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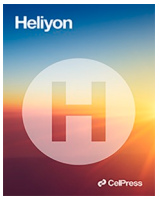

Research article

Knowledge, attitude and practices around breast cancer and screening services among women of reproductive age in Turbo sub-county, Kenya

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ABSTRACT

Background: Only 12% of Kenyan women use breast cancer (BC)screening programs. Early identification is critical for reducing the condition's associated morbidity and mortality. Unfortunately, few studies have been conducted on the screening program's implementation and the causes for the low usage rates in Turbo Sub-County, Kenya. The purpose of this study was to learn about women of reproductive age's (WRA) practices, attitudes, and knowledge regarding BC screening programs, as well as to investigate the potential association between lifestyle factors and BC screening service utilization.

Methods: Mixed-method approaches were used in an analytical cross-sectional study design. The study included 317 participants selected randomly. An interviewer-administered questionnaire was used to collect quantitative data while focus group discussion (FGD) and key informant interview (KII) guides were used for collecting qualitative data. The Statistical Package for Social Sciences (SPSS) version 26 was used to manage quantitative data, whereas NVivo version 12 was used to analyze qualitative data. Chi-square, Fisher's exact test, and multiple logistic regression were used to assess the degree of relationship between BC screening service uptake and independent variables. The qualitative data was transcribed verbatim, and the transcripts were automatically coded to generate themes.

Results: The participants' mean age was 30.14 (9.64). Breast cancer screening services were used by 10.21% of the population. Women who were aware of the signs and symptoms of BC were 71.5 times more likely to undergo screening than their counterparts. Similarly, those with positive attitudes toward BC and screening programs were 84 times more likely to get screened than those with negative attitudes. Breastfeeding increased the likelihood of BC screening by OR = 37 (95%

Abbreviations: WRA, Women of Reproductive Age; BC, Breast cancer; FGD, Focus group discussion; KII, Key informant interview; DALYs, Disability adjusted life years; QoL, Quality of life; SSA, Sub-Saharan Africa; SBE, Self breast examination; SPSS, Statistical Package for Social Sciences; MMG, Mammography; CBE, Clinical breast examination; KNCSG, Kenya national cancer screening guidelines.

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CI: 0.00–0.32), physical activity by OR = 37 (95% CI: 0.00–0.25), and chronic illnesses by OR = 37 (95% CI: 0.00–0.17).
Conclusion: Knowledge of signs and symptoms of BC and a positive attitude towards perceived barriers enhanced the probabilities of BC screening. Being physically active, breastfeeding, and having a chronic disease all increased the odds of BC screening uptake. To improve screening rates, it is necessary to provide sufficient information to those who are least likely to be screened.

1. Introduction

Breast cancer (BC) is the most commonly diagnosed cancer in women worldwide, with 2.3 million cases (11.7%) and a 15% mortality rate [1]. According to global statistics, BC is the most prevalent in 140 of 184 countries [2]. In 2020, BC was the most common cancer type, accounting for 24.5% of all newly diagnosed cancers worldwide [3]. One in every six cancer deaths have been linked with BC among women globally [4]. Sub-Saharan Africa (SSA) led in BC deaths in 2017, with BC accounting for 17.42 million Disability Adjusted Life Years (DALYS) [5].

According to 2020 statistics, the half-decade magnitude of BC for African nations for all ages was 64 per 100,000 women, making it the most common cause of death at 12.1% of all mortality cases and the most common type of cancer at 16.8% [1]. In Africa, BC screening has been low for example in South Africa, the uptake of mammography (MMG) screening among women aged ≥30 years is 13.4% compared to the Papanicolaou smear test which is 52% [6]. In Kenya, BC has been linked with 23% of all cancers. In 2020, it was the second highest cause of deaths among women [7].

Despite the Kenya National Cancer Screening Guidelines (KNCSG) [8] BC screening rates remain low at 12%, compared to cervical cancer screening rates of 16% [9]. Majority of BC patients (50.7%) are discovered late [10]. On-time BC screening has benefits including; enhanced quality of life (QoL), less financial burden linked to treatment, and higher survival rates [10]. A delayed diagnosis could be a significant factor in the poor prognosis [11]. In Uasin-Gishu, BC accounts for 13.6% of all cases [12], and Turbo sub-county, one of its administrative regions, has the highest number of these cases.

Knowledge is a crucial factor that influences health behavior [13]. Lack of understanding of the risk factors of BC and screening techniques results in late diagnosis, increasing mortality and death risks [14]. Attitude is also a key component of women's preventative behavior [15] and hurdles to screening procedures include negative attitudes and lack of information [16]. Lifestyle characteristics such as alcohol consumption and physical exercise have been associated with BC screening participation, with individuals who lead a healthy lifestyle being more likely to engage in cancer screening and other preventative health behaviors [17]. Despite a variety of lifestyle factors being linked to an increased risk of BC, less research has looked into how they may affect screening participation [18]. In Australia, women who were overweight or obese but got enough exercise were more likely to have ever had a mammogram screening [18].

While there have been a number of studies done in different developing countries to evaluate the knowledge, attitudes, and practices of BC screening in the general public and specifically in healthcare professionals, and a few comparable ones also done in Kenya, few have been done on WRA. This study aimed to evaluate the knowledge, attitudes, practices, and lifestyle factors associated with BC screening among WRA in Kenya's Turbo Sub-County.

2. Methodology

2.1. Research design and study population

Cross-sectional study was conducted in Turbo sub-county of Uasin Gishu County; it was a mixed quantitative and qualitative methodologies study.

2.2. Sample size and sampling techniques

A sample size of 317 was determined using Fisher's et al., formula [19]. The nationwide prevalence of 25% [20] among WRA for self-breast examination (SBE) uptake was used to produce more representative data. This translated to a sample size of 288 respondents; however, to account for non-response, 10% more sampling [21] was conducted, yielding a total of 317 respondents. Participants in the qualitative research included nurses and clinicians with at least one year of clinical experience.

Uasin Gishu County was chosen purposively from among the 47 counties because it has a high rate of BC (13.1%) [12]. Women of reproductive age from eight randomly selected Turbo Sub-County villages were recruited for this study. Multistage sampling was used to find qualified responders. The chief provided a list of households with WRA, and households were chosen using a systematic selection approach. The sampling interval was established by dividing the total number of WRA homes by the computed sample size. When more than one WRA was discovered in a household, a simple random sample by lottery approach was employed to recruit one.

2.3. Eligibility criteria

This study included WRA who lived in the eight randomly selected Turbo sub-county villages and had lived in the sub-county for

the previous one year. Women of reproductive age were sought out for qualitative research if they had engaged in quantitative research, were well-educated, and were willing to participate in the planned FGDs.

2.4. Data collection methods and procedures

A researcher-administered, pre-designed, and pre-tested questionnaire was used to collect data. A pilot involving 32 women (10% of the participants) ensured the questionnaire's accuracy and reliability. Bio-demographic characteristics of age, marital status, parity, education, employment, income, and family history of BC were gathered.

Thereafter, data about BC awareness and attitude was collected using a breast cancer awareness measure (BCAM) Likert scale questionnaire of 1–5. Questions about BC awareness were in three categories: possible risk factors, signs and symptoms, and methods for detecting , such as BSE, CBE, ultrasound, and MMG. There were 11 questions: BC symptoms included changes in breast position and shape, an inverted nipple, pain in one or both breasts, peeling of the breast skin, abnormal discharge from a nipple, bleeding, lumping, changes in breast size and color, presence of a rash/pimple on the breast's surface, having a lump under the armpit and change in nipple size. Participants received the following alternatives for responding to each of the aforementioned items: "strongly agree," "agree," "neither agree nor disagree," "disagree," or "strongly disagree." For the presentation of results, "strongly agree" and "agree," "disagree" and "strongly disagree," and were combined.

Participants' attitude regarding BC was assessed by asking them to rate 16 BCAM-specific statements on a 5-point Likert scale [22]. The questionnaire had the following 16 statements: 1) You experience embarrassment when having a BC examination by a doctor; 2) You worry about going to the doctor for a checkup or screening; 3) Getting a BC screening service wastes doctors' time; 4) Language influences your interaction with a doctor; 5) The cost of BC screening services is prohibitively expensive; 6) Access to BC screening is hampered by transportation; 7) Scheduling an appointment doctor is difficult; 8) The doctor's traits is an hindrance to BC screening; 9) The environment of medical facilities that provide BC screening services has an impact on health behaviors; 10) Breast cancer screening procedures are influenced by ethnicity; 11) Culture affects health seeking practices; 12) Work obligations and a hectic schedule affects health seeking behaviors; 13) Health insurance affects BC screening habits; 14) The use of alcohol or tobacco affects health seeking practices; 15) Insufficient health care personnel affect health seeking practices; 16) Lack of knowledge affects women health seeking behavior. Each of the items above had the following options for responses from participants: "strongly agree," "agree," "neither agree nor disagree," "disagree," or "strongly disagree." "Strongly agree" and "agree" were merged for the presentation of the results , as were "disagree" and "strongly disagree ".

The lifestyle factors evaluated included breastfeeding, presence of life-style related chronic diseases, body mass index (BMI), and use of contraceptives, physical activity, alcohol use, and smoking status. The global physical activity questionnaire (GPAQ) developed by WHO was used to measure physical activity [23]. The BMI was calculated based on the subjects' weight and height and classified as underweight (18.5 kg/m2), normal (>18.5 kg/m2), overweight (25–30 kg/m2), or obese (30 kg/m2).

Qualitative data was collected using validated FGD and KII guides. The FGDs were conducted among WRA volunteers. The KIIs were conducted on the in-charge clinical officer and nursing officer, both of whom were experts in this field. The FGDs and KIIs were recorded and transcribed later.

Table 1
Socio-demographic characteristics.

Independent variable	Categories	Frequency	Valid percentage %
Age	15–19	44	15.49
	20–29	102	35.91
	30–39	77	27.11
	40–49	61	21.48
Marital status	Married	164	57.75
	Single	92	32.39
	Divorced	15	5.28
	Widowed	7	2.46
	Separated	6	2.11
Parity status	Nulliparous	69	24.30
	Uniparous	51	17.96
	Multiparous	164	57.75
Education level	None	12	4.23
	Primary	80	28.17
	Secondary	132	46.48
	Tertiary	60	21.13
Employment status	Employed	61	21.48
	Self-employed	109	38.38
	Unemployed	97	34.15
	Retired	1	0.35
	Students	16	5.63
Income	6000 Ksh and below	178	62.67
	Above 6000Ksh	106	37.32
Family history of breast cancer	Yes	67	23.59
	No	217	76.41

2.5. Data analysis

The SPSS.26 was used to examine quantitative data. Univariate analyses provided summary statistics for the bio-demographic characteristics. For bivariate analysis, Chi-square analysis was performed for relationships. Multivariate analysis entailed regressions performed on variables with a p-value <0.05 from bivariate analysis. A p-value of <0.05 was considered statistically significant. Thematic content analysis approach was utilized foranalysis of qualitative data. Data from audio recordings was transcribed. Transcripts were analyzed into themes by use of NVIVO v. 11.

2.6. Ethical consideration

The study was approved by Mount Kenya University Institutional Research Ethics Review Committee (IREC); Ref no. MKU/ERC/1890. The National Commission for Science, Technology, and Innovation (NACOSTI) granted permission to conduct the study under license number NACOSTI/P/21/12804. Upon signing an informed consent, the survey was conducted in a private setting, which ensured confidentiality of the respondent's information. No identifiers were used throughout the data collection process.

3. Results

3.1. Socio-demographic characteristics of the participants

284 (89.59%) women completed the survey out of the 317-sampled participants. Of these, 10.21% had been screened for BC. The mean age of participants was 30.14 (9.64).. As shown in Table 1, most of the sampled women (35.91%) were between 20 and 29 years old, 42.25% were unmarried and 57.75% were multiparous. Most participants (46.48%) had a secondary level of education and below. Twenty four percent had a history of BC in their lineage.

3.2. Knowledge, attitude, and practices associated with uptake of BC screening services

The majority of the respondents (96.83%) were aware of BC. The chi-square test results for association between knowledge of BC and the use of BC screening services were $\chi^2 = 0.01$, df = 1, and p =1.00, indicating a non-significant association (Table 2). A clinical officer and one discussant, respectively, supported these observations;

> *"Only a fraction of the majority of women who have heard about breast cancer visit our medical institution for screening services."*

> *"Although I have heard of breast cancer screening programs, I have not yet undergone a screening." (Italize all the quotes in the document)*

Table 2
Multiple logistic regression analysis of Knowledge, Attitude and Practices.

Independent variable	Chi-square test for independence	Multiple logistic regression OR 95 % CI	p-value
Knowledge of breast cancer	$\chi^2 = 0.01$	-	-
Yes	df = 1	-	-
No	p* = 1.000	-	-
Knowledge of breast cancer screening services	$\chi^2 = 24.41$		
Yes	df = 1	1.17(0.098, 13.90)	0.903
No	p < 0.001	Reference	
Knowledge of breast cancer risk factors	$\chi^2 = 6.18$		
Yes	df = 1	0.49 (0.08, 3.21)	0.459
No	p = 0.013	Reference	
Knowledge of breast cancer signs and symptoms	$\chi^2 = 108.44$		<0.001
Knowledgeable of breast cancer signs and symptoms (Strongly Agree and Agree)	df = 2	71.50 (6.10, 838.21)	<0.001
	p < 0.001		
Knowledge of breast cancer signs and symptoms (Neutral)		24.77 (1.90, 322.98)	0.014
Not knowledgeable of BC signs and symptoms (Strongly disagree and disagree)		Reference	
Attitude	$\chi^2 = 110.91$		0.014
Positive Attitude	df = 2	84.15 (4.30, 1647.98)	<0.001
Neutral	p < 0.001	1499621608 (0.00)	0.993
Poor Attitude		Reference	–
Practiced self-breast examination	$\chi^2 = 30.88$	0.52 (0.04, 6.40)	0.606
	df = 1		
	p < 0.001		
Did not practice self-breast examination		Reference	–

3.2.1. Knowledge of BC risk factors

Less than a third (28.52%) of the participants were aware of BC risk factors. Smoking (75.33%) and alcohol consumption (72.78%) were the most cited risk factors while getting the first child at an advanced age (9.91%), early-onset of menarche (8.62%), having dense breasts (5.98%), and not breastfeeding (1.19%) were least cited. There was a strong relationship between knowledge of BC risk factors and the use of BC screening services, with accompanying values of $\chi^2 = 6.18$, df = 1, and p = 0.01. Knowledge of BC risk factors was not a significant predictor of the use of BC screening services (Table 2).

3.2.2. Knowledge of BC screening services

More than half of the respondents (59.85%) were aware of BC screening services. Additionally, 55.25% were aware of SBE, MMG (15.32%), biopsy (0.59%), and ultrasound (0.58%) the least known BC screening services. The cross-tabulation between awareness of BC screening services and use of such services produced chi-square values $\chi^2 = 24.41$, df = 1, and $p < 0.001$, showing a significant association. A multiple logistic regression model (Table 2) however, showed awareness of BC screening services had no statistical significance (p = 0.90), an observation supported by a clinical officer in KII who pointed out that; *"Most of the women are aware of breast cancer screening services, yet only a few seek screening services in our health facility" (apply the ident techniques for consistency with the rest).*

3.2.3. Knowledge of BC signs and symptoms

Recognizing a change in breast position and shape as a potential sign of BC had a significant association with the likelihood of seeking screening services ($\chi^2 = 40.84$, df = 2, $p < 0.001$). Similarly, the presence of an inverted nipple, which was perceived as an indicator of BC or increased risk, showed a strong connection with the utilization of screening services ($\chi^2 = 84.79$, df = 2, $p < 0.001$). Participants who believed that having pain in one or both breasts was indicative of BC were more likely to seek screening services, with the results showing a statistically significant association ($\chi^2 = 80.80$, df = 2, $p < 0.001$). The perception that peeling of the breast skin might signify BC also demonstrated a significant relationship with the utilization of screening services ($\chi^2 = 69.81$, df = 2, $p < 0.001$). These are shown in Table 2.

Abnormal nipple discharge as a symptom of BC was significantly associated with seeking screening services ($\chi^2 = 39.44$, df = 2, $p < 0.001$), as was bleeding as a sign of BC ($\chi^2 = 22.01$, df = 2, $p < 0.001$). Breast lumps ($\chi^2 = 21.51$, df = 2, $p < 0.001$), changes in the size and color of the breast ($\chi^2 = 53.08$, df = 2, $p < 0.001$), presence of a rash or pimple on the surface of the breast ($\chi^2 = 71.41$, df = 2, $p < 0.001$), lump in the armpit ($\chi^2 = 97.85$, df = 2, $p < 0.001$) and changes in nipple size ($\chi^2 = 61.62$, df = 2, $p < 0.001$) all additionally increased likelihood of seeking screening services.There was a demonstrable relationship between knowledge of signs and symptoms of BC and the likelihood to seek ($\chi^2 = 108.44$, df = 2, $p < 0.001$) or utilize BC screening services. Those knowledgeable of BC signs and symptoms were up to 71.50 times more likely to participate in BC screening services than those who were not,resonating well with qualitative findings as narrated by most participants. Discussants in the FGDs perceived that: *"As I mentioned before, I have not been screened for breast. Some of these symptoms that I know include; headache, loss of appetite and loss of weight. "(Respondent5, 15–19)(make this to be idented like the rest for consistency purposes).*

> *"I already said I have never sought those services. Breast is painful and you can feel something is moving inside" (Respondent1, 40–49).* (italize all the quotes)

3.2.4. Participant's attitude towards BC screening

Participants who reported feeling embarrassed during a doctor's examination for BC, those who feared visiting the doctor for checkups, and those who considered BC screening a waste of doctor's time all had a negative likelihood of seeking screening services ($\chi^2 = 23.60$, df = 2, $p < 0.001$; $\chi^2 = 49.29$, df = 2, $p < 0.001$ and $\chi^2 = 28.21$, df = 2, $p < 0.001$) respectively. Additionally, individuals who considered BC screening services as too expensive and those perceiving certain characteristics of the doctor as barriers were significantly less likely to utilize such services ($\chi^2 = 42.23$, df = 2, $p < 0.001$,and $\chi^2 = 87.76$, df = 2, $p < 0.001$) respectively.

Holding the effects of other variables constant, attitude was statistically associated with uptake of BC screening services (OR = 84.15, $p < 0.001$, 95%, CI: 4.30–1647.98 as shown in Table 2. Those with a positive attitude towards BC screening services were 84.15 times more likely to seek screening services than those who had a negative attitude. Consistent with multiple logistic results, most of the participants in qualitative research narrated similar findings. One discussant in FGD and the nursing officer-in-charge argued that;

> *"I first avoid using screening services because of the stigma. The second fear is that you might visit the hospital and be examined by a male doctor, which would be humiliating and cause you to feel ashamed" (Respondent, 30–39).* (make the rest look like this)

> *"No, they do not seek out breast cancer screening services, nor do they perform self-breast exams. They're not present when we're meant to be teaching them how to perform a self-breast inspection. As a result, you cannot claim that people who examine their own breasts do so in order to obtain services—that is not the case"" (Nursing officer In-Charge, KII1).*

3.2.5. Self-breast examination practices

Thirty percent (30.36%) of participants who reported having practiced SBE had been screened for BC. There was a significant relationship between practicing SBE and uptake of BC screening services in chi-square test analysis with values $\chi^2 = 30.88$, df = 1, $p < 0.001$. Self breast examination practices were not a predictor variable of the uptake of BC screening services (p = 0.606; Table 2). These results agreed with qualitative findings as supported by the majority of the participants. The nursing officer-in-charge noted that;

"No, they do not seek out breast cancer screening services, nor do they perform self-breast exams. They're not present when we're meant to be teaching them how to perform a self-breast inspection. As a result, you cannot claim that people who examine their own breasts do so in order to obtain services—that is not the case"" (Nursing officer In-Charge, KII1). (Put the closing quotation marks in all quotes and remove the decimal places and retain the last one after the respondent) additionally italize all the quotes

3.3. Lifestyle factors associated with uptake of BC screening services

Nearly all women (94.36%) were not breastfeeding, and 76.08% were using contraceptives. About half of the women (47.5%) fell in the normal category of BMI, Forty four percent of the respondents met the recommended 75 min for vigorous physical activity and 150 min for moderate physical activity, 5.26% smoked, 20.75% were currently drinking, and 26.12% had been diagnosed with chronic diseases.

The lifestyle factors with a significant relationship with the dependent variable were then modeled with multiple logistic regression analysis at a 95% confidence level and the Omnibus test was significant, implying that the variables in the model collectively influenced the uptake of BC screening services ($\chi^2 = 56.40$, $df = 4$, $p < 0.001$). The Hosmer and Lemeshow goodness–of–fit test was insignificant ($\chi^2 = 11.97$, df = 6, p = 0.063), confirming that the prediction model was a good fit for the data. Wald criterion demonstrated that breastfeeding ($\chi^2 = 29.28$, $df = 1$, $P^*<0.001$), contraceptive use ($\chi^2 = 515$, $df = 1$, $P = 0.023$), involvement in physical activity (χ^2=22.05, $df = 1$, $p < 0.001$) and whether respondents had been diagnosed with any lifestyle disease ($\chi^2 = 21.59$, df = 1, $p < 0.001$) were significantly associated with uptake of BC screening services (Table 3).

The likelihood of seeking BC screening services was found to be 37 times higher across three demographics; breastfeeding mothers, physically active mothers, and mothers previously diagnosed with chronic diseases. Insights from qualitative findings from KII and FGD emphasized how breastfeeding mothers often seek screening services during antenatal visits: *"Mostly breastfeeding mothers who*

Table 3
Multiple logistic regression on Lifestyle Factors.

Independent variable	Chi-square test for independence	Multiple logistic regression OR 95 % CI	p-value
Breastfeeding	$\chi^2 = 29.28$		P <
	df = 1		0.001
Yes	P*<0.001	37.04(0.00, 0.32)	
No		Reference	
Contraceptive Use	$\chi^2 = 515$		0.257
Yes	df = 1	0.31 (0.04, 2.34)	
No	P = 0.023	Reference	
Body Mass Index	$\chi^2 = 22.87$		
Move it to the right like the rest Underweight	df = 3		
Normal	P* = 0.245		
Overweight			
Obese			
MUAC Mid-Upper Arm Circumference	$\chi^2 = 2.96$		
Underweight	df = 4		
Normal	p* = 0.564		
Overweight			
Obese			
Does the respondent meet the required 75 min for vigorous physical activity or 150 min for moderate physical activity?	$\chi^2 = 22.05$	37.04(0.00, 0.25)	P <
	df = 1		0.001
Yes	P < 0.001		
No		Reference	
Smoking	$\chi^2 = 0.17$		
Yes	df = 1		
No	P* = 0.657		
Alcohol Intake	$\chi^2 = 1.60$		
Yes	df = 1		
No	P* = 0.235		
Chronic Diseases	$\chi^2 = 21.74$		P <
	df = 1		0.001
Yes	P < 0.001	37.04(0.00, 0.17)	
No		Reference	
Name of the Chronic Disease	$\chi^2 = 3.73$		
Ulcers	df = 7		
Diabetes	P* = 0.861		
Cancer			
High Blood Pressure			
Chronic Obstructive Respiratory Disease			
Mental Illness			
Heart Disease			
Any Other Specify			

come for antenatal services seek BC screening services as well", (Nursing In-charge) refine it to look like the rest by making it ident. Besides, while physically active individuals prioritize their overall health examinations, those managing chronic diseases are usually encouraged during clinic sessions to undergo screenings due to lifestyle changes and potential health risks.

4. Discussion

Our study established that only 10.21% of the sampled women in Turbo sub-county were screened for BC. The participation rate in this recent research was in accordance with a national survey carried out in Kenya [9].

There was no statistically significant correlation between BC awareness and the use of BC screening services. Al-Azri found that although most participants were aware of BC only a few were screened [24], which was in concordance with these current findings. The current results, however were inconsistent with previous reports that awareness of BC adversely affected BC screening rates [25–27]. The discrepancies and similarities might be attributed to the varying amount of information respondents were given on BC. In this current study, uptake of BC screening services was independent of knowledge of BC risk factors. These results deviated from earlier studies which revealed a significant association between knowledge of BC risk factors and uptake of BC screening services [25–27].

This study found a statistically significant association between awareness of BC signs and symptoms and the use of BC screening services. Besides, the findings of this study aligned with previous studies that found women who were knowledgeable of BC signs and symptoms were more likely to seek BC screening services [25,26]. The knowledge that respondents had about BC screening services supported their healthy living practices which may be the most evident explanation for the constant findings between the results of the current study and those of earlier studies. These results, however did not support the findings of the aforementioned research [28,29], which indicated no association between screening rates and knowledge of the signs and symptoms of BC. The discrepancies seen may be explained by the fact the current study used a wider-scope Likert scale.

The current study, like in previous studies conducted in Nigeria and Saudi Arabia [24,28], found a non-significant association between BC screening uptake and knowledge of BC screening services. The current results were, however inconsistent with previous research works which reported that awareness of BC screening services adversely affected screening rates [25–27]. The discrepancies may be explained by the active awareness campaigns that encouraged women to be screened in earlier reports, in contrast to the current study.

The study found an association between uptake of BC screening and possessing a positive attitude. These findings support the existing literature [26,27,21], which revealed that a positive attitude towards BC screening services increased the rates of BC screening. However, the current results differ from those of a study by Okomo et al. (2019), who found no association between attitudes and the use of BC screening programs. A possible explanation for these conflicting outcomes could be that the present study used a 16 Likert BCAM questionnaire to measure attitude, contrary to Okomo et al., 2019 who used only two parameters [30].

In the current study, there was a non-significant correlation between SBE practices and the use of BC screening services. These findings agreed with Olasehinde et al. (2019) who similarly found a non-significant association between SBE practice and utilization of BC screening services [31] but countered studies [25,32] claiming SBE practices predicted the use of BC screening services. The unwillingness of women in this study to undergo screening and engage in SBE may have been impacted by socio-cultural factors.

Our Study established that breastfeeding women were more likely to have ever been screened for BC. These findings aligned with a previous study in Australia [33]. Previous reports have also indicated that breastfeeding increases BC screening rates [27,34]. The apparent agreement between this current study and the previous works could be explained by breastfeeding women getting more awareness about BC screening services when seeking antenatal and post-natal services.

We did not find any significant association between the use of contraceptives and the uptake of BC screening services. Harmoniously, previous studies reported a non-significant relationship between contraceptive use and BC screening rates [33,35,36]. This can be attributed to low levels of awareness of contraceptives as a risk factor for BC. In this study, significantly higher screening rates were recorded among women who were adherent to regular physical activity. South Africa and Turkey's findings were in concordance with current study findings [6,36]. This could be because women who adhere to regular physical activity are likely to be aware of the benefits of preventive health practices.

We found higher BC screening uptake rates among participants who had lifestyle-related diseases. In support of our study findings, previous research has found an association between having a lifestyle-related disease and screening rates [6,36]. The opportunity for referral for cancer screening during clinical visits is high for individuals with lifestyle-related diseases. This was in contrast to the findings of Aminisani et al. (2016) and Talley et al. (2015), who found no link between lifestyle diseases and uptake rates [35,37]. Since these studies included women from different ethnic and racial groups, they could have received underserved medical care, contributing to the divergence with the current study.

In this present study, BC risk factors such as alcohol consumption and smoking were not related to the uptake of BC screening services. This was in agreement with past research carried out in Australia [33]. The consistencies in the reported observations between the present research and the previous report could be explained by low levels of awareness of BC risk factors and the importance of early screening services. Women who drank alcohol and those who smoked were more likely to participate in MMG screening in past research carried out in Sweden and Iran, which contrasted with our current findings [38,39]. Smoking does not directly increase screening, but instead is an indicator of the increased likelihood of women who are smoking and drinking getting BC, thus targeted educational and screening programs among these high-risk groups.

Finally, we found no linkage between BMI and uptake rates. This was in agreement with earlier reports from Carey and El-Zaemey (2020), and Sozmen et al. (2016) [33,36]. The likely explanation for the consistent results could be attributed to a lack of awareness of the implications of nutritional status on health. An Iranian study had previously found that women who had normal weight were more

likely to be screened compared to those who were overweight and obese, and additionally that the obese are less likely to adhere to preventive health services [35].

5. Implications

The implications of these findings are far-reaching and necessitate urgent attention from healthcare providers, policymakers, and public health advocates. Interventions aimed at enhancing knowledge dissemination regarding BC screening protocols, benefits, and risks are imperative. Education campaigns should target not only the general population but also specific demographic groups identified as particularly vulnerable to misinformation or lacking in awareness. Furthermore, addressing negative attitudes towards BC screening is essential. This may involve targeted communication strategies to debunk myths, alleviate fears, and promote a positive perception of screening services. Additionally, lifestyle factors influencing screening uptake highlight the importance of holistic healthcare interventions. Efforts to promote healthy lifestyles, including regular exercise, and breastfeeding, should be integrated with BC screening programs. Collaborative efforts between healthcare providers, community organizations, and governmental agencies are pivotal in implementing multifaceted interventions that address these interconnected factors comprehensively.

6. Conclusion

The findings of this research underscore the significant impact of knowledge, attitude, and lifestyle factors on the uptake of BC, revealing a concerning trend of poor utilization. Through a comprehensive analysis, it is evident that deficiencies in knowledge regarding screening procedures, negative attitudes towards screenings, and certain lifestyle choices (breastfeeding, physical activity, and chronic diseases) were significant barriers hindering women from accessing these vital healthcare services. These factors collectively contribute to a disconcerting scenario where preventive measures against BC remain underutilized, thereby compromising early detection and timely intervention efforts.

Data availability statement

Upon a reasonable request, the authors will provide the raw data that underpins the conclusions of this article without undue reservation. (Consider the first author name as Koech J Maureen in author contribution statement and also in the authorship list. Adjust the section similary and start with the first author. According to the released online copy, the first author contribution has been placed at the end.).

CRediT authorship contribution statement

J. Maureen Koech: Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Karani Magutah:** Writing – review & editing, Validation, Supervision, Project administration, Methodology, Investigation, Conceptualization. **Dominic M. Mogere:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis. **John Kariuki:** Writing – review & editing, Supervision, Methodology, Investigation, Conceptualization. **Kipyegon Willy:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Formal analysis. **Mutua Alex Muriira:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis. **Harrison Chege:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Africa Cancer Fact sheets, Globocan [Internet], International Agency for Research on Cancer, vol. 598, World Health Organization, 2020, pp. 1–2. Available from: https://gco.iarc.fr/today/data/factsheets/populations/903-africa-fact-sheets.pdf.
[2] F. Bray, M. Laversanne, E. Weiderpass, I. Soerjomataram, The ever-increasing importance of cancer as a leading cause of premature death worldwide [Internet], Cancer 127 (16) (2021 Aug 15), 3029–30. Available from: https://onlinelibrary.wiley.com/doi/full/10.1002/cncr.33587. (Accessed 9 September 2022).
[3] GLOBOCAN, GLOBOCAN 2020: New Global Cancer Data [Internet], UICC, 2020. uicc.org/news/globocan-2020-new-global-cancer-data. (Accessed 17 January 2022).
[4] H. Sung, J. Ferlay, R.L. Siegel, M. Laversanne, I. Soerjomataram, A. Jemal, et al., Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries [Internet], CA Cancer J Clin 71 (3) (2021 May 1) 209–249 [cited 2024 May 18], https://onlinelibrary.wiley.com/doi/full/10.3322/caac.21660.
[5] J. Liu, J. Wang, Disability-adjusted life-years (DALYs) for breast cancer and risk factors in 195 countries: findings from global burden of disease study 2017. https://doi.org/10.1101/2020.04.02.20050534, 2020.
[6] N. Phaswana-Mafuya, K. Peltzer, Breast and cervical cancer screening prevalence and associated factors among women in the South African general population [Internet], Asian Pac J Cancer Prev 19 (6) (2018 Jun 1) 1465. Available from:/pmc/articles/PMC6103566/. (Accessed 18 May 2024).
[7] GLOBOCAN, Statistics at a Glance, 2022 Top 5 Most Frequent Cancers Number of New Cases 44 726, 2020.
[8] Ministry of Health, MOH-National-Cancer-Control-Strategy-2017-2022, 2017.
[9] R. Antabe, Utilization of breast cancer screening in Kenya: what are the determinants? [cited 2021 Feb 3], BMC Health Serv Res [Internet] 20 (1) (2020 Mar 18). Available from: https://pubmed.ncbi.nlm.nih.gov/32183801/.

[10] K.K. Poudel, Z. Huang, P.R. Neupane, R. Steel, J.K. Poudel, Hospital-based cancer incidence in Nepal from 2010 to 2013. Nepal [Internet], J. Epidemiol. 7 (1) (2017 Jul 13) 659. Available from:/pmc/articles/PMC5607447/. (Accessed 18 May 2024).
[11] A. Davidson, S. Chia, R. Olson, A. Nichol, C. Speers, A.J. Coldman, et al., Stage, treatment and outcomes for patients with breast cancer in British Columbia in 2002: a population-based cohort study, CMAJ Open 1 (4) (2013 Nov 7) E134–E141.
[12] ECR, Kenya - eldoret cancer registry [Internet], https://afcrn.org/membership/members/101-eldoret, 2023. (Accessed 18 May 2024).
[13] N. Karimi, S. Saadat-Gharin, A. Tol, R. Sadeghi, M. Yaseri, B. Mohebbi, A problem-based learning health literacy intervention program on improving health-promoting behaviors among girl students [cited 2024 May 18], J Educ Health Promot [Internet] 8 (1) (2019 Dec 1). Available from:/pmc/articles/PMC6967126/.
[14] D.U. Ramathuba, C.T. Ratshirumbi, T.M. Mashamba, Knowledge, attitudes and practices toward breast cancer screening in a rural South African community [Internet], Curationis 38 (1) (2015 Feb 27). Available from:/pmc/articles/PMC6091642/. (Accessed 18 May 2024).
[15] M.Z. Sarwar, S.F.H. Shah, M.R. Yousaf, Q.A. Ahmad, S.A. Khan, Knowledge, attitude and practices amongst the Pakistani females towards breast cancer screening programme [Internet], J Pak Med Assoc 65 (10) (2015 Oct 1), 1075–8. Available from: https://europepmc.org/article/MED/26440836. (Accessed 18 May 2024).
[16] L. Lostao, T.E. Joiner, J.W. Pettit, P. Chorot, B. Sandín, Health beliefs and illness attitudes as predictors of breast cancer screening attendance, Eur J Public Health 11 (3) (2001) 274–279.
[17] A.S. Anderson, D. Mackison, C. Boath, R. Steele, Promoting changes in diet and physical activity in breast and colorectal cancer screening settings: an unexplored opportunity for endorsing healthy behaviors [Internet], Cancer Prev. Res. 6 (3) (2013 Mar) 165–172 [cited 2024 May 18], https://pubmed.ncbi.nlm.nih.gov/23324132/.
[18] K.R. Beckmann, D.M. Roder, J.E. Hiller, G. Farshid, O.W. Lynch, Do breast cancer risk factors differ among those who do and do not undertake mammography screening? J. Med. Screen 20 (4) (2013 Dec 1) 208–219.
[19] A. Fisher, J. Laing, J. Stoeckel, J. Townsend. Handbook for family planning operations research design [Internet] Reproductive Health Social and Behavioral, Science Research, 1991, pp. 43–46. Available from: https://knowledgecommons.popcouncil.org/departments_sbsr-rh/980.
[20] KNBS, 2019 Kenya Population and Housing Census: Volume II I, 2015.
[21] L.T. Duong, H.M. Chen, C.Y. Liu, P.Y. Chiou, Factors affecting mammography screening behaviour among rural Vietnamese women [Internet], Eur. J. Cancer Care 29 (6) (2020 Nov 1) [cited 2024 May 18], https://scholars.lib.ntu.edu.tw/handle/123456789/609224.
[22] United Kingdom CR, King's College London, Breast Cancer Awareness Measure (Breast CAM) Toolkit V.2, Cancer Research UK, University College London, 2015, pp. 1–75 (version 2).
[23] WHO, Global physical activity questionnaire [cited 2024 May 18];1–3. Available from: https://www.who.int/publications/m/item/global-physical-activity-questionnaire, 2021.
[24] M. Al-Azri, K. Al-Rubaie, S. Al-Ghafri, M. Al-Hinai, S.M. Panchatcharam, Barriers and attitudes toward breast cancer screening among Omani women, Asian Pac. J. Cancer Prev. APJCP 21 (5) (2020 May 1) 1339–1347.
[25] C. Atuhairwe, D. Amongin, E. Agaba, S. Mugarura, I.M. Taremwa, The effect of knowledge on uptake of breast cancer prevention modalities among women in Kyadondo County, Uganda [Internet], BMC Publ. Health 18 (1) (2018 Feb 23) 1–8. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-018-5183-5. (Accessed 18 May 2024).
[26] D. Bhandari, A. Shibanuma, J. Kiriya, S. Hirachan, K.I.C. Ong, M. Jimba, Factors associated with breast cancer screening intention in Kathmandu Valley, Nepal [Internet], PLoS One 16 (1) (2021 Jan 1) e0245856 [cited 2024 May 18], https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0245856.
[27] M. Salama, B. Factors, Affecting mammography screening utilization among educated women in Al Beheira governorate, Egypt [Internet], Indian J. Community Med. 45 (4) (2020) 522 [cited 2024 May 18], https://journals.lww.com/ijcm/fulltext/2020/45040/factors_affecting_mammography_screening.28.aspx.
[28] A.H. Al-Zalabani, K.D. Alharbi, N.I. Fallatah, R.I. Alqabshawi, A.A. Al-Zalabani, S.M. Alghamdi, Breast cancer knowledge and screening practice and barriers among women in madinah, Saudi Arabia [Internet], J. Cancer Educ. 33 (1) (2018 Feb 1) 201–207 [cited 2024 May 18], https://link.springer.com/article/10.1007/s13187-016-1057-7.
[29] S.H. Subba, S.P. Parida, D.P. Sahu, J. Kumari, Knowledge and attitude towards, and the utilisation of cervical and breast cancer screening services by female healthcare professionals at a tertiary care hospital of Eastern India: a cross-sectional study [Internet], Niger. Postgrad. Med. J. 29 (1) (2022) 63 [cited 2022 Feb 22], https://www.npmj.org/article.asp?issn=1117-1936;year=2022;volume=29;issue=1;spage=63;epage=69;aulast=Subba.
[30] R.A. Okomo, J. Owenga, D. Onguru, Knowledge, attitude and practice towards breast cancer screening among female out-patients aged 18-65 Years seeking health care services at jaramogi oginga odinga teaching and referral hospital, kisum, International Journal of Scientific and Research Publications (IJSRP) 9 (5) (2019 May 6) p8959.
[31] O. Olasehinde, O.I. Alatise, O.A. Arowolo, V.L. Mango, O.S. Olajide, A.D. Omisore, et al., Barriers to mammography screening in Nigeria: a survey of two communities with different access to screening facilities [Internet], Eur. J. Cancer Care 28 (2) (2019 Mar 1) e12986. Available from:/pmc/articles/PMC6430195/. (Accessed 18 May 2024).
[32] N.W. Busakhala, F.A. Chite, J. Wachira, V. Naanyu, J.W. Kisuya, A. Keter, et al., Screening by clinical breast examination in western Kenya: who comes? [Internet], J Glob Oncol 2 (3) (2016 Jun 27) 114–122 [cited 2021 Feb 16], http://www.ncbi.nlm.nih.gov/pubmed/28717690.
[33] R.N. Carey, S. El-Zaemey, Lifestyle and occupational factors associated with participation in breast mammography screening among Western Australian women [Internet], J. Med. Screen 27 (2) (2020) [cited 2021 Nov 9], https://pubmed.ncbi.nlm.nih.gov/31581885/.
[34] S.A. Alshammari, A.M. Alhazmi, H.A. Alenazi, H.S. Alshammari, A.M. Alshahrani, Mammography uptake among the female staff of King Saud University [Internet], J Family Med Prim Care 9 (1) (2020) 221. Available from:/pmc/articles/PMC7014892/. (Accessed 18 May 2024).
[35] N. Aminisani, R. Fattahpor, S. Dastgiri, M. Asghari Jafarabadi, H. Allahverdipour, Determinants of breast cancer screening uptake in Kurdishwomen of Iran, Health Promot. Perspect. 6 (1) (2016 Mar) 42–46.
[36] K. Sözmen, B. Unal, S. Sakarya, G. Dinc, N. Yardim, B. Keskinkilic, et al., 101177/1010539516654541 [Internet], Determinants of Breast and Cervical Cancer Screening Uptake Among Women in Turkey, vol. 28, 2016 Jun 26, pp. 528–538, 6, https://journals.sagepub.com/doi/10.1177/1010539516654541?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub++0pubmed. (Accessed 18 May 2024).
[37] C.H. Talley, K.P. Williams, Impact of age and comorbidity on cervical and breast cancer literacy of african Americans, latina, and Arab women [Internet], Nurs Clin North Am 50 (3) (2015) 545. Available from:/pmc/articles/PMC4559754/. (Accessed 18 May 2024).
[38] M. Kardan-Souraki, M. Moosazadeh, S. Khani, Z. Hamzehgardeshi, Factors related to breast cancer screening in women in the Northern part of Iran: a cross-sectional study [Internet], Open Access Maced J Med Sci 7 (4) (2019 Feb 2) 637. Available from:/pmc/articles/PMC6420934/. (Accessed 18 May 2024).
[39] M. Lagerlund, I. Drake, E. Wirfält, J.M. Sontrop, S. Zackrisson, Health-related lifestyle factors and mammography screening attendance in a Swedish cohort study [Internet], Eur. J. Cancer Prev. 24 (1) (2015 Jan 11) 44–50. Available from: https://journals.lww.com/eurjcancerprev/fulltext/2015/01000/health_related_lifestyle_factors_and_mammography.7.aspx. (Accessed 18 May 2024).