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HIV testing and counselling among women in Benin: a cross-sectional analysis of prevalence and predictors from demographic and health survey data

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ABSTRACT

Objective To examine the uptake of HIV testing and counselling (HTC) and its associated factors among women in Benin.

Design We performed a cross-sectional analysis of data from the 2017–2018 Benin Demographic and Health Survey. A weighted sample of 5517 women was included in the study. We used percentages to present the results of the uptake of HTC. Multilevel binary logistic regression analysis was used to examine the predictors of HTC uptake. The results were presented using adjusted odds ratios (aORs), with 95% confidence intervals (CIs).

Setting Benin.

Participants Women aged 15–49.

Outcome measure Uptake of HTC.

Results The overall uptake of HTC among women in Benin was found to be 46.4% (44.4%–48.4%). The odds of HTC uptake was higher among women covered by health insurance (aOR 3.04, 95% CI 1.44 to 6.43) and those with comprehensive HIV knowledge (aOR 1.77, 95% CI 1.43 to 2.21). The odds of HTC uptake increased with increasing level of education, with the highest odds among those in the secondary or higher level (aOR 2.06, 95% CI 1.64 to 2.61). Also, the age of the women, mass media exposure, region of residence, high community literacy level, and high community socioeconomic status were associated with higher odds of HTC uptake. Women residing in rural areas were less likely to use HTC. Religious affiliation, number of sexual partners, and place of residence were associated with lower odds of HTC uptake.

Conclusion Our study has shown that the uptake of HTC among women in Benin is relatively low. There is a need to enhance efforts to empower women, as well as reduce health inequities as they all have a substantial impact on HTC uptake among women in Benin, taking into consideration the factors identified in this study.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The use of nationally representative data and the use of rigorous statistical analysis to estimate the prevalence and predictors of HTC uptake ensures the generalisability of the findings.

⇒ Findings in this study aid to bridge literature gap on prevalence and predictors of HIV testing and counselling among women in Benin.

⇒ This study used secondary data and the analysis was limited to only the variables present in the dataset. Hence, the interpretation of the findings and any inferences made should be based on the variables used.

⇒ Demographic Health Survey employs a cross-sectional design and this limits the study's ability to draw causal inferences.

⇒ The study's variables were assessed based on the women's self-reports, which raised the possibility of recall bias and other social desirability biases.

INTRODUCTION

The global burden of HIV/AIDS currently stands at about 38 million with approximately 36.2 million being adults and 1.8 million children.[1] Also, an estimated 81% of people living with HIV (PLHIV) are aware of their status and nearly 19 million people do not know of their serostatus, even though this figure has dropped to about 7.1 million in 2019.[1] The HIV burden in sub-Saharan Africa (SSA) is high, with West and Central Africa being the most afflicted regions.[1] There is a high prevalence of PLHIV in SSA, with women being disproportionately affected.[1–3] In 2019, 4.9 million people in West and Central Africa were living with HIV, 240,000 were newly infected, and 140,000 died of AIDS-related illnesses.[3]

HIV testing and counselling (HTC) is a key public health intervention that entails counselling, testing, and treatment to lower HIV/AIDS transmission and its associated health burden.[4] The relevance of voluntary counselling and testing (VCT) sessions cannot be overstated. VCT has long been a significant

policy strategy for controlling HIV transmission.[5] HIV testing is an important first step in HIV prevention, care, and treatment because it allows for early diagnosis and treatment, which helps to prevent new infections in women.[2]

According to data from the Joint United Nations Programme on HIV/AIDS (UNAIDS), 68% of PLHIV in West and Central Africa knew their serological status as of 2019.[3] The UNAIDS announced an ambitious 95-95-95 target for ending the HIV epidemic by 2030, with the goal of having 95% of PLHIV know their status, 95% of those diagnosed with HIV infection receive sustained antiretroviral therapy, and 95% of those on treatment have suppressed viral loads by 2030.[6]

In SSA, HTC uptake remains low, especially among women.[7–9] Meanwhile, adolescent girls and women of reproductive age account for over 60% of new HIV infections occurring each day globally.[7 10] Thus, to achieve the global target of ending the HIV epidemic by 2030, countries in SSA need to implement strategies that could enhance HIV testing uptake among the populace, especially women. Although Benin has implemented some strategies to enhance HIV testing uptake, such as a mandatory testing and counselling for all pregnant women during antenatal visits,[11] the level of HIV testing uptake remains low. As of 2019, 75,000 people in Benin were living with HIV, with 3,500 new infections.[1] Meanwhile, HIV testing is the initial step in the HIV care process and the gateway to treatment and support.[11]

Age, gender, marital status, educational status, socioeconomic position, area of residence and wealth index have been identified as independent predictors of HIV testing among women in Ethiopia and other regions of Africa.[12–14] Previous research in Benin focused on the HIV prevention and treatment pathways among female sex workers.[11] To date, no current study has looked at the prevalence and determinants of HTC uptake in Benin using the current nationally representative data. Findings from this study could provide useful information to aid policy-makers in the design and implementation of targeted strategies and interventions, as well as guide public health professionals and policymakers on how to distribute resources fairly to improve HTC uptake among women in Benin. In this study, we examined the prevalence and correlates of HTC uptake among women in Benin.

METHODS
Data source and study design
We performed a secondary data analysis of the 2017–2018 Benin Demographic and Health Survey (DHS). The DHS is a nationally representative survey conducted in over 85 countries globally.[15] DHS used a cross-sectional design to collect data from the respondents: women, men and children. A two-stage cluster sampling method was adopted by DHS to recruit respondents for the survey. Detailed sampling technique has been published elsewhere.[16 17] Pretested and structured questionnaires were used to collect data from the respondents on several health and demographic characteristics, including HTC uptake.[16 17] We included a weighted sample of 5,517 women of reproductive age (15–49 years) in the study. This sample consisted of women with complete observations on all the variables of interest included in the study. We relied on the Strengthening the Reporting of Observational Studies in Epidemiology guidelines to draft this paper (online supplemental table 1).[18] The dataset is freely accessible to download at https://dhsprogram.com/data/dataset/Benin_Standard-DHS_2017.cfm?flag=1.[19]

Study variables
HTC uptake is the outcome variable in the study. To assess this variable, the women were asked the question 'Have you ever tested for HIV?'. The response options were 'no' and 'yes'. We coded those who responded 'no' as '0' and 'yes' as '1' and used it in the analysis.[20–22]

A total of 17 explanatory variables were considered for this study. The variables were selected not based on parsimony but based on their significant association with HTC uptake from the literature[14 21–23] as well as their availability in the DHS dataset. We grouped the variables into individual level and contextual level. The individual-level variables consisted of women's age, level of education, marital status, current working status, religion, ethnicity, health insurance coverage, presence of sexually transmitted infections in the last 12 months preceding the survey, condom use during the last sex with most recent partner, comprehensive HIV knowledge, number of sexual partners excluding spouse in the last 12 months prior to the survey, wealth index, and exposure to mass media. Place of residence, region, community literacy level, and community socioeconomic status were the contextual-level variables included in the study. Detailed description of the explanatory variables have been highlighted in the literature.[20–22]

Statistical analyses
We used Stata software V.17.0 to perform all the analyses. Percentages were used to present the results of the uptake of HTC and its distribution across the explanatory variables. We employed binary logistic regression analysis to select the significant variables for the multilevel regression analysis. All the variables with $p<0.05$ were included in the multilevel model. Later, we employed a multivariable multilevel binary logistic regression analysis to examine the predictors of HTC uptake among the women in Benin using four models (models O–III). Model O consisted of only the outcome variable, with no explanatory variable with the results indicating the variation in HTC uptake attributed to the clustering at the primary units. Models I and II consisted of the individual-level and contextual-level variables, respectively. Model III contained all the explanatory variables. The results were presented using adjusted odds ratios (aORs), with

their respective 95% CIs. The Akaike's information criterion (AIC) was used to evaluate model fitness, or how well various models fitted the data, with the best-fitted model being the model with the smallest AIC values. Model III was chosen as the best-fitted model since it has the least AIC value. We performed the multilevel regression using Stata's 'mlogit' function. We also weighted all the analyses and the Stata's 'svyset' command was used to adjust for disproportionate sampling and non-response.

Patient and public involvement
In this study, patients and the public were not included in the study's design and conduct.

RESULTS
Background characteristics of the respondents
Table 1 presents the background characteristics of the respondents included in the study. Majority of the respondents were aged 25–29 (22.6%), attained no formal education (57.4%), were married (62.9%), were working (81.6%) and belonged to the Fon ethnic group (37.4%). Most of the respondents were not covered by health insurance (98.9%), had no STIs in the last 12 months preceding the survey (92.1%), belonged to the richest wealth quintile (22.8%), and resided in rural areas (56.9%).

Prevalence of HTC uptake among women in Benin
The overall prevalence of HTC uptake among women in Benin was found to be 46.4%. Across the various age range, women in the age range 30–34 years reported the highest prevalence (56.6%) of HTC uptake whereas women in the age range 15–19 years reported the least prevalence (21.8%). Also, women with secondary education or higher reported a higher prevalence (60.7%) of HTC uptake than those with primary (51.2%) and no education (39%). Also, the prevalence of HTC uptake was higher in women with comprehensive knowledge of HIV (60.6%) than in women without comprehensive knowledge of HIV. The prevalence of HTC uptake was also found to be higher in women who were covered by health insurance (87.1%) than in women without health insurance coverage. Similarly, women with a higher exposure to mass media (three) reported a higher prevalence of HTC uptake (70.5%). The results are presented in table 1.

Predictors of HTC uptake among women in Benin
Table 2, model III, presents the results of the predictors of HTC among women in Benin. The results showed that the odds of HTC uptake increases with an increasing level of education, with the highest odds among those with secondary or higher education (aOR 2.06, 95% CI 1.64 to 2.61). Similarly, increasing the number of mass media exposure was associated with higher likelihood of HTC uptake, with those exposed to three mass media having higher odds relative to those with no exposure (aOR

1.63, 95% CI 1.07 to 2.51). Women covered by health insurance were more likely to test for HIV compared to those not covered by health insurance (aOR 3.04, 95% CI 1.44 to 6.43). Relative to women with no HIV knowledge, those with comprehensive HIV knowledge had higher odds of testing for HIV (aOR 1.77, 95% CI 1.43 to 2.21). Women aged 20–49 years were more likely to test for HIV as compared to those aged 15–19 years. The odds of HTC uptake was higher among women from communities with high literacy level (aOR 1.76, 95% CI 1.28 to 2.41), those from communities with high socioeconomic status (aOR 1.43, 95% CI 1.08 to 1.90), and those belonging to the Adja ethnic group (aOR 1.84, 95% CI 1.01 to 3.35). Women from the Atlantic, Littoral, Couffo, Mono, and Zou regions were more likely to test for HIV compared to those in the Alibori region.

However, women belonging to the African Traditional religion (aOR 0.73, 95% CI 0.54 to 0.98) were less likely to test for HIV compared to their Christian counterparts. Increasing the number of sexual partners was associated with a reduction in the odds of HTC uptake with the lowest odds among those with two or more partners (aOR 0.35, 95% CI 0.18 to 0.68). Women residing in rural areas (aOR 0.73, 95% CI 0.57 to 0.92) were less likely to undergo HTC compared to those in urban areas.

DISCUSSION
This study sought to examine the prevalence and correlates of HTC uptake among women in Benin. The study found the prevalence of HTC uptake to be 46.4% among women in Benin, which is relatively low. The prevalence found in this study is lower than the prevalence found in Ethiopia (53%),[24] Zambia (80%),[25] Nigeria (58.4%),[26] and Uganda (75.6%).[26] Since HTC is an important strategy to ending the HIV epidemic, this finding suggests the need to improve the uptake of HTC among women in Benin.

We found that women who had health insurance were more likely to utilise HTC services. This result corroborates with the findings from previous studies conducted in Malawi[27] and Ghana.[21] Health insurance coverage has been found to be an important determinant of access to health services in most countries.[28–30] This is mainly because health insurance subscription offers subscribers some level of protection against health expenditure,[31] thus subscribers do not pay for certain health services. This could be the case in the context of HTC in Benin, as women who subscribed to health insurance might have had free access to HTC services.

Also, we found that women with higher educational attainment and women with comprehensive knowledge of HIV had an increased likelihood of HTC uptake. This is similar to findings from other studies in Zambia[25] and Ghana.[32] Attaining a higher educational level has the potential to impact women's level of knowledge on HIV which could have eventually improve their HIV-related behaviour especially in the context of HTC uptake.[33–35]

Table 1 Bivariate analysis of HIV testing and counselling (HTC) across the explanatory variables

Variable	Weighted N (%)	HTC		cOR (95% CI)
		Yes (%)	No (%)	
Prevalence		46.4 (44.4–48.4)	43.6 (51.6–55.6)	
Women's age (years)				
15–19	620 (11.2)	135 (21.8)	485 (78.2)	1.00
20–24	1090 (19.8)	476 (43.7)	614 (56.3)	2.78*** (2.18 to 3.55)
25–29	1247 (22.6)	652 (52.3)	595 (47.7)	3.93*** (3.04 to 5.06)
30–34	862 (15.6)	487 (56.6)	375 (43.4)	4.66*** (3.57 to 6.10)
35–39	772 (14.0)	412 (53.4)	360 (46.6)	4.10*** (3.18 to 5.30)
40–44	506 (9.2)	240 (47.4)	266 (52.6)	3.23*** (2.48 to 4.22)
45–49	420 (7.6)	156 (37.1)	264 (62.9)	2.12*** (1.57 to 2.86)
Level of education				
No formal education	3169 (57.4)	1234 (39.0)	1935 (61.0)	1.00
Primary	1066 (19.3)	546 (51.2)	520 (48.8)	1.65*** (1.38 to 1.96)
Secondary or higher	1282 (23.3)	778 (60.7)	504 (39.3)	2.42*** (2.05 to 2.85)
Marital status				
Never married	773 (14.0)	223 (28.8)	550 (71.2)	1.00
Married	3469 (62.9)	1653 (47.7)	1816 (52.3)	2.25*** (1.85 to 2.74)
Cohabiting	1057 (19.1)	567 (53.7)	490 (46.3)	2.86*** (2.19 to 3.74)
Previously married	218 (4.0)	116 (53.4)	102 (46.6)	2.84*** (2.02 to 3.98)
Current working status				
No	1015 (18.4)	426 (41.9)	589 (58.1)	1.00
Yes	4502 (81.6)	2134 (47.4)	2368 (52.6)	1.25* (1.05 to 1.49)
Religion				
Christianity	3040 (55.1)	1610 (53.0)	1430 (47.0)	1.00
Islamic	1630 (29.5)	625 (38.4)	1005 (61.6)	0.55*** (0.46 to 0.66)
African traditional	528 (9.6)	215 (40.8)	313 (59.2)	0.61*** (0.49 to 0.76)
No religion/others	319 (5.8)	108 (34.0)	211 (66.0)	0.46*** (0.34 to 0.61)
Ethnicity				
Adja	729 (13.2)	364 (50.0)	365 (50.0)	1.00
Bariba	660 (12.0)	260 (39.3)	400 (60.7)	0.65* (0.46 to 0.91)
Dendi	322 (5.8)	131 (40.8)	191 (59.2)	0.69 (0.44 to 1.07)
Fon	2064 (37.4)	1163 (56.4)	901 (43.6)	1.29* (1.03 to 1.62)
Yoa, Lokpa	147 (2.7)	57 (38.7)	90 (61.3)	0.63 (0.39 to 1.01)
Betamaribe	298 (5.4)	102 (34.2)	196 (65.8)	0.52*** (0.36 to 0.75)
Peulh	343 (6.2)	57 (16.5)	286 (83.5)	0.20*** (0.13 to 0.30)
Yoruba	692 (12.6)	312 (45.1)	380 (54.9)	0.82 (0.62 to 1.09)
Other beninois	195 (3.5)	76 (38.7)	119 (61.3)	0.63 (0.39 to 1.03)
Other nationalities	67 (1.2)	37 (56.2)	29 (43.8)	1.29 (0.73 to 2.25)
Covered by health insurance				
No	5457 (98.9)	2507 (45.9)	2950 (54.1)	1.00
Yes	60 (1.1)	52 (87.1)	8 (12.9)	7.96*** (3.98 to 15.92)
Had sexually transmitted infections in the last 12 months				
No	5080 (92.1)	2349 (46.2)	2731 (53.8)	1.00
Yes	437 (7.9)	210 (48.2)	227 (51.8)	1.08 (0.83 to 1.40)
Condom used during last sex with most recent partner				
No	5218 (94.6)	2423 (46.4)	2795 (53.6)	1.00
Yes	299 (5.4)	136 (45.4)	163 (54.6)	0.96 (0.73 to 1.25)
Comprehensive HIV knowledge				
No	4459 (80.8)	1918 (43.0)	2541 (57.0)	1.00
Yes	1058 (19.2)	641 (60.6)	417 (39.4)	2.04*** (1.72 to 2.41)

Continued

Table 1 Continued

Variable	Weighted N (%)	HTC Yes (%)	No (%)	cOR (95% CI)
No of sexual partners excluding spouse, in last 12 months				
0	4539 (82.3)	2224 (49.0)	2314 (51.0)	1.00
1	878 (15.9)	303 (34.5)	575 (65.5)	0.55*** (0.46 to 0.65)
2 or more	101 (1.8)	32 (31.7)	69 (68.3)	0.48** (0.31 to 0.75)
Exposure to mass media				
None	1864 (33.8)	655 (35.1)	1029 (64.9)	1.00
1	1669 (30.2)	732 (43.8)	937 (56.2)	1.44*** (1.23 to 1.69)
2	1627 (29.5)	921 (56.6)	706 (43.4)	2.41*** (2.02 to 2.87)
3	356 (6.5)	251 (70.5)	105 (29.5)	4.41*** (3.36 to 5.78)
Wealth index				
Poorest	982 (17.8)	273 (27.8)	709 (72.2)	1.00
Poorer	1056 (19.1)	371 (35.1)	685 (64.9)	1.40** (1.13 to 1.74)
Middle	1048 (19.0)	437 (41.8)	610 (58.2)	1.86*** (1.47 to 2.36)
Richer	1173 (21.3)	544 (53.6)	544 (46.4)	3.00*** (2.37 to 3.80)
Richest	1258 (22.8)	409 (67.5)	409 (32.5)	5.38*** (4.27 to 6.79)
Place of residence				
Urban	2380 (43.1)	1339 (56.3)	1041 (43.7)	1.00
Rural	3137 (56.9)	1220 (38.9)	1917 (61.1)	0.49*** (0.42 to 0.59)
Region				
Alibori	767 (13.9)	240 (31.3)	527 (68.7)	1.00
Atacora	406 (7.4)	125 (30.7)	281 (69.3)	0.97 (0.62 to 1.53)
Atlantic	715 (13.0)	420 (58.7)	296 (41.3)	3.12*** (2.07 to 4.70)
Borgou	501 (9.1)	184 (36.7)	317 (63.3)	1.27 (0.80 to 2.02)
Collines	465 (8.4)	164 (35.2)	301 (64.8)	1.19 (0.78 to 1.83)
Couffo	356 (6.4)	171 (48.1)	185 (51.9)	2.03** (1.33 to 3.12)
Donga	294 (5.3)	126 (42.9)	168 (57.1)	1.65* (1.05 to 2.58)
Littoral	337 (6.1)	248 (73.7)	89 (26.3)	6.16*** (4.09 to 9.28)
Mono	264 (4.8)	129 (48.8)	135 (51.2)	2.10** (1.24 to 3.54)
Ouémé	492 (8.9)	287 (58.2)	205 (41.8)	3.06*** (2.06 to 4.55)
Plateau	354 (6.4)	153 (43.1)	202 (56.9)	1.66* (13 to 2.45)
Zou	567 (10.3)	315 (55.5)	252 (44.5)	2.74*** (1.82 to 4.14)
Community literacy level				
Low	1878 (34.0)	665 (35.4)	1214 (64.6)	1.00
Medium	2073 (37.6)	910 (43.9)	1164 (56.1)	1.44** (1.16 to 1.79)
High	1565 (28.4)	985 (62.9)	580 (37.1)	2.72*** (2.21 to 3.34)
Community socioeconomic status				
Low	2237 (40.5)	808 (36.1)	1429 (63.9)	1.00
Medium	1506 (27.3)	676 (44.9)	830 (55.1)	1.43** (1.14 to 1.79)
High	1774 (32.2)	1075 (60.6)	699 (39.4)	3.10*** (2.50 to 3.84)

*p<0.05, **p<0.01, ***p<0.001; 1.00=reference category.
cOR, crude OR.

This finding suggests that the education of women is very important in efforts towards HIV prevention and ending the HIV epidemic.

Moreover, women exposed to mass media had an increased likelihood of HTC uptake. The use of media outlets such as the radio, television, and reading newspapers or magazines as a behavioural change intervention has improved access to a lot of health services in different parts of the world[36 37] and is now evident in the context of HTC uptake among women in Benin. This is because media outlets have been reported to be one of the most effective medium to reach mass audience in a short period.[36] While reading newspaper or magazine is dependent on a person's literacy level, radio and television on the other hand is not. This finding suggests the need to enhance the use of

Table 2 Mixed-effect analysis of factors associated with HIV testing and counselling among women in Benin

Variables	Model O	Model I aOR (95% CI)	Model II aOR (95% CI)	Model III aOR (95% CI)
Fixed effect				
Women's age (years)				
15–19		1.00		1.00
20–24		2.74*** (1.99 to 3.78)		2.74*** (1.99 to 3.77)
25–29		4.04*** (2.90 to 5.63)		3.95*** (2.84 to 5.50)
30–34		4.97*** (3.46 to 7.13)		4.86*** (3.39 to 6.98)
35–39		4.27*** (2.96 to 6.18)		4.11*** (2.85 to 5.95)
40–44		3.77*** (2.56 to 5.55)		3.60*** (2.45 to 5.31)
45–49		2.24*** (1.43 to 3.52)		2.15*** (1.37 to 3.38)
Level of education				
No formal education		1.00		1.00
Primary		1.51*** (1.21 to 1.90)		1.45** (1.15 to 1.82)
Secondary or higher		2.17*** (1.73 to 2.73)		2.06*** (1.64 to 2.61)
Religion				
Christianity		1.00		1.00
Islamic		1.09 (0.83 to 1.43)		1.12 (0.85 to 1.48)
African traditional		0.73* (0.54 to 0.99)		0.73* (0.54 to 0.98)
No religion/others		0.82 (0.57 to 1.19)		0.84 (0.58 to 1.21)
Current working status				
No		1.00		1.00
Yes		1.04 (0.83 to 1.31)		1.04 (0.83 to 1.31)
Ethnicity				
Adja		1.00		1.00
Bariba		1.06 (0.68 to 1.65)		1.84* (1.01 to 3.35)
Dendi		0.64 (0.35 to 1.17)		1.02 (0.49 to 2.12)
Fon		1.15 (0.84 to 1.58)		1.20 (0.79 to 1.82)
Yoa, Lokpa		0.74 (0.35 to 1.59)		1.19 (0.52 to 2.73)
Betamaribe		0.96 (0.52 to 1.76)		1.72 (0.82 to 3.63)
Peulh		0.31*** (0.17 to 0.58)		0.58 (0.28 to 1.16)
Yoruba		0.94 (0.62 to 1.43)		1.16 (0.68 to 1.99)
Other Beninois		0.96 (0.51 to 1.79)		1.59 (0.77 to 3.28)
Other nationalities		0.81 (0.41 to 1.62)		1.05 (0.50 to 2.22)
Covered by health insurance				
No		1.00		1.00
Yes		3.05** (1.45 to 6.41)		3.04** (1.44 to 6.43)
Comprehensive HIV knowledge				
No		1.00		1.00
Yes		1.74*** (1.40 to 2.17)		1.77*** (1.43 to 2.21)
No of sexual partners excluding spouse, in last 12 months				
0		1.00		1.00
1		0.45*** (0.35 to 0.59)		0.44*** (0.34 to 0.57)
2 or more		0.37** (0.19 to 0.70)		0.35** (0.18 to 0.68)
Exposure to mass media				
None		1.00		1.00
1		1.26* (1.02 to 1.54)		1.22 (0.99 to 1.49)
2		1.42** (1.12 to 1.82)		1.39** (1.09 to 1.78)
3		1.68* (1.09 to 2.57)		1.63* (1.07 to 2.51)

Continued

Table 2 Continued

Variables	Model O	Model I aOR (95% CI)	Model II aOR (95% CI)	Model III aOR (95% CI)
Wealth index				
Poorest		1.00		1.00
Poorer		0.91 (0.69 to 1.18)		0.88 (0.67 to 1.15)
Middle		1.09 (0.81 to 1.47)		1.01 (0.75 to 1.37)
Richer		1.38* (1.01 to 1.90)		1.19 (0.86 to 1.65)
Richest		1.90*** (1.32 to 2.73)		1.39 (0.95 to 2.05)
Place of residence				
Urban			1.00	1.00
Rural			0.55*** (0.45 to 0.69)	0.73** (0.57 to 0.92)
Region				
Alibori			1.00	1.00
Atacora			0.84 (0.52 to 1.37)	0.89 (0.49 to 1.60)
Atlantic			2.56*** (1.65 to 3.98)	2.81*** (1.53 to 5.17)
Borgou			0.82 (0.48 to 1.40)	0.88 (0.50 to 1.56)
Collines			0.90 (0.55 to 1.46)	1.20 (0.63 to 2.29)
Couffo			1.90** (1.20 to 3.02)	2.64* (1.25 to 5.60)
Donga			1.32(0.81 to 2.16)	1.18 (0.64 to 2.17)
Littoral			2.23** (1.38 to 3.60)	2.32** (1.25 to 4.28)
Mono			1.50(0.90 to 2.50)	2.23* (1.04 to 4.77)
Ouémé			1.87** (1.22 to 2.87)	1.80 (0.98 to 3.30)
Plateau			1.57* (1.05 to 2.35)	1.75 (0.95 to 3.20)
Zou			2.26*** (1.42 to 3.60)	2.90** (1.53 to 5.50)
Community literacy level				
Low			1.00	1.00
Medium			1.33* (1.05 to 1.68)	1.23(0.97 to 1.58)
High			2.23*** (1.67 to 2.98)	1.76*** (1.28 to 2.41)
Community socioeconomic status				
Low			1.00	1.00
Medium			1.44** (1.13 to 1.83)	1.21(0.94 to 1.56)
High			1.91*** (1.49 to 2.45)	1.43* (1.08 to 1.90)
Random effect model				
PSU variance (95% CI)	1.649(1.367, 1.988)	1.037(0.833 to 1.291)	0.853(0.699 to 1.042)	0.872(0.707 to 1.076)
ICC	0.333	0.240	0.206	0.210
Wald χ^2	Reference	424.16 (<0.001)	343.13 (<0.001)	654.39 (<0.001)
Model fitness				
Log-likelihood	−9620.8883	−8840.3917	−9476.8784	−8780.1638
AIC	19245.78	17748.78	18989.76	17660.33
N	5517	5517	5517	5517
No of clusters	555	555	555	555

*p<0.05, **p<0.01, ***p<0.001; 1=reference category.
AIC, Akaike's information criterion; aOR, adjusted OR; ICC, intraclass correlation; PSU, primary sampling unit.

radio, especially as a medium of behavioural change communication.

We also found that women residing in rural areas have lower likelihood of HTC uptake compared to women in urban areas. This result aligns with finding from a previous study in Ghana[32] where women in rural areas have reduced odds of HTC uptake. This finding could be due to geographical disparity in access to healthcare services in most parts of SSA including Benin where women in urban areas usually have higher access to quality and needed health services due to some socioeconomic privilege in urban

dwellings. This finding suggests the need to improve universal health coverage in Benin.[38]

Additionally, women aged 20–49 years were more likely to test for HIV compared to those aged 15–19 years. This finding affirms the reports from previous studies in Zambia[25] and Gambia.[1] The high uptake of HTC among women aged 20 years and above could be attributed to their increased exposure to HIV-related information and increased awareness. For instance, women who are 20 years and older are more likely to get pregnant and thus receive HIV education, counselling and testing through the prevention of mother-to-child transmission programmes.[39 40] Meanwhile, evidence suggests that younger women (15–19 years) have higher risk for HIV due to their increased exposure to multiple sexual partners.[41] Like the findings of a previous study in South Africa,[42] our result suggests that having higher number of sexual partners was associated with a reduced likelihood of HTC uptake, perhaps due to fear of HIV diagnosis and limited confidentiality.[42] The high risk of HIV exposure coupled with a reduced propensity to test increases the risk of HIV infection among adolescents. This emphasises the need for adolescent-targeted HIV education, counselling and testing programmes to improve testing uptake.

We also found that the likelihood of HTC uptake was higher among women from communities with high literacy levels. Women in communities with high literacy rates are more likely to have higher education and thus comprehensive HIV/AIDS knowledge,[43] which increases their propensity to uptake HTC.[44 45] In addition, evidence shows that higher education is associated with increased healthcare decision-making capacity and HIV screening uptake among women in SSA.[22] Our findings again revealed that women living in communities with higher socioeconomic status were more likely to uptake HTC. Similar findings were reported in previous studies.[25 46 47] Higher socioeconomic status had been associated with increased empowerment and autonomy in healthcare decision-making and healthcare seeking behaviour among women in SSA[22 48] and thus increasing the likelihood of HTC uptake.

Also, our finding suggests that women belonging to the African Traditional religion were less likely to test for HIV compared to their Christian counterparts. Similar findings were reported in Burkina Faso[47] and in Ghana.[49] Women who belong to the traditional religion have a strong belief in supernatural powers and faith, which reduces their wiliness to uptake HTC.[50] For instance, the high rate of Voodooism adherents in Benin had been associated with reduced uptake of preventive healthcare services.[51] Perhaps, educating and involving leaders of the traditional religion in designing and implementing targeted screening programmes could improve HTC uptake among members.

Further, we found that women living in Alibori region were least likely to test for HIV compared to those from Atlantic, Littoral, Couffo, Mono and Zou. Alibori, located in the Northmost part of Benin, is one of the poorest departments in Benin.[52] Perhaps, the low socioeconomic status of women in the region couple with reduced access to healthcare services[53] contributed to the low HIV screening uptake. Thus, improving availability and ensuring easy accessibility to HIV screening services with limited or no cost to the women could improve screening uptake among women in the Alibori region.

Strength and limitation

The major strength of our study is the use of nationally representative data to examine the prevalence and predictors of HTC among women. Also, the use of weighting and rigorous statistical analysis to a complex sample helped to reduce the undersampling and oversampling of the DHS dataset. For the limitations, causal inferences cannot be drawn from the study due to the cross-sectional nature of the DHS dataset. In addition, there is a hint of recall bias in the study as the variables were assessed using a self-reporting method. Further, our study is limited to only the variables present in the dataset. As a result, the findings should be interpreted in light of the studied variables.

CONCLUSION

We found a relatively low uptake of HTC in Benin. There is the need to enhance efforts to empower women, as well as reduce health inequities as they all have a substantial impact on HTC uptake among women in Benin, taking into consideration the factors identified in this study.

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concerning the dataset and the ethical guidelines can be accessed at http://goo.gl/ny8T6X. We adhered to the ethical guidelines regarding the use of secondary data for publication.

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