

BMJ Open Effect of HIV-related knowledge on utilisation of voluntary HIV testing service among university students in Sub-Saharan Africa: a systematic review and meta-analysis protocol

Gedefaw Diress , Amanuel Addisu , Melese Linger Endalifer 

To cite: Diress G, Addisu A, Endalifer ML. Effect of HIV-related knowledge on utilisation of voluntary HIV testing service among university students in Sub-Saharan Africa: a systematic review and meta-analysis protocol. *BMJ Open* 2021;**11**:e045748. doi:10.1136/bmjopen-2020-045748

► Prepublication history and supplemental material for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2020-045748>).

Received 10 October 2020
Accepted 27 May 2021



© Author(s) (or their employer(s)) 2021. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

Public Health, Woldia University, Woldia, Ethiopia

Correspondence to

Gedefaw Diress;
gedefawdiress@gmail.com

ABSTRACT

Introduction Voluntary HIV testing is a vital preventive measure to reduce HIV transmission. Existing evidence on the association between HIV-related knowledge and HIV testing service utilisation shows inconsistent findings. Therefore, the aim of this review is to assess whether knowledge of HIV is related to improvement in voluntary HIV testing service utilisation among university students in Sub-Saharan Africa.

Methods and analysis A systematic review of studies on the association of HIV-related knowledge and voluntary HIV testing service utilisation among university students will be conducted. We will search several electronic databases, including PubMed/MEDLINE, African Journals Online, Web of Science and Cochrane Library, for all study types looking at the association between HIV-related knowledge and voluntary HIV testing service utilisation. Two reviewers will independently screen all retrieved records and full-text articles and extract data. The Higgins I^2 test will be used to assess heterogeneity between studies. Random-effects meta-analysis will be conducted, if feasible and appropriate. Additional analyses will be performed to explore potential sources of heterogeneity. Stata statistical software (V.14) will be used to analyse the data.

Ethics and dissemination Formal ethical approval is not required because the systematic review relies on primary studies. The results will be disseminated through a peer-reviewed publication, conference presentation and the popular press.

INTRODUCTION

HIV remains a major public health challenge worldwide. Globally, in 2018, about 37.9 million people living with HIV and the vast majority (57%) of people with HIV were found in Africa.¹ In Sub-Saharan Africa (SSA), an area disproportionately affected by the HIV epidemic, young and adolescents are among the groups most vulnerable to HIV infection. In SSA, almost half of new HIV infections are among the youth age group (15–24 years).²

For young and adolescents, university campuses are spaces of sexual initiation and

Strengths and limitations of this study

- This is a systematic review and meta-analysis of any epidemiological study design.
- The methods described apply to reviews of any association between knowledge of HIV and HIV testing service utilisation.
- The results will suggest concrete evidence on the importance of HIV education programmes in enhancing HIV testing uptake.
- Exclusion of papers not published in English may mean that important additional findings are missed.

risky sexual behaviours (having multiple sex partners, premarital sexual debut and unprotected sex).^{3,4} A very recent study in Rwanda showed that 21% of university students had multiple sexual partners, 16% of students pay for sex and 10% receive payment for sex. Unfortunately, only 15% of sexually active students used condoms consistently.⁵ Similarly, in Ethiopia, risky sexual behaviours among college and university students are common.^{6,7} This risky behaviour significantly increases the incidence of HIV infection and unsafe abortion among the young and adolescent segment of the population.^{8–11} One of the effective strategies for facilitating behavioural change in HIV prevention among these vulnerable populations is voluntary counselling and testing of HIV.

HIV testing is an important preventive measure in reducing HIV transmission as well as in getting early access to care and support. However, recent worldwide evidence confirmed only 79% of HIV-infected people knew their HIV serostatus,¹ which is far from the WHO target (to identify 90% of HIV-infected people in 2020).^{8,12} Similarly, majority of students at higher education institutions did not know their HIV serostatus

even though they are classified as risky populations and vulnerable to HIV infections.^{13–17} Recent studies done in SSA indicated that only 14%–19% of adolescents have been tested for HIV.^{2 18} This suggests HIV testing service utilisation is low among the young and sexually active segments of populations. Voluntary HIV testing service utilisation has a significant outcome on adolescent and youth healthy sexual behaviour, including decrease in unprotected sexual intercourse, reduction in multiple partners, increase in condom use and more clients with negative results choosing abstinence.¹⁹

Although risky sexual behaviours and HIV infections are increasing in SSA, there is still a great reluctance among the youth to be tested for HIV.^{11 20} There are several possible contributing factors that must be addressed if HIV testing is to have an important role in HIV prevention and care. Therefore, understanding the determinants of HIV testing service utilisation will have significant public health importance in Ethiopia. Although several studies in Africa have reported on a wide variety of different barriers to HIV testing service utilisation, HIV-related knowledge is the most fundamental factor to intervene.

Multiple studies have demonstrated the impact of HIV-related knowledge on HIV testing practice. However, there was inconsistent finding on the association between HIV-related knowledge and HIV testing service utilisation across studies. Several studies identified HIV-related knowledge as facilitators for HIV testing service utilisation,^{21–23} but few studies reported that HIV-related knowledge was a barrier to accepting HIV testing.^{24 25} Hence, this systematic review and meta-analysis will serve as a synthesis of evidence on the effect of improvements in HIV-related knowledge on HIV testing service utilisation. Therefore, the main objective of this systematic review and meta-analysis is to assess the effect of good knowledge of HIV on voluntary HIV testing service utilisation.

Research question

Does improving knowledge of HIV prove to be effective in promoting the uptake of voluntary HIV testing services among university students in SSA?

METHODS AND ANALYSIS

Protocol registration and reporting

This systematic review protocol is reported per the reporting guidance provided by the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols criteria.

Eligibility criteria

Studies will be selected according to the following study characteristics: study design, participants, exposure/interventions, comparators and outcomes (PICO framework).

Study design

All epidemiological studies (cross-sectional, cohort, case–control) and interventional studies reporting the

associations between HIV-related knowledge and voluntary HIV testing service utilisation will be included.

Population

We will include all types of university students in Africa irrespective of their age and type of university (public and private university).

Intervention/exposure

Studies assessing knowledge of HIV using all HIV knowledge measurement tools will be eligible. Different studies used different instruments for measuring HIV knowledge. We will include studies measuring knowledge of HIV using any questions about the modes of prevention and transmission, including unsafe sexual intercourse, unsafe blood transfusion, mother-to-child transmission, using contaminated sharp objects, and misconceptions such as eating together, shaking hands, mosquito bites and sharing toilets.^{26 27}

Comparators

The comparator group will be students who had poor knowledge of HIV.

Outcome measure

The main outcome of interest will be utilisation of voluntary HIV testing service. We will include all studies examining utilisation of HIV testing service voluntarily after university admission.

There are no language restrictions to using and including articles in this study. If the language used in an article is other than English, we will ask for a translator to translate the article. We will include studies carried out in SSA. Articles that met the criteria will be considered irrespective of their publication status, that is, published, unpublished or grey literature.

Exclusion criteria

Eligible articles with unclear reporting of the association between HIV-related knowledge and voluntary HIV counselling and testing will be excluded. We will also exclude former reviews and articles presenting different parts of the same study.

Information source and search strategy

Relevant literature will be searched using electronic databases such as PubMed/MEDLINE, African Journals Online,²⁸ Web of Science and Cochrane Library. To identify any additional unpublished work, grey literature will also be searched. Internet search using Google search engine and Google Scholar will also be conducted to look for relevant studies. We will perform hand searching of the reference lists of the included studies and relevant reviews to identify additional eligible papers. Every effort will be made to gather unpublished data when reports are available for full abstraction.

We will develop a search strategy using the following keywords in the research question: voluntary HIV counselling and testing, sexual and reproductive health service

utilisation, HIV-related knowledge, university students, and Africa. For each key concept, appropriate free-text words and medical subject headings (MeSH) will be developed. To develop a final search strategy, an initial limited search of MEDLINE will be undertaken and then we will analyse the text words contained in the titles and abstracts and of the index terms used to describe each article. We will conduct search of both thesaurus terms and terms in the title and abstract fields and other appropriate fields that may be available. The free-text words and MeSH terms will be used separately and in combination using Boolean logic operators: AND and OR. A full draft of the search strategy for PubMed/MEDLINE is provided in the online supplemental additional file.

We will search PubMed/MEDLINE using the following terms: (“Voluntary HIV counseling and testing” OR “HIV testing” OR “HIV testing*” OR “Voluntary HIV testing uptake” OR “Sexual and Reproductive Health Services” OR “Youth Friendly Reproductive Health Services”) AND (utilization OR use OR practice OR uptake) AND (“Knowledge on HIV” OR “HIV knowledge” OR Factors OR Determinants) AND (“University students” OR “Students”) AND (Africa OR “Sub-Saharan Africa”).

Two independent reviewers (GD and MLE) will implement the electronic search strategy in the following electronic databases between 25 February 2021 and 25 September 2021: PubMed, African Journals Online, Web of Science and Cochrane Library.

Screening and selection procedure

All retrieved titles and abstracts of identified articles will be imported into the software EndNote V.X8 (Thomson Reuters). Two independent reviewers (GD and AA) will conduct a systematic and stepwise selection of eligible studies, that is, screening of titles, abstracts and full texts. When the reviewers disagree, the article will be re-evaluated and, if the disagreement persists, a third reviewer (MLE) will make a final decision. Potential conflicts between the two reviewers will be resolved after consultation with a third reviewer (MLE) from the study team. A flow diagram presenting the study selection process will be prepared.

Data collection process

Using a pretested data extraction format, necessary data will be extracted by two investigators (GD and AA) and imported to Excel (Microsoft Office Professional Plus, 2013). This step will be pretested with four articles to test for feasibility and completeness. Any disagreements between the two reviewers on the extraction of data will be settled through discussion and consensus. In addition, variations will be resolved by involving a third reviewer (MLE). Numerous main categories and individual data, including first author, country where the study was conducted, study design, year of publication, sample size and effect size (OR, relative risk), will be extracted from

Table 1 Data extracted from included articles

Categories	Data extracted
Study characteristics	First author Year of publication Country where the study was conducted Study design
Samples	Sample size
Assessment of exposure	Knowledge of HIV using all HIV knowledge measurements
Statistical analyses and reported results	Type of statistical methods and analyses Measures of the strength of associations between HIV-related knowledge and HIV testing service utilisation (OR, relative risk, with SE and 95% CI) P values
Control of confounders	Potential confounder variables

all eligible articles (table 1). Corresponding authors will be contacted when relevant information is missing.

Outcome of interest

The outcome of this systematic review and meta-analysis will be the association between HIV-related knowledge and HIV testing service utilisation.

Risk of bias in individual studies (quality assessment)

To evaluate the quality of the included studies, we will use the Newcastle-Ottawa Quality Assessment Tool.²⁹ Using the tool as a protocol, two independent reviewers will evaluate the quality of the original articles. Those studies with medium (fulfilling 50% of quality assessment criteria) and high (≥ 6 out of 10 scales) quality will be included for meta-analysis.

Statistical analysis

Necessary data will be extracted from studies using Microsoft Excel (2013) format and then analysed using Stata (V.14) software, respectively. First, we will present qualitative data on the included studies. Second, if an adequate number of high-quality studies are retrieved, we will summarise the data using forest plot. Heterogeneity across the studies will be assessed using I^2 statistics.³⁰ If substantial heterogeneity ($I^2 > 50\%$) is detected across the studies, we will use a random-effect model to estimate the effect size based on DerSimonian and Laird.³¹ OR with 95% CI will be reported as an overall synthesised measure of effect size.

Meta-biases

Potential publication bias will be assessed subjectively by funnel plot (recommended when around 10 studies are included in the meta-analysis) and objectively using Egger’s regression test.



Confidence in cumulative evidence

The final results of the systematic review will be condensed in a Recommendations Assessment, Development, and Evaluation (GRADE) Evidence Profile. This table will contain the PICO question, the type and number of studies included, the number of participants in the studies, the effect sizes and their CIs, and the grading of the quality of evidence.

To evaluate the quality of the studies, we will use the Newcastle-Ottawa Quality Assessment Tool adapted to each study design. The tool has three indicators. The first section is graded out of five stars and assesses the quality of the methodology of a study. The second part of the tool is graded out of three stars and assesses the comparability of the studies. The last part of the tool is graded out of two stars and measures the quality of the original articles with respect to their statistical analyses. Using the tool as a protocol, two independent reviewers (GD and MLE) will evaluate the quality of the original articles. Studies with medium (fulfilling 50% of quality assessment criteria) and high (≥ 6 out of 10 scales) quality will be included for analysis.

Patient and public involvement statement

Patients were not directly involved in the design of this study. As this is a protocol for a systematic review, no participant recruitment will take place and participants will not be involved in the recruitment and dissemination of findings.

DISCUSSION

HIV testing and counselling is one of the public health interventions to reduce new HIV infections in SSA, most importantly among vulnerable populations. This planned systematic review and meta-analysis will explore the evidence available on the association between HIV-related knowledge and HIV testing service utilisation among university students in Africa. By summarising information about the effect of HIV-related knowledge on the utilisation of voluntary HIV testing services, the findings will provide directions for future HIV education programmes. The results of our study may also have implications for HIV testing service improvements being planned by university higher officials.

ETHICS AND DISSEMINATION

This article does not contain any studies with human participants or animals performed by any of the authors because it relies on primary studies. The results will be disseminated through a peer-reviewed publication, conference presentation and the popular press.

Contributors GD is the first and corresponding author. GD and AA conceived and designed the study. GD, AA and MLE will acquire the data. GD and AA will analyse and interpret the data. GD drafted the initial and final manuscript. AA and MLE performed critical revisions of the manuscript. All authors approved the final version of the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Gedefaw Diress <http://orcid.org/0000-0002-8616-0034>

Amanuel Addisu <http://orcid.org/0000-0003-3043-1816>

Melese Linger Endalifer <http://orcid.org/0000-0003-1505-2500>

REFERENCES

- UNAIDS. The global AIDS epidemic. Geneva; 2018.
- UNICEF. HIV and AIDS in adolescents, 2019. Available: <https://data.unicef.org/topic/adolescents/hiv-aids/>
- UNAIDS, UNICEF, WHO. Global AIDS response progress reporting 2013: construction of core indicators for monitoring the 2011 UN political declaration on HIV/AIDS. Geneva, Switzerland UNAIDS; 2013.
- Dingeta T, Oljira L, Assefa N. Patterns of sexual risk behavior among undergraduate university students in Ethiopia: a cross-sectional study. *Pan Afr Med J* 2012;12:33.
- Pierre G, Umutoni A, Nzeyimana Z, *et al.* Assessment of risky sexual behaviors among university students in Kigali, Rwanda. *IJHPBS* 2019;5:141.
- Mavhandu-Mudzusi AH, Asgedom Ttesfay. The prevalence of risky sexual behaviours amongst undergraduate students in Jijiga University, Ethiopia. *Health SA Gesondheid* 2016;21:179–86.
- Alamrew Z, Bedimo M, Azage M. Risky sexual practices and associated factors for HIV/AIDS infection among private college students in Bahir Dar City, Northwest Ethiopia. *ISRN Public Health* 2013;2013:1–9.
- Ethiopia Federal Ministry Of Health. National guidelines for comprehensive HIV prevention, care and treatment; 2017.
- Getu Melese K, Gebrie MH, Berta Badi M, *et al.* Unintended pregnancy in Ethiopia: community based cross-sectional study. *Obstet Gynecol Int* 2016;2016:4374791:1–5.
- Tilahun FD, Assefa T, Belachew T. Predictors of emergency contraceptive use among regular female students at Adama University, central Ethiopia. *Pan Afr Med J* 2010;7:16.
- Central Statistical Agency (CSA)[Ethiopia] I. Ethiopia Demographic and Health Survey(EDHS); 2016.
- Ethiopia Ministry of Health. HIV Prevention in Ethiopia National Road Map 2018 - 2020. Addis Ababa, Ethiopia; 2018.
- Malhotra S. Impact of the sexual revolution: consequences of risky sexual behaviors. *Journal of American Physicians and Surgeons* 2008;13.
- Abebe M, Tsion A, Netsanet F. Living with parents and risky sexual behaviors among preparatory school students in Jimma zone, South West Ethiopia. *Afr Health Sci* 2013;13:498–506.
- Yi S, Poudel KC, Yasuoka J, *et al.* Role of risk and protective factors in risky sexual behavior among high school students in Cambodia. *BMC Public Health* 2010;10:477.
- Chiao C, Yi C-C, Ksobiech K. Exploring the relationship between premarital sex and cigarette/alcohol use among college students in Taiwan: a cohort study. *BMC Public Health* 2012;12:527.
- Tagoe M, Aggor RA. Knowledge, behaviour, perceptions and attitudes of University of Ghana students towards HIV/AIDS: what

- does behavioural surveillance survey tell us? *J Health Hum Serv Adm* 2009;32:51–84.
- 18 Population Council HP. HIV voluntary counseling and testing among youth: results from an exploratory study in Nairobi, Kenya, Kampala and Masaka, Uganda, Washington, DC 2008.
 - 19 (UNAIDS) UNPoHA. The impact of voluntary counseling and testing: a global review of the benefits and challenges. Geneva, Switzerland; 2001.
 - 20 Celum C, Barnabas R. Reaching the 90-90-90 target: lessons from HIV self-testing. *Lancet HIV* 2019;6:e68–9.
 - 21 Tsegay G, Edris M, Meseret S. Assessment of voluntary counseling and testing service utilization and associated factors among Debre Markos University students, North West Ethiopia: a cross-sectional survey in 2011. *BMC Public Health* 2013;13:243.
 - 22 Dagne S, Agedew E, Misikir D, et al. Voluntary counseling and testing utilization and associated factors among Arba Minch university students, South Ethiopia. *J AIDS Clin Res* 2017;08.
 - 23 Tewabe T, Destaw B, Admassu M. Assessment of factors associated with voluntary counseling and testing uptake among students in Bahir Dar University: a case control study. *Ethiopian Journal of Health Development* 2012;26:16–21.
 - 24 Erena AN, Shen G, Lei P. Factors affecting HIV counselling and testing among Ethiopian women aged 15-49. *BMC Infect Dis* 2019;19:1076.
 - 25 Abdu OA, Teshome G, Dereje MM, et al. Knowledge, attitude, practice and associated factors of voluntary counseling and testing for HIV/AIDS among Wolkite university students in Ethiopia. *J AIDS HIV Res* 2017;9:98–105.
 - 26 Kotecha PV, Patel S, Makwana B, et al. Measuring knowledge about HIV among youth: a survey for Vadodara district. *Indian J Dermatol Venereol Leprol* 2011;77:252.
 - 27 Hughes AK, Admiraal KR. A systematic review of HIV/AIDS knowledge measures. *Res Soc Work Pract* 2012;22:313–22.
 - 28 African Journals OnLine (AJOL). Available: <http://www.ajol.info>
 - 29 Wells GA, Shea B, O'Connell D. Newcastle–Ottawa quality assessment Scale—Case control studies. Namibia Belia Vida Centre; 2017.
 - 30 Higgins JPT, Thompson SG, Deeks JJ, et al. Measuring inconsistency in meta-analyses. *BMJ* 2003;327:557–60.
 - 31 DerSimonian R, Laird N. Meta-Analysis in clinical trials. *Control Clin Trials* 1986;7:177–88.