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Knowledge, attitudes, and cervical cancer screening practices among HIV-positive female sex workers in Benue State, Nigeria

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Abstract

Cervical cancer is a leading cause of cancer-related deaths in sub-Saharan Africa, and women with human immunodeficiency virus (HIV) are at significantly increased risk. However, information on cervical cancer screening among female sex workers (FSWs) in parts of Nigeria remains limited. This study assessed knowledge, attitudes, and screening practices relating to cervical cancer among HIV-positive FSWs in Benue State, Nigeria, and examined variables associated with screening behaviour. A facility-based descriptive cross-sectional study was conducted among 215 HIV-positive FSWs receiving care at Key Population One-Stop Shop (KP-OSS) facilities in Makurdi, Gboko, and Otukpo. Data were collected using interviewer-administered questionnaires. The mean age of the participants was 32.1 ± 6.7 years, and 74.6% lived in urban areas. Overall, 77.2% had previously undergone cervical cancer screening, most commonly by visual inspection with acetic acid (VIA). In addition, 76.9% understood how cervical cancer could be prevented, whereas 66.5% demonstrated general awareness of the disease. Nevertheless, fear of the screening procedure (44.2%), fear of a positive diagnosis (49.8%), and embarrassment about genital exposure (42.3%) were reported. Knowledge was not a significant predictor of screening behaviour ($\beta = 0.002$, $p > 0.05$), whereas attitude was significant ($\beta = -0.32$, $p < 0.01$). Screening behaviour was negatively correlated with age and number of pregnancies ($p < 0.01$). Negative attitudes and psychosocial barriers persisted and significantly influenced screening behaviour. Culturally tailored behavioural interventions and psychosocial support should therefore be integrated into HIV care platforms to enhance cervical cancer screening uptake in this high-risk population.

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1. Introduction

Globally, cervical cancer is a major public health concern and a leading cause of cancer-related morbidity and mortality among women. It ranks as the fourth most prevalent cancer in women worldwide. Cervical cancer accounts for about 600,000 new cases and more than 340,000 deaths every year [1–5]. Low- and middle-income countries account for more than 85% of these deaths, and sub-Saharan Africa has the highest age-standardized incidence and mortality rates worldwide [2, 6–8].

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Roughly 25% of all female cervical cancer diagnoses and deaths worldwide occur in sub-Saharan Africa [6, 8, 9]. Cervical cancer is the leading cause of cancer death among women in several sub-Saharan African countries, particularly those with high HIV prevalence [9, 10]. Owing to late-stage diagnosis and restricted access to therapy, five-year survival rates are substantially lower than global averages [10–12]. Screening coverage remains very low. Only 14% of women in sub-Saharan Africa aged 30–49 years have ever been screened, compared with more than 60% in high-income settings; some West African countries report less than 1% coverage [7, 13]. Obstacles include inadequate knowledge or support regarding human papillomavirus (HPV) vaccination or cervical cancer [14]; sociocultural stigma [15]; financial limitations [16]; a lack of trained personnel or equipment [14]; geographic remoteness [13]; limited policy prioritization [17, 18]; competing health priorities, including HIV/AIDS [19]; and inadequate infrastructure for follow-up or treatment [20]. Persistent infection with high-risk HPV is a major cause of cervical cancer. Women living with HIV have a several-fold increased risk of cervical cancer due to immunosuppression, which accelerates HPV persistence and progression to cervical intraepithelial neoplasia and invasive disease [21]. Consequently, the World Health Organization (WHO) recommends prioritizing women with HIV for more regular and active cervical cancer screening [22].

According to Refs. [18, 23–28], cervical cancer is the second most common cancer among Nigerian women and a major cause of cancer-related death. It is a major public health concern, with an estimated 12,000–15,000 new cases and 8,000–10,400 deaths annually [18, 23–26]. Because of late-stage presentation, low screening coverage, and low awareness, the disease disproportionately affects women in their reproductive years and is linked to high morbidity and mortality [23, 24, 26, 29, 30]. Nigeria still faces substantial obstacles in reducing the incidence of cervical cancer, even though it is largely preventable through HPV vaccination and routine screening [18, 23, 31]. Evidence specifically focused on HIV-positive FSWs, especially in North-Central Nigeria, remains limited, although several Nigerian studies have examined cervical cancer screening in the general population and among women living with HIV. Agbo *et al.* [32] reported that FSWs in Benue State, Nigeria, which has a high HIV burden, often experience intersecting vulnerabilities, such as economic marginalization, violence, stigma, discrimination, and restricted access to preventive health services. For FSWs, the expansion of Key Population One-Stop Shop (KP-OSS) models in Nigeria provides an opportunity to incorporate cervical cancer screening into standard HIV care.

It remains unclear, however, how knowledge and attitudes affect screening practices in this service-delivery setting. Therefore, this study evaluated the knowledge, attitudes, and cervical cancer screening practices of HIV-positive FSWs in Benue State, Nigeria. It also examined the sociodemographic and psychosocial characteristics associated with screening behaviour. The results are intended to guide focused interventions and policy plans aimed at reducing cervical cancer morbidity and mortality in this highly vulnerable group.

2. Materials and methods

2.1. Study design

A facility-based descriptive cross-sectional study was conducted to evaluate the knowledge, attitudes, and cervical cancer screening practices of HIV-positive FSWs in Benue State, Nigeria. The design allowed simultaneous measurement of exposure variables, including sociodemographic characteristics, knowledge, attitudes, and social support, and outcome variables, including screening behaviour, and was suitable for determining associations within high-risk populations.

2.2. Study setting

The study was conducted in Benue State, North-Central Nigeria. Benue State is one of Nigeria's high-burden HIV states, with an estimated population of more than five million [33]. Makurdi is the state capital, and the state is administratively organized into 23 local government areas and three senatorial zones. Information was gathered from every senatorial district. KP-OSS facilities in Makurdi, Gboko, and Otukpo local government areas, supported by the AIDS Prevention Initiative in Nigeria Public Health Initiatives, were used. These facilities provide comprehensive, stigma-free services for key populations, including HIV testing and treatment, sexually transmitted infection management, family planning, psychosocial support, and cervical cancer screening. By combining curative and preventive care on a single platform, the one-stop-shop model increases access for underserved groups.

2.3. Study population

The study population comprised HIV-positive FSWs who were registered and receiving HIV care at the selected KP-OSS facilities during the study period and who were at least 18 years old. HIV-positive FSWs were selected because of their increased likelihood of chronic HPV infection and faster progression to cervical neoplasia.

2.3.1. Eligibility criteria

Inclusion criteria. Participants were eligible if they were: (i) FSWs aged ≥ 18 years; (ii) had confirmed HIV-positive status documented in clinic records; (iii) were currently enrolled in care at one of the selected KP-OSS facilities; and (iv) provided written informed consent.

Exclusion criteria. Participants were excluded if they: (i) declined participation; (ii) were severely ill or cognitively unable to respond at the time of data collection; or (iii) were not resident within the study area.

2.4. Sample size determination

The sample size was determined using Cochran's formula for cross-sectional studies, as described for survey research [34]:

$$n = \frac{Z^2 p(1-p)}{d^2}, \tag{1}$$

where $Z = 1.96$ for a 95% confidence level, p is the estimated prevalence of cervical cancer screening uptake among women living with HIV, and d is the margin of error of 5%. Using a prevalence of 10.8% [35], the required minimum sample size was determined to be 148 participants. An adjusted sample size of 215 participants was achieved to increase study power and precision.

2.5. Sampling technique

A multistage sampling strategy was used. In the first stage, three one-stop-shop facilities in Makurdi, Gboko, and Otukpo were purposively selected because they serve as important service-delivery hubs for key populations in Benue State. In the second stage, peer-navigator registers at each site provided sample frames of eligible HIV-positive FSWs. The number of participants recruited per site was determined by proportionate allocation based on facility client load. Participants were then selected from each list using systematic random sampling.

2.6. Data collection instrument

A structured interviewer-administered questionnaire, adapted from previously validated tools used in sub-Saharan African cervical cancer screening studies, was used to collect data. The questionnaire comprised five sections: sociodemographic characteristics, knowledge of cervical cancer and screening, attitudes toward cervical cancer screening, social support and access to healthcare, and cervical cancer screening practices.

2.6.1. Pretesting and reliability

The questionnaire was pretested among approximately 10% of the study population at a KP-OSS facility outside the selected study sites. Minor wording changes were made based on pretesting feedback. Internal consistency of the scales was evaluated using Cronbach's alpha. Reliability coefficients ranged from 0.66 to 0.84 across subscales, indicating acceptable internal consistency.

2.6.2. Measurement of variables

Knowledge items evaluated knowledge of cervical cancer risk factors, signs and symptoms, and prevention. Correct answers were scored as 1, whereas incorrect or "do not know" answers were scored as 0. Composite scores were calculated and classified as adequate or inadequate based on the mean score. Attitudes toward cervical cancer screening were assessed using Likert-scale items measuring fear, embarrassment, perceived discomfort, and willingness to screen. Higher scores reflected more negative attitudes. Screening behaviour was assessed by self-report of ever having undergone cervical cancer screening, as well as by frequency, recency, and type of screening. Positive screening behaviour was defined as having ever undergone screening. Social support was assessed in the peer, family, and healthcare-provider domains.

2.7. Data collection procedure

Trained female research assistants with prior experience working with key populations collected data over a four-week period. To preserve confidentiality, interviews were conducted in private rooms within the one-stop-shop facilities. Depending on each participant's preference, questionnaires were administered in English or local languages.

2.8. Data management and analysis

Completed questionnaires were checked daily for completeness and accuracy. Data were entered into EpiData and exported to SPSS version 23.0 for analysis. Variables were summarized using descriptive statistics, including means, standard deviations, frequencies, and percentages. Chi-square tests were used in bivariate analysis to examine relationships between categorical variables. Pearson's correlation was used to assess the relationships between screening behaviour and continuous variables. Binary logistic regression analysis was used to identify independent determinants of screening behaviour. Statistical significance was set at $p < 0.05$.

2.9. Ethical considerations

Ethical approval was provided by the Benue State Ministry of Health Research Ethics Committee and the APIN Public Health Initiatives Institutional Review Board. All participants provided written informed consent. Personal identifiers were replaced with anonymous codes to maintain strict confidentiality. Counseling, referral for cervical cancer screening, and psychosocial support were provided to participants as needed.

Table 1: Sociodemographic characteristics of HIV-positive female sex workers in Benue State.

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	20–25	17	7.9
	26–30	69	32.1
	31–35	76	35.3
	36–40	38	17.7
	≥41	15	7.0
Residence	Urban	161	74.6
	Rural	54	25.4
Religion	Christianity	195	90.7
	Islam/traditional/other	20	9.3
Marital status	Married	142	66.0
	Single	55	25.6
	Divorced/widowed	18	8.4

Table 2: Reliability coefficients of study scales.

Scale/subscale	Cronbach's α
Cervical cancer screening behaviour	0.840
Knowledge (overall)	0.801
Attitude toward screening	0.663
Social support	0.693

Table 3: Cervical cancer screening practices.

Variable	Category	n	%
Ever screened for cervical cancer	Yes	166	77.2
	No	49	22.8
Frequency of screening	Every year	101	47.0
	Not every year	76	35.3
	Do not know	38	17.7
Time of last screening	< 1 year	102	47.0
	≥ 1 year	46	21.4
	Do not know	67	31.6
Screening method	VIA	147	68.4
	Pap smear	15	6.7
	Others	53	24.9

3. Results

3.1. Sociodemographic characteristics of participants

A total of 215 HIV-positive FSWs participated in the study (Table 1). The mean age of the respondents was 32.1 ± 6.7 years. The largest proportion of participants (35.3%) were aged 31–35 years, followed by those aged 26–30 years (32.1%).

Most participants were Christians (90.7%) and lived in urban areas (74.6%). Sixty-six percent were married, and the average lifetime number of pregnancies was 2.2 ± 1.4. Although educational attainment varied, most participants had completed at least primary school.

3.2. Reliability of study scales

The internal consistency of the study instruments was acceptable (Table 2). Cronbach's alpha values ranged from 0.66 to 0.84.

3.3. Cervical cancer screening behaviour

As shown in Table 3, 166 respondents (77.2%) reported that they had ever undergone cervical cancer screening. Among all respondents, 47.0% reported annual screening. The most frequently reported screening method was visual inspection with acetic acid (VIA; 68.4%). In addition, 21.4% had been screened more than one year before the study.

Table 4: Knowledge of cervical cancer and screening.

Knowledge domain	Adequate *n* (%)	Inadequate *n* (%)
Risk factors	129 (59.8)	86 (40.2)
Signs and symptoms	129 (59.8)	86 (40.2)
Prevention	165 (76.9)	50 (23.1)
Awareness of screening	143 (66.5)	72 (33.5)

Table 5: Attitudes toward cervical cancer screening.

Statement	Yes *n* (%)	No *n* (%)
Willing to screen if opportunity arises	158 (73.5)	57 (26.5)
Fear screening procedure	95 (44.2)	120 (55.8)
Embarrassed by genital exposure	91 (42.3)	124 (57.7)
Afraid of pain	91 (42.3)	124 (57.7)
Afraid of bleeding	92 (42.8)	123 (57.2)
Fear positive diagnosis	107 (49.8)	108 (50.2)

Table 6: Social support for cervical cancer screening.

Source of support	Yes *n* (%)	No *n* (%)
HCW available for screening	128 (59.5)	87 (40.5)
Discuss screening with HCW	157 (73.0)	58 (27.0)
HCW has discussed screening	160 (74.4)	55 (25.6)
Family provides financial support	125 (58.1)	90 (41.9)
Family provides emotional support	128 (59.5)	87 (40.5)
Friends encourage screening	96 (44.7)	119 (55.3)

HCW, healthcare worker.

3.4. Knowledge of cervical cancer and screening

The majority of respondents showed adequate knowledge in several important areas (Table 4). Overall, 76.9% demonstrated adequate understanding of preventive measures, whereas 66.5% demonstrated awareness of cervical cancer screening. Similarly, 59.8% correctly identified common signs and symptoms and key risk factors.

3.5. Attitudes toward cervical cancer screening

Significant negative attitudes were recorded, even though 73.5% of respondents reported willingness to be screened if the opportunity arose (Table 5). A substantial proportion of women reported fear of the screening procedure (44.2%). Nearly half (49.8%) were afraid of receiving a positive cervical cancer diagnosis, and similar proportions feared pain (42.3%) and possible bleeding during or after the procedure (42.8%). Embarrassment about genital exposure was reported by 42.3% of participants. These findings demonstrate how psychological and social barriers can continue to prevent screening, even when women are informed about the disease and have access to screening facilities.

3.6. Social support networks

Study participants reported substantial support from family members and healthcare professionals regarding cervical cancer screening (Table 6). The majority (74.4%) reported that healthcare workers had discussed cervical cancer screening with them, and 73.0% felt comfortable discussing screening concerns with healthcare workers. More than half of the respondents (58.1%) reported that family members helped them pay for screening services, and 59.5% said that family members provided emotional support. However, only 44.7% reported that friends had encouraged them to be screened.

3.7. Predictors of screening behaviour

Regression analysis showed that knowledge was not a significant predictor of screening behaviour ($\beta = 0.002$, $p > 0.05$), whereas attitude toward screening was significant ($\beta = -0.32$, $p < 0.01$). Furthermore, screening behaviour was negatively correlated with age ($r = -0.53$, $p < 0.01$) and number of pregnancies ($r = -0.64$, $p < 0.01$), indicating that younger and less-parous FSWs were more likely to screen (Table 7). Attitude toward screening was an important independent predictor (Table 8). In addition, chi-square analysis revealed significant associations between screening behaviour and educational level and marital status ($p < 0.05$), but not religion (Table 9).

Table 7: Pearson correlation between selected variables and screening behaviour.

Variable	r	p-value
Age	-0.53	< 0.01
Number of pregnancies	-0.64	< 0.01

Table 8: Multiple linear regression predicting screening behaviour.

Predictor	β	SE	t	p-value
Knowledge score	0.002	0.014	0.14	0.89
Attitude score	-0.32	0.10	-3.21	< 0.01

Table 9: Association between sociodemographic variables and screening behaviour.

Variable	χ^2	df	p-value
Religion	6.50	6	0.37
Educational level	37.99	18	< 0.01
Marital status	52.34	12	< 0.01

4. Discussion

Most study participants were young to middle-aged HIV-positive FSWs, with a mean age of 32 years. This age distribution is often linked to increased cervical cancer risk in sub-Saharan Africa. Owing largely to chronic oncogenic HPV infection acquired earlier in life, epidemiological analyses show that cervical cancer incidence peaks during the reproductive and economically active years, especially among women aged 30–49 years [2, 5]. The predominance of urban residence in this study may help explain the comparatively high screening uptake, given that urban women often have better access to screening facilities and health information than their rural counterparts [7]. Evidence that marital status affects healthcare participation through increased contact with reproductive health services is supported by the large proportion of married participants [16]. The educational attainment of most respondents also reflects a recognized determinant of preventive health behaviour, because education can improve risk perception and health literacy [25].

The acceptable internal consistency values (Cronbach's $\alpha = 0.66$–0.84) indicate that the study tools reliably captured behavioural, attitudinal, and psychosocial dimensions. Similar reliability ranges have been documented in cervical cancer behavioural research in African contexts, where social constructs such as stigma and fear require multidimensional measurement approaches [13]. These results therefore support the methodological soundness of the study. The proportion of participants who reported ever being screened (77.2%) was substantially higher than screening coverage estimates for the general female population in sub-Saharan Africa, where uptake often remains low [7]. This relatively higher coverage probably reflects the deliberate integration of screening opportunities into antiretroviral treatment programmes for women living with HIV [21]. The widespread use of VIA is consistent with WHO-recommended strategies for low-resource settings because of its affordability and feasibility [22]. Similar trends have been observed across sub-Saharan Africa, where VIA remains central to population-level screening initiatives [9]. However, the finding that only about half of participants reported annual screening suggests persistent gaps in adherence to recommended follow-up intervals, consistent with broader implementation challenges in African health systems [14].

The comparatively high level of knowledge in this study contrasts with previous Nigerian studies that reported low awareness among women [24, 26]. This improvement may be attributable to increased health education within HIV treatment facilities. Research shows that systematic counseling in HIV programmes can improve knowledge about cervical cancer prevention [24]. The persistence of gaps in the recognition of risk factors and symptoms supports the findings of Mafiana *et al.* [23], who noted that information about cervical cancer in Nigeria can remain superficial and may not always translate into preventive action. This reinforces the view that behaviour change requires more than information alone. Substantial levels of anxiety, embarrassment, and fear were reported despite high willingness to screen. These findings are consistent with local data showing that sociocultural and psychological barriers are important obstacles to screening adoption [9, 16]. Nearly half of the participants expressed fear of receiving a diagnosis, which is indicative of the cancer fatalism documented in sub-Saharan African populations, where cancer is frequently perceived as a death sentence [8]. Concerns about genital exposure highlight gender-sensitive service-delivery issues that have been noted as major barriers for African women [13]. These findings show that increasing service acceptability remains as important as increasing service availability.

The considerable role of family members and healthcare professionals in promoting screening supports evidence that institutional and interpersonal support can strongly influence preventive health behaviour. Research conducted across sub-Saharan Africa

indicates that provider referral is one of the strongest predictors of screening participation [14]. Given that out-of-pocket expenses remain a major barrier in Nigeria [23], the findings on family financial and emotional support reflect the socioeconomic realities of screening access. In contrast, limited support from peers may indicate persistent stigma associated with both sex work and cancer, which is consistent with qualitative studies describing social isolation among affected women [15].

A significant finding of this study was that screening behaviour was predicted by attitude but not by knowledge. This finding supports behavioural health theories and empirical evidence from Africa showing that cognitive awareness alone rarely leads to action [12]. Qualitative syntheses have similarly highlighted perceived fear, stigma, and emotional readiness as more powerful behavioural drivers than knowledge [13]. Younger FSWs may be more responsive to preventive measures, possibly because of greater exposure to contemporary health messaging. Similarly, reduced screening among women with higher parity may reflect competing caregiving responsibilities and financial constraints, which have been repeatedly reported in screening studies conducted in Africa [16]. Significant associations between marital status, education, and screening behaviour further support the role of socioeconomic determinants in preventive healthcare utilization [25].

Overall, these results support a growing body of global cervical cancer research showing that increasing screening coverage requires a shift from awareness campaigns alone toward attitude change, culturally competent service delivery, and stronger provider engagement. The findings also support the approach recommended in the WHO elimination framework, namely integrating cervical cancer prevention into HIV programmes [22].

5. Recommendations

Continued integration of cervical cancer screening into HIV service delivery, together with focused behavioural and peer-led interventions, is a feasible strategy for reducing cervical cancer morbidity and mortality in this high-risk population.

6. Conclusion

This study shows that HIV-positive FSWs in Benue State have comparatively high awareness of and exposure to cervical cancer screening services, likely because screening is integrated into HIV treatment platforms. However, negative attitudes marked by fear of procedures, embarrassment, and anxiety about a positive diagnosis remain major obstacles to regular screening uptake. Attitude, rather than knowledge, was the strongest predictor of screening behaviour, highlighting the important role of psychosocial variables in shaping preventive health practices among underserved groups. These results indicate that improving cervical cancer outcomes among FSWs living with HIV will require interventions that address emotional, cultural, and institutional barriers in addition to information provision.

This study provides evidence that psychological obstacles and sociocultural dynamics remain important predictors of screening behaviour, even among high-risk individuals with relatively adequate information and service access. Therefore, in addition to the continued expansion of screening programmes, the results underscore the need for behaviour-informed interventions that address stigma, fear, and service acceptability.

Data availability

The dataset generated during the study will be made available upon reasonable request from the corresponding author.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

[1] S. Pimple & G. Mishra, "Cancer cervix: epidemiology and disease burden", CytoJournal **19** (2022) 21. https://doi.org/10.25259/cmas_03_02_2021.

[2] D. Singh, J. Vignat, V. Lorenzoni, M. Eslahi, O. Ginsburg, B. Lauby-Secretan, M. Arbyn, P. Basu, F. Bray & S. Vaccarella, "Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative", Lancet Global Health **11** (2023) e197. https://doi.org/10.1016/S2214-109X(22)00501-0.

[3] Y. Ma, X. Lai & H. Fang, "Global, regional, and national disease burden and economic costs of cervical cancer (1991–2021): a multidimensional data synthesis analysis", Frontiers in Public Health **13** (2025) 1633975. https://doi.org/10.3389/fpubh.2025.1633975.

[4] W. Small, M. Bacon, A. Bajaj, L. Chuang, B. Fisher, M. Harkenrider, A. Jhingran, H. Kitchener, L. Mileshkin, A. Viswanathan & D. Gaffney, "Cervical cancer: a global health crisis", Cancer **123** (2017) 2404. https://doi.org/10.1002/cncr.30667.

[5] M. Arbyn, E. Weiderpass, L. Bruni, S. de Sanjosé, M. Saraiya, J. Ferlay & F. Bray, "Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis", Lancet Global Health **8** (2020) e191. https://doi.org/10.1016/S2214-109X(19)30482-6.

[6] E. Jedy-Agba, W. Joko, B. Liu, N. Buziba, M. Borok, A. Korir, L. Masamba, S. Manraj, A. Finesse, H. Wabinga, N. Somdyala & D. Parkin, "Trends in cervical cancer incidence in sub-Saharan Africa", British Journal of Cancer **123** (2020) 148. https://doi.org/10.1038/s41416-020-0831-9.

[7] L. Yang, M. Boily, M. Rönn, D. Obiri-Yeboah, I. Morhason-Bello, N. Meda, O. Lompo, P. Mayaud, M. Pickles, M. Brisson, C. Hodgins, S. Delany-Moretlwe & M. Maheu-Giroux, "Regional and country-level trends in cervical cancer screening coverage in sub-Saharan Africa: a systematic analysis of population-based surveys (2000–2020)", PLoS Medicine **20** (2023) e1004143. https://doi.org/10.1371/journal.pmed.1004143.

[8] R. Bouassa, T. Prazuck, T. Lethu, J. Meyé & L. Bélec, "Cervical cancer in sub-Saharan Africa: an emerging and preventable disease associated with oncogenic human papillomavirus", Médecine et Santé Tropicales **27** (2017) 16. https://doi.org/10.1684/mst.2017.0648.

[9] T. Dzinamarira, E. Moyo, M. Dzobo, E. Mbunge & G. Murewanhema, "Cervical cancer in sub-Saharan Africa: an urgent call for improving accessibility and use of preventive services", International Journal of Gynecological Cancer **33** (2023) 592. https://doi.org/10.1136/ijgc-2022-003957.

[10] N. Ngcobo, A. Jaca, C. Iwu-Jaja & E. Mavundza, "Reflection: burden of cervical cancer in sub-Saharan Africa and progress with HPV vaccination", Current Opinion in Immunology **71** (2021) 21. https://doi.org/10.1016/j.coi.2021.03.006.

[11] T. Emagneneh, C. Mulugeta, B. Ejigu, A. Alamrew, A. Y. Hiwot & S. F. Feleke, "Survival status of women with cervical cancer in sub-Saharan Africa: a systematic review and meta-analysis, 2024", Frontiers in Oncology **14** (2024) 1491840. https://doi.org/10.3389/fonc.2024.1491840.

[12] C. Anakwenze, A. Kalra, C. Lumley, G. Chinniah, M. Munsell, T. Rajan, G. Moorkanat, P. Mehta, A. Ewongwo, L. Valle, K. Litcher, Y. Geng & S. Grover, "Cervical cancer stage distribution and survival outcomes in Africa: a systematic review and meta-analysis", International Journal of Gynecological Cancer **35** (2025) 100008. https://doi.org/10.1016/j.ijgc.2024.100008.

[13] D. Atnafu, R. Khatri & Y. Assefa, "Drivers of cervical cancer prevention and management in sub-Saharan Africa: a qualitative synthesis of mixed studies", Health Research Policy and Systems **22** (2024) 21. https://doi.org/10.1186/s12961-023-01094-3.

[14] D. Rivero-Mendoza, K. Gjoka, L. Singh, L. Adkins, C. Bylund, S. Staras, R. Salloum, E. Shenkman, N. Egbounye & R. Mkuu, "Health system strategies to improve the uptake of cervical cancer screening in sub-Saharan Africa: a scoping systematic review", Health Promotion Practice (2025) 15248399251370668. https://doi.org/10.1177/15248399251370668.

[15] E. Chona, R. Gosse, E. Msengi, T. Aruldhas, L. Mkonongo, T. Matle, M. Iseselo & J. Ambikile, "Life experiences of women diagnosed with cervical cancer in sub-Saharan Africa: a systematic review of qualitative studies", Psycho-Oncology **34** (2025) e70280. https://doi.org/10.1002/pon.70280.

[16] F. Mantula, Y. Toefy & V. Sewram, "Barriers to cervical cancer screening in Africa: a systematic review", BMC Public Health **24** (2024) 525. https://doi.org/10.1186/s12889-024-17842-1.

[17] E. Asempah, "Cervical cancer prevalence in sub-Saharan Africa and HPV vaccination policy: a public health grand challenge", Journal of Cancer Immunology **3** (2021) 87. https://doi.org/10.33696/cancerimmunol.3.043.

[18] E. Okolie, K. Beek, B. Patel, C. Ndikom & R. Joshi, "Cervical cancer prevention and control in Nigeria: mapping and review of policies", Health Policy and Planning **40** (2025) 931. https://doi.org/10.1093/heapol/czaf049.

[19] A. Ntekim, "Cervical cancer in sub-Sahara Africa", in R. Rajamanickam (Ed.), *Topics on Cervical Cancer with an Advocacy for Prevention*, InTech, 2012, p. 51. https://doi.org/10.5772/27200.

[20] S. Mina, P. Ochieng, E. Addison, A. Manirakiza, A. Falade, K. Kemper, T. Konney, A. Fekadu, G. Mwango, B. Mongare, Y. Dibaba, A. Bogan, C. Dodoo, M. Truman, K. Merrell, E. Osei-Bonsu & E. Woldetsadik, "Cervical cancer treatment patterns and outcomes in sub-Saharan Africa: findings from a multi-institutional cancer dataset", Journal of Clinical Oncology **43** (2025) e17511. https://doi.org/10.1200/jco.2025.43.16_suppl.e17511.

[21] S. A. Adams, M. J. Mphahlele & M. Tshimanga, "Cervical cancer screening uptake among women living with HIV in sub-Saharan Africa: a systematic review", BMC Public Health **22** (2022) 1843. https://doi.org/10.1186/s12889-022-14216-0.

[22] World Health Organization, "Member States consultation on implementation strategies for the acceleration of cervical cancer elimination", 2023. Available online: https://iris.who.int/handle/10665/374980.

[23] J. Mafiana, S. Dhital, M. Halabia & X. Wang, "Barriers to uptake of cervical cancer screening among women in Nigeria: a systematic review", African Health Sciences **22** (2022) 295. https://doi.org/10.4314/ahs.v22i2.33.

[24] T. Olubodun, O. Odukoya & M. Balogun, "Knowledge, attitude and practice of cervical cancer prevention among women residing in an urban slum in Lagos, South West, Nigeria", Pan African Medical Journal **32** (2019) 130. https://doi.org/10.11604/pamj.2019.32.130.14432.

[25] A. Ayeni, O. Okesanya, N. Olaleke, C. Ologun, O. Amisu, D. Lucero-Prisno, V. Ogunwale, H. Abubakar, M. Emery & T. Oso, "Knowledge of cervical cancer, risk factors, and barriers to screening among reproductive women in Nigeria", Journal of Global Health Science **5** (2023) e2. https://doi.org/10.35500/jghs.2023.5.e2.

[26] L. Abugu & E. Nwagu, "Awareness, knowledge and screening for cervical cancer among women of a faith-based organization in Nigeria", Pan African Medical Journal **39** (2021) 200. https://doi.org/10.11604/pamj.2021.39.200.23761.

[27] Y. Adegeye, J. Ogunbiyi & A. Omigbodun, "Trends in the patterns of cancers in Nigerian women over five decades", African Journal of Biomedical Research **23** (2020) 105 https://pmc.ncbi.nlm.nih.gov/articles/PMC8580297/.

[28] O. Awofeso, A. Roberts, O. Salako, L. Balogun & P. Okediji, "Prevalence and pattern of late-stage presentation in women with breast and cervical cancers in Lagos University Teaching Hospital, Nigeria", Nigerian Medical Journal **59** (2018) 74. https://doi.org/10.4103/nmj.nmj_112_17.

[29] O. Lawson, L. Ameyan, Z. Tukur, S. Dunu, M. Kerry, O. Okuyemi, Z. Yusuf, O. Fasawe, O. Wiwa, K. Hebert, J. Joseph, U. Nwokwu, O. Okpako & C. Chime, "Cervical cancer screening outcomes in public health facilities in three states in Nigeria", BMC Public Health **23** (2023) 1716. https://doi.org/10.1186/s12889-023-16539-1.

[30] O. Abiodun, O. Olu-Abiodun, J. Sotunsa & F. Oluwole, "Impact of health education intervention on knowledge and perception of cervical cancer and cervical screening uptake among adult women in rural communities in Nigeria", BMC Public Health **14** (2014) 814. https://doi.org/10.1186/1471-2458-14-814.

[31] M. Adigun, D. Esan, B. Oyinloye, B. Adeyanju, K. Olowoyo & D. Olawade, "Knowledge and practice of health promotive lifestyle toward cervical cancer prevention among women in Africa: a scoping review", Cancer Treatment and Research Communications **43** (2025) 100877. https://doi.org/10.1016/j.ctarc.2025.100877.

[32] E. Agbo, U. Obeta, A. Ikpeazu, G. Kalada, C. Ejeckam, M. Okpara, B. Orji & U. Onyeonoro, "Socioeconomic and cultural factors driving human immun-

odeficiency virus epidemic among female sex workers in Akwa-Ibom and Benue States of Nigeria", Journal of Public Health and Diseases **5** (2022) 56. https://doi.org/10.31248/jphd2022.118.

[33] A. Onovo, A. Adeyemi, D. Onime, M. Kalnoky, B. Kagniniwa, M. Dessie, L. Lee, D. Parrish, B. Adebobola, G. Ashefor, O. Ogorry, R. Goldstein & H. Meri, "Estimation of HIV prevalence and burden in Nigeria: a Bayesian predictive modelling study", eClinicalMedicine **62** (2023) 102098. https://doi.org/10.1016/j.eclinm.2023.102098.

[34] J. E. Bartlett, J. W. Kotrlik & C. C. Higgins, "Organizational research: determining appropriate sample size in survey research", Information Technology, Learning, and Performance Journal **19** (2001) 43 https://www.opalco.com/wp-content/uploads/2014/10/Reading-Sample-Size1.pdf.

[35] T. A. Ehwarieme, C. I. Elusoji & C. A. Enuku, "Prevalence of cervical cancer and associated factors among patients in a tertiary health facility in Edo State, Nigeria", Advanced Biomedical and Health Sciences **4** (2025) 61. https://doi.org/10.4103/abhs.abhs_55_24.