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DETERMINANTS OF CERVICAL CANCER SCREENING PRACTICES AMONG HIV INFECTED AND UNINFECTED WOMEN ATTENDING BINGHAM UNIVERSITY TEACHING HOSPITAL IN JOS, PLATEAU STATE, NIGERIA: COMPARATIVE STUDY.

Ibrahim Bakshak Kefas[1], Isaac Isiko[2*], Lenz Nwachinemere Okoro[3],Haroun Isa[1], Naya Gadzama Bulus[4], Jackson Micheal Asingwire[5], Fortune Sunday Richman[6] , Ibrahim Jane Kefas[7],Joy Malle Dogo[8]

[1]Department of Community Medicine, Bingham University Hospital, Karu, Nassarawa State, Nigeria
[2]Department of Community Medicine, Axel Pries Institute of Public Health and Biomedical Sciences, Nims University, Jaipur, Rajasthan State, India
[3]Department of Community Medicine, David Umahi Federal University Teaching Hospital, Uburu, Ebonyi State, Nigeria
[4]Department of Community Medicine, College of Medical Sciences, Abubakar Tafawa Balewa University, Bauchi, Nigeria
[5]Department of Pharmaceutical Sciences, Faculty of Health Sciences, Marwadi University, Rajkot, Gujarat, 360003, India
[6]Faculty of Pharmacy, University of Uyo, Nigeria
[7]Department of Community Medicine, New Life Fountain Hospital, Jos North, Plateau State, Nigeria
[8]Department of Community Medicine, Jos University Teaching Hospital,Jos, Nigeria

Abstract

Purpose

This study focused on identifying the determinants of cervical cancer screening practices among HIV-infected and uninfected women attending Bingham University Teaching Hospital in Jos, Plateau State of Nigeria.

Methods

This was a comparative cross-sectional study that included women aged 15 to 49 years who had given birth at least once in their lifetime, both HIV-infected and uninfected, who attended Bingham University Teaching Hospital, Jos, Nigeria. Structured questionnaires were used to collect the data, and the collected data were cleaned and analyzed using the Statistical Package for Social Sciences (SPSS) software.

Results

There were significantly more HIV-infected women aged 35-44 years (AOR 5.71, CI 1.27-25.62, p = 0.023), the determinants from the study were employment status- employed uninfected women (AOR 5.11, CI 1.60-16.29, p = 0.006) and ethnicity- non-Plateau ethnicity uninfected women (AOR 7.44, CI 1.67-33.05, p = 0.007) with cervical cancer screening practices. None of the other determinants were significantly related to cervical cancer screening practices.

Conclusion

There was a low level of screening in both groups which means there is a need to increase cervical cancer awareness among both HIV-infected and uninfected populations.

Keywords: *Cervical cancer, screening practices, HIV, Women's health, HIV infection in women, Nigeria*
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Corresponding Author: *Isaac Isiko**
Email: *isaacisiko12@gmail.com*
Department of Community Medicine, Axel Pries Institute of Public Health and Biomedical Sciences, Nims University, Jaipur, Rajasthan State, India.

Introduction

Cervical cancer is the fourth most common cancer in women worldwide, with approximately 660,000 new cases and 350,000 deaths in 2022. The highest number of cases of incidence and mortality are in countries with low or middle incomes, primarily in sub-Saharan Africa, Southeast Asia, and Central America (1). Nigeria has made a substantial contribution to the worldwide cervical cancer epidemic, as there is an approximate annual diagnosis rate of 12,075 cases of cervical cancer or 18.4 cases per 100,000 women. Thus, it is now the second leading cause of cancer-related deaths among women in Nigeria (2).

This cancer is caused by chronic genital high-risk human papillomavirus (HPV) infection. While the majority of HPV infections are normally eliminated without the development of the disease, some women may develop cancerous lesions that, if left untreated, can progress to

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aggressive malignancy (3, 4). More than 100 different forms of HPV have been identified, with HPV being the most common sexually transmitted infection (5). Most research has revealed a strong relationship between HPV and human immunodeficiency virus (HIV) infection. High rates of HIV infection contribute to the burden of cervical cancer because women living with HIV (WLWH) have an immune system that is compromised and is more vulnerable to HPV infection (6), and several studies have shown that HIV-positive women have greater rates of HPV infection, malignant cervical lesions, and aggressive cervical cancer than HIV-negative women (7).

Several factors contribute to the high prevalence and fatality rates of cervical cancer in Nigeria and other developing countries, including inadequate screening programs, limited access to healthcare facilities, and inadequate awareness of cervical cancer and its associated risk factors (8). WLWH may have exclusive challenges in receiving cervical cancer screening services, including stigma, discrimination, lack of information about Papanicolaou (pap) smear tests, and conflicting health goals (9). In Nigeria, several studies have examined cervical cancer screening practices among HIV-positive women; for example, research conducted by the theGwagwalada Area Council revealed that only 21.8% of WLWH had ever undergone cervical cancer screening (10). In another survey, 82.0% of HIV-positive women planned to be screened for cervical cancer. Cervical cancer screening intention was determined by one's level of education, and HIV-positive women with a low level of education were 2.67 times more likely to want to test than those with no formal education, while those with a higher level of education were 3.16 times more likely to intend to screen than those without any kind of formal education (11). This relates to a study conducted in Ethiopia on 432 women infected with HIV that reported that approximately 71% of individuals had previously heard of cervical cancer. Forty-nine percent of women who had heard of cervical cancer did not know its exact cause, while 74% could identify at least one risk factor for the disease (12).

Despite the higher risk of cervical cancer among HIV-positive women and the availability of screening programs in some healthcare facilities, including government settings, the acceptance of these services remains inadequate in Nigeria (13). The aforementioned factors included deficient health systems, insufficient resources, and staff to execute regular screening initiatives, costly screening expenses, insufficient knowledge and instruction regarding current initiatives, and delayed presentation and diagnosis (14). Previous research has shown that health system characteristics such as low-quality services, lengthy waiting hours, or inadequate responses from healthcare providers, resulting in a loss of belief in healthcare staff, are crucial for the utilization of screening services (15,16).

Furthermore, sociodemographic variables such as age, marital status, family history, and educational attainment may have an impact on cervical cancer screening behaviors in this group of people (17). A comprehensive study by Adedimeji et al., 2021 reported major challenges to women seeking cervical cancer screening, such as low-risk perceptions, poor health-seeking behaviors, lack of information availability, and the high cost of the test. Negative attitudes and behaviors are also fostered by influences, which include social networks, sociocultural norms, views on men's roles, and HIV-related stigma when screening is included in HIV care. A lack of national cancer prevention strategies and initiatives, as well as inadequately equipped healthcare facilities, were also macrolevel impediments to screening for cervical cancer (18). Other studies have reported low levels of knowledge about risk factors, prevention, and screening services for cervical cancer among women living with HIV in most sub-Saharan states, such as Morocco (19) and Tanzania (20).

There has been an initiative in Nigeria to prevent cervical cancer, although it is not yet advanced. In hospitals, opportunistic screening is used when female patients have gynecological symptoms. Few government tertiary hospitals in each state offer cervical cancer screening. These services are also offered by some secondary health facilities that are owned by the government and private diagnostic labs and hospitals. Cervical cancer screening outreach programs are occasionally organized by governmental and non-governmental organizations in local communities and occasionally in impoverished areas (21). According to the guidelines for cervical cancer screening, women between the ages of 21 years and 29 years should have a Pap test every three years; those between 30 years and 65 years should have an HPV test or a Pap test every three years; and women over the age of 66 years should inquire with their physicians about the necessity of ongoing screening every five years (22). Nevertheless, putting these guidelines and instructions into practice has proven difficult, as evidenced by the poor screening and testing coverage rates that have been recorded across the country (23). Identifying the factors that influence cervical cancer screening habits among HIV-positive and HIV-negative women is critical for establishing targeted interventions and increasing access to these potentially life-saving services (24).

This paper aimed to study the determinants of cervical cancer screening practices among women living with HIV and infected women attending Bingham University Teaching Hospital in Jos, Plateau State.

Methods and tools

Study Design and Study Population

This was a comparative cross-sectional study. The study was conducted in two groups: the HIV-infected group, which consisted of HIV-infected women of reproductive age who were confirmed by positive test results with a history of at least one child delivery and who had attended postpartum/immunization clinics in BHUTH, Jos. The HIV-uninfected group consisted of HIV-uninfected

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women whose HIV test results were negative within the reproductive age range of 15-49 years, who had at least one childbirth, and who were admitted to the postpartum/immunization clinic at BHUTH, Jos.

Study Setting and Area

This study was conducted at Bingham University Teaching Hospital (BHUTH) located in Jos North LGA, Plateau State, which served as the location of the study. [1]The hospital has a vesicovaginal fistula center that provides clinical services to hundreds of thousands of women both inside and outside the country. [2]

The northern LGA population has an HIV prevalence of 16%, which is the highest among the 17 LGAs in the state. [3][4] The Local Government Area has seven health facilities providing comprehensive HIV care, including Jos University Teaching Hospital (JUTH), BHUTH, Plateau Specialist Hospital, Our Lady of Apostle Hospital, Faith Alive Foundation, Hwolshe Medical Centre, and Solat Hospital, all of which are funded by the PEPFAR program through the APIN Public Health Initiative.

Sample size and sampling technique

The minimum sample size was determined using the formula for determining the sample size for a comparative study.

$$n = \frac{2(z\alpha + z\beta)\,2\quad P\,(1-P)}{(p1-p2)2}$$

Where n = minimum sample size in the 2 groups

$z\alpha$ = standard normal deviate corresponding to a 5% level of significance =1.96 Confidence

$z\beta$ = standard normal deviate corresponding to a power of 80%=0.84

p1= proportion of Pap smear uptake among HIV-infected women in Botswana =80% [36]

p2= proportion of Pap smear uptake among HIV uninfected women in Botswana=64%[36]

$$P=\frac{p1+p2}{2}=80+64/2=72\%=0.72$$

d = expected difference between the two groups= p1-p2=80%-64%=16%

The minimum sample size calculated is 124 HIV-infected and uninfected women for each group.

Participants who met the inclusion criteria (women of reproductive age(15-49 years) with at least one childbirth attending immunization clinics/postpartum with positive test results and enrolled in care) for each group were recruited using the convenience sampling method. This process was repeated at each HIV clinic day until the sample size was reached.

Similarly, women who met the inclusion criteria (women of reproductive age(15-49 years) with at least one childbirth attending immunization clinics/postpartum with documented negative results in their folders) for the uninfected group were recruited at each postpartum/immunization clinic until the sample size was reached. Women who met the criteria but did not give their consent for the study were excluded.

Study instrument and data collection

Data was collected for eight weeks from 10th May to 15th July 2021.

A structured questionnaire administered by an interviewer was used to obtain the necessary information from the recruited participants. This scale was adapted from the Champion's Health Belief Model (CHBM) scale and WHO "Improving data for an informed decision-making: a toolkit for cervical cancer prevention and control programs"[5]. The questionnaire consisted of 3 sections: a) sociodemographic, b) screening practice, and c) factors affecting risk perception and screening uptake.

Five research assistants were trained in data collection. The questionnaire was pretested with 10% of the total sample at the comprehensive health center in Dadin Kowa, Jos South. This helped uncover ambiguities, assess the ease of survey administration, and helped in including relevant questions that were previously omitted. The data were collected over four weeks from May 10th to June 15th, 2021. HIV status was determined from participant files for both HIV-infected and HIV-uninfected participants. The data were collected from the HIV-infected group at the HIV clinic and the immunization/postpartum clinic for the HIV-uninfected groups until the sample size was reached. The screening practices include ever having a Pap smear test and the recommended age to start cervical screening tests. Each correct answer received a score of one, an incorrect answer received a score of zero, and the screening score was calculated as the sum of the cervical cancer screening scores.

Measurement of Variables

Cervical cancer screening in HIV-infected and uninfected women was measured as the dependent variable, with sociodemographic characteristics and factors influencing screening as independent variables.

Recall bias was anticipated in this study but women were asked to attach dates to events which could help to overcome to an extent.

Data analysis

All the generated data were entered into Excel and analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 23. A P-value of 0.05 was considered to indicate statistical significance for all the statistical tests.

Quantitative variables are described using the mean and standard deviation, while the basic statistics describing sociodemographic characteristics are presented as frequencies and percentages.

Chi-square tests were used to assess associations between sociodemographic characteristics stratified by HIV status. The significance of the relationships between these groups was also assessed. The mean and standard deviation were used to summarize the scores for each item. The chi-

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square test was used to compare cervical screening practices stratified by HIV status.

Ethical consideration

Ethical approval was granted by the Bingham University Teaching Hospital Ethical Committee with ethical approval ID of **NHREC/21/05/2005/00768** and permission was given by the BHUTH's chief medical officer. Participants/respondents provided written consent, and they were free to leave the research at any stage of the study. The study was conducted by the Declaration of Helsinki.

Results

One hundred and twenty-four respondents were interviewed in both the HIV-infected and uninfected groups, respectively. The age range of the respondents in this study was 18-49 years. The mean age of the respondents in the HIV-infected group was 32.54 ± 5.52 years, and that in the HIV-uninfected group was 26.23 ± 3.85 years; these ages were not comparable (X2 = 63.92; df = 3; p = 0.001). Among theHIV-infected respondents, 45 (66.2%) had a secondary education, while among the HIV-uninfected respondents,88 (69.3%) had a tertiary education; this difference was statistically significant (X2 = 40.16; df = 3; p = 0.001). The majority of both groups were married: 67 (37.6%)in the HIV-infected group and 111 (62.4%) in the uninfected group. Most of the respondents in both the HIV-infected 112 (48.7) and -uninfected 118 (51.3) groups had a parity of 1-3 children, and this was comparable (X2= 2.157; df = 1, p = 0.220). The majority of the respondents in the HIV-infected group (37,64.9) reported having multiple sexual partners compared to uninfected respondents (20,35.1%). Christianity was the predominant religion among the respondents in this study, with 139 (78.1%) in the HIV-infected group and 134(75.3%) in the noninfected group. In both the HIV-infected and -uninfected groups, 97 (51.3%) and 92 (48.7%) of the respondents, respectively, were unemployed(Table 1).

Table 1: Sociodemographic characteristics of the HIV-infected and uninfected women

	HIV status			
Variables	**Infected n=124 Freq (%)**	**Uninfected n=124 Freq (%)**	**X2**	**p-value**
Age group (yrs)				
15-24	20(29.4)	48(70.6)	63.917	0.001*
25-34	38(36.2)	67(63.8)		
35-44	41(83.7)	8(16.3)		
≥45	25(96.2)	1(3.8)		
Educational level				
No education	10(83.3)	2(16.7)	40.161	0.001*
Primary	30(73.2)	11(26.8)		
Secondary	45(66.2)	23(33.8)		
Tertiary	39(30.7)	88(69.3)		
Marital status				
Single	30(76.9)	9(23.1)	41.184	0.001*
Married	67(37.6)	111(62.4)		
Separated	12(75.0)	4(25.0)		
Widow	15(100.0)	0(0.0)		
Parity				
1-3	112(48.7)	118(51.3)	2.157	0.220
≥4	12(66.7)	6(33.3)		
Number of sexual partners				
1	87(45.5)	104(54.5)	2.6	0.30
≥2	37(64.9)	20(35.1)		
Religion				
Christian	107(50.0)	107(50.0)	0.000	1.000
Islam	17(50.0)	17(50.0)		
Ethnicity				
Plateau ethnicity	57(53.3)	50(46.7)	1.915	0.370†
Non-Plateau ethnicity	68(48.0)	74(52.0)		
Employment status				
Employed	27(45.8)	32(54.2)	0.556	0.551
Unemployed	97(51.3)	92(48.7)		

**Statistically significant † Fisher's exact test*

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Table 2: Comparison of cervical cancer screening practices among HIV-infected and -uninfected women

Variable	HIV status		COR (95%CI)	p-value
	Infected n (%)	Uninfected n(%)		
Screening practice				
Yes	39(63.9)	22(36.1)	2.1 (1.17-3.38)	0.018*
No	65(45.5)	102(54.5)		

**Statistically significant † Fisher's exact test*

As shown in Table 2 above, compared with HIV-uninfected respondents, HIV-infected respondents had 2.1 times greater odds of having been screened for cervical cancer, and this difference was statistically significant (COR = 2.1, CI 1.17-3.38, p = 0.018).

Table 3: Logistic regression showing determinants of screening practices among HIV-infected and uninfected respondents

Variable	HIV infected			HIV uninfected		
	AOR	95% CI	p-value	AOR	95% CI	p-value
Age group						
15-24	1					
25-34	1.106	0.23-5.30	0.900	3.736	0.01-1.00	1.000
35-44	5.709	1.27-25.62	0.023*	1.943	0.01-1.00	1.000
≥45	0.554	0.55-1.69	0.301	5.515	0.01-1.00	1.000
Employment status						
Unemployed	1					
Employed	3.625	0.97-10.41	0.057	5.111	1.60-16.29	0.006*
Ethnicity						
Plateau ethnicity	1					
Non-Plateau ethnicity	0.873	0.35-2.20	0.773	7.444	1.67-33.05	0.007*

**Statistically significant*

As shown in Table 3 above, age 35-44 years in the HIV-infected group was a good predictor of cervical cancer screening. Those aged 35-44 years had 5.7 times greater odds of being screened for cervical cancer than those aged 15-24 years (AOR 5.71, CI 1.27-25.62, p = 0.023). However, among HIV-uninfected people, age was not a predictor of screening practices. Among the uninfected respondents, those who were employed had 5.1 times greater odds of being screened than those who were unemployed (AOR 5.11, CI 1.60-16.29, p = 0.006). Non-Plateau ethnicity respondents had 7.4 times the odds of being screened as Plateau ethnicity respondents (AOR 7.44, CI 1.67-33.05, p = 0.007).

Discussion

This study revealed a low rate of screening among both HIV-infected and -uninfected respondents. The findings in this study were relatively greater than those reported in most previous Nigerian studies. [6][7][8][9][10][11][12][13]. These findings align with previous research conducted in Nigeria, Kenya, and South Africa (25,29).In contrast, a study from the United States reported significantly higher screening rates (29). These regional disparities likely stem from differences in demographics, healthcare access, and cultural attitudes toward cervical cancer screening. Among HIV-positive women, the screening rate was slightly higher than that reported in a study from Ethiopia (30). This variation could be due to methodological differences or cultural factors specific to the study populations.

A study conducted among Federal Civil Servants in North Central Nigeria revealed that a greater proportion of women were screened for cervical cancer[14] than in this study. The higher screening practice among HIV-infected respondents compared to HIV-uninfected respondents could be attributed to the improved expansion and accessibility of screening centers across the country, as well as the integration of cervical cancer screening into the standard of care for HIV-positive women. [15]

The low level of screening may be due to a poor attitude bordering service availability, ease of access, cultural acceptability of sample collection methods, availability of adequate laboratory support, and availability of specialists to offer correct counseling on negative results and correct management of positive results. [16]Another factor that

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may influence cervical cancer screening is the high cost or lack of coverage of cervical cancer by health insurance. [17] It is worth noting that the availability and accessibility of cervical cancer screening are not sufficient for ensuring high cervical cancer uptake. [9] This should be accompanied by a well-articulated strategy as well as interventions to increase knowledge and behavioral change. Male participation in increasing cervical cancer screening should not be underestimated. Men are the head of the household, and they are often the ones who pay the bills, adhere to cultural beliefs, and make decisions for the family. This emphasizes the importance of women's empowerment in gaining control over health and its determinants.

A high level of education was associated with screening practices in both the HIV-infected and uninfected groups. A similar finding was reported in a study of reproductive-aged women. [6][18] In contrast, a study conducted in Birnin Kebbi revealed that educational status has no positive impact on cervical cancer screening uptake. [11] More educated women are more likely to utilize cervical cancer prevention services than are those with a low educational status. This may be because they are more likely to practice safe sex. A lack of sexual education was also viewed as a barrier to cervical cancer screening

In this study, respondents' employment status influenced cervical cancer screening among the HIV-infected and -uninfected groups, with those who were employed having higher employment rates than those who were unemployed. [18]

Interestingly, this study identified age as a significant predictor for HIV-positive women. Those aged 35-44 years were almost six times more likely to be screened than younger participants (15-24 years). This finding aligns with a study in India suggesting that older women may have greater exposure to health information and be more likely to participate in health education programs targeting cervical cancer screening (31).

For HIV-uninfected women, employment status emerged as a predictor for screening. Compared with their unemployed counterparts, employed women were five times more likely to undergo screening. This aligns with studies from India, suggesting that employment is associated with higher income and the ability to afford out-of-pocket healthcare costs associated with cervical cancer screening (31). Employed women might also belong to a higher socioeconomic class, which often correlates with better access to health information and services.

The study also demonstrated that women of non-Plateau ethnicity were seven times more likely to be screened than those of Plateauorigin. This finding warrants further investigation into potential cultural or social barriers specific to the plateau population that may hinder cervical cancer screening practices.

This study demonstrated a low prevalence of cervical cancer screening among women in Nigeria. This is particularly troubling because cervical cancer is a highly preventable disease, and early detection through regular screening is crucial for successful treatment. These findings highlight several key disparities that require targeted interventions to improve overall screening rates. First, age and employment status emerged as significant predictors. Second, a substantial gap exists between plateau and non-plateau plateau ethnicities.

Conclusion

Educating and empowering women of reproductive age is very important in screening against a preventable cancer such as cervical cancer as seen in the results of the study. The determinants of screening were education and ethnicity while the predictor was employment status.

Recommendation

To address these issues, a multipronged approach is necessary. First, enhancing health education and awareness campaigns specifically designed for different age groups and socioeconomic backgrounds is crucial. Additionally, strategies to reduce out-of-pocket expenses associated with screening can improve access for unemployed and low-income women. In the same vein, culturally sensitive approaches are needed to understand and address any barriers specific to the plateau population. Finally, integrating cervical cancer screening into routine healthcare visits can significantly increase accessibility and convenience for all women.

By implementing these interventions, healthcare providers and policymakers can work towards closing the gap in cervical cancer screening practices. This, in turn, will lead to a significant reduction in the overall burden of cervical cancer in Nigeria.

Limitations

This study did not involve the male sex in increasing cervical cancer screening uptake, which should not be underestimated. Men are the head of the house and often pay bills, adhere to cultural beliefs, and make decisions for the family—the significance of women's empowerment in achieving control over health and its determinants.

This study was purely quantitative. A study with a qualitative component is needed to investigate the reasons for women's low use of cervical cancer screening. This was consistent with the findings of a study conducted in Edo state among women of reproductive age. This study has important implications for increasing the use of cervical cancer screening services and serves as the foundation for a large-scale multicenter study.

Competing interests

There are no competing interests among the authors.

Author contributions

IBK and II conceptualized the study, IBK, II. LNO, IJK, and IH wrote the first draft of the paper; NGB wrote the

discussion; JMA, AM, and II wrote the abstract and introduction; and IBK, II, and LNO analyzed the data. All authors wrote and approved the final draft of the manuscript.

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There was no funding for this study.

Abbreviations

AOR	Adjusted odds ratio
HIV	Human immunodeficiency virus
BHUTH	Bingham University Teaching Hospital
CHBM	Champion's health belief model
WHO	World Health Organization
LGA	Local Government Area
JUTH	Jos University Teaching Hospital

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