

The Relationship Between HIV Testing and HIV Transmission Risk Behaviors among Men in Cameroon

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Abstract

HIV testing stands out as a pivotal HIV preventive measure in the face of increasing HIV transmission risk behaviors. This study examined the relationship between HIV transmission risk behaviors and HIV testing among men aged 15 to 64 years in Cameroon. The dataset from the 2018 Cameroon Demographic and Health Survey (N=6978) were utilized. Chi-square tests examined the prevalence and association between HIV testing and HIV transmission risk behaviors. Multivariate logistic regression was fitted to predict the odds of HIV testing. About 58.7% had tested for HIV. Specifically, 55.8% of men who never tested for HIV were aged 15 and 24 years and 73% who never tested for HIV did not use a condom during their most recent sex. Remarkably, 27.3% of men aged 15-64 years who have never been tested for HIV also had multiple sexual partners, while 26.7% that never tested for HIV also did not use condom when engaging in paid sex. Regression results indicated that men aged 15-59 years who had multiple sexual partners (AOR=1.83, 95% CI=1.57-2.14, p<.001), a recent STI (AOR=1.40, 95% CI=1.18-1.66, p<.001), condom use during sex (AOR=1.30, 95% CI=1.10-1.53, p=.022) and paid for sex (AOR=1.19, 95% CI=1.01-1.41, p=.037), were associated with higher odds of testing for HIV compared to those who did not. HIV prevention efforts should focus on addressing the public health implications of unsafe sexual practices among men, devising innovative strategies for scaling up HIV testing among the vulnerable younger age groups and regions with lower HIV testing rates in Cameroon.

Keywords: *Cameroon, HIV/AIDS, HIV Testing, HIV Transmission Risk Behaviors, Men, Sexual Behaviors.*

Introduction

The best available evidence suggests that 75 to 85% of HIV infection are most likely acquired through sexual intercourse and majority of men living with HIV might have been infected through the penis [1]. Men serve as the primary conduits for the transmission of HIV to their partners, primarily attributed to their propensity for multiple sexual partnerships; yet compared to women, they are less likely to get tested for HIV [2-5]. Attaining viral suppression among people living with HIV (PLWH) begins with HIV testing and contributes to both HIV infection and HIV

transmission reduction [6]. HIV testing stands out as an important preventive measure, wielding substantial and enduring influence on the HIV epidemic. It holds a central position in the HIV care continuum, being the sole means of identifying individuals within a population who are unaware of their HIV-positive status. For men, this initial step is crucial in the linkage to essential services of prevention, care, and treatment [6]. The expansion of HIV testing, particularly among demographics with elevated HIV infection rates, emerges as an indispensable and economically viable component of comprehensive HIV prevention endeavours. HIV testing also serves as a cost-

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effective first step of comprehensive health services linking people to life-saving care.

Existing studies identified practices involving HIV testing, multiple sexual partnerships, and condom use with the most recent sexual partnerships as HIV transmission risk behaviours [3, 7]. Age, HIV testing, and educational status were identified as significant predictors of HIV transmission risk behaviours in a pooled study conducted across six southern African countries [7]. Similarly, some previous studies support the finding that age and education are predictors of HIV testing [5, 8]. One study among mostly young adults in Cameroon reported a 40% incidence of risky behaviours among participants self-identifying as not practising safe sex [9]. Other studies conducted in the United States have shown that PLWHs who are unaware of their HIV status are considerably more prone to engaging in behaviours that increase the risk of HIV transmission to their sexual partners, compared to those who are aware of their status [10-12]. Similarly, HIV transmission risk behaviours of PLWH who are unaware of their HIV status likely account for 54% of sexually acquired HIV infections [10, 13]. One study reported that the transmission rate from persons unaware of their HIV-positive status was 3.5 times compared to those who were aware of their HIV status [13]. In 2021, UNAIDS estimated that there were 38.4 million individuals globally living with HIV, with 5.9 million unaware of their HIV statuses [14]. Perhaps, HIV transmission risk behaviors may be common in the population unaware of their HIV status. This reiterates the need for decentralized and de-medicalized HIV testing for all age groups including men who patronize sex workers, and leads to questions about how to correlate HIV testing and HIV transmission risk behaviors. More recently, approximately 39 million individuals are living with HIV, but only 86% know their HIV status, and 28.5 million PLWH are located in sub-Saharan Africa where 70% of the global population of PLWH reside [7, 15].

The high population of PLWH may also be indicative of a high prevalence of HIV transmission risk behaviours in sub-Saharan Africa.

In Cameroon, the current HIV prevalence rate is estimated at 2.6% with deaths due to AIDS at 7,400 per year for a country with a 60.3 years life expectancy and a total population of 27.9 million people [16]. However, for the 2018 Cameroon Demographics and Health Survey (CDHS) study, the HIV prevalence data were derived from voluntary blood samples provided by individuals interviewed. Out of the 6,213 eligible men aged 15-49, 93% of men participated in HIV testing. Nationally, 2.7% of adults aged 15-49 tested positive for HIV, with a higher prevalence among women (3.4%) than men (1.9%), but the HIV positivity rate among young people aged 15-19 was less than 1% [17]. HIV prevalence increases with age, reaching its peak at ages 35-39 for both genders. Regionally, HIV prevalence among adults aged 15-49 varies in Cameroon, ranging from approximately 1% in the Far-North region to almost 6% in the South and East regions [17]. Notably, HIV prevalence is significantly higher among divorced/separated women (8.2%) or widowed women (18.4%) compared to married women (2.9%) [17].

As an important executor of the President's Emergency Plan for AIDS Relief (PEPFAR) in Cameroon, the Centers for Disease Control and Prevention (CDC) advances the UNAIDS 95-95-95 objectives within the country [16]. The program places a primary focus on ensuring that 95% of all persons living with HIV (PLHIV) are diagnosed, 95% of diagnosed individuals are on antiretroviral therapy (ART), and 95% of those on ART achieve viral suppression, across a wide range of age groups, genders, and sub-populations throughout Cameroon by the year 2025 [6, 16]. In pursuit of these targets, CDC actively assists Cameroon in amplifying efforts related to HIV prevention and testing, broadening the scope of targeted care and treatment services for individuals with

HIV, and bridging existing gaps in the availability of antiretroviral therapy. Earlier in 2015, Cameroon committed to the ambitious UNAIDS 90-90-90 target, striving to eliminate the AIDS epidemic by 2030 [6]. Already, five countries in sub-Saharan Africa namely; Botswana, Eswatini, Rwanda, the United Republic of Tanzania, and Zimbabwe have successfully reached the 95-95-95 targets in 2022 [15]. Cameroon is yet to do so but has undertaken various initiatives to ensure the provision of HIV services to all citizens, overcoming financial, social, and geographical obstacles to meet this important goal. Additionally, the country implemented key national policies addressing HIV/AIDS, including the Behavior Change Communication Strategy, the National Health Digital Strategy Plan 2020-2024, and the National Strategic Plan to combat HIV/AIDS and STIs for 2021-2023 [18]. Despite these efforts, challenges persist due to individual, socio-economic, community-level, and health system-related factors, hindering the optimization of the HIV prevention and care continuum. Resistance to undergoing testing, shortages of HIV test kits, stigma, failure to return to collect HIV test results, concerns about confidentiality and privacy are among the most prevalent obstacles to HIV testing in Cameroon [6, 19, 20]. Existing studies have not utilized a nationally representative sample, have not specifically targeted men's HIV transmission risk behaviors in Cameroon and have not correlated them with HIV testing. This study presents the best available evidence for HIV testing and HIV transmission risk behaviors in Cameroon.

Purpose of the Study

To enhance our understanding of the intricacies linked to HIV transmission risk behaviors and the primary determinants of HIV testing in Cameroon, it is essential to investigate the interplay between these variables and address existing gaps in the

literature. Consequently, this study aimed to explore the following research questions:

1. What is the prevalence and association between HIV testing, socio-demographic factors, and HIV transmission risk behaviors among men aged 15 to 64 years in Cameroon?
2. Does HIV transmission risk behaviors predict HIV testing among men aged 15 to 64 years in Cameroon?

Methods

Data Source

The 2018 Cameroon National Demographic and Health Survey (CDHS) is a comprehensive, nationally representative sample survey designed to furnish essential data for the ongoing monitoring of both population and health conditions in Cameroon [17]. The National Institute of Statistics (NIS), in partnership with the Ministry of Public Health, spearheaded the execution of the 2018 CDHS. Financial support for the survey was contributed by the Government of Cameroon, the United States Agency for International Development (USAID), the U.S. President's Malaria Initiative (PMI), the United Nations Population Fund (UNFPA), and the Global Fund through the National Malaria Control Program (PNLP). The Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC) funded a specific module on smoking. Technical assistance for HIV lab testing was provided by the Centre Pasteur du Cameroun (CPC), while the International Reference Centre Chantal Biya (IRCCB) played a crucial role in ensuring quality control for lab testing. The module on smoking received financial backing from SESRIC. The DHS Program, supported by USAID, extended technical assistance through ICF, contributing to the overall success of the survey. Data collection for the CDHS took place from June 2018 to January 2019. The study utilized a male questionnaire to gather information from eligible male participants

aged 15 to 64, focusing on modules covering HIV Knowledge, Attitudes, and Behavior and HIV transmission risk behaviours amongst other domains.

Sampling Design and Sample Size

This study is a secondary data analysis research study based on the primary dataset known as the 2018 CDHS [17]. Employing a stratified, two-stage cluster design, the survey utilized enumeration areas (EAs) as the first-stage sampling units. In the second stage, a complete listing of households was conducted and the average household size in Cameroon is five members, with women heading one-quarter (26%) of households. Additionally, nearly half (45%) of the household population is under the age of 15 [17]. In the 2018 CDHS, interviews were conducted with 6,978 men aged 15-64 from half of the chosen households, resulting in an impressive 98% response rate among men. The sample design of the 2018 CDHS allows for the generation of estimates at the national level, in urban and rural areas, and across 12 study domains, encompassing topics such as HIV Knowledge, Attitudes, and Behavior [17]. Measures for this current study were solely derived from the Man's questionnaire of the CDHS which was administered to all men aged 15-64 in the subsample of households selected for the men's survey. This extensive survey serves as a valuable resource for understanding and addressing demographic and health issues across the country.

Measures

Dependent Variables

The measures analyzed aim to evaluate the relationship between HIV testing and HIV transmission behaviours among men aged 15-64 in Cameroon.

HIV testing: this was assessed by asking the participants: "I don't want to know the results, but have you ever been tested for HIV?" This

variable was coded "yes" or "no" and was used as the dependent variable.

Independent Variables

HIV transmission risk behaviours were chosen because of their dominance in the literature and presence in the DHS dataset. Previous studies recognized several contributing factors to HIV transmission, including age groups. HIV transmission risk behaviours were assessed by asking participants the following items: (1) sexual partners excluding spouse, "In total, with how many different people have you had sexual intercourse with excluding your spouse?" (2) used a condom every time they had sex with the most recent partner in the last 12 months, "was a condom used every time you had sexual intercourse with this person in the last 12 months?" (3) paid anyone in exchange for sex, "have you ever paid anyone in exchange for having sexual intercourse?" (4) condom use every time they paid someone for sex. This was asked by asking the following questions: "Was a condom used during sexual intercourse every time you paid someone in exchange for having sexual intercourse in the last 12 months?" (5) Had any STI in the last 12 months: now I would like to ask you some questions about your health in the last 12 months. During the last 12 months, have you had a disease which you got through sexual contact? (6) Recent sexual activity, "When was the last time you had sexual intercourse with this person?" (7) Ever forced to perform unwanted sexual acts, "At any time in your life, as a child or as an adult, has anyone ever forced you in any way to have sexual intercourse or perform any other sexual acts when you did not want to? All these were coded as "yes" or "no". Age was assessed by asking participants: "How old were you on your last birthday? In the original survey, this was coded as 1=15-19 years old, 2=20-24 years old, 3=25-29 years old, 4=30-34 years old, 5=35-39 years old, 6=40-44 years old, 7=45-49, 8=50-54 years old, 9=55-59 years old, 10=60-64

years old.” In the current study, age groups were re-coded into four categories as 1=15-24 years old, 2=25-34 years old, 3=35-49 years old, and 4=50-64 years old.

Sociodemographic Characteristics

The socio-demographic characteristics included the following variables: region, ethnicity, resident type, marital status, education, employment, and religion. All these were used as control variables.

Data Analysis

SPSS version 29.0 was utilized to conduct all the data analysis in this study. The univariates were obtained using frequencies and proportions across all the sociodemographic characteristics. Bivariate analysis was conducted using chi-square tests to determine the association and estimate the prevalence between HIV testing and HIV transmission risk behaviours (e.g., age group, region, recent sexual activity, condom use with most recent partner, ever paid in exchange for sex, used condom every time they pay in exchange for sex, ever forced to perform unwanted sexual acts, number of sexual partners excluding spouse, and had an STI in the past 12 months). Multivariate analyses were obtained using three logistic regression models to predict an association between independent and dependent variables. First, we performed a multivariate logistic regression to assess whether there was an association between primary independent variables (age group, sexual partners excluding spouse, and condom use during the last sex with the most recent partner) and the dependent variable (HIV testing). In Model 2, we performed logistic regression to assess whether there was an association between the independent variable (paid anyone in exchange for sex) and the dependent variable (HIV testing). In Model 3, we performed logistic regression to assess whether there was an association between the independent variable (Had an STI in the last 12

months) and the dependent variable (HIV testing). In all three models, we controlled for sociodemographic characteristics. All the results from the three models were then summarized, and merged in one table, considering that the dependent variables for all three models were the same (HIV testing). The p-value of 0.05 was used to determine the statistical significance of this study.

Ethical Considerations

The 2018 CDHS was executed collaboratively by the National Institute of Statistics (NIS), in collaboration with the Ministry of Public Health of Cameroon [17]. The survey was funded by the Government of Cameroon, the United States Agency for International Development (USAID), the U.S. President’s Malaria Initiative (PMI), the United Nations Population Fund (UNFPA) and the Global Fund through the National Malaria Control Program (PNLP). *The Centre Pasteur du Cameroun* (CPC) provided technical assistance for HIV lab testing and the International Reference Centre Chantal Biya (IRCCB) provided quality control for lab testing [17]. The Inner-City Fund International (ICF) provides technical assistance through The DHS Program, which is funded by USAID. Based on The DHS Program's standard Demographic and Health Survey (DHS-7) questionnaires, questionnaires were modified to address population and health issues specific to Cameroon. The survey protocol underwent scrutiny and approval from the National Institute of Statistics (NIS), and the ICF Institutional Review Board. The 2018 CDHS was the 5th Demographic and Health Survey in Cameroon since 1991 [17]. The objective of the survey was to provide reliable estimates for HIV Knowledge, Attitudes, and Behavior, amongst other domains to assist policy and health stakeholders in evaluating and improving existing programs. Authorization to employ the CDHS data for this current research was obtained from the Department of Health

and Human Services (DHS) Inner City Fund International (ICF), securing approval on November 27th, 2023. The research participant datasets do not contain any personal identifiers.

Results

Descriptive Characteristics of the Participants

This table provides descriptive characteristics of the participants. The total sample size included 6,978 Cameroonian men aged 15 to 64 years. The participants were distributed across different regions of the country, with the highest representation in the

Centre without Yaoundé (12.7%), followed by the South (11.2%) and the Far North (9.9%). More than half of the participants lived in urban areas (53.1%), were between 15 and 34 years old (63.1%), were never married (48.4%), and identified as practicing Catholics (38.2%). Approximately 63.2% of the participants had at least secondary or higher education, and only 79.6% were currently working. Additionally, 58.7% of the participants reported having ever tested for HIV, while 41.3% never tested for HIV. Finally, the overwhelming majority of the participants reported being sexually active (80.4%), while only 19.7% reported not having been sexually active.

Table 1. Descriptive Characteristics of the Participants (n=6,978)

Variables	N	%
Region		
Adamawa	438	6.3
Centre (without Yaounde)	884	12.7
Douala	636	9.1
East	563	8.1
Far-North	688	9.9
Littoral (without Douala)	518	7.4
North	700	10
North-West	288	4.1
West	670	9.6
South	779	11.2
South West	156	2.2
Yaounde	658	9.4
Resident type		
Urban	3702	53.1
Rural	3276	46.9
Age group (years)		
15 – 24	2648	37.9
25 – 34	1757	25.2
35 – 49	1658	23.8
50 – 64	915	13.0
Marital status		
Married	2277	32.6
Never married	3380	48.4
Living with partner	938	13.4
Others	383	5.6
Highest level of education		

No education	687	9.8
Primary	1877	26.9
Secondary	3679	52.7
Higher	735	10.5
Employment status		
Not working	1422	20.4
Currently working	5556	79.6
Religion		
Catholic	2669	38.2
Protestant	1847	26.5
Other Christians	419	6.0
Islam	1566	22.4
Animist	214	3.1
Others	263	3.8
Ever tested for HIV		
Yes	4098	58.7
No	2880	41.3
Recent sexual activity		
Never had sex	1371	19.7
Sexually active	5606	80.4

The Prevalence and Association of HIV Testing Across HIV Transmission Risk Behaviors and Sociodemographic Characteristics

The chi-square test results showing an association and prevalence of HIV testing across HIV sexual risk behaviours and sociodemographic characteristics are shown in Table 2. The results indicate that age in 5-year groups ($p<.001$), region ($p<.001$), recent sexual activity ($p<.001$), STIs in the last 12 months ($p<.001$), number of sexual partners excluding spouse ($p<.001$), condom used during sex with most recent partner ($p<.030$), paid anyone in exchange for sex ($p<.037$), condom used every time they paid anyone in exchange for sex ($p<.022$), were significantly associated with HIV testing. Conversely, being forced to perform unwanted sexual acts ($p<.086$) was not significantly associated with HIV testing. The results indicate that 80.4% of the sample are sexually active, while 19.7% never had sex.

The prevalence findings show that 55% of participants between the ages of 15-24 years

never tested for HIV. Amongst those ever tested for HIV (58.7%), participants aged 25-29 years had the highest HIV testing rates (17%), while ages 55-59 years had the lowest HIV testing rate (5.1%) out of all age groups. Centre (13.5%), South (13.0%), Yaounde (12.3%), and Doula (11.4%) regions had the highest HIV testing rates, while Far North (16.8%) and North (15.2%) have the highest number of participants not testing for HIV. Sixty-three (63%) per cent of participants who never tested for HIV were sexually active. However, among the participants who ever tested for HIV (58.7%), those who were sexually active in the last four weeks (61.4%) had the highest prevalence of testing for HIV compared to those who were never sexually active but were not active in the last four weeks (30.7%). Only 30.3% of participants tested for HIV used a condom in their last sexual encounter with their most recent partner. Yet, 72.7% of participants were never tested for HIV and did not use condoms during sex with the most recent sexual partner. Out of the 12.4% of participants who

had paid anyone in exchange for sex (transactional sex), only 14.4% of the participants had ever tested for HIV. Seventy-two per cent of participants used condoms when they paid for sex, and 84.9% of them have been tested for HIV. A startling finding indicated that 26.7% of those who never used a condom every time they paid for sex were never tested for HIV. Although there is no significant association between ever being forced to

perform unwanted sexual acts and HIV testing, 3% of the participants who were ever forced to perform unwanted sexual acts had never been tested for HIV. Regarding STIs in the last 12 months and the number of sexual partners excluding spouses, 3.7% of the participants had an STI in the last 12 months and never tested for HIV, whereas 27.3% of participants had other sexual partners excluding their spouses but have never tested for HIV.

Table 2. The Prevalence and Association of HIV Testing Across Socio-demographic Characteristics and HIV Transmission Risk Behaviors

Variable	Ever tested for HIV		P-Values
	No (N=2880)	Yes (N=4098)	
Age group			<.001
15-19	1123 (39.0%)	408 (10.0%)	
20-24	483 (16.8%)	634 (15.5%)	
25-29	283 (9.8%)	695 (17.0%)	
30-34	214 (7.4%)	565 (13.8%)	
35-39	180 (6.3%)	494 (12.1%)	
40-44	161 (5.6%)	391 (9.5%)	
45-49	131 (4.5%)	301 (7.3%)	
50-59	122 (4.2%)	250 (6.1%)	
55-59	97 (3.4%)	208 (5.1%)	
60-64	86 (3.0%)	152 (3.7%)	
Region			<.001
Adamawa	249 (8.6%)	189 (4.6%)	
Centre (without Yaounde)	330 (11.5%)	554 (13.5%)	
Douala	168 (5.8%)	468 (11.4%)	
East	202 (7.0%)	361 (8.8%)	
Far-North	483 (16.8%)	205 (5.0%)	
Littoral (without Doula)	215 (7.5%)	303 (7.4%)	
North	438 (15.2%)	262 (6.4%)	
North-West	96 (3.3%)	192 (4.7%)	
West	265 (9.2%)	405 (9.9%)	
South	246 (8.5%)	533 (13.0%)	
South-West	36 (1.3%)	120 (2.9%)	
Yaounde	152 (5.3%)	506 (12.3%)	
Recent sexual activity			<.001

Never had sex	1048 (36.4%)	323 (7.9%)	
Active last 4wks	1090 (37.9%)	2517 (61.4%)	
Not active last 4wks	741 (25.7%)	1258 (30.7%)	
Condom use during last sex with most recent partner			.030
No	1188 (72.7%)	2431 (69.7%)	
Yes	446 (27.3%)	1055 (30.3%)	
Ever paid anyone in exchange for sex			.037
No	1605 (87.6%)	3230 (85.6%)	
Yes	227 (12.4%)	545 (14.4%)	
Condom used every time they paid someone in exchange for sex			.022
No	23 (26.7%)	28 (15.1%)	
Yes	62 (72.1%)	158 (84.9%)	
Ever forced to perform unwanted sexual acts			.086
No	934 (96%)	1564 (94.6%)	
Yes	30 (3.1%)	79 (4.8%)	
Had any STI in the last 12 months			<.001
No	2770 (96.2%)	3802 (92.8%)	
Yes	106 (3.7%)	283 (6.9%)	
Number of Sexual Partners excluding spouse			<.001
None	2092 (72.7%)	2203 (53.9%)	
One and more	787 (27.3%)	1883 (46.1%)	

Logistic Regression showing the Relationship between HIV Transmission Risk Behaviors and HIV Testing among Men Aged 15 to 64 Years in Cameroon

Table 3 indicates that age and HIV transmission risk behaviours that include the number of sexual partners excluding spouse, having any STI in the past 12 months, condom use during last sex, and paying anyone in exchange for sex, were significant predictors of

HIV testing among men aged 15 to 64 in Cameroon. Specifically, being between the age of 15-19 years old (AOR = 2.92, 95% CI = 2.29 – 3.73, $p < .001$) and 30-34 years (AOR = 6.94, 95% CI = 5.20 – 9.26, $p < .001$) was associated with higher odds of being tested for HIV. Having sexual partners excluding the spouse significantly increased the odds of HIV testing (AOR = 1.83, 95% CI = 1.57 – 2.14, $p < .001$). Using a condom during the last sexual encounter with the most recent partner

significantly increased the odds of HIV testing (AOR = 1.30, 95% CI = 1.10 – 1.53, $p = .002$). Furthermore, having been diagnosed with STI in the past 12 months was associated with higher odds of being tested for HIV (AOR =

1.40, 95% CI = 1.18 – 1.66, $p < .001$). Finally, having paid anyone in exchange for sex is also associated with an increase in the odds of testing for HIV (AOR = 1.19, 95% CI = 1.01 – 1.41, $p = .037$).

Table 3. Logistic regression model showing the relationship between HIV transmission risk behaviours and HIV testing among men aged 15 to 64 years in Cameroon

Variables	Model 1
	Ever tested for HIV
	AOR (95% CI)
Age group	
15-19	2.92 (2.29 – 3.73) ***
20-24	5.51 (4.24 – 7.14) ***
25-29	6.17 (4.69 – 8.11) ***
30-34	6.94 (5.20 – 9.26) ***
35-39	6.37 (4.72 – 8.58) ***
40-44	6.10 (4.44 – 8.37) ***
45-49	5.33 (3.85 – 7.37) ***
50-54	5.50 (3.88 – 7.79) ***
55-59	5.00 (3.43 – 7.28) ***
60-64	Ref
Sexual partners excluding spouse	
One or more	1.83 (1.57 – 2.14) ***
None	Ref
Had any STI in the last 12 months	
Yes	1.40 (1.18 – 1.66) *** *
No	Ref
Condom used during last sex	
Yes	1.30 (1.10 – 1.53) *
No	Ref
Paid anyone in exchange for sex	
Yes	1.19 (1.01 – 1.41) *
No	Ref

*= $P < .05$, **= $P < .01$, ***= $P < .001$, AOR = Adjusted Odd Ratio, CI = Confidence Intervals.

Model 1 = Ever tested for HIV is analyzed as an outcome variable.

Discussion

This study sought to assess the prevalence of HIV testing and investigate its relationship with specific socio-demographic factors and HIV transmission behaviors among men aged 15 to 64 in Cameroon. Our sample was a predominantly unmarried, urban dwelling, educated, highly sexually active, and younger demographic with a nearly equal proportion of

men who have been HIV tested and those who have never been tested for HIV. Consequently, our findings represent a noteworthy addition to existing literature, revealing crucial insights that underscore the significance of age and HIV transmission risk behaviors as key predictors of HIV testing among men aged 15 to 64 years in Cameroon.

The first noteworthy findings indicated that age was found to be significantly associated

with HIV testing. Consistent with theory, there was a significant association between age groups and ever testing for HIV in similar sub-Saharan African populations in Lesotho, Mozambique, Namibia, Zambia and Zimbabwe with the exception of South Africa, where HIV test uptake was not associated with age at first sex [7]. Among the participants tested for HIV, adolescents and young adults below 40 years make up a majority 68.4%, yet also account for 79.3% of the 2880 participants that never tested for HIV. Findings from previous studies ascribe the highest propensity for HIV transmission behaviors to this group of youth unaware of their HIV status [10, 12, 13, 21]. These youngest predominantly youth population that never tested for HIV may wield the most impact on HIV transmission and may very well constitute the main thrust of ending the HIV epidemic in Cameroon. Based on the complimentary finding that adolescents and young adults below 40 years also account for 61.5% of the participants who are sexually active in the last 4 weeks, and 73.4% of those who are sexually active despite not being active in the last 4 weeks of the study; there is need for the male youth population of Cameroon to be specifically targeted in the HIV care continuum.

Furthermore, our findings also indicate that for each 5-year increase in age, the odds of being tested for HIV increase significantly with the lowest odds at age 15-19 years. This suggests that the younger our participants were, the less likely they were to be tested for HIV and may pose the greatest threat of HIV transmission in the population. A previous study conducted among a similar demographic of young men in Cameroon, found that younger men aged 21-30 years were more likely to accept HIV testing but expressed concerns about cost and access to the HIV testing services [22]. Admittedly, only 25% of adolescents and young adults aged 15-24 years involved in this current study were aware of their HIV status. This is congruent with

previous studies that found that age was a significant predictor of HIV transmission and was also a predictor of HIV testing particularly among the youth population [3, 5, 7, 8, 23]. Given that school aged men 15-24 years constitute the highest proportion of those not tested for HIV in this demographic (55.8%), compared to other age groups, a scale up of HIV testing among this age cohort should be prioritized using expanded community and school health HIV testing mechanisms particularly in regions such as Far North, North, and Centre with the highest rate of not testing for HIV. A similar study among Cameroonian and Gabonese youth aged 15-24 years found that men were likely to exhibit higher HIV transmission risk behaviours such as multiple sex partnerships or non-spousal sex compared to women [24], whereas another study in Cameroon that evaluated the implementation of HIV testing services found that more men were HIV positive than women [25]. Quality improvement assessment to identify areas to channel more testing should be made an iterative priority at least every quarter of the year in this population.

Furthermore, we found that various HIV transmission risk behaviours, including recent sexual activity, condom usage with the most recent partner, engagement in paid sex, consistent condom use during paid sex, having multiple sexual partners, and experiencing an STI in the past 12 months, were all significantly associated with higher odds of HIV testing. The only exception to this association was found among individuals who had ever been coerced into performing unwanted sexual activities. Previous studies conducted among this demographic in Nigeria found similar significant associations with multiple sexual partners, condom use in the past, sex with non-steady partners in the past, and older age group [26]. In another comparable study, it was observed that men in the 21-30 age group exhibited greater receptivity to HIV testing particularly if it was free of charge, considering

it had become a commonly accepted practice, in contrast to their older counterparts [22].

In general, only 30.3% of individuals who have undergone HIV testing used condoms in their last sexual encounter with their most recent partner. However, among those who have never been tested for HIV, 72.7% never used condoms during their most recent sexual activity with their current partner. Another remarkable finding from this study is that 26.7% of individuals who fail to consistently use condoms when engaging in paid transactional sexual activities are never tested for HIV. Similarly, 27.3% of the participants who had other sexual partners excluding spouses were never tested for HIV. Similar studies conducted among urban and rural men in Tanzania, Uganda, and Zambia align with these findings but recommended the use of men's social networks to positively influence the HIV transmission risk behaviour of men who had a record of low testing [23, 27-29]. Men are more likely to undergo HIV testing when engaged in social networks with their peers. The propensity for HIV testing is influenced by the structural and compositional features of men's peer networks, as well as the prevailing norms within these networks. Given that stigma is also a correlate of HIV testing services utilization and hinders the use of testing services in sub-Saharan Africa, it is crucial to take steps to alleviate this obstacle which has been acknowledged by previous studies in Nigeria, and South Africa [30, 31].

In terms of HIV risk behaviors, we found that participants aged 15-59, who had multiple sexual partners, had a recent STI, used condoms during sex, and paid for sex, were significantly associated with higher odds of testing for HIV compared to those who did not. On the contrary, a similar study conducted in Ghana found that HIV testing uptake did not show a significant association with any of the factors related to sexual risk behaviour [3]. However, much like this current study, men who were sexually active and those with multiple sexual partners

were more inclined to undergo HIV testing compared to their counterparts [3]. Conversely, men who did not use a condom in their last sexual encounter were less likely to undergo testing compared to those who used a condom in the Ghanaian study [3]. Other studies with similar demographics also show significantly higher odds for risk behaviours such as condom use in the past, sexual exposure, and sex with non-steady partners [26]. These findings suggest that HIV testing within this demographic may serve both as a preventive measure for individuals who consistently use condoms and as a protective measure for those who do not consistently practice safe sex, either in routine sexual encounters or when engaging in paid transactional sex, presumably with sex workers.

Implications of the Study

The findings from this current study present a unique insight into the intricate relationship between HIV transmission risk behaviours and HIV testing and advance the crucial need to scale up HIV prevention in favour of those who are behaviorally vulnerable to HIV/AIDS such as adolescents and young adults. Considering that adolescents and young adults reach sexual maturity before they develop mental and emotional maturity and social skills [32, 33], it is necessary to expose the youth much early to family life and HIV education before potential exposure to HIV transmission risk behaviours. Evidence from this study suggests that there is a crucial need to improve acceptance of HIV testing and increase access to and the demand for HIV testing among those people behaviorally vulnerable to HIV such as men with a history of multiple sexual partners, men who pay for sex, and indeed people who have a prior episode of STIs. A lot of work still needs to be done to close the gap between those tested for HIV (58.7%) and those never tested for HIV (41.3%) in this demographic. One way of making progress in this regard is to move away from the standard HIV testing practice which is

the symptom-based HIV testing approach, create men's social networks with their peers, and adopt alternative HIV testing models such as the provider-initiated model, the decentralized and de-medicalized approaches which objectively scales up access to HIV test for everyone visiting any health facility.

Limitations and Strengths of the Study

During the data collection of the 2018 CDHS, research teams were restricted from accessing certain zones in the South-West because of security considerations. The data provided for this region may not accurately depict the overall situation but rather reflect conditions in urban areas. Consequently, caution should be exercised when interpreting data from the South-West region, and direct comparisons with data from other regions are not advisable. Considering that HIV disease is rooted in social and economic inequities and is still highly stigmatized, self-report surveys as used in this study may be prone to recall bias and social desirability bias. Also, the study design suggests that the current study cannot establish or infer a causal relationship between HIV testing and HIV transmission risk behaviours due to the study being cross-sectional in general. Conversely, this study boasts of a nationally representative sample and findings can be easily generalizable across Cameroon and other sub-Saharan African countries. This study presents the best available evidence regarding HIV testing and HIV transmission risk behaviours in Cameroon. Existing previous studies have not examined these variables and have not utilized the most recent CDHS dataset, as we did in this study.

Conclusions

The current study extensively examines the relationship between HIV transmission risk behaviours and HIV testing in Cameroon. Remarkably, 27.3% of men aged 15-64 years who have never been tested for HIV also had

multiple sexual partners, and 26.7% of men aged 15-64 years who have never been tested for HIV also do not use condoms when engaging in paid transactional sex. This group of men potentially perpetuate HIV transmission risk behaviors which undermine ongoing efforts to mitigate the surge in new HIV infections. This study recommends the adoption of men's social networks with their peers and the implementation of stigma reduction measures that will encourage HIV testing services utilization in this demographic. Barely one-quarter of adolescent and young adult men aged 15-24 years are aware of their HIV status in Cameroon. The youth population between ages 15-39 years in Cameroon constitutes a high proportion of the never tested and undiagnosed HIV demographic, with a high vulnerability to HIV transmission risk behaviours such as multiple sexual partnerships, inconsistent condom use, and patronage of paid sex. Overall, this study provides valuable insights required to strengthen existing and ongoing efforts to identify those unaware that they are living with HIV while scaling up HIV testing in Cameroon for specific youth and regions lagging in HIV testing services utilization.

Conflict of Interests

The author(s) declare that they have no competing interests.

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