



RESEARCH ARTICLE

What has comprehensive HIV/AIDS knowledge got to do with HIV testing among men in Kenya and Mozambique? Evidence from Demographic and Health Surveys

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Abstract

People living with undiagnosed HIV are big contributors to the transmission of the virus. Although measures have been made to scale up HIV prevention and voluntary counselling and testing in sub-Saharan Africa, testing coverage remains low in many sub-Saharan African countries, including Mozambique and Kenya, where most people live with HIV/AIDS. Studies have shown that, in most countries in sub-Saharan Africa, men are less likely to test for HIV compared with women. This study examined the relationship between comprehensive HIV/AIDS knowledge and HIV testing among men in Kenya and Mozambique. Data were from the men's re-code file of the Demographic and Health Surveys of Mozambique and Kenya. Binary logistic regression models were generated and the results presented as crude odds ratios (cOR) and adjusted odds ratios (aOR). The prevalences of HIV testing in Kenya and Mozambique were 80.1% and 46.7%, respectively. Men in Mozambique who had comprehensive HIV/AIDS knowledge (aOR=1.26, CI: 1.07–1.47) were more likely to test for HIV compared with their counterparts who had no comprehensive HIV/AIDS knowledge. In Kenya, men who had comprehensive HIV/AIDS knowledge (aOR=1.23, CI: 1.09–1.39) were more likely to test for HIV compared with their counterparts who had no comprehensive HIV/AIDS knowledge. This study found a statistically strong significant association between comprehensive HIV/AIDS knowledge and HIV testing among men in Kenya and Mozambique. To improve HIV testing rate among men, it is important that interventions are geared towards improving men's comprehensive HIV/AIDS knowledge, perhaps by expanding HIV/AIDS education programmes and campaigns. This could improve HIV testing rates and ensure the realization of the global HIV/AIDS target of 95-95-95 by the year 2030.

Keywords: HIV testing; Kenya; Mozambique

Introduction

The world has seen a significant reduction in the burden of new infections of HIV since the beginning of the 21st century (UNAIDS, 2015a). The virus has affected more than 76 million people, with almost 40 million people living with HIV across the globe as of 2016 (UNAIDS, 2017). Although the new infection rate has reduced by almost 40%, it remains a global health challenge with at least 35 million people still living with the virus in spite of this remarkable progress

(Wilson *et al.*, 2011; UNAIDS, 2014). Low- and middle-income countries continue to bear the largest burden of HIV cases and sub-Saharan Africa (SSA) accounts for almost two-thirds of people living with HIV (UNAIDS, 2017). The virus is a public health concern that needs to be tackled, and goal three of the Sustainable Development Goals (SDGs) seeks to end AIDS and other diseases including tuberculosis, malaria and neglected tropical diseases and combat hepatitis and water-borne diseases by 2030 (UNAIDS, 2018).

The virus has been destructive in SSA due to the existence of different strains of HIV, economic marginalization, poverty and sexually transmitted infections (STIs), coupled with opportunistic infections (Amuche *et al.*, 2017). The main mode of transmission is by sexual intercourse, and it occurs across all categories of the population, including children, young people, adults, women and men. However, there are new occurrences of HIV infections among men in the general population as well as female sex workers, people who inject drugs and men who have sex with men (National AIDS Control Council, 2014; UNAIDS, 2015b).

The reduced rate of new infections in many SSA countries is as a result of behavioural changes such as increased condom use, fewer sexual partners and delayed sexual debut among young adults (Ghys *et al.*, 2010). It is estimated that less than half of young adults worldwide have an error-free knowledge of HIV. Undoubtedly, there has been an improvement in knowledge and awareness of HIV transmission (Ghys *et al.*, 2010; UNAIDS, 2010). The virus has impacted negatively on the economies in the world, especially in SSA (World Health Organization [WHO], 2015). Although HIV-related deaths in SSA have declined and new infection rates have stabilized, only 45% of people in SSA know their HIV status and men are more likely to be unaware of their status than women (UNAIDS, 2014).

In SSA, males are less likely to access health services compared with females, as evidence suggests various challenges to the uptake of HIV testing. Individual factors such as gender norms, fear of results, stigma and discrimination, low perception of risk and fear of disclosure, as well as provider attitude and confidentiality, inadequate supplies and equipment, have been documented to hinder access to testing services (Sylvester *et al.*, 2010; Ziraba *et al.*, 2011; Shattuck *et al.*, 2013; Treves-Kagan *et al.*, 2017; Rhead *et al.*, 2019). People living with undiagnosed HIV, especially men, contribute significantly to the transmission of the virus (Hall *et al.*, 2012).

There is still no effective vaccine for HIV. However, measures have been taken to scale up HIV preventive measures and voluntary counselling and testing (VCT) among men in SSA. Despite this, testing coverage remains low among men in many SSA countries (Kharsany & Karim, 2016; Statistics South Africa, 2017). However, it has seen some improvement based on community and home-based HIV counselling and testing models (DiCarlo *et al.*, 2014; Hensen *et al.*, 2014, 2015). HIV testing, as an intervention in itself, underlies the effectiveness of most other prevention approaches (Sullivan *et al.*, 2012).

Historically, there is only limited self-testing rates available for men with HIV, and SSA is no exception, with the proportion of the male population receiving an HIV test and obtaining a test result in the last 1 year spanning from 1.6% in Niger to 41.7% in Eritrea (Instituto Nacional de Saude *et al.*, 2010). A focus on knowledge, prevention and treatment among men should greatly impact on mortality, new infections and the economic impact of HIV in SSA (Mills *et al.*, 2012). Mozambique has been severely impacted by HIV/AIDS (Gona *et al.*, 2020). It increased the number of adults undergoing HIV testing compared with baseline testing rate in 2003, but by 2009 only a minority of men (17.2%) reported ever receiving an HIV test and being aware of their status (WHO *et al.*, 2010). Mozambique is ranked amongst the highest in terms of HIV prevalence (Instituto Nacional de Saude *et al.*, 2010). It is among the ten countries in the world with the highest HIV burden and accounts for 8% of all new HIV infections in SSA, with HIV prevalence of 13.2% in adults aged 15–49 in 2009 (Mocumbi *et al.*, 2017).

Kenya is recognized as a priority in SSA and is one of its hardest hit countries, with almost 2 million people living with the virus (Kimanga *et al.*, 2014; Kharsany & Karim, 2016; UNAIDS, 2017). Nonetheless, about 84% of infected persons in Kenya were unaware of their HIV status in 2013, resulting in a call for universal access to HIV testing (Ng'ang'a *et al.*, 2014). HIV testing

has been part of many national household surveys, including the Kenya Demographic and Health Surveys (2003 and 2008–09) and the Kenya AIDS Indicator Survey (KAIS) in 2007. These surveys estimated that HIV prevalence in adults ranged from 6.3% to 7.4% (Kimanga *et al.*, 2014). The HIV incidence rate is currently 7%, with a number of new infections occurring almost always in specific key populations, including female sex workers, men who have sex with men and people who inject drugs (Kharsany & Karim, 2016; Bhattacharjee, 2019).

The UNAIDS 95-95-95 by 2030 targets are for at least 95% of the world population being made aware of their HIV status and an ‘AIDS-free generation’ (UNAIDS, 2014). This meant HIV/AIDS prevention and treatment campaigns focusing on other sub-population group, including women and children (Mills *et al.*, 2012). This means that fewer measures have directly targeted HIV prevention, testing and care at men in SSA (Mills *et al.*, 2012; Gunn *et al.*, 2016). While some studies on HIV among men in Kenya and Mozambique largely focused on their role in the Prevention of Mother to Child Transmission (PMTCT) services or oral self-testing, and less on men as HIV testing clients (Okal *et al.*, 2020) and men who have sex with men (Horth *et al.*, 2015), no previous study has assessed the comprehensive HIV/AIDS knowledge and testing of men in Kenya and Mozambique. The purpose of this study was therefore to assess the association between comprehensive HIV/AIDS knowledge and HIV testing among men in Kenya and Mozambique. It was hypothesized that there would be a positive association between comprehensive HIV/AIDS knowledge and the probability of being tested for HIV.

Methods

Study design and data source

The study utilized data from the men’s re-code file of the Demographic and Health Surveys of Mozambique in 2015 and Kenya in 2014. The DHS is a nationally representative survey that is conducted in over 85 low- and middle-income countries globally. It focuses on essential markers such as breastfeeding, fertility, family planning, immunization, HIV/AIDS, child health and nutrition (Corsi *et al.*, 2012). The survey employs a two-stage stratified sampling technique, which makes the data nationally representative. The study by Aliaga and Ruilin (2006) provides details of the sampling process. A total of 3395 men in Mozambique and 8433 men in Kenya who had complete information on all the variables of interest were included in the study. The Strengthening the Reporting of Observational Studies in Epidemiology’ (STROBE) statement was followed closely when writing the manuscript (Von Elm *et al.*, 2007). The dataset is freely available for download at: <https://dhsprogram.com/data/available-datasets.cfm>

Definition of variables

Outcome variable

The outcome variable was ‘HIV/AIDS testing’, derived from survey responses to the question ‘Have you ever tested for HIV?’ Responses were ‘Yes’ and ‘No’, and were coded as No=0 and Yes=1 (Seidu, 2020).

Independent variables

The main independent variable was ‘comprehensive HIV/AIDS knowledge, defined as: i) knowing that consistent use of condoms during sexual intercourse and having just one uninfected faithful partner can reduce the chance of getting an HIV infection; ii) knowing that a healthy-looking person can have the AIDS virus; and iii) rejecting the two most common local misconceptions about AIDS transmission or prevention (i.e. it is transmitted via mosquito bites or witchcraft/supernatural means). Comprehensive HIV knowledge was dichotomously coded Yes = 1 if a respondent demonstrated correct knowledge of all the preceding elements and No = 0 if a

respondent did not demonstrate correct knowledge of all the elements (Ochako *et al.*, 2011; Agegnehu *et al.*, 2020; Darteh, 2020).

Control variables

Eleven control variables were considered, broadly grouped into individual and contextual variables. The individual variables included age, employment status, marital status, educational level, frequency of reading newspapers/magazines, frequency of listening to radio, frequency of watching television, condom use and number of sexual partners. The contextual factors included wealth quintile and urban/rural place of residence. These variables were not determined *a priori*, but were based on parsimony, theoretical relevance and practical significance with HIV/AIDS testing.

Statistical analyses

The data were analysed with Stata version 14.0. The analysis was done in three steps. The first step was the computation of the prevalence of HIV testing in Mozambique and Kenya. The second step was a bivariate analysis that calculated the proportions of HIV/AIDS testing across the outcome variable with their significance levels (Table 1). The last step of the analysis was a binary logistic analysis, using the variables that were significant from the chi-squared test of fitness, which was carried out in a hierarchical order. Three models were used for the logistic regression analysis. The first model, Model I, looked at the bivariate analysis of comprehensive knowledge of HIV/AIDS and HIV/AIDS testing in Mozambique and Kenya. In Model II, individual variables were added to Model I. Finally, individual and contextual variables were added to form the complete model.

Results

HIV testing by explanatory variables in Mozambique

Table 1 shows HIV testing by explanatory variables in Mozambique. The overall prevalence of HIV testing among men in Mozambique was 46.7%. Apart from number of sexual partners, all the explanatory variables showed significant associations with HIV testing among men in Mozambique. More than half (55.3%) of the men who had comprehensive knowledge of HIV/AIDS tested for their HIV status. In Mozambique, the age groups of men with the largest proportions testing for HIV were 25–29 years (57.0%), 30–39 years (52.1%) and 55–59 years (51.8%). Less than half (49.1%) of men who were working had tested for HIV. A greater proportion of men who were cohabiting (57.3%) had tested for HIV than those of other marital statuses. The richest (67.9%), those with secondary/higher education (63.8%), those who read newspapers/magazines at least once a week (69.7%), those who listened to radio at least once a week (53.2%), those who watched television (64.6%), those who used a condom during sex (62.8%) and those residing in urban centres (59.0%) were the groups reporting the highest proportions of HIV testing. Also, less than half (49.3%) of the men with multiple sexual partners had tested for HIV.

HIV testing by explanatory variables in Kenya

Table 2 shows HIV testing by explanatory variables in Kenya. The overall prevalence of HIV testing in Kenya was 80.1%. All the explanatory variables had significant associations with HIV testing among men in Kenya. A large majority of the men who had comprehensive knowledge of HIV/AIDS (81.8%) had tested for HIV. In Kenya, the age groups of men with the largest proportions testing for HIV were 15–19 years (56.4%), 20–24 years (81.9%), 25–29 years (85.4%), 30–34 years (83.5%), 35–39 years (80.4%), 40–44 years (81.6%), 45–49 years (77.6%) and 50–55 years (75.5%). A greater proportion of men who were working (80.9%) and who were married (82.6%) tested for HIV than those who were not working or who were unmarried. The richest (86.3%),

Table 1. HIV testing by explanatory variables in Mozambique

Variable	Weighted <i>n</i>	Weighted %	Received HIV test	<i>p</i> -value
Comprehensive knowledge about HIV/AIDS				<0.001
No	1957	57.6	40.4	
Yes	1438	42.4	55.3	
Age				<0.001
15–19	413	12.2	26.4	
20–24	650	19.1	45.9	
25–29	507	14.9	57.0	
30–34	463	13.6	52.1	
35–39	381	11.2	52.1	
40–44	324	9.5	49.0	
45–49	283	8.3	41.5	
50–54	212	6.3	42.4	
55–59	162	4.8	51.8	
Employment status				<0.001
Not working	582	17.1	35.1	
Working	2813	82.9	49.1	
Marital status				<0.001
Not married	785	23.1	43.8	
Married	1206	35.5	37.0	
Cohabiting	1213	35.7	57.3	
Other	190	5.6	52.5	
Educational level				<0.001
No education	322	9.5	26.4	
Primary	1740	51.3	37.4	
Secondary/Higher	1333	39.2	63.8	
Frequency of reading newspapers/magazines				<0.001
Not at all	2258	66.5	37.6	
Less than once a week	639	18.8	60.9	
At least once a week	498	14.7	69.7	
Frequency of listening to radio				<0.001
Not at all	1056	31.1	34.7	
Less than once a week	716	21.1	49.8	
At least once a week	1623	47.8	53.2	
Frequency of watching television				<0.001
Not at all	1856	54.7	33.7	
Less than once a week	305	9.0	53.6	
At least once a week	1234	36.3	64.6	

(Continued)

Table 1. (Continued)

Variable	Weighted <i>n</i>	Weighted %	Received HIV test	<i>p</i> -value
Condom used during last sex				<0.001
No	2698	79.5	42.6	
Yes	697	20.5	62.8	
Number of sexual partners				0.194
One	1978	58.3	44.8	
Many	1417	41.7	49.3	
Wealth index				<0.001
Poorest	527	15.5	24.3	
Poorer	606	17.8	39.9	
Middle	583	17.2	41.3	
Richer	673	19.8	52.4	
Richest	1007	29.7	67.9	
Place of residence				<0.001
Urban	1435	42.3	59.0	
Rural	1960	57.7	37.7	
Total	3395	100.0	46.7	

those with secondary/higher education (85.4%), those who were exposed to newspapers at least once a week (85.7%), those who were exposed to radio at least once a week (81.3%), those who were exposed to television (83.8%), those who used a condom during sex (82.2%) and those residing in urban centres (84.4%) were the groups reporting the highest proportions of HIV testing. Also, a greater proportion (82.0%) of the men with one sexual partner tested for HIV than those with many sexual partners.

Binary logistic regression of the association between comprehensive HIV/AIDS knowledge and HIV testing

Table 3 shows the binary logistic regression of the association between comprehensive HIV/AIDS knowledge and HIV testing among men in Mozambique and Kenya. Men in Mozambique who had comprehensive HIV/AIDS knowledge (aOR=1.26, CI: 1.07–1.47) were more likely to test for HIV compared with their counterparts who had no comprehensive HIV/AIDS knowledge. Similarly, in Kenya, those who had comprehensive HIV/AIDS knowledge (AOR=1.23, CI: 1.09–1.39) were also more likely to test for HIV compared with their counterparts who had no comprehensive HIV/AIDS knowledge.

Discussion

This study examined the association between comprehensive HIV/AIDS knowledge and HIV testing among men in Kenya and Mozambique. The prevalence of HIV testing among men was higher in Kenya (80.1%) than in Mozambique (46.7%). Staveteig *et al.* (2013) reported similar but lower HIV testing prevalences for men in Kenya (40.4%) and Mozambique (17.2%). Other previous studies in Kenya (Cherutich *et al.*, 2012; Waruiru *et al.*, 2014) and Mozambique (De Schacht

Table 2. HIV testing by explanatory variables in Kenya

Variable	Weighted <i>n</i>	Weighted %	Received HIV test	<i>p</i> -value
Comprehensive knowledge about HIV/AIDS				<0.001
No	2146	25.5	75.1	
Yes	6287	74.5	81.8	
Age				<0.001
15–19	568	6.7	56.4	
20–24	1358	16.1	81.9	
25–29	1626	19.3	85.4	
30–34	1456	17.3	83.5	
35–39	1205	14.3	80.4	
40–44	1006	11.9	81.6	
45–49	623	7.4	77.6	
50–54	590	7.0	75.5	<0.001
Employment status				
Not working	503	6.0	67.4	
Working	7930	94.0	80.9	
Marital status				<0.001
Not married	2248	26.6	74.3	
Married	5505	65.3	82.6	
Cohabiting	236	2.8	81.1	
Other	443	5.3	77.8	
Educational level				<0.001
No education	188	2.2	48.0	
Primary	3945	46.8	75.9	
Secondary/Higher	4300	51.0	85.4	
Frequency of reading newspapers/magazines				<0.001
Not at all	2826	33.5	72.1	
Less than once a week	1818	21.6	80.8	
At least once a week	3789	44.9	85.7	
Frequency of listening to radio				<0.001
Not at all	361	4.3	68.7	
Less than once a week	618	7.3	72.2	
At least once a week	7454	88.4	81.3	
Frequency of watching television				<0.001
Not at all	1678	19.9	70.0	
Less than once a week	1417	16.8	78.3	
At least once a week	5338	63.3	83.8	

(Continued)

Table 2. (Continued)

Variable	Weighted <i>n</i>	Weighted %	Received HIV test	<i>p</i> -value
Condom used during last sex				<0.001
No	6002	71.2	79.3	
Yes	2431	28.8	82.2	
Number of sexual partners				<0.001
One	5171	61.3	82.0	
Many	3262	38.7	77.1	
Wealth index				<0.001
Poorest	960	11.4	69.0	
Poorer	1429	17.0	76.7	
Middle	1604	19.0	77.8	
Richer	2160	25.6	82.5	
Richest	2279	27.0	86.3	
Place of residence				<0.001
Urban	3990	47.3	84.4	
Rural	4443	52.7	76.3	
Total	8433	100.0	80.1	

et al., 2014; Horth *et al.*, 2015) also reported a lower prevalence of HIV testing among men than the present study. The variations in the prevalence figures could be attributed to the different periods in which the studies were conducted. Perhaps the high prevalence of HIV testing among men in the two countries recorded in the present study could be attributed to HIV testing intervention programmes implemented in these countries in the past few years.

In Mozambique, for instance, increased funding from foreign governments and international organizations has resulted in a significant increase in the number of health care units providing voluntary counselling and testing services (Yao *et al.*, 2014). Apart from the improved access to, and minimization of, structural barriers to HIV testing (Yao *et al.*, 2014; Ha *et al.*, 2019), the use of community-based advocacy and intervention programmes such as ‘Male Champions’ and male-to-male community health agents to counsel male partners on the importance HIV testing has also contributed to an increased HIV testing uptake among men in Mozambique (Audet *et al.*, 2016).

With regards to Kenya, increased HIV testing rates among men had been associated with interventions such as male involvement in Prevention of Mother-To-Child HIV Transmission (PMTCT) services (Osoti *et al.*, 2014), as well as the use of home-based voluntary counselling and testing services (Aluisio *et al.*, 2011; Waruiru *et al.*, 2014). Kenya and Mozambique are also beneficiaries of the US President’s Emergency Plan for AIDS Relief (PEPFAR), which has contributed immensely towards the management and prevention of HIV/AIDS, including scaling-up of HIV testing programmes in the two countries (El-Sadr *et al.*, 2012; Fauci & Eisinger, 2018).

Despite the relatively high rate of HIV testing uptake among men in Kenya and Mozambique, Kenya recorded a higher testing rate (80.1%) than Mozambique (53.3%). The high level of stigma towards people living with HIV/AIDS in Mozambique (20.7%) than Kenya (11.9%) (UNAIDS, 2017) might have contributed to the lower testing rate among men in Mozambique. Recent studies have shown that stigma continues to be one of the major barriers to HIV testing uptake among men in Mozambique (Ha *et al.*, 2019) and elsewhere in SSA (Hatzold *et al.*, 2019; Hlongwa *et al.*, 2020; Sullivan *et al.*, 2020). Meanwhile, high HIV testing uptake among men is important for the

Table 3. Binary logistic regression on the association between comprehensive HIV/AIDS knowledge and HIV testing among men in Mozambique and Kenya

Variable	Mozambique		Kenya	
	Model I cOR (95% CI)	Model II aOR (95% CI)	Model I cOR (95% CI)	Model II aOR (95% CI)
Comprehensive knowledge about HIV/AIDS				
No (Ref.)				
Yes	1.92*** (1.67–2.20)	1.26** (1.07–1.47)	1.56*** (1.40–1.75)	1.23*** (1.09–1.39)
Age				
15–19 (Ref.)				
20–24		2.12*** (1.58–2.83)		2.52*** (2.00–3.17)
25–29		3.16*** (2.24–4.47)		2.80*** (2.16–3.62)
30–34		3.17*** (2.18–4.60)		2.33*** (1.67–2.96)
35–39		3.73*** (2.52–5.53)		2.22*** (1.67–2.96)
40–44		3.77*** (2.53–5.61)		1.91*** (1.43–2.57)
45–49		2.62*** (1.74–3.93)		1.55** (1.14–2.10)
50–54		2.28*** (1.49–3.49)		1.34 (0.98–1.82)
55–59		3.66*** (2.33–5.74)		–
Employment status				
Not working (Ref.)				
Working		1.23 (0.98–1.55)		1.17 (0.93–1.47)
Marital status				
Not married (Ref.)				
Married		1.44* (1.06–1.94)		2.53*** (1.92–3.33)
Cohabiting		2.25*** (1.68–3.00)		2.94*** (1.90–4.55)
Other		1.44 (0.97–2.14)		1.40* (1.05–1.86)
Educational level				
No education (Ref.)				
Primary		1.45* (1.07–1.96)		2.09*** (1.64–2.67)
Secondary/Higher		2.69*** (1.92–3.75)		3.03*** (2.32–3.97)
Frequency of reading newspapers/magazines				
Not at all (Ref.)				
Less than once a week		1.40*** (1.13–1.74)		1.12 (0.96–1.31)
At least once a week		2.02*** (1.57–2.59)		1.42*** (1.22–1.65)
Frequency of listening to radio				
Not at all (Ref.)				
Less than once a week		1.20 (0.95–1.51)		0.95 (0.72–1.24)
At least once a week		1.08 (0.89–1.32)		1.17 (0.93–1.47)

(Continued)

Table 3. (Continued)

Variable	Mozambique		Kenya	
	Model I cOR (95% CI)	Model II aOR (95% CI)	Model I cOR (95% CI)	Model II aOR (95% CI)
Frequency of watching television				
Not at all (Ref.)				
Less than once a week		1.12 (0.82–1.53)		1.31** (1.11–1.55)
At least once a week		1.34* (1.02–1.77)		1.22** (1.05–1.43)
Condom used during last sex				
No (Ref.)				
Yes		1.69*** (1.36–2.10)		2.12*** (1.81–2.49)
Number of sexual partners				
One		–		
Many		–		1.11 (0.90–1.38)
Wealth index				
Poorest (Ref.)				
Poorer		1.25 (0.90–1.74)		1.21* (1.02–1.45)
Middle		1.74*** (1.26–2.39)		1.14 (0.95–1.36)
Richer		2.54*** (1.80–3.58)		1.20 (0.99–1.45)
Richest		3.74*** (2.50–5.61)		1.26 (1.00–1.59)
Place of residence				
Urban (Ref.)				
Rural		1.50** (1.18–1.91)		0.92 (0.81–1.05)
<i>N</i>	3395	3395	8433	8433
Pseudo <i>R</i> ²	0.019	0.162	0.007	0.081

p*<0.05; *p*<0.01; ****p*<0.001.

Ref. = reference category.

early initiation of treatment and to reduce the morbidity and mortality associated with the disease (Hatzold *et al.*, 2019). This calls for interventions to scale up HIV testing among men, especially in Mozambique where only 61% of men who have HIV know their status, compared with 88% in Kenya (UNAIDS, 2019).

In this study, comprehensive HIV/AIDS knowledge was found to be associated with a higher prevalence and odds of HIV testing among men in both Kenya and Mozambique. Specifically, men who had comprehensive HIV/AIDS knowledge in Kenya (81.8%) and Mozambique (55.3%) had higher odds of testing for HIV compared with their counterparts who had no comprehensive HIV/AIDS knowledge. This finding was significant, even after controlling for age, employment status, marital status, educational level, condom use, wealth quintile, type of residence and exposure to newspapers, radio or television. The findings support those of previous studies conducted in Uganda (Gage & Ali, 2005), Burkina Faso (De Allegri *et al.*, 2015) and Ghana (Nyarko & Sparks, 2020). One possible reason for this finding is that men with comprehensive HIV/AIDS knowledge are more likely to have higher education and increased access to

information from the media, as found in the present study and in previous studies in SSA (Asaolu *et al.*, 2016; Fleming *et al.*, 2019). Men with comprehensive HIV/AIDS knowledge are better informed about the importance of HIV testing and where to access an HIV test, which may increase their likelihood of getting tested (Bwambale *et al.*, 2008; Onsomu *et al.*, 2013; Fleming *et al.*, 2019). Conversely, low educational attainment and limited access to information on HIV/AIDS has been shown to be related to low levels of HIV/AIDS knowledge and its associated misinformation, misconceptions and stigma (Bwambale *et al.*, 2008; Sharma *et al.*, 2015; Mumtaz *et al.*, 2020), which are among the major barriers to HIV test uptake among men in Kenya and Mozambique (Fleming *et al.*, 2019). Thus, improving HIV/AIDS knowledge through the dissemination of information in communities could reduce the misconceptions, misinformation and stigma associated with the disease (Stephenson *et al.*, 2013). This could further improve testing rate among men in both countries.

This study's major strength was the use of nationally representative data. However, it had its limitations. First, data were limited to 2015 and 2014 DHS data, so HIV testing prevalence figures were limited to the periods for which these DHS data were collected. For example, new developments in the area of HIV testing such as the large-scale introduction of oral self-test HIV kits in Kenya in the year 2017 (UNAIDS, 2017) might have significantly changed the prevalence of HIV testing in the country. Secondly, the cross-sectional nature of the study did not allow for causality to be inferred from the findings. Additionally, HIV test self-reporting is subject to recall bias, which can result in under- or over-reporting. Finally, some factors related to culture and religion were not included in the analysis due to the absence of complete data on these variables in the datasets.

In conclusion, this study found a significant association between comprehensive HIV/AIDS knowledge and HIV testing among men in Kenya and Mozambique. Therefore, to improve the HIV testing rate among men in these countries, it is important that interventions are geared towards improvement in comprehensive HIV/AIDS knowledge, especially among men. This would ensure the realization of the global HIV/AIDS target of 95-95-95 by the year 2030 (Ajayi *et al.*, 2020). Also, ensuring that all men have access to comprehensive HIV/AIDS education could reduce the stigma and misinformation associated with the disease, thereby further improving HIV testing uptake.

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Ethical Approval. The DHS reports that ethical clearances were obtained from the Ethics Committee of ORC Macro Inc., as well as from the ethics boards of partner organizations in Mozambique and Kenya, including the Ministries of Health. The DHS follows the standards for ensuring the protection of respondents' privacy. ICF International ensures that the survey complies with the United States Department of Health and Human Services' regulations for the respect of human subjects. This was a secondary analysis of data and therefore no further approval was required since the data are available in the public domain. Further information about the DHS data usage and ethical standards are available at <http://goo.gl/ny8T6X>.

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