

# Determinants of Comprehensive HIV knowledge among reproductive-age women in Gambia: Further analysis of recent Gambia demographic and health survey

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## Research Article

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# Abstract

**Introduction:** Globally there were 37.7 million people living with Human Immunodeficiency Virus (HIV). HIV is a major global public health problem with disproportionately highest burden in sub-Saharan Africa accounting 70% of the global burden of infection.

**Objective:** To assess factors associated with comprehensive knowledge on HIV among reproductive-age women in Gambia

**Methods:** This study was based on a large community-based cross-sectional survey, conducted from 21 November 2019 to 30 March 2020 in Gambia. The survey employed a stratified two-stage cluster sampling technique to recruit study participants. Descriptive statistics and logistic regression models were used to summarize descriptive data and identify factors associated with HIV comprehensive knowledge respectively. A p-value of less than 0.05 and 95% confidence interval were used to determine statistical significance.

**Results:** A total of 11,865 weighted sample of reproductive age women were included in the study with a mean age of 28.21( $\pm$ 9.33) which ranges from 15 to 49 years. Older age (AOR=1.21 (95%CI: 1.17,1.25)),being married (AOR=0.71 (95%CI: 0.61, 0.81)), using contraceptive (AOR=1.15 (95%CI: 1.01, 1.31)),secondary and higher education (AOR=2.17(95%CI:1.91, 2.45)),and(AOR=4.73 (95%CI: 3.86, 5.81)) respectively, middle and rich wealth quintile (AOR=1.29 (95%CI:1.11, 1.49)),and (AOR=1.61 (95%CI: 1.37, 1.87)), media exposure (AOR=1.76 (95%CI:1.39, 2.23)), ever tested for HIV (AOR=1.56 (95%CI: 1.41,1.73)), used internet (AOR=1.43 (95%CI:1.28,1.59)) and visited health facility within the last 12 months(AOR=1.26(95%CI:1.13,1.40)) were significantly associated with comprehensive HIV knowledge.

**Conclusion:** socio-demographic factors, contraceptive use, media exposure, tested for HIV, internet use and visiting health facility was significantly and positively associated with comprehensive HIV knowledge except being married and residing in Basse region in which they associated negatively and significantly. Health managers, policy makers and intended stakeholders working on this area should consider those factors while designing health intervention programs to enhance comprehensive HIV knowledge among reproductive age women. Educational interventions about HIV/AIDS prevention mechanisms should be designed especially for married women and lower socio-economic status .Efforts has to be made to address those disparities at the national level.

## Introduction

Globally there were 37.7 million people living with Human Immunodeficiency Virus (HIV), 680 000 people died from HIV-related causes and 1.5 million people acquired HIV and 28.2 million people living with HIV were receiving ART in 2021(1, 2). HIV is a major global public health problem with disproportionately highest burden in sub-Saharan Africa accounting 70% of the global burden of infection (3, 4). In 2014, the Joint United Nations Programme on HIV/AIDS (UNAIDS) and partners set the 90–90–90 target for the year 2020: diagnose 90% of all people living with HIV (PLHIV); treat 90% of people who know their status;

and suppress the virus in 90% of people on treatment (5). Among all PLHIV worldwide, 79% (67–92%) knew their HIV status, of these, 78% (69–82%) were accessing treatment and 86% (72–92%) of people accessing treatment had suppressed viral loads so far, hence only 15 countries had achieved this target since 2018 (6). Comprehensive knowledge (CK) about human immunodeficiency virus (HIV) includes an understanding of HIV transmission routes and the ability to reject local misconceptions about human immunodeficiency virus/ Acquire immune deficiency syndrome (HIV/AIDS) transmission (7,8). Comprehensive HIV knowledge is very important for sexual health and behavior (9). Many studies conducted on comprehensive knowledge has found that age of the participant, educational level, ever tested of HIV, media exposure and wealth as the independent predictors of HIV comprehensive knowledge (7,10–13).

To achieve the 90-90-90 plan of United Nations (UN) ending AIDS, the Gambia launched Catch Up Plan (2018–2020) which mainly targeted on scaling UP voluntary counseling and testing, and introducing free anti-retroviral treatment (ART) services, following this the estimated number of people living with HIV (PLHIV) was 25,900; with 9500 (37%) knowing their status, and out of which 7,500 (78.9%) are receiving ART, of which 66.7% are virally suppressed in 2019 (14). According to the Gambia Demographic Health Survey (GDHS) 2019-20, comprehensive knowledge were 27% among reproductive-age women 15–49 years (15).

There is scanty of information on the factors affecting comprehensive HIV knowledge among reproductive age women in Gambia. Therefore, the current study is aimed to identify factors associated with comprehensive HIV knowledge among reproductive age women in Gambia.

## **Methods**

### **Study design and setting**

This study was based on a large community-based cross-sectional study conducted from 21 November 2019 to 30 March 2020 in Gambia. Gambia is located on the West African coast. It is bordered on the North, South and East by the Republic of Senegal and on the West by the Atlantic Ocean. The survey employed a stratified two-stage cluster sampling. In the first stage, Enumeration Areas (EAs) were selected with a probability proportional to their size within each sampling stratum. In the second stage, the households were systematically sampled. A total of 11,865 weighted samples of reproductive-age women were included in the study.

### **Variables of the study**

#### **Dependent variable**

Comprehensive HIV knowledge was the outcome variable which was categorized as “Yes” or “No”. A woman was considered as having comprehensive HIV knowledge if she knows that using condoms

consistently and limiting sex to one faithful, uninfected partner can reduce the likelihood of HIV transmission, knowing that a healthy-looking person can have HIV/AIDS, and rejects common misconceptions that mosquitoes transmit HIV/AIDS and sharing food with an infected person transmits HIV/AIDS(10,13,16)

## Independent variables

Age of participants ,sex of household head, marital status, educational status, wealth index, media exposure(yes, no), type of place of residence(rural, urban), religion, region, working status (yes, no), history of HIV testing(yes, no) ,contraceptive use (yes, no),internet use(yes, no) and visited health facility within the last 12 months(yes, no) were independent variables of the study. We have extracted those variables by reviewing different relevant literatures (9,16–20).

## Data analysis

Data cleaning was performed to check any missing values. Recoding, labeling, and statistical analysis were performed according using STATA version 14.0. The women's individual sample weightings were used in the estimation to provide nationally representative data. Descriptive measures like frequency mean and percentages were computed. Bivariable logistic regression was used to select candidate variables for multivariable logistic regression. In the Bivariable logistic regression, a p-value of less than 0.2 was used as a cut of point to select variables for the multi-variable analysis entry. Multivariable logistic regression was used to identify independent predictors of comprehensive HIV knowledge among reproductive-age women in Gambia by controlling confounders. A 95% confidence interval (CI) and p-value < 0.05 were used to determine the statistical significance.

## Results

The mean ages of the participants were 28.21( $\pm$  9.33) years with a range of 15 to 49 years. Among the participants 5299 (44.66%) were from Brikama region, 4119 (34.72%) had no education, 8747 (73.72%) were resided in urban area, 4133 (34.83%) were from poor household, 5000 (42.14%) had tested for HIV and 7965 (67.13%) has visited health facility with in the last 12 months (Table 1).

Table 1  
Socio-demographic characteristics and its association with comprehensive HIV knowledge among reproductive-age women in Gambia (n = 11,865)

Variables	Comprehensive HIV knowledge		Total	Percent	p-value
	Yes	No			
Age					
15–19	503	2130	2633	22.19	< 0.001
20–24	576	1605	2181	18.38	
25–29	609	1639	2248	18.95	
30–34	532	1087	1619	13.65	
35–39	474	964	1438	12.12	
40–44	277	751	1028	8.67	
45–49	239	479	718	6.05	
Marital status					
Single	1008	2697	3705	31.22	0.016
Married	2202	5958	8160	68.78	
Current contraceptive use					
Yes	540	1052	1592	13.42	< 0.001
No	2670	7603	10273	86.58	
Region					
Banjul	59	104	163	1.37	< 0.001
Kaniking	849	1740	2589	21.83	
Brikama	1529	3770	5299	44.66	
Mansakonko	84	347	431	3.63	
Kerewan	385	744	1129	9.51	
Kuntaur	80	442	522	4.40	
Janjanbureh	122	473	595	5.02	
Basse	102	1035	1137	9.58	
Women's educational level					
No education	728	3391	4119	34.72	< 0.001

Variables	Comprehensive HIV knowledge		Total	Percent	p-value
	Yes	No			
Primary	363	1491	1854	15.62	
Secondary	1623	3398	5021	42.32	
Higher	496	375	871	7.34	
Current Working status					
Yes	1774	4215	5989	50.47	< 0.001
No	1436	440	5876	49.53	
Religion					
Christian	141	281	422	3.56	< 0.001
Islam	3069	8374	11443	96.44	
Residence					
Urban	2599	6148	8747	73.72	< 0.001
Rural	611	2507	3118	26.28	
Wealth index					
Poor	746	3387	4133	34.83	< 0.001
Middle	568	1724	2292	19.32	
Rich	1896	3544	5440	45.85	
Media exposure					
Yes	3145	8008	11,153	94.00	< 0.001
No	65	647	712	6.00	
Sex of household head					
Male	2329	6899	9228	77.77	< 0.001
Female	881	1756	2637	22.23	
Ever tested for HIV					
Yes	1691	3310	5000	42.14	< 0.001
No	1519	5345	6864	57.86	
Use of internet					
No	2488	5295	7783	65.60	< 0.001

Variables	Comprehensive HIV knowledge		Total	Percent	p-value
	Yes	No			
Yes	722	3360	4082	34.40	
Visited health facility in the last 12 months					
No	2298	5667	7965	67.13	< 0.001
Yes	912	2988	3900	32.87	

### Factors associated with HIV comprehensive knowledge

In the Bivariable logistic regression age of the women, religion, region, educational level, working status, residence, wealth index, media exposure, marital status, sex of household head, current contraceptive use, visited a health facility, ever tested for HIV, and use of internet were independently fitted to the outcome variable. All those variables were candidates for multivariable logistic regression at p-value less than 0.2.

In multivariable logistic regression, only age of the women, region, educational level, wealth index, media exposure, marital status, contraceptive use, ever tested for HIV, internet use and visited health facility within the last 12 months were significantly associated with the comprehensive HIV knowledge among reproductive-age women in Gambia.

Older age women were 1.21 times more likely to have higher odds of comprehensive HIV knowledge than younger ages (AOR = 1.21 (95%CI: 1.17, 1.25)). The odds of comprehensive HIV knowledge were reduced by 29% among married women as compared with single women (AOR = 0.71 (95%CI: 0.61, 0.81)). The odds of having comprehensive knowledge on HIV were 1.88 (AOR = 1.88 (95%CI: 1.53, 2.32)) and 1.30 (AOR = 1.30 (95%CI: 1.04, 1.64)) times higher among women resided in Kerewan and Janjanbureh respectively as compared with those from Banjul. However, being resided in Basse reduces the odds of having comprehensive HIV knowledge by 60% (AOR = 0.40 (95%CI: 0.32, 0.51)). The likelihood of having comprehensive knowledge about HIV were 1.15 times higher among contraceptive users as compared to their counterparts (AOR = 1.15 (95%CI: 1.01, 1.31)). Women with secondary and higher educational level were 2.17 (AOR = 1.91 (95%CI: 1.91, 1.49)) and 4.73 (AOR = 4.73 (95%CI: 3.86, 5.81)) times more likely to have comprehensive HIV knowledge as compared to those with no education respectively.

Comprehensive knowledge on HIV were 1.29 (AOR = 1.29(95%CI: 1.11, 2.45)) and 1.61 (AOR = 1.61 (95%CI: 1.37, 1.87)) times higher among women from households with a middle and rich wealth quintiles as compared with those women from households with a poor wealth quintiles. The likelihood of having comprehensive HIV knowledge was 1.76 times higher among women who were exposed to media as compared with those who were not exposed (AOR = 1.76 (95%CI: 1.39, 2.23)). The likelihood of having comprehensive HIV knowledge was 1.56 (AOR = 1.56 (95%CI: 1.41, 1.73)) times higher among those women who had ever tested for HIV as compared with those who had not tested. Women who used internet were 1.43 times more likely to have Comprehensive HIV knowledge as compared to those who

did not use. The likelihood of having comprehensive HIV knowledge were 1.26 (AOR = 1.26 (95%CI: 1.13, 1.40)) times higher among women who had visited health facility within the last 12 months as compared with their counterparts (Table 2).

Table 2  
factors associated with HIV comprehensive Knowledge among reproductive-age women in Gambia (n = 11,865)

Variables	COR(95%CI)	P-value	AOR(95%CI)	p-value
Age of the mother	1.12 (1.09, 1.14)	< 0.001	1.21 (1.17, 1.25)*	< 0.001
Region				
Banjul(ref)	1		1	
Kaniking	0.89 (0.76, 1.06)	0.194	0.89 (0.74, 1.06)	0.187
Brikama	0.79 (0.68, 0.92)	0.003	0.89 (0.75, 1.05)	0.170
Mansakonko	0.47 (0.39, 0.56)	< 0.001	0.90 (0.71, 1.14)	0.396
Kerewan	0.74 (0.63, 0.88)	0.001	1.88 (1.53, 2.32)*	< 0.001
Kuntaur	0.28 (0.24, 0.34)	< 0.001	0.92 (0.72,1.18)	0.509
Janjanbureh	0.47 (0.39, 0.56)	< 0.001	1.30 (1.04, 1.64)*	0.023
Basse	0.17 (0.14, 0.21)	< 0.001	0.40 (0.32, 0.51)*	< 0.001
Women's educational level				
No education	1		1	
Primary	1.10 (0.97, 1.25)	0.133	1.08 (0.93, 1.25)	0.313
Secondary	2.57 (2.34, 2.82)	< 0.001	2.17 (1.91, 2.45)*	< 0.001
Higher	9.75 (8.08, 11.76)	< 0.001	4.73 (3.86, 5.81)*	< 0.001
Respondent currently working				
No	1		1	
Yes	1.19 (1.09, 1.28)	< 0.001	0.97 (0.88, 1.07)	0.541
Religion				
Christian/other	1		1	
Islam	0.51 (0.40, 0.66)	< 0.001	1.03 (0.79,1.35)	0.818
Marital status				
Single	1		1	
Married	0.89 (0.81,0.98)	0.016	0.71 (0.61, 0.81)*	< 0.001
Residence				

Note: (\*) statistically significant, (-) not applicable for adjusted odds ratio

Variables	COR(95%CI)	P-value	AOR(95%CI)	p-value
Urban	1		1	
Rural	0.49 (0.46, 0.55)	< 0.001	0.95 (0.81, 1.11)	0.516
Wealth index				
Poor	1		1	
Middle	1.49 (1.32, 1.68)	< 0.001	1.29 (1.11, 1.49)*	< 0.001
Rich	2.67 (2.42, 2.93)	< 0.001	1.61 (1.37, 1.87)*	< 0.001
Media exposure				
No	1		1	
Yes	3.72 (2.97, 4.67)	< 0.001	1.76 (1.39, 2.23)*	< 0.001
Sex of household head				
Male	1		1	
Female	1.57 (1.43, 1.73)	< 0.001	0.95 (0.81, 1.11)	0.516
Ever tested for HIV				
No	1		1	< 0.001
Yes	1.56 (1.45, 1.69)	< 0.001	1.56 (1.41, 1.73)*	
Visited health facility within the last 12 months				
No	1		1	
Yes	1.25(1.15,1.37)	< 0.001	1.26 (1.13, 1.40)*	< 0.001
Contraceptive use				
No	1		1	
Yes	1.47 (1.30,1.65)	< 0.001	1.15 (1.01,1.31)*	0.033
Use of internet				
No	1		1	
Yes	2.16 (1.97, 2.37)	< 0.001	1.43 (1.28, 1.59)*	< 0.001
Note: (*) statistically significant, (-) not applicable for adjusted odds ratio				

## Discussion

The aim of this study was to identify factors associated comprehensive HIV knowledge among reproductive-age women in Gambia.

Age of the women was significantly associated with comprehensive HIV knowledge. Older age women were more likely to have comprehensive HIV knowledge than younger ages. This finding is in line with the studies done in Sub-Saharan Africa, Uganda, India and Nigeria (10,16,18,19). This might be due to older women are matured and they may search information about their health. The other possible reason might be older women might feel free to visit a health facility to get information about their general health condition and they might understand their susceptibility to diseases as well as the dysfunctional outcomes associated with it (21).

Marital status was significantly associated with comprehensive HIV knowledge. Married women were less likely to have comprehensive HIV knowledge than single women. This result is consistent with the studies done in Ghana, and Ethiopia (9,17). The possible reason might be that married women might believe that marriage is protective of HIV/AIDS and may not seek information about HIV transmission as well as prevention methods (16).

Local geographic area was significantly associated with comprehensive HIV knowledge. Women who reside in Kerewan and Janjanbureh regions of Gambia were more likely to have comprehensive HIV knowledge than those who reside in Banjul region. In contrary with this, women who reside in Basse were less likely to have comprehensive HIV knowledge as compared with Banjul. The possible reason might be that there may be spatial differences in access and availability of media or other information system about HIV. There may also be inter and intra-regional socio-cultural variation which may either impede or facilitate HIV knowledge. The other possible reason might be that there may be educational level differences and differences in wealth quintile which may in turn results in variation of comprehensive HIV knowledge across and with in regions of Gambia. However, this needs further research of why this regional discrepancy occurs.

Current contraceptive use was significantly associated with comprehensive HIV knowledge. Those women who use contraceptives were more likely to have comprehensive HIV knowledge. This finding is in line with the study done in Ethiopia (20). This might be due to the reason that women who used contraceptive methods might get information about HIV while they are going to the health facility. The other reason might be since condom is one of the HIV and pregnancy preventive method a health professional might advice about the importance of using condom and about HIV prevention as well as transmission in general.

Educational level of the women was significantly associated with comprehensive HIV knowledge. Women with secondary and higher educational level are more likely to have higher comprehensive HIV knowledge than women with no education. This finding is in line with the studies done in Indonesia, Uganda, and Bangladesh (16,22,23). Educated women have decision making power which helps them to seek health information about HIV/AIDS and their health issues in general. They might have autonomy to decide on their health related aspects of life, and could access to health care services easily the other possible

reason might be This might due to women attending secondary and higher education may get HIV related information either in the school curricula or in different extra-curricular activities like in different school clubs and education may also help people to be curious about their health as well as to seek information for their health. Educated women may search different information sources like the social media and internet web-sites of various organizations who are working targeted primarily on HIV which may help them to clear out misperceptions there by helping to develop comprehensive knowledge(13,24,25).

Wealth was significantly associated with comprehensive HIV knowledge. Women who were from middle and rich wealth quintiles were more likely to have comprehensive HIV knowledge than those from poor quintiles. This finding is in line with the studies conducted in Vietnam, Ethiopia, and Sub-Saharan Africa(19,20,26). The possible reason might be women from higher wealth quintiles may have access to media and health information.

Media exposure was significantly associated with comprehensive HIV knowledge. Women who had exposed to media were more likely to have higher comprehensive HIV knowledge than their counterparts. This finding is in line with the studies done in Uganda, Ethiopia, and Malawi(13,16,25). Media has a great importance in creating awareness, enhancing knowledge, and changing health behavior of individuals as well as the community at large by delivering health information through the use of various channels (27).

Ever tested for HIV was significantly associated with comprehensive HIV knowledge. Women who had ever tested HIV were more likely to have higher comprehensive HIV knowledge as compared with their counterparts. This finding is in line with the studies done in Kenya, Uganda, Ethiopia, and Vietnam(13,16,26,28). The reason might be women who had tested for HIV may be get HIV counseling services by the health care provider about its transmission as well as preventive methods.

Internet use was significantly associated with comprehensive HIV knowledge. Women who had used internet were more likely to have higher comprehensive HIV knowledge than those who had not used. This finding is in line with the studies done in Nigeria (29). Internet has a substantial impact in providing health information especially in this information era it takes a lion share of information dissemination(30).

Visiting health facility in the last 12 months was significantly associated with comprehensive HIV knowledge. Women who had visited health facility within the last 12 months were more likely to have comprehensive HIV knowledge than those who had not visited. The possible reason might be those who visited health facility may get health education about different health and health related issues during their waiting time. A women visited a health facility for another purpose may get information on HIV at the health facility(7).

## **Strength**

The use of sample weighting to overcome non-proportional sample allocation during the survey is one of the strengths of the study. The other Strength of the current study is the use of a large sample size that

can help to increase the statistical power and validity of the study. Utilization of large sample size and nationally representativeness of DHS data helps to generalize to the population of Gambia.

## **Limitations**

The main limitation of the study is that since it is a cross-sectional study the causal relationship between the outcome and independent variables could not be ascertained. Due to the use of secondary data some important variables like socio-cultural factors could not be identified which limits the number of variables to be included in the study. Since data has been collected through self-reporting of the participants there may be a chance of introducing recall bias.

## **Conclusion**

Age, marital status, educational level, region, contraceptive use, wealth, media exposure, tested for HIV, internet use and visiting health facility was significantly associated with comprehensive HIV knowledge. Health managers, policy makers and intended stakeholders working on this area should consider those factors while designing health intervention programs to enhance comprehensive HIV knowledge among reproductive age women in Gambia. Educational interventions about HIV/AIDS prevention mechanisms should be designed especially for married women and lower socio-economic status. An effort has to be made to address those disparities at the national level.

## **Acronyms**

COR (Crude Odds Ratio), AOR (Adjusted Odds Ratio) CI: Confidence interval: GDHS: Gambia Demographic Health Survey

## **Declarations**

### **Ethical consideration**

We have used secondary data and we cannot obtain direct informed consent from the participants rather than mentioning that the DHS program has obtained informed consent from participants. To access the data we have obtained permission from the DHS program after registration on a reasonable request. The DHS program conducted the study after getting ethical approval of the Gambian National Ethics Committee. As it is stated in the 2019–20 GDHS report the DHS obtained informed consent from each participant and anonymized the data set during the analysis. Moreover, the data for this study was obtained from the DHS at (<http://www.measuredhs.com>) after registration and permission had obtained. All the methods were performed in accordance with relevant ethical guidelines and regulations, that means the participants were informed that they have the right to withdraw from the study at any time they want, and they were also told that their confidentiality and privacy will be kept.

### **Consent for publication**

Not applicable

### **Availability of data and material**

The datasets used and/or analyzed during the current study are publicly available and can access at [https://dhsprogram.com/data/dataset/Gambia\\_Standard-DHS\\_2019.cfm](https://dhsprogram.com/data/dataset/Gambia_Standard-DHS_2019.cfm).

### **Competing interest**

The authors declare that they have no competing interests.

### **Funding**

None

### **Author's contribution**

MT, KS, and BM contributed to the study conceptualization and provided critical editorial input to the interpretation of the data. MT conducted the formal analysis and wrote the draft manuscript. MT, KS, and BM reviewed the drafted manuscript. All authors read and approved the final manuscript.

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