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Age at first menstruation and clinical breast cancer screening utilization: insights from the 2021 Côte d'Ivoire demographic and health survey

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Abstract

Background There is a strong evidence showing that women who start menstruation early are at a greater risk of developing breast cancer. Recognizing that women will seek breast cancer screening when they have a high perceived risk, we hypothesized that women who experienced early menarche will be more likely to utilize clinical breast examination (CBE). Hence, we aimed to investigate the association between age at first menstruation and women's utilization of CBE in Côte d'Ivoire.

Methods We used data from the 2021 Côte d'Ivoire demographic and health survey. A sample of 14,685 women was used for the analysis. A descriptive analysis, as well as bivariate and multivariate logistic regression models were computed in STATA version 18. Adjusted odds ratio (AOR) and a 95% confidence interval was used to present the result.

Results CBE utilization was 17.4%. Women who had their first menstruation before attaining 15 years were significantly less likely to utilize CBE services [AOR = 0.89; 95% CI 0.81–0.99]. A significantly higher utilization of CBE was found among those with primary [AOR = 1.48, 95% CI 1.29–1.70], secondary [AOR = 2.96, 95% CI 2.59–3.38], and higher education [AOR = 4.35, 95% CI 3.50–5.40] compared to those with no formal education. Increasing likelihood of CBE utilization was observed as age increased. Rural residence was associated with lower odds of CBE utilization (AOR = 0.84, 95% CI 0.74–0.95]. Increasing wealth status was associated with higher odds of CBE utilization with those in the richest households having the highest odds compared to women in the poorest household [AOR = 2.11, 95% CI 1.69–2.64].

Conclusion Utilization of CBE is low among women of reproductive age in Côte d'Ivoire. We conclude that even though existing literature has established early age at first menstruation as a strong risk factor for breast cancer, CBE utilization is significantly low among those who had early menarche. Going forward, it is necessary for Côte d'Ivoire's health Ministry to intensify breast cancer awareness in the country. Such awareness campaigns must emphasize age at menarche as a risk factor so as to motivate women with a history of early menstruation to utilize CBE.

Keywords Cancer, Breast cancer, Screening, Menstruation, Public health, Reproductive health

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Background

Female breast cancer is a public health concern worldwide. In 2020, more than 2.3 million new cases and 685,000 deaths attributable to breast cancer were reported worldwide [1]. It is estimated that the incidence of breast cancer will increase exponentially by 46% by the end of 2040 [2]. Available evidence indicates that breast cancer mortality rates are notably elevated in Sub-Saharan Africa (SSA), where the five-year survival rate stands at less than 40% compared to 86% in the United States of America [3–5]. This situation makes it imperative to work toward breast cancer prevention and early detection in SSA countries including Côte d'Ivoire.

In Côte d'Ivoire, breast cancer is the most frequently diagnosed cancer among women with an incidence rate of 44.7 per 100,000 women [6]. It is further reported that most cases of breast cancer (74%) in the country are reported in the late stages of the disease (stage III and IV), hence, resulting in a mortality rate (attributable to breast cancer) of 25.3 per 100,000 women in 2020 [6]. Recognizing how devastating breast cancer can be on the quality of life of the person living with the disease and their family [7–9], the World Health Organization (WHO) has called for the implementation of secondary preventive measures such as breast cancer screening to help detect the disease early and improve survivorship [10].

Breast cancer screening encompasses two primary approaches: clinical breast examination (CBE) and breast self-examination (BSE) [11]. Although BSE is simple and attracts no costs, the gold standard in breast cancer screening, particularly in low-and-middle-income countries, is to have the breast examined by a healthcare professional (i.e., CBE) [12]. Yet, studies from different parts of SSA suggest a low utilization of CBE. For instance, the CBE utilization prevalence stands at 9.7% in Lesotho [13], 10.1% in Ghana [14], and 16.3% in SSA [15]. The existing literature within the SSA region has attributed the low CBE utilization to several factors including far distance to healthcare facilities, no health insurance coverage, zero parity, no to low exposure to media, and being in a lower wealth index [13–15]. A missing piece of the existing literature is the role of reproductive factors such as the age at first menstruation in predicting women's utilization of CBE.

There is strong evidence showing that women who start menstruation early are at a greater risk of developing breast cancer. For example, Zuraidah et al. [16] report that "age of first menstruation < 12 years have a 10–25% greater risk of developing breast cancer". In a case–control study conducted in Morocco [17], it was found that early menarche (i.e., < 13 years) was associated with 1.6 times higher risk of breast cancer. This high risk association between early menarche and breast cancer risk can be clinically explained from the perspective of a longer lifetime exposure to estrogen and progesterone, and other steroid hormones that stimulate breast cell proliferation; thus, increasing the likelihood of DNA mutations that can lead to cancer. Recognizing the Champion health belief model that women will seek breast cancer screening when they have a high perceived risk, we hypothesized that women who experienced early menarche will be more likely to utilize CBE. Hence, we aimed to investigate the association between age at first menstruation and women's utilization of CBE in Côte d'Ivoire. To the best of our knowledge, this dimension of CBE utilization is absent in the current scholarship, and thus, indicates an important knowledge gap that must be filled.

Methods

Data source and design

We used data from the 2021 Côte d'Ivoire demographic and health survey (DHS). The survey is a component of the global DHS series and aims to provide nationally representative data from developing countries, focusing on women between the ages of 15 and 49 years [18]. In order to guarantee nationwide representativeness, the DHS implemented a two-stage sampling design, and corresponding sampling weights were calculated [18, 19]. A random selection of households was made, and within each selected household, all individuals aged 15 to 49 years were invited to take part [19]. Those who agreed were then interviewed through a face-to-face questionnaire administration.

Measures

Dependent variable

The dependent variable was CBE utilization which was generated from the question, "Have you ever had your breasts examined for cancer by health care provider?". The responses to this question was no, yes, and don't know. However, we dropped "don't know" to have a binary response of "0 = No" and "1 = Yes".

Independent variable

Age at first menstruation was our main independent variable for the study. This was derived from a self-reported recall of the "age at first menstrual period". The raw ages were recoded as "Before 15 years" and "At 15 years and above".

Covariates

We identified and adjusted for eight covariates based on evidence from previous literature on CBE utilization [13–15, 20] in order to effectively evaluate the association

between age at menarche and the outcome. This included age, educational level, place of residence, frequency of exposure to the media (newspaper, radio, and television), wealth index, and distance to the healthcare facility (See Table 1).

Statistical analyses

The total sample from the data was 14,877. However, after dropping the responses 'don't know' and 'never menstruated' from the dependent and independent variables, the remaining sample for analysis was 14,685. Using the STATA command 'gen wt = v005/1000000', the sample was weighted. We then performed a cross-tabulation to see the distribution of all variables of the sample. Pearson's chi-square (X^2) test was then computed to check whether the proportional distribution differed significantly. A bivariable logistic regression model was fitted to examine the association between age at first menstruation and CBE utilization. Results from the bivariable were presented in odds ratio and 95% confidence interval. This was followed by a multivariable logistic regression analysis to adjust for the effects of the covariates. Results from the multivariable were presented in adjusted odds ratio and 95% confidence interval. All the analyses were computed in STATA version 18 (StataCorp, College Station, TX, USA).

Table 1 Coding of covariates

Variable name	Code
Age	1 = 15–19 years
	2 = 20–24 years
	3 = 25–29 years
	4 = 30–34 years
	5 = 35–39 years
	6 = 40–44 years
	7 = 45–49 years
Place of residence	0 = Urban
	1 = Rural
Educational level	0 = No education
	1 = Primary
	2 = Secondary
	3 = Higher
Frequency of reading newspaper/magazine	0 = Not at all
	1 = Less than once a week
	2 = At least once a week
Frequency of listening to the radio	0 = Not at all
	1 = Less than once a week
	2 = At least once a week
Frequency of watching television	0 = Not at all
	1 = Less than once a week
	2 = At least once a week
Wealth index	0 = Poorest
	1 = Poorer
	2 = Middle
	3 = Richer
	4 = Richest
Distance to health facility	0 = Big problem
	1 = Not a big problem

Results

Prevalence and distribution of clinical breast cancer screening across the variables

Table 2 shows the prevalence and distribution of clinical breast cancer screening across the variables. Out of the 14,685 women who participated in the study, only 2837 (translating to 17.4%) had ever undergone breast examination from a healthcare professional. The proportion of CBE utilization was similar for women who had their menarche before 15 years (17.5%) or at age 15 and above (17.4%). A higher proportion of CBE utilization was found among women residing in urban areas (22.4%), those with higher educational attainment (48.8%), those who read the newspaper at least once a week (38.3%), listened to the radio at least once a week (23.3%), or watched television at least once a week (22.5%). Also, a higher proportion of CBE utilization was found among women who were in the richest wealth index (30.8%) and among those who did not consider distance as a problem (19.4%).

Association between age at first menstruation and CBE utilization

Our findings show that women who had their first menstruation before attaining 15 years were significantly less likely to utilize CBE services [AOR = 0.89; 95% CI 0.81–0.99] (see Table 3). A significantly higher utilization of CBE was found among those with primary [AOR = 1.48, 95% CI 1.29–1.70], secondary [AOR = 2.96, 95% CI 2.59–3.38], and higher education [AOR = 4.35, 95% CI 3.50–5.40] compared to those with no formal education. An increasing likelihood of CBE utilization was observed as age increased. Rural residence was associated with lower odds of CBE utilization (AOR = 0.84, 95% CI 0.74–0.95]. Increasing wealth status was associated with higher odds of CBE utilization with those in the richest households having the highest odds compared to women in the poorest household [AOR = 2.11, 95% CI 1.69–2.64]. The pseudo R^2 value increased from 0.0474 in Model I to 0.0811 in Model II, indicating improved model fitness.

Discussion

Our findings showed that indeed, there was a significant association between age at first menstruation and women's utilization of CBE services. This finding is

Table 2 Prevalence and distribution of clinical breast cancer screening across the variables

Variables	Weighted frequencies n (%)	Yes n (%) n = 2837	Chi-square (X^2); p-value
Age at first menstruation			$X^2 = 3.3884$; p = 0.066
Before age 15	9889 (67.3)	839 (17.5)	
At age 15 and above	4796 (32.7)	1721 (17.4)	
Age			$\boldsymbol{X^2} = 22.6098$; p < 0.001
15–19 years	3097 (21.1)	559 (18.7)	
20–24 years	2685 (18.3)	498 (18.6)	
25–29 years	2302 (15.7)	427 (18.5)	
30–34 years	2316 (15.8)	418 (18.1)	
35–39 years	1925 (13.1)	301 (15.6)	
40–44 years	1452 (9.9)	216 (14.9)	
45–49 years	908 (6.1)	141 (15.5)	
Place of residence			$\boldsymbol{X^2} = 273.0540$; p < 0.001
Urban	8901 (60.6)	1996 (22.4)	
Rural	5784 (39.4)	564 (9.8)	
Educational level			$\boldsymbol{X^2} = 887.3285$; p < 0.001
No education	7246 (49.4)	695 (9.6)	
Primary	2720 (18.5)	373 (13.7)	
Secondary	3944 (26.9)	1114 (28.2)	
Higher	775 (5.2)	378 (48.8)	
Frequency of reading newspaper/magazine			$\boldsymbol{X^2} = 355.0572$; p < 0.001
Not at all	12,802 (87.2)	1925 (15.0)	
Less than once a week	1100 (7.5)	335 (30.5)	
At least once a week	783 (5.3)	300 (38.3)	
Frequency of listening to radio			$\boldsymbol{X^2} = 85.5859$; p < 0.001
Not at all	9231 (62.9)	1411 (15.3)	
Less than once a week	3051 (20.8)	589 (19.3)	
At least once a week	2403 (16.3)	560 (23.3)	
Frequency of watching television			$\boldsymbol{X^2} = 229.6234$; p < 0.001
Not at all	4596 (31.3)	451 (9.8)	
Less than once a week	2053 (13.9)	305 (14.9)	
At least once a week	8036 (54.7)	1804 (22.5)	
Wealth index			$\boldsymbol{X^2} = 560.7826$; p < 0.001
Poorest	2512 (17.1)	177 (7.0)	
Poorer	2576 (17.5)	263 (10.2)	
Middle	2827 (19.3)	381 (13.5)	
Richer	3244 (22.1)	649 (20.0)	
Richest	3526 (24.0)	1090 (30.9)	
Distance to health facility			$\boldsymbol{X^2} = 34.9383$; p < 0.001
Big problem	6309 (43.0)	936 (14.8)	
Not a big problem	8376 (57.0)	1624 (19.4)	
Total	14,685 (100)	2560 (17.4)	

consistent with a previous study conducted in Nigeria [21] that found a significant association between age at first menstruation and mammography screening services. However, the direction of the association was inconsistent with our hypothesis. That is, women who had their first menstruation at an early age were significantly less likely to utilize CBE services. This contradicts Umeh et al.'s [21] study that breast cancer screening utilization was less likely to be undertaken by women who menstruated at a later age. The result is worrying given the high risk of breast cancer associated with early menarche [16, 17, 20]. A possible explanation

Table 3 Results from bivariable and multivariable logistic regression

Variables	Model I Odds ratio (OR)	Model II Adjusted odds ratio (AOR)
Age at first menstruation		
< 15 years	0.91 [0.83–1.01]	0.89 [0.81–0.99]*
15 years and above	Ref.	Ref.
Covariates		
Educational level		
No education		Ref.
Primary		1.48 [1.29–1.70]***
Secondary		2.96 [2.59–3.38]***
Higher		4.35 [3.50–5.40]***
Age		
15–19 years		Ref.
20–24 years		1.39 [1.19–1.61]***
25–29 years		1.46 [1.24–1.72]***
30–34 years		1.51 [1.28–1.78]***
35–39 years		1.49 [1.24–1.77]***
40–44 years		1.45 [1.19–1.76]***
45–49 years		1.35 [1.08–1.68]***
Place of residence		
Urban		Ref.
Rural		0.84 [0.74–0.95]**
Frequency of reading newspaper/magazine		
Not at all		Ref.
Less than once a week		1.26 [1.06–1.49]**
At least once a week		1.31 [1.05–1.63]**
Frequency of listening to radio		
Not at all		Ref.
Less than once a week		1.00 [0.88–1.14]
At least once a week		1.14 [0.99–1.31]
Frequency of watching television		
Not at all		Ref.
Less than once a week		1.16 [0.99–1.37]
At least once a week		1.00 [0.87–1.16]
Wealth index		
Poorest		Ref.
Poorer		1.22 [1.01–1.47]*
Middle		1.42 [1.18–1.72]***
Richer		1.75 [1.42–2.15]***
Richest		2.11 [1.69–2.64]***
Distance to health facility		
Big problem		Ref.9587
Not a big problem		0.96 [0.87–1.07]
Model fitness		
Constant	0.18 [0.17–0.19]***	0.06 [0.05–0.07]***
Pseudo R^2	0.0474	0.0811
Prob > chi2	0.0003	0.0000
AIC	12,308.42	11,355.22

AIC: akaike information criterion

*p < 0.05, **p < 0.01, ***p < 0.001

for this observation could be that women who experience early menarche lack knowledge and understanding of strong link between early age at menstruation and the risk of breast cancer. It is, therefore, imperative for the health ministry in Côte d'Ivoire to review existing health promotion campaigns targeted at improving CBE utilization. Breast cancer screening awareness programs in the country must educate women about the risk that age at menarche poses to their breast cancer risk. This is likely to increase their perceived risk or susceptibility and motivate them to utilize CBE services.

Some of the covariates showed significant association with CBE utilization. Notably, the likelihood of utilizing CBE increased with age—a result that resonates with studies conducted in Iran [22] and SSA [23]. This is likely due to the high risk perception among older women compared to younger women of reproductive age. Consistent with previous studies [13, 23], we found that women were more likely to utilize CBE services when they had some level of formal education. The observed association may be explained by the point that formal education improves the healthcare decision-making autonomy of women [24, 25]. Hence, women are able to make healthcare decisions including the utilization of CBE services without needing permission from their partners. Another explanation is that women with some levels of formal education are likely to be more health literate and understand the need for them to undergo breast cancer screening than those with no formal education.

Consistent with existing literature [23], we found that wealth index was positively associated with CBE utilization among women in Côte d'Ivoire. This is not surprising as the utilization of CBE is often accompanied by some costs including the cost of the screening as well as the cost of transportation to the healthcare facility [26, 27]. However, affluent women have access to financial resources that allow them to overcome the financial commitments that otherwise would have been a barrier to CBE utilization. Our study also found lower odds of CBE utilization among women residing in rural areas compared to urban-dwelling women. The result is corroborated by a study conducted among Kurdish women that found CBE utilization to be significantly low among women in rural settings [23]. Perhaps, the low utilization of CBE services in rural areas could be due to the unavailability of healthcare facilities that provide this service. Moreover, rural-dwelling women are likely to be less exposed to the media and thus unlikely to be aware of breast cancer and the need to undergo breast cancer screening. Future studies should consider women's knowledge of age at first menarche as a risk factor for breast cancer in Côte d'Ivoire.

Strengths and limitations

The dataset used for the analysis is quite recent and thus, ensures that our findings reflect the current status quo with respect to CBE utilization. Also, the large sample of the 2021 Côte d'Ivoire DHS guarantees nationally representative data whose findings are applicable to the broader population of women aged 15–49 years. Responding to the question about the age at first menstruation demanded that the respondents recall; this may have potentially caused some recall bias. Also, we are precluded from making causal inferences between age at first menstruation and CBE utilization due to the cross-sectional nature of the DHS. Some key variables such as women's knowledge about age of menarche as a risk factor for breast cancer were not factored in our regression model due to its absence in the DHS data. Also, other factors such as perceived risk, perceived benefits and perceived susceptibility were not available in the dataset. As such, we could not control for their effects in the model.

Conclusion

Utilization of CBE is low among women of reproductive age in Côte d'Ivoire. We conclude that even though existing literature has established early age at first menstruation as a strong risk factor for breast cancer, CBE utilization is significantly low among those who had early menarche. Going forward, it is necessary for Côte d'Ivoire's health Ministry to intensify breast cancer awareness in the country. Such awareness campaigns must emphasize age at menarche as a risk factor so as to motivate women with a history of early menstruation to utilize CBE. Also, the government should work in collaboration with non-governmental organizations and the private sector to bring CBE services to the rural communities of Côte d'Ivoire. This will help in narrowing the rural–urban disparities in CBE utilization.

Abbreviations

BSE Breast self-examination
CBE Clinical breast examination
DHS Demographic and health survey
SSA Sub-Saharan Africa

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Author contributions

JO conceived and designed the study. CA and JO contributed to the design of the analysis. JO performed the formal analysis. JO drafted the initial manuscript. CA provided methodological insights. JO, CA, SAA, and KSD reviewed the analysis. All authors read, revised and approved the final manuscript for submission. JO had the responsibility of submitting the manuscript.

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Availability of data and materials
The datasets generated and/or analysed during the current study are available in the Measure DHS repository: http://dhsprogram.com/data/available-datasets.cfm.

Declarations

Ethical approval and consent to participate
We did not need to seek ethical clearance because the DHS dataset we used is publicly available. We obtained the datasets from the DHS Program after completing the necessary registration and getting approval for their use. We followed all the ethical guidelines that pertain to using secondary datasets in research publications. You can find detailed information about how we used the DHS data and the ethical standards we followed at this link: http://goo.gl/ny8T6X.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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