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Menstrual Cycle, Ethnicity, Region of Residence and Women Engagement in Clinical Breast Exam for Cancer in Ghana

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ABSTRACT

Background: The rate of breast cancer cases in Ghana compared to other cancers is 31.8%, much higher than the global rate of 25%. However, advances in breast cancer examination allow healthcare professionals to diagnose breast cancer earlier. **Objective:** Based on this, the study aimed to investigate whether menstrual cycle, ethnicity, and region of residence influence women to engage in clinical breast exam for cancer in Ghana. **Methods:** Data for the study were extracted from the 2022 GDHS. The survey was conducted cross-sectionally with 18,450 households drawn from 618 clusters which resulted in 15,014 interviewed women age 15–49 and 7,044 interviewed men age 15–59 (in one of every two households selected). The survey made used of a stratified two-stage cluster sampling procedure which was carefully designed to yield representative results at the national level, for urban and rural areas, and for each of the 16 regions, for most DHS indicators. Data were processed with SPSS version 27 and analysed with frequency distribution, chi-square and binary logistic regression. The binary logistic regression was used to determine the influences of the IVs on the DV. **Results:** The study found that ovulation in the middle of a cycle was significantly associated with clinical breast exam for cancer uptake in Ghana. **Conclusion:** The study found low clinical breast exam for cancer uptake among women. Therefore, to efficiently inspire women in Ghana to join in clinical breast exam for cancer, the current study recommends healthcare providers to use mobile phone, television and radio messaging to educate women on the eminence benefits of CBE to ensure an increase uptake of CBE in Ghana.

Keywords: Cancer, Clinical Breast Exam, Engagement, Ethnicity, Ghana, Menstrual Cycle, Region of Residence, Women.

INTRODUCTION

Breast cancer occurs in every country of the world in women at any age after puberty but with increasing rates in later life [1]. In 2022, 2.3

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million women were diagnosed with breast cancer and with 670 000 deaths worldwide in that same year [1,2]. Breast cancer is noted as one of the most common cancers affecting women making it a significant health concern globally [1,3,4]. Breast cancer occurs when abnormal cells in the breast grow uncontrollably, forming a tumour [1]. It can begin in different parts of the breast, such as the milk ducts, lobules, or other breast tissues [5,6]. While breast cancer primarily affects women, it can also occur in men, although it is rare [7]. Female gender is the strongest breast cancer risk factor [1]. Approximately 99% of breast cancers occur in women and 0.5–1% of breast cancers occur in men [1]. The treatment of breast cancer in men follows the same principles of management as for women [1,8,9].

The rate of breast cancer cases in Ghana compared to other cancers is 31.8%, much higher than the global rate of 25% [10]. This rising frequency is attributed to a number of risk factors including age, obesity, diet, lifestyle, harmful use of alcohol, family history of breast cancer, history of radiation exposure, reproductive history (such as age that menstrual periods began and age at first pregnancy), tobacco use and postmenopausal hormone therapy [11-13]. Approximately half of breast cancers develop in women who have no identifiable breast cancer risk factor other than gender (female) and age (over 40 years) [1,14,15]. Breast cancer typically affects women age 50 and older, but it can also affect women who are younger than 50 [16,17]. Family history of breast cancer increases the risk of breast cancer, but most women diagnosed with breast cancer do not have a known family history of the disease. Lack of a known family history does not necessarily mean that a woman is at reduced risk. Hence, everyone is born with some breast tissue therefore, anyone can get breast cancer [1,17].

Advances in breast cancer examination allow healthcare professionals to diagnose breast cancer earlier. Finding the cancer earlier makes it much more likely that the cancer can be cured. Even when it cannot be cured, many treatments exist to extend life [18,19]. Healthcare providers may do physical examinations or order mammograms to check for signs of breast cancer. Aside that, they can also do the following tests to diagnose the disease: Breast ultrasound, breast magnetic resonance imaging scan, breast biopsy, immunohistochemistry test to check for hormone receptors, and genetic tests to identify mutations that cause breast cancer [6,20].

Globally, evidence suggests that countries with a very high human development index (HDI), 1 in 12 women will be diagnosed with breast cancer in their lifetime while only 1 in 71 women will die of it [12,21]. However, countries where HDI is low, 1 in 27 women will be diagnosed with breast cancer in their lifetime while 1 in 48 women will die from it. Therefore, detecting breast cancer at an early stage would significantly improves treatment outcomes. Hence, the best way to beat cancer is to make sure you detect your cancer early and get treatment options as soon as possible [21]. It is important to get examined for breast cancer because it is only by examination that can help find the cancer early when it is most easily treatable [10,22,23]. In this regard, a clinical breast examination once in three years for women under the age of forty years and once every year for those above forty years is recommended [10,24].

The month of October is commemorated every year as Breast Cancer Awareness Month worldwide. The observance of the breast cancer awareness month is to impress upon women (and men), the need to examine their breasts routinely in order to detect the disease at a treatable stage before it becomes deadly [25,26]. Though clinical breast examination is noted to have associated with profound benefits; yet, studies confirmed there is a low uptake of clinical breast exam for cancer among women in Ghana [24,27-29]. The increasing incidents of low clinical breast exam for cancer cases in Ghana calls for concerted efforts to address the disease [10,24,27]. This call increased interests in research in this discipline. However, the numerous studies conducted in aid of dealing with this menace in totality, independently examined how menstrual cycle timing [30], ethnicity [31,32], or geographic location [33] impacted breast cancer screening behaviours and outcomes which led to a significant research gap in integrated and multi-factorial research that examines the combined effects of these variables on the clinical breast examination process. Till date, there has not been a robust empirical study that has synthesised these three interrelated dimensions to assess their interactive effects on clinical breast exam for cancer (CBE) quality, detection sensitivity, or women's comfort and compliance. Based on this, the study aimed to investigate whether menstrual cycle, ethnicity, and region of residence influence women to engage in clinical breast exam for cancer in Ghana. Specifically, the study seeks to:

1. Analyse if menstrual cycle influences women to engage in clinical breast exam for cancer in Ghana;
2. Ascertain whether ethnicity predicts women's engagement in clinical breast exam for cancer in Ghana; and
3. Assess if region of residence trigger women to engage in clinical breast exam for cancer in Ghana.

The study further hypothesised that there is no statistically significant relationship between menstrual cycle, ethnicity as well as region of residence and women's engagement in clinical breast exam for cancer in Ghana.

METHODS

Data Source and Sampling Procedure

Data for the study were extracted from the 2022 Ghana Demographic and Health Survey (2022GDHS). This survey was implemented by the Ghana Statistical Service (GSS). For the 2022 GDHS program to achieve its objectives, a national stratified representative sample of 18,450 households was selected in 618 clusters, which resulted in 15,014 interviewed women age 15–49 and 7,044 interviewed men age 15–59 (in one of every two households selected). The survey made used of an updated frame prepared by GSS based on the 2021 Population and Housing Census. Further, the survey adopted a stratified two-stage cluster sampling procedure which was carefully designed to yield representative results at the national level, for urban and rural areas, and for each of the 16 regions, for most DHS indicators.

In stage 1, a probability proportional to size was employed to select 618 target clusters from the sampling frame for urban and rural areas in each region. Then, the targeted number of clusters were also chosen with equal probability, systematic random sampling of the clusters selected in the first phase, for the urban and rural areas in each region.

In stage 2, the survey carried out a household listing and map updating operation in all the selected clusters after successful selection of the clusters just to develop a list of all the households in the cluster. This list served as a sampling frame for selection of the household sample. Tablet computers were used for the household listing with software provided by The DHS Program. A fixed number of 30 households in each cluster was randomly selected from the list for interview.

Variables and Measurement

Independent Variables

In this study, the independent variables (IVs) are menstrual cycle, ethnicity and region of residence. The IVs were carefully chosen because some studies have asserted that understanding the interplay of these variables (menstrual cycle phase, ethnicity, and region of residence) in clinical breast examinations among women is essential for developing more accurate, culturally sensitive, and accessible breast cancer screening strategies thereby ensuring earlier detection and more equitable outcomes for all women [24,34]. So, in order not to ignore their intersectional impact on CBE uptake among women, an attempt was made to ascertain how these factors interact to shape how effectively women receive CBEs.

Dependent Variable

The dependent variable (DV) is engagement in clinical breasts exam for cancer. This DV was based on self-reported information but not on health records. Hence, the 2022 GDHS survey relied on self-reported information regarding breast examinations by a healthcare provider, not on health records [35]. The questionnaires used in the survey asked women about their breast examination history, including whether they had been examined by a healthcare provider. This self-reported information was then used to analyse the prevalence of CBE uptake among women of reproductive age in Ghana [35]. These variables were the indicators themselves.

Questionnaire and Data Collection Procedure

Four questionnaires were used for the 2022 GDHS: The Household Questionnaire, the Woman's Questionnaire, the Man's Questionnaire, and the Biomarker Questionnaire. The questionnaires, based on The DHS Program's Model Questionnaires, were adapted to reflect the population and health issues relevant to Ghana. In addition, a self-administered Fieldworker Questionnaire collected information about the survey's fieldworkers. Data collection commenced on 17th of October, 2022 and ended on 14th January, 2023. In all, the survey used three (3) months to collect the data from the field. Technical assistance for the survey was also provided by ICF.

Analytical Tool

Data extracted from the 2022 GDHS were processed with

SPSS version 27 and analysed with frequency distribution, Pearson's chi-squared test of independence and binary logistic regression. The frequency distribution was used to summarise respondents' responses into proportions, the Pearson's chi-squared test of independence was used to test the hypotheses postulated in the study either to accept or reject the null hypotheses. However, the binary logistic regression was used to examine the influences the IVs exert on the DV.

Ethical Consideration

Ethical approval to conduct the survey was obtained from both the Ethical Review Committee (ERC) of the Ghana Health Service and the ICF Institutional Review Board (IRB). The ethical clearance obtained from these two bodies assure that the survey procedures were in accordance with Ghana's ethical research standards as well as in accordance with US and international ethical research standards.

RESULTS

To identify women who had examined breasts for cancer by health care provider instigated us to extract data on a single item used by the 2022GDHS to ascertain those who had and who had not. The results revealed that 83.5% of women had not engaged in clinical breasts exam for cancer while only 16.5% had.

To analyse menstrual cycle of women in Ghana, we extracted data revolving menstruated in the last six weeks, knowledge of ovulatory cycle, and age at first menstrual period for analysis. The results are presented in Table 1.

Table 1. Menstrual Cycle of Women in Ghana

Variable	Frequency	Percentage
Menstruated in last six weeks		
No	1118	38.6
Yes	1776	61.4
Knowledge of ovulatory cycle		
During her period	87	3.0
After period ended	1002	34.6
Middle of the cycle	1279	44.2
Before period begins	268	9.3
At any time	146	5.0
Other	2	0.1
Don't know	110	3.8
Age at first menstrual period		
8	2	0.1
9	6	0.2
10	17	0.6
11	40	1.4
12	162	5.6
13	315	10.9
14	532	18.4
15	826	28.5
16	433	15.0
17	209	7.2
18	219	7.6
19	49	1.7
20	23	0.8
21	3	0.1
22	2	0.1
23	2	0.1
26	1	0.0
27	1	0.0
30	1	0.0
39	1	0.0
49	1	0.0
Never menstruated	3	0.1
Don't know	46	1.6
Total	**2894**	**100.0**

Source: GDHS (2022).

When asked whether women menstruated in the last six weeks or not, the results revealed that 61% of women menstruated in the last six weeks while 39% did not menstruate in the last six weeks (see Table 1). Concerning knowledge of ovulatory cycle, 44% of women reported middle of the cycle while 0.0% intimated other (see Table 1). Whereas 28.5% of women experienced their first menstrual period at age 15, 0.0% experienced their first menstrual period either at age 26, 27, 30,39 or 49 (see Table 1).

Table 2 has Pearson's chi-squared test of independence on menstrual cycle and women's engagement in clinical breasts exam for cancer in Ghana. This analysis was conducted to test the hypothesis there is no statistically significant relationship between menstrual cycle and women's engagement in clinical breasts exam for cancer among women in Ghana. Statistically significant relationship was found in all the variables studied under menstrual cycle. Namely: menstruated in the last six weeks [χ2=3.159, p=0.076], knowledge of ovulatory cycle [χ2=19.785, p<0.001] as well as age at first menstrual period [χ2=38.688, p=0.015] and women's engagement in clinical breasts exam for cancer in Ghana.

Table 2. Relationship between Menstrual Cycle and Women's Engagement in Clinical Breasts Exam for Cancer in Ghana

Variable	No (%)	Yes (%)	Total n (%)	χ^2	P-value
Menstruated in the last six weeks				3.159	0.076
No	85.1	14.9	1118(100.0)		
Yes	82.5	17.5	1776(100.0)		
Knowledge of ovulatory cycle				19.785	<0.001
During her period	84.8	15.2	112(100.0)		
After period ended	84.9	15.1	1355(100.0)		
Middle of the cycle	78.3	21.7	700(100.0)		
Before period begins	85.1	14.9	342(100.0)		
At any time	87.7	12.3	244(100.0)		
Don't know	83.7	16.3	141(100.0)		
Age at first menstrual period				38.688	0.015
8	50.0	50.0	2(100.0)		
9	83.3	16.7	6(100.0)		
10	94.1	5.9	17(100.0)		
11	90.0	10.0	40(100.0)		
12	78.4	21.6	162(100.0)		
13	82.5	17.5	315(100.0)		
14	84.0	16.0	532(100.0)		
15	84.6	15.4	826(100.0)		
16	83.8	16.2	433(100.0)		
17	77.5	22.5	209(100.0)		
18	86.8	13.2	219(100.0)		
19	75.5	24.5	49(100.0)		
20	82.6	17.4	23(100.0)		
21	66.7	33.3	3(100.0)		
22	100.0	0.0	2(100.0)		
23	50.0	50.0	2(100.0)		
26	0.0	100.0	1(100.0)		
27	100.0	0.0	1(100.0)		
30	100.0	0.0	1(100.0)		
39	100.0	0.0	1(100.0)		
49	0.0	100.0	1(100.0)		
Never menstruated	66.7	33.3	3(100.0)		
Don't know	97.8	2.2	46(100.0)		

Note: Row percentages in parenthesis, Chi-square significant at (0.001), (0.05), (0.10)

No: had not examined Yes: examined

Source: GDHS (2022).

Further analysis was conducted with binary logistic regression on the three variables studied under menstrual cycle which included (menstruated in the last six weeks, knowledge of ovulatory cycle, and age at first menstrual period) just to unravel how each of them influences women's engagement in clinical breasts exam for cancer in Ghana. The results are presented in Table 3.

Table 3. Binary Logistic Regression Results on Menstrual Cycle and Women's Engagement in Clinical Breasts Exam for Cancer in Ghana

Variable	Sig.	Exp(B)	95CI	
Knowledge of ovulatory cycle (During her period =1.0)				
After period ended	0.307	1.452	0.710	2.967
Middle of the cycle	0.038	2.110	1.041	4.276
Before period begins	0.067	2.030	0.951	4.335
At any time	0.849	1.089	0.453	2.619
Don't know	0.141	8.911	0.483	164.401
After period ended	0.690	1.206	0.480	3.033
Age at first menstrual period (8=1.0)				
9	0.297	0.154	0.005	5.173
10	0.105	0.058	0.002	1.818
11	0.113	0.091	0.005	1.766
12	0.309	0.233	0.014	3.843
13	0.223	0.176	0.011	2.872
14	0.190	0.155	0.010	2.513
15	0.185	0.152	0.009	2.461
16	0.195	0.159	0.010	2.575
17	0.320	0.242	0.015	3.962
18	0.145	0.125	0.008	2.056
19	0.384	0.282	0.016	4.876
20	0.253	0.174	0.009	3.485
21	0.613	0.388	0.010	15.295
22	0.999	0.000	0.000	0.000
23	0.859	0.701	0.014	35.625
26	1.000	1154978222.572	00.000	0.000
27	1.000	0.000	0.000	0.000
30	1.000	0.000	0.000	0.000
39	1.000	0.000	0.000	0.000
49	1.000	1154978222.572	0.000	0.000
Never menstruated	0.613	0.388	0.010	15.295
Don't know	0.029	0.022	0.001	0.676
Constant	**0.799**	**0.689**		

Source: GDHS (2022). Significant at 0.05.

After processing the data, only two variables (knowledge of ovulatory period, and age at first menstrual period) were significant. The variable which was not significant was removed from the model (see Table 3). Overall, the logistic regression model was significant at -2LogL = 2531.248; Nagelkerke R2 of 0.034; χ2= 59.362; p<0.001 with correct prediction rate of 83.7%. Significantly, the Model Summary which shows a Nagelkerke R2 of 0.034 suggests that the model explains 3.4% of variance in the likelihood of women's engagement in clinical breasts exam for cancer in Ghana. With this percentage contribution to the entire model, the results confirmed the whole model significantly predict women's engagement in clinical breasts exam for cancer in Ghana.

Table 3 revealed that middle of their menstrual cycle was statistically significant to clinical breasts exam for cancer at p=0.038, (OR=2.110, 95%CI ([1.041-4.276]). This factor labels those women to have 2.1times more likely to engage in clinical breasts exam for cancer compared with their counterparts that reported during their period (see Table 3).

Further, women who do not know the exact age at which they experienced their first menstrual period was statistically significant to women's engagement in clinical breasts exam for cancer at p=0.029, (OR=0.022, 95%CI ([0.001-0.676]). This variable tag those women to have 0.02times less likely to engage in clinical breasts exam for cancer compared with their counterparts that intimated at the age of eight (8) years (see Table 3). However, the rest of the variables were not significant which could be as a result of chance.

To find answers for research objective two which is "ascertain if ethnicity influences women's engagement in clinical breasts exam for cancer in Ghana" prompted us to extract data on ethnicity for analysis. However, when asked about the ethnicity of women in Ghana, the results revealed that 30.9% were Mole-Dagbani while 0.9% belong to other ethnic groups (see Table 4).

Table 4. Ethnicity among Women in Ghana

Variable	Frequency	Percentage
Ethnicity		
Akan	764	26.4
Ga/Dangme	124	4.3
Ewe	282	9.7
Guan	141	4.9
Mole-Dagbani	895	30.9
Grusi	160	5.5
Gurma	374	12.9
Mande	129	4.5
Other	25	0.9
Total	**2894**	**100.0**

Source: GDHS (2022).

Further analysis was conducted with Pearson's chi-squared test of independence on ethnicity and women's engagement in clinical breasts exam for cancer in Ghana. This analysis was conducted to test the hypothesis there is no statistically significant relationship between ethnicity and women's engagement in clinical breasts exam for cancer in Ghana. Statistically significant relationship was found between ethnicity [$\chi 2=65.271$, $p<0.001$] and women's engagement in clinical breasts exam for cancer in Ghana (See Table 5).

Table 5. Relationship between Ethnicity and Women's Engagement in Clinical Breasts Exam for Cancer in Ghana

Variable	No (%)	Yes (%)	Total n (%)	χ^2	P-value
Ethnicity				65.271	<0.001
Akan	75.3	24.7	764(100.0)		
Ga/Dangme	80.6	19.4	124(100.0)		
Ewe	80.9	19.1	282(100.0)		
Guan	86.5	13.5	141(100.0)		
Mole-Dagbani	87.0	13.0	895(100.0)		
Grusi	88.8	11.3	160(100.0)		
Gurma	89.8	10.2	374(100.0)		
Mande	88.4	11.6	129(100.0)		
Other	84.0	16.0	25(100.0)		

Note: Row percentages in parenthesis, Chi-square significant at (0.001), (0.05), (0.10)

No: had not examined

Yes: examined

Source: GDHS (2022).

Table 6 has binary logistic regression results on ethnicity and women's engagement in clinical breasts exam for cancer in Ghana. This analysis was conducted to ascertain the effect of ethnicity on women's engagement in clinical breasts exam for cancer in Ghana.

Table 6. Binary Logistic Regression Results on Ethnicity and Women's Engagement in Clinical Breasts Exam for Cancer in Ghana

Variable	Sig.	Exp(B)	95CI	
Ethnicity (Akan=1.0)				
Ga/Dangme	0.194	0.730	0.454	1.174
Ewe	0.058	0.721	0.513	1.011
Guan	0.004	0.474	0.284	0.789
Mole-Dagbani	0.000	0.453	0.351	0.585
Grusi	0.000	0.386	0.230	0.647
Gurma	0.000	0.344	0.237	0.500
Mande	0.001	0.400	0.228	0.703
Other	0.323	0.579	0.196	1.709
Constant	**0.000**	**0.329**		

Source: GDHS (2022). Significant at 0.05.

After processing the data, the logistic regression model was significant at -2LogL = 2526.955; Nagelkerke R2 of 0.037; χ2= 63.655; p<0.001 with correct prediction rate of 83.5%. Significantly, the Model Summary which shows a Nagelkerke R2 of 0.037 suggests that the model explains 3.7% of variance in the likelihood of women's engagement in clinical breasts exam for cancer in Ghana. With this percentage contribution to the entire model, the results confirmed the whole model significantly predict women's engagement in clinical breasts exam for cancer in Ghana.

It emerged in Table 6 that Guan was statistically significant to women's engagement in clinical breasts exam for cancer at p=0.004, (OR=0.474, 95%CI ([0.284-0.789]). This variable tag those women to have 0.5times less likely to engage in clinical breasts exam for cancer compared with their Akan counterparts (see Table 6). Further, belonging to Mole-Dagbani was statistically significant to women's engagement in clinical breasts exam for cancer at p<0.001, (OR=0.453, 95%CI ([0.351-0.585]). This factor identifies those women to have 0.5times less likely to engage in clinical breasts exam for cancer compared with their Akan counterparts (see Table 6). Furthermore, Grusi was statistically significant at p<0.001, (OR=0.386, 95%CI ([0.230-0.647]). This variable discloses that those women have 0.4times less likely to engage in clinical breasts exam for cancer compared with their Akan counterparts (see Table 6).

Additionally, belonging to Gurma was statistically significant at p<0.001, (OR=0.344, 95%CI ([0.237-0.500]). This indicator recognizes those women to have 0.3times less likely to examine breasts for cancer compared with their Akan counterparts (see Table 6). Then, belonging to Mande was statistically significant at p<0.001, (OR=0.400, 95%CI ([0.228-0.703]). This indicator recognizes those women to have 0.4times less likely to engage in clinical breasts exam for cancer compared with their Akan counterparts (see Table 6). However, the rest of the ethnic groups were not significant indicating that women's quest to examine breast for cancer is not dependent on them.

To unravel region of residence of women in Ghana, we were compelled to extract data on region of residence from the 2022GDHS for analysis. Since we were interested in the proportion, we analysed these data with frequency distribution. When asked about the region of residence of women in Ghana, the results revealed that 11.8% reside in the north while 3.6% live in the Bono Region (see Table 7).

Table 7. Region of Residence of Women in Ghana

Variable	Frequency	Percentage
Western	154	5.3
Central	128	4.4
Greater Accra	189	6.5
Volta	130	4.5
Eastern	124	4.3
Ashanti	161	5.6
Western North	123	4.3
Ahafo	177	6.1
Bono	103	3.6
Bono East	196	6.8
Oti	184	6.4
Northern	341	11.8
Savannah	259	8.9
North East	222	7.7
Upper East	201	6.9
Upper West	202	7.0
Total	**2894**	**100.0**

Source: GDHS (2022).

In Table 8 has Pearson's chi-squared test of independence results on region of residence and women's engagement in clinical breasts exam for cancer in Ghana. This analysis was conducted to test the hypothesis there is no statistically significant relationship between region of residence and women's engagement in clinical breasts exam for cancer in Ghana. Statistically significant relationship was found between region of residence [χ2=92.700, P<0.001] and women's engagement in clinical breasts exam for cancer in Ghana.

Table 8. Relationship Between Region of Residence and Women's Engagement in Clinical Breasts Exam for Cancer in Ghana

Variable	No (%)	Yes (%)	Total n (%)	χ^2	P-value
Region of residence				92.700	<0.001
Western	73.4	26.6	154(100.0)		
Central	79.7	20.3	128(100.0)		
Greater Accra	71.4	28.6	189(100.0)		
Volta	80.8	19.2	130(100.0)		
Eastern	71.8	28.2	124(100.0)		
Ashanti	87.6	12.4	161(100.0)		
Western North	87.8	12.2	123(100.0)		
Ahafo	80.2	19.8	177(100.0)		
Bono	80.6	19.4	103(100.0)		
Bono East	87.8	12.2	196(100.0)		
Oti	88.6	11.4	184(100.0)		
Northern	89.1	10.9	341(100.0)		
Savannah	93.8	6.2	259(100.0)		
North East	78.8	21.2	222(100.0)		
Upper East	81.6	18.4	201(100.0)		
Upper West	88.1	11.9	202(100.0)		

Note: Row percentages in parenthesis, Chi-square significant at (0.001), (0.05), (0.10)

No: had not examined

Yes: examined

Source: GDHS (2022).

Further analysis was conducted with binary logistic regression to determine the influence of region of residence on women's engagement in clinical breasts exam for cancer in Ghana. The results are presented in Table 9.

Table 9. Binary Logistic Regression Results on Region of Residence and Women's Engagement in Clinical Breasts Exam for Cancer in Ghana

Variable	Sig.	Exp(B)	95CI	
Region of residence (Western=1.0)				
Central	0.216	0.703	0.401	1.229
Greater Accra	0.688	1.102	0.684	1.776
Volta	0.143	0.656	0.373	1.153
Eastern	0.766	1.084	0.638	1.841
Ashanti	0.002	0.391	0.217	0.705
Western North	0.004	0.383	0.200	0.731
Ahafo	0.141	0.679	0.406	1.136
Bono	0.185	0.664	0.363	1.216
Bono East	0.001	0.385	0.220	0.671
Oti	0.000	0.355	0.199	0.633
Northern	0.000	0.335	0.205	0.550
Savannah	0.000	0.181	0.098	0.337
North East	0.220	0.740	0.458	1.197
Upper East	0.065	0.622	0.375	1.030
Upper West	0.000	0.372	0.213	0.648
Constant	**0.000**	**0.363**		

Source: GDHS (2022). Significant at 0.05.

After processing the data, the logistic regression model was significant at -2LogL = 2497.276; Nagelkerke R2 of 0.054; χ2= 93.334; p<0.001 with correct prediction rate of 83.5%. Significantly, the Model Summary which shows a Nagelkerke R2 of 0.054 suggests that the model explains 5.4% of variance in the likelihood of women's engagement in clinical breasts exam for cancer in Ghana. With this percentage contribution to the entire model, the results confirmed the whole model significantly predict women's engagement in clinical breasts exam for cancer in Ghana.

Table 9 revealed that Ashanti was statistically significant to women's engagement in clinical breasts exam for cancer at p=0.002, (OR=0.391, 95%CI ([0.217-0.705]). This factor tags those women to have 0.4times less likely to engage in clinical breasts exam for cancer compared with their counterparts' resident in the Western Region (see Table 9). Further, Western North was statistically significant to women's engagement in clinical breasts exam for cancer at p=0.004, (OR=0.383, 95%CI ([0.200-0.731]). This indicator classifies those women to have 0.4times less likely to to engage in clinical breasts exam for cancer compared with their counterparts' resident in the Western Region (see Table 9).

Furthermore, Bono East was statistically significant at p<0.001, (OR=0.385, 95%CI ([0.220-0.671]). This item reveals those women to have 0.4times less likely to engage in clinical breasts exam for cancer compared with their counterparts' resident in the Western Region (see Table 9). Additionally, Oti was statistically significant at p<0.001, (OR=0.355, 95%CI ([0.199-0.633]). This variable recognizes those women to have 0.4times less likely to engage in clinical breasts exam for cancer compared with their counterparts' resident in the Western Region (see Table 9). Then, Northern was statistically significant at p<0.001, (OR=0.335, 95%CI ([0.205-0.550]). This indicator identifies those women to have 0.3times less likely to engage in clinical breasts exam for cancer compared with their counterparts' resident in the Western Region (see Table 9).

Also, Savannah was statistically significant at p<0.001, (OR=0.181, 95%CI ([0.098-0.337]). This item identifies those women to have 0.2times less likely to engage in clinical breasts exam for cancer compared with their counterparts' resident in the Western Region (see Table 9). Similarly, Upper West was statistically significant at p<0.001, (OR=0.372, 95%CI ([0.213-0.648]). This indicator categorizes those women to

have 0.4times less likely to engage in clinical breasts exam for cancer compared with their counterparts' resident in the Western Region (see Table 9). However, the rest of the regions were not significant indicating that women's quest to examine breast for cancer is not dependent on them.

DISCUSSION

The study aimed to unfold the influences of menstrual cycle, ethnicity and region of residence on women's engagement in clinical breast exam for cancer in Ghana. The analysis of the data brought to light that 61% of the women menstruate in the last six weeks while 39% did not. For adolescent girls in particular, menstruation signifies an important transition to womanhood [36-40]. Hence, it serves as a time that they benefit from the support of family and friends. To them the first period can be met with either celebration, fear or concern. This finding corroborated with a submission by UNICEF [41] that most women menstruate each month for about two to seven days. However, women who did not experience menstruation during the last six weeks prior to the study may have experienced this due to factors ranging from hormonal imbalances, pregnancy, breastfeeding, certain medical conditions, and lifestyle choices like birth control [42,43]. This outcome is in line with previous research finding that secondary amenorrhea is the absence of menses for greater than 3 cycle intervals or 6 consecutive months in a previously menstruating female [44-48].

The study found varied knowledge of ovulatory cycle among women in Ghana ranging from middle of the cycle 44.2%, after period has ended 34.6%, before period begins 9.3%, at any time 5.0%, don't know 3.8%, during the period 3.0%, and other 0.1%. This finding indicates that when a woman knows her ovulatory cycle, it might empower her to make thoughtful decisions about her reproductive health which might include family planning thereby reducing unintended pregnancies and unsafe abortions particularly for those using natural family planning methods. Further, a woman who has adequate knowledge about her ovulatory cycle is better able to identify any abnormalities which might include body's signals related to fertility and to identify potential medical issues that require medical attention for redress [49-52]. This finding is in line with previous studies which found that ovulation does not always occur on the same day every month and can vary by a day or more on either side of the expected date [53]. The reason for the similarity in the findings could be attributed to similar phenomena studied and rigorous analysis conducted.

The study found varied ages at which women first experienced their menstrual period. Women's age at their first menarche (blood flow) is a significant indicator of overall health and reproductive health, and it can be connected to various health consequences. Changes in the age of menarche, particularly earlier onset, have been related to a higher risk of certain cancers, cardiovascular disease, and other health complications [54,55]. This finding is in line with a previous study which found that a majority of women (66.2%) attained menarche between the ages of 13–14 years [56].

The study found that relationship exists between menstrual cycle and women's engagement in clinical breast exam for cancer. Therefore, the null hypothesis was refused. The relationship found indicates that menstrual cycle of women significantly predicts clinical breast exam for cancer among women in Ghana. This finding agrees with a previous study which found that women irregular menstrual cycle had 1.29 time (95% CI: 1.08–3.53) increases the screening of breast cancer [57]. The agreement in the findings could be attributed to standardised methodologies and statistical analytical tools applied for the analysis.

The study found that women who ovulate in the middle of their cycle had higher odds of engaging in clinical breast exam for cancer. This implies a link between ovulation and breast cancer screening behaviour. The plausible reason for this finding could be that these women might be at high risk for breast cancer and that might not want it to have a debilitating effect on their life. This outcome agrees with previous studies which found that the accuracy of mammography among premenopausal women might improve with screening at a point in their menstrual cycle when breast density is lower [58-59].

The study found that women who do not know the exact age at which they experienced their first menstrual period had lower likelihood of engaging in clinical breast exam for cancer. This implies a woman knowing her exact age at first menstruation might be a precursor for her deciding to engage in a clinical breast exam, potentially impacting breast cancer screening. The plausible explanation to this finding could be that these women might not be at risk for cancer. Further, a woman who cannot recall the age at her first menarche might not see the need to use the clinical

breast exam for cancer [60]. Hence, she might not need the information for anything. This outcome is in line with a study which found that women who had their first menstruation before attaining 15 years were significantly less likely to utilize CBE services [60].

The study found Mole-Dagbani as the dominant ethnic group. Knowing women's ethnic group could help to ascertain if there exist a disparity in clinical breast exam for cancer among them. Hence, factors such as socioeconomic status, education levels, and access to healthcare services can influence women's engagement in clinical breast exam for cancer across different ethnic populations. For it is assumed that in Ghana, factors such as age, education, and access to healthcare facilities have been associated to clinical breast exam for cancer [24,29,60,61].

The study found that relationship exists between ethnicity and women's engagement in clinical breast exam for cancer in Ghana. Therefore, the null hypothesis was not confirmed. A p-value of <0.001 found indicates a strong relationship. This outcome corroborated with previous study that multiple logistic regressions demonstrate that race continues to be a factor influencing mammography use [62].

The study found that the kind of ethnic group women belong be it Guan, Mole-Dagbani, Grusi, Gurma, and Mande did not translate to higher likelihood of engaging in clinical breast exam for cancer. This finding implies that an ethnic group is not a simulant for clinical breast exam for cancer among women in Ghana. This finding is in line with previous study which found that minorities exhibited less screening-based detection, lower socioeconomic status (all 4 indicators), less healthcare access (insurance, type of primary care), and were less likely to have obtained a clinical breast exam within one year of their breast cancer diagnosis [32].

The study found that a significant proportion of the women live in the north. Knowing the region of residence of women and its associated demographics and the use of clinical breast exam to detect cancer could help in our understanding of breast cancer prevalence, access to care, and potential disparities [24,63]. With this information at hand, it would aid in tailoring clinical breast exam for cancer programs and also call for specific interventions to populations and areas that might be in urgent need.

The study found that relationship exists between region of residence and women's engagement in clinical breasts exam for cancer in Ghana. Therefore, the null hypothesis was rejected. A p-value of <0.001 found indicates strong relationship. This signifies that women's engagement in clinical breasts exam for cancer is strongly predicted by region of residence. This finding is in line with previous study which found that residential area and ethnicity demonstrate a pattern indicating association with participation in breast cancer screening [64].

The study found that the regions in which women are residents did not increase their likelihood of engagement in clinical breasts exam for cancer. This implies that geographical location itself might not be a primary predictor of this behaviour and that other factors are likely more important. Therefore, interventions or policies focused solely on addressing regional disparities might not be the most effective way to improve breast cancer screening rates. But other factors such as socioeconomic status, access to healthcare, cultural beliefs, and knowledge about breast cancer may play a more significant role [65-67]. The plausible explanation to this finding could be partly due to several factors such as sociocultural barriers, lack of awareness, and financial or accessibility issues. Further, the reasons could be fear, embarrassment, or cultural beliefs that are related to cancer as well as mistrust of healthcare services, and lack of knowledge about breast cancer and its screening methods [68]. Additionally, geographic barriers, affordability of services, and lack of accessible transportation to healthcare facilities can also hinder participation [68]. This outcome corroborated with a previous study which found that the area of residence did not impact knowledge or practices of early breast cancer detection methods [69].

CONCLUSION

The study found low clinical breast exam for cancer uptake among women. Therefore, to efficiently inspire women in Ghana to join in CBE, the current study recommends healthcare providers to use mobile phone, television and radio messaging to educate women on the eminence benefits of CBE to ensure an increase uptake of CBE in Ghana. Further, the study recommends that Ghana Health Service should endeavour to ensure easy access to CBE services.

LIMITATIONS OF THE STUDY

Effort was made to limit the errors and biases in the study.

However, the secondary data used (the 2022 GDHS data) made it impossible. Hence, The DHS was a sample, not a census therefore, the probability it might not represent the entire country is high. Again, The DHS Program employed a cross-sectional design which has its associated weaknesses, and that same weaknesses are likely to be introduced into the current study. Therefore, the results should be interpreted with caution.

DECLARATION

ABBREVIATIONS

DHS: Demographic and Health Survey; DV: Dependent Variable; ERC: Ethical Review Committee; GDHS: Ghana Demographic and Health Survey; GSS: Ghana Statistical Service; HDI: Human Development Index; IRB: Institutional Review Board; ICF: International Coaching Federation; IVs: Independent Variables; SPSS: Statistical Package for the Social Sciences.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The GDHS Program obtained ethical approval from both The Ghana Health Service's Ethics Review Committee (ERC) and The ICF The Institutional Review Board (IRB) for ethical review. This dual approval process assure that the survey adheres to ethical guidelines and protects the rights of participants.

CONSENT FOR PUBLICATION

Not Applicable

AVAILABILITY OF DATA AND MATERIALS

The study made used of the 2022 Ghana Demographic and Health Survey data. Therefore, it is publicly available online at https://dhsprogram.com/data. This is Measure DHS Initiative or Program.

COMPETING INTERESTS

Author did not register any conflict of interest.

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AUTHOR'S CONTRIBUTIONS

Anthony Edward Boakye is the sole author of the Manuscript.

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