	76	27.3	3.977	0.137
	Yes	95	51.9	42	44.2	137	49.3		
Painless sores on the sexual organs	No	51	27.9	17	17.9	68	24.5		
	Don't know	48	26.2	32	33.7	80	28.8	3.836	0.147
	Yes	84	45.9	46	48.4	130	46.8		
Some people with STIs have no symptoms	No	81	44.3	30	31.6	111	39.9		
	Don't know	55	30.1	26	27.4	81	29.1	7.450	0.024
	Yes	47	25.7	39	41.1	86	30.9		

Table 1d
Students' knowledge of STIs prevention.

Prevention of STIs		Level of Education						Chi-square/Fishers test	p-value
		Ordinary level		Advanced level		Total			
		n	%	n	%	n	%		
Use of contraceptives pills does not reduce chances of getting STIs	No	69	37.7	20	21.1	89	32.0	19.698	0.000
	Don't know	42	23.0	11	11.6	53	19.1		
	Yes	72	39.3	64	67.4	136	48.9		
Use of condoms during sexual intercourse reduces chances of getting STIs	No	7	3.8	5	5.3	12	4.3		
	Don't know	7	3.8	1	1.1	8	2.9	1.982	0.371
	Yes	169	92.3	89	93.7	258	92.8		
Alcohol intake can increase chances of getting STIs	No	117	63.9	67	70.5	184	66.2		
	Don't know	35	19.1	13	13.7	48	17.3	1.533	0.465
	Yes	31	16.9	15	15.8	46	16.5		
Having sex with many people can increase chances of being infected with STIs	No	13	7.1	3	3.2	16	5.8		
	Don't know	10	5.5	2	2.1	12	4.3	3.698	0.157
	Yes	160	87.4	90	94.7	250	89.9		
Sexual Abstinence is the most effective means of avoiding STIs	No	10	5.5	4	4.2	14	5.0		
	Don't know	10	5.5	3	3.2	13	4.7	.995	0.608
	Yes	163	89.1	88	92.6	251	90.3		

STIs was significantly associated with level of education.

Table 2 shows that 'O' and 'A' level students had positive attitudes towards condom use (77.7%), banning of prostitution (75.5%), screening for HIV/STIs (71.2%) and seeking treatment after noticing symptoms of HIV and STIs (95.7%). However, the attitude of students towards condom use varied; 13.1% more 'A' level students than 'O' level agreed that condoms protect people against STIs and HIV. There was a significant association between level of education and attitude towards condom use ($\chi 2 = 7.241$; $p = 0.027$). On the other hand, more 'A' level students disagreed (5.3%) than 'O' level students (0.5%) about seeking treatment after noticing symptoms of STIs and HIV. This was significantly associated with the level of education ($\chi 2 = 6.510$, $p = 0.026$).

The results of the Pearson correlation show a weak relationship between knowledge and students' attitude toward STIs. With the exception of knowledge of causes which has a negative relationship with attitude to STIs (−.017), other dimensions of knowledge are positively associated with attitude, indicating increase in knowledge with higher score on attitude towards STIs. However, knowledge of symptoms ($p \leq 000$) and students' knowledge of the routes of transmission ($p = 0.012$) are the two measures of knowledge which are significantly ($p < 0.05$) correlated with students' attitude towards STIs (Table 3).

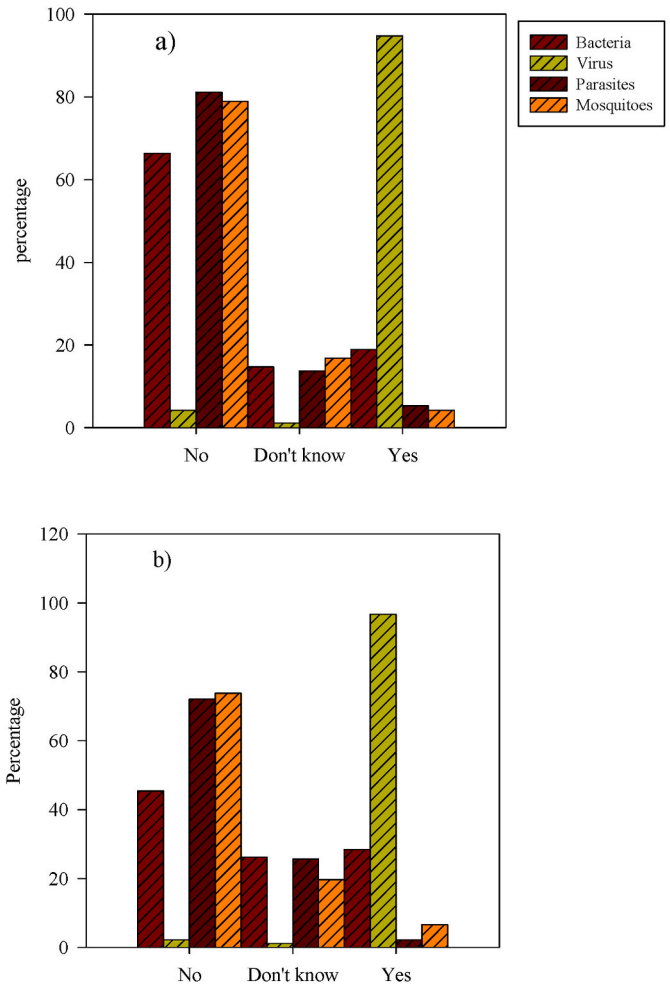

Fig. 2. 'O' level students' (a) and 'A' level students' (b) knowledge of organisms that cause STIs.

9. Discussion

This study has revealed that both 'O' and 'A' level students know the types of HIV/STIs, routes of transmission, symptoms, causes and prevention. The majority of 'A' and 'A' level students reported that gonorrhoea and syphilis are STIs whereas few 'A' level students reported that hepatitis B is an STI. These findings corroborate those of Visalli et al. (2019) who found that high school and university students in Italy could not identify all STIs from a list of diseases. Similarly, Asuke et al. (2019) reported that 19.8% of secondary school students in Jos Local Government Area in Nigeria had limited knowledge of STIs.

Our findings show that although 'O' and 'A' level students have knowledge of HIV, there is a gap in knowledge of other STIs such as Hepatitis B and Chlamydia, which is worrying given that Hepatitis B virus infection has a prevalence of 257–291 million worldwide (Lim et al., 2020) and Africa has the second largest number chronic cases (Argaw et al., 2020). In Uganda, estimated prevalence is at 4.3% among the adult population (Kayondo et al., 2020; Ministry of health, 2017) and it is highest in the northern region. Although literature on prevalence of STIs is scanty, a study among 18–24-year-old students in higher learning institutions in Tanzania showed prevalence of 17% (Mcharo et al., 2022). Unfortunately, there are no comparable data on STIs prevalence Uganda's secondary schools.

Despite Chlamydia being one of the most prevalent STIs (Huai et al., 2018; Center for Disease Control, 2021), less than 5% of Ordinary- and Advanced-level students were aware of its existence. These findings are consistent with those of Von Rosen, Von Rosen, Müller-Riemenschneider, Damberg, & Tinnemann. (2018) who reported that in Germany, Chlamydia was the least known disease among secondary school students. Raia-Barjat et al. (2020) also reported limited knowledge of Chlamydia among health science students. Chlamydia infections are asymptomatic in over 60% of the infected individuals and are largely undiagnosed, untreated and many infected people are unaware of it, hence they unknowingly spread it to others (Huai et al., 2018). In this regard, Chlamydia is unlikely to feature in the discussions of STIs and HIV/AIDS among students and/or other stakeholders, including health workers. Although our results are consistent with those discussed above, the respondents in this study were secondary school students, which may account for the lower than 5% knowledge of Chlamydia as an STI compared to more than 50% reported in other studies. Nonetheless, this study has revealed that Chlamydia poses a high risk to secondary school students due to limited knowledge about it and, more importantly, among adolescents who are known to engage in self-discovery sexual behaviour.

Although students know STIs transmission routes, less than 20% of 'O' and 'A' level students are aware that some STIs can be transmitted through kissing. Whereas STI can be spread through sexual activity including intercourse, some STIs are spread through oral sex, including kissing (Johnson & Jackson, 2021). It would be reasonable to expect that as the students grow older, sexual curiosity and development would lead them to seek information on sexual issues. Similarly, it is erroneous to assume that 'A' level students would be more knowledgeable about HIV/AIDS and STIS than 'A' level students. Contradictory findings have been reported about students' knowledge of HIV/AIDS and STI transmissions. Some authors reported high knowledge levels (Orlando, Beard, & Kumar, 2019) while others found limited levels of knowledge (Barmare & Pratinidhi, 2020; Ezer et al., 2019). Many factors including sex, employment status of parents, sources of information and age, influence knowledge of HIV/AIDS and STIs transmission among students (Kassie, Gudayu, & Araya, 2020; Nigussie & Yosef, 2020).

Ordinary-level students cited ulcers in sexual organs as one of the symptoms of STIs and many disagreed that some people may have no symptoms. This can be explained by the fact that STI infection is linked to transmission of HIV/AIDS (Sousa et al., 2022) as ulcers in sexual organs may cause bleeding and increase the chance of infection. Uganda's population was severely affected by HIV and AIDS from the mid-1980s. It became the first country in sub-Saharan Africa to successfully reverse a generalized HIV epidemic (Putzel, 2004). Government efforts such as the PIACY programme and promoting Abstinence, Being faithful and Condom use (ABC) strategy (Okware et al., 2005) helped to prevent HIV spread. The history of HIV infection and efforts to fight its spread accelerates knowledge of symptoms of STIs associated with HIV/AIDS spread.

Both 'O' and 'A' level students reported condom use (92.8%) and abstinence from sexual activity (90.3%) as the best ways to avoid contracting HIV/AIDS and other STIs. These findings concur with those of Nabisubi et al. (2021) who found that secondary school students in Nakaseke district in central Uganda reported condom use and abstinence as the most appropriate ways of preventing the spread of HIV/STIs. Despite consumption of alcohol escalating the risk of HIV/AIDS and STIs spread among young people living in slums in Uganda (Culbreth, Swahn, & Salazar, 2020), less than 20% of the students linked alcohol consumption to HIV/AIDS and STI spread. This is a challenge in fighting HIV/AIDS and STIs spread given that a large number of adolescents, including students, in Uganda, consume alcohol (Kumar, Culbreth, Swahn, & Kasirye, 2020; Swahn et al., 2020; Matagi, Lubanja, Besigomwe, Asiimwe, & Mwase, 2022). Thus, there is need for increased awareness about the factors associated with HIV/AIDS and STI spread among secondary school students in Uganda. In this study, 90.3% of the students rated abstinence from sexual activity as an important preventive measure against contracting STI and HIV/AIDS. This large percentage is most likely because of the PIASCY programme in schools, which advocates for abstinence until marriage (de Haas et al., 2017).

Table 2
Students' attitude towards HIV/AIDS and STIs spread.

Attitudes		Level of education						Chi-square/Fishers test	p
		Ordinary level		Advanced level		Total			
		n	%	n	%	n	%		
I feel condoms protect people against STIs and HIV	Disagree	38	20.8	12	12.6	50	18.0		
	Don't know	11	6.0	1	1.1	12	4.3	7.241	0.027
	Agree	134	73.2	82	86.3	216	77.7		
I feel it is not necessary to use condoms during sex	Disagree	132	72.1	74	77.9	206	74.1		
	Don't know	14	7.7	4	4.2	18	6.5	1.597	0.450
	Agree	37	20.2	17	17.9	54	19.4		
If both partners are infected with STIs and HIV.	Disagree	71	38.8	39	41.1	110	39.6		
	Don't know	30	16.4	8	8.4	38	13.7	3.425	0.180
I feel there is no need of using a condom (Reverse coded)	Agree	82	44.8	48	50.5	130	46.8		
I feel numerous sexual partners play no role in STIs and HIV transmission (Reverse coded)	Disagree	45	24.6	14	14.7	59	21.2		
	Don't know	75	41.0	42	44.2	117	42.1	3.764	0.152
	Agree	63	34.4	39	41.1	102	36.7		
I feel banning of prostitution can control the spread of STIs and HIV	Disagree	34	18.6	19	20.0	53	19.1		
	Don't know	11	6.0	4	4.2	15	5.4	0.443	0.801
	Agree	138	75.4	72	75.8	210	75.5		
I feel screening for STIs and HIV is good	Disagree	18	9.8	8	8.4	26	9.4		
	Don't know	36	19.7	18	18.9	54	19.4	0.191	0.909
	Agree	129	70.5	69	72.6	198	71.2		
STIs are not dangerous because they can be cured (Reverse coded)	Disagree	29	15.8	17	17.9	46	16.5		
	Don't know	7	3.8	6	6.3	13	4.7	1.152	0.562
	Agree	147	80.3	72	75.8	219	78.8		
The STIs problem is something that I have not given much thought to	Disagree	90	49.2	46	48.4	136	48.9		
	Don't know	27	14.8	16	16.8	43	15.5	0.215	0.898
	Agree	66	36.1	33	34.7	99	35.6		
If I have unprotected sexual intercourse I am most concerned about getting HIV	Disagree	22	12.1	14	14.7	36	13.0		
	Don't know	19	10.4	7	7.4	26	9.4	0.966	0.617
	Agree	141	77.5	74	77.9	215	77.6		
If I have unprotected sexual intercourse	Disagree	35	19.1	18	18.9	53	19.1		
	Don't know	19	10.4	15	15.8	34	12.2	1.745	0.426
I am most concerned about; Unwanted pregnancy	Agree	129	70.5	62	65.3	191	68.7		
I think some STIs are not curable.	Disagree	26	14.2	8	8.4	34	12.2		
	Don't know	20	10.9	13	13.7	33	11.9	2.188	0.335
	Agree	137	74.9	74	77.9	211	75.9		
If I notice symptoms of STIs and HIV on me, I think I should seek treatment immediately	Disagree	1	0.5	5	5.3	6	2.2		
	Don't know	5	2.7	1	1.1	6	2.2	6.510	0.026
	Agree	177	96.7	89	93.7	266	95.7		

Table 3
Correlation between knowledge and students' attitude toward STIs.

	Attitude	P-value
Index for knowledge STI identification	0.08	0.18
Index for knowledge of causes	−0.02	0.77
Index for knowledge of symptoms	0.27**	≤0.01
Index for routes of transmission	0.15*	0.01
Index for knowledge of prevention	0.09	0.14

** Correlation is significant at the 0.01 level (2-tailed), * significant at the 0.05 level (2-tailed). N = 278.

This response, however, is speculative given that pregnancy among school girls in Uganda is high and accounts for the high dropout rate (Manzi et al., 2018; Nabugoomu, 2019).

Although, STIs such as Chlamydia, gonorrhoea, and syphilis are caused by bacteria, (Silverberg et al., 2022), the findings show that 'O' level students (28.4%) are more likely than 'A' level students (18.9%) to believe that bacteria causes STIs. These findings indicate the limited knowledge among 'A' level students; few reported that bacteria cause STIs. Boateng et al. (2022) found high awareness of causes of STIs among senior high school students in metropolitan Kumasi in Ghana. They attributed the knowledge of causes of STIs among the students to fact that some topics related to STIs are taught in the curriculum and there are similar adverts on radio and television. Even though some topics on STIs are included in the biology curriculum, which is compulsory in 'O' level, this would only be possible for 'A' level students studying biology as a subject. Although this might explain the relatively lower percentage (18.9%) of 'A' level students with limited knowledge of STIs compared to 'O' level students, it is not a sufficient basis since all 'A' level students studied Biology while at 'O' level. The limited knowledge among 'A' level students suggests that the causes of STIs may not have been covered in their 'O' level curriculum or the knowledge they had acquired had degenerated (Bjork & Bjork, 2019).

The students had a positive attitude towards condom use, banning of prostitution, screening for HIV/STIs and seeking treatment after

noticing symptoms of HIV and STIs. Condoms are the most effective barrier for preventing unwanted pregnancies and STIs, including HIV (Pascual, Riera, & Sánchez, 2016; Nguyen et al., 2022). The 'A' level students had more positive attitudes toward condom use in consonance with findings by Silassie et al. (2016) who established that high school students in Ethiopia had positive attitude towards condom use. Knowledge is one of several factors that affect attitudes (Khamisa et al., 2020; Zhang & Chung, 2021). In this study, knowledge alone cannot explain Advanced-level students' positive attitudes toward condom use since knowledge between 'O' and 'A' level students in this study were comparable in several areas, including the prevention of STIs. Studies of the association between knowledge and attitudes towards prevention of STIs show that age, sex and socio-economic status are equally important (Alhasawi et al., 2019).

The implications of these findings are that there is a need for continuous awareness to sustain students' knowledge of STIs and HIV/AIDS due to knowledge gaps on types of STIs, transmission, causes, symptoms, and prevention. This is compounded by high prevalence and incidence of STIs and the associated increased risk of HIV infection (Rowley et al., 2016). Since there are gaps in knowledge of the disease, programmes geared towards attaining Uganda's school health goals such as PIASCY, World Starts with Me and StraightTalk, need to be strengthened.

10. Conclusions and recommendations

We have found that 'O' and 'A' level students are knowledgeable about the different types of HIV/AIDS and STIs as well as their symptoms, causes, and prevention. However, there are knowledge gaps between 'O' and 'A' level students about chlamydia and hepatitis B as types of STI and kissing as one of the routes of transmission of STIs. The students have a positive attitude towards HIV/AIDS and STIs. Level of education was partially significant in explaining the students' knowledge of types, symptoms and attitudes towards prevention of STIs and HIV/AIDS. We recommend continued sensitization of all students on HIV/AIDS and STIs to reduce the disparity in knowledge. This research contributes knowledge to inform development of health education programmes in secondary school to address sexual health of secondary school students and, ultimately, the community. Future studies should include rural and urban schools in order to broaden understanding of the levels of awareness of the disease among adolescents.

The study's strength is that self-report data has been demonstrated to be both reliable and valid (Vanable et al., 2009). A modified closed ended self-administered questionnaire was used to collect data; since it was anonymous, it should have encouraged accurate and honest self-disclosure. However, the honesty of students' responses may still be questioned.

This study did not use a mixed methods approach to research; therefore, students' perspectives through interviews and focus group discussions would have been useful in enriching the results and providing more insights into the research questions by triangulating qualitative and quantitative responses (Shorten & Smith, 2017; Tashakkori, 2007). Another limitation is the use of non-parametric statistical tools such as Chi-square that are less powerful than parametric tests, hence small but significant differences between groups may not have been detected (Sharpe, 2015), which limits the generalizability of the findings.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Sam Mutabazi: Conceptualization, contributed to the study's conceptualization and design and were in charge of data collection. **Josephine Esaete:** Conceptualization, contributed to the study's conceptualization and design and were in charge of data collection. **Edward Kansiime:** Data analysis was the responsibility, All three authors contributed to the interpretation and writing of the manuscript, and all three authors agreed on all aspects of the work and approved the version to be published.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors thank Prof. Joseph Obua and anonymous reviewers for their comments on this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssaho.2023.100475.

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl, & J. Beckmann (Eds.), *Action-Control: From cognition to behavior* (pp. 11–39). Heidelberg: Springer.

Alhasawi, A., Grover, S., Sadek, A., Ashoor, I., Alkhabbaz, I., & Almasri, S (2019). *Assessing HIV/AIDS Knowledge, Awareness, and Attitudes among Senior High School Students in Kuwait.* Med. https://doi.org/10.1159/000500307

Argaw, B., Mihret, A., Aseffa, A., Tarekegne, A., Hussen, S., Wachamo, D., Shimelis, T., & How, R. (2020). Sero-prevalence of hepatitis B virus markers and associated factors among children in Hawassa City, southern Ethiopia. *BMC Infectious Diseases*. https://doi.org/10.1186/s12879-020-05229-7

Asuke, S., Kurya, J. M., Olusanmi, B. T., Hikon, Y. A., & Eseigbe, P. (2019). Knowledge of sexually transmitted infections and practice of risky sexual behaviours among senior secondary school students in Jos north local government area, Plateau state, Nigeria. *Port Harcourt Medical Journal, 13*, 87–92.

Bae, S., & Lee, G. (2022). AAUS guidelines 2021 revision sexually transmitted infection (STIs) diagnostic strategy for STI. *Journal of Infection and Chemotherapy, 28*, 135–141.

Barmare, A., & Pratinidhi, S. A. (2020). Knowledge and attitude regarding sexually transmitted infections in school and college students in an urban area of Maharashtra, India. *Journal of Research in Medical Education & Ethics, 10*, 120–128.

Behulu, G. K., Anteneh, K. T., & Aynalem, G. L. (2019). Pre-marital sexual intercourse and associated factors among adolescents students in Debre-Markos town secondary and preparatory schools north west Ethiopia 2017. *BMC Research Notes*. https://doi.org/10.1186/s13104-019-4132-4

Bekker, L. G., & Hosek, S. (2015). HIV and adolescents: Focus on young key populations. *Journal of the International AIDS Society, 18*, Article 20076. https://doi.org/10.7448/IAS.18.2.20076

Bjork, R. A, & Bjork, E. L (2019). Forgetting as the friend of learning. Implications for teaching and self regulated learning. *Adv. Physiol. Educ.*. https://doi.org/10.1152/advan.00001.2019

Boateng, S., Baah, A., Boakye-Ansah, D., & Aboagye, B. (2022). Senior high school students' knowledge and attitudes toward information on their health in the Kumasi metropolis. *Frontiers in Public Health, 9*, Article 752195. https://doi.org/10.3389/fpubh.2021.752195

Bower, K. M. (2003). When to use Fisher's exact test. *American Society for Quality, Six Sigma Forum Magazine, 2*(4), 35–37.

Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R. L., Torre, L. A., & Jemal, A. (2018). *Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries*. https://doi.org/10.1371/journal.pone.0211720

Buder, S., Schöfer, H., Meyer, T., Bremer, V., Kohl, P. K., Adriane Skaletz-Rorowski, A., & Brockmeyer, N. (2019). Bacterial sexually transmitted infections. *Journal of the German society of dermatology*. https://doi.org/10.1111/ddg.13804

Centers for Disease Control and Prevention. (2021). Chlamydia CDC fact sheet. Available from: https://www.cdc.gov/std/chlamydia/stdfact-chlamydia-detailed.htm.

Cho, H., Hallfors, D. D., Mbai, I. I., Itindi, J., Milimo, B. W., Halpern, C. T., & Iritani, B. J. (2011). Keeping adolescent orphans in school to prevent human immunodeficiency virus infection: Evidence from a randomized controlled trial in Kenya. *Journal of Adolescent Health, 48*, 523–526.

Cohen, S. (2004). Beyond slogans: Lessons from Uganda's experience with ABC and HIV/AIDS. *Reproductive Health Matters, 12*(23), 132–135.

Cui, S., Jiang, Y., Shi, Q., Zhang, L., Kong, D., Qian, M., & Chu, J. (2021). Impact of COVID-19 on anxiety, stress and coping styles of nurses in emergency departments

and fever clinics: Across sectional survey. *Risk Management and Healthcare Policy, 14*, 585–594.
Culbreth, R., Swahn, M. H., & Salazar, L. F. (2020). Risk factors associated with HIV, sexually transmitted infections (STI), and HIV/STI Co-infection among youth living in the slums of Kampala, Uganda. *AIDS and Behavior, 24*, 1023–1031. https://doi.org/10.1007/s10461-019-02444-5
De Neve, J.-W., Fink, G., Subramanian, S. V., Moyo, S., & Bor, J. (2015). Length of secondary schooling and risk of HIV infection in Botswana: Evidence from a natural experiment. *Lancet Global Health*. https://doi.org/10.1016/S2214-109X(15)00087-X, 10.3390/ijerph17072451.
Etikan, I., & Bala, K. (2017). Sampling and sampling methods. *Biom Biostat Int J.* , Article 00149. https://doi.org/10.15406/bbij.2017.05.00149
Ezer, P., Kerr, L., Fisher, C. M., Heywood, W., & Lucke, J. (2019). Australian students' experiences of sexuality education at school. *Sex Education, 19*(5), 597–613.
Folasayo, A. T., Oluwasegun, A. J., Samsudin, S., Saudi, S. N. S., Osman, M., & R, A. (2017). Assessing the knowledge level, attitudes, risky behaviors and preventive practices on sexually transmitted diseases among university students as future healthcare providers in the central zone of Malaysia: A cross-sectional study. *International Journal of Environmental Research and Public Health, 14*. https://doi.org/10.3390/ijerph14020159
Fu, L., Sun, Y., Han, M., Wang, B., Xiao, F., Zhou, Y., Gao, Y., Fitzpatrick, T., Yuan, T., Li, P., Zhan, Y., Lu, Y., Luo, G., Duan, J., Hong, Z., Fairley, C. K., Zhang, T., Zhao, J., & Zou, H. (2022). Incidence trends of five common sexually transmitted infections excluding HIV from 1990 to 2019 at the global, regional, and national levels: Results from the global burden of disease study 2019. *Frontiers of Medicine, 9*, Article 851635. https://doi.org/10.3389/fmed.2022.851635
GBD. (2019). *Global, regional, and national burden of hepatitis B, 1990–2019: A systematic analysis for the global burden of disease study 2019*. https://doi.org/10.1016/S2468-1253(22)00124-8
Griffiths, J. D., Hart, C., & Brickel, M. (2010). Using vignettes to change knowledge and attitudes about rape. *College Student Journal, 44*, 515–527.
de Haas, B. (2017). *Sexuality education in Uganda: Teachers' reasoning in a 'morally upright' context*. University of Groningen. https://doi.org/10.1080/14681811.2019.1566896
de Haas, B., Hutter, I., & Timmerman, G. (2017). Young people's perceptions of relationships and sexual practices in the abstinence-only context of Uganda. *Sex Education, 17*(5), 529–543. https://doi.org/10.1080/14681811.2017.1315933
Haggerty, C. L., Ness, R. B., Totten, P. A., Farooq, F., Tang, G., Ko, D., Hou, X., Fiedler, T. L., Srinivasan, S., Astete, S. G., & Fredricks, D. N. (2020). Presence and concentrations of select bacteria-vaginosis-associated with increased risk of pelvi inflammatory disease. *Sexually Transmitted Diseases, 47*, 344–346. http://health/topics/adolescence/laws/en/.
Huai, P., Li, F., Li, Z., Sun, L., Fu, X., & Pan, Q. (2018). Prevalence, risk factors, and medical costs of chlamydia trachomatis infections in shandong province, China: A population-based, cross-sectional study. *BMC Infectious Diseases, 18*(1), 534.
Iqbal, S., Maqsood, S., Zafar, A., Zakar, R., Zakar, M. Z., & Fischer, F. (2019). 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, 19*. https://doi.org/10.1186/s12889-019-7124-3
Johnson, A., & Jackson, J. B. (2021). Sexually transmitted infections among college students. *Microbiology and Infectious Disease, 5*, 1–4.
Kassie, A. A., Gudayu, T. W., & Araya, B. M. (2020). Knowledge, attitude, and preventive practices towards sexually transmitted infections among preparatory school students in West Gojjam zone, Ethiopia. *Advances in Public Health*. https://doi.org/10.1155/2020/6894394
Kayondo, S. P., Byamugisha, J. K., & Ntuyo, P. (2020). *Prevalence of hepatitis B virus infection and associated risk factors among pregnant women attending antenatal clinic in Mulago hospital Uganda: A cross sectional study*, 10.1136bmjopen-2019-033043.
Keto, F., Tilahun, A., & Mamo, A. (2020). Knowledge, attitude and practice towards risky sexual behaviour among secondary and preparatory students of Metu town southwestern Ethiopia. *BMC Public Health*. https://doi.org/10.1186/s12889-020-09371-4
Khamisa, N., Mokgobi, M., & Basera, T. (2020). Knowledge, attitudes and behaviours towards people with HIV and AIDS among private higher education students in Johannesburg, South Africa. *Southern African Journal of HIV Medicine, 21*. https://doi.org/10.4102/sajhivmed.v21i1.991
Khan, R., Bilal, A., & Siddiqui, S. (2019). Knowledge about HIV and discriminatory attitudes towards people living with HIV in Pakistan. *Pakistan Journal of Public Health, 9*, 38–41.
Kihumuro, R. B., Muganzi, D. J., Wandira, E. G., Alinaiswe, R., Nanyunya, J. J., Kugumisiriza, R., … Mubangizi, V. (2021). Influence of boarding secondary school environment on HIV positive students in South Western Uganda. *BMC Public Health*. https://doi.org/10.1186/s12889-021-10380-0.
Kimera, E., Vindevogel, S., Rubaihayo, J., Reynaert, D., De Maeyer, J., Engelen, A.-M., & Bilsen, J. (2019). Youth living with HIV/AIDS in secondary schools: Perspectives of peer educators and patron teachers in Western Uganda on stressors and supports. *SAHARA-J: Journal of Social Aspects of HIV/AIDS, 16*(1), 51–61. https://doi.org/10.1080/17290376.2019.1626760
Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological measurement*. Small-sample techniques (1960). *NEA Research Bulletin, 38*.
Kuete, M., Huan, Q., Rashid, A., Ma, X. L., Yuan, H., Antezana, J. P. E., Yeltay, R., Rao, M., He, Q., Xiong, C., & Zhang, H. (2016). *Differences in knowledge, attitude, and behavior towards HIV/AIDS and sexually transmitted infections between sexually active foreign and Chinese medical students*. BioMed Research International. https://doi.org/10.1155/2016/4524862
Kumar, S, Culbreth, RE, Swahn, M. H, & Kasirye, R (2020). Examining correlates of alcohol related condom-less sex among youth living in the slums of Kampala, Uganda. *AIDS Care*. https://doi.org/10.1080/09540121.2020.1762066
Lakshminarayana, S. K., Sahana Devadas, Bharath, K., Kariyappa, M., Byadarahalli Keshavamurthy, B., Bagewadi, M. S., Veeranna Sajjan, S., Vineet, D., & Mohammed, T. (2022). Early congenital syphilis: Missed opportunities in a mother owing to many problems during pregnancy – a case report. *Paediatrics and International Child Health*. https://doi.org/10.1080/20469047.2022.2044676
Lauwers, L., Bastiaens, H., Remmen, R., & Keune, H. (2020). Nature's contributions to human health: A missing link to primary health care? A scoping review of international overview reports and scientific evidence. *Frontiers in Public Health, 8*, 52. https://doi.org/10.3389/fpubh.2020.00052
Lim, J. K., Nguyen, M. H., Faasld, M. A., Kim, W. R., Gish, R., Perumalswami, P., & Jacobson, I. M. (2020). Prevalence of chronic hepatitis B virus infection in the United States. *American Journal of Gastroenterology, 115*, 1429–1438. https://doi.org/10.14309/ajg.0000000000000651
Ling, S. C., Lin, H.-H. S., Murray, K. F., Rosenthal, P., Mogul, D., Rodriguez-Baez, N., Schwarzenberg, S. J., Teckman, J., & Schwarz, K. B. (2021). Chronic hepatitis is common and often untreated among children with hepatitis B infection in the United States of America and Canada. *The Journal of Pediatrics*. https://doi.org/10.1016/j.jpeds.2021.05.035
Lövdén, M., FratiglioniL, M., Glymour, M., Lindenberger, U., & Tucker-Drob, E. M. (2020). Education and cognitive functioning across the life span. *Association for Psychological Science, 21*, 6–41.
Manzi, F., Ogwang, J., Akankwatsa, A., Wokali, O. C., & Obba, F. (2018). Factors associated with teenage pregnancy and its effects in Kibuku town council, Kibuku district, eastern Uganda: A cross sectional study. *Primary Health Care, 8*, 298. https://doi.org/10.4172/2167-1079.1000298
Matagi, L., Lubanja, G., Besigomwe, F., Asiimwe, C., & Mwase, P. (2022). A baseline survey for drugs and substance Abuse (DASA) in primary and secondary schools in Uganda. *African Journal of Education, Science and Technology, 7*, 156–183.
Mbita, G., Komba, A. N., Casalini, C., Bazant, E., Curran, K., Christensen, A., Nyato, D., Mi Kim, Y. M., Jason Reed, J., Makyao, N., Kategile, U., Donaldson, F., Conserve, D. F., Faini, D., van Roosmalen, J., & van den Akker, T. (2022). Predictors of HIV among 1 million clients in high-risk male populations in Tanzania. *AIDS and Behavior*. https://doi.org/10.1007/s10461-022-03667-9
Mcharo, R. D., Kisinda, A., Njovu, L., Mcharo, M., Mbwilo, F., & Mihale, G. (2022). Prevalence of and risk factors associated with HIV, Herpes Simplex Virus-type 2, Chlamydia trachomatis and Neisseria gonorrhoeae infections among 18–24 year old students attending Higher Learning Institutions in Mbeya-Tanzania. *PLoS One, 17*(5), Article e0266596.
Ministry of health. (2017). *Uganda population-based HIV impact assessment (UPHIA) 2016–2017*. Ministry of Health (MoH), 2017 https://uac.go.ug/content/uganda-population-based-hiv-impact-assessment-uphia-2016-2017-0.Ac.
Nabisubi, P., Kanyerezi, S., Kebirungi, G., & Mboowa, G. (2021). *Knowledge and attitude of secondary school students in Nakaseke, Uganda towards HIV transmission and treatment*. https://doi.org/10.12688/aasopenres.13210.2
Nabugoomu, J. (2019). School dropout in rural Uganda: Stakeholder perceptions on contributing factors and solutions. *Education Journal, 8*, 185–195. https://doi.org/10.11648/j.edu.20190805
Nguyen, NC, Luong, TN, Le, VT, Hobbs, M, Andridge, R, Casterline, J, et al. (2022). Effectiveness of erectogenic condom against semen exposure among women in Vietnam: Randomized controlled trial. *PLoS ONE, 17*(2), Article e0263503. https://doi.org/10.1371/journal.pone.0263503
Nigussie, T., & Yosef, T. (2020). Knowledge of sexually transmitted infections and its associated factors among polytechnic college students in Southwest Ethiopia. *Pan-African Journal*. https://doi.org/10.11604/pamj.2020.37.68.22718
Nihan, S. T. (2020). Karl Pearson's chi-square tests. *Educational Research and Reviews, 15*(9), 575–580.
Okware, S., Kinsman, J., Onyango, S., Opio, A., & Kaggwa, P. (2005). Revisiting the ABC strategy: HIV prevention in Uganda in the era of antiretroviral therapy. *Postgraduate Medical Journal, 81*(960), 625–628.
Orlando, J. F., Beard, M., & Kumar, S. (2019). Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. *PLoS One*. https://doi.org/10.1371/journal.pone.0221848
Pascual, A. M, Riera, R. J. F., & Sánchez, A. C. (2016). Behavioral Interventions for Preventing Sexually Transmitted Infections and Unintended Pregnancies: An Overview of Systematic Reviews. *Actas Dermo-Sifiliográficas (English Edition), 107*, 301–317.
Putzel, J. (2004). The politics of action on AIDS: A case study of Uganda. *Public Administration and Development, 24*, 19–30.
Raia-Barjat, T., Gannard, I., Virieux, D., De Aguila-Berthelot, C., Nekaa, M., Chauvin, F., Botelho-Nevers, E., Berthelot, P., & Gagneux-Brunon, A. (2020). Health students' knowledge of sexually transmitted infections and risky behavious before participation to the heatlh promotion program. *Medecine et Maladies Infectieuses, 50*, 368–371. https://doi.org/10.1016/j.medmal.2020.01.015, 2020.
Ratna, R. V. (2019). *Economic analysis of health impacts in developing countries. Encyclopedia of Human Health*. Elsevier.
Ravel, J., Moreno, I., & Simon, C. (2020). Bacterial vaginosis and its association with infertility, endometritis and pelvic inflammatory disease. *American Journal of Obstetrics and Gynecology*. https://doi.org/10.1016/j.ajog.2020.10.019
Rowley, J., Vander Hoorn, S. V., Korenromp, E., Low, N., Unemo, M., Abu-Raddad, L. J., Chico, R. M., Smolak, A., Newman, L., Gottlieb, S., Thwin, S. S., Brouteta, N., & Taylora, M. M. (2016). Chlamydia, gonorrhoea, trichomoniasis and syphilis: Global

prevalence and incidence estimates. *Bulletin World health Organisation Bulletin*. https://doi.org/10.2471/BLT.18.228486

Schrader, P. D., & Lawless, K. A. (2004). The knowledge, attitudes and behaviour approach performance: How to evaluate performance and learning in complex environments. *Performance Improvement, 43*, 8–15. https://doi.org/10.1002/pfi.4140430905

Sharpe, D. (2015). Chi-square test is statistically significant: Now what? *Practical Assessment, Research and Evaluation, 20*(8). http://pareonline.net/getvn.asp?v=20&n=8.

Shorten, A., & Smith, J. (2017). Mixed methods research: Expanding the evidence base. *Evidence-Based Nursing, 20*, 74–75.

Silassie, A. G., Giorgis, M. W., Kahsay, N., Fisaha, Y., & Zerihun, Z. (2016). Knowledge, attitude and practice of condom utilization among axum preparatory school students. *Journal of AIDS & Clinical Research, 7*, 560. https://doi.org/10.4172/2155-6113.1000560Unitednations

Silverberg, B., Moyers, A., Hinkle, T., Kessler, R., & Russell, N. G. (2022). CDC update: Treatment and complications of sexually transmitted infections (STIs). *Venereology, 1*, 23–46, 10.3390/.

Sousa, J. D., Müller, V., & Vandamme, A.-M. (2022). The impact of Genital ulcers on HIV transmission has been underestimated—a critical review. *Viruses, 14*, 538. https://doi.org/10.3390/v14030538

Spector, P. E. (1992). A Consideration of the Validity and Meaning of Self-Report Measures of Job Conditions. *Psychology Faculty Publications*. https://digitalcommons.usf.edu/psy_facpub/567.

Swahn, M. H., Culbreth, R., Salalzar, L., Tumwesigye, N. M., Jernigan, D. H., Kasiyre, R., & Obot, I. S. (2020). The prevalence and context of alcohol us, problem drinking ' and alcohol-related harm among youth living in the slums of Kampala Uganda. *International Journal of Environmental Research and Public Health*.

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education, 48*(6), 1273–1296.

Tashakkori, A. (2007). Exploring the nature of research questions in mixed research methods. *Journal of Mixed Research Methods, 1*, 207–211.

The World Bank. (2012). *Early childhood development; Uganda*. Washington: The World Bank.

UNICEF. (2021). *Adolescent HIV prevention. Adolescent HIV prevention - UNICEF DATA*. . (Accessed 2 February 2022).

USAID. (2010). *HIV/AIDS Health Profile for Ethiopia. Wikipedia, the free encyclopedia (2008)*. List of countries by HIV/AIDS Adult prevalence rate http://en.wikipedia.org/wiki. (Accessed 18 January 2022).

Vallejo-Ortega, M. T., Gaitán Duarte, H., Mello, M. B., Caffe, S., & Perez, F. A. (2022). Systematic review of the prevalence of selected sexually transmitted infections in young people in Latin America. *Revista Panamericana de Salud Públic, 46*, e73. https://doi.org/10.26633/RPSP.2022.73

Vanable, P. A., Carey, M. P., Brown, J. L., DiClemente, R. J., Salazar, L. F., Brown, L. K., Romer, D., Valois, R. F., Hennessy, M., & Stanton, B. F. (2009). Test–retest reliability of self-reported HIV/STD-Related measures among African-American adolescents in four U.S. Cities. *Journal of Adolescent Health, 44*. https://doi.org/10.1016/j.jadohealth.2008.09.002, 0– 221.

Vandemoortele, & Delamonica. (2000). The Education vaccine against HIV. *Current Issues in Comparative Education, 3*, 6–13.

Visalli, G., Cosenza, B., Mazzù, F., Bertuccio, M. P., Spataro, P., Pellicanò, G., Di Pietro, A., Picerno, I., & Facciolà, A. (2019). Knowledge of sexually transmitted infections and risky behaviours: a survey among high school and university students. *J PREV MED HYG*. https://doi.org/10.15167/2421-4248/jpmh2019.60.2.1079

Von Rosen, F. T., Von Rosen, A. J., Müller-Riemenschneider, F., Damberg, I., & Tinnemann, P. (2018). STI Knowledge in Berlin Adolescents. *International Journal of Environmental Research and Public Health*. https://doi.org/10.3390/ijerph15010110.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wang, Y., Wu, M., Gong, X., Zhao, L., Zhao, J., Zhu, C., & Gong, C. (2019). Risk factors for congenital syphilis transmitted from mother to infant — suzhou, China, 2011–2014. *Morbidity and Mortality Weekly Report, 68*, 347-250.

WHO. (2021). *Sexually transmitted infections: Key facts*. https://www.who.int/news-room/fact-sheets/detail/sexually-transmitted-infections-(stis). (Accessed 6 August 2022).

Young, H., Burke, L., & Gabhainn, S. N. (2018). *Sexual intercourse, age of initiation and contraception among adolescents in Ireland: Findings from the health behaviour of in school-aged children (HBSC) Ireland study*. https://doi.org/10.1186/s12889-018-5217-z

Zhang, F., & Chung, L. (2021). HIV/AIDS awareness among young adults in Hong Kong: The roles of knowledge, acceptance and stigma. *International Journal of Environmental Research and Public Health, 18*, 7473. https://doi.org/10.3390/ijerph18147473