

# 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

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## Abstract

**Background:** Women living in Sub-Saharan Africa endure disproportionate burden of HIV/AIDS. Correct and comprehensive knowledge can change attitude and behavior related to HIV markedly. The aim of this study was to investigate the relationship between comprehensive HIV/AIDS knowledge and acceptance attitude towards people living with HIV/AIDS among women in three east African countries.

**Methods:** Demographic and Health Surveys in 2009, 2010, 2011 from Kenya, Burundi and Ethiopia respectively were analyzed in SPSS, using multivariate logistic regression.

**Results:** Awareness was more than 96% in the three countries. The variables, age (except Ethiopia), place of residence (except Kenya), educational level, religion, marital status (except Ethiopia and Kenya) and wealth index were significant associates of comprehensive HIV/AIDS knowledge. Similarly, age (except Ethiopia), residence (except Burundi and Kenya), educational level, religion, marital status, wealth index and comprehensive HIV/AIDS knowledge showed significant associations with acceptance attitude towards people living with HIV/AIDS. After controlling the socio-demographic characteristics, higher comprehensive HIV/AIDS knowledge was observed among women in Burundi (OR=4.01, P<0.001) than in Ethiopia, Burundi (OR=1.11, P<0.001) than in Kenya and Kenya (OR=3.62, P<0.001) than in Ethiopia. Similarly, more acceptance attitude towards people living with HIV/AIDS was observed among women in Burundi (OR=3.39, P<0.001) than in Ethiopia, Burundi (OR=1.93, P<0.001) than in Kenya and Kenya (OR=1.75, P<0.001) than in Ethiopia.

**Conclusion:** The level of comprehensive knowledge and acceptance attitude varied significantly among women of the three countries, though associate variables were similar. Despite awareness of the disease, respondents lacked comprehensive knowledge on HIV/AIDS and acceptance attitude towards people living with HIV/AIDS hence education and communication activities on HIV/AIDS are recommended.

**Keywords:** Comprehensive knowledge; Attitude; HIV/AIDS; Women; East Africa countries

## Introduction

HIV/AIDS is one of the major public health challenges across the globe. Sub-Saharan Africa (SSA) continues to be the most heavily affected region by HIV/AIDS in the world. In 2013, out of the 35 million People living with HIV, 24 million were living in this region [1]. Almost one in every twenty adults was living with the virus in SSA [1,2]. SSA is an epicenter for HIV/AIDS, even though it represents 12 percent of the total population of the globe [3]. The national HIV prevalence rates are more than one percent in this region [4]. This region accounted for 70% of the new HIV infections around the world, and 74% of all the people dying from AIDS related causes [1].

HIV/AIDS is a leading cause of death among women of the reproductive age in SSA [5], claiming around one million lives every year since 1998 [3]. Women are disproportionately affected by HIV/AIDS in SSA, accounting for 59% of the total number of people living with HIV in 2013 [1] and bear the greatest burden of care [2]. Unlike other regions, the primary route of transmission in SSA is unsafe heterosexual intercourse and every minute, a young woman is newly infected with HIV [6]. As a result, women and girls are mentioned as one of key populations for intervention [1,7]. The area severely affected by HIV/AIDS epidemic in the globe is Southern SSA followed by Eastern Africa. The prevalence rate among non-pregnant women was 14.5% (95%CI, 11.2-18.4%) [8]. Moreover, studies revealed that young women were three to six times more likely to have HIV compared with

males of the same age in Kenya and Tanzania [9,10]. Therefore, It has great importance to study on women related to HIV/AIDS epidemics.

One of the fundamental subjects in the study of HIV/AIDS in women is comprehensive knowledge. Comprehensive knowledge about HIV/AIDS is an indicator commonly used to measure knowledge of the essential facts about HIV transmission and prevention. Correct and comprehensive knowledge on transmission and prevention is important in avoiding HIV infection. According to the United Nations General Assembly Special Session (UNGASS) target set in 2001, 95% of young adults need to have correct and comprehensive knowledge of HIV/AIDS [11]. Yet, this is far below the target, since only 33% of young women demonstrated comprehensive knowledge of HIV/

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AIDS in national household surveys in SSA [12]. Studies showed that in Mozambique, despite the nearly universal awareness of HIV/AIDS, only 31.8% women of age 15-49 have accurate and, comprehensive knowledge of HIV/AIDS [13]. A study in Northern Uganda among youths revealed that, 23% of young women had comprehensive HIV/AIDS knowledge [14]. Moreover, another study conducted in Zambia among young women showed that, there was a gap in HIV/AIDS knowledge and misconceptions regarding its transmission [15]. High awareness levels alone are not enough to combat HIV/AIDS infection. Therefore, women in East Africa should know methods of prevention, transmission as well as to understand and reject misconceptions about the disease [16]. Acceptance attitude towards people living with HIV/AIDS (PLHA) is another fundamental subject in the study of HIV/AIDS in women. Negative attitudes are barriers for HIV prevention and decrease individual's disclosure of HIV status, voluntary HIV testing, access and adherence to treatment [17,18]. Moreover, negative attitude and beliefs towards PLHA was related to individual's incorrect knowledge of prevention and transmission of the disease [19-21]. A study conducted in SSA countries suggested that, large numbers of people have discriminatory attitude towards PLHA [22]. For instance, Demography Health Survey of Lesotho in 2009 showed that, 4 out of 10 women have acceptance attitude towards PLHA [23]. Noticeably, comprehensive knowledge on HIV/AIDS as well as acceptance attitude towards PLHA are fundamental subjects in prevention and halting HIV infection among women of reproductive age. Therefore, women from three east African countries namely Burundi, Ethiopia and Kenya were involved in this study. Although several studies were conducted on HIV/AIDS knowledge and attitude towards PLHA in the three East African countries [24-30], they were not nationally representative or were not based on the AIDS indicators survey (AIS) measures, which are internationally accepted and standardized tools.

To the best of our knowledge, there are no studies concerning associates of comprehensive HIV/AIDS knowledge and acceptance attitude towards PLHA among women in the three selected countries, based on nationally representative data. Hence, there could be no comparative study conducted as well. To fill this gap, nationally representative data from DHS was taken to: 1) investigate associates of comprehensive knowledge and acceptance attitude related to HIV/AIDS, 2) compare the level of comprehensive knowledge and attitude towards PLHA, among women 15-49 years old for the three countries. The study will help policy makers in providing vital information on key HIV-related indicators to monitor, evaluate, and to improve strategies at the national and international level for prevention.

## Methods and Materials

### Data source

The data was taken from Demographic and Health Surveys (DHS), conducted in three countries of East Africa (Burundi 2010, Ethiopia 2011 and Kenya 2009). Multistage probability sampling technique was used in DHS, in order to provide nationally representative samples of women age 15-49. The samples for this study were women of the reproductive age 15-49, with sample size from Burundi (n=9,389), Ethiopia (n=16,515), and Kenya (n=8,444). Availability of AIDS Indicator Surveys (AIS) from recent DHS data and utilization of standardized questionnaire made unique opportunity for population-based comparison study across countries.

### Measures

**Dependent variables:** The dependent variables in this study

were two binary variables, comprehensive HIV/AIDS knowledge and acceptance attitude towards PLHA. Comprehensive knowledge of HIV/AIDS is defined as having heard of HIV/AIDS, identifying two ways to prevent HIV/AIDS transmission, rejecting two common local misconceptions and knowing that a healthy-looking person can have HIV/AIDS. To measure comprehensive knowledge of HIV/AIDS, each woman was asked the following five questions and allowed for binary yes or no response: 1) condoms can be used to prevent HIV transmission; 2) HIV can be prevented by limiting sex to one faithful uninfected partner; 3) a person can get HIV from mosquito bites; 4) a person can get HIV by sharing a meal with someone infected and 5) a healthy looking person can have HIV. Similarly, acceptance attitude towards PLHA, each woman was asked the following four statements and allowed for a binary response: 1) Would you be willing to care for a family member who became sick with the AIDS virus; 2) Would you buy fresh vegetables from a vendor who was a known HIV positive; 3) A female teacher who is HIV positive but not sick should be allowed to continue teaching in school; 4) Would not want to keep the HIV positive status of a family member a secret.

**Independent variables:** Socio-demographic and economic characteristics include age, place of residence, religion, educational level, marital status and wealth index. Age was measured as continuous variable and grouped in to seven categories: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44 and 45-49. Place of residence was grouped as urban and rural. Religion was re-categorized as Christian (Orthodox, Catholic, protestant, Methodist, Salvation Army, Seventh Day Adventist), Moslem, other-religion (Traditionalist and Animist) and no religion. Educational status was divided in to four categories: no education, primary, secondary and higher educational level. Marital status was divided into six categories: never in union, married, living with partner, widowed, divorced and not living together. Moreover, wealth index was subdivided in the following five groups: poorest, poorer, middle, richer and richest.

### Statistical analysis

Descriptive statistics were used to illustrate respondents' demographic characteristics. Association between socio-demographic variables and women's comprehensive HIV/AIDS knowledge and attitude towards PLHA were analyzed using multivariate logistic regression. The dependent variable score of comprehensive HIV/AIDS knowledge and acceptance attitude towards PLHA was constructed to be a binary outcome. The binary outcome was defined as; "Yes" if women answered all the five questions of comprehensive HIV/AIDS knowledge correctly and "No" if the women had any incorrect answers. On the other hand, for acceptance attitude, "yes", if women answered all the four questions about HIV/AIDS correctly and "No", if the respondent had any incorrect answer. Finally, the three countries were compared with each other using adjusted odds ratio. The results of all logistic regression analyses were reported as adjusted odds ratios (OR) with 95% confidence intervals (95% CI) taking p-values less than 0.05 as significant. All analyses were done using Predictive Analysis Software (SPSS version 20).

## Results

Table 1 presents the percentage distribution of 34,347 women of the reproductive age (15-49) of three east African countries, with mean age 27.86 (SD±9.38). Related to place of residence, majority of the women 77.5% (Burundi), 67.7% (Ethiopia) and 69% (Kenya) were from rural areas. Half of Ethiopian women (50.1%) were illiterate and half of Kenyan women (52.2%) were at the primary level of Education, while

Variable	Burundi Number (%)	Ethiopia Number (%)	Kenya Number (%)
<b>HIV/AIDS Awareness</b>	9369 (99.8)	15898 (96.3)	8359 (99)
<b>Comprehensive Knowledge on HIV/AIDS</b>			
Yes	4536 (48.9)	3052 (19.3)	3866 (46.3)
No	4739 (51.1)	12786 (80.7)	4477 (53.0)
<b>Acceptance Attitude towards PLWHA</b>			
Yes	4432 (47.4)	3340 (21.0)	2658 (31.8)
No	4909 (52.6)	12536 (79.0)	5688 (67.4)
<b>Age (Over all Mean <math>\pm</math> SD, 27.86<math>\pm</math>9.38)</b>			
15-19	2377 (25.3)	3835 (23.2)	1766 (20.9)
20-24	1854 (19.7)	3022 (18.3)	1744 (20.7)
25-29	1591 (16.9)	3185 (19.3)	1423 (16.9)
30-34	1084 (11.5)	2100 (12.7)	1180 (14.0)
35-39	1054 (11.2)	1958 (11.9)	930 (11.0)
40-44	738 (7.9)	1314 (8.0)	730 (8.6)
45-49	691 (7.4)	1101 (6.7)	670 (7.9)
<b>Place of Residence</b>			
Urban	2109 (22.5)	5329 (32.3)	2615 (31)
Rural	7280 (77.5)	11186 (67.7)	5828 (69)
<b>Highest Educational Level</b>			
No Education	3836 (40.9)	8278 (50.1)	1242 (14.7)
Primary	3946 (42)	5858 (35.5)	4403 (52.2)
Secondary	1449 (15.4)	1395 (8.4)	2084 (24.7)
Higher	158 (1.7)	984 (6.0)	714 (8.5)
<b>Religion*</b>			
No Religion	127 (1.4)	-	184 (2.2)
Christian	8834 (94.1)	10108 (61.2)	6835 (81)
Islam	324 (3.5)	6170 (37.4)	1358 (16.1)
Other Religion	95 (1.0)	229 (1.4)	57 (0.7)
<b>Current Marital Status</b>			
Never in union	3285 (35)	4413 (26.7)	2539 (30.1)
Married	3674 (39.1)	9478 (57.4)	4682 (55.4)
Living with Partner	1587 (16.9)	726 (4.4)	359 (4.3)
Widowed	412 (4.4)	581 (3.5)	351 (4.2)
Divorced	46 (0.5)	922 (5.6)	118 (1.4)
No longer living together/separated	385 (4.1)	395 (2.4)	394 (4.7)
<b>Wealth Index</b>			
Poorest	1693 (18.0)	3711 (22.5)	1698 (20.1)
Poorer	1724 (18.4)	2402 (14.5)	1284 (15.2)
Middle	1634 (17.4)	2268 (13.7)	1455 (17.2)
Richer	1592 (17.0)	2505 (15.2)	1617 (19.1)
Richest	2746 (29.2)	5629 (34.1)	2389 (28.3)

\*Religion is re-categorized

**Table 1:** Distribution of socio-demographic characteristics, HIV/AIDS awareness, comprehensive HIV/AIDS knowledge and acceptance attitude towards PLHA of women 15-49 years old, Three East African countries.

an equivalent percentage existed for illiterate (40.9%) and primary (42.0%) in Burundi. Majority of women were classified as richest based on the Wealth Index, followed by poorest in all the three east African countries (except Burundi which was followed by Poorer). Almost all respondents had heard about HIV/AIDS before the survey, 99.8%, 99.0%, and 96.3% in Burundi, Kenya and Ethiopia respectively.

Respondent's comprehensive knowledge of HIV/AIDS was less than half in Burundi (48.9%) and Kenya (46.3%), while in Ethiopia it was below one-fourth (19.3%). In Burundi, women in age groups 40-44 (OR=1.38, P=0.004), 35-39 (OR=1.24, P=0.034), 30-34 (OR=1.23, P=0.030), 25-29 (OR=1.20 P=0.037) had higher comprehensive

knowledge of HIV/AIDS than the reference group, 15-19 years old (Table 2). Higher comprehensive knowledge of HIV/AIDS was also found in the age group of 35-39 (OR= 1.32, P=0.010), 30-34, (OR=1.29, P=0.010), 25-29 (OR=1.42, P<0.001) and 20-24 (OR=1.23, P=0.013) than the reference group in Kenya.

In general, women from urban areas had significantly higher comprehensive knowledge of HIV/AIDS than from rural in both Burundi (OR=1.43, P<0.001) and Ethiopia (OR=1.21, P=0.023). In Burundi, women in primary (OR=1.59, P<0.001), secondary (OR=3.63, P<0.001) and higher (OR=6.68, P<0.001) educational levels had higher comprehensive knowledge than women with no education.

Variable	Burundi			Ethiopia			Kenya		
	OR	95%CI	P	OR	95% CI	P	OR	95% CI	P
<b>Age(Ref=15-19)</b>									
20-24	1.11	0.96-1.29	0.160	0.99	0.87-1.13	0.886	1.23	1.04-1.44	0.013
25-29	1.20	1.01-1.42	0.037	1.00	0.86-1.17	0.975	1.42	1.17-1.71	<0.001
30-34	1.23	1.02-1.50	0.030	0.98	0.82-1.17	0.822	1.29	1.06-1.57	0.010
35-39	1.24	1.02-1.51	0.034	0.89	0.74-1.08	0.229	1.32	1.07-1.62	0.010
40-44	1.38	1.11-1.71	0.004	0.91	0.73-1.14	0.421	1.25	0.10-1.56	0.054
45-49	1.07	0.85-1.34	0.565	1.13	0.89-1.42	0.320	0.93	0.74-1.18	0.573
<b>Place of Residence(Ref=rural)</b>									
Urban	1.43	1.24-1.65	<0.001	1.21	1.03-1.43	0.023	1.11	0.95-1.29	0.196
<b>Highest Educational Level (Ref= No education)</b>									
Primary	1.59	1.44-1.76	<0.001	2.77	2.46-3.12	<0.001	3.73	3.02-4.61	<0.001
Secondary	3.63	3.09-4.27	<0.001	4.47	3.81-5.24	<0.001	6.26	4.97-7.80	<0.001
Higher	6.68	4.04-11.03	<0.001	5.51	4.60-6.59	<0.001	11.33	8.51-15.08	<0.001
<b>Religion (Ref=No religion)</b>									
Christian	1.65	1.11-2.45	0.014	1.94	1.08-3.48	0.027	2.34	1.48-3.70	<0.001
Islam	1.54	0.96-2.46	0.071	1.22	0.68-2.20	0.507	1.45	0.91-2.33	0.122
Other Religion	1.76	0.98-3.14	0.057		Ref		1.44	0.68-3.03	0.340
<b>Current Marital Status (Ref= Never in Union)</b>									
Married	1.33	1.14-1.54	<0.001	0.94	0.83-1.07	0.371	1.01	0.88-1.17	0.861
Living with partner	1.11	0.95-1.31	0.185	0.88	0.71-1.09	0.248	1.05	0.81-1.36	0.708
Widowed	1.10	0.85-1.43	0.464	0.80	0.60-1.07	0.128	1.15	0.87-1.51	0.331
Divorced	1.46	0.79-2.70	0.226	0.96	0.96-0.78	0.680	0.79	0.50-1.22	0.287
No longer living together/ separated	1.01	0.79-1.29	0.965	0.96	0.73-1.25	0.745	0.86	0.67-1.11	0.247
<b>Wealth Index(Ref=Poorest)</b>									
Poorer	1.16	1.00-1.33	0.045	1.61	1.32-1.96	<0.001	1.50	1.26-1.78	<0.001
Middle	1.33	1.16-1.54	<0.001	2.23	1.85-2.69	<0.001	1.88	1.59-2.23	<0.001
Richer	1.34	1.16-1.55	<0.001	2.54	2.13-3.04	<0.001	1.68	1.42-1.99	<0.001
Richest	1.63	1.39-1.91	<0.001	2.98	2.42-3.68	<0.001	2.31	1.87-2.85	<0.001

\*Religion is re-categorized

**Table 2:** Multivariate analysis showing associates of comprehensive HIV/AIDS knowledge among women of age 15-49 in three east African countries.

High comprehensive knowledge on HIV/AIDS was found in primary (OR=3.73, P<0.001), secondary (OR=6.26, P<0.001), and higher (OR=11.3, P<0.001) educational levels than the reference group in Kenya. Similarly, women in primary (OR=2.77, P<0.001), secondary (OR=4.47, P<0.001) and higher (OR=5.51, P<0.001) educational levels had higher comprehensive knowledge of HIV/AIDS than women with no education in Ethiopia. Regarding religion, Christian women had statistically significant higher comprehensive knowledge of HIV/AIDS than the reference group, women with no religion, in Burundi (OR=1.65, P=0.014) and Kenya (OR=2.34, P<0.001). Likewise, Christian women had higher comprehensive knowledge of HIV/AIDS than women of other religion in Ethiopia (OR=1.94, P=0.027). However, Moslem respondents did not show any statistically significant difference compared with the reference group in all the three East African countries. Only married women from Burundi had higher comprehensive knowledge of HIV/AIDS than the reference group (OR= 1.33, P<0.001). Higher comprehensive knowledge of HIV/AIDS was found in wealth category of poorer (OR=1.16, P=0.045), middle (OR=1.33, P<0.001), richer (OR=1.34, P<0.001) and richest (OR=1.63, P<0.001) than the reference group, poorest, in Burundi. In Ethiopia, women in wealth index group of poorer (OR=1.61, P<0.001), middle (OR=2.23, P<0.001), richer (OR=2.54, P<0.001) and richest (OR=2.98, P<0.001) had higher comprehensive knowledge of HIV/AIDS than the poorest. Furthermore, higher comprehensive knowledge of HIV/AIDS was found in women with wealth category group of poorer (OR=1.50, P<0.001), middle (OR=1.88, P<0.001),

richer (OR=1.68, P<0.001), richest (OR=2.31, P<0.001) than the poorest women in Kenya.

Acceptance attitude towards PLHA in descending order were 47.4% in Burundi, 31.8% in Kenya and 21% in Ethiopia. All age groups in Burundi and Kenya had higher acceptance attitude towards PLHA than the reference group of women age 15-19 years (Table 3). Only urban women from Ethiopia had higher acceptance attitude towards PLHA than rural women (OR=1.97, P<0.001). Higher acceptance attitude towards PLHA was found in primary (OR=1.41, P<0.001) and secondary (OR=2.20, P<0.001) educational levels than women with no education in Burundi. In Ethiopia, women with primary (OR=1.82, P<0.001), secondary (OR= 2.54, P<0.001) and higher (OR=2.76, P<0.001) educational level had more acceptance attitude towards PLHA than women with no education. Similarly, in Kenya women in primary (OR=2.16, P<0.001), secondary (OR=3.52, P<0.001) and higher (OR=2.99, P<0.001) educational level had more acceptance attitude towards PLHA than women with no education. Christian women from Burundi (OR=1.66, P=0.015) and Kenya (OR=1.64, P=0.036) had higher acceptance attitude towards PLHA than women with no religion. Married women (OR=1.21, P=0.011) in Burundi and no longer living together (OR=1.32, P=0.034) in Ethiopia had more acceptance attitude towards PLHA than woman who were never in union. In contrast, in Kenya women living with partner (OR=0.73, P=0.028) and widowed (OR=0.60, P<0.001) had less acceptance attitude towards PLHA than women who were never in union. Higher acceptance attitude towards PLHA was found in women with wealth index category of poorer

Variable	Burundi			Ethiopia			Kenya		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
<b>Age (Ref=15-19)</b>									
20-24	1.65	1.42-1.92	<0.001	0.98	0.86-1.23	0.801	1.38	1.17-1.64	<0.001
25-29	1.79	1.51-2.13	<0.001	0.94	0.80-1.11	0.410	1.49	1.23-1.81	<0.001
30-34	1.93	1.59-2.34	<0.001	0.88	0.73-1.11	0.155	2.07	1.69-2.54	<0.001
35-39	1.82	1.49-2.25	<0.001	1.01	0.84-1.22	0.879	1.99	1.60-2.47	<0.001
40-44	2.24	1.80-2.80	<0.001	0.94	0.76-1.16	0.569	2.10	1.67-2.65	<0.001
45-49	2.00	1.60-2.51	<0.001	1.21	0.97-1.52	0.096	1.84	1.44-2.34	<0.001
<b>Place of Residence (Ref=Rural)</b>									
Urban	1.12	0.97-1.29	0.140	1.97	1.68-2.30	<0.001	0.91	0.78-1.07	0.244
<b>Highest Education level (Ref=No Education)</b>									
Primary	1.41	1.27-1.56	<0.001	1.82	1.62-2.04	<0.001	2.160	1.73-2.70	<0.001
Secondary	2.20	1.87-2.59	<0.001	2.54	2.17-2.98	<0.001	3.520	2.76-4.48	<0.001
Higher	1.32	0.91-1.91	0.140	2.76	2.31-3.29	<0.001	2.990	2.25-3.96	<0.001
<b>Religion* (Ref=No religion)</b>									
Christian	1.66	1.11-2.50	0.015	0.93	0.85-1.02	0.155	1.640	1.03-2.62	0.036
Moslem	1.18	0.74-1.90	0.479	0.58	0.32-1.05	0.071	1.130	0.70-1.82	0.620
Other	1.27	0.70-2.31	0.422		Ref		0.720	0.33-1.56	0.403
<b>Marital Status (Ref=Never in Union)</b>									
Married	1.21	1.05-1.41	0.011	1.02	0.89-1.16	0.804	0.870	0.75-1.00	0.065
Living with partner	0.92	0.78-1.08	0.288	1.14	0.92-1.41	0.224	0.600	0.46-0.79	<0.001
Widowed	1.20	0.93-1.56	0.164	1.25	0.95-1.63	0.107	0.730	0.54-0.96	0.028
Divorced	1.37	0.74-2.55	0.999	1.12	0.91-1.37	0.290	0.740	0.47-1.18	0.205
No longer living together/ separated	0.87	0.69-1.13	0.309	1.32	1.02-1.71	0.034	0.860	0.67-1.11	0.263
<b>Wealth Index (Ref=Poorest)</b>									
Poorer	1.26	1.09-1.46	<0.001	1.28	1.05-1.56	0.015	1.14	0.95-1.38	0.161
Middle	1.41	1.22-1.64	<0.001	1.38	1.13-1.68	0.002	1.33	1.11-1.59	<0.001
Richer	1.63	1.41-1.89	<0.001	1.73	1.44-2.08	<0.001	1.31	1.09-1.58	<0.001
Richest	1.80	1.53-2.13	<0.001	3.31	2.71-4.05	<0.001	1.39	1.11-1.74	<0.001
<b>Comprehensive HIV/AIDS Knowledge (Ref=No Comprehensive Knowledge)</b>									
Comprehensive Knowledge	2.13	1.95-2.33	<0.001	1.65	1.49-1.82	<0.001	1.72	1.55-1.91	<0.001

\*Religion is re-categorized

**Table 3:** Multivariate analysis showing associates of acceptance attitude towards PLHA among women age 15-49 in three east African countries.

Country	Reference	Comprehensive Knowledge			Acceptance Attitude		
		OR	95% CI	P	OR	95%CI	P
Burundi	Ethiopia	4.01	3.79-4.24	<0.001	3.39	3.21-3.58	<0.001
Burundi	Kenya	1.11	1.04-1.18	0.001	1.93	1.82-2.05	<0.001
Kenya	Ethiopia	3.62	0.34-3.83	<0.001	1.75	1.65-1.86	<0.001

**Table 4:** Multivariate analysis comparison of HIV/AIDS comprehensive knowledge and acceptance attitude towards PLHA among women age 15-49 in three east Africa countries.

(OR=1.26, P<0.001), middle (OR=1.41, P<0.001), richer (OR= 1.63, P<0.001) and richest (OR=1.80, P<0.001) than reference group, the poorest, in Burundi. In Ethiopia, the poorer (OR=1.28, P=0.015), middle (OR=1.38,P=0.002), richer (OR=1.73,P<0.001) and richest (OR=3.31,P<0.001) wealth index groups had higher acceptance attitude towards PLHA than the poorest. Moreover, women in middle (OR=1.33, P=0.002), richer (OR=1.31, P=0.003) and richest (OR=1.39, P=0.004) wealth index categories in Kenya had higher acceptance attitude towards PLHA than the poorest.

Women with comprehensive knowledge were more likely to have higher acceptance attitude towards PLHA than woman with no comprehensive knowledge in Burundi (OR=2.13, P<0.001), Ethiopia (OR=1.65, P<0.001) as well as Kenya (OR=1.72, P<0.001).

Comparison among countries revealed that, women in Kenya were 3.6 times more likely to have comprehensive HIV/AIDS knowledge than

women in Ethiopia (AOR= 3.62, P<0.001). On the other hand, women in Burundi were 4 and 1.1 times more likely to have comprehensive HIV/AIDS knowledge than women in Ethiopia (OR=4.01, P<0.001) and Kenya (OR=1.11, P=0.001) respectively. Women in Kenya were 1.7 times more likely to have acceptance attitude towards PLHA than women in Ethiopia (OR=1.75, P<0.001). Similar in pattern with that of comprehensive knowledge, women in Burundi were 1.9 and 3.4 times more likely to have acceptance attitude towards PLHA than women in Kenya (OR=1.93, P<0.001) and Ethiopia (OR=3.39, P<0.001) respectively (Table 4).

## Discussion

### Comprehensive knowledge on HIV/AIDS

Women of all the three East African countries had nearly universal awareness. Similar results were reported in SSA [26,31,32], nonetheless

only 70 percent of women had heard about HIV/AIDS in Bangladesh [33]. The fact that the percentage in comprehensive knowledge is less than fifty - Burundi (48.9%), Kenya (46.3%) and Ethiopia (19.3%) indicate that women of the three East African countries lack comprehensive knowledge on HIV/AIDS. Similarly, a population based study in Bolivia (Sucre) revealed that, women had 31% adequate knowledge of HIV/AIDS [34]. Moreover, research conducted in Bangladesh (DHS, 2007) showed that, comprehensive knowledge in transmission and prevention of HIV/AIDS was 45.4 percent [33]. Globally, less than 30 percent of young women have comprehensive and correct knowledge on HIV/AIDS. Women account for two-thirds (796 million) of the world's illiterate adults [35].

Women living in urban areas were more likely to have higher comprehensive knowledge of HIV/AIDS compared to women living in rural areas of Burundi and Ethiopia. A broad difference between rural and urban areas related to HIV/AIDS comprehensive knowledge has been also reported from Sub-Saharan Africa and other areas [25,26,33,34,36]. Women living in urban areas might have more access to education, mass media and campaigns related to HIV/AIDS information than rural areas. According to study reported by Veinot et al., rural-urban gap in HIV knowledge could be due to the difference in social networks and the different degrees of pressure residents feel to uphold community norms [36]. Religious associations could play a vital role on HIV information dissemination. Christian women had higher level of comprehensive knowledge than women with no religion in Kenya, Ethiopia and Burundi. This might be because women having religion could get more information about HIV/AIDS from religious leaders. Our result showed that, married respondents from Burundi have significant difference in comparison to the reference group (never in union) in comprehensive knowledge of HIV/AIDS. However, respondents from Ethiopia and Kenya do not show any significant associations with the reference group. Moreover, studies conducted among Kenyan young women by Ochako et al. revealed that ever married women had less comprehensive knowledge of HIV/AIDS than never in union [27].

Studies revealed that education has a great role in determining a person's social status, income and access to information [37]. This study showed that educated women were more likely to have comprehensive knowledge of HIV/AIDS than women with no education. As educational level of women increase, they are more likely to have higher comprehensive knowledge on HIV/AIDS. In line to this, a study conducted in Kenya AIDS Indicator Survey (KAIS) also reported that, women with higher educational levels had higher comprehensive knowledge than women with no education [9]. Moreover, similar results were reported in Sub-Saharan Africa, South Asia, South and North America [25,33,34,36,38,39]. Wealth index was significantly associated with comprehensive knowledge of HIV/AIDS in the selected East African countries. Wealthier people may have more access to education as well as mass media. Hence they can get correct and comprehensive knowledge of HIV/AIDS in comparison to the poorest people. People living in lower Socio-Economic Status (SES) tend to gain less benefit from information flow than their counterparts with higher SES [40]. Similar results were reported elsewhere [25,34]. Gender inequalities, taboos associated with the discussion of sexuality and sexual health, the submissive role of women in a relationship, and male control of decision-making regarding sexual relations might also explain why African women are less knowledgeable about HIV/AIDS [16].

### Acceptance attitude towards PLHA

Results highlighted that participants acceptance attitude towards

PLHA was below average, Burundi (47.4%), Kenya (31.8%) and Ethiopia (21.0%). According UNAIDS report; negative attitudes are common in many parts of the world. However, evidence indicates that where knowledge of HIV is higher, negative attitudes towards people living with HIV are lower. Increasing HIV knowledge and awareness among the general population enables people to protect themselves and works to reduce stigma and discrimination against people living with HIV [1]. In this study, all age groups had significantly higher acceptance attitude towards PLHA in comparison to the reference group women age 15-19 in Burundi and Kenya. Our result is consistent with the research conducted previously elsewhere [29]. However, women from Ethiopia do not show any statistical significance and similar result was reported [25]. Women living in urban had higher acceptance attitude towards PLHA than those in rural areas in Ethiopia while women from Burundi and Kenya did not show any significant associations. Similar results were observed in Ethiopia [16,25,30] and the research reported in Kenya [29]. People living in urban areas have more accesses to education, mass media exposure and health services such as voluntary counseling test (VCT), hence they can avoid misconceptions and misunderstanding about the disease.

Acceptance attitude towards PLHA were significantly more in women with higher, secondary and elementary educational level than women with no education (except in Burundi for higher education). The likelihood of acceptance attitude towards PLHA increases with increasing level of education. In line with this, similar researches were reported elsewhere [25,26,32,34]. Christian women from Burundi and Kenya have higher acceptance attitude towards PLHA than women with no religion. Married women from Burundi and not living together/separated from Ethiopia had higher acceptance attitude towards PLHA than women never in union. However, married and living together women from Kenya had less acceptance attitude than women never in union, which is consistent with the previously reported research [29]. Wealth index in all the three east African countries has statistically significant association on acceptance attitude towards PLHA. Women in highest socioeconomic status were more likely to have highest accepting attitude towards PLHA, even though the pattern is not uniform. Similar results were reported elsewhere [25,29]. Results showed that women with comprehensive knowledge have more acceptance attitude towards PLHA than their counterparts with no comprehensive knowledge. This revealed that, comprehensive knowledge is a basic and necessary factor to build accepting attitudes towards PLHA. Similar results showed that women with good knowledge were more favorable towards PLHA [25,32,41].

### Limitation

Even though, our findings revealed nationally and sub-regional representative figures on HIV/AIDS comprehensive knowledge and acceptance attitude towards PLHA in women of the three East African countries, the study has several limitations. The objective and self-reported measures of comprehensive knowledge on HIV/AIDS and acceptance attitude towards PLHA might affect the quality of data. Individuals may not willingly express their attitudes during face to face interview. Moreover, due to the cross-sectional nature of the study method, we are unable to make any casual inferences based on the associations presented. However, this could be a baseline for in-depth studies in women of East African countries.

### Conclusion

Our study findings highlighted that, majority of women of the East African countries sampled were aware of HIV/AIDS. However,

comprehensive knowledge on HIV/AIDS as well as acceptance attitude towards PLHA remained low. Women living in urban areas, educated and those with higher socioeconomic status were found to have adequate comprehensive knowledge and acceptance attitude towards PLHA. Women from Burundi have higher HIV/AIDS comprehensive knowledge and acceptance attitude towards PLHA than women in Kenya and Ethiopia. Hence, education and information on HIV/AIDS prevention and transmission methods are necessary to all women of East African countries and particularly to women living in rural areas, women with no educational background and women in the lower economic status of the society to prevent HIV infection.

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