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Drivers of breast cancer and cervical cancer screening among women of reproductive age: insights from the Ghana Demographic and Health Survey

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Abstract

Background The two major causes of cancer-related deaths among women in Ghana are breast cancer (BC) and cervical cancer (CC). These types of cancers typically do not show any symptoms until they have progressed. Therefore, it is important to screen for early detection. This research aimed to investigate the rate of breast cancer and cervical cancer screening, as well as the factors associated with it, among women of reproductive age in Ghana.

Methods This study analysed data from the 2022 Ghana Demographic and Health Survey. A total of 15,014 women aged 15 to 49 years were included in the analysis. Descriptive statistics and binary logistic regression were employed to analyse the data with the aid of STATA/SE, version 17.

Results It was found that 18.4% and 5.0% of the women had screened for BC and CC, respectively. Women aged 45–49 years were about three times more likely (aOR = 2.83, 95% CI: 1.88–4.24) to screen for BC compared to those aged 15–19 years. Women who had tested for HIV had increased odds (aOR = 1.88, 95% CI: 1.56–2.25) of screening for BC compared to their counterparts. Women within the richest wealth index (aOR = 1.95, 95% CI: 1.40–2.72) had increased odds of screening for BC compared to those in the poorest wealth index. Regarding CC screening, women with higher education (aOR = 2.56, 95% CI: 1.53–4.29) were two times more likely to screen for CC compared to those with no formal education. Women who did not use tobacco (aOR = 0.45, 95% CI: 0.21–0.96) had decreased odds of CC screening compared to their counterparts.

Conclusions This study showed that the uptake of BC and CC screening services among women in Ghana was very low. The drivers of BC and CC screening included enabling, predisposing, and need factors. Stakeholders can leverage the mass media to raise awareness and educate women in reproductive age about the importance of BC and CC screening. This study provides relevant information that can inform BC and CC policies and programmes in Ghana.

Keywords Cervical cancer, Breast cancer, Examination, Screening, Drivers, Women of reproductive age, Ghana

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Introduction

Breast cancer (BC) and cervical cancer (CC) remain global public health concerns [1]. BC is the most common cancer among women [2], and CC is the fourth most common cancer among women worldwide [3]. BC and CC contribute to disability-adjusted life years (DALY) and premature death [4]. Globally, 17.4 million and 8.1 million cases of BC and CC, respectively, were reported in 2017 [4–6]. Approximately 2.3 million new BC cases and 685,000 BC-related deaths were recorded globally in 2020 [7]. Additionally, 604,127 new CC cases and 341,831 CC-related deaths were reported in the same year across the world [3, 5]. In Africa, 198,553 (29.29%) BC cases with 91,252 (21.9%) deaths, and 80,614 (18.5%) CC cases with 125,699 (18.5%) deaths were reported in 2022 [8].

The burden of BC and CC in Africa continues to increase due to the ageing population, low socioeconomic status and environmental challenges [4, 9, 10]. The burden of breast cancer (BC) is higher in West African countries compared to other African regions [8]. For example, a study found that West Africa had the second-highest incidence of breast cancer (37.3 per 100,000) compared to Southern (46.2 per 100,000), Eastern (29.9 per 100,000), and Central Africa (27.9 per 100,000). Also, West Africa had the highest breast cancer mortality rate (17.8) compared to Southern (15.6), Central (15.8), and Eastern (15.4) Africa [11].

In Ghana, the incidence of BC increased from 23.8 per 100,000 in 2008 to 37.8 per 100,000 in 2018 [12]. In 2020, 4,645 (20.4%) new BC cases were recorded in the country, which is more than twice the number of cases reported in 2012 (2,240), with close to 50.0% case fatality rate [13]. BC accounts for 12.4% of all cancer deaths among women in Ghana [14]. Additionally, the incidence of CC in Ghana is 35.4%, which is above the Sustainable Development Goal (SDG) 3.4 target of below 4 per 100,000 women [12, 15].

The increasing cases of breast cancer and cervical cancer in Ghana can be linked to demographic shifts and lifestyle changes, along with a higher prevalence of risk factors such as obesity and reproductive behaviours, similar to the situation in other African countries [16]. For instance, the female population in Ghana accounts for over 50.0% of the total population [17]. In the years spanning from 1960 to 2021, Ghana's population has increased by five folds, surging from 6.7 million to 30.8 million [17]. Furthermore, there are indications that the percentage of elderly individuals in the nation is rising [18]. The prevalence of overweight and obese women has risen significantly. A recent Demographic and Health Survey found that over 50.0% of Ghanaian women between 20 and 49 years old were overweight or obese [19]. Regarding genetic factors, research into pathogenic mutations has shown that high to moderate-risk breast cancer genes are consistent among various populations, such as African, Asian, and European populations [20].

Screening for BC and CC is crucial for early detection and can help reduce DALYs and mortality [3]. In developing countries, breast cancer is typically detected through breast self-examination (BSE), clinical breast examination (CBE), and mammography [21]. Meanwhile, cervical cancer is screened using methods such as visual inspection, human papillomavirus (HPV) testing, and cytology [22]. In Ghana, breast cancer examination could involve a clinical breast examination or a mammogram. As for cervical cancer, screening may include a Pap smear or HPV test, as well as visual inspection with acetic acid (VIA), where a healthcare provider applies vinegar to the cervix to observe any potential reactions [19]. Despite the benefits associated with BC and CC screening, there is a low uptake of screening services among women in African countries [4, 23–25]. For instance, a survey in four sub-Saharan African countries revealed an overall prevalence of 13.0% for BC screening [26]. Regarding the uptake of CC screening services, national-level surveys in Kenya, Cameroon, Namibia, and Zimbabwe revealed a prevalence of 23.4% [27].

There are several factors associated with the uptake of BC and CC screening services. These include age, level of knowledge about the importance of screening, desire for early detection, perceived risk, religion and emotional support. Other associated factors include culture, spousal and family support, previous engagement with screening programmes, information gathered from people diagnosed with cancer, proximity of screening centres, cost of screening, privacy and confidentiality [4, 28]. Studies have also found that provider sex, quality of care, method of disclosure, waiting time, and follow-up schedule were associated with the uptake BC and CC screening services [4, 23].

There is a paucity of data on the national prevalence and drivers of BC and CC screening among women of reproductive age in Ghana. This is the first study in the country to examine BC and CC screening among women of reproductive age using nationally representative data. The findings from this study can inform national-level BC and CC screening and treatment policies and programmes. Therefore, this study aimed to identify the proportion of women of reproductive age who have screened for BC and CC. This study also sought to assess factors associated with the uptake of BC and CC screening services among Ghanaian women. We analysed data from the recent Ghana Demographic and Health Survey (2022 GDHS).

This study was underpinned by Andersen Health Service Utilization Model. This model emphasizes

predisposing, enabling and need factors that influence health service utilization [29]. Predisposing factors comprise demographic and social characteristics of individuals, including age, educational status, and health behaviours such as smoking. Enabling factors refer to factors that enable or impede use, including personal or community resources that make it possible for people to access healthcare. Examples include socio-economic status, health insurance coverage and transportation issues. Need factors refer to how the individual views their health status and wellbeing or professional assessment of an individual's health status [29].

Methods

Data source

This study analysed secondary data from the 2022 Ghana Demographic and Health Survey. This survey was conducted by the Ghana Statistical Service and funded by the United States Agency for International Development and the United States President's Malaria initiative. The 2022 GDHS collected data on demographic and health indicators, including age, educational status, wealth status, contraceptive use, breast and cervical cancer screening.

Population and sampling

The target population for the 2022 GDHS included women of reproductive age (15–49 years) across the 16 administrative regions in Ghana. The sampling frame from the 2021 Population and Housing Census was used. A stratified two-stage cluster sampling process was employed for urban and rural areas. In stage one, 618 clusters were selected from the sampling frame using probability proportionate to size. In stage two, household listing and mapping were carried out in all selected clusters to obtain a list of households. The list was then used as a sampling frame for the selection of households. For the 2022 GDHS, a national stratified representative sample of 18,450 households were selected from 618 clusters. All women who had spent the night before the survey in the selected households were eligible for the survey. A total of 15,014 women of reproductive age were interviewed. This study analysed data from all the 15,014 women (weighted).

Study variables

Outcome variables

The outcome variables were BC and CC screening by a health care provider, which was originally coded as '1 = Yes, 2 = No and 8 = don't know. These variables were recoded into a dummy variable as '1 = Yes, and 0 = otherwise'.

Independent variables

The independent variables were categorized into predisposing, enabling and need factors. The predisposing factors included age of the respondent, educational status, marital status, parity, and age at menarche, age at first sexual intercourse, tobacco use, contraceptive use and abortion. Enabling factors included wealth index, health insurance, employment status, type of place of residence, region, frequency of reading newspaper, listening to radio and watching television, barriers to care (distance, money, permission and not wanting to go alone) and traveling time to the nearest health facility. Self-reported health status, health facility visits, STI status and HIV testing constituted need factors.

Data analysis

We employed descriptive statistics, including frequency and percentage, and binary logistic regression to analyse the data. Two models were computed, including model 1 (drivers of BC screening, both crude and adjusted odd ratios) and model 2 (drivers of CC screening, both crude and adjusted odd ratios). We used STATA/SE, version 17 to aid the data analysis. The 'svyset' function in STATA was used to adjust for the sampling weight, clustering and stratification. The results were reported at a 95% confidence interval and a significance level of 0.05.

Ethical consideration

The 2022 GDHS protocol was approved by the Ghana Health Service Ethics Review Committee and ICF Institutional Review Board. In this study, ethical approval was not required since further analysis of the 2022 GDHS data was performed. We downloaded the dataset from the website of the DHS Program after seeking permission.

Results

Participant characteristics

The results showed that 17.9% of the participants were adolescent girls. Approximately 60.0% of the participants had secondary education and 40.0% of them were married. 32.3% of the participants were nulliparous, and 22.3% of them were in the richest wealth index. In addition, a majority (74.6%) of the participants were working, 57.0% resided in urban areas, and approximately 20.0% resided in the Ashanti region.

Regarding exposure to mass media, 88.5% of the participants did not read a newspaper, 33.3% did not listen to radio, and 70.0% were exposed to television. About 90.0% of the participants were covered by health insurance, and 31.2% perceived their health status to be very good. For a majority of the participants, distance to the health

facility (77.7%), obtaining money for treatment (55.3%), and obtaining permission for treatment (90.1%) were not problems to accessing care. Specifically, 12.4% of the participants had to travel for sixty or more minutes to the nearest health facility.

In addition, 48.1% of the participants had not visited a health facility in the last 12 months, 5.5% had a sexually transmitted infection in the last 12 months, and 42.6% had not tested for HIV. Additionally, 3.7% of the participants experienced early menarche, 10.3% initiated early sexual intercourse, 23.4% used modern contraceptives, 25.3% terminated a pregnancy, and 1.0% used cigarettes or tobacco. Exactly, 18.4% and 5.0% of the participants had screened for breast cancer and cervical cancer, respectively (Table 1).

A crude analysis of factors associated with BC and CC screening among women of reproductive age in Ghana

At the crude analysis level, uptake of CC screening service was significantly associated with predisposing factors, such as respondent's age, educational status, marital status, parity, and age at menarche, age at first sexual intercourse, contraceptive use and history of abortion. For instance, participants who had terminated a pregnancy (cOR = 1.47, 95% CI: 1.29–1.68) had increased odds of BC screening compared to their counterparts. Additionally, participants who use modern method of contraception (cOR = 1.29, 95% CI: 1.12–1.49) were more likely to screen for BC compared to those using no contraception.

We also found a significant association between enabling factors (wealth index, health insurance, currently working, region, place of residence, exposure to mass media, and barriers to accessing care) and the uptake of breast cancer screening service. For example, participants with health insurance (cOR = 2.22, 95% CI: 1.71–2.88) were two times more likely to screen for BC compared to their counterparts. The odds of BC screening decreased with traveling time to the nearest health facility. Participants who had to travel for less than ten minutes (cOR = 2.33, 95% CI: 1.79–3.03) to the nearest health facility had increased odds of BC screening compared to those who had to travel for an hour or more.

The associations between need factors, such as health status, health facility visit, having STI, testing for HIV and testing for cervical cancer, and uptake of BC screening services were found to be statistically significant. For instance, participants who had visited a health facility in the last 12 months (cOR = 2.06, 95% CI: 1.82–2.33) had increased odds of BC screening compared to their counterparts. Additionally, participants who had tested for HIV (cOR = 3.38, 95% CI: 2.95–3.87)

Table 1 Descriptive statistics of participant characteristics

Characteristic	*n* (%)	%
Predisposing factors		
Age of respondent (years)		
15–19	2682	17.9
20–24	2695	17.9
25–29	2340	15.6
30–34	2252	15.0
35–39	2059	13.7
40–44	1675	11.2
45–49	1312	8.7
Highest educational level		
No education	2411	16.1
Primary	2071	13.8
Secondary	8999	59.9
Higher	1533	10.2
Current marital status		
Never in union	5268	35.1
Married	6008	40.0
Living with partner	2197	14.6
Widowed	367	2.4
Divorced	389	2.6
Separated	786	5.2
Parity		
None	4854	32.3
1–5 children	8732	58.2
6–13 children	1428	9.5
Age of menarche		
Early (< 12 years)	557	3.7
Normal (12–16 years)	12,169	81.1
Delayed (> 16 years)	2077	13.8
Don't know/never menstruated	212	1.4
Age of first sexual intercourse		
Never had sex	2134	14.2
Early initiation (< 15 years)	1541	10.3
Normal (> 15 years)	11,339	75.5
Doesn't use cigar/tobacco		
No	151	1.0
Yes	14,863	99.0
Contraceptive use		
No method	10,289	68.5
Folkloric	160	1.1
Traditional	1046	7.0
Modern	3519	23.4
Terminated a pregnancy		
No	11,217	74.7
Yes	3797	25.3
Enabling factors		
Wealth index		
Poorest	2447	16.3
Poorer	2712	18.1

Table 1 (continued)

Characteristic	*n* (%)	%
Middle	3121	20.8
Richer	3379	22.5
Richest	3355	22.3
Respondent currently working		
No	3808	25.4
Yes	11,206	74.6
Covered by health insurance		
No	1482	9.9
Yes	13,532	90.1
Type of place of residence		
Urban	8557	57.0
Rural	6457	43.0
Region		
Western	955	6.4
Central	1703	11.3
Greater Accra	2327	15.5
Volta	713	4.7
Eastern	1220	8.1
Ashanti	2928	19.5
Western North	411	2.7
Ahafo	317	2.1
Bono	567	3.8
Bono East	676	4.5
Oti	403	2.7
Northern	1149	7.7
Savannah	319	2.1
North East	290	1.9
Upper East	640	4.3
Upper West	398	2.7
Frequency of reading newspaper		
not at all	13,293	88.5
less than once a week	1182	7.9
at least once a week	539	3.6
Frequency of listening to radio		
not at all	4993	33.3
less than once a week	3674	24.5
at least once a week	6347	42.3
Frequency of watching television		
not at all	3463	23.1
less than once a week	2305	15.4
at least once a week	9246	61.6
Barrier to care: distance		
Big problem	3354	22.3
Not a big problem	11,660	77.7
Barrier to care: money		
Big problem	6706	44.7
Not a big problem	8308	55.3
Barrier to care: permission		
Big problem	1485	9.9
Not a big problem	13,529	90.1
Barrier to care: not wanting to go alone		
Big problem	2435	16.2
Not a big problem	12,579	83.8
Minutes to the nearest facility		
0–9 min	2260	15.1
10–29 min	6465	43.1
30–59 min	4430	29.5
60 + minutes	1859	12.4
Need factors		
Self-reported health status		
Very good	4680	31.2
Good	6862	45.7
Moderate	2957	19.7
Bad	451	3.0
Very bad	63	0.4
Visited a health facility last 12 months		
No	7226	48.1
Yes	7788	51.9
Had any STI in last 12 months		
No	14,191	94.5
Yes	823	5.5
Tested for HIV		
No	6403	42.6
Yes	8611	57.4
Uptake of breast and cervical cancer screening services		
Breasts examined for cancer by health care provider		
No	12,253	81.6
Yes	2761	18.4
Ever tested for cervical cancer by health care provider		
No	14,270	95.0
Yes	744	5.0

and cervical cancer (cOR = 11.16, 95% CI: 8.95–13.90) had increased odds of BC screening compared to their counterparts (Table 2).

In addition, there was a significant association between predisposing factors and CC screening. For instance, respondent's age, educational status, marital status, parity, age at first sexual intercourse, tobacco use, contraceptive use and pregnancy termination were significantly associated with CC screening. For instance, participants who had terminated a pregnancy (cOR = 1.60, 95% CI: 1.28–1.98) had increased odds of CC screening compared to their counterparts.

The following enabling factors were associated with CC screening: wealth index, health insurance, working status, region, place of residence, exposure to mass media and barriers to accessing healthcare.

Table 2 Crude binary logistic regression for predictors of the uptake of BC and CC screening services

	Breast cancer screening		Cervical cancer screening	
Predisposing factors	**cOR (95% CI)**	***p* value**	**cOR (95% CI)**	***p* value**
Age of respondent				
15–19	1 (ref)		1(ref)	
20–24	2.35(1.87–2.95)	0.000	3.73(1.86–7.50)	0.000
25–29	3.37(2.71–4.18)	0.000	8.76(4.76–16.10)	0.000
30–34	4.12(3.28–5.19)	0.000	11.10(6.16–20.01)	0.000
35–39	4.34(3.45–5.45)	0.000	11.36(5.87–21.98)	0.000
40–44	3.59(2.80–4.59)	0.000	11.40(6.43–20.20)	0.000
45–49	4.19(3.27–5.38)	0.000	13.85(7.47–25-70)	0.000
Highest education				
No education	1 (ref)		1(ref)	
Primary	1.27(0.97–1.68)	0.079	1.04(0.64–1.68)	0.868
Secondary	2.12(1.74–2.59)	0.000	1.23(0.86–1.77)	0.238
Higher	8.96(7.05–11.38)	0.000	6.17(4.07–9.36)	0.000
Current marital status				
Never in union	1 (ref)		1(ref)	
Married	1.83(1.59–2.09)	0.000	3.47(2.65–4.54)	0.000
Living with partner	1.14(0.93–1.40)	0.189	1.96(1.35–2.83)	0.000
Widowed	1.52(0.98–2.36)	0.060	3.03(1.59–5.76)	0.001
Divorced	1.77(1.26–2.49)	0.001	3.71(2.04–6.75)	0.000
Separated	1.47(1.09–1.98)	0.012	3.01(1.84–4.93)	0.000
Parity				
None	1(ref)		1(ref)	
1–5 children	1.69(1.49–1.92)	0.000	2.24(1.75–2.85)	0.000
6–13 children	1.07(0.85–1.35)	0.534	1.69(1.15–2.48)	0.007
Age of menarche				
Early (< 12 years)	2.12(1.11–4.04)	0.021	2.62(0.79–8.69)	0.113
Normal (12–16 years)	1.91(1.05–3.46)	0.031	2.39(0.82–6.98)	0.109
Delayed (> 16 years)	2.09(1.16–3.78)	0.014	2.78(0.95–8.12)	0.061
DK/never menstruated	1(ref)		1(ref)	
Age of first sex				
Never had sex	1(ref)		1(ref)	
Early initiation (< 15 years)	1.61(1.20–2.15)	0.001	9.36(4.27–20.51)	0.000
Normal (> 15 years)	2.49(2.02–3.07)	0.000	13.26(6.49–27.08)	0.000
Doesn't use cigar/tobacco				
No	1(ref)		1(ref)	
Yes	0.87(0.39–1.92)	0.739	0.45(0.21–0.95)	0.039
Contraceptive use				
No method	1(ref)		1(ref)	
Folkloric	1.26(0.76–2.12)	0.353	1.76(0.85–3.63)	0.126
Traditional	1.99(1.64–2.42)	0.000	1.59(1.11–2.29)	0.011
Modern	1.29(1.12–1.49)	0.000	1.12(0.88–1.42)	0.355
Terminated a pregnancy				
No	1 (ref)		1(ref)	
Yes	1.47(1.29–1.68)	0.000	1.60(1.28–1.98)	0.000
Enabling factors				
Wealth index				
Poorest	1(ref)		1(ref)	
Poorer	1.51(1.18–1.1.93)	0.001	1.70(1.11–2.61)	0.015

Table 2 (continued)

Predisposing factors	Breast cancer screening		Cervical cancer screening	
	cOR (95% CI)	***p* value**	**cOR (95% CI)**	***p* value**
Middle	2.18(1.70–2.80)	0.000	2.94(1.78–4.85)	0.000
Richer	2.88(2.25–3.70)	0.000	3.68(2.27–5.96)	0.000
Richest	6.14(4.90–7.68)	0.000	6.95(4.46–10.83)	0.000
Currently working				
No	1(ref)		1(ref)	
Yes	1.80(1.56–2.08)	0.000	2.43(1.85–3.21)	0.000
Health insurance				
No	1(ref)		1(ref)	
Yes	2.22(1.71–2.88)	0.000	2.62(1.63–4.15)	0.000
Place of residence				
Urban	1(ref)		1(ref)	
Rural	0.46(0.39–0.55)	0.000	0.43(0.33–0.57)	0.000
Region				
Western	0.89(0.65–1.23)	0.514	0.48(0.26–0.87)	0.017
Central	0.67(0.48–0.92)	0.013	0.66(0.42–1.04)	0.079
Greater Accra	1(ref)		1(ref)	
Volta	0.69(0.49–0.98)	0.040	1.11(0.66–1.86)	0.678
Eastern	0.88(0.66–1.17)	0.398	1.10(0.72–1.67)	0.652
Ashanti	0.71(0.52–0.97)	0.035	0.98(0.58–1.65)	0.963
Western North	0.50(0.37–0.67)	0.000	0.62(0.34–1.12)	0.118
Ahafo	0.65(0.48–0.88)	0.006	0.86(0.50–1.49)	0.612
Bono	0.73(0.50–1.06)	0.100	0.72(0.41–1.25)	0.256
Bono East	0.49(0.33–0.72)	0.000	0.65(0.35–1.22)	0.183
Oti	0.28(0.19–0.42)	0.000	0.52(0.30–0.91)	0.024
Northern	0.56(0.36–0.85)	0.008	1.16(0.65–2.08)	0.593
Savannah	0.22(0.15–0.35)	0.000	0.25(0.13–0.50)	0.000
North East	0.66(0.44–0.99)	0.048	0.67(0.38–1.18)	0.174
Upper East	0.47(0.31–0.70)	0.000	0.67(0.36–1.25)	0.211
Upper West	0.34(0.22–0.52)	0.000	0.62(0.34–1.11)	0.110
Freq. of reading newspaper				
not at all	1(ref)		1(ref)	
less than once a week	1.76(1.47–2.12)	0.000	1.86(1.40–2.49)	0.000
at least once a week	2.82(2.16–3.69)	0.000	2.50(1.64–3.81)	0.000
Freq. of listening to radio				
not at all	1(ref)		1(ref)	
less than once a week	1.32(1.10–1.59)	0.002	1.37(1.03–1.84)	0.031
at least once a week	1.98(1.72–2.28)	0.000	2.02(1.58–2.58)	0.000
Freq. of watching television				
not at all	1(ref)		1(ref)	
less than once a week	1.65(1.34–2.04)	0.000	2.04(1.45–2.86)	0.000
at least once a week	2.25(1.87–2.72)	0.000	2.77(2.02–3.80)	0.000
Barrier to care: distance				
Big problem	1(ref)		1(ref)	
Not a big problem	1.72(1.46–2.01)	0.000	1.54(1.17–2.02)	0.002
Barrier to care: money				
Big problem	1(ref)		1(ref)	
Not a big problem	1.68(1.48–1.90)	0.000	1.66(1.34–2.06)	0.000

Table 2 (continued)

	Breast cancer screening		Cervical cancer screening	
Predisposing factors	cOR (95% CI)	*p* value	cOR (95% CI)	*p* value
Barrier to care: permission				
Big problem	1(ref)		1(ref)	
Not a big problem	1.52(1.25–1.86)	0.000	1.38(0.94–2.02)	0.100
Barrier to care: not wanting to go alone				
Big problem	1(ref)		1(ref)	
Not a big problem	1.33(1.11–1.58)	0.002	1.52(1.08–2.13)	0.015
Minutes to the nearest facility				
0–9 min	2.33(1.79–3.03)	0.000	2.87(1.47–4.73)	0.000
10–29 min	2.01(1.61–2.51)	0.000	1.92(1.25–2.96)	0.003
30–59 min	1.75(1.40–2.20)	0.000	1.58(1.03–2.44)	0.035
60 + minutes	1(ref)		1(ref)	
Need factors				
Self-reported health status				
Very good	1(ref)		1(ref)	
Good	0.80(0.68–0.94)	0.007	0.75(0.56–1.01)	0.065
Moderate	0.87(0.72–1.05)	0.150	0.86(0.63–1.18)	0.362
Bad	0.62(0.43–0.91)	0.016	0.45(0.23–0.85)	0.015
Very bad	0.98(0.46–2.11)	0.978	0.54(0.11–2.58)	0.448
Visited facility last 12 months				
No	1(ref)		1(ref)	
Yes	2.06(1.82–2.33)	0.000	2.26(1.77–2.89)	0.000
Had any STI in last 12 months				
No	1(ref)		1(ref)	
Yes	1.27(1.02–1.58)	0.030	1.34(0.91–1.96)	0.132
Tested for HIV				
No	1(ref)		1(ref)	
Yes	3.38(2.95–3.87)	0.000	4.78(3.42–6.69)	0.000
Breasts screened				
No	----------		1(ref)	
Yes			11.16(8.95–13.90)	0.000
Cervix screened				
No	1(ref)		----------	
Yes	11.16(8.95–13.90)	0.000		

For example, participants residing in rural areas (cOR = 0.43, 95% CI: 0.33–0.57) had lower odds of CC screening compared to those residing in urban areas. Additionally, participants who did not have a problem with getting money for treatment (cOR = 1.66, 95% CI: 1.34–2.06) had increased odds of CC screening compared to their counterparts.

Moreover, need factors, such as health status, health facility visits, HIV testing and BC screening, were associated with CC screening. For instance, participants who had poor health status (cOR = 0.45, 95% CI: 0.23–0.85) had decreased odds of CC screening compared to those who had very good health status. Additionally, participants who had tested for HIV (cOR = 4.78, 95% CI: 3.42–6.69) were four times more likely to test for CC (Table 2).

An adjusted analysis of factors associated with BC and CC screening among women of reproductive age in Ghana

In the adjusted analysis, the results showed that the uptake of BC screening service was driven by predisposing, enabling and need factors. Predisposing factors, such as age, education and contraceptive use were significantly associated with the uptake of BC screening service. For instance, participants aged 45–49 years (aOR = 2.83, 95% CI: 1.88–4.24) were more likely to screen for BC

compared to adolescent girls. Additionally, participants with a higher educational status (aOR = 3.76, 95% CI: 2.75–5.15) were more likely to screen for BC compared to those with no formal education. Moreover, participants who used modern methods of contraception (aOR = 1.16, 95% CI: 1.00–1.36) had increased odds of BC screening compared to participants who use no contraceptive.

In addition, enabling factors, including wealth index, place of residence, region, health insurance, frequency of reading newspaper, frequency of listening to radio, and barriers to accessing care, were associated with the uptake of BC screening services. Participants within the richest wealth index (aOR = 1.95, 95% CI: 1.40–2.72) were more likely to have their breast examined for BC by a health provider compared to those within the poorest wealth index. Additionally, participants in rural areas (aOR = 0.81, 95% CI: 0.67–0.99) had lower odds of BC screening compared to those in urban areas. Furthermore, participants who had health insurance (aOR = 1.41, 95% CI: 1.10–1.80) were more likely to screen for BC compared to their counterparts.

It was also found that need factors, such as health facility visit, testing for HIV and testing for cervical cancer were associated with the uptake of BC screening service. For example, women who had visited a health facility in the last 12 months (aOR = 1.42, 95% CI: 1.23–1.65) had increased odds of BC screening compared to their counterparts. In addition, participants who had tested for HIV (aOR = 1.88, 95% CI: 1.56–2.25) and cervical cancer (aOR = 6.46, 95% CI: 5.05–8.26) had increased odds of BC screening compared to their counterparts (Table 3).

The uptake of cervical cancer screening service was driven by predisposing factors, including age, education, marital status, age at first sexual intercourse and tobacco use. For instance, participants aged 45–49 years (aOR = 2.72, 95% CI: 1.27–5.80) were two times more likely to screen for CC compared to adolescent girls. Additionally, women who initiated early sexual intercourse (aOR = 5.76, 95% CI: 2.22–14-96) were five times more likely to screen for CC compared to those who never had sex. Participants who did not use tobacco (aOR = 0.45, 95% CI: 0.21–0.96) had decreased odds of CC screening compared to tobacco users.

In addition, we found a significant association between enabling factors, such as wealth index and region, and CC screening. Women within the richest wealth index (aOR = 2.07, 95% CI: 1.17–3.66) had increased odds of CC screening compared to those within the poorest wealth index. Moreover, participants in the Northern region (aOR = 2.87, 95% CI: 1.59–5.16) were more likely to screen for CC compared to those in the Greater Accra region.

The only need factor significantly associated with CC screening was screening for breast cancer. Women who had screened for breast cancer (aOR = 6.82, 95% CI: 5.42–8.58) were six times more likely to screen for cervical cancer compared to their counterparts (Table 3).

Discussion

This study sought to assess the prevalence and drivers of BC and CC screening among women of reproductive age in Ghana using Andersen's healthcare utilization model as a theoretical guide. In this study, the prevalence of BC screening was 18.4%. Our finding is greater than that of a national population-based study conducted in Lesotho, where 9.7% of women of reproductive age had undergone BC screening [30]. Another study among four sub-Saharan African countries revealed an overall prevalence of 12.9% for BC screening [26]. The results of this study highlight the possible clinical and public health ramifications because early detection is crucial for the management and prevention of breast cancer. Therefore, the low prevalence of BC screening among women of reproductive age in Ghana underscores the need for stakeholders to intensify public health education to help raise awareness of breast cancer and promote the uptake of screening services.

The prevalence of CC screening was 5.0%. A constant screening prevalence of 14.0% was observed for the African sub region from 2000 to 2020 [31]. Another study on CC screening revealed that 9.0% of women from low-middle-income countries, 4.3% from SSA, and 3.0% from Ghana had screened for CC [32]. A study using national-level data in Kenya, Cameroon, Namibia, and Zimbabwe found a prevalence of 23.4% for CC screening [27] and 13.1% in Malawi [33]. Although the uptake of both BC and CC appears to be increasing, the rate is still low. A possible explanation is the non-inclusion of clinical screening for the breast and cervix in the National Health Insurance benefit package. Additionally, most sub-Saharan African countries lack national-level policies for promoting these services among women [34]. In addition, approximately one-third of respondents answered that they had moderate to very poor health status, which could signify low access to healthcare in terms of distance from health facility [34], cost [27], or availability of trained health personnel for such examinations [35, 36]. Therefore, prioritizing and including clinical examinations for these two cancers in health insurance plans could increase the use of screening services, especially among women in poor wealth quintiles.

Table 3 Adjusted binary logistic regression for predictors of uptake of BC and CC screening

	Breast cancer screening		Cervical cancer screening	
Predisposing factors	**aOR (95% CI)**	***p* value**	**aOR (95% CI)**	***p* value**
Age of respondent				
15–19	1(ref)		1(ref)	
20–24	1.40(1.06–1.84)	0.016	1.10(0.52–2.38)	0.796
25–29	1.43(1.06–1.94)	0.019	1.64(0.81–3.34)	0.164
30–34	1.73(1.24–2.40)	0.001	1.77(0.84–3.71)	0.129
35–39	2.03(1.43–2.89)	0.000	1.74(0.82–3.71)	0.145
40–44	1.95(1.32–2.89)	0.001	2.13(1.01–4.49)	0.044
45–49	2.83(1.88–4.24)	0.000	2.72(1.27–5.80)	0.010
Highest education				
No education	1(ref)		1(ref)	
Primary	1.23(0.92–1.65)	0.145	1.07(0.63–1.82)	0.798
Secondary	1.82(1.42–2.33)	0.000	1.11(0.74–1.68)	0.591
Higher	3.76(2.75–5.15)	0.000	2.56(1.53–4.29)	0.000
Current marital status				
Never in union	1(ref)		1(ref)	
Married	0.96(0.76–1.21)	0.750	1.81(1.17–2.81)	0.008
Living with partner	0.83(0.64–1.07)	0.158	1.71(1.02–2.85)	0.040
Widowed	0.99(0.60–1.62)	0.971	1.90(0.90–3.98)	0.089
Divorced	0.89(0.58–1.37)	0.613	2.20(1.05–4.61)	0.035
Separated	0.93(0.64–1.36)	0.735	2.40(1.24–4.63)	0.009
Parity				
None	1(ref)		1(ref)	
1–5 children	1.01(0.80–1.28)	0.890	0.80(0.54–1.20)	0.294
6–13 children	0.95(0.69–1.31)	0.775	0.91(0.52–1.60)	0.759
Age of menarche				
Early (< 12 years)	1.36(0.71–2.61)	0.340		
Normal (12–16 years)	1.27(0.72–2.23)	0.391	----------	
Delayed (> 16 years)	1.33(0.76–2.32)	0.302		
DK/never menstruated	1(ref)			
Age of first sex				
Never had sex	1(ref)		1(ref)	
Early initiation (< 15 years)	0.96(0.68–1.34)	0.818	5.76(2.22–14-96)	0.000
Normal (> 15 years)	0.94(0.68–1.30)	0.742	4.58(1.92–10.91)	0.001
Doesn't use cigar/tobacco				
No	----------		1(ref)	
Yes			0.45(0.21–0.96)	0.041
Contraceptive use				
No method	1(ref)		1(ref)	
Folkloric	1.02(0.56–1.86)	0.937	1.44(0.49–4.21)	0.503
Traditional	1.43(1.14–1.81)	0.002	0.88(0.60–1.30)	0.544
Modern	1.16(1.00–1.36)	0.048	0.89(0.68–1.15)	0.393
Terminated a pregnancy				
No	1(ref)		1(ref)	
Yes	1.08(0.93–1.27)	0.284	1.16(0.84–1.62)	0.351
Enabling factors				
Wealth index				
Poorest	1(ref)		1(ref)	
Poorer	1.17(0.93–1.49)	0.168	1.38(0.91–2.09)	0.119

Table 3 (continued)

Predisposing factors	Breast cancer screening		Cervical cancer screening	
	aOR (95% CI)	***p* value**	**aOR (95% CI)**	***p* value**
Middle	1.35(1.00–1.81)	0.043	2.06(1.24–3.38)	0.004
Richer	1.32(0.97–1.80)	0.070	2.09(1.24–3.54)	0.006
Richest	1.95(1.40–2.72)	0.000	2.07(1.17–3.66)	0.012
Currently working				
No	1(ref)		1(ref)	
Yes	1.14(0.96–1.36)	0.118	1.16(0.84–1.62)	0.351
Health insurance				
No	1(ref)		1(ref)	
Yes	1.41(1.10–1.80)	0.006	1.45(0.86–2.44)	0.161
Place of residence				
Urban	1(ref)		1(ref)	
Rural	0.81(0.67–0.99)	0.042	0.83(0.62–1.11)	0.225
Region				
Western	1.27(0.90–1.78)	0.158	0.59(0.31–1.12)	0.112
Central	0.98(0.69–1.39)	0.922	1.10(0.69–1.76)	0.660
Greater Accra	1(ref)		1(ref)	
Volta	0.89(0.60–1.30)	0.553	1.80(1.09–2.96)	0.021
Eastern	1.16(0.84–1.60)	0.357	1.58(1.00–2.49)	0.050
Ashanti	0.85(0.61–1.17)	0.334	1.44(0.88–2.34)	0.142
Western North	0.85(0.59–1.22)	0.384	1.33(0.72–2.46)	0.359
Ahafo	1.20(0.84–1.71)	0.293	2.12(1.17–3.82)	0.012
Bono	1.08(0.74–1.59)	0.669	1.12(0.66–1.91)	0.651
Bono East	0.94(0.65–1.37)	0.778	1.39(0.74–2.60)	0.297
Oti	0.62(0.41–0.94)	0.026	1.68(0.93–3.05)	0.082
Northern	1.19(0.78–1.81)	0.396	2.87(1.59–5.16)	0.000
Savannah	0.76(0.47–1.23)	0.272	1.05(0.51–2.14)	0.891
North East	2.40(1.43–4.03)	0.001	2.21(1.15–4.25)	0.017
Upper East	0.90(0.60–1.33)	0.605	1.71(0.93–3.13)	0.081
Upper West	0.75(0.47–1.20)	0.240	1.85(1.03–3.30)	0.037
Freq. of reading newspaper				
not at all	1(ref)		1(ref)	
less than once a week	1.26(1.01–1.56)	0.034	1.40(1.00–1.96)	0.050
at least once a week	1.55(1.12–2.5)	0.008	1.08(0.65–1.65)	0.753
Freq. of listening to radio				
not at all	1(ref)		1(ref)	
less than once a week	1.03(0.84–1.25)	0.757	1.12(0.83–1.96)	0.440
at least once a week	1.30(1.12–1.51)	0.000	1.24(0.94–1.65)	0.119
Freq. of watching television				
not at all	1(ref)		1(ref)	
less than once a week	0.96(0.75–1.21)	0.740	1.35(0.87–2.08)	0.171
at least once a week	0.92(0.74–1.14)	0.469	1.40(0.95–2.06)	0.084
Barrier to care: distance				
Big problem	1(ref)		1(ref)	
Not a big problem	1.14(0.95–1.37)	0.137	0.86(0.59–1.25)	0.443
Barrier to care: money				
Big problem	1(ref)		1(ref)	
Not a big problem	1.20(1.03–1.39)	0.016	1.02(0.76–1.38)	0.850

Table 3 (continued)

Predisposing factors	Breast cancer screening		Cervical cancer screening	
	aOR (95% CI)	*p* value	aOR (95% CI)	*p* value
Barrier to care: permission				
Big problem	1(ref)		1(ref)	
Not a big problem	0.95(0.75–1.20)	0.689	1.07(0.68–1.71)	0.747
Barrier to care: not wanting to go alone				
Big problem	1(ref)		1(ref)	
Not a big problem	0.79(0.65–0.97)	0.025	1.13(0.77–1.67)	0.521
Minutes to the nearest facility				
0–9 min	1.23(0.96–1.59)	0.095	1.50(0.88–2.55)	0.131
10–29 min	1.11(0.90–1.39)	0.310	1.07(0.68–1.69)	0.760
30–59 min	1.20(0.95–1.51)	0.110	1.12(0.72–1.75)	0.594
60 + minutes	1(ref)		1(ref)	
Need factors				
Self-reported health status				
Very good	1(ref)		1(ref)	
Good	0.86(0.74–1.00)	0.054	0.77(0.56–1.04)	0.094
Moderate	0.94(0.77–1.15)	0.565	0.95(0.66–1.37)	0.820
Bad	0.92(0.61–1.41)	0.732	0.55(0.28–1.07)	0.079
Very bad	1.66(0.73–3.75)	0.222	0.59(0.09–3.53)	0.563
Visited facility last 12 months				
No	1(ref)		1(ref)	
Yes	1.42(1.23–1.65)	0.000	1.23(0.94–1.63)	0.128
Had any STI in last 12 months				
No	1(ref)		1(ref)	
Yes	1.12(0.87–1.43)	0.356	1.09(0.69–1.70)	0.701
Tested for HIV				
No	1(ref)		----------	
Yes	1.88(1.56–2.25)	0.000		
Breasts cancer screening				
No	----------		1(ref)	
Yes			6.82(5.42–8.58)	0.000
Cervical cancer screening				
No	1(ref)		----------	
Yes	6.46(5.05–8.26)	0.000		

Predisposing, enabling, and need factors for breast and cervical cancer screening

Our findings revealed that women aged 20 years and above had higher odds of screening for BC and those aged 40 years and above had increased odds of screening for CC. Similarly, a study in four African countries (Kenya, Cameroon, Namibia, and Zimbabwe) revealed that women aged 40 years and above were twice more likely to be screened for CC than those below 40 years [27]. However, this finding contradicts a finding of a study in Namibia where women aged 35–44 years were more likely to screen for CC compared to those aged 45 years and older [33]. For BC, a study in Lesotho revealed an increase in screening uptake among those aged 20–24 years (10.82%) and 30–34 years (11.32%); thereafter, it declined among those aged 35–39 years (10.47%) and 40–44 years (9.5%) [30]. In another study in Africa, BC screening was less common among participants aged 15–24 years (7.6%) compared to those aged 35–49 years (17.2%) [26]. This result also confirms earlier research in Burkina Faso [37], Kenya [38], and South Africa [39].

The contexts in which these studies were performed could be a possible factor for these observations. Additionally, the timing of interventions on health promotion activities on the uptake of such services might vary in the various study settings. This result could be attributed to

the fact that awareness initiatives on screening for cervical and breast cancers and its benefits have been targeted at older women compared to younger women, resulting in a greater likelihood of screening among older women [36]. On the basis of emerging evidence, cervical and breast cancers are being diagnosed at younger ages [40]. In this light, it is prudent to target people of all ages in cancer screening and awareness programs.

In addition, the likelihood of BC and CC screening was higher among women with higher education. A multi-country study using DHS data from Burkina Faso, Ivory Coast, Kenya and Namibia [26] and a national population-based study in Lesotho [30] reported similar findings with regards to BC screening. Similar findings have been reported in Kenya, Cameroon, Namibia, and Zimbabwe [27]; Benin, Ivory Coast, Kenya, 40.0%, and Zimbabwe [26]; and South Africa [41]. This finding supports the existing evidence on determinants of utilization of cancer screening services. Educated women could be more informed about the importance of screening for such cancers than those who are not educated.

Our findings contradict with those of a recent study in India, where women who were married had slightly greater odds of screening for CC compared to those who were previously married [42]. However, our findings are similar to another study in peri-urban Ghana, which reported greater odds of CC screening among women who were married or divorced compared to those who were cohabiting [43]. This could be due to exposure to human papillomavirus, which usually occurs in sexually active women [44].

Enabling and needs factors associated with breast cancer and cervical cancer screening among women of reproductive age

In this study, the odds of screening for BC were higher among women within the richest wealth index. In a multi-country study including Albania, Tajikistan, Namibia, and Kenya, the prevalence of BC screening was found to be higher among participants in the highest wealth quintile [45]. Similar trends were recorded by studies in Botswana [46] and India [47]. Regarding CC screening, the same trend was observed among women in the richest wealth index. This confirms the findings of studies in India [42], Malawi [48] and Botswana [46], where increasing wealth status of women positively influenced the uptake of CC screening service. Various studies have found an association between low socioeconomic status to poor knowledge [46, 49] and less access to cancer screening services [50–52]. Hence, socioeconomic empowerment of women could help increase the uptake of cancer screening services [53].

Furthermore, our findings revealed that screening for BC was associated with place of residence, reading newspapers, listening to radio and being covered by health insurance. Whereas a study in Rwanda revealed that living in urban areas increased the likelihood of cervical cancer screening by more than three times [54], another study from India revealed a slightly lower prevalence among rural inhabitants than among those in urban areas [42]. Our observation of media influence is consistent with earlier studies in which women who read newspapers were more likely to screen for cancer [36, 55]. This finding suggests that mass media can be used as tool for promoting cancer screening among women in both rural and urban locations. The findings also revealed that women covered by health insurance had greater chances of BC screening. Studies in the United States [5, 56] and Burkina Faso, Ivory Coast, Kenya and Namibia [26] recorded higher BC screening uptake among the insured. These findings underscore the need to enrol more women in the national health insurance scheme. Poor treatment outcomes for BC [57] have been found among women without health insurance coverage. Subscribing to health insurance has the potential to increase the demand for breast cancer screening services among low-income populations [56, 57]. Additionally, our findings revealed that screening for CC was associated with the uptake of BC screening service and vice versa. This observation is consistent with an earlier study in Ghana where CC screening was significantly linked to BC screening among adult women [28]. Women who had screened for CC might be knowledgeable about the importance of CC screening and vice versa or they were advised by health care providers to screen for both CC and BC.

Recommendations

The insights from this study highlight the gaps in public health interventions aimed at fighting non-communicable diseases such as cancer. Considering that a considerable number of the women were adolescents, had no formal education, widowed and belonged to the poor and poorer wealth quintiles, the burden of these cancers could be curtailed by prioritizing the needs of these vulnerable groups. Media exposure was a driver of the uptake of screening services. Hence, promoting health education through the mass media could help increase the uptake of cancer screening services. As per the guidelines of the National Comprehensive Cancer Network (NCCN), American Society for Clinical Oncology (ASCO), and European Society for Medical Oncology (ESMO), we recommend that women aged 25 and below undergo risk assessment and screening for cervical cancer and breast cancer to minimize the risk and promote early detection of cancer. Also, stakeholders, such as the

Ghana Health Service, should encourage regular mammography screening for women at average risk of breast cancer (aged 45 and above) and periodic human papillomavirus testing for women at risk of cervical cancer (aged 25 to 65 years).

Strengths and limitations of the study

Notwithstanding the rigour of the study design, recall bias could influence the results of this study. Additionally, relying on self-reporting could result in social desirability bias. The variables included in this study were limited to the variables available in the GDHS dataset. Nonetheless, the use of nationally representative data, standardized instruments for data collection and training of field workers improved the validity and reliability of the findings.

Conclusion

Our study revealed that the prevalence of both BC and CC screening among women of reproductive age was low. Women who lived in rural areas, not educated, uninsured, and of low socio-economic status were less likely to screen for BC and CC. Going forward, it is crucial for stakeholders to prioritize the uptake of BC and CC screening services. Moreover, stakeholders could leverage the mass media to raise awareness and promote early detection of BC and CC among women of reproductive age in Ghana.

Abbreviations

BC	Breast Cancer
CC	Cervical Cancer
GAEC	Ghana Atomic Energy Commission
GDHS	Ghana Demographic Health Survey
SDG	Sustainable Development Goal
WHO	World Health Organization
WRA	Women in Reproductive Age
NCCN	National Comprehensive Cancer Network
ASCO	American Society for Clinical Oncology
ESMO	European Society for Medical Oncology
SSA	Sub-Saharan Africa

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Authors' contributions

EAA conceptualized the study, obtained and analyzed the data, SKA wrote the introduction and the results, CDB wrote the discussions, CB wrote the methods, BM wrote the abstract, and AA reviewed the paper. All authors contributed extensively to the work presented in this paper. All authors read and approved the final manuscript.

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Availability of data and materials

The DHS Program owns the data used in this study, therefore, the authors cannot share the data. Interested persons can contact The DHS Program for the data (https://dhsprogram.com/data/available-datasets.cfm). The authors confirm they had no special access or privileges to the data that other researchers would not have.

Declarations

Ethics approval and consent to participate

The 2022 GDHS protocol was approved by the Ghana Health Service Ethics Review Committee and ICF Institutional Review Board. Informed consent was obtained from all adult participants and informed assent from minors. A formal request to use the raw data was made to The DHS Program through their website (https:// dhsprogram. com/ data/ available-datasets. cfm). The study was performed in accordance with relevant regulations and guidelines. Data used in this study were anonymised before use.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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