



Factors Associated with Underutilization of Cervical Cancer Screening Services among HIV Positive Women in Serenje District, Central Province

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ABSTRACT

Cervical cancer is the most common cancer among women living with Human Immunodeficiency Virus (HIV) (UNAIDS, 2019⁵⁹). An estimated 604,000 new cases were diagnosed globally, with 342,000 deaths recorded in 2020 (Sung et al., 2021⁶⁹). According to WHO (2020), approximately 6.5% of all female cancers are cervical cancer-related, with 5% of cases attributable to HIV. Zambia ranks second in cervical cancer incidence, with an estimated mortality of 1,839 (WHO, 2020⁵⁶). The current utilization of cervical cancer screening services (CCSS) in Zambia among HIV-positive women stands at 27%, indicating underutilization (UNAIDS, 2019⁵⁹). In Serenje District, only 25.8% of HIV-positive women access these services. This study determined factors associated with the underutilization of CCSS among HIV-positive women in Serenje District.

Methods

A descriptive cross-sectional study was conducted involving 303 HIV-positive women in Serenje District of Central Province, Zambia. Systematic random sampling was used to recruit respondents from selected facilities, and a structured questionnaire was employed for data collection. Statistical Software (STATA V15) was utilized for analysis. Univariate, bivariate, and multivariable logistic regressions were performed to determine associations between variables.

Results

Utilization of CCSS in Serenje District was low, with only 42.24% of respondents reporting service use. Being far from a healthcare facility [AOR: 0.49 (P<0.036, 95% CI 0.25-0.96)], low/inadequate knowledge [AOR: 0.26 (P<0.001, 95% CI 0.13-0.54)], low income [AOR: 0.16 (P<0.001, 95% CI 0.06-0.37)], and negative attitudes towards CCSS [AOR: 0.26 (P<0.001, 95% CI 0.12-0.53)] were significant contributors to reduced utilization.

Conclusion

Low knowledge, poor attitudes, far distances to healthcare facilities, and poor socioeconomic status were identified as key factors contributing to the underutilization of CCSS. It is recommended that the district design and implement awareness campaign on cervical cancer screening services, engage in outreach awareness campaigns, and conducts screening camps to bring these services closer to the communities.

BACKGROUND

Cervical cancer is the most common cancer among women living with HIV. It is preventable and curable if diagnosed and treated early (UNAIDS, 2019⁵⁹). Approximately 70% of all cervical cancers and pre-cancerous cervical lesions are caused by sexually transmitted Human Papillomavirus (HPV) types 16 and 18 (WHO, 2020⁷²).

According to WHO (2020⁵⁶), an estimated 604,000 women were diagnosed with cervical cancer globally. About 6.5% of all female cancers and 5% of cases are attributable to HIV. HIV accounts for more than 40% of cervical cancer cases in eight sub-Saharan African countries. Despite their increased risk, women living with HIV in sub-Saharan Africa continue to experience limited access to regular screening for cervical cancer (UNAIDS, 2019⁵⁹).

In 2020, 85% of sub-Saharan African women with cervical cancer were reported to have HIV (WHO, 2020²⁷). Countries with the highest rates of cervical cancer by age-standardized incidence per 100,000 include Swaziland (75.3%), Malawi (72.9%), and Zambia (66.4%) (Bray, 2018²¹). The WHO recommends simple, low-cost visual inspection with acetic acid (VIA) as the optimal screening method for developing countries. However, utilization of screening services among women living with HIV aged 30-49 years remains low in Malawi (19%) and Zambia (27%) (UNAIDS, 2019⁵⁹).

In Zambia, cervical cancer represents 34.3% of all cancers, making it the most prevalent cancer in the country (Kalubula et al., 2018²⁰). The incidence rate of cervical cancer is 58.4 per 100,000, with a mortality rate of 36.2 per 100,000 (Venturas et al., 2017¹⁹), which remain unacceptably high. The Ministry of Health in Zambia launched cervical cancer screening services in 51 hospitals nationwide to reduce cervical cancer-related deaths by 25% by 2025 (MOH, 2016⁵⁸). However, Serenje, being among the pioneer districts in the Central Province, has continued to experience low service uptake. In 2020, only 1,294 out of 4,997 HIV-positive women in the district were screened (SDH, 2021⁷⁰), a relatively low rate compared to other districts in the province. This study aimed to determine factors associated with the underutilization of cervical cancer screening services among HIV-positive women aged 18-69 years in Serenje District.

METHODS

Study Design

A cross-sectional study design was utilized. This design allowed the researcher to compare different variables at a specific point in time.

Study Setting

The study was conducted in Serenje District and involved eight (8) health centers offering Anti-Retroviral Treatment (ART) services. These centers included Muzamani, Mulilima, Nchimishi, Chibale, Kabundi, Serenje HAHC, Kabamba, and Serenje District Hospital.

Study Population

The study population comprised HIV-positive women aged 18 to 69 years, living with HIV and attending routine HIV treatment services at the selected Public Health Facilities within Serenje District.

Inclusion Criteria

Women of 18 to 69 years old, who met the following Criteria; residents of Serenje District, living with HIV positive, present at the time of interview and had lived in Serenje for at least 12 months were included in the study.

Exclusion Criteria

The researcher excluded women who were below 18 and above 69 years of age, women who had hysterectomy with removal of the uterine cervix; women with mental or physical limitations and unable to respond to the questions.

Sample Size determination

The sample size was determined by using the prevalence formula. According to the Zambian fact sheet 2019, a total of 27% women living with HIV utilized the services (UNAIDS, 2019).

n = sample size, Z (Confidence level of 95%) = 1.96, (Margin of error) e = 0.05, prevalence = P . Total sample size was = **303**

$$n = \frac{z^2 p(1 - p)}{e^2}$$

Sampling Method

Systematic random sampling was used to select respondents at different selected study sites. The calculated sample size (No. 303) was proportionally allocated based on the number of HIV positive women to each facility. Therefore, Probability Proportion to Size (PPS) formula was used as shown below;

$$\text{Number of participants per facility} = \frac{\text{total HIV positive women per facility}}{\text{total HIV positive women in eight study sites}} \times \text{total sample size}$$

The sampling interval (K_{th}) for each facility was determined by dividing the average number of HIV positive women attending ART clinic for the past 3 month (sampling frame= N) by the required sample size for each facility (n), therefore the formula;

$$K_{th} = \frac{\text{average monthly attendant of HIV+women at ART clinic (N)}}{\text{sample size per facility (n)}}$$

On each day of data collection, the first respondent was randomly selected, and then every K_{th} eligible respondent was chosen based on their order of arrival until the required sample size for the facility was achieved.

Data Collection Tool

A researcher-administered questionnaire was used to collect data from 303 respondents aged 18 to 69 years. The structured questionnaire comprised closed-ended questions to ensure consistency and accuracy in data collection. As the study involved human participants, written informed consent was obtained from all respondents prior to participation. Individuals who declined to participate were not coerced, and all participants were assured protection from emotional harm. The variables collected included age, distance to the nearest health facility, education level, marital status, among others.

Data Analysis

The data collected from interviews was entered into Microsoft Excel. Data cleaning and error checking were performed before exporting the data to Statistical Software (STATA V.15) for analysis. Descriptive statistics were used to summarize the data for categorical variables, which were reported in frequencies and percentages (e.g., education level, marital status). The Chi-square test was employed to assess the association between the outcome and various categorical independent variables at the unadjusted level, such as the association between the utilization of the screening method and knowledge.

Multiple logistic regression was utilized to predict the relationship between predictors (independent variables) and the predicted variable (dependent variable). Variables with a P-value of less than 0.05 in the bivariate logistic regression analysis (unadjusted level) were included in the multiple logistic regression model. The 95% confidence interval of the odds ratio was computed, and variables with a P-value of less than 0.05 in the multiple logistic regression analysis were considered statistically significant.

RESULTS

Characteristics of Study Participants

A total of 303 HIV-positive women participated in the study, of whom 128 (42.24%) utilized cervical cancer screening services, while 175 (57.75%) did not. The majority of participants (84.2%, n=255) were aged between 18 and 40 years, with 105 (41.2%) having utilized screening services, and the remaining 150 (58.8%) not utilizing the services. Most participants (47.5%, n=144) were married, with 63 (43.8%) of them utilizing the services, while 81 (56.3%) did not. Regarding parity, more than half (65.3%, n=198) of the participants had fewer than five children, of whom 80 (40.4%) utilized screening services. Among participants with five or more children (34.7%, n=105), only 48 (45.7%) utilized the services. With respect to average monthly income, the majority (61.4%, n=186) reported earning less than \$36.1. Among this group, only 62 (33.3%) utilized the services, while the remaining 124 (66.7%) did not.

Concerning knowledge levels, 217 (71.6%) of the participants had inadequate knowledge about cervical cancer screening, while 86 (28.4%) demonstrated adequate knowledge. Among those with adequate knowledge, 65 (75.6%) utilized the services, compared to only 21 (24.4%) who did not. The majority of respondents (75.6%, n=229) resided more than 5 km from the facilities offering cervical cancer screening services, with only 88 (38.4%) of them utilizing the services. Conversely, among those residing within 5 km of a facility (24.4%, n=74), 40 (54.1%) utilized the services.

Out of the 175 respondents who did not utilize screening services, 151 (86.3%) expressed a negative attitude toward cervical cancer and its screening services, while 24 (13.7%) had a positive attitude but still did not utilize the services. Among the 128 respondents who utilized the screening services, 61 (47.6%) expressed a positive attitude, whereas 67 (52.3%) had a negative attitude despite utilizing the services. Educational attainment also influenced utilization, with 32.3% (n=98) of participants having completed secondary education. Among this group, more than half (52%, n=51) utilized screening services. However, the majority of respondents (50.8%, n=154) had attained only primary education, with 101 (65.6%) not utilizing the services (**Table 1**).

Table 1: Demographic Characteristics of respondents

Independent variable	Indicator	Utilization of cervical cancer screening			
		Yes	No	Total	Percentage
Age range	40+	23	25	48	(15.8%)
	30-40	51	59	110	(36.3%)
	18-30	54	91	145	(47.9%)
	Total	128	175	303	
Marital status	Married	63	81	144	(47.5%)
	Divorced	17	25	42	(13.9%)
	Widow	13	21	34	(11.2%)
	Single	35	48	83	(27.4%)
	Total	128	175	303	
Educational level	Tertiary	23	19	42	(13.9%)



	Secondary	51	47	98	(32.3%)
	Primary	53	101	154	(50.8%)
	No formal education	1	8	9	(3%)
	Total	128	175	303	
Current employment	Public/private employed	25	23	48	(15.8%)
	Not employed	59	101	160	(52.8%)
	Self employed	44	51	95	(31.3%)
	Total	128	175	303	
Parity	<5/ low parity	80	118	198	(65.3%)
	>5/ grand multiparous	48	57	105	(34.7%)
	Total	128	175	303	
Income	>\$108.3/ High	36	12	48	(15.8%)
	\$72.2-\$108.3/ Medium	30	39	69	(22.8%)
	<\$36.1/ Low	62	124	186	(61.4%)
	Total	128	175	303	
Knowledge levels on CC screening services	Adequate Knowledge	65	21	86	(28.4%)
	Inadequate Knowledge	63	154	217	(71.6%)
	Total	128	175	303	
Attitude of HIV Positive women towards CC screening services	Positive attitude	61	24	85	(28.1%)
	Negative attitude	67	151	218	(71.9%)
	Total	128	175	303	
Distance to the cervical cancer screening facility	Near	40	34	74	(24.4%)
	Far	88	141	229	(75.6%)
	Total	128	175	303	
Waiting time to access the service	Less than 30 minutes	44	60	104	(34.3%)
	More than 30 minutes	84	115	199	(65.7%)
	Total	128	175	303	

Utilization of Cervical Cancer Screening Services

This section presents information about the utilization of cervical cancer screening services among HIV-positive women in Serenje District. Out of the 303 participants, 128 (42.24%) reported having utilized the screening services, while the majority (57.76%, n=175) had not. Among the 128 who utilized the services, 76 (59.4%) had been screened within the past two years or more, while 30 (23.4%) underwent screening within the last 12 months (**Fig. 1 and Fig. 2**).

Figure 1 (Fig 1): Utilization of Cervical Cancer Screening Services by HIV positive women in Serenje District (n=303).

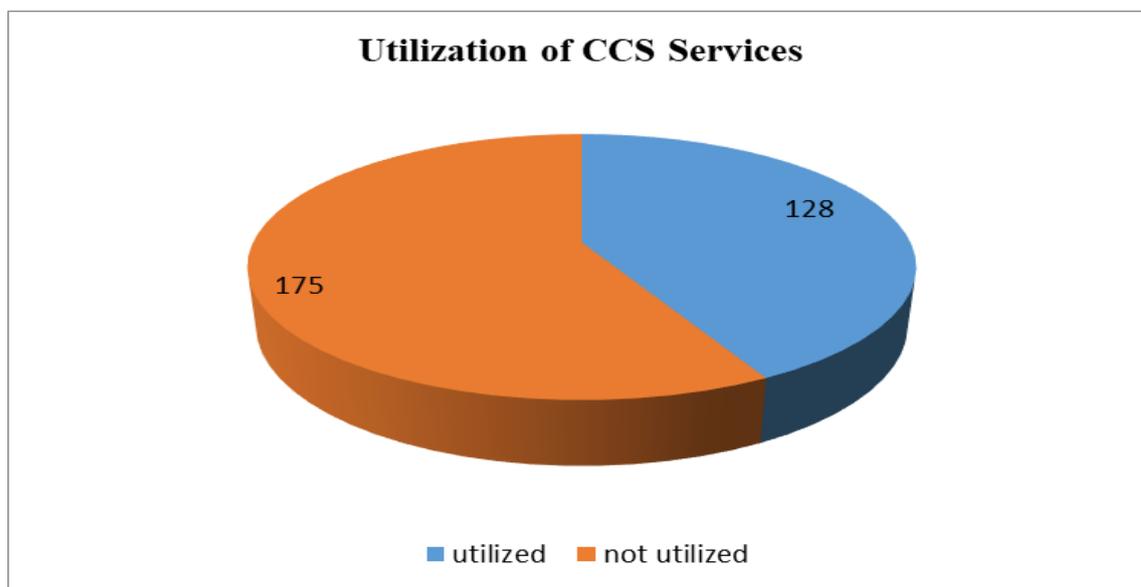
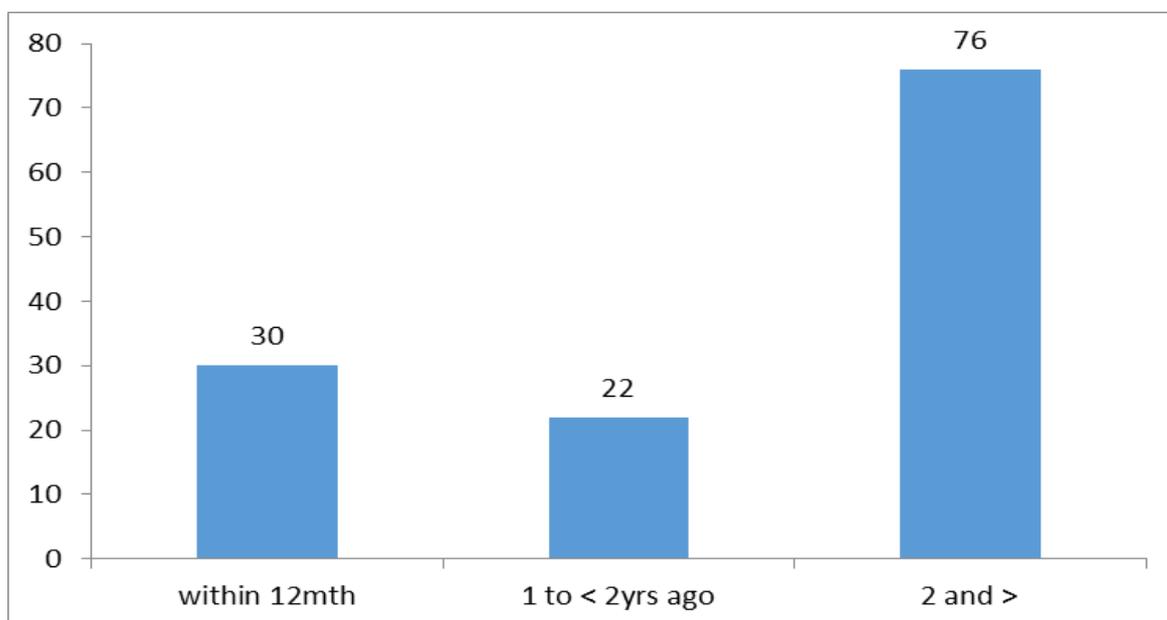


Figure 2 (Fig 2): When last the respondent, utilized Cervical Cancer Screening Services



Facility-Level Characteristics Associated with Underutilization

The study investigated associations between facility-level characteristics and the underutilization of cervical cancer screening services. Variables analyzed included age, marital status, employment status, educational level, parity, income level, knowledge, attitude, cultural beliefs, waiting time, and distance to facilities. To determine whether respondents' attitudes were positive or negative and their knowledge was inadequate or adequate, a rating scale was used to measure the variables based on their responses.

During bivariate analysis, five variables (educational level, average monthly income, knowledge, attitude, and distance) yielded p-values <0.05 and were included in the multivariable logistic regression analysis. After adjusting for confounders, four variables remained significantly associated with underutilization (p < 0.05) (**Table: 2**):

Table 2: Characteristics associated with underutilization of Cervical Cancer Screening Services

Characteristics	Bivariate Analysis		Multivariate Analysis	
	Crude Odds Ratio (95%CI)	Unadjusted P-value	Adjusted Odds Ratio (95%CI)	Adjusted P-value
1. Location (distance from HF)				
<5km	ref	n/a	n/a	n/a
>5km	0.53(0.31-0.9)	0.02	0.5 (0.26-0.95)	<0.036*
2. Education level				
Tertiary	ref	n/a	n/a	n/a
Secondary	0.89(0.43-1.85)	0.77	2.2 (0.86-5.66)	0.099
Primary	0.43(0.21-0.87)	0.02	1.3 (0.48-3.43)	0.614
No formal education	0.1(0.01-0.9)	0.04	0.5 (0.04-6.28)	0.599
3. Levels of income				
>\$108.3	Ref	n/a	n/a	n/a
Between \$72.2-\$108.3	0.27(0.11-0.58)	0.001	0.22 (0.09-0.54)	<0.001
<\$36.1	0.17(0.08-0.34)	0.001	0.16 (0.06-0.37)	<0.001
4. Levels of knowledge				
Adequate	Ref	n/a	n/a	n/a
Inadequate	0.13(0.07-0.23)	0.001*	0.27 (0.13-0.54)	< 0.001*
5. Attitude towards cancer screening				
Positive	Ref	n/a	n/a	n/a
Negative	0.17(0.1-0.3)	0.001*	0.26 (0.13-0.53)	<0.001*

- **Attitude:** HIV-positive women with a negative attitude were 74% less likely to utilize cervical cancer screening services compared to those with a positive attitude [AOR: 0.26, p<0.001, 95% CI: 0.12–0.53].
- **Knowledge:** Participants with inadequate knowledge were 73% less likely to utilize screening services compared to those with adequate knowledge [AOR: 0.27, p<0.000, 95% CI: 0.13–0.54].

- **Distance:** Women residing more than 5 km from a screening facility were 50% less likely to utilize the services compared to those living within 5 km [AOR: 0.50, $p=0.036$, 95% CI: 0.25–0.96].
- **Income:** Women with an average monthly income of less than \$36.1 were 84% less likely to utilize screening services compared to those earning \$108.3 or more [AOR: 0.16, $p<0.000$, 95% CI: 0.06–0.37]. Similarly, women with an income between \$72.2 and \$108.3 were 78% less likely to utilize the services compared to those earning \$108.3 or more [AOR: 0.22, $p<0.001$, 95% CI: 0.08–0.54]

DISCUSSION OF FINDINGS

Discussion of Findings

Cervical Cancer Screening Services (CCSS)

Study findings revealed an increased utilization rate of cervical cancer screening services in the district among HIV-positive women, with a utilization rate of 42.2%. However, this remains significantly lower than the recommended national target of ensuring 100% annual screening among HIV-positive women. Similar findings have been reported in studies conducted in Ethiopia, where utilization was 41.1% (Assefa et al., 2019³⁴), and lower rates were observed in Morocco (Belglaiaa E et al., 2018⁰²), Gondar (Nega et al., 2019³⁵), and Addis Ababa (Belete, N et al., 2015³⁶). The slight increase in utilization within the district may be attributed to the integration of screening services with mobile ART clinics spearheaded by non-governmental organizations operating within the district.

The observed utilization rate, however, falls short compared to studies in countries such as Canada (Leece P et al., 2010³⁹), England (Ogunwale A, N et al., 2016⁴⁰), and Thailand (Ploysawang, P., et al., 2021⁶²), which reported higher utilization rates. The variation in rates may be attributed to differences in socio-demographic and economic statuses, as well as the health promotion initiatives in these countries. Policies promoting improved access to screening services, nationwide advocacy campaigns, community sensitization, and awareness programs are factors that contribute to higher utilization rates in these regions. Limited distribution of screening facilities in the district may also contribute to the lower utilization rates, unlike countries with universal healthcare systems ensuring widespread availability of primary and specialist care.

Knowledge of Cervical Cancer Screening Services (CCSS)

Cervical cancer remains a significant health challenge among women in Zambia. This study found that approximately 71.6% of HIV-positive women demonstrated low knowledge about cervical cancer and its screening services. The analysis revealed that HIV-positive women with low knowledge levels were 73% less likely to utilize screening services. Inadequate knowledge in the district may result from the lack of planned information dissemination schedules, insufficient community outreach programs, and limited facility-based sensitization initiatives.

The findings align with other studies reporting that lack of knowledge is a major contributor to low screening service utilization (Adibe et al., 2017⁴⁵; Omowhara et al., 2022⁶³; Zulu, 2017⁶⁷; Selmouni et al., 2015¹⁵; Laranjeira et al., 2013⁶; Ghosh et al., 2020⁶⁴). Factors such as limited time spent between healthcare providers and clients, coupled with the integration of cervical cancer screening into other activities such as ART services, may lead to assumptions that clients are already aware of the program. Increasing awareness campaigns and promoting education at both the community and facility levels could improve knowledge and subsequently utilization rates.

Attitude of HIV-Positive Women Towards Cervical Cancer Screening Services

The study revealed that 71.9% of respondents exhibited a negative attitude towards cervical cancer screening services, significantly reducing the likelihood of service utilization by 74% [AOR: 0.26 ($P<0.001$, 95% CI 0.12–0.53)]. A negative attitude may stem from fears, including being attended to by male healthcare



providers, concerns about test outcomes, or embarrassment about the procedure. Other contributing factors include misconceptions about the necessity of screening services in the absence of symptoms.

Positive attitudes, on the other hand, are often associated with an understanding of the importance of cervical cancer screening and its benefits, which encourages engagement in preventive measures. Studies have shown that a perceived severity of cervical cancer, along with an understanding of the benefits of screening, motivates women to utilize screening services. Efforts to address these negative perceptions through targeted education and support could improve attitudes and increase utilization.

Accessibility of Cervical Cancer Screening Services

The results indicated that most HIV-positive women in the study had limited geographical access to screening services, with a significant proportion (75.6%) residing more than five kilometers from the nearest health facility. Similar findings have been reported in other studies where long distances to healthcare facilities and poor transportation infrastructure significantly reduced service utilization (Al-Naggar et al., 2018⁶⁵; Mupepi et al., 2011¹⁸; Beran et al., 2012¹⁴). Additionally, it was revealed that HIV-positive women located more than five kilometers away are 50% less likely to utilize cervical cancer screening services [AOR: 0.5 (P<0.036, 95% CI 0.25-0.96)].

In the district, the large catchment area comprising rural communities likely contributed to the low utilization rates. To address this, strategies such as implementing mobile screening camps could bring services closer to communities, reducing the reliance on women traveling long distances to access care. Improved access through community-based services is essential to overcoming the geographical barriers to cervical cancer screening utilization.

Study Limitations

- The quality of care received during screening was not investigated; therefore, it is unknown whether the care provided was adequate. This would be an important area for future research, as high utilization of cervical cancer screening services is only effective if the care received is of good quality.
- Service-related factors such as staff attitude and the availability of services were not assessed. These factors can significantly influence the utilization of health services.

CONCLUSION

The findings from this study indicate inadequate utilization of cervical cancer screening services among HIV-positive women in Serenje District, Zambia. The key determinants associated with the utilization of these services were the distance to healthcare facilities, low levels of knowledge, waiting time, and the attitude of women. These findings should guide policymakers in designing and delivering strategies that target women at high risk.

RECOMMENDATIONS

- Health personnel at health facilities should intensify targeted and individualized health education on cervical cancer screening services during clinical contacts.
- Community-Based Organizations (CBOs) should be adequately equipped with knowledge about cervical cancer and the importance of screening services, enabling them to sensitize communities effectively.
- The District Health Office should include outreach awareness creation and screening camps to bring services closer to communities, rather than waiting for women to visit health facilities.
- The District Health Office or Provincial Health Office should design and implement information, communication, and education campaigns on cervical cancer screening services through media,



women's groups, and involvement of influential community figures, such as headmen, civic leaders, clergy, and local chiefs.

- The Provincial and District Health Offices should establish mechanisms to enhance monitoring of screening services and the dissemination of information.
- The Government should consider employing more health practitioners to improve staffing levels in selected facilities, reducing client waiting times. This includes hiring midwives, nurses, and clinical officers.
- Increased funding should be allocated to the fight against cervical cancer, enabling health workers to conduct sensitization programs closer to the communities that need them.

Abbreviations

CC	Cervical Cancer
CCS	Cervical Cancer Screening
CCSS	Cervical Cancer Screening Services
CDC	Centre of Disease Control and prevention
HPV	Human Papillomavirus
ICC	Invasive Cervical Cancer
MoH	Ministry of Health
VIA	Visual Inspection with Acetate
WHO	World Health Organization
HIV	Human Immunodeficiency Virus
UNAIDS	Joint United Nations programme on HIV/AIDS
LMIC	Low Middle-Income Countries

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Ethical and Cultural Consideration

Ethical clearance was obtained from the University of Zambia, Research Ethical Committee (UNZABREC) and authority from the national health research. Further the request was made to the District Health Office in Serenje to allow collecting data from the institution in the district. Since this study involved human subjects, verbal and written consent was sought from the study participants. Those who declined to take part in the research were not coerced and all respondents were free from emotional danger or harm.

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Consent for publication

Not applicable

Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author and the University of Zambia on reasonable request.

Competing interests

The authors declare no competing interests in this study.

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This research was part of a thesis for MSM who was pursuing a Master of Public Health from the University of Zambia, School of Public Health, Department of Community and Family Medicine

Authors' contributions

MSM was involved in the conceptualization, data curation, data analysis and drafting of the manuscript under the Supervision of PAB. PAB, CZ and ANH we involved in conceptualization of the study, reviewing and editing the manuscript.

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