Predictors of High HIV/AIDS Risk Sexual Behaviors: Comparison Study among Cameroonian and Gabonese Youth Aged 15-24 years

Minet Tesfai Hadish[1,2], Jing Mao[1], Guilan Gong[1], Berhe Tesfai Hadish[3] and Eyasu Habte Tesfamariam[4]

1   School of Nursing, Tongji Medical College of Huazhong University of Science and Technology, Wuhan, China
2   School of Nursing, Asmara College of Health Sciences, Asmara, Eritrea, Africa
3   Massawa Hospital, Zoba Semenawi Keyh Bahri, Ministry of Health of Eritrea, Massawa, Eritrea, Africa
4   Department of Epidemiology and Biostatistics, School of Public Health, Asmara College of Health Sciences, Asmara, Eritrea, Africa

Corresponding author: Jing Mao

✉ maojing@hust.edu.cn

Dean, School of Nursing, Tongji Medical College of Huazhong University of Science and Technology, 13Hang Kong Rd, Hankou, Wuhan, Hubei, China.

Tel: 00862783692635
Fax: 00862783692635

Abstract

Background: Cameroon and Gabon are among the most highly HIV/AIDS prevalent Central and West African countries with unwavering HIV epidemic. The spread of HIV, among youth in Gabon and Cameroon, is believed to be driven by unsafe heterosexual intercourse. However, no research has been done to investigate the predicting factors of risk sexual behaviors among the youth of the two countries. Therefore, the aim of this study was to investigate the predicting factors of high-risk sexual behaviors among 15-24 aged youth from Gabon and Cameroon.

Methods: This study used nationally representative datasets from Demographic and Health Surveys (DHS) of Cameroon (2011) and Gabon (2012). The study variables: non-spousal sex, multiple sexual partnerships, and paid sex were managed based on the MEASURE DHS online tools for HIV/AIDS survey indicators database. A total of 14,880 youth, of which 9511 (63.91%) from Cameroon and 5369 (36.08%) from Gabon were taken by probability proportional to size. SPSS version 22 was used to run a binary multivariate logistic regression.

Results: Of all the respondents, 67.9% of Cameroonian and 81.0% of Gabonese youth had history of sexual intercourse before the survey. Despite the difference by gender, 17.4% of Cameroonian and 21.3% of Gabonese youth had multiple sexual partners. Similarly, 33.9% of Cameroonian and 57.3% Gabonese youth reported non-spousal sex. On multivariate analysis, age, place of residence, educational level, religion, marital status, wealth index, occupation, comprehensive knowledge and attitude of respondents were significantly associated with non-spousal sex, multiple partnerships and paid sex. When comparing by gender, males were more likely to have high-risk sexual behaviors than their female counterparts in both countries.

Conclusion: The present study indicates that youth are at high risk to be contracted by HIV. Therefore, designing strategic plan focused on the sexual behavior of youth and investigating their self-protecting and health seeking behavior is crucial.

Keywords: HIV/AIDS; Risk sexual behaviors; Youth; Cameroon; Gabon

Background

HIV/AIDS is a global burden and Sub-Saharan Africa is the most affected region. A global estimate of HIV-infected people in 2014 was 36.9 million, out of which 25.8 million were living in sub-Saharan Africa [1]. In spite of the decrease of the new HIV infection by 41% in sub-Saharan Africa between 2000 and 2014, the infection rate in Cameroon and Gabon showed an unwavering pattern in which the prevalence of HIV/AIDS has increased from 4.3% in 2011 to 4.8% in Cameroon and a minimal decrease in

Gabon, from 4.1% in 2012 to 3.9% in 2014 [1-5]. In this regard, the Joint United Nations Program on HIV/AIDS (UNAIDS) in its program, the fragile window of opportunity to fast-track the AIDS response '2016 to 2020', has identified Gabon with the countries that need a focused action and Cameroon among the 35 countries in which special focus and scaled up efforts are needed [6].

Globally, youth are particularly affected by HIV and half of the new infections are among 15-24 years old youth [7,8]. Worldwide new HIV infection among youth in 2010 was 42% out of which 80% were living in sub-Saharan Africa [9]. Based on the world Health Organization (WHO) report, every day 6000 youth are infected with HIV [10]. Hence, the number of AIDS-related deaths among youth increased by 50% between 2005 and 2012 [11]. More specifically, in Cameroon, 2.7% of young women and 0.5% of young men were living with HIV in 2011 [12] and in Gabon, the percentage of young people aged 15 to 24 who were living with HIV was 1.5% in 2012 [13].

The spread of HIV in sub-Saharan Africa and specifically in Gabon and Cameroon is believed to be driven by unsafe heterosexual intercourse [14-19]. Unsafe sexual behaviors like multiple sexual partnerships, non-spousal sex, and sex with sex workers are common and are mentioned as the main reasons for the increased risk of HIV among youth [12,13,15,20,21]. For example in Cameroon, 29% of adult men and 6% of women and in Gabon 17.2% of adults had more than one sexual partner [12,13,20]. Having multiple sexual partners among singles is also very common. A study in Cameroon found that 21.3% of secondary school girls aged 10-19 years were sexually active and 43.6% of them had more than one sexual partners [21]. In Gabon, 73.04% of high school and college students were sexually active and only 25.62% of them used condom consistently with their casual partners [14]. Besides, non-spousal sex is another high-risk sexual behavior which aggravates the risk of HIV infection. One study in Cameroon revealed that the last sex of 21% of men was with non-spousal partners [15]. Non-spousal sex also disrupts the quality of relationship of the couples by leading to quarrels and may block open discussions between partners and that may further intensify the risk of HIV infections [22]. Paid sex is also a significant contributor to HIV/AIDS epidemic in Western, Central and Eastern Africa [19]. The percentage of sex workers living with HIV in Gabon (88.6%) and Cameroon (36.8%) was very high. Moreover, the low HIV test rates and inconsistent condom use among the sex workers exacerbates the infection among youth. For example, in Gabon, 40.5% of the sex workers got tested for HIV and only 57.9% of them used condom during their last client [13]. Similarly, in Cameroon, 62% of the sex workers got tested for HIV and 72.7% of them used condom with their last client [12]. Additionally, in Gabon and Cameroon, youth are sexually active before the age of 15. For example in Gabon, more than a quarter of boys aged 15 to 19 reported that their first sex was before age 15 [10]. In this context, sexually active Gabonese and Cameroonian youth are at high risk of contracting by HIV.

Reducing HIV-related risk sexual behavior among young people is the principal objective of UNAIDS for 2020 ambition; to make HIV-free generation [6]. This is because of the fact that young

people aged 15-24 are particularly vulnerable due to quick physical and psychosocial development in the history of HIV. Moreover, young people are key populations; expected to engage meaningfully and play their leadership role to lead the sustainable and effective response to end the HIV/AIDS epidemic [6]. It has been evidenced by countries with reduced HIV rates in which the most notable reductions have been among young people [10].

However, researchers in sub-Saharan Africa indicate that only a very small decrease in risk sexual behaviors against an increase in HIV epidemic [16]. Besides the national HIV/AIDS policies and programs of Cameroon and Gabon and the available small-scale studies found in Cameroon and Gabon are focused on awareness, prevention and treatment hence the behavioral change of youth remained unaddressed [12,13,15,20,23-32]. As a result, lack of sex and age disaggregated epidemiological and programmatic national and subnational data among youth have become a big challenge to develop intervention plans [6,15,20,29]. Generally, even though studies from other countries revealed that age, urban residence, education, wealth index, HIV knowledge and working status of youth are predicting factors of risk sexual behavior [18,19,33-36], in these two countries, sexual behaviors of youth are poorly addressed and no research has been done to investigate the predicting factors of risk sexual behaviors among youth.

Therefore, this study was aimed at presenting an epidemiological study that could transparently alleviate the gap by investigating the level and predicting factors of high-risk sexual behaviors, as well as comparing the variables by gender and country among 15-24 aged youth from Gabon and Cameroon. This is very significant and coincides with the 2020 ambition of the UNAIDS and the 2030 sustainable developmental goals [6]. To our knowledge, this is the first study that investigates the predicting factors of higher risk sexual behaviors among the youth of the two countries.

Method and Design

Data source

This study used DHS data conducted in Cameroon (2011) and Gabon (2012) which are the most recently available DHS data on the two countries as of January 2017 [37]. The DHS is a nationally representative household survey, which collects data on a wide range of health indicators including HIV/AIDS. It is conducted based on multistage cluster sampling method and by probability proportional to size which enables us to generate a nationally representative sample. First, geographic units commonly known as primary sample units (PSU) are sampled within the country, and then a random sample of households are selected with a known probability. Interviews are conducted with all women aged 15–49 and men 15 -59 who spent the previous night in the household.

During the collection of data, interviewers use a standardized questionnaire to gather information from participants in each country, providing an internationally accepted, comparable and consistent data among countries [38]. The data collection

method in DHS is defined and published elsewhere [18,38-40]. In this study, nationally representative sample of 14,880 youth 15-24 years old selected by probability proportional to size was filtered from the DHS data files of the two countries. Variables of risk sexual behaviors were selected and re-categorized based on the MEASURE DHS online tools for HIV/AIDS survey indicators database [40].

Measures

Independent variables

The explanatory variables of the survey respondents like level of education, place of residence, and wealth index were taken as they appeared in the DHS data files. The study used only the first two age groups, 15-19 and 20-24 from the seven 5 year groups created in the data. Marital status was re-categorized into three: never in union, currently in union and formerly in union. The religion of the respondents was recorded into four: Christian,

Muslim, other religion and no religion. The various categories of occupation in the two countries were also re-grouped into working and not working.

Definition of dependent variables

High-risk sexual behavior is defined as unsafe sexual intercourse with more than one who are neither a spouse/cohabiting partner nor one faithful partner [16,22]. In this regard, high-risk sexual behaviors included in this study were non-spousal sex, multiple sexual partners and sex with sex workers among youth.

Non-spousal sex: Youth who had the act of sexual intercourse with other than spouse or cohabiting partner in last 12 months. Cohabitation or free union (without formal marriage either legal or traditional) is common in Cameroon and Gabon. Hence, we included data of all youth who had married or cohabited at least once in the last 12 months. Non-spousal sex was a dichotomous variable in which coded 0 if the youth did not have history of non-spousal sex otherwise 1.

Table 1 Distribution of socio-demographic characteristics among youth.

		CAMEROON		GABON	
		Female (N=6708) N (%)	Male (N=2803) N (%)	Female (N=3407) N (%)	Male (N=1962) N (%)
Age					
	15-19	3590 (53.5)	1612 (57.5)	1834 (53.8)	1192 (60.8)
	20-24	3118 (46.5)	1191 (42.5)	1573 (46.2)	770 (39.2)
Type of residence					
	Urban	3585 (53.4)	1561 (55.7)	2476 (72.7)	1403 (71.5)
	Rural	3123 (46.6)	1242 (44.3)	931 (27.3)	559 (28.5)
Educational status					
	No education	771 (11.5)	134 (4.8)	76 (2.2)	44 (2.2)
	Primary	1984 (29.6)	754 (26.9)	872 (25.6)	492 (25.1)
	Secondary	3698 (55.1)	1770 (63.1)	2374 (69.7)	1389 (70.8)
	Higher	255 (3.8)	145 (5.1)	85 (2.5)	37 (1.9)
†Religion					
	Christian	5072 (75.8)	2066 (74.5)	2975 (87.4)	1459 (74.4)
	Muslim	1340 (20.0)	570 (20.6)	150 (4.4)	97 (4.9)
	Other religion	172 (2.6)	28 (1.0)	33 (1.0)	24 (1.2)
	No religion	110 (1.6)	108 (3.9)	247 (7.3)	381 (19.4)
†Marital status					
	Never in union	3637 (54.2)	2511 (89.6)	2188 (64.2)	1752 (89.3)
	Currently in union	2834 (42.2)	261 (9.3)	1083 (31.8)	174 (8.9)
	Formerly in union	237 (3.5)	31 (1.1)	136 (4.0)	36 (1.8)
Wealth index					
	Poorest	865 (12.9)	368 (13.1)	1156 (33.9)	681 (34.7)
	Poorer	1254 (18.7)	471 (16.8)	817 (24.0)	494 (25.2)
	Middle	1395 (20.8)	584 (20.8)	555 (16.3)	281 (14.3)
	Richer	1638 (24.4)	679 (24.2)	478 (14.0)	253 (12.1)
	Richest	1556 (23.2)	701 (25.0)	401 (11.8)	253 (12.1)
†Occupation					
	Not working	3428 (51.1)	808 (28.8)	2598 (76.3)	1088 (55.5)
	Working	3280 (48.9)	1995 (71.2)	809 (23.7)	874 (44.5)

† = indicates variables which are re-categorized to fit the difference in the two countries
- *Religion* was recoded into four groups: 'Christian'- (Catholic, Protestant, Methodist, Evangelical and Other Christians), 'Muslim', 'Other religion' - (Animist and other religions) and 'No religion'
- *Occupation* in the two countries was re-grouped to working (involving in different works) and not working
- *Marital status* was re-categorized into three: never in union, currently in union (married and living with partner) and formerly in union (widowed, divorced and separated or no longer living together)

Multiple partners: Number of sex partners, among those who ever had sex, in last 12 months. That was a binary variable in which those who had only one partner were coded 0 and those who ever had more than one partners in the last 12 months were coded as 1.

Men who had sex with sex workers: Men who had paid for sex to sex workers in the last 12 months. Data of women for sex with sex workers was not available in the DHS data files. Therefore, we analyzed only the available data of male youth. It was a binary variable coded 0 if the answer was no and otherwise 1.

Statistical analysis

The study used SPSS version 22 to analyze the DHS data. The distribution of respondents by key variables and the level of risk sexual behaviors in the two countries are presented as percentages in descriptive statistics. Binary logistic regression was used for multivariate analysis to examine the associations among the selected risk sexual behaviors. Odds ratio and 95 percent confidence interval were used to observe the associations and comparisons by taking p-values less than 0.05 as significant.

Ethics approval and consent to participate

The DHS survey is approved by the Institutional Review Board of ICF Macro in Calverton, Maryland, USA, and by the ethics committees in the ministry of Health of the countries. In all countries, DHS study participants give informed consent before participation. All information is collected confidentially by removing all the identifiers of the participants. Permission for use of the raw data in the present study has been obtained from ICF Macro Inc. in Calverton, Maryland, USA.

Results

Characteristics of respondents and level of risk sexual behaviors

Socio-demographic characteristics of the survey respondents are presented in **Table 1**. A total of 14,880 youth aged 15-24 years; 4765(32.0%) males and 10,115(68.0%) females were included. The mean age of the respondents' was in 19.15 ± 2.82 years. The percentages of sexual activity **(Table 2)** have some differences by gender that 4776 (71.2%) of females and 1680 (59.9%) of males from Cameroon, as well as 2787 (81.8%) of females and 1562 (79.6%) of males from Gabon had history of sexual intercourse before the survey. About 39% of Cameroonian boys and 10% of girls, as well as 34% of Gabonese boys and 14% of girls, had multiple sexual partners in the last 12 months. Similarly, above 57% of Gabonese and 34% of Cameroonian youth who ever married/cohabited at least once in the last 12 months, had reported non-spousal sex. Similarly, 6.5% of Cameroonian males and 3.3% of Gabonese males reported that they had sex with sex workers in the last 12 months.

Predicting factors of risk sexual behaviors among youth

Multivariate analysis of non-spousal sex: Table 3 presents the multivariate analysis of non-spousal sex in the last 12 months among youth against selected variables*. Cameroonian males with primary (AOR=7.12, p=0.020), secondary (AOR=6.72, p=0.025) and higher (AOR=22.37, p=0.029) educational level and formerly married youth were more likely to have non-spousal sex compared to youth with no education and currently married youth, respectively. Similarly, poorer (AOR=2.58, p=0.036), middle (AOR=3.30, p=0.0017), richer (AOR=3.98, p=0.026), and the richest (AOR=24.36, p<0.001) Cameroonian males and richer Cameroonian females (AOR=3.12, p=0.010), as well as Gabonese

Table 2 Level of risk sexual behaviors variables among youth.

Variables	CAMEROON			GABON		
	Female (N=6708) N (%)	Male (N=2803) N (%)	Overall (N=9511) N (%)	Female (N=3407) N (%)	Male (N=1962) N (%)	Overall (N=5369) N (%)
Had ever had sex						
No	1932 (28.8)	1123 (40.1)	3055 (32.1)	620 (18.2)	400 (20.4)	1020 (19.0)
Yes	4776 (71.2)	1680 (59.9)	6456 (67.9)	2787 (81.8)	1562 (79.6)	4349 (81.0)
†Number of sex partners						
Only one	3789 (89.9)	886 (61.4)	4675 (82.6)	2187 (85.6)	907 (65.8)	3094 (78.7)
Multiple	427 (10.1)	558 (38.6)	985 (17.4)	367 (14.4)	472 (34.2)	839 (21.3)
††Non-spousal sex						
No	2561 (83.4)	137 (46.9)	6285 (66.1)	829 (68.0)	79 (37.6)	2294 (42.7)
Yes	510 (16.6)	155 (53.1)	3226 (33.9)	390 (32.0)	131 (62.4)	3075 (57.3)
†††Men who had sex with sex workers						
No	-	1339 (93.5)	-	-	1506 (96.7)	-
Yes	-	93 (6.5)	-	-	52 (3.3)	-

† the percentage of number of sexual partners was only among those who have had sex in the last12 months
†† The percentage of non-spousal sex was calculated among those who ever married or cohabited at least once in the last 12 months
††† Only the percentages of men who have sex with sex workers in the last 12 months was included because data about women on that variable was not available

Table 3 Multivariate analysis showing associates of non-spousal sex in the last 12 months.

Variable	Cameroon						Gabon					
	Female			Male			Female			Male		
	OR	95% CI	P-value	OR	95% CI	P-value	OR	95% CI	P-value	OR	95% CI	P-value
Age (Ref=15-19)												
20-24	0.66	0.46-0.95	0.024	0.46	0.20-1.07	0.071	0.54	0.40-0.75	<0.001	1.08	0.42-2.77	0.880
Place of Residence (Ref=Rural)												
Urban	1.07	0.66-1.73	0.792	0.63	0.26-1.50	0.294	1.31	0.94-1.83	0.113	0.33	0.15-0.73	0.007
Highest Education level (Ref=No Education)												
Primary	0.97	0.45-2.08	0.939	7.12	1.36-37.38	0.020	0.65	0.23-1.80	0.402	5.54	0.84-36.68	0.076
Secondary	2.07	0.93-4.61	0.073	6.72	1.27-35.48	0.025	0.88	0.32-2.44	0.812	5.53	0.86-35.58	0.072
Higher	1.74	0.55-5.56	0.348	22.37	1.39-361.31	0.029	0.21	0.04-1.16	0.074	9.76	0.71-133.30	0.088
†Religion† (Ref=No religion)												
Christian	2.36	0.54-10.21	0.252	5.90	0.60-58.32	0.129	1.29	0.76-2.19	0.344	0.82	0.35-1.92	0.642
Muslim	0.52	0.11-2.52	0.418	2.96	0.28-31.43	0.368	0.09	0.03-0.32	<0.001	1.22	0.26-5.77	0.803
Other	2.33	0.29-18.66	0.426	13.41	0.30-603.02	0.181	0.96	0.25-3.64	0.952	3.06	0.27-35.21	0.369
†Marital Status (Ref=Currently in Union)												
Formerly married	7.99	5.03-12.70	<0.001	5.46	1.66-17.93	0.005	23.07	13.07-40.72	<0.001	-	-	-
Wealth Index (Ref=Poorest)												
Poorer	1.48	0.70-3.13	0.311	2.58	1.07-6.23	0.036	0.74	0.50-1.08	0.114	1.31	0.55-3.11	0.546
Middle	1.69	0.76-3.76	0.198	3.30	1.24-8.82	0.017	0.84	0.54-1.31	0.435	1.69	0.55-5.17	0.361
Richer	3.12	1.32-7.40	0.010	3.98	1.18-13.48	0.026	0.59	0.34-1.01	0.055	2.44	0.37-16.07	0.354
Richest	1.87	0.74-4.71	0.183	24.36	5.30-111.98	<0.001	1.20	0.60-2.39	0.608	1.14	0.23-5.73	0.876
†Occupation (Ref=Not Working)												
Working	0.81	0.57-1.15	0.240	1.47	0.39-5.61	0.573	1.02	0.75-1.39	0.911	0.98	0.42-2.26	0.962
††Comprehensive knowledge (Ref=No)												
Yes	1.07	0.74-1.57	0.714	0.46	0.24-0.88	0.020	1.70	1.20-2.40	0.003	1.18	0.52-2.66	0.688
†††Acceptance attitude (Ref=No)												
Yes	1.14	0.69-1.88	0.609	1.48	0.65-3.39	0.356	1.36	0.95-1.96	0.096	1.41	0.63-3.16	0.408

† = indicates variables which are re-categorized to fit the difference in the two countries
†† Comprehensive knowledge was defined as (1) knowing that both condom use and limiting sex partners to one uninfected faithful partner are HIV prevention methods, (2) being aware that a healthy looking person can have the AIDS virus, and (3) rejecting two most common local misconceptions (the two most common local misconceptions in Cameroon and Gabon were; that the AIDS virus can be transmitted through mosquito bites, and by supernatural means)
††† To assess acceptance attitudes of the respondents towards PLHA, respondents were asked if they would (1) be willing to care for a relative sick with the AIDS virus, (2) be willing to buy fresh vegetables from a market vendor who had the AIDS virus, (3) say that a female teacher who has the AIDS virus but is not sick should be allowed to continue teaching, and (4) not want to keep a family member's HIV positive status secret

females with comprehensive knowledge (AOR=1.70, p=0.003), were more likely to have non-spousal sex compared to the poorest, and with no comprehensive knowledge, respectively. However, Gabonese (AOR=0.66, p=0.024) and Cameroonian females aged 20-24(AOR=0.54, p=<0.001), Gabonese urban resident males (AOR=0.33, p=0.007), Gabonese Muslim females (AOR=0.09, p<0.001), and Cameroonian males with comprehensive knowledge (AOR=0.46, p=0.020) were less likely to have non-spousal sex compare to 15-19 age group, rural, no religion and with no comprehensive knowledge youth, respectively. On the other hand, occupational status and acceptance attitude of the participants did not show significant association with non-spousal sex.

Multivariate analysis of multiple sex partnership: Table 4 presents the multivariate analysis of multiple sex partnership of youth in the last 12 months. The 20-24 age group in Cameroonian (AOR=1.68, p<0.001) and Gabonese (AOR=1.51, p=0.001) males

had more multiple sex partners in the last 12 months compared to their 15-19 aged counterparts. Similarly, Gabonese males with primary (AOR=9.41, p=0.032), secondary (AOR=15.93, p=0.008), higher (AOR=27.44, p=0.003) and Cameroonian males with secondary (AOR=3.12, p=0.016) educational level were more likely to have multiple sexual partners than youth with no education. Formerly married females from Gabon (AOR=2.48, p<0.001) had more sexual partners than never in union youth. Increasing odds ratios of multiple sexual partners were seen in relation to an increase in wealth index among Cameroonian males from the poorer to the richest and females from the richer to richest compared to the poorest. In Gabon, only the richer males showed higher multiple sexual partners than the poorest. Related to occupation, working youth showed higher multiple sexual partners compared to not working youth. However, urban resident Cameroonian males (AOR=0.72, p=0.042), Gabonese Christian (AOR=0.71, p=0.018) and Muslim males (AOR=0.43,

p=0.011), currently married female youth from Cameroon (AOR=0.55, p=0.001) and Gabon (AOR=0.71, p=0.013) were less likely to have multiple sexual partners compared to rural, no religion, and never married youth, respectively. Comprehensive knowledge and acceptance attitude among all youth was not significantly associated with multiple sexual partnerships.

Multivariate analysis of sex with sex workers among males: Cameroonian formerly married males (AOR=5.68, p<0.001) were more likely to be involved in paid sex than never in union males **(Table 5)**. Similarly, the richer (AOR=3.29, p=0.015) and richest (AOR=3.35, p=0.027) and working (AOR=2.31, p=0.015) youth in Gabon were more likely to be engaged in sex with sex workers compared to the poorest and not working males, respectively. However, males with comprehensive knowledge in Cameroon (AOR=0.36, p=0.0001) were less likely to have sex with sex

workers than males with no comprehensive knowledge. The difference of age, place of residence, educational level, religion and acceptance attitude were not significant associated with paid sex among male youth.

Comparisons of sexual risk behaviors by country and gender: Comparing by country **(Table 6)**, Gabonese males (AOR=2.97, p<0.001) were more likely to have non-spousal sex than Cameroonian males. Similarly, Gabonese girls were more likely to have multiple sexual partners (AOR=1.54, p<0.001) and non-spousal sex (AOR=2.16, p<0.001) than Cameroonian females. However, multiple sexual partnerships and sex with sex workers did not show statistically significant difference between males of the two countries.

Comparing by gender **(Table 7)**, Cameroonian males were more likely to have multiple sexual partners (AOR=1.60, p<0.001) and

Table 4 Multivariate analysis showing associates of multiple sex partners.

| Variable | Cameroon | | | | | | Gabon | | | | | |
| | Female | | | Male | | | Female | | | Male | | |
	OR	95% CI	P-value	OR	95% CI	P-value	OR	95% CI	P-value	OR	95% CI	P-value
Age (Ref=15-19)												
20-24	1.11	0.78-1.59	0.557	1.68	1.31-2.16	<0.001	0.90	0.70-1.16	0.426	1.51	1.17-1.95	0.001
Place of Residence (Ref=Rural)												
Urban	0.84	0.52-1.35	0.466	0.72	0.52-0.99	0.042	1.07	0.80-1.43	0.668	1.08	0.80-1.47	0.609
Highest Education level (Ref=No Education)												
Primary	0.95	0.378-2.37	0.910	2.31	0.91-5.84	0.078	2.69	0.35-20.43	0.339	9.41	1.21-73.12	0.032
Secondary	1.27	0.49-3.25	0.624	3.12	1.24-7.86	0.016	3.42	0.45-25.80	0.234	15.93	2.08-122.20	0.008
Higher	2.09	0.69-6.29	0.191	2.06	0.73-5.83	0.173	4.77	0.57-40.02	0.150	27.44	3.13-240.29	0.003
†Religion† (Ref=No religion)												
Christian	2.84	0.38-21.28	0.309	0.92	0.51-166	0.779	0.70	0.45-1.08	0.108	0.71	0.53-0.94	0.018
Muslim	1.55	0.19-12.44	0.681	0.54	0.28-1.03	0.061	-	-	-	0.43	0.22-0.83	0.011
Other	2.93	0.24-36.01	0.402	4.11	0.74-22.95	0.107	0.83	0.26-2.64	0.752	0.41	0.12-1.36	0.145
†Marital Status (Ref=Never in Union)												
Currently married	0.55	0.38-0.79	0.001	1.14	0.83-1.56	0.427	0.71	0.53-0.93	0.013	1.12	0.77-1.63	0.538
Formerly married	1.72	0.91-3.26	0.097	1.21	0.53-2.76	0.658	2.48	1.60-3.82	<0.001	1.77	0.85-3.69	0.130
Wealth Index (Ref=Poorest)												
Poorer	1.16	0.49-2.75	0.741	1.88	1.14-3.12	0.014	1.00	0.72-1.38	0.980	1.11	0.80-1.55	0.541
Middle	1.31	0.53-3.3.25	0.554	1.89	1.13-3.16	0.015	1.26	0.88-1.82	0.209	1.16	0.78-1.72	0.479
Richer	2.65	1.05-6.69	0.039	2.13	1.22-3.71	0.008	1.01	0.66-1.55	0.956	1.73	1.14-2.61	0.010
Richest	3.00	1.16-7.79	0.024	3.42	1.92-6.09	<0.001	1.25	0.80-1.96	0.327	1.30	0.84-2.00	0.237
†Occupation (Ref=Not Working)												
Working	1.50	1.06-2.11	0.021	1.29	0.96-1.72	0.092	1.52	1.17-1.97	0.002	1.46	1.14-1.88	0.003
Comprehensive knowledge (Ref=No)												
Yes	0.82	0.57-1.17	0.272	0.85	0.67-1.08	0.189	0.94	0.71-1.25	0.669	0.85	0.65-1.10	0.216
Acceptance attitude (Ref=No)												
Yes	1.47	0.97-2.22	0.071	0.98	0.74-1.30	0.903	0.80	0.59-1.10	0.167	0.85	0.65-1.10	0.209

† = indicates variables which are re-categorized to fit the difference in the two countries

††Comprehensive knowledge was defined as (1) knowing that both condom use and limiting sex partners to one uninfected faithful partner are HIV prevention methods, (2) being aware that a healthy looking person can have the AIDS virus, and (3) rejecting two most common local misconceptions (the two most common local misconceptions in Cameroon and Gabon were; that the AIDS virus can be transmitted through mosquito bites, and by supernatural means)

†††To assess acceptance attitudes of the respondents towards PLHA, respondents were asked if they would (1) be willing to care for a relative sick with the AIDS virus, (2) be willing to buy fresh vegetables from a market vendor who had the AIDS virus, (3) say that a female teacher who has the AIDS virus but is not sick should be allowed to continue teaching, and (4) not want to keep a family member's HIV positive status secret

Table 5 Sex with sex workers among male youth.

Variable		Cameroon Male			Gabon Male		
		OR	95% CI	*P-value*	OR	95% CI	*P-value*
Age (Ref=15-19)							
	20-24	1.43	0.88-2.35	0.152	1.59	0.84-3.01	0.158
Place of Residence (Ref=Rural)							
	Urban	0.87	0.47-1.61	0.658	1.38	0.65-2.93	0.405
Highest Education level (Ref=No Education)							
	Primary	1.73	0.38-8.00	0.482	0.46	0.10-2.07	0.308
	Secondary	1.76	0.38-8.18	0.469	0.24	0.05-1.04	0.057
	Higher	0.38	0.03-4.76	0.453	0.00	0.00	0.998
†Religion† (Ref=No religion)							
	Christian	1.99	0.46-8.59	0.358	0.67	0.34-1.30	0.234
	Moslem	2.11	0.45-9.80	0.341	0.22	0.04-1.22	0.083
	Other	12.08	1.32-110.24	0.027	2.52	0.49-12.83	0.266
†Marital Status (Ref=Never in Union)							
	Currently married	0.86	0.47-1.59	0.634	0.99	0.40-2.42	0.978
	Formerly married	5.68	2.18-14.79	0.000	2.20	0.59-8.24	0.243
Wealth Index (Ref=Poorest)							
	Poorer	1.02	0.40-2.58	0.974	0.96	0.38-2.42	0.934
	Middle	1.62	0.66-4.00	0.297	1.96	0.76-5.06	0.165
	Richer	1.45	0.52-4.05	0.476	3.29	1.26-8.56	0.015
	Richest	1.57	0.54-4.59	0.410	3.35	1.15-9.80	0.027
†Occupation (Ref=Not Working)							
	Working	1.88	0.92-3.84	0.082	2.31	1.18-4.52	0.015
††Comprehensive knowledge (Ref=No)							
	Yes	0.36	0.20-0.64	0.001	0.55	0.25-1.18	0.125
†††Acceptance attitude (Ref=No)							
	Yes	0.81	0.44-1.50	0.511	0.58	0.27-1.24	0.161

† = indicates variables which are re-categorized to fit the difference in the two countries
††Comprehensive knowledge was defined as (1) knowing that both condom use and limiting sex partners to one uninfected faithful partner are HIV prevention methods, (2) being aware that a healthy looking person can have the AIDS virus, and (3) rejecting two most common local misconceptions (the two most common local misconceptions in Cameroon and Gabon were; that the AIDS virus can be transmitted through mosquito bites, and by supernatural means)
†††To assess acceptance attitudes of the respondents towards PLHA, respondents were asked if they would (1) be willing to care for a relative sick with the AIDS virus, (2) be willing to buy fresh vegetables from a market vendor who had the AIDS virus, (3) say that a female teacher who has the AIDS virus but is not sick should be allowed to continue teaching, and (4) not want to keep a family member's HIV positive status secret

Table 6 Comparison of sexual risk behaviors by country.

Variable	GENDER	Country	OR	95%CI	*P-value*
Multiple sex partners in the last 12 months	Male	Gabon *(Ref=Cameroon)*	0.97	0.80-1.19	0.787
	Female	Gabon *(Ref=Cameroon)*	1.54	1.21-1.95	<0.001
Non-spousal sex in the last 12 months	Male	Gabon *(Ref=Cameroon)*	2.97	2.51-3.51	<0.001
	Female	Gabon *(Ref=Cameroon)*	2.16	1.88-2.49	<0.001
Men having sex with sex workers in the 12 months	Male	Gabon *(Ref=Cameroon)*	0.72	0.46-1.12	0.145

Table 7 Comparison by gender.

Variable	Gender *(Ref=Female)*	Cameroon			Gabon		
		OR	95% CI	*P-value*	OR	95% CI	*P-value*
Multiple partners in the last 12 months	Male	5.19	4.18-6.45	<0.001	2.80	2.32-3.36	<0.001
Non-spousal sex in the last 12 months	Male	1.60	1.41-1.83	<0.001	1.27	1.11-1.46	0.001

non-spousal sex (AOR=5.19, *p*<0.001) than Cameroonian females. Gabonese males were also more likely to have multiple partners (AOR=2.80, *p*<0.001) and non-spousal sex (AOR=1.27, *p*<0.001) than their female counterparts.

Discussion

Levels of risk sexual behaviors among youth

Investing to reduce risk sexual behavioral of youth is vital to prevent HIV epidemic as evidenced by countries with decreased HIV rates [10]. However, high-risk sexual behavior was very high in this study in which about three-fourth of Cameroonian and one fifth of Gabonese youth had history of sexual intercourse before the survey. Despite the differences by gender, the level of multiple sexual partnerships, non-spousal sex, and paid sex among Cameroonian and Gabonese youth were very high in the last 12 months. Similar studies have reported high level of multiple sexual partners and non-spousal sex from Cameroon, sub-Saharan African countries, African and non-African countries and Jamaica [15,17-20,35].

In spite of the progress in time and implementation of different programs, the percentages of risk sexual behaviors in this study were higher than most of the findings from other studies [15,20,35,41]. This could be of different reasons, for example, Cameroon and Gabon are among the countries with the highest ethnic diversities and complex social and cultural variations in Africa in which Cameroon has 250 as well as Gabon has 40 ethnic groups [20,42,43]. Study findings evidenced that communities with higher ethnic diversities are found to be significantly associated with non-spousal sex [18]. Another most probable reason could be the national HIV/AIDS policies and programs in Cameroon and Gabon overlooks the case of youth and most importantly, the reproductive services are aimed to serve to the married individuals [12,13,20,23-25]. Additionally, internal migrations of young people for education or work is common that my lead youth to be away from their families so that they get chance to practice risk sexual behaviors and to involve in paid sex [18,19,44].

Predicting factors of risk sexual behaviors among youth

The effectiveness of HIV prevention program may depend upon the understanding of the policy makers to the predicting factors of high-risk sexual behaviors of the most at-risk part of the society [34]. In this study, age, place of residence, higher educational level, religion, marital status, wealth index, occupation, comprehensive HIV/AIDS knowledge and acceptance attitude towards people living with HIV/AIDS were significantly associated with most of the risk sexual behaviors among 15-24 aged Cameroonian and Gabonese youth.

The 20-24 age group males were more likely to have multiple sexual partners than their 15-19 age group counterparts. This result coincides with the findings of other similar studies [20,29,34]. In contrast, females aged 20-24 were less likely to have non-spousal sex compared to the 15-19 age group.

Even though the prevalence of HIV is believed to be higher in urban than in rural in Cameroon and Gabon [4,5], in this study, Cameroonian and Gabonese urban resident males were less likely to have non-spousal sex and multiple sex partners compared to their rural counterparts. However, paid sex was not significantly associated with type of residence. Findings regarding type of residence are inconsistent in which rural residents had higher risk sexual behaviors in Kenya and no significant association was found in Ivory Coast, Haiti, Tanzania and Uganda [19]. Other studies found that urban residents had higher risk sexual behavior compared to rural residents [15,18-20].

Multiple sexual partnership and non-spousal sex were significantly associated with increased educational level among Cameroonian and Gabonese males. This finding was congruent with the results of similar studies [15,18-20,29,31,34,45]. However, educational status among females did not show significant association with multiple sexual partnerships and non-spousal sex in this study. School enrollment was protective against females to be sexually active and to have multiple sexual partners [34,35]. Generally, actively involving at school and being goal oriented with an ambition of achieving higher education could be protective against high-risk sexual behaviors [34,35,46]. In this context, school-based behavior change interventions programs can be sought as it has been evidenced from other countries to reduce sexual risk behavior [36].

In this study, religion was found to be protective against non-spousal sex and multiple sexual partnerships among Gabonese youth. similar studies also reported that youth who were active attendants of religious services were less likely to engage in high-risk sexual activities [35].

Formerly married youth in both genders and in both countries were more likely to have non-spousal sex than currently married youth and had more multiple sexual partners (Gabonese females) and paid sex (Cameroonian males) than never in union youth. However, currently married females from both countries were less likely to have multiple sex partners. These results indicate that being formerly married is a predicting factor of high-risk sexual behavior. Studies found that formerly married were more likely to be infected with HIV than currently married [47]. This could be due to poverty or limited access to high-quality health care may lead them to engage in higher risk sex for exchange of drugs, money or to meet other needs among females [48]. Among men, separation and being away from home was associated with multiple sexual partnerships and non-spousal sex [49].

The wealth index was significantly associated with non-spousal sex, multiple sex partnership and paid sex among Cameroonian and Gabonese youth. This is consistent with the findings of other similar studies [15,18,20,29,31,35,45]. Moreover, studies suggested that some wealthy families may offer money to their sons/daughters which intern may lead them to experiment sex by engaging in high-risk sex [19]. The unsafe sexual behavior among wealthier youth may also be evidenced by the higher prevalence of HIV among the wealthiest quintiles and increased with wealth [5,50]. This indicates that wealthy youth are at high risk and need particular attention of public health interventions to decrease their risk sexual behaviors.

Working youth were more likely to have multiple sexual partners and paid sex than not working youth. Studies suggested that youth who are involved in different works for salary and away from home can have more rights and decision-making autonomy to engage in risk sex [33].

Having comprehensive HIV/AIDS knowledge showed inconsistent associations to risk sexual behaviors. Cameroonian males had less non-spousal sex and paid sex while Gabonese females had higher non-spousal sex than youth without comprehensive knowledge. Studies found that knowing about health risks alone could not lead people to change their behavior [47], instead, information exposure, use of information and experience of that information were significantly associated with behavior change [51]. This indicates that interventional health education can be best recommended to bring about behavior change. Surprisingly, acceptance attitude did not show any statistically significant association with all risk sexual behavior variables. However, studies reported similar results that there was no significant relationship found among attitudes toward HIV/AIDS and the degree of sexual behavior among university students in Kenya and the United States [52].

Comparison of sexual risk behaviors by country and gender

When comparing the countries by controlling all other variables, Gabonese youth were more likely to have high-risk sexual behaviors than Cameroonian youth. This might be explained by the fact that the percent of urban population out of the total, was higher in Gabon (86.2%) than Cameroon (52.1%) [42,43].The GDP per capita was lowest in Cameroon (2,300USD) as compared to Gabon (17,600USD) [42,43] as wealth is directly associated to have high-risk sexual behavior. Additionally, Cameroon is the first country to establish an important government intervention to fight against HIV/AIDS pandemic by the creation of the National AIDS Control Committee (NACC) in 1986 and later had undergone two national strategic plans from 2000 to 2010 [25,53,54]. Similarly, in Gabon, a five year national strategic plan was founded created in 2001 to establish therapeutic solidarity fund and in 2011 the government took another important strategic plan to fight against HIV/AIDS [13]. However these policies and programs were not focused on youth and the sexual behavior of youth remained unaddressed [12,13,20,23-25]. This can be evidenced by the high levels of risk sexual behaviors among youth **(Table 2)**. On the other hand, exposing to HIV can be intensified by the health seeking and self-protecting behaviors of youth [34]. Therefore, it is very important to investigate HIV testing and condom use experiences among youth to tackle the HIV epidemic.

Comparing by gender, Cameroonian and Gabonese males were more likely to have higher risk sexual behavior than females. This is consistent with the findings of other similar studies [17,18,34,55]. This can be due to the gender-based inequalities that male dominant cultures give sexual freedom to males and limit the ability of girls and women to protect their health and their ability to negotiate a safer sex [7,56]. Another reason can be the high consumption of alcohol among male youth that might increase the high-risk sexual behaviors of the males [15].

Conclusion

In spite of the differences by country and gender, the level of risk sexual behaviors in the present study was very high which was opposite to the ambition of UNAIDS for 2020. However, age, place of residence, educational level, religion, marital status, wealth index, occupation and comprehensive knowledge of respondents were found to be significant predictors of risk sexual behaviors among youth. Therefore, the results of this study can be fundamental foundation for the policy and program maker to design strategic plan focused on the sexual behavior of youth to address the different needs of the various social groups who are at high risk. It is also very important to investigate the condom use and HIV test experiences among youth to halt the HIV epidemic.

Limitations of the study

This study consists of some limitations related to the cross-sectional nature of the study; it looks at associations, not causes and effects. The DHS is a household-based survey, and hence excludes significant non-household population groups, like those living on the street or in institutions, for example, prisons, colleges or boarding schools, military barracks, refugee camps, which could have more risk sexual behaviors than the household population. Similarly, as the questionnaire is designed to collect self-reported responses, there could be recall biases and socially desirable responses and the missing data in the data files may affect the results.

Competing Interests

The authors declare that they have no competing interests.

Acknowledgement

References

1   UNAIDS (2015) World AIDS day: Fact sheet 2015: Geneva, Switzerland.

2   UNAIDS (2014) HIV and AIDS estimates: Cameroon: Geneva, Switzerland.

3   UNAIDS (2014) HIV and AIDS estimates: Gabon: Geneva, Switzerland.

4   La Direction Générale de la, S; I.C.F. International (2013) Prévalence du VIH/sida au Gabon : résultats de l'EDSG-II 2012.

5   L'Institut National de la, S; I.C.F. International (2012) HIV Prevalence in Cameroon: Finding from the 2011 DHS-MICS.

6   UNAIDS (2016) 2016–2021 strategy, on the fast-track to end AIDS.

7   WHO (2009) Women and health: Today's evidence tomorrow's agenda: World Health Organization.

8   UNAIDS (2012) Every minute, a young woman is newly infected with HIV.

9   UNAIDS (2012) Fact sheet on adolescents, young people and HIV/AIDS.

10   http://www.who.int/mediacentre/news/releases/who56/en/

11   http://www.avert.org/professionals/hiv-social-issues/key-affected-populations/young-people

12   Cameroun RD (2014) Rapport national de suivi de la declaration politique sur le vih/sida cameroun, in global aids response progress (garp), onusida.

13   GABONAISE R (2014) Rapport national sur la reponse Au VIH/SIDA 2014, Ministère de la Santé et de la Prévoyance Sociale.

14   Christiane NA (2014) HIV/AIDS prevalence, knowledge, attitudes and related behaviors among young people in Libreville, Gabon. Journal of Humanities and Social Science 19: 59-65.

15   Kongnyuy EJ, Wiysonge CS (2007) Alcohol use and extramarital sex among men in Cameroon. BMC Int Health Hum Rights 7: 1.

16   Oster E (2012) HIV and sexual behavior change: Why not Africa? J Health Econ 31: 35-49.

17   Wang W, Alva S, Wang S, (2012) HIV-related knowledge and behaviors among people living with HIV in eight high HIV prevalence countries in sub-Saharan Africa. DHS analytical studies 29. Calverton, Maryland, USA: ICF International.

18   Uthman O (2010) Does it really matter where you live? A multilevel analysis of social disorganization and risky sexual behaviors in sub-Saharan Africa. DHS Working Papers 78: 1-29.

19   Berhan Y, Berhan A (2015) A meta-analysis of risky sexual behavior among male youth in developing countries. AIDS Res Treat 2015.

20   Versteegh HP (2013) Evaluation of HIV and AIDS knowledge in rural Cameroon men with the use of a questionnaire. Pan Afr Med J 16: 141.

21   Foumane P (2013) Sexual activity of adolescent school girls in an urban secondary school in Cameroon. J Reprod Infertil 14: 85.

22   Kumari A, Nair R (2012) Predictors of high risk sexual behaviour among men in India. J Fam Welf 58: 25-34.

23   Awuba J, Macassa G (2007) HIV/AIDS in Cameroon: Rising gender issues in policy-making matters. Afr J Health Sci 14: 118-128.

24   Boyer S (2010) Scaling up access to antiretroviral treatment for HIV infection: the impact of decentralization of healthcare delivery in Cameroon. AIDS 24: s5-s15.

25   Mbany D, Sama M, Tchounwou PB (2008) Current status of HIV/AIDS in Cameroon: How effective are control strategies? Int J Environ Res Public Health 5: 378-383.

26   Christane NA (2014) HIV/AIDS prevalence, knowledge, attitudes and related behaviors among young people in Libreville, Gabon. IOSR Journal of Humanities and Social Science 19: 59-65.

27   Jacobi CA (2013) HIV/AIDS-related stigma felt by people living with HIV from Buea, Cameroon. AIDS care 25: 173-80.

28   Tarkang EE (2009) Knowledge, Attitudes and perceptions regarding HIV/AIDS and sexual behaviors among senior secondary school learners in Kumba, Cameroon.

29   Kongnyuy EJ (2006) Wealth and sexual behavior among men in Cameroon. BMC Int Health Hum Rights 6: 1.

30   Dimbuene ZT, Defo BK (2011) Fostering accurate HIV/AIDS knowledge among unmarried youths in Cameroon: Do family environment and peers matter? BMC Public Health 11: 1.

31   Vescio F (2013) Individual and area-based socioeconomic influences on HIV seroprevalence in Cameroon.

32   Foumane P (2013) Sexual activity of adolescent school girls in an urban secondary school in Cameroon. J Reprod Infertil 14: 85-90.

33   Uchudi J, Magadi M, Mostazir M (2012) A multilevel analysis of the determinants of high-risk sexual behavior in sub-Saharan Africa. J Biosoc Sci 44: 289-311.

34   Aichele SR (2014) Attitudinal and behavioral characteristics predict high risk sexual activity in rural Tanzanian youth. PloS ONE 9: e99987.

35   Ishida K, Stupp P, McDonald O (2011) Prevalence and correlates of sexual risk behaviors among Jamaican adolescents. Int Perspect Sex Reprod Health 37: 6-15.

36   Cowan F, Pettifor A (2009) HIV in adolescents in sub-Saharan Africa. Curr Opin HIV AIDS 4: 288-293.

37   http://dhsprogram.com/data/available-datasets.cfm

38   http://dhsprogram.com/pubs/pdf/DHSG4/Recode6_DHS_22March2013_DHSG4.pdf

39   Teshome R, Youjie W, Habte E, Kasm NM (2016) Comparison and association of comprehensive HIV/AIDS knowledge and attitude towards people living with HIV/AIDS among women aged 15-49 in three East African countries: Burundi, Ethiopia and Kenya. J AIDS Clin Res.

40   http://hivdata.measuredhs.com/ind_tbl.cfm

41   Wang W, Alva S, Wang S (2012) HIV-related knowledge and behaviors among people living with HIV in eight high HIV prevalence countries in Sub-Saharan Africa.

42   http://www.indexmundi.com/gabon/

43   http://www.indexmundi.com/cameroon/

44   Cai Y (2010) A study of HIV/AIDS related knowledge, attitude and behaviors among female sex workers in Shanghai China. BMC Public Health 10: 1.

45   Hargreaves JR, Howe LD (2010) Changes in HIV prevalence among differently educated groups in Tanzania between 2003 and 2007. Aids 24: 755-761.

46   Plummer ML, Wight D (2011) Young people's lives and sexual relationships in rural Africa: Findings from a large qualitative study in Tanzania.

47 Brima N (2015) Factors associated with HIV prevalence and HIV testing in Sierra Leone: Findings from the 2008 demographic health survey. PloS ONE 10: e0137055.

48 Khan AD, Magee E, Grant G (2013) National Center for HIV/AIDS, viral hepatitis, STD and TB prevention, CDC. CDC Health Disparities and Inequalities Report—United States 62: 149.

49 Mutenheri E (2014) Correlates of multiple sexual partnerships among formerly married men in Zimbabwe. Int J Med Res Health 3: 28-35.

50 Mishra V, Bignami-Van AS, Robert G, Martin V, Rathavuth H, et al. (2007) HIV infection does not disproportionately affect the poorer in sub-Saharan Africa. AIDS 21: s17-s28.

51 Meadowbrooke CC, Veinot TC, Loveluck J, Hickok A, Bauermeister JA (2014) Information behavior and HIV testing intentions among young men at risk for HIV/AIDS. J Assoc Inf Sci Technol 65: 609-620.

52 Olaly WHA, Venable RH (2015) A comparative study on HIV-related attitude and HIV high risk behavior among Kenyan and American University Students. International Journal of Scientific Research and Innovative Technology 2: 109-117.

53 Mbanya D, Sama M, and Tchounwou P (2008) Current status of HIV/AIDS in Cameroon: How effective are control strategies? Int J Environ Res Public Health 5: 378-83.

54 D'Ivoire RDC (2014) Suivi de la declaration de politique sur le sida de juin 2011, Rapport National De La Cote D'Ivoire 2014, C.N.D.L.C.L.S. Union – Discipline – Travail, Secretariat Technique, Editor.

55 Stulhofer A, Graham C, Bozicevic I, Kufrin K, Ajdukovic D (2007) HIV/AIDS-related knowledge, attitudes and sexual behaviors as predictors of condom use among young adults in Croatia. Int Fam Plan Perspect 33: 58-65.

56 Faimau G, Maunganidze L, Tapera R, Mosomane LCK, Apau S (2016) Knowledge of HIV/AIDS, attitudes towards sexual risk behavior and perceived behavioral control among college students in Botswana. Cogent Social Sciences 22: 1164932.