



RESEARCH ARTICLE

COMPARISON AND ASSOCIATION OF COMPREHENSIVE HIV/AIDS KNOWLEDGE AND ACCEPTANCE ATTITUDE TOWARDS PEOPLE LIVING WITH HIV/AIDS AMONG FEMALE YOUTH AGED 15-24 IN THREE WEST AFRICAN COUNTRIES: IVORY COAST, CAMEROON AND GABON

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ABSTRACT

Background: Nationally representative as well as comparative studies had never been done in three West African countries: Ivory Coast, Cameroon and Gabon. Hence, this study focuses on comparison of HIV/AIDS related knowledge and acceptance attitude towards people living with HIV/AIDS (PLHA) of female youth among the three highly prevalent West African countries.

Methods: The study utilized nationally representative datasets from Demographic and Health Surveys (DHS) of Ivory Coast 2011/12, Cameroon 2011, and Gabon 2012. IBM SPSS 22 was used to run multivariate logistic regression to find out the associates of HIV/AIDS related knowledge and attitudes as well as comparison among the countries.

Results: There was lack of comprehensive HIV/AIDS knowledge and acceptance attitude towards people living with HIV/AIDS in the three countries. Age, residence (except Cameroon), educational level, religion (only in Ivory Coast), marital status and wealth index (except Ivory Coast) were significant associates of comprehensive HIV/AIDS knowledge. On the other hand, age (except Gabon), residence (only in Ivory Coast), educational level (except Gabon), religion (only in Cameroon), wealth index and comprehensive HIV/AIDS knowledge showed significant associations with acceptance attitude towards people living with HIV/AIDS. Higher comprehensive HIV/AIDS knowledge was detected among youth in Gabon (AOR=2.08, $p<0.001$) and Cameroon (AOR=2.06, $p<0.001$) than in Ivory Coast. Results of acceptance attitude were in reverse manner to knowledge where less acceptance attitude was detected in Gabon (AOR=0.89, $p=0.023$) and Cameroon (AOR=0.86, $p=0.003$) than in Ivory Coast. However, comprehensive knowledge and acceptance attitude in Cameroon did not differ significantly from that of Gabon.

Conclusion: Generally, very low comprehensive HIV/AIDS knowledge and acceptance attitude towards PLHA were observed in the three countries and specifically in Ivory Coast. At this instant, it is urgent to give emphasis on education to adolescents and rural residents. A need to convey information in a manner that is contextually appropriate, socio-culturally acceptable and gender-sensitive is suggested.

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INTRODUCTION

Globally, it is estimated that a total of 36.9 million people are infected with HIV, and more than two-thirds (25.8 million) live in sub-Saharan Africa (UNAIDS, 2015). Despite the decline of the new infection by 41% in sub-Saharan Africa between 2000 and 2014, the region still accounts for 66% of the global total new HIV infections (UNAIDS, 2015). The prevalence of HIV infection in West Africa was reported to be low compared to those of South and East African countries

(United States Agency for International Development [USAID], 2012). However, the rate of decrease, need to be observed in terms of prevalence, in order to attain UNAIDS vision for "getting to zero infections" in the strategic plan of 2011-2015 (UNAIDS, 2010). As UNAIDS reports revealed, we are in an era of dramatic reductions in the HIV/AIDS infections in the whole world and specifically in sub-Saharan Africa. Nonetheless, Cameroon, the first highly prevalent country in West Africa, has shown increment in HIV/AIDS from 4.3% in 2011 to 4.8% in 2014 (L'Institut National de la Statistique (INS) and ICF International, 2012; UNAIDS, 2014a). The second prevalent country, Gabon, has shown marginal decrement from 4.1% in 2012 to 3.9% in 2014 (La

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Direction Générale de la Statistique (DGS) and ICF International, 2013; UNAIDS, 2014c). Similarly, the third country, Ivory Coast, has shown minimal decrement from 3.7% in 2011/12 to 3.5% in 2014 (Institut National de la Statistique and ICF International, 2013; UNAIDS, 2014b). Young people aged 15-24 made up a section of the population that was particularly vulnerable to HIV that accounted 42% of the new HIV infections in 2010. Moreover, nearly four million (80%) were living in sub-Saharan Africa (UNAIDS, 2012). This second decade of life is a stage of experimentation and risk, and many factors increase young people's vulnerability to HIV during these years of quick physical and psychosocial development. As youth are the main agents in the struggle against HIV, focus on them is very crucial. Globally, the infection rate of young women aged 15-24 is twice as high as in young men which accounted 22% of all new HIV infections and 31% of new infections in sub-Saharan Africa (UNAIDS, 2011). This was intensified due to relationship of young females with older for economic reasons, lack of sexual negotiation because of fear and partner objection. The median age at first intercourse was lower in females (15.5 years in the three selected countries) than for males (17.5 years in Gabon and 18.5 in Ivory Coast and Cameroon). Besides, though empirical evidence did not exist for Cameroon, higher percent of females had sex before the age of 15 in Ivory Coast (30.7% vs 8.8%) and Gabon (29.6% vs 7.7%) as compared to males (Kaye W, Martine C, Emma S, Susheela S, Zoé H, 2006).

Correct knowledge of HIV transmission and prevention, and acceptance attitude towards PLHA have been noted as critical components of achieving an HIV free generation (Anne L Stangl, 2013). Despite efforts to improve knowledge about HIV/AIDS and acceptance attitude towards PLHA, both indicators remained far below the target level (95 percent of young people aged 15-24 worldwide)-set by the United Nations General Assembly Special Session (UNGASS) in 2001. Small studies conducted both in Kumba secondary schools (which included large proportion of 15-24) (Tarkang, 2009) and Bandjoun (Tsala Dimbuene & Kuate Defo, 2011) in Cameroon, and another in Gabon (Christane, 2014) reported that youth did not have sufficient knowledge about HIV/AIDS. Similar less acceptance attitude was observed in small scale studies done in Gabon (Christane, 2014) and Cameroon (Jacobi *et al.*, 2013; Tarkang, 2009). Very few small studies have been done to assess comprehensive HIV/AIDS knowledge and acceptance attitudes toward PLHA in each of the three countries. However, they were not nationally representative for two major reasons. First they were not based on nationally representative samples and second they fail to fulfill the AIDS Indicators Survey (AIS) measures. Hence, a study in Gabon clearly detected the gap and highly recommended future research involving nationally representative samples (Christane, 2014).

Moreover, there were no studies which compare comprehensive knowledge and acceptance attitude towards PLHA among the three highly prevalent West African countries. Hence, to fill these two major information gaps, the purpose of this study was: to investigate associates of comprehensive knowledge and acceptance attitude related to HIV/AIDS, and to compare the level of comprehensive knowledge and acceptance attitude towards PLHA, among female youth 15-24 years old for the three countries.

Method

The study used Demographic and Health Surveys (DHS), conducted in three West African countries (Cameroon 2011, Gabon 2012 and Ivory Coast 2011/12). Nationally representative sample of female youth (15-24 years) selected by probability proportional to size were filtered from the three countries. Variables of HIV-related knowledge and attitudes were selected and categorized based on the MEASURE DHS online tools for HIV/AIDS Survey Indicators Database. The HIV/AIDS Survey Indicator Database offers an internationally-accepted, consistent method for measuring factors related to HIV prevention across countries.

Variables

Dependent Variables: The two dependent variables used in this study were comprehensive HIV/AIDS knowledge and acceptance attitude towards PLHA. 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 at least two out of the three most common local misconceptions—that the AIDS virus can be transmitted through mosquito bites, a person can get HIV by sharing meal with someone infected, and by supernatural means. Comprehensive knowledge was a binary response variable coded 1 if youth reported five correct responses and 0 otherwise. To assess respondents' acceptance attitudes towards people living with HIV/AIDS, respondents who had heard of AIDS were asked if they would: (1) be willing to care for a relative sick with the AIDS virus in their own households; (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. Acceptance attitude was coded 1 if youth correctly answered the four questions and 0 otherwise.

Independent Variables: The demographic and socioeconomic characteristics of the survey respondents included were age, level of education, place of residence, marital status, religion, wealth index and occupation. This study used only the first two age groups, 15-19 and 20-24, from the seven 5-year groups created in women data. Type of place of residence was categorized into two groups, "Urban" and "Rural" areas in the DHS and were taken without any change. The level of education was also taken as the originally classified four groups: "No Education", "Primary Education", "Secondary Education", and "Higher Education". Marital status was grouped into six categories: "Never married", "Married", "Living together", "Widowed", "Divorced" and "Not living together". The respondents were asked about their religion, and the responses were grouped into many categories which varied among the three countries. However, this study recoded them into four groups: "Christian"- (Catholic, Protestant, Methodist, Evangelical and Other Christians), "Muslim", "Other religion" - (Animist and other religions) and "No religion". DHS grouped wealth quintiles, including "Poorest", "Poorer", "Middle", "Richer", and "Richest", were taken to compare the influence of wealth on the dependent variables. The various categories of occupation in the three countries were re-grouped to "Agricultural"-(self-employed and employee), "Sales", "Services and others"-(services,

professional/technical/managerial, clerical, household and domestic, skilled/unskilled manpower, armed force, others) and "Not working".

Data Analysis

This study used the Predictive Analytic Software-PASW (SPSS version 22) as a program to manage and analyze the DHS data. Descriptive results of the three countries were displayed using a table. Binary logistic regression was used for multivariate analysis to examine the associations among selected potential correlates with comprehensive HIV/AIDS knowledge and acceptance attitudes towards PLHA. Moreover, bivariate logistic regression was used to compare the comprehensive knowledge and acceptance attitude among the three countries. Odds ratios and 95 percent confidence intervals were used to observe their associations and to compare among the countries. Missed cases were not included throughout the analysis. For all types of analyses, the study used 0.05 of significance level.

RESULTS

Table 1 presents the distribution of female aged 15-24 by background characteristics. Of the 14,099 female youth respondents, 3984 (28.26%) were from Ivory Coast, 6708 (47.58%) from Cameroon and 3407 (24.16%) from Gabon. The level of comprehensive knowledge among Cameroonians (45.3%) and Gabonese (45.2%) was relatively higher than Ivorians (30.7%). Conversely, the level of acceptance attitude among Ivorians (32.7%) was slightly higher than Cameroonians (29.9%) and Gabonese (29.4%). Results from multivariate analyses for associates of comprehensive knowledge are shown in Table 2. Age group, place of residence (except Cameroon), educational level, religion (only in Ivory Coast), marital status and wealth index (except Ivory Coast) were significant associates of comprehensive HIV/AIDS knowledge. Table 3 shows the associates of acceptance attitude towards PLHA. Age group (except Gabon), place of residence (only in Ivory Coast), educational level (except Gabon), religion (only in Cameroon), wealth index and comprehensive HIV/AIDS knowledge showed

Table 1. Distribution of socio-demographic characteristics, HIV/AIDS awareness, comprehensive HIV/AIDS knowledge, and acceptance attitude towards PLHA of females 15-24 years old in the three countries

Variables	Ivory Coast	Cameroon	Gabon
	n (%)	n (%)	n (%)
Age			
15-20	1997(50.1)	3590(53.5)	1834(53.8)
20-24	1987(49.9)	3118(46.5)	1573(46.2)
Type of residence			
Urban	2097(52.6)	3585(53.4)	2476(72.7)
Rural	1887(47.4)	3123(46.6)	931(27.3)
Educational status			
No education	1832(46)	771(11.5)	76(2.2)
Primary	1008(25.3)	1984(29.6)	872(25.6)
secondary	1070(26.9)	3698(55.1)	2374(69.7)
Higher	74(1.9)	255(3.8)	85(2.5)
Religion†			
No religion	394(9.9)	107(1.6)	249(7.3)
Christian	1737(43.6)	5085(75.8)	2974(87.3)
Muslim	1717(43.1)	1342(20)	150(4.4)
Other religion	136(3.4)	174(2.6)	34(1.0)
Marital status			
Never in union	2354(59.1)	3637(54.2)	2188(64.2)
Married	907(22.8)	1691(25.2)	136(4.0)
Living with partner	638(16)	1143(17)	947(27.8)
widowed	10(0.3)	11(0.2)	4(0.1)
Divorced	10(0.3)	51(0.8)	1(0.0)
No longer living together	65(1.6)	175(2.6)	131(3.8)
Wealth index			
Poorest	642(16.1)	865(12.9)	1156(33.9)
poorer	658(16.5)	1254(18.7)	817(24.0)
Middle	833(20.9)	1395(20.8)	555(16.3)
Richer	793(19.9)	1638(24.4)	478(14.0)
Richest	1058(26.6)	1556(23.2)	401(11.8)
Occupation††			
Not Working	1867(46.9)	3534(52.7)	2674(78.5)
Agriculture	654(16.4)	1247(18.6)	184(5.4)
Sales	951(23.9)	1047(15.6)	315(9.2)
Services and Others	512(12.9)	880(13.1)	234(6.9)
HIV/AIDS Awareness			
Yes	3721(93.4)	6500(96.9)	3349(98.3)
No	263(6.6)	208(3.1)	58(1.7)
Comprehensive Knowledge			
Yes	1223(30.7)	3039(45.3)	1540(45.2)
No	2761(69.3)	3669(54.7)	1867(54.8)
Acceptance Attitude			
Yes	1303(32.7)	2006(29.9)	1002(29.4)
No	2681(67.3)	4702(70.1)	2405(70.6)

†Religion and ††occupation were re-categorized

Table 2. Multivariate analysis showing associates of comprehensive HIV/AIDS knowledge among females of age 15-24 in the three countries

Variable	Ivory Coast			Cameroon			Gabon		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Age (Ref=15-19)									
20-24	1.44	1.21-1.73	<0.001	1.61	1.35-1.93	<0.001	1.22	1.04-1.44	0.017
Place of Residence (Ref=Rural)									
Urban	1.66	1.26-2.2	<0.001	1.02	0.81-1.28	0.876	1.44	1.19-1.73	<0.001
Highest Education level (Ref=No Education)									
Primary	1.43	1.14-1.8	0.002	3.23	2.01-5.19	<0.001	1.60	0.77-3.32	0.204
Secondary	4.75	3.78-5.96	<0.001	8.31	5.09-13.57	<0.001	3.84	1.88-7.84	<0.001
Higher	8.92	5.12-15.54	<0.001	10.77	5.71-20.29	<0.001	7.95	3.34-18.95	<0.001
Religion† (Ref=No religion)									
Christian	1.51	1.06-2.16	0.021	1.27	0.70-2.30	0.426	1.04	0.77-1.4	0.797
Muslim	1.62	1.13-2.31	0.008	0.99	0.53-1.86	0.984	1.68	0.97-2.91	0.064
Other religion	0.42	0.19-0.91	0.028	1.41	0.63-3.15	0.398	0.99	0.45-2.2	0.985
Marital Status (Ref=Never in Union)									
Married	1.12	0.87-1.45	0.369	1.12	0.87-1.45	0.369	0.31	0.18-0.52	<0.001
Living with partner	1.05	0.81-1.34	0.721	1.05	0.81-1.34	0.721	0.84	0.7-1.01	0.063
Widowed	0.93	0.11-7.89	0.949	0.93	0.11-7.89	0.949	0.40	0.04-3.92	0.429
Divorced	0.62	0.08-5.16	0.662	0.62	0.08-5.16	0.662	-	-	-
No longer living together/separated	0.71	0.37-1.35	0.296	0.86	0.53-1.38	0.522	0.88	0.6-1.29	0.505
Wealth Index (Ref=Poorest)									
Poorer	0.97	0.69-1.36	0.860	1.90	1.29-2.81	0.001	1.28	1.04-1.57	0.018
Middle	0.98	0.68-1.41	0.919	2.23	1.48-3.35	<0.001	1.47	1.17-1.86	0.001
Richer	1.01	0.69-1.47	0.976	2.55	1.65-3.96	<0.001	1.32	1.03-1.7	0.026
Richest	0.99	0.67-1.48	0.978	2.68	1.71-4.22	<0.001	1.59	1.22-2.07	0.001
Occupation†† (Ref=Not Working)									
Agriculture	0.71	0.51-0.99	0.045	0.78	0.6-1.01	0.056	0.69	0.48-1.01	0.056
Sales	1.08	0.88-1.32	0.465	0.87	0.7-1.1	0.244	0.92	0.71-1.19	0.517
Services and Others	1.27	0.99-1.64	0.058	0.96	0.76-1.22	0.730	1.05	0.79-1.39	0.755

†Religion and††Occupation were re-categorized

Table 3. Multivariate analysis showing associates of acceptance attitude towards PLHA among females of age 15-24 in the three countries

Variable	Ivory Coast			Cameroon			Gabon		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Age (Ref=15-19)									
20-24	1.36	1.15-1.61	<0.001	1.40	1.17-1.68	<0.001	1.14	0.96-1.34	0.129
Place of Residence (Ref=Rural)									
Urban	1.62	1.26-2.08	<0.001	0.98	0.78-1.24	0.874	0.96	0.79-1.16	0.664
Highest Education level (Ref=No Education)									
Primary	1.17	0.96-1.43	0.113	1.61	1.05-2.47	0.030	0.93	0.49-1.76	0.827
Secondary	2.57	2.08-3.18	<0.001	2.50	1.59-3.93	<0.001	1.44	0.77-2.69	0.253
Higher	1.60	0.94-2.70	0.081	2.67	1.48-4.80	0.001	1.35	0.63-2.93	0.442
Religion† (Ref=No religion)									
Christian	1.33	0.98-1.81	0.067	3.11	1.38-7.02	0.006	1.22	0.89-1.67	0.209
Muslim	1.34	0.98-1.83	0.065	2.41	1.04-5.59	0.041	1.57	0.92-2.69	0.101
Other religion	0.72	0.40-1.29	0.272	1.70	0.62-4.72	0.305	1.75	0.80-3.84	0.163
Marital Status (Ref=Never in Union)									
Married	0.98	0.78-1.24	0.895	0.93	0.72-1.19	0.551	0.71	0.44-1.17	0.180
Living with partner	1.27	1.01-1.59	0.039	1.07	0.85-1.33	0.577	0.97	0.81-1.17	0.774
Widowed	2.16	0.48-9.77	0.315	1.39	0.09-20.38	0.811	2.10	0.29-15.18	0.462
Divorced	0.37	0.04-3.20	0.365	0.83	0.27-2.55	0.742	-	-	-
No longer living together/separated	1.07	0.61-1.88	0.825	1.40	0.88-2.24	0.159	0.96	0.65-1.41	0.820
Wealth Index (Ref=Poorest)									
Poorer	1.37	1.01-1.85	0.041	2.13	1.39-3.27	<0.001	1.36	1.10-1.68	0.004
Middle	1.26	0.91-1.74	0.163	2.91	1.87-4.53	<0.001	1.39	1.09-1.77	0.007
Richer	1.66	1.18-2.34	0.003	2.64	1.65-4.25	<0.001	1.28	0.99-1.66	0.057
Richest	1.63	1.13-2.33	0.008	2.40	1.48-3.94	<0.001	1.20	0.91-1.58	0.193
Occupation†† (Ref=Not Working)									
Agriculture	0.75	0.57-1.00	0.052	0.84	0.64-1.09	0.190	0.91	0.63-1.31	0.619
Sales	1.05	0.87-1.27	0.588	0.90	0.72-1.14	0.388	0.87	0.67-1.14	0.318
Services and Others	1.29	1.02-1.63	0.032	1.03	0.81-1.31	0.790	0.99	0.74-1.33	0.965
Comprehensive HIV/AIDS Knowledge(Ref=No)									
Yes	2.12	1.79-2.51	<0.001	1.80	1.52-2.13	<0.001	1.50	1.29-1.75	<0.001

†Religion and††Occupation were re-categorized

Table 4. Comparison of comprehensive HIV/AIDS knowledge and acceptance attitude towards PLHA among the three countries

Country	Reference	Comprehensive Knowledge			Acceptance Attitude		
		OR	95%CI	P	OR	95%CI	P
Gabon	Ivory Coast	2.08	1.88-2.30	<0.001	0.89	0.81-0.98	0.023
Cameroon	Ivory Coast	2.06	1.86-2.28	<0.001	0.86	0.78-0.95	0.003
Cameroon	Gabon	0.99	0.90-1.09	0.865	0.96	0.87-1.07	0.455

significant associations with acceptance attitude towards PLHA. Table 4 shows comparison of comprehensive HIV knowledge and acceptance attitude towards PLHA. Cameroonian and Gabonese female youth did not have significantly different comprehensive HIV/AIDS knowledge. However, Gabonese (AOR=2.08, $p<0.001$) and Cameroonian (AOR=2.06, $p<0.001$) youth were almost two times more likely to have higher comprehensive knowledge than Ivorian youth. Ivorian female youth had 12% and 16% more acceptance attitude towards PLHA than Gabonese (AOR=0.89, $p=0.023$) and Cameroonians (AOR=0.86, $p=0.003$) respectively. However, no significant difference existed among Gabonese and Cameroonian female youth.

DISCUSSION

Awareness and Comprehensive HIV/AIDS Knowledge

Awareness is one of the key measures in prevention of HIV/AIDS. In this study, the lowest was in Ivory Coast, though nearly universal awareness was observed in the three countries. Similar results were reported in sub-Saharan Africa and other countries (Deribew *et al.*, 2010; Jha *et al.*, 2015; Ngayimbeshu & Chen, 2011; Nketiah-Amponsah & Afful-Mensah, 2013). The fact that almost half of female youth in Ivory Coast have no education at the time of study could be one of the main reasons for the lowest awareness. Despite the constant calls for improving knowledge, Ivorians, Cameroonians and Gabonese females had low level of comprehensive knowledge, far below the 95% target agreed at the UNGASS. The main source of information for adolescents was found to be the school (Al-Jabri *et al.*, 2014; Hendra Van Z, Deborah M, 2015), hence they might not be properly given HIV/AIDS education at classes. Similar low level comprehensive knowledge was reported among women in urban Kenya (2008/09, 54%) (Ochako, Ulwodi, Njagi, Kimetu, & Onyango, 2011) and Bolivia (2008/09, 31%) (Terán Calderón *et al.*, 2015). In sub-Saharan Africa, only 26% of female adolescents aged 15–19 years have a comprehensive and correct knowledge of HIV (UNICEF, 2013). Globally, less than 30 percent of young women have comprehensive and correct knowledge on HIV/AIDS (UNAIDS, 2012).

Generally, female youth 20-24 years of age, have statistically significant higher comprehensive knowledge than the 15-19 age groups in all the three countries. Similar results were found in other study (Idele *et al.*, 2014). Moreover, with an increase in educational level, comprehensive knowledge rose in a multiplied pattern. A study in Ghana has found English as a medium of disseminating the prevention strategies, directly affected women who lack basic education in understanding the precautions (Sallar, 2009). Besides, the lack of enough knowledge of the parents in guiding and equipping their girl teens might lead to less comprehensive knowledge. Similarly, urban youth had higher comprehensive knowledge in Ivory Coast and Gabon when compared with the rural residents. The advantages of urban residents over rural in easy access to mass media (like radio, television, newspapers), social networks and HIV/AIDS prevention programs have played a big role in altering comprehensive knowledge (A. BAnkole, S. Singh, V. Woog, 2004; Al-Jabri *et al.*, 2014; Ciampa *et al.*, 2012; Hendra Van Z, Deborah M, 2015). Other studies have also shown that urban residency and higher education were among the strong predictors of accurate knowledge of HIV/AIDS and prevention strategies (A. BAnkole, S. Singh, V. Woog, 2004;

Al-Jabri *et al.*, 2014; Burgoyne & Drummond, 2008; Ciampa *et al.*, 2012; Hazarika, 2010; Hendra Van Z, Deborah M, 2015; M. Ngoma, Roos, & Siziya, 2015; Mulu, Abera, & Yimer, 2014; Terán Calderón *et al.*, 2015; Tsala Dimbuene & Kuate Defo, 2011; Wenjuan, Soumya, & Shanxiao, 2012). Significance of religion to bring about changes in comprehensive knowledge was not sufficient except in Ivory Coast where Christians and Muslims had relatively higher which is in line to other study (Mulu *et al.*, 2014). Regarding marital status, only Gabonese married women showed more comprehensive knowledge than women never in union. Studies in sub-Saharan African youth showed that reproductive health needs of unmarried people were left unaddressed due to failure of recognition by some officials (A. BAnkole, S. Singh, V. Woog, 2004). The richest female youth of Cameroon and Gabon showed the highest comprehensive knowledge of HIV/AIDS. Study done on Cameroonian youth (Tsala Dimbuene & Kuate Defo, 2011), Omani women (Al-Jabri *et al.*, 2014) and sub-Saharan African countries (Oljira, Berhane, & Worku, 2013; Wenjuan *et al.*, 2012) also supported the results. It was suggested that, socioeconomic deprivations, like low media exposure or lower levels of educational attainment were results of lower wealth index which in turn negatively affected knowledge (A. BAnkole, S. Singh, V. Woog, 2004; Al-Jabri *et al.*, 2014; Tsala Dimbuene & Kuate Defo, 2011).

Not working females had more comprehensive knowledge than agricultural workers in Ivory Coast only. This might be due to involvement of females in agriculture specifically in rural areas which leads to lack of enough knowledge as compared to those not working who are most likely students.

Acceptance Attitude towards PLHA

Only one third of the respondents in all the three countries had acceptance attitude towards PLHA. Comparable country level studies have shown that the prevalence of acceptance attitude was very low in sub-Saharan Africa (United States Agency for International Development [USAID], 2012), Bolivia (Terán Calderón *et al.*, 2015), and Estonia (Liilia, L, Aire, 2003). According to UNAIDS (2014) report; negative attitudes were common in many parts of the world. In this study, the 20-24 age group showed higher degree of acceptance attitude towards PLHA in both Cameroon and Ivory Coast than the lower age group, however female youth in Gabon did not show significant difference. Our findings are also consistent with other studies (Mbonu, Van den Borne, & De Vries, 2009). Only in Ivory Coast, urban female youth had better acceptance attitude than the rural females. This is in line with other studies (Chen, Choe, Chen, & Zhang, 2007; Hazarika, 2010; Regassa & Kedir, 2011; Terán Calderón *et al.*, 2015). With regard to education, less acceptance attitude existed among females with no education than those with primary and post-primary in Cameroon. Similar results were found elsewhere (Mulu *et al.*, 2014; Terán Calderón *et al.*, 2015). Studies has shown that illiteracy led to inability to grasp appropriate health information and thereby develop different misconceptions, that in turn brought about greater HIV related stigmas (Mbonu *et al.*, 2009). Even though, significantly increased comprehensive knowledge in relation to education has been reported in the three countries, no difference in acceptance attitude was observed in Gabon and Ivory Coast (except secondary education). Religion has been documented as a factor that may foster or mitigate HIV/AIDS stigma (Mbonu *et*

al., 2009) or justifying stigmatizing behavior towards PLHA (Campbell, Foulis, Maimane, & Sibiya, 2005; Kalichman *et al.*, 2006). In this study, acceptance attitude towards PLHA was significantly higher in Christian and Muslim than those with no religion in Cameroon only. Studies have also shown that people who were active attendants of religious activities were more likely to have favorable attitude on prevention (Regassa & Kedir, 2011). However, the association was not found in both Gabon and Ivory Coast. Female youth living with partner in Ivory Coast had higher acceptance attitude than never in union. Acceptance attitude was greater in poorer, middle (except in Ivory Coast), richer (except in Gabon) and richest (expect in Gabon) than the poorest females. This is in line with a review study done in sub-Saharan African countries (Mbonu *et al.*, 2009), Bolivia (Terán Calderón *et al.*, 2015) and China (Chen *et al.*, 2007) where the stigma of HIV/AIDS has been closely intertwined with poverty. Occupation against acceptance attitude towards PLHA in the three countries exhibited weaker association except in Ivory Coast. Female youth with comprehensive HIV/AIDS knowledge have higher degree of acceptance attitude than their complements. The finding accords with that of USAID gap report's and other studies (Galvez CA, Vallejos M, 2012; Hamra, Ross, Orrs, & D'Agostino, 2006; Jessica Ogden, 2005; Kalichman *et al.*, 2006; Mbonu *et al.*, 2009; Mulu *et al.*, 2014; Sallar, 2009; UNAIDS, 2014d).

Comparison among the countries

Compared to Ivory Coast, female youth in Gabon and Cameroon were more likely to have better comprehensive knowledge of HIV. This could be explained by the facts in 2011, in relation to the correlates significantly associated with comprehensive knowledge in this study namely education, wealth index and residence. The first could be higher literacy rate of women in Gabon (85.6%) and Cameroon (64.8%) than Ivory Coast (47.6%) (Index Mundi, 2015). Secondly, the GDP per capita was lowest in Ivory Coast (1,600 USD), as compared to Cameroon (2,300USD) and Gabon (17,600USD)(Index Mundi, 2015). Thirdly, the percent of urban population out of the total, was higher in Gabon (86.2%) and Cameroon (52.1%) than Ivory Coast (51.3%)(Index Mundi, 2015). For Cameroon the foundation of the National AIDS Control Committee (NACC) in 1986, which had already undergone two national strategic plans from 2000 to 2010, might had contributed to higher comprehensive knowledge (Mbanya, Sama, & Tchounwou, 2008). Despite their low level of comprehensive knowledge towards HIV/AIDS, Ivorians showed greater acceptance attitude towards PLHA in comparison to the Cameroonian and Gabonese youth. A study conducted in sub-Saharan Africa revealed that acceptance attitude towards PLHA among Ivorian adult women (8.9%, DHS 2005) was almost the same with Cameroonians (9.0%, DHS 2004) though, comprehensive knowledge in HIV/AIDS was relatively higher in Cameroonian (22.5%) than Ivorians (16.1%) (Mishra, Agrawal, Alva, Gu, & Wang, 2009). Hence, having a high level of knowledge might not always reflect an individual's attitudes but rather influenced by counseling, coping skills acquisition, increased access to drugs, empathy for PLHA through direct contact(Brown, Macintyre, & Trujillo, 2003).

Conclusion

The prevention goals of UNGASS states that by 2010 at least 95 per cent, of young women aged 15 to 24 must have access

to the information, education (including peer education and youth-specific HIV education) and services necessary to develop the life skills required to reduce vulnerability to HIV infection. Contrarily, the levels of comprehensive knowledge of HIV/AIDS and acceptance attitude towards PLHA in this study were far below the prevention goals. Hence, education, information and counseling on HIV/AIDS prevention and transmission methods are very necessary to all females aged 15-19, females in rural areas, females with no educational background (principally in Ivory Coast) and females in low economic status of the society. This could accelerate the rate of decrease so as to achieve the zero HIV/AIDS infection goal.

Strength and Limitations

The data used in this study were nationally representative with large sample sizes from the three countries, Cameroon, Gabon and Ivory Coast. Therefore, the results were able to generalize to the whole population in the three countries. This study also consists of some limitations. First, due to the cross sectional nature of the study, it looks for associations, not causes and effects. Second, recall bias potentially occurred because the data were self-reported. Third, even though the whole sample sizes of the data from the three countries were large, a few variables also had big missing data especially in Cameroon, which affected the results of analysis.

Abbreviations

HIV:	Human Immunodeficiency Virus;
AIDS:	Acquired Immune Deficiency Syndrome;
PLHA:	People living with HIV/AIDS;
DHS:	Demographic and Health Surveys;
SPSS:	Statistical Package for Social Sciences;
UNAIDS:	United Nations Program on HIV/AIDS;
USAIDS:	United States Agency for International Development;
INS:	L'Institut National de la Statistique;
DGS:	La Direction Générale de la Statistique;
UNGASS:	United Nations General Assembly Special Session;
AIS:	AIDS Indicators Survey

Consent for publication

Not applicable.

Availability of data and materials

The raw data in excel file under identification policy could be provided via the e-mail of corresponding author upon request for research purpose only.

Competing interests

The authors declare that they have no competing interests.

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