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Screening for cervical cancer among adult women: a self-reported nationwide study in Ghana

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Abstract

Background Cervical cancer remains a significant global health challenge, despite advancements in screening and treatment. As one of the most preventable and curable cancers, its burden disproportionately affects women in low- and middle-income countries where access to screening programs and healthcare services is limited. Screening for cervical cancer has evolved significantly over the decades, with the advent of cytology-based Pap smears and more recently, human papillomavirus (HPV) testing, offering improved sensitivity and specificity in detecting precancerous lesions. Effective screening programs have led to a substantial reduction in cervical cancer incidence and mortality in many high-income countries. However, disparities persist due to variations in healthcare infrastructure, socioeconomic factors, and awareness levels among women. This manuscript explores uptake of screening test, type of tests and barriers to periodic uptake of screening among adult women in Ghana.

Methods A nationwide survey was conducted, using a nationally representative sample of 3,326 women aged 18 to 69, and the data were analyzed using Stata 17. The study forms part of the WHO STEPwise approach to NCD risk factor surveillance (STEPS).

Results The results showed generally low screening uptake, particularly among women aged 30–49, who are considered a high-risk group. The HPV-DNA test (70.42%) was the most reported screening method, while 29.58% of women were screened using the Pap smear. The primary barrier to screening uptake was a lack of knowledge about how or where to access testing services.

Conclusion The study highlights the need for increased community awareness and education on cervical cancer screening. Integrating cervical cancer screening education into routine sexual and reproductive health programs offers a promising approach to raising awareness and improving uptake, which could help reduce the burden of cervical cancer in Ghana.

Keywords Cervical cancer, Screening, Self-report, Adult women, Ghana

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Background

Cervical cancer remains a preventable yet significant public health challenge globally. Each year, more than half a million new cases of cervical cancer are diagnosed, resulting in over 350,000 deaths worldwide in 2022, making it the fourth most common cancer among women globally [1]. Cervical cancer is largely preventable through effective vaccination and screening programs, yet it remains one of the leading causes of cancer death with about 80% of these cervical cancer deaths occurring in low- and middle-income countries (LMICs) due to inadequate access to preventive healthcare services and early detection programs [1–3]. The burden is exponentially greater in sub-Saharan Africa, where systemic healthcare limitations and sociocultural factors further exacerbate disparities in outcomes. In Ghana specifically, cervical cancer is the second most prevalent cancer among women, accounting for an estimated 2,797 new cases and 1,699 deaths annually [4–8].

Persistent infection with one or more oncogenic subtypes of Human Papillomavirus (HPV) has been identified as risk factor for cervical cancer [9, 10]. Currently, there are more than 100 identified subtypes of HPV, of which at least 15 are considered to have oncogenic potential [10]. Cervical cancer is almost exclusively caused by persistent infections with high-risk human papillomavirus (HPV) genotypes, including 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68 [11, 12]. Types 16 and 18 alone account for approximately 70% of cervical cancer cases, and a multivalent vaccine is available to prevent infections from these and other high-risk genotypes. Without vaccination, nearly all sexually active individuals will contract HPV at some point in their lives [1].

The Human Papilloma Virus (HPV) is the most common sexually transmitted infection [13]. Worldwide, it is estimated that at any given time more than 10% of women with normal cytology are harbouring HPV infection [14, 15]. Administering the HPV vaccine to girls aged 9–13, before they become sexually active, is the most effective primary prevention measure, with the potential to prevent more than 90% of cervical precancers and cancers [1, 16]. Early detection and treatment of precancerous cervical lesions lead to better prognosis. Advances in screening methodologies, such as cervicovaginal HPV testing, have shown 90% sensitivity in detecting precancerous lesions, offering a robust tool for early detection. A combination of HPV genotyping and cervical cytology (Papanicolaou testing) is recommended for individuals with positive HPV test results to stratify precancer risk and guide clinical management [17].

The WHO recommends HPV DNA detection in a screen-and-treat approach starts at the age of 30 years with regular screening every 5 to 10 years for general population and for people living with HIV, HPV DNA detection in a screen, triage and treat approach starts at the age of 25 with regular screening every 3 to 5 years [1]. However, in Ghana, screening services is largely limited.

In addition to DNA detection, cervical cancer can also be diagnosed using Visual Inspection with Acetic Acid (VIA + AA). The World Health Organization (WHO) recommended in the year 2013 that visual inspection after application of acetic acid (VIA) as one of the most feasible and affordable alternatives to cytology screening for the LMICs. VIA involve examination of the cervix with eyes after the application of 3–5% acetic acid solution [18]. The test aims to detect precursor lesions as well as early cervical cancers in asymptomatic women. The screening test is interpreted based on the detection of a well-defined opaque acetowhite area on the transformation zone of the cervix. This appears one minute after the application of acetic acid solution. Studies have found that the provider's professional background (e.g., physicians, nurses, health workers) does not influence the test accuracy of VIA [19], and that trained non-physicians can perform VIA screening [20].

Another screening that is used detect cervical cancer is the Pap Smear test. Pap smear testing is a very useful, simple, economical, and safe tool for detecting precancerous cervical epithelial lesions. The American College of Obstetricians and Gynecologists (ACOG) in 2009, recommended that pap smear test can be advised for the married women who are above the age of 21years [21], which has been adopted for this study. The overall sensitivity of the Pap test in detecting a high-grade squamous intraepithelial lesion (HSIL) is 70.80% [22]. A Pap screening done in association with an HPV DNA test increases the sensitivity for early detection of precancerous lesions [23].

In Ghana, cervical cancer screening reflects the intersection of structural and cultural barriers that hinder effective prevention and control. Limited access to screening services especially at the subnational level, insufficient awareness of the benefits of screening, and sociocultural stigmas contribute to low screening uptake [24–26]. While national health policies emphasize the importance of early detection, the extent of screening coverage and adherence to recommended follow-up protocols remain poorly understood. Addressing these gaps requires comprehensive data on the prevalence of screening, factors influencing access, and barriers to care. Furthermore, the long latency period from HPV infection to invasive cervical cancer, spanning several decades, underscores the critical role of screening and early detection in reducing mortality [1].

This study aims to provide a nationwide overview of cervical cancer screening practices among adult women in Ghana, using self-reported data to assess uptake of screening, identify barriers, and explore factors

associated with low uptake of screening services. These findings are particularly critical as global initiatives, such as the World Health Organization's Cervical Cancer Elimination Strategy, calls for a 90-70-90 target: 90% of girls fully vaccinated against HPV by 15 years of age, 70% of women screened at least twice in their lifetime, and 90% of women with identified precancer or cancer receiving appropriate treatment [1]. Achieving these goals in Ghana requires targeted efforts informed by local data to ensure equitable access and sustained impact.

Method

Study design

This was a nationwide cross sectional survey on NCDs risk factor study conducted based on the WHO STEPS survey methodology. The primary objective of the study was to establish a baseline for the prevalence of NCD risk factors in Ghana, thereby ensuring targeted interventions towards the significant reduction of the NCDS risk factor burden. A multi-stage sampling technique was employed to select 5,775 male and female participants from 385 enumeration areas (EAs) across all 16 regions in Ghana. Data collection was conducted using computer-assisted personal interviews (eSTEPs) via Android tablets. Upon completion of the survey, data had been collected from 5,438 participants aged 18 to 69 years from both urban and rural EAs nationwide. The study adopted the WHO Stepwise approach to documenting risk factors for NCDs. Detail study methods is already published in the final report for the Ghana 2023 STEPS survey [27] and in the WHO methodology for STEPS available on WHO websites [28].

Study area

The study was conducted in the 16 regions of Ghana. The regions were stratified into three ecological zones, namely Coastal (Western, Central, Greater Accra and Volta), Middle (Eastern, Western North, Ashanti, Bono, Bono East, Oti, and Ahafo) and Northern (Northern, Savannah, North- East, Upper East, and Upper West). Ghana, situated in West Africa, occupies a total land area of approximately 238,533 square kilometres (92,099 square miles). It shares its eastern border with Togo, its western border with Côte d'Ivoire, and its northern border with Burkina Faso, while the Gulf of Guinea lies to the south. The country is widely recognized for maintaining one of the most stable democratic systems on the African continent. Administratively, Ghana is divided into 16 regions and 260 districts. With a total population of 30,792,608, of which 50.7% are female [29], Ghana ranks as the second most populous country in West Africa. Accra serves as both the capital and the largest city.

The population structure of Ghana is predominantly youthful, with 37.1% of the population below the age of 15 years, 59.7% between 16 and 59 years, 6.7% between 60 and 64 years, and 3.1% aged 65 years and above [29]. The age dependency ratio is estimated at 67 dependents per 100 individuals of working age. Approximately 43% of Ghanaians reside in rural areas, and the national literacy rate is 79% [29]. The average life expectancy at birth is 64 years (Ghana Statistical Service, 2021).

Sampling technique

Multi-stage cluster sampling method was adopted for this study. The primary sampling units (PSUs) or clusters were randomly selected proportional to the population size, followed by the random selection of households and, subsequently, the random selection of survey participants. Each region was first stratified into urban and rural areas based on population. In each of the strata, 15 enumeration areas were randomly selected. Within a selected Enumeration Areas (EAs), households were randomly selected using the 2020 Population and Housing Census conducted by the Ghana Statistical Service. In selected household, listing was done, and one participant was randomly selected using the eSTEPS software. To be eligible for inclusion in the study, individuals were required to have been permanent residents of the household for at least six months. Individuals who declined to provide informed consent or were residing in institutional settings, such as hospitals, were excluded from participation. The detailed sampling technique is available in the Ghana 2023 STEPS survey final report [27].

Data collection tool and procedure

The study adopted the use of a structured questionnaire for the WHO STEPWise survey for NCDs risk factors. The questions on cervical cancer covered screening tests for cervical cancer prevention including Visual Inspection with Acetic Acid/vinegar (VIA), pap smear and Human Papillomavirus (HPV) DNA test. Flash cards displaying images of various cervical cancer screening methods were shown to participants to help them identify the type of test they had undergone. These flash cards were developed by the World Health Organization (WHO) specifically for use in such surveys. The cards were pretested during a pilot study to assess their validity and reliability. The results indicated that the flash cards were both valid, accurately representing the screening methods, and reliable, producing consistent responses across repeated administrations. Face-to-face data collection was done using a pre-loaded structured questionnaire on an android tablet for onsite electronic data collection. The questionnaire was translated into four languages: Ga, Ewe, Dagbali and Twi. The questions were asked based on the participants preference. Details of the data collection tools and procedure is available in the Ghana STEPS survey 2023 report [27].

Study variables

Cervical cancer screening questions were a core component under the behavioural measurements (STEP 1) among others such as tobacco use, alcohol consumption, fruit and vegetable consumption, salt intake, physical activity, history of raised blood pressure, diabetes, raised total cholesterol and cardiovascular diseases, lifestyle advice.

The STEPS question on cervical cancer screening asks female respondents whether they have ever had a screening test for cervical cancer. The preamble to question on cervical cancer states the following:

> *"The next question asks about cervical cancer prevention. Screening tests for cervical cancer prevention can be done in different ways, including Visual Inspection with Acetic Acid/vinegar (VIA), pap smear and Human Papillomavirus (HPV) test. VIA is an inspection of the surface of the uterine cervix after acetic acid (or vinegar) has been applied to it. For both pap smear and HPV test, a doctor or nurse uses a swab to wipe from inside your vagina, take a sample and send it to a laboratory. It is even possible that you were given the swab yourself and asked to swab the inside of your vagina. The laboratory checks for abnormal cell changes if a pap smear is done, and for the HP virus if an HPV test is done."*

The dependent variable for this study is the female participants response to the question: Have you ever had a screening test for cervical cancer, using any of these methods described above? Allowable responses to this question were "yes", "no", and "don't know".

All those who answered yes to ever taking a screening testing for cervical cancer were eligible for answering these next set of questions: If yes, please indicate the type of test that was carried out?, At what age were you first tested for cervical cancer?, When was your last (most recent) test for cervical cancer?, What is the main reason you had your last test for cervical cancer?, Where did you receive your last test for cervical cancer?, What was the result of your last (most recent) test for cervical cancer?, Did you have any follow-up visits because of your test results?, Did you receive any treatment to your cervix because of your test result?, Did you receive treatment during the same visit as your last test for cervical cancer?, What is the main reason you did not receive treatment?. For participants who answered "no" to ever taking a screening test for cervical cancer were eligible to answer these set of questions: What is the main reason you have never had a cervical cancer test? and an open-end question that ask of other reasons for not having a cervical cancer test.

Participants selection

Of the 5438 participants of the study, 3,416 were females. For cervical cancer screening, 90 participants accounting for 2.6% did not have any knowledge about cervical cancer and screening and were excluded from all analysis. This analysis therefore used data on 3326 women aged 18–69.

Ethical approval

The protocol for this study was reviewed and approved by the Ghana Health Service Ethics Review committee (GHS-ERC 032/08/22). Written informed consent was elicited and obtained from each participant before data collection.

Statistical analysis

The data collected was analyzed using STATA version 17.0 (StataCorp, College Station, TX, USA), employing methods for analysis appropriate for the complex sample design of the survey. Prior to data analysis, data weighing was done to give national representative data. The weighting was done at three levels: individual weighting, population distribution weighting and non-response. The final weighting was computed as the inverse of the product of the three weights. During analysis, the data was disaggregated by age categories and rural-urban variations. Descriptive statistics were employed to summarize the socio-demographic characteristics of the study participants and the history of cervical cancer screening. Categorical variables were presented as frequencies and proportions, while continuous variables were expressed as means and standard deviations (SD) where applicable.

To enable the data analysis to provide results for Ghana to satisfy the WHO Core indicator for cervical cancer screening, where member states were required to report on: "Percentage of women aged 30-49 years who have ever had a screening test for cervical cancer"[29], the age variable was further coded into a binary variable, age range 30 – 49 years, all other age groups and all the demographic and socioeconomic background characteristics were reported for all participants including those in the in the core indicator target age group. Also, WHO recommends that, HPV DNA detection in a screen-and-treat approach starting at the age of 30 years with regular screening every 5 to 10 years and for people living with HIV, HPV DNA detection in a screen, triage and treat approach starting at the age of 25 with regular screening every 3 to 5 years. Since the STEPS survey did not collect data on HIV status, the general recommendation of 30 years was used in categorizing the age at first screening. Hence for the variable on age at first screening, data was segregated into age 30years and below and then age above 31 years.

Differences in the history of cervical cancer screening across socio-demographic categories were assessed using the chi-square test for categorical variables. For continuous variables, independent sample t-tests or one-way ANOVA was used, depending on the number of groups being compared. Statistical significance was set at a p-value of <0.05. To identify factors associated with cervical cancer screening uptake, univariate logistic regression was initially performed to estimate crude odds ratios (ORs) with 95% confidence intervals (CIs). Variables with a p-value <0.20 in the univariate analysis was included in a multivariable logistic regression model to adjust for potential confounders and estimate adjusted odds ratios (AORs) with 95% CIs. The final model was selected using a backward stepwise method based on the Akaike Information Criterion (AIC). Collinearity among the independent variables was assessed using the variance inflation factor (VIF), with a threshold of VIF >10 indicating no multicollinearity. Hosmer-Lemeshow goodness-of-fit tests were applied to evaluate the fit of the multivariable model. To examine regional disparities in cervical cancer screening prevalence, data were stratified by region, and prevalence rates were calculated for both the overall population and the target age group (30–49 years). Prevalence estimates were reported with 95% confidence intervals. Additionally, choropleth maps were generated to visually represent the regional variation in screening prevalence. All analyses were conducted in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross sectional studies (see SF1) to ensure transparency and reproducibility.

Results

Socio-demographic and cervical cancer screening history

Table 1 presents a summary of the socio-demographic characteristics of study participants. Overall, 3326 (97.4%) of female study participants were included in this analysis after excluding 90 (2.6%) of females who have never head of cervical cancer screening giving an overall response rate of 97.4% and a reporting rate of ever being screened at 3.6%. The socio-demographic characteristics showed that there are significant disparities in cervical cancer screening among adult women in Ghana. A higher proportion of urban women (4.09%) had undergone cervical cancer screening compared to rural women (2.84%), highlighting disparities in healthcare access and awareness between the two groups. Educational attainment showed a strong association with cervical cancer screening uptake. The proportion of women with higher or tertiary education who had been screened was 15.25%, compared to only 1.95% among those with no formal education. Although differences across ethnic groups were not statistically significant, variations were observed, with Ga/Dangme women recording the highest screening proportion (8.03%) and Gurma women the lowest (0.77%). Religious affiliation also showed some influence, as Christians had a slightly higher screening prevalence (4.06%) than Muslims (2.54%), though this difference was not statistically significant.

Analysis by marital status showed that divorced women had the highest proportion of cervical cancer screening uptake (8.49%), followed by widowed (5.36%) and currently married women (4.46%), while never-married women had the lowest screening proportion (1.39%). Employment status also demonstrated a strong association, with government employees recording the highest screening prevalence (18.48%), compared to non-paid workers (1.01%) and homemakers (1.93%), who had the lowest proportions.

An unexpected pattern was observed across socioeconomic groups: women in the poorest wealth quintile reported the highest screening proportion (8.61%), whereas those in the richest quintile had the lowest (0.92%). This inverse relationship suggests that women in higher socioeconomic groups may require more targeted awareness and outreach interventions.

Overall, these disparities underscore significant gaps in cervical cancer screening coverage and highlight the urgent need for a nationally coordinated screening programme in Ghana.

Uptake of cervical cancer screening among all females and females in targeted age group

Table 2 describe the history of ever screened for cervical cancer screening in Ghana among all females and among targeted age group of 30-49 years.

The overall proportion of women aged 18–69 years in Ghana who reported ever being screened for cervical cancer was 3.6% (95% CI: 2.87–4.57). Among women within the target age group of 30–49 years, screening uptake was slightly higher, at 4.3 % (95% CI: 3.10–5.91).

Place of residence influenced screening behavior, with urban women consistently reporting higher proportions of screening than their rural counterparts. Across all age groups, the prevalence among urban residents was 4.1% (95% CI: 3.06–5.45), compared to 2.8% (95% CI: 1.89–4.24) among rural residents. This disparity persisted within the target age group, where 5.1% (95% CI: 3.42–7.48) of urban women had been screened, compared to 2.95% (95% CI: 1.68–5.11) of rural women.

Regional variations were also notable. The Greater Accra Region recorded the highest proportion of women ever screened, both among all women (5.23%; 95% CI: 2.98–9.01) and within the target age group (7.3%; 95% CI: 3.64–14.27). Relatively higher screening proportions were also observed in the Central and Ashanti Regions,

Table 1 Socio-demographic characteristics of respondents

Characteristics		Weighted %		
	N	Ever screened	Never screened	Chi squared (p-value)
All Females	3326	3.6	96.4	
Urban or Rural Residency				
Rural	2575	2.	97.2	
Urban	2863	4.1	95.9	
Age (years)				
Core indicator target age group (30–49)	2674	4.3	95.7	1.881 (0.1711)
All participants (18–69)	5438	3.6	96.44	
Highest level of Education				
No formal schooling	1232	1.9	98.1	11.4646 (< 0.0001)
Pre-primary primary school	636	2.7	97.3	
Primary school completed	660	2.4	97.6	
Middle School completed	373	7.6	92.4	
Junior High school completed	1238	1.3	98.7	
Secondary	91	12.2	87.8	
Senior High/Secondary school completed	792	4.4	95.6	
Higher/tertiary	414	15.2	84.8	
Ethnic Background				
Akan	2200	4.1	95.9	1.8381 (0.0806)
Ga/Dangme	282	8.0	92.0	
Ewe	693	2.2	97.8	
Guan	254	2.9	97.1	
Mole-Dagbani	1000	3.8	96.2	
Grusi	227	5.4	94.6	
Gurma	257	0.8	99.2	
Mande	54	1.6	98.44	
Other	469	1.6	98.4	
Religion				
Christian	3920	4.1	95.9	1.5728 (0.1966)
Muslim	1198	2.5	97.5	
Traditionalist/Spiritual	197	1.1	98.9	
None	120	0	100	
Other	3	0	100	
Marital Status				
Never married	1252	1.4	98.6	3.7123 (0.0041)
Currently married	2967	4.5	95.5	
Separated	193	3.2	96.8	
Divorced	256	8.5	91.5	
Widowed	408	5.4	94.6	
Cohabitating	359	3.2	96.8	
Main work status over the past 12 months				
Government employee	254	18.5	81.5	8.0910 (< 0.0001)
Non-government employee	399	4.1	95.9	
Self-employed	3,685	3.1	96.9	
Non-paid	233	1.0	99	
Student	267	1.9	98.1	
Homemaker	110	1.9	98.1	
Retired	69	14.6	85.4	
Unemployed (able to work)	337	3.2	96.8	
Unemployed (unable to work)	84	13.7	86.3	
Number of adults living in household				
1	1,608	4.8	95.2	1.2551 (0.2833)
2	2,139	3.7	96.3	

Table 1 (continued)

Characteristics		Weighted %		
	N	Ever screened	Never screened	Chi squared (p-value)
3	937	3.1	96.9	
4	426	4.8	95.2	
5	169	2.2	97.8	
6	159	0	100	
Socioeconomic status				
Poorest Wealth Quintile	1087	8.6	91.4	11.7102 (< 0.0001)
Poorer Wealth Quintile	1087	2.3	97.7	
Middle Wealth Quintile	1089	3.0	97.0	
Richer Wealth Quintile	1086	2.1	97.9	
Richest Wealth Quintile	1086	0.9	99.1	
Screening test for Breast cancer				
Ever had a screening test	666	10.6	89.4	71.4156 (< 0.0001)
Never Screened for Breast cancer	2733	1.9	98.1	
Blood pressure Measurement				
Ever had blood pressure measured	4493	3.9	96.1	4.0222 (0.0456)
Never measured blood pressure	945	1.7	98.3	
Blood Sugar Measurement				
Ever had Blood sugar measured	1861	7.0	93.00	40.2493 (< 0.0001)
Never measured blood sugar	3577	1.7	98.3	
Blood Cholesterol Measurement				
Ever had blood cholesterol measured	599	15.5	84.5	100.7385 (< 0.0001)
Never measured blood cholesterol	4839	2.1	97.9	
Visited a doctor or health worker during past 12 months				
Recent contact with health provider	2645	4.8	95.2	10.1421 (0.0016)
No recent contact with health provider	2793	2.1	97.9	

while regions such as Bono and Savannah reported no cases of screening within the target age group.

Socioeconomic status further influenced screening uptake. Among women in the target age group, those in the richest wealth quintile reported the highest screening proportion (1.8%; 95% CI: 0.61–5.12), whereas no screening was reported among women in the poorest quintile. When considering all age groups, the middle wealth quintile had the highest proportion ever screened (3.0%; 95% CI: 1.53–5.70), although screening prevalence remained generally low across all socioeconomic categories. Fig. 1, displays the history of ever screened for cervical cancer screening across the various age groups. The modal group was 60-69 years (7.9%). Fig. 2, displays proportion of urban (3.0%) and rural (5.1%) dwellers screened for cervical cancer. Also, Fig. 3 display a choropleth map displaying the uptake of cervical cancer screening across the regions in Ghana.

Cervical cancer screening characteristics among women who have ever screened for cervical cancer

Table 3 presents insights into the characteristics and patterns of cervical cancer screening among women who have ever taken a screening test. The majority of women who underwent cervical cancer screening received the HPV-DNA test (70.4%), while a smaller proportion had a Pap smear (29.59%). Notably, none of the participants reported undergoing Visual Inspection with Acetic Acid (VIA). The age at first screening was almost evenly distributed, with 49.01% screened at or before 30 years and 60.0% screened after 30 years.

Screening frequency was generally low: only 11.9% had been screened within the past 12 months, whereas 35.4% had been screened 3–5 years ago, and 33.30% had last been screened more than 5 years ago.

The primary motivations for screening varied. The largest proportion of women (39.33%) reported undergoing screening as part of a routine exam, 24.0% were screened on the recommendation of a healthcare provider, and 19.37% were screened due to experiencing symptoms.

Screening was predominantly conducted in hospitals (78.2%), with smaller proportions accessing services at doctor's offices (5.4%) or mobile clinics (5.0%). Among women who received their results, 86.0% were normal or negative, 4.78% were abnormal or positive, and 0.7% had results suggestive of cancer.

Types of cervical cancer screening and reasons for uptake

For most women who had never been screened, the primary barrier was a lack of knowledge about how or where to access the test (37.6%). Other reasons included the perception that it was too expensive (4.8%), lack of time

Table 2 Uptake of cervical cancer screening among all females and target age group

	All Age groups (18–69)		Target Age group (30–49)	
	Weighted uptake	95% Conf. interval	Weighted uptake	95% Conf. interval
All participants	3.6	2.87–4.57	4.3	3.10–5.91
Prevalence by Residency				
Rural dwellers	2.8	1.89–4.24	2.9	1.68–5.11
Urban dwellers	4.1	3.06–5.45	5.1	3.42–7.48
Prevalence by region				
Western	1.9	0.51–6.53	1.7	0.42–6.70
Central	5.0	2.41–10.02	6.3	2.62–14.59
Greater Accra	5.2	2.98–9.01	7.4	3.64–14.27
Volta	2.0	0.73–5.18	4.0	1.24–11.96
Eastern	1.9	0.99–3.75	2.9	0.99–7.97
Ashanti	5.0	3.33–7.37	3.3	1.58–6.89
Western North	1.4	0.49–4.02	2.8	0.80–9.02
Ahafo	1.3	0.32–5.45	1.5	0.19–1.10
Bono	0.99	0.18–5.24	0.00	-
Bono East	1.5	0.48–4.91	3.9	1.39–10.53
Oti	2.9	0.71–10.98	5.2	1.56–16.21
Northern	2.9	1.08–7.51	5.5	1.90–14.68
Savannah	3.0	0.55–14.85	0.0	-
North East	1.1	0.17–6.76	0.5	0.00–4.28
Upper East	7.8	2.88–19.56	3.8	1.19–11.45
Upper West	2.5	0.94–6.50	1.3	0.14–10.62
Ever screened by Socioeconomic status				
Poorest Wealth Quintile	0.0	-	0.0	-
Poorer Wealth Quintile	2.3	1.26–4.05	0.0	-
Middle Wealth Quintile	3.0	1.53–5.70	1.2	0.38–3.34
Richer Wealth Quintile	2.1	1.08–3.87	2.6	0.95–7.10
Richest Wealth Quintile	0.9	0.37–2.27	1.8	0.61–5.12

(4.7%), and fear of the procedure or social stigma (1.6%), (see SF2). A significant proportion also cited "other reasons" (29.1%) or expressed uncertainty, responding with "don't know" (20.1%).

Factors associated with no uptake of cervical cancer screening test

Table 4 presents factors linked to the low uptake of cervical cancer screening services based on both univariate and multivariable logistic regression analyses. Younger women, particularly those aged 18–29 years (adjusted OR: 4.14, $p<0.001$) and 30–44 years (adjusted OR: 2.45, $p=0.010$) were significantly more likely to undergo screening compared to women aged 60–69 years. Education also played an important role: in crude analyses, women with no formal education or less than primary schooling were more likely to have low screening uptake, although these associations weakened after adjustment. Conversely, women with higher or tertiary education were significantly less likely to have poor screening uptake (adjusted OR: 0.29, $p=0.01$). Socioeconomic disparities were also apparent, with poorer women particularly those in the lowest wealth quintiles showing a greater likelihood of inadequate screening access (e.g., richest quintile: crude OR: 10.09, $p<0.001$).

Regional differences were evident across Ghana, with women in regions such as Bono (adjusted OR: 10.63, $p=0.007$) and Western North (adjusted OR: 9.95, $p=0.001$) showing significantly higher odds of poor screening uptake compared to those in the Upper East Region. Marital status also influenced screening behavior—never-married women were significantly more likely to have low screening uptake (adjusted OR: 3.76, $p=0.001$). Employment status further affected participation, with non-paid workers and homemakers being the most disadvantaged groups. Moreover, women who had never participated in other health screenings, such as breast cancer (adjusted OR: 3.02, $p<0.001$) or blood

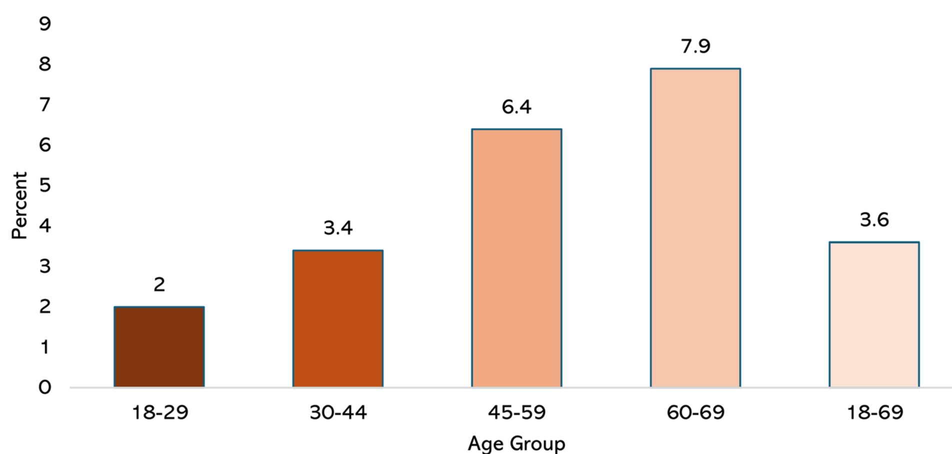

Fig. 1 Bar chart of the proportion of women in various age groups who have ever been screened for cervical cancer

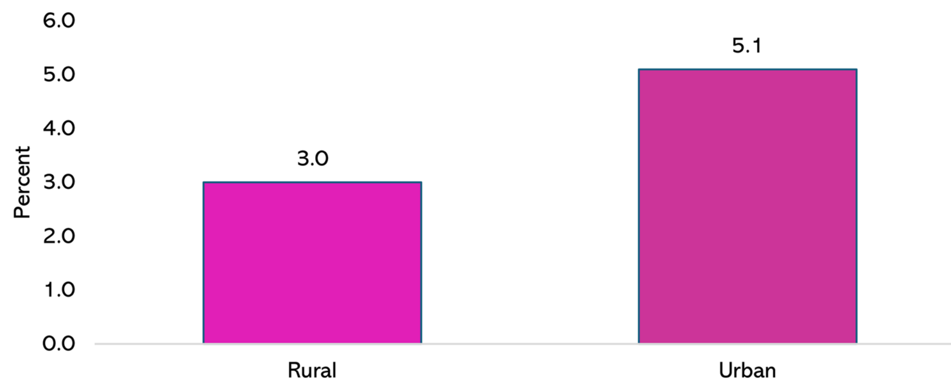

Fig. 2 Bar chart of the proportion of women (30-49 years) in rural and urban population who have ever been screened for cervical cancer

cholesterol testing (adjusted OR: 3.53, $p < 0.001$), were also significantly less likely to undergo cervical cancer screening. Similarly, lack of recent contact with healthcare providers was linked to lower odds of screening (crude OR: 2.31, $p = 0.002$), underscoring the role of routine healthcare interactions in encouraging preventive health practices.

Discussion

This study was conducted to determine self-reported cervical cancer screening uptake among adult females across Ghana. Findings revealed that screening uptake remains alarmingly low nationwide. Overall, only 3.6% of women reported ever being screened, and among those in the target age group of 30–49 years, the rate was 4.3%. Screening was more common among women residing in urban areas, those with higher levels of education, and government employees. In contrast, rural residents, women without formal education, and unpaid workers exhibited the lowest levels of screening.

Significant regional disparities were also observed. The Greater Accra Region recorded the highest proportion of screened women within the target age group, while regions such as Bono and Savannah reported no screening cases. Interestingly, socioeconomic status showed a non-linear trend, with women in the poorest wealth quintile reporting higher screening rates than those in the richest.

Barriers commonly reported included limited awareness of cervical cancer and available screening services, concerns about affordability, and low engagement with healthcare providers. These findings underscore the urgent need for targeted and equitable public health interventions to address educational, economic, and geographical disparities, thereby improving access to and utilization of cervical cancer screening services across Ghana.

Comparing with estimates from nationally representative STEPS data from countries in Africa and some low-resource settings, Ghana's prevalence is significantly low. For instance Iran's 2016 STEPS reported cervical cancer screening prevalence of 52.1% [30]; Kenya 2015 STEPS, 11.18%; Eswatini 2024 STEPS, 13.41%; Botswana 2014 STEPS, 34.3%;; Morrocco 2017 STEPS, 10.48%; Lebanon 2017 STEPS, 15.16%; Iraq 2017 STEPS, 9.91%; Algeria 2017 STEPS, 12.70%; Tajkistan 2017 STEPS, 8.70%; Ethiopia 2015 STEPS, 2.9%; Sudan, 2016 STEPS,1.37%; Benin 2015 STEPS, 0.65%, [31].

The low screening uptake for cervical cancer among women, particularly in the high-risk group of 30–49 years, is deeply concerning. These rates are far below the World Health Organization's (WHO) recommended target of at least 70% screening coverage among eligible women to effectively reduce cervical cancer incidence globally [1, 32, 33]. This low screening uptake reflects systemic challenges in raising awareness, ensuring accessibility, and fostering engagement with preventive healthcare services. One of the core indicators set by the World Health Organization is the Prevalence (%) of cervical cancer screening among women aged 30-49 years [29], Data from the WHO health observatory data on cervical cancer screening rates among the target age group of 30-49 years showed little deviation from what was observed in this study. A lifetime prevalence of 3% (95% CI; 3-4) [34]. Estimates available on the global health observatory data for Ghana shows that the prevalence of cervical cancer screening in the last year 2% (95% CI; 1-3), in the last three years 3% (95% CI; 2-4) and in the last five years 3 (95% CI; 2-4) [32] are higher than what was observed in this study.

The draft Ghana National Cervical Cancer Strategic Document (2023-2028) Reproductive Health Policy, recommended cervical cancer screening using HPV-DNA testing and visual inspection with acetic acid (VIA) as well as treatment of pre-cancerous lesions with Cryotherapy for women aged 25–45 years, and Cytology screening with Pap smear for women aged 45 and older. However, this study found out that none of the type of tests found nationwide was from VIA. HPV-DNA accounted for 70.4% of all screening tests while Pap Smear accounted

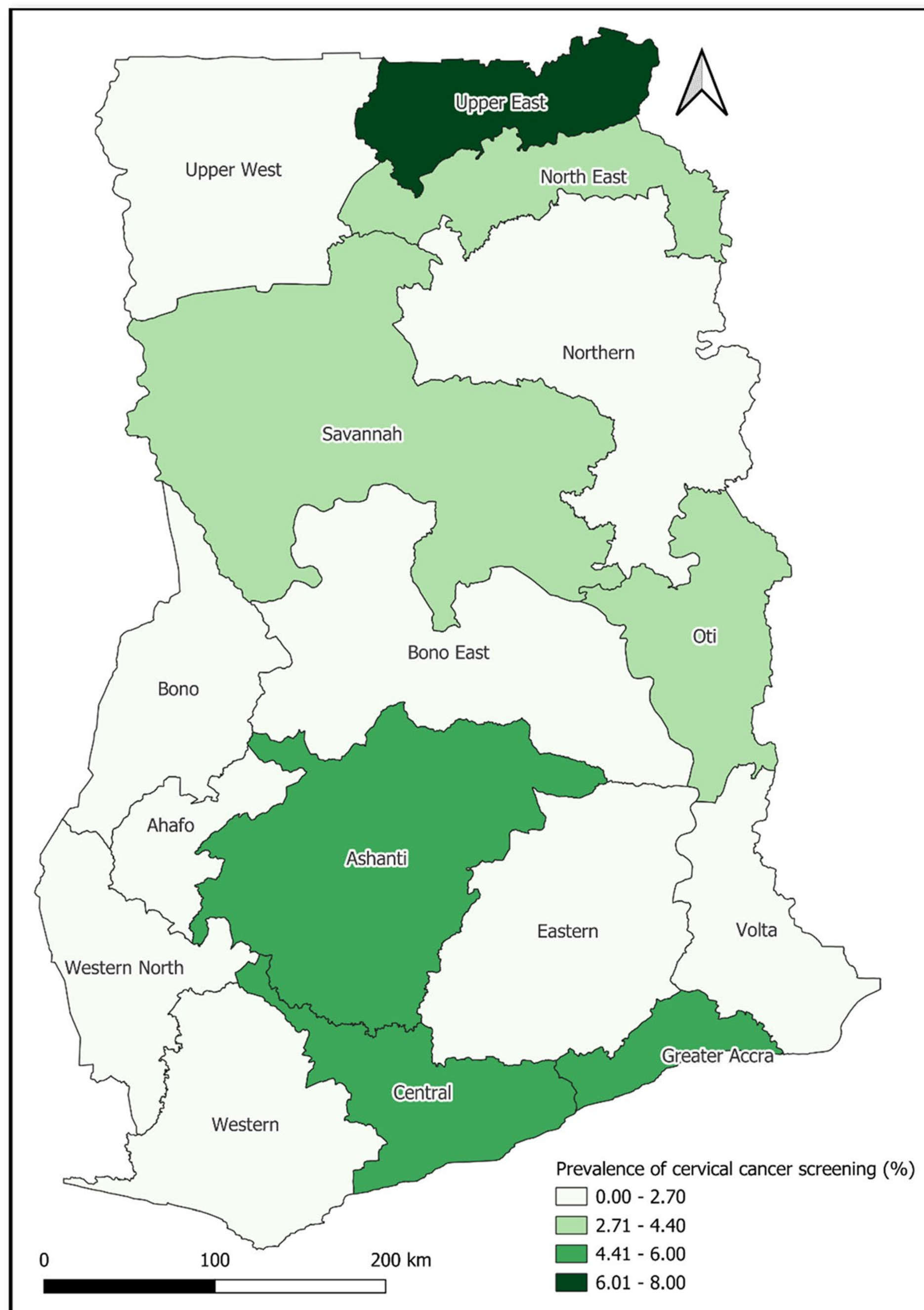

Fig. 3 Regional distribution of cervical cancer screening in Ghana, 2023 nationwide STEPS survey

for 29.6%. HPV-based screening has a significantly higher sensitivity compared to VIA and cytology for the detection of high-grade cervical lesions [35–37]. Also, HPV testing can be performed with self-collected samples, which allows patients' privacy and, importantly, reduces reliance on clinics with trained personnel. These factors could account for the higher proportion of more than 7 in 10 of all cervical cancer screening in Ghana.

Ghana currently lacks a national cervical cancer screening programme, resulting in most screenings being opportunistic rather than systematic. In such cases, Pap smears or Visual Inspection with Acetic Acid (VIA) are typically requested only when women visit healthcare facilities for other medical reasons, rather than as part of routine preventive care. Public awareness and education on cervical cancer and its screening remain limited, contributing to the low uptake of screening services

Table 3 Cervical cancer screening characteristics among females

Screening Characteristics	N	Weighted proportion
Type of Cervical cancer screening test		
HPV-DNA	88	70.4
Pap Smear	38	29.6
Visual Inspection with Acetic Acid	0	0.0
Age at First screening test for cervical cancer		
30 years and below	48	49.0
Above 30 years	80	51.0
Most recent test for cervical cancer		
Less than 1 year ago	15	11.7
1–2 years ago	24	19.6
3–5 years ago	41	35.44
More than 5 years ago	47	33.3
Testing place for last cervical cancer screening test		
Doctor's office	8	5.4
Mobile clinic	6	44.0
Community clinic	12	6.3
Hospital	94	78.2
Other	8	6.1
Results of most recent test for cervical cancer		
Did not receive result	9	5.5
Normal/Negative	108	86.0
Abnormal/Positive	7	4.8
Suspect cancer	1	0.7
Inconclusive	1	2.2
Don't know	2	0.8

observed in this study. Furthermore, screening facilities are concentrated in urban centres, primarily within regional and teaching hospitals, while access in rural and remote areas remains extremely limited, leaving many women without practical opportunities for early detection and prevention.

Urban residency consistently emerged as a significant determinant of higher screening uptake, with urban women nearly twice as likely to be screened as their rural counterparts. [38, 39]. Conversely, rural women, who often face logistical, financial, and informational barriers, exhibited significantly lower screening uptake, emphasizing the need for targeted interventions such as mobile screening units and community-based awareness campaigns to bridge this urban-rural divide [40].

Education, region of residency had strongest predictors of cervical cancer screening uptake. Women with tertiary education reported the highest screening uuptake (15.2%), while those with no formal schooling had the lowest (1.9%). This finding aligns with studies suggesting that education enhances awareness of cervical cancer and its prevention, empowering women to seek preventive services [41, 42]. The stark disparity underscores the critical role of education in promoting health-seeking behaviours and the urgent need for public health campaigns that effectively communicate the importance of cervical cancer screening, particularly targeting women with lower levels of education. Regional variations in screening uptake were striking, with the Greater Accra region reporting the highestuptake, while regions like Bono and Savannah recorded no cases in the target age group. This finding reflects inequities in resource allocation and the availability of healthcare services across regions [43]. Tailored region-specific interventions, including increased healthcare investment in underserved areas, are imperative to address these gaps.

Interestingly, socioeconomic status exhibited a paradoxical trend, with women in the poorest wealth quintile having higher screening uptake (8.6%) than those in the richest quintile (0.9%). This may be due to targeted outreach programmes or subsidies that make screening more accessible to economically disadvantaged groups. However, the low screening uptake among wealthier women suggests the need for strategies addressing psychological barriers, perceived invulnerability, or logistical challenges in this group. Marital status also influenced screening behaviour. Divorced and widowed women were more likely to be screened than never-married women, possibly due to differences in social support or perceived health risks. Employment status further demonstrated inequalities, with government employees reporting the highest screening uptake (18.5%), likely due to access to workplace health benefits, while homemakers and unpaid workers had the lowest rates. This highlights the importance of extending healthcare access to informal and vulnerable employment sectors [44].

Healthcare interactions played a significant role, as women with no prior preventive health checks, such as for breast cancer or cholesterol, were significantly less likely to undergo cervical cancer screening. Additionally, lack of recent contact with healthcare providers was associated with poor screening uptake, underscoring the importance of integrating cervical cancer screening into routine healthcare visits and other preventive health programmes.

Patient proffered challenges contributing to the low screening rates include insufficient skills and competencies to conduct screening, lack of local and sustainable research, high costs of HPV immunization, unaffordability of therapeutic resources, inadequate palliative care, and poor collaboration and coordination among stakeholders. These issues need to be addressed comprehensively to enhance early detection, diagnosis, and management of cervical cancer.

Conclusion

This study highlights the critically low self-reported uptake of cervical cancer screening among women in Ghana, with fewer than one in twenty women, particularly in the high-risk age group of 30–49 years. Despite

Table 4 Factors associated with no uptake for cervical cancer screening test

Predictor	Crude OR [95% CI]	*p*-value	Adjusted OR [95% CI]	*p*-value
Residency				
Urban	Ref			
Rural	1.45 [0.87–2.44]	0.147		
Age range (years)				
18–29	4.14 [1.88–9.12]	< 0.001		
30–44	2.45 [1.24–4.82]	0.010		
45–59	1.25 [0.70–2.26]	0.454		
60–69	Ref			
Highest level of Education				
No formal schooling	4.14 [1.66–10.31]	0.002	1.44 [0.51–4.05]	0.49
Less than primary school	2.92 [1.27–6.71]	0.012	1.13 [0.43–2.93]	0.81
Primary school completed	3.38 [1.23–9.27]	0.018	1.05 [0.34–3.21]	0.93
Middle School completed	Ref		Ref	
Junior High school completed	6.13 [2.39–15.70]	< 0.001	1.84 [0.64–5.29]	0.26
Secondary	0.59 [0.13–2.70]	0.496	0.33 [0.07–1.59]	0.17
Secondary school completed	1.77 [0.21–1.00]	0.194	0.41 [0.14–1.17]	0.10
Higher/tertiary	0.46 [0.21–1.00]	0.051	0.29 [0.12–0.68]	0.01
Region				
Western	4.47 [0.92–21.61]	0.062	7.55 [1.85–30.83]	0.010
Central	1.62 [0.48–5.46]	0.436	2.52 [0.91–6.99]	0.080
Greater Accra	1.54 [0.50–4.75]	0.452	4.73 [1.91–11.71]	< 0.001
Volta	4.23 [1.09–16.36]	0.037	4.25 [1.30–13.92]	0.020
Eastern	4.31 [1.33–13.92]	0.015	8.60 [3.05–24.27]	< 0.001
Ashanti	1.62 [0.56–4.64]	0.369	2.52 [1.10–5.76]	0.028
Western North	5.94 [1.46–24.13]	0.013	9.95 [2.52–39.36]	0.001
Ahafo	6.28 [1.20–33.02]	0.03	9.54 [1.93–47.26]	0.006
Bono	8.48 [1.33–54.06]	0.024	10.63 [1.89–59.80]	0.007
Bono East	5.38 [1.25–23.25]	0.024	8.96 [2.25–35.66]	0.002
Oti	2.86 [0.56–14.65]	0.207	1.69 [0.39–7.30]	0.481
Northern	2.85 [0.73–11.08]	0.13	2.04 [0.62–6.74]	0.239
Savannah	2.72 [0.42–17.51]	0.291	1.51 [0.25–9.13]	0.654
North East	7.72 [1.05–56.67]	0.044	6.15 [0.81–46.42]	0.078
Upper East	Ref		Ref	
Upper West	3.30 [0.87–12.57]	0.079	3.45 [0.85–13.97]	0.083
Socioeconomic status				
Poorest Wealth Quintile	Ref			
Poorer Wealth Quintile	4.06 [2.10–7.84]	< 0.001		
Middle Wealth Quintile	3.08 [1.43–6.62]	0.004		
Richer Wealth Quintile	4.49 [2.19–9.20]	< 0.001		
Richest Wealth Quintile	10.09 [3.88–26.27]	< 0.001		
Marital Status				
Never married	0.30 [0.13–0.68]	0.004	3.76 [1.68–8.39]	0.001
Currently married	Ref		Ref	
Separated	0.42 [0.16–1.10]	0.077	1.77 [0.56–5.56]	0.328
Divorced	0.15 [0.05–0.46]	0.001	0.36 [0.11–1.13]	0.079
Widowed	0.25 [0.10–0.64]	0.004	0.92 [0.43–1.97]	0.828
Cohabitating	0.43 [0.12–1.50]	0.185	0.82 [0.31–2.20]	0.696
Main work status over the past 12 months				
Government employee	Ref			
Non-government employee	5.35 [1.81–15.85]	0.003		
Self-employed	7.16 [3.63–14.12]	< 0.001		
Non-paid	22.27 [4.78–103.83]	< 0.001		
Student	11.86 [3.03–46.41]	< 0.001		

Table 4 (continued)

Predictor	Crude OR [95% CI]	*p*-value	Adjusted OR [95% CI]	*p*-value
Homemaker	11.52 [3.06–43.40]	< 0.001		
Retired	1.33 [0.29–5.99]	0.714		
Unemployed (able to work)	6.94 [2.58–18.68]	< 0.001		
Unemployed (unable to work)	1.42 [0.40–5.08]	0.585		
Screening test for Breast cancer				
Ever had a screening test for Breast cancer	Ref			
Never Screened for Breast cancer	6.15 [3.83–9.88]	< 0.001	3.02 [1.80–5.07]	< 0.001
Blood pressure Measurement				
Ever had blood pressure measured	Ref			
Never measured blood pressure	2.33 [0.99–5.45]	0.052		
Blood Sugar Measurement				
Ever had Blood sugar measured	Ref			
Never measured blood sugar	4.35 [2.66–7.13]	< 0.001	2.32 [1.24–4.35]	0.009
Blood Cholesterol Measurement				
Ever had cholesterol measured	Ref			
Never measured cholesterol	8.53 [5.21–13.96]	< 0.001	3.53 [2.07–6.03]	< 0.001
Visited a doctor or health worker during past 12 months				
Recent contact with health provider	Ref			
No recent contact with health provider	2.31 [1.36–3.93]	0.002		

the availability of effective screening methods, participation remains far below the WHO target, reflecting persistent gaps in awareness, accessibility, and service delivery.

Key determinants of screening included education, place of residence, and engagement with healthcare services. Urban women, those with higher education, and those employed in the formal sector were more likely to have been screened, whereas rural residents, women with limited education, and non-paid workers exhibited the lowest participation. Significant regional inequalities were also observed, underscoring uneven access to screening services across the country.

The high uptake of HPV-DNA testing among screening methods is encouraging, given its superior sensitivity and potential for self-sampling, which could improve future coverage if scaled appropriately. However, the absence of a national organized screening programme means that most services remain opportunistic and urban-centered, leaving large segments of the population underserved.

To accelerate progress toward the WHO's global target of 70% screening coverage, Ghana must urgently operationalize its national cervical cancer control strategy. This includes expanding community-based and mobile screening programmes, integrating screening into routine healthcare visits, improving public education, and ensuring equitable access across all regions. Strengthening healthcare infrastructure, training personnel, and fostering multi-sectoral collaboration will be essential to overcoming the systemic barriers identified in this study. Ultimately, increasing cervical cancer screening coverage in Ghana requires sustained policy commitment, resource allocation, and community engagement to ensure that every woman regardless of education, income, or location has the opportunity to benefit from life-saving preventive care.

Abbreviations

AOR	Adjusted Odds Ratio
CI	Confidence Interval
DNA	Deoxyribonucleic Acid
EA	Enumeration Area
eSTEPS	Electronic STEPwise approach to NCD risk factor surveillance
GHS-ERC	Ghana Health Service - Ethics Review Committee
HIV	Human Immunodeficiency Virus
HPV	Human Papillomavirus
HSIL	High-grade Squamous Intraepithelial Lesion
LMICs	Low- and Middle-Income Countries
NCD	Noncommunicable Disease
OR	Odds Ratio
PSU	Primary Sampling Unit
SD	Standard Deviation
STEPS	STEPwise Approach to Surveillance of NCD Risk Factors
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology
VIA	Visual Inspection with Acetic Acid
WHO	World Health Organization

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

BDN, JA, EBN, LG, PT-NT, PKM, EPA, IOP, MEC, LR, KMA, PKP, EK and AH conceived and designed the study. JA, EBM, EK, AH participated in data collection. BDN, JA EBN, LG, PKM, EPA, IOT, PR, LR, KMA, PkP, EK AH and PTNT analysed the data. JA, and BDN drafted the initial manuscript EBN, LG, PT-NT, PKM, EPA, IOP, MEC, LR, KMA, PKP, EK, and AH reviewed the draft. All authors reviewed and commented on the manuscript and approved the final draft for publication.

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Data availability

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

Declarations

Ethics approval and consent to participate

The protocol for this study was reviewed and approved by the Ghana Health Service Ethics Review committee (GHS-ERC 032/08/22). Written informed consent was elicited and obtained from each participant before data collection. The study adhered to the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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