HIV and AIDS related knowledge and attitudes towards learners infected with HIV: Survey among high school learners in Gauteng and North West provinces in South Africa.

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The success of the proposed HIV testing and counselling (HTC) initiative among learners at high school in South Africa depends on their acceptability of the service, which may be influenced by their HIV/AIDSknowledge, perceptions, and attitudes. The study assessed high school learners' HIV knowledge and attitudes towards learners infected with HIV. The survey was part of formative evaluation with grade 10-12 learners in order to assess the acceptability of HTC at schools. The study consisted of 17 high schools in two provinces in South Africa. *T*- tests were used to compare the differences in the mean HIV knowledge scores. Logistic regressions were performed to establish relationships between demographic variables, attitudes, and HIV knowledge scores. The sample consisted of 2970 learners aged 14-27years, 1810 (61%) had had sex, and 1494 (50.3%) had tested for HIV in the past year. The majority had high knowledge scores: 87% on HIV-related knowledge, 98.6% on the modes of transmission, and 73% on prevention. Overall, HIV knowledge was high, with a total mean score of 20.5 out of 26 points. There were significant differences in the HIV knowledge total mean scores; females had higher scores (M= 20.6, SD=2.3) than males (M=20.3, SD=2.4), and the younger age group (M= 20.5, SD=2.4) had higher scores than the older age group (M=20.1, SD=2.1). A quarter (25.4%) exhibited negative attitudes, 13.9% felt that HIV-positive learners should be isolated, and 75% would not date HIV-positive learners. Attitudes were associated with gender (OR=0.48, CI: 0.41-0.57), grades (OR=3.24, CI: 2.36-4.44), and total HIV knowledge scores (OR=2.21, CI: 1.43-3.43). Despite substantial HIV knowledge, there were knowledge gaps and misconceptions, which resulted in negative attitudes towards the disease. Appropriate sexual health education and HIV prevention interventions in school are crucial in correcting the knowledge gaps as well as reducing stigma and discrimination to assist learners to be accepting of HIV-positive persons.

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Introduction

The National Department of Health (NDoH) initiated the HIV testing and counselling (HTC) campaign targeting people aged 12 to 60 years old to ensure that all South Africans know their HIV status. To ensure that young people are reached, the NDoH proposed the implementation of HTC in schools. Since HTC has been widely advocated as an HIV prevention strategy among adults, the appropriateness and success of the initiative among young people remain uncertain. This is despite evidence that the HIV and AIDS prevalence of young people in Sub-Saharan Africa is increasing. In South Africa, in 2008, the prevalence of HIV among 15-24-year-olds was 8.3% and 2.5% among 2-14-year-olds (Shisana et al. 2009). A recent South African study conducted in rural KwaZulu Natal reported a prevalence of 4.7% and 2.5% among learners aged 12-25 years in two schools in different districts. (Kharsany et al. 2012). Similar to the trend in the general population in South Africa (Shisana et al. 2009), the prevalence among girls was higher compared to boys in both schools (Kharsany et al. 2012). It should be noted that the fear of HIV-related stigma has affected the uptake of the testing of children in public health facilities in South Africa. It is, thus, possible that the prevalence of HIV among school children might be higher than that reported in the last national survey, given the high numbers of perinatally infected children who are surviving to adolescence and who are currently in public schools in South Africa (Shisana et al. 2009).

The fundamental principle of HTC campaigns is that people should know their HIV status and have access to treatment and care programs. This is also the guiding principle for the roll-out of HTC at school, the successful implementation of which depends on learners' acceptability of the service. However, available data show low utilization of HIV-testing services by learners in high schools. Most people do not want to know their HIV status, and some are worried that others might find out about their HIV test results and be subjected to stigma and discrimination, while others believe that they are not vulnerable to HIV infection (Abebe & Mitikie 2009; MacPhail et al. 2009; Omary 2010). Other studies conducted with learners in high schools or colleges indicate that they exhibit negative attitudes towards and discriminate against HIV-positive persons. Discrimination attitudes impact negatively on HIV testing, disclosure, and prevention (Christiane et al. 2014; Sallar 2009). Therefore, in preparation for the roll-out of HTC in schools, it is important to understand the attitudes of learners towards their HIV-positive peers, in order to develop educational messages to increase tolerance towards HIV-positive students in particular.

Educational messages that decrypt the myths and stigma of HIV infection will reduce individual and societal obstacles that impede HIV prevention efforts (Sallar 2009).

As a result of the prevalence of HIV among school children, the Department of Basic Education embarked on the implementation of interventions that promote safe sexual behaviour among learners in schools. The interventions should also focus on HIV risk reduction and provide sexual reproductive health services in high schools (Kharsany et al. 2012). There is, however, no baseline data on HIV knowledge among learners in schools in South Africa. The limited available data in sub-Saharan Africa show existing gaps in HIV-related knowledge and misconceptions about HIV infection (Adeomi et al. 2014; MacPhail et al. 2009; Oladepo & Fayemi 2011; Sallar 2009). It has been shown that an increase in HIV-related knowledge does not translate to behaviour change (MacPhail et al. 2009), but then adequate HIV-related knowledge is a prerequisite for the reduction of HIV infections and transmission (Sales et al. 2006), while negative attitudes towards HIV positive people are barriers for uptake of HIV prevention strategies (Christiane et al. 2014; Sallar 2009). This was the rationale for assessing the learners' level of HIV knowledge and related attitudes towards HIV-positive learners in preparation for the proposed roll out of HTC at schools. Therefore the data gathered on HIV knowledge and related attitudes will establish a baseline to inform the development of appropriate health education programs as well as the proposed roll out of HIV counselling and testing at schools.

Materials and Methods

Design

This survey was part of a larger formative evaluation with grade 10-12 high school learners conducted in order to assess the acceptability of HTC at schools (a manuscript on the acceptability of HTC at schools has been submitted for publication). The survey was conducted from July to September, 2013. The study settings consisted of 17 public high schools in the Bojanala educational district in North West province and the Tshwane North educational district in Gauteng province. The schools were randomly selected from 56 high schools, and all were eligible for inclusion in the study because they fall under the provincial departments of education and follow the same curriculum and enrolment processes. Of the 17 high schools included in the sample, nine were selected from two rural sub-districts in Bojanala and eight from an urban district in Tshwane North.

Data collection

Data collection commenced only after permission to conduct the study was obtained from the relevant departments of education. Permission was also obtained from sub-district area managers who assisted the investigators in the random selection of the schools; they also facilitated access to the selected schools by informing the principals about the intended study. The individual principals then nominated a school contact who was generally the life orientation (LO) teacher to facilitate the actual administration of the survey. The research team then visited the selected schools to meet with the school contact in order to explain the purpose of the study and discuss the protocol to be followed during the administration of the questionnaire. In all the schools surveyed, the life orientation periods were randomly assigned to the research team, and all learners in the assigned LO periods volunteered to participate. The LO periods were offered for the administration of the questionnaire because the teachers were of the opinion that the purpose of the study and the questions that the learners had to respond to were relevant content for the LO lessons. In ten schools, only the LO periods in grade 10-11 classes were selected; grade 12 learners were excluded because they were preparing for final-year exams. Prior to the completion of the questionnaire, the purpose of study was thoroughly explained to the learners, and they were also informed that participation was voluntary and of the confidentiality of their responses. Their anonymity was ensured by not gathering any personal information. Learners were also informed that they could withdraw from the study at any time should they wish to do so without any consequences.

The study instrument was a researcher-assisted self-administered semi-structured questionnaire that included 26 HIV knowledge items, which were subdivided into three sets of questions. HIV knowledge was assessed using seven true/false questions and two questions asking for the meaning of HIV and AIDS. The modes of HIV transmission were assessed using 10 true/false questions and prevention and control of HIV/AIDS was assessed using six yes/no/not sure questions. Learners' attitudes towards HIV-positive persons were assessed using nine agree/disagree/not sure questions. We also asked questions regarding learner's sexual experience, we asked if they ever had sex, their age at first sexual intercourse, if they currently had a sexual partner, and if they ever tested for HIV. The questionnaire was adapted from the Australian Secondary Students and Sexual Health Survey (Smith et al. 2009). Although this was a validated instrument, it was pilot-tested to assess its appropriateness in the context of learners in South Africa. The pilot was conducted among 150 learners in a high school that did not form part of the

schools that were included in the survey. Learners signed an informed consent or an assent form before completing the questionnaire. The questionnaire was in English and took about 20 minutes to complete under the supervision of the research team so that all the fields in the questionnaire were completed, hence no missing data. The research team consisted of a research coordinator and five trained fieldworkers.

Data analysis

Descriptive statistics were used to summarize the learners' demographic characteristics and their knowledge about HIV/AIDS. The Chi-square test was used to test for associations between gender, grade, age, and HIV knowledge score levels. To evaluate knowledge, we assigned a score of one (1) for a correct answer and zero (0) for incorrect and "not sure" answers. The knowledge score for each set of questions was then summed up to generate an overall score for each learner. The scores for HIV knowledge ranged from 1 to 10; for modes of transmission, scores ranged from 2 to 10; and from 0 to 6 for HIV prevention methods. The total knowledge score was calculated by adding the scores from each of the three sections of the knowledge questions, ranging from 9 to 26. *T*-tests were used to compare the differences in the mean knowledge on HIV/AIDS, modes of transmission, and HIV prevention by gender, grade, and age category. We also created a categorical variable for low and high HIV knowledge scores for bivariate analyses. Total knowledge scores from 0 to 15 were considered as low knowledge, while knowledge scores of more than 15 were considered as high knowledge. We also assigned a score of one (1) for every positive answer in the attitude towards positive learners' section and zero (0) for negative answers. Attitude scores ranged from 0-10, the mean score was determined and scores below the mean were considered as a negative attitude, and scores equal and more than the mean were considered as positive.

Bivariate logistic regressions were performed to establish whether there were any relationships between demographic variables and HIV knowledge scores, as well as between HIV knowledge score levels and attitudes towards HIV-positive learners. Attitude scores were computed and compared by gender, grade, and age category. For the bivariate analyses, we calculated unadjusted odds ratios (OR) at 95% confidence intervals (CI). *P*-values <0.05 were considered statistically significant. STATA (version 10) statistical software was used for data analysis.

Ethics

The study was conducted after obtaining ethical approval from the Research and Ethics Committee of the University of Limpopo, Medunsa Campus (MREC/H/215/2012: PG).

Results

Description of study participants

The demographic characteristics and sexual behaviour of the learners are presented in Table 1. The sample consisted of 2970 high school learners. Their ages ranged from 14-27 years; almost all 2591 (92.3%) of the learners were aged 14-19 years. The mean age of the learners was 17.4 years. There were slightly more girls (1632; 55%) than boys. The majority of learners were in grade 11.

Sexual activity in the past year

The results show that the majority of learners (2370; 79.8%) had sexual partners and two thirds (1810; 61%) have had sex before, (878 females; 48.5%) and (932 males; 51.5%). The age, at which learners first had sex, ranged from 9-21 years with a mean of 15.6 years. Of the sexually active learners, 55% reported engaging in sexual activities in the three months prior to the survey. The learners were asked a single question as to whether they had ever tested for HIV, and half (1494; 50.3%) had tested 12 months prior to the survey, and slightly less than a third (860; 29.0%) would disclose their HIV results to other learners, while 1258 (42.5%) would disclose it to the teachers (Table 1).

HIV knowledge of learners

Table 2 shows the percentage of learners who provided correct answers to HIV knowledge questions. HIV knowledge was assessed using 10-item questions with true and false responses. HIV knowledge was scored and categorised as low (0-5) and high (6-10), and the majority (87%) of the learners had high knowledge scores, whilst 13% had low scores. Concerning the individual items on HIV knowledge, 92.9% knew HIV to be the causative agent of AIDS; 76.7% knew that there was no cure for AIDS; 74.8% knew the difference between HIV and AIDS; 88.2% knew that having multiple sexual partners increases the transmission rate of HIV; 85.5% knew that having sexually transmitted infections also increases the transmission rate; and 87.1% knew that one cannot determine HIV status by simply looking at a person. Although the overall learners' knowledge about HIV was high for some items, it was of concern that their knowledge on HIV/AIDS treatment was very low. Two thirds (62.3%) believed that there is a vaccine against

HIV, and 23.3% believed that there is a cure for AIDS. With regards to the meanings of common HIV/AIDS concepts; 17.9% did not know that HIV means Human Immunodeficiency Virus and 30.7% did not know that AIDS means Acquired Immunodeficiency Syndrome. Misconceptions were also noted among the surveyed learners: 25.3% were of the view that a person who is HIV-positive has AIDS and 12.9% believed that one can tell by looking at a person that he or she has HIV or AIDS.

The mean of the total correct HIV/AIDS knowledge scores of all the learners on a 10-item test was M=7.34 (SD=1.58). The results showed no significant difference in terms of total mean score between male and female learners.

Knowledge of learners about HIV transmission modes

The percentage of learners who provided correct answers to the questions on the mode of HIV transmission is presented in Table 2. The study showed that 98.6% of the learners had a high total knowledge score on the modes of HIV transmission. They knew that the most common routes of HIV transmission are sexual contact (97.3%), mother-to-child transmission (63.1%), breastfeeding (79.3%), and through sharing of needles and syringes (86.6%). Of importance is that they also knew that HIV cannot be transmitted by shaking hands with an HIV-positive person (97.2%), by drinking from the same glass (93.4%), or by sharing a toilet with an HIV-positive person (96.1%). They also knew that sneezing or coughing (86.5%) and hugging an HIV-positive person could not transmit HIV (98.6%). However, some misconceptions about HIV transmission through casual contact were observed among learners; 13.5% believed that HIV could be transmitted through sneezing or coughing, through hand-shakes (2.79%), sharing a glass (6.57%), and sharing a toilet (3.94%) with HIV-infected persons. Learners were also less certain about mother-to-child transmission of HIV; 36 9% were not aware that a pregnant woman could transmit HIV to her baby. There were statistically significant differences in the learners' knowledge about the modes of HIV transmission according to school grade. More than two thirds (27; 62.8%) of the learners in grade 10 had a lower score in the overall knowledge of modes of HIV transmission. Logistic regression showed that learners in grade 11 were two times more likely to have a high knowledge score on HIV transmission than learners in grade 10 (OR=2.31, p=0.014, CI: 1.18-4.50) (Table 5).

The mean of the total knowledge score on HIV transmission on a 10-item question was M=9.03 (SD= 1.04). There were significant gender differences in the mean score on HIV transmission

knowledge; females had a significantly (p = .000) higher total mean score (M=9.11, SD=1.00) than male learners (M=8.94, SD=1.09). There were also differences in the scores by age group: the younger age group (14-19 years) had a significantly (p=0.001) higher total mean score (M=9.05, SD=1.03) than the older age group (M=8.83, SD=1.14).

Knowledge of learners about HIV prevention methods

Table 3 shows the percentage of learners who correctly identified the methods of HIV prevention and control. The results showed that the overall knowledge of HIV prevention was high: 73.0% had a high knowledge score on HIV prevention (M =4.13, SD=1.17). The majority (90.6%) knew that condoms during sex offer protection from HIV, and 73.4% knew that being faithful to a partner also offered some level of protection. However, abstinence was not the most popular method of preventing HIV transmission among the learners, as only 66% stated that abstinence is the HIV prevention measure that they should practice. There were significant differences between female (59.2%) and male learners (40.8%) about following abstinence as a method of HIV prevention (OR=0.60, p=.001. CI: .517-.703). The logistic regression showed that the males were 40% less likely to be abstinent compared to the female learners. Learner grade was also significantly associated with a high knowledge score for HIV prevention; over half (51.9%) of the learners in grade 10 had a lower score in the overall knowledge for HIV prevention. Logistic regression showed that learners in grade 12 were three times more likely to have a high knowledge score on HIV prevention than learners in grades 10 and 11 (OR=2.99, p=0.000 0.001, CI: 2.21-4.04) (Table 5).

There were no significant gender differences in the HIV prevention total mean scores, though the younger age group (14-19 years) had a higher total mean score M=4.14, (SD=1.17) than the older age group M=4.01, (SD=1.19), although the level of significance was weak, (p=0.05).

Attitudes of learners towards HIV-positive learners and teachers

The attitudes of the learners towards HIV-positive learners and teachers were assessed using nine questions, and the scores ranged from 0 to 9 (M=7.10, SD=1.37). The results indicate that learners had positive attitudes towards HIV-infected learners and teachers: 74.6% had a positive attitude (scored equal or more than the mean score), while 25.4% had negative attitudes, and they scored less than the mean score. The majority of learners who had positive attitudes stated that they would continue their friendships with HIV-positive friends (91.8%), they would continue sharing food with HIV-positive friends (77.2%), they would become friends with HIV-positive

learners (85.3%), that HIV-positive learners should continue studying (92.5%), and that HIV-positive teachers should continue teaching (89.8%). The results also showed that learners exhibited negative attitudes on issues such as disclosure of HIV status, 21.9% were of the view that HIV-positive learners should not keep their status secret, and 20.2% were uncertain. Only a quarter (25.2%) would date HIV-positive learners, 35.6% would not, and 39.2% were uncertain (Table 4).

Gender was statistically associated with attitudes towards HIV-positive learners. Female learners exhibited positive attitudes compared to male learners (OR=0.48, p=0.000, CI: 0.41-0.57). The results also showed that learners in grade 12 were three times more likely (OR=3.24, p=0.000, CI: 2.36-4.44) to have positive attitudes compared with those in grade 10. When we compared learners with high and low scores on HIV knowledge, learners with high scores were two times more likely to exhibit positive attitudes compared to those with low scores (OR=2.21, p=0.000, CI: 1.43-3.43).

Having a high knowledge score on HIV prevention was also associated with positive attitudes towards HIV-positive learners (OR=2.10, p=0.000, CI: 1.76-2.50). Logistic regressions further showed that dating an HIV-positive learner was statistically associated with having a high knowledge score on HIV prevention (OR=1.30, p= 0.006, CI: 1.07-1.58); learners with high scores were 1.3 times more likely to agree with the statement that HIV-positive learners should keep their status secret compared to those with low scores (OR=1.30, p=0.001, CI: 1.11-1.54); and that learners with a high score were 1.8 times more likely to disagree with the statement that HIV-positive learners should be isolated (OR=1.85, p=0.000, CI: 1.57- 2.20). Other knowledge-related scores (HIV knowledge and HIV transmission modes) were not statistically associated with attitudes towards HIV-positive learners (Table 6).

Discussion

The study determined attitudes and knowledge of HIV/AIDS amongst high-school learners in grades 10-12. The results indicated that the knowledge scores for HIV were high, with a total mean score of 20.5 out of 26 points. Studies that observed high HIV levels of knowledge attributed these to the HIV/AIDS campaigns and educational programmes that were implemented over the years (Durojaiye 2011; Oppong & Oti-Boadi 2013). In South Africa, high levels of HIV knowledge could be attributed to, amongst others, the life orientation curriculum, which has been

a compulsory course in grades 8-12 since 1999. An evaluation of the LO program in 2005 showed that the LO classes are the most common sources of information on HIV/AIDS for learners, and that the majority of the learners learned the most about HIV/AIDS from these classes (Bhana et al. 2005). With regards to gender, there were differences in the total HIV knowledge mean scores; female learners had significantly higher scores than male learners, while similar differences in HIV knowledge between female and male learners in Ghana were observed (Asante et al. 2014). Studies conducted in Ethiopia found that male learners had more knowledge than females (Mulu et al. 2014; Oljira et al. 2013). We also found that learners in higher grades (11 and 12) were more likely to have high knowledge scores on the modes of HIV transmission and on the methods of HIV prevention than learners in grade 10.

The high level of HIV knowledge amongst high school learners in the current study is similar to that in studies conducted among university and college students in Nigeria, Ghana, and South Africa (Durojaiye 2011; Moodley & Phillips 2011; Oppong & Oti-Boadi 2013). This is an encouraging finding for the HIV educational programmes for high schools in South Africa, because generally HIV knowledge amongst students increases with age and level of education (Mulu et al. 2014). This general assumption suggests that the level of knowledge amongst learners in our study should be relatively lower than that found among university and college students. In contrast, our findings were higher than those reported among university students in Dahir Bar in Ethiopia (Mulu et al. 2014). An unexpected finding in our study is that the younger age group (14-19 years) had a significantly higher mean score for HIV knowledge than the older age group (20 years and above). These findings are contrary to findings from other studies (Oppong & Oti-Boadi 2013).

Consistent with other studies, there were some misconceptions about HIV infection resulting from casual contact with HIV-positive persons. The learners were of the opinion that sneezing or coughing, shaking hands, along with sharing utensils and toilet facilities with HIV-positive persons, could transmit HIV (Durongritichai 2012; Kumar et al. 2012; Mulu et al. 2014; Sallar 2009; Thanavanh et al. 2013). Misconceptions about HIV transmission may develop unrealistic attitudes about HIV/AIDS (Durongritichai 2012), which might hinder HIV prevention and safe sex practice (Mulu et al. 2014). According to Sallar, students who have a strong belief that HIV could be contracted through casual contact exhibit negative attitudes towards HIV-positive persons (Sallar 2009).

There was also some confusion about the difference between HIV and AIDS. For example, some of the learners were of the view that a person who is HIV-positive has AIDS, and they also incorrectly thought that one can determine HIV status by simply looking at a person, while some did not know that there is no cure for AIDS, and that a pregnant woman can transmit HIV to her baby. Results showing low levels of HIV/AIDS knowledge on certain HIV-related questions were reported in studies conducted among secondary school learners (Adeomi et al. 2014; Christiane et al. 2014; Durojaiye 2011; Kumar et al. 2012) and among university students (Mulu et al. 2014; Oppong & Oti-Boadi 2013). Some of the researchers attributed the low HIV knowledge to lack of formal HIV education in most schools, and most recommended a focused HIV education programme at school to bring changes in risky sex practices, along with knowledge and attitudes. Other countries could learn from the LO syllabus in South Africa, which was found to be the major source of HIV information for learners and has been successful in increasing knowledge about HIV/AIDS (Bhana et al. 2005; James et al. 2006), and most likely, the reason for the high HIV knowledge in the current study. Oljira and colleagues also attributed comprehensive HIV/AIDS knowledge of HIV to attending classes on HIV/AIDS and sexual matters at school. They determined that learners who attended such classes were more likely to have comprehensive HIV/AIDS knowledge compared to those who did not attend such classes (Oljira et al. 2013). These findings have implications for HIV prevention and suggest the need for focused efforts to provide learners with more information and education about methods to prevent the spread of HIV as well as the modes of transmission (Mulu et al. 2014).

The study found that whilst more than three quarters of the learners displayed positive attitudes towards learners and teachers who were infected with HIV on most of the issues like remaining friends with HIV-positive learners, sharing food with them, and that they should be allowed to continue attending school, over a third wanted HIV-positive learners to be isolated. Sallar also found that two thirds of their students believed that HIV-positive persons should be isolated (Sallar 2009), while Christiane and colleagues reported that over half of their students believed that HIV-positive students should not continue to study, and they were reluctant to sit in the same classroom with them (Christiane et al. 2014). Negative attitudes were also observed when it came to personal relationships with HIV-positive learners. More than a third of the learners in our study would not date HIV-positive learners, even though the majority would be friends with or continue their friendship with them. Learners with a high knowledge score on HIV prevention were more

likely to date HIV-positive learners than those with low scores. Consistent with other studies, female learners as well as those with high overall HIV knowledge scores had more favourable or positive attitudes towards HIV-positive learners (Asante et al. 2014; Mulu et al. 2014). We also found that learners in higher grades were more positive towards HIV-positive learners than those in lower grades. This study and other studies reported some misconceptions about HIV infection through casual contact, which might explain the learners' belief that HIV-positive persons should be isolated. They feared that having close contact with HIV-positive persons might put them at risk of contracting HIV (Christiane et al. 2014; Sallar 2009; Thanavanh et al. 2013). This is particularly true if they had to engage in a sexual relationship, as established in our study.

Negative attitudes towards and stigmatisation of HIV-positive persons result in delay in seeking HIV testing, treatment, and disclosure of HIV status for fear of discrimination (Sallar 2009; Thanavanh et al. 2013). The fact that over half of the surveyed learners were of the view that HIV-positive learners should keep their status secret signifies their attitude towards disclosure. The majority were unwilling to disclose their HIV-positive status in the event they tested positive. They felt that they would be stigmatized and discriminated by other learners and teachers. The fact that the learners fear stigma and discrimination is an indication of their personal beliefs and attitudes towards HIV-positive persons. In view of the fact that they are inclined to discriminate, they believed that if they tested positive, other learners would behave similarly. These findings have implications for the proposed roll-out of HIV testing and counselling at school because fear of stigma and discrimination is likely to affect the uptake of the program. On the other hand, these findings offer an opportunity for the development of interventions that seek to reduce stigma and discrimination as part of the implementation of HTC at school.

Limitations

The study is subject to a number of biases; the study was based on self-report of participants, which could lead to socially desirable responses given the nature of the subject under study. Learners could have under-reported their sexual activities and biases towards HIV-positive persons. Assurance of confidentiality of respondents' answers and the anonymity of the questionnaire might have minimized the social desirability of the responses. The strength of the study can be attributed to the relatively large sample and the representations of rural and urban schools.

Conclusions

The study showed that high school learners had high levels of HIV-related knowledge. However, the study also highlighted knowledge gaps and misconceptions in some areas of HIV transmission, prevention, and control. Learners in lower grades had low HIV knowledge, particularly in HIV prevention and transmission, which might predispose them to risky sexual behaviours, HIV infection, and unintended pregnancies. The study findings will serve as baseline data for the development of appropriate interventions at school. There is a need to improve sexual health education and prevention programs in school to reverse some of the knowledge gaps and correcting the misconceptions that were identified.

Misconceptions about HIV infections resulted in negative attitudes towards HIV-positive learners. The results showed that learners are inclined to discriminate or exhibit negative sentiments towards HIV-positive learners. The school remains the best place to implement specific and focused educational programs to empower learners to adopt positive attitudes and safe sexual behaviour to prevent HIV transmission early in life. The school is also in a good position to reduce stigma and discrimination through the development of appropriate interventions to assist learners to be accepting of HIV-positive persons.

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Table 1(on next page)

Demographic characteristics of high school learners

Table 1

Table 1: Demographic characteristics and sexual behavior of high school learners

Variable	Frequency	Percent
Gender		
Female	1632	55.0
Male	1338	45.1
Age groups		
14-19 years	2741	92.3
20 years and more	229	7.7
Grade		
Grade 10	1223	41.2
Grade 11	1345	45.3
Grade 12	402	13.5
Have sexual partner		
No	600	20.2
Yes	2370	79.8
Ever had sex		
No	1157	39.0
Yes	1810	61.0
Had sex past three months		
No	837	44.7
Yes	1035	55.3
Condom use during most recent sexual intercourse		
No	439	24.1
Yes	1382	75.9
Number of sexual partners in the past year		
One partner	1278	43.1
Two partners	600	20.2
More than two partners	671	22.6
Ever tested for HIV in the past year		
No	1476	49.7
Yes	1494	50.3
Disclose HIV status to other learners		
No	1031	34.8
Yes	860	29.0
Not sure	1074	36.2

Table 2(on next page)

Knowledge about HIVtransmission

Table 2

Table 2: Knowledge about HIV and modes of transmission among high school learners

	Correct response
HIV is the virus that causes AIDS *(True)*	2758 (92.9)
A person who is HIV-positive has AIDS *(False)*	2222 (74.8)
There is no cure for AIDS currently *(True)*	2278 (76.7)
There is no vaccine against HIV currently *(True)*	1106 (37.3)
Having a sexually transmitted disease can increase a person's risk of getting HIV *(True)*	2539 (85.5)
You can tell by looking at the person that they are HIV-positive *(False)*	2587 (87.1)
Having multiple sexual partners increases the risk of getting HIV *(True)*	2618 (88.2)
Meaning of **HIV**	2442 (82.2)
Meaning of **AIDS**	2059 (69.3)
Knowledge about modes of HIV transmission	
A pregnant HIV-positive woman can transmit HIV to her baby *(True)*	1873 (63.1)
A mother who is HIV-positive can infect her child through breastfeeding *(True)*	2355 (79.3)
HIV can be transmitted by sexual intercourse *(True)*	2886 (97.2)
HIV can be transmitted by sharing needles or syringes *(True)*	2573 (86.6)
HIV can be transmitted by blood transfusion *(True)*	2760 (92.9)
HIV can be transmitted by shaking hands with an HIV-positive person *(False)*	2887 (97.2)
HIV can be transmitted by drinking from the same glass of an HIV-positive person *(False)*	2775 (93.4)
HIV can be transmitted by sharing a toilet with an HIV-positive person *(False)*	2853 (96.1)
HIV can be transmitted by HIV-infected person while sneezing or coughing *(False)*	2569 (86.5)
HIV can be transmitted by hugging an HIV-infected person *(False)*	2927 (98.6)

Table 3(on next page)

HIV prevention knowledge

Table 3

Table 3: Knowledge about HIV prevention among learners in high school

Knowledge of learners about HIV prevention and control	Correct	Incorrect	Not sure
HIV can be prevented by using a condom	2688 (90.6)	145 (4.9)	134 (4.5)
HIV transmission can be avoided by remaining faithful	2178 (73.4)	326 (11.0)	463 (15.6)
HIV can be prevented by AIDS education	2178 (73.4)	326 (11.0)	463 (15.6)
HIV/AIDS can be controlled by taking ARVs	2828 (95.2)	46 (1.6)	96 (3.2)
Abstinence is the HIV prevention measure I should follow	1969 (66.3)	133 (4.5)	868 (29.2)

Table 4(on next page)

Attitudes towardsHIV-positive learners

Table 4

Table 4: Attitudes of high school learners towards HIV-positive learners

Variables	Agree	Disagree	Not sure
Learners with HIV should be allowed to attend school	2746 (92.5)	88 (3.0)	136 (4.5)
Learners with HIV should be isolated	411 (13.9)	1901 (64.1)	656 (22.1)
HIV-positive learners should keep their status secret	1721 (58.0)	649 (21.9)	600 (20.2)
HIV-positive learners continue studying in school	2693 (90.7)	178 (6.0)	98 (3.3)
HIV-positive teachers should continue teaching	2666 (89.8)	138 (4.6)	166 (5.6)
If your friend is HIV-positive, would you continue your friendship?	2704 (91.8)	146 (4.9)	116 (3.9)
Continue sharing food with your HIV-positive friend?	2292 (77.2)	346 (11.7)	331 (11.2)
Date an HIV-positive learner?	826 (27.8)	1017 (34.2)	1127 (38.0)
Become friends with an HIV-positive learner?	2534 (85.3)	168 (5.7)	268 (9.0)

Table 5(on next page)

A ssociation between learnerdemographics and HIV related knowledge, transmission, and prevention

Table 5

Table 5: Logistic regression analysis showing association between learner demographics and HIV related knowledge, transmission, and prevention

	Unadjusted Odds Ratio	P>z	95% Conf. Interval
HIV/AIDS knowledge score			
Age	1.03	0.864	0.69-1.55
Gender	0.93	0.536	0.75-1.15
Grade 10	Ref		
Grade 11	1.19	0.129	0.94-1.50
Grade 12	1.07	0.658	0.77-1.50
Knowledge on modes of transmission score			
Age	1.11	0.856	0.34-3.63
Gender	0.70	0.265	0.38-1.29
Grade 10	Ref		
Grade 11	2.31	0.014	1.18-4.50
Grade 12	3.00	0.072	0.90-9.94
Knowledge on HIV prevention score			
Age	0.79	0.113	0.59-1.05
Gender	0.88	0.132	0.75-1.03
Grade 10	Ref		
Grade 11	1.61	0.000	1.35-1.91
Grade 12	2.99	0.000	2.21-4.04

Table 6(on next page)

Association between learner demographics,knowledge, and attitudes towards HIV-positive learners

Table 6

Table 6: Logistic regression analysis showing association between learner demographics, knowledge, and attitudes towards HIV-positive learners

	Unadjusted Odds Ratio	P>z	95% Conf. Interval
Age category	0.75	0.061	0.56-1.01
Gender	0.48	0.000	0.41-0.57
Grade 11	1.65	0.000	1.38-1.96
Grade 12	3.24	0.000	2.36-4.44
HIV knowledge	0.94	0.684	0.74-1.21
Knowledge on modes of transmission	3.14	0.000	1.71-5.74
Knowledge on HIV prevention	2.10	0.000	1.76-2.50
Total knowledge score	2.21	0.000	1.43-3.43
Ever tested for HIV	0.99	0.952	0.84-1.17
Disclose HIV status to other learners	0.89	0.027	0.81-0.98