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Breast cancer knowledge, beliefs, attitudes and screening efforts by micro-community of advanced breast cancer patients in Ghana

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ABSTRACT

The burden of breast cancer is greater in Ghana because most women present with advanced disease with poor prognostic outcomes. A person's health beliefs, experiences, exposures, and disease representation have been noted to influence his/her health behavior. We examined whether knowing someone who has an advanced breast cancer would influence knowledge, attitudes, beliefs, and practices of self and clinical breast-examination. We conducted a descriptive cross-sectional survey of 67 women, who were purposively sampled based on relation, through patients receiving palliative care services at a tertiary healthcare facility. Participants were non-blood relation of the patients and hence, referred to as patients' micro-community. Data were collected from January to June 2018, using an adapted and adopted questionnaire and analyzed in R software version 3.5.1.3. Statistical significance was based on P-value < 0.05. The penalized maximum likelihood logistic regression was employed to examine study participants' knowledge, beliefs, attitudes, and practices towards breast cancer with various sociodemographic variables. All participants agreed to positive knowledge and attitude towards breast cancer screening which reflected in their breast self-examination, but the influence of these positive features was unclear in their clinical breast-examination practices. A significant association was shown between both self and clinical breast examination practices and most of the demographical features. This study highlights a significant value of social relationships and interactions between advanced breast cancer patients and other women in their social networks in terms of fostering positive knowledge, attitudes, and beliefs. A need to nurture the social networks of advanced breast cancer patients in is paramount.

1. Introduction

Globally, breast cancer (BC) is one of the most occurring cancers among women, with an incidence and mortality rates of 11.6% (2.1million) and 6.6% (627,000) of all cancers respectively (Bray et al., 2018; International Agency for Research on Cancer & World Health Organization, 2018). Population-based data on BC[1] in Ghana is limited (Thomas et al., 2017). However, the disease is now a national burden, with a respective estimated incidence and mortality rates of 43.0 and 17.7 cases per 100,000 women (Bray et al., 2018; International Agency for Research on Cancer & World Health Organization, 2018). Notably, a diagnosis of advanced breast cancer (ABC[2]) is associated with reduced survival in Ghana (Mensah, Yarney, Nokoe, Opoku, & Clegg-Lamptey, 2016) and affects the bio-psycho-social being of a woman with consequences such as pain, fear of death, financial struggles and stigma (Bonsu, Aziato, & Clegg-Lamptey, 2014). These consequences go

Abbreviations: BC, Breast cancer; ABC, Advanced breast cancer; MC, Micro-community(s); FH, Family history; BSE, Breast self-examination; CBE, Clinical breast examination; WHO, World Health Organization; PCA, Principal components analysis; PML, Penalized maximum likelihood logistic; P-value, Probability value

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[1] Breast cancer.

[2] Advanced breast cancer.

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beyond the patient to affect other women within her community and social networks such as micro-communities (MC[3]) (Brum et al., 2018). Socio-cultural values and relationships seem significant in most African communities and with the continuous growth in BC population within these contexts (Anderson, 2014), we can tentatively conclude that the likelihood of a person knowing someone living with BC in our societies and communities is high. However, the extent to which such relationships and interactions influence Ghanaian women's knowledge, attitudes, beliefs and practices pertaining to breast cancer and its screening remain unknown.

2. Problem statement

Socio-cultural beliefs and experiences of other individual's BC can potentially influence women's perception and behavior towards BC (Gonzalez et al., 2015). For instance, evidence have shown higher knowledge and improved perception of BC among women believed to know a BC patient (Brum et al., 2018). Also, a heightening risk appraisal of BC among women is seen to change women health behaviors; resulting in an adoption of breast screening practices and lifestyle modification to gain a sense of control over the disease (Sheeran, Harris, & Epton, 2014). However, research examining whether advanced breast cancer experience alter attitudes, beliefs and behavior in MC of advanced breast cancer patients, leading these women for instance, to adhere to early detection measures such as breast self-examination (BSE[4]) and clinical breast examination (CBE[5]) appears scanty. Such a study is relevant as the disease remains the leading prevalent type of cancer in Ghana, with late presentation as a hall mark.

In our prior study which focused on symptom recognition and appraisal of Ghanaian women diagnosed with advanced breast cancer, lack of knowledge about the disease, maladaptive beliefs and attitudes toward the disease and its practices emerged as key facilitators of delayed presentation (Bonsu & Ncama, 2019). Further, the study revealed that advice from the social networks of advanced breast cancer patients such as friends within her community (herein referred as MCs) contributed to delayed presentation (Bonsu & Ncama, 2019). Thus, raising concerns about the knowledge, beliefs, attitudes, and practices pertaining to breast cancer and its screening among these social networks of patients. Hence, studies focusing on this area to give a broader understanding of the phenomenon seem imperative. Findings from such studies may potentially guide the development of contextual interventions to address any breast cancer-related deficiencies identified. This may possibly change the cultural narratives around BC, modify women's breast health behavior and promote early health seeking for future breast symptoms among women within the community at large.

The World Health Organization (WHO) has recommended BC early detection measures within a context of a comprehensive national cancer control program for its member states (World Health Organization, 2014), yet, to date, Ghana does not have such a program in operation (World Health Organization. (2014a) (2014a), 2014a), hence, no structured BC screening program exists for women (Clegg-Lamptey et al., 2009a). To achieve early detection in a more practical and feasible approach in Ghana (Clegg-Lamptey et al., 2009b; World Health Organization, 2014b; Zelle et al., 2012), BSE, an awareness tool (World Health Organization, 2007) as well as CBE, a low–cost approach to breast screening which has demonstrated a low rate for ABC in screened women (Gadgil et al., 2015; Sayed et al., 2016) compared to an unscreened group of women (Sankaranarayanan et al., 2011) must be adopted.

This study is part of a larger study intended to develop a tool that will potentially reduce the incidence of advanced stage presentation of BC among Ghanaian women and beyond. In the quest to develop an intervention aimed at integrating early detection of BC into a cancer palliative care in Ghana, we aimed to examine whether knowing someone living with ABC in the community, moreover, belonging to the patient's group of MCs would influence knowledge, attitudes, beliefs and breast screening efforts by the micro-community of advanced breast cancer patients in Ghana.

The study objective is to describe breast cancer knowledge, beliefs, attitudes and screening efforts by micro-community of advanced breast cancer patients in Ghana.

3. Method and materials

3.1. Study setting

This study was carried out in the capital of the most populated and fast growing region of Ghana - the Ashanti region (Ghana Statistical Service. (2011), 2011). Currently, the Komfo Anokye Teaching Hospital (KATH) is the locus for cancer management with palliative care services for BC patients in the region and beyond. Breast cancer is the most common malignancy among women in the region and the most commonly diagnosed cancer at KATH. Further, about 80% of women present with advanced breast cancer (Laryea et al., 2014; Ohene-Yeboah & Adjei, 2012), making the facility a suitable site to study breast cancer knowledge, beliefs, attitudes and screening efforts by the micro-community of advanced breast cancer patients in Ghana. The palliative care unit of the Family Medicine department of KATH was the outlet for recruitment.

3.2. Study design and sample

This study was a descriptive cross-sectional survey of women who knew someone diagnosed of ABC in Ghana. This design was deemed appropriate as potentially, breast cancer-related factors were being measured at a specific point in time for a defined population (Christensen, Johnson, Turner, & Christensen, 2011). Further, prior studies that focused on knowledge, attitudes and practices of breast cancer employed a descriptive cross sectional design (Dahiya et al., 2018; Opoku, Benwell, & Yarney, 2012), hence, this study drew on such studies.

The study targeted the MCs of women diagnosed with ABC. We defined women's MC as those identified by patients as friends, co-tenants, church members and colleagues at the work place. Findings from our prior study revealed that advice from the social networks of advanced breast cancer patients such as friends (herein referred as MCs) contributed to delayed presentation (Bonsu & Ncama, 2019). Therefore, the current study targeted the MCs of advanced breast cancer patients to describe their knowledge, beliefs, attitudes and screening efforts following their exposure to the disease in someone they know. We intended to examine how such relationships and interactions will nurture a positive knowledge, beliefs, attitudes and screening practices within the context of breast cancer. Eligibility criteria for inclusion were women: (a) identified by patients as MC; (b) with no personal history of confirmed malignancy and lastly (c) who reside within the Ashanti region of Ghana.

3.3. Sampling and size

Purposive sampling technique was employed to intentionally select participants for this study (Christensen et al., 2011). As part of a larger study, patients were asked to purposively identify their MC whom they had informed about their diagnosis for possible recruitment into this study. Discussing the objectives of the study with the patients led them to identify 70 MC whom they had informed and are aware of their experiences with ABC. The patients linked the first author (ABB) to their MC. The MC were reached individually to discuss the study. In

[3] Micro-community (s).
[4] Breast self-examination.
[5] Clinical breast examination.

total, 70 women were invited to participate in the study, of which 3 refused (refusal rate 4.3%). Hence, a sample size of 67 voluntarily participated in the study.

3.4. Data collection

Based on qualitative findings from our prior qualitative study (Bonsu & Ncama, 2019), we adopted and adapted a related questionnaire previously used in Ghana for the data collection (Opoku & Benwell, 2018). The survey was pilot-tested on 10 participants who had similar characteristics with the study participants and visiting the Oncology clinic of KATH with their friends for breast cancer care. This was done to estimate the time required to complete the questionnaire and to determine the comprehensibility of questions so that it could be refined accordingly. Pilot questionnaires were excluded from the final analysis. The final questionnaire consisted of 73 questions, which required approximately 15 min answering.

The first part of the questionnaire collected sociodemographic information about the participants, including age, marital status, number of children, educational level, religion, family history of BC, age at menarche and menopause, and whether they are current or past contraceptive users, smokers and alcohol drinkers. The survey contained a section about the effect of knowing a woman with ABC have on the participants' knowledge, attitudes and beliefs towards BC as a disease condition. The survey also solicited information about the knowledge, attitudes and practices towards BC examination and screening. The response options utilized a 5-point Likert scale and the responses to the questions and statements were as follows: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

Using the patients as the recruitment link, 70 MCs of advanced breast cancer patients were invited to participate in the study. However, a sample size of 67 voluntarily participated in the study. We recorded 3 refusals (refusal rate 4.3%). Data collection occurred between January and June 2018.

Table 1
Participants' demographical characteristics.

Demographic data	Frequency (n = 67)	Percent (%)
Age group		
18–39	36	53.7
40–45	13	19.4
46–50	10	14.9
51–55	3	4.5
56–60	4	6.0
61–65	1	1.5
Religion		
Christian	52	77.6
Moslem	14	20.9
Traditional	1	1.5
Educational background		
Primary	8	12.0
Middle	12	18.0
Secondary	12	18.0
Tertiary	27	40.0
None	8	12.0
Occupation		
Farming	3	4.5
Trading	16	23.9
Self-employed	8	11.9
House wife	5	7.5
Public servant	14	20.9
Unemployed	9	13.4
Other	12	17.9
Marital status		
Married	30	44.8
Single	26	38.8
Divorced	4	6.0
Separated	2	3.0
Widow	5	7.4
Parity		
Yes	38	56.7
No	29	43.3
Family history of breast cancer		
Yes	16	23.88
No	51	76.12
Contraception use		
Yes	34	51.5
No	32	48.5
Age at Menarche		
9–15	44	65.8
16–20	23	34.3
Menopause		
Yes	10	14.9
No	57	85.1
Smoking		
Yes	6	8.9
No	61	91.1
Alcohol use		
Yes	25	37.3
No	42	63.7

3.5. Statistical analysis

Categorical variables are reported as frequencies and percentages. Continuous variables were presented as median with an interquartile range. The chi-squared test was used to assess associations between different categorical variables. We tested the reliability of all the 73 variables in the questionnaire to rightly answer the intended research questions using Cronbach's alpha test and principal components analysis (PCA). We assigned weights of 1, 2, 3, 4 and 5 to the five-point Likert scale responses, strongly disagree, disagree, neutral, agree and strongly agree respectively. The individual questions making the various domains were weighted as median scores per observation. These median scores were further categorized into a dichotomous variable with value $>$ or $<$ 3 on the Likert scale. Variables with median score $<$ 3 indicate disagreement to the statements culminating into that domain and vice versa. The penalized maximum likelihood logistic (PML) regression was used to relate study participants' knowledge, beliefs, attitudes and practices towards BC examination with various sociodemographic variables, including age, marital status, family history of BC, history of contraceptive, smoking, alcohol consumption, religion, educational background, parity as well as age at menarche and menopause. All statistical analyses were conducted in R software version 3.5.1.3. (Khan, 2013). The statistical significance was based on P-value $<$ 0.05

3.6. Ethic statements

The study was ethically approved by the Committee on Human Research, Publication and Ethics, Kwame Nkrumah University of Science and Technology and KATH[6], Ghana (Ref: CHRPE/AP/546/17 & CHRPE/AP/554/17) and Biomedical Research Ethics Committee, South Africa (Ref: BE549/17). Komfo Anokye Teaching Hospital gave the institutional permission (REG. NO: RD/CR17/251). All the participants consented in writing. Participants were further assured of confidentiality and anonymity. Hence, participants were assigned study codes during recruitment (MC 001-067). No names of the participants were recorded during the study.

4. Results

The response rate for the study was 100%. A little more than half of

[6] X.

Table 2
Weighted Median Score and Interquartile ranges of Study Outcome Domains.

Outcome Domains	Median Score	Interquartile range
Knowledge on Breast Cancer	4.00	1.00
Beliefs on Breast Cancer	3.00	1.00
Attitude towards Breast Cancer	4.50	1.00
Knowledge towards Breast Cancer screening	4.00	0.50
Attitude towards BC screening	4.25	1.00
Self-Breast Examination Practice	4.00	1.88
Clinical Breast Examination Practice	2.00	1.00

the study participants were aged between 18 and 39 years (53.7%) and about half were married (44.8%) with a substantial number of single women (38.0%). An overwhelming majority were Christians (77.7%) and 40% of participants had tertiary education. > 50% had given birth and had no history of BC. Table 1 shows the demographic characteristics of study participants.

All weighted outcome domains had more than half of the study population with median score > 3 except beliefs about BC and clinical breast examination practices. Most of the participants affirmed to enhanced knowledge and attitudes towards BC as a disease condition from their exposure to someone with ABC. Nearly all participants agreed to positive knowledge and attitude towards BC screening which reflected in their BSE practices. However, the effects of these positive features were unclear in their CBE practices. Tables 2 and 3 show the weighted mean scores and interquartile ranges of outcome domains and percentages of study participants with median domain score ≤ 3 and > 3. Fig. 1 is a graphical display of percentage of study participants with the weighted median score ≤ 3 and > 3.

The chi-squared test for independence between groups found significant relationships between contraceptive use ($X^2 = 4.543$, df = 1, p > 0.033) and age at menarche ($X^2 = 5.455$, d = 1, p > 0.02) and participants' attitude towards BC screening. Also, significant relationships were observed between the age at menarche ($X^2 = 4.074$, df = 1, p > 0.044), whether participants have reached menopause ($X^2 = 9.979$, d = 1, p > 0.002) and BSE examination practices. The study participants' level of education is significantly related to knowledge on BC ($X^2 = 12.881$, df = 5, p > 0.025), BC screening ($X^2 = 17.897$, df = 5, p > 0.003) and BSE practice ($X^2 = 16.911$, df = 5, p > 0.005)

About 41.2% (28) of participants who obtained a high knowledge about BC demonstrated enhanced BSE practices. This relationship was statistically significant ($X^2 = 8.791$, df = 1, p > 0.003).

We explored these relationships with the use of the PML estimator (Eyduran, 2008; Ploner, 2010) which has been shown to estimate effects in small study samples with rare outcomes much better than other estimators including the standard logistic regressions without violation to underlying assumptions. In the univariate analysis, we found significant associations between both clinical and self-breast examination practices and demographic characteristics–age, religion, educational level, employment status, smoking and alcohol use–reproductive history–age at menarche, menopause, parity and contraceptive use–and external factors such as beliefs, attitudes and knowledge on BC and BC screening. The effects of age at menarche and employment status persisted in both CBE and BSE practices in the multiple variable regressions. While history of BC and positive beliefs on BC (median score > 3) showed significant associations with BSE practices, the association between knowledge of BC and CBE persisted. Tables 4 and 5 show the results of the univariate and multiple variable PML[7] estimates (as Odds Ratio) and corresponding 95% profile likelihood confidence intervals for the study variables.

We conducted reliability statistics to assess the effectiveness of the questionnaire to appropriately answer all intended research questions. A reliability coefficient for the set of variables in the questionnaire was estimated with a Cronbach's alpha and found to be 0.77. A Cronbach's alpha ≥ 0.70 has been shown to be acceptable.

Table 3
Percentage and counts of responses of study participants to outcome domains.

Outcome Domains	Percentage and Counts of Participants			
	Median Score ≤ 3		Median Score > 3	
	No.	(%)	No.	(%)
Knowledge on Breast Cancer	33	48.5	35	51.5
Beliefs on Breast Cancer	35	51.5	33	48.5
Attitudes towards Breast Cancer	3	4.4	65	95.6
Knowledge towards Breast Cancer screening	9	13.2	59	86.8
Attitude towards Breast Cancer screening	4	5.9	64	94.1
Self-Breast Examination Practice	25	36.8	43	63.2
Clinical Breast Examination Practice	63	92.6	5	7.4

5. Discussions

We examined the breast cancer knowledge, beliefs, attitudes and practices towards BC and its screening among women who knew someone living with an ABC in their community. This study primarily assesses the effects of women's lived experiences and independent predictors of CBE and BSE practices. There is no population-based cancer registry in the study's context; yet, there is an estimation of over 4 thousand (20.4%) new BC cases diagnosed annually in Ghana, corresponding to an incidence range of 43.0 women/100,000 populations (Bray et al., 2018; International Agency for Research on Cancer & World Health Organization, 2018). Because of the above prevalence of the disease, we can presume that an appreciable number of women know patients who had/have BC in their community. However, our search for available statistics about the prevalence of this knowledge among Ghanaian women yielded no result.

In this study, improved attitude towards BC screening among the participants was identified, and this translated into enhanced BSE. Some psycho-social factors are noted to make an essential influence to whether a woman seeks BC screening (Gonzalez et al., 2015). For instance, prior authors have commented that a concern of BC is beneficial, since it leads individuals to adopt a positive and proactive attitude towards the disease and screening (Brum et al., 2018). On the contrary, others suggested that such emotions could cause women to avoid screening due to fear of diagnosis (Sheeran et al., 2014). The psychological influence of knowing someone with ABC was beyond the scope of the present study. However, one-way to comprehend our findings might be in accordance with the first suggestion. Alternatively, it is possible that the exposure to women's physical and financial struggle with ABC influenced women to adopt the positive attitude and BSE practices observed. Our findings is confirmed by reports from a prior study (Lemon, Zapka, & Clemow, 2004).

In our study, participants with additional family history of BC had significant associations with both CBE and SBE practices in the univariate analysis. However, the association was persistent only in the multivariable analysis of CBE practices. This finding does not support the common notion that the fear of diagnosis can possibly lead women to avoid screening, inasmuch as the family history did not demonstrate to be a hindrance to the adherence to the appropriate an early detection measure.

In this context, health personnel are very significant to counsel women to deconstruct the cultural narratives that exist around BC in Ghana. In fact, this is deemed essential, since the mass media is the

[7] Penalized maximum likelihood logistic.

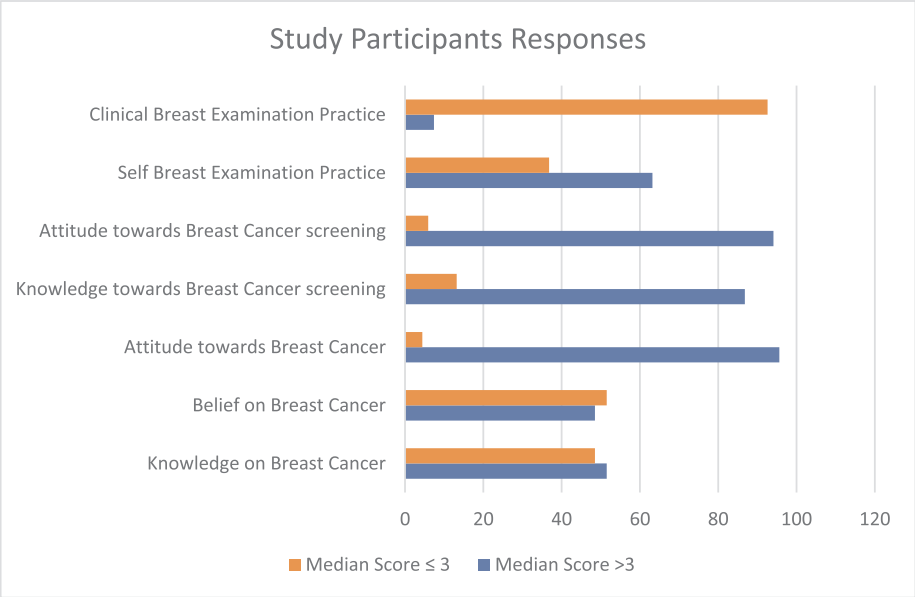

Fig. 1. Percentage of study participants with the weighted median score ≤ 3 and > 3.

Table 4
Univariate PML logistic estimates with profile confidence interval of Clinical and Self Breast Examination Practices by various predictors.

Parameter	Clinical breast exams practices	Breast self-exams practices
Age(years)	OR (95% CI)	OR (95%CI)
18–39 (reference)		
40–45	0.5 (0.3–0.6)	0.4 (1.2×10^{-4} –1120.8)
51–55	52.6 (8.3×10^{-5}-2.5 x 10^{5})	0.3 (8.2×10^{-5}– 797.5)
56–60	0.4 (0.3–0.6)	0.1 (2.3×10^{-5}–228.7)
61–65	0.2 (0.1)	0.04 (1.2×10^{-5}–136.2)
Age at menarche (9–15 years)	12.1 (10.0–15.2)	47.8 (17.5–1.3×10^{5})
Religion		
Traditional religion (reference)		
Christianity	0.4 (7.6×10^{-5}-1.9×10^{3})	0.34 (1.1×10^{-4}-1058.4)
Islamic Religion	0.02 (4.3×10^{-6}-1.3×10^{3})	0.04 (1.3×10^{-5}–148.3)
History of BC	302.1 (4.4–1.4×10^{6})	14.8 (5.6–189.3)
Parity	82.6 (40.7–3.5×10^{5})	11.5 (7.9–22.5)
Menopause	11.2 (4.1–82.2)	3.3 (1.1–19.7)
Contraceptive use	35.1 (19.9–124.6)	45.4 (12.9–1.2×10^{5})
Ever smoked	9.7 (2.5–322.9)	43.5 (3.2–2.0 $\times 10^{5}$)
Alcohol use	307.6 (2.5–1.3×10^{5})	9.3 (4.9–29.4)
Educational level		
Primary level (reference)		
Middle school level	3.3 (0.9–23.5)	2.9 (0.3–18.4)
Senior high school level	2.8 (0.8–1.4×10^{5})	12.8 (1.3–544.0)
Tertiary level	25.8 (0.1–1.1×10^{5})	1.7 (0.1–12.3)
No formal education	0.9 (0.2–3.6)	16.5 (2.1–974.5)
Employment status		
Farming (reference)		
Trader	17.7 (2.9–2.1×10^{2})	2.9 (0.3–18.4)
Self-employed	2.7 (0.4–10.9)	12.8 (1.3–544.0)
House wife	2.1 (0.3–9.8)	1.7 (0.1–12.3)
Public servant	64.6 (0.1–3.5×10^{5})	16.5 (2.1–974.5)
Unemployed	2.6 (0.4–11.8)	3.6 (0.32–26.38)
Others (Student, vocational skills)	14.9 (2.1–500.6)	39.1 (0.01–1.3×10^{5})
Beliefs about BC* (median > 3)	35.4 (19.7–139.2)	3.6 (0.3–26.4)
Knowledge of BC (median > 3)	41.8 (20.0–308.9)	39.1(0.01–1.3×10^{5})
Knowledge of BC screening (median > 3)	11.0 (3.6–116.2)	14.6 (3.8–3.9×10^{4})
Attitude towards BC (median > 3)	8.3 (1.7–1.5×10^{4})	25.9 (2.1–8.7×10^{4})

main means of information disseminations in Ghana, hence, most women get BC related information from radio and television (Opoku et al., 2012). Misconceptions and inaccurate information shared about the disease could negatively influence women behavior towards the disease. Few of our study participants did not adopt any screening measure, irrespective of their exposure to the disease. While reasons for this observation are out of scope for this study; it could be plausibly linked to deficiencies in information on BC and its related practices. Future research can explore this observation comprehensively to afford a complete understanding of this phenomenon.

Table 5
Shows are multiple variable penalized maximum likelihood estimates and profile likelihood confidence interval of Clinical and Self Breast Examination Practices.

Predictors of Clinical Breast Examination Practice			
	OR[1]	Lower 95%	Upper 95%
Age (years)			
Age at Menarche (9–15 years)	0.4	0.2	0.7
Employment status			
Farming (Reference)			
Trading	8.8	1.6	8.2
Self-employed	13.5	2.5	100.2
Public servant	11.8	1.4	150.6
Unemployed	10.5	1.4	135.8
Others (mostly students)	25.8	3.9	667.2
Knowledge of BC* (median score < 3)	2.0	1.1	4.9
Predictors of self breast examination practices			
Age at menarche (9–15 years)	3.9	2.6	8.4
History of BC	0.6	0.3	0.9
Employment status			
Farming (reference)			
Trading	6.1	1.7	35.3
Self-employed	6.4	1.7	42.3
Others (mostly students)	5.6	1.4	38.3
Educational level			
Primary level (reference)			
Middle school level	0.2	0.04	0.3
Senior high school level	0.4	0.1	0.7
No formal education	0.2	0.1	0.5
Beliefs about BC (median score > 3)	1.9	1.4	3.1

[1] Odd ration.

In addition to psychological concerns, knowing someone with ABC can cause women to adhere to early detection measures through other domains. For example, knowledge, belief and attitude towards BC screening and its benefits can play an important role in making a woman either or not adhere to screening measures. In this study, interesting observations were made when the aforementioned variables were assessed. Nearly half of the study population was divided about their knowledge and beliefs about BC. However, significantly wide differences in responses were observed about the attitude towards BC and attitude and knowledge towards BC screening. In each of these domains, > 80% of the participants had improved attitude and knowledge towards BC and screening with a median score > 3. These positive responses may have translated into enhanced BSE but not CBE practices.

The later observation highlights the existing deficiencies in CBE services in Ghana. As earlier mentioned, no routine nationwide literacy and screening protocol exist for women (Mena et al., 2014). Yet, adherence to recommended screening practices such as CBE for early diagnosis need frontline professionals competent in CBE and breast health education to coordinate such activities through a referral network for prompt diagnosis and treatment. Our study revealed that knowing someone who has ABC alone improved knowledge, attitude towards BC and practice of BSE. However, the exposure and experience did not motivate women to seek CBE. Evidence has revealed that CBE leads to stage shifting in developing countries like Ghana where mammography screening has limited application (Sankaranarayanan et al., 2011). A need to improve BC awareness and initiate acceptable and accessible CBE services for Ghanaian has been demonstrated in our study.

6. Limitation and strengths

The authors acknowledge some limitations. First, the small sample size reduces the generalizability of our study findings. Second, only participants who were within the geographic proximity of the researcher were included in the study. Hence, generalizability of the findings should be done with caution. Third, the screening prevalence was projected on the women's responses; hence, it was not possible to confirm the practice of the screening methods. On the contrary, sampling of the participants was relation-based, participants' current exposure and experience with an ABC patient was an additional value to this study. The use of a questionnaire developed from the qualitative findings of a prior study is a strength to the study. We have demonstrated that knowing someone with ABC alone may lead to enhanced knowledge, beliefs and attitudes toward BC as well as BSE practices. We have further shown the value of social relationships and interactions between women diagnosed with advanced breast cancer and other healthy women in their social networks such as micro-communities in terms of nurturing positive knowledge, attitudes, beliefs, and practices of breast cancer and its screening. A significant need to develop an intervention for use by health personnel to frontline BC awareness and offer breast screening services such as CBE for similar women has been highlighted. Such an intervention may potentially foster the nurturing of social networks of advanced breast cancer patients such as micro-communities regarding BC and its practices as well as the community at large.

7. Implications

- A need to nurture social networks of advanced breast cancer patients such as micro-communities on breast cancer and its screening practices is paramount.
- There is a need to promote health awareness on breast cancer on a community level.
- A stark need for literacy and appropriate screening initiatives led by health professionals are critical.
- A larger mix-method research on this area will provide a comprehensive understanding of the phenomenon.
- Exploration of psycho-social variables underlying the adoption and adherence to screening methods is required.

8. Availability of data

All relevant dataset on which conclusions of this manuscript were made are within the manuscript.

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Ethical approval

The study was approved by both Committee on Human Research, Publication and Ethics, Kwame Nkrumah University of Science and Technology, Ghana (Ref: CHRPE/AP/546/17 & CHRPE/AP/554/17) and Biomedical Research Ethics Committee, University of KwaZulu-Natal, South Africa (Ref: BE549/17). Institutional permission was granted and the study was registered at the Research and Development Unit of Komfo Anokye Teaching Hospital (REG. NO: RD/CR17/251).

CRediT authorship contribution statement

Adwoa Bemah Bonsu: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Writing - original draft, Writing - review & editing. **Busisiwe Purity Ncama:** Conceptualization, Methodology, Project administration, Resources, Supervision, Writing - review & editing. **Kwadwo Osei Bonsu:** Formal analysis, Software,

Writing - review & editing.

Declaration of Competing Interest

None

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