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Al-Baha Women's Breast Cancer Perspectives

RESEARCH ARTICLE

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Knowledge about Breast Cancer and Barriers to Screening among Saudi Women in Al-Baha Region

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Abstract

Objective: The aim of this study was to measure the knowledge about breast cancer and to identify the barriers in screening among Saudi women in the Al-Baha region. To achieve this, a cross-sectional study was conducted, involving 468 women, to assess their understanding of breast cancer and to explore the obstacles they face in accessing breast cancer screening services. **Methods:** The cross-sectional study included 468 women from Al Baha, Saudi Arabia, starting from May 17, 2022, to May 17, 2023. Participants were interviewed by well-trained team members of the research, and their responses were subsequently entered into a Google Form. This process aimed to evaluate their awareness, knowledge, and barriers to breast cancer screening. **Results:** The majority of participants (48.9%) were in the 18-28 age group. The findings reveal a high level of awareness (96.4%) among participants regarding the significance of early breast cancer detection. For the effectiveness of breast cancer treatment, 59% believed there is an effective treatment, while 32.9% were uncertain or did not know. Knowledge about various risk factors for breast cancer varied. Smoking (73.5%), genetic factors (65.6%), and a family history of breast cancer (70.7%) were well-recognized as risk factors. Education and occupation significantly influenced knowledge about breast cancer (p-value of 0.000, and 0.035 respectively). **Conclusion:** this research highlights strong awareness of breast cancer's importance but gaps in knowledge regarding lesser-known factors. Education is crucial, requiring tailored campaigns and healthcare professional engagement.

Keywords: Awarenesses- access to health services- risk factor- community health education

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Introduction

Breast cancer is the leading cancer among women worldwide, surpassing lung cancer, with an estimated 2.3 million new cases annually [1, 2]. According to 2020 GLOBOCAN data, nearly 2.2 million women were diagnosed with breast cancer, leading to 684,996 deaths. The American Cancer Society states that 1 in 8 U.S. women will develop breast cancer in her lifetime. Future projections suggest that global breast cancer cases could rise to approximately 3.2 million annually by 2050 [3]. The incidence of breast cancer is becoming more noticeable in emerging countries due to the increasing life expectancy of individuals. Factors such as age, the longer lifespan of women, and lifestyle choices contribute to this higher occurrence rate [4]. These us highlight the significant global impact of breast cancer, underscoring the urgent need for preventive and treatment strategies [3].

Early cancer detection facilitates timely intervention and treatment, significantly improving patient outcomes and treatment success rates. Advances in diagnostic techniques, such as improved imaging technologies and screening programs, have been instrumental in early detection efforts. Moreover, increased awareness and education about cancer symptoms and risk factors have prompted more individuals to seek medical attention during the disease's early stages [5].

Breast cancer, a complex disease, is influenced by various factors including gender, age, hormonal changes, family history, obesity, genetic mutations, and lifestyle choices [6]. Its incidence, previously predominant in Western countries, is increasingly observed in Asian nations, leading to higher mortality rates [7].

Early detection and treatment are key to reducing breast cancer mortality, involving clinical breast examinations and mammography. Lack of early diagnosis initiatives contributes to rising mortality rates in both developing and industrialized nations. This highlights the urgent need for enhanced global efforts in early detection to combat breast cancer mortality [8].

Research in different parts of Saudi Arabia reveals a significant lack of knowledge among Saudi women about

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breast cancer, highlighting the crucial need for early detection [9, 10].

Studies by Radi, [11] and Abulkhair et al. [12] have explored the knowledge, attitudes, and awareness of breast cancer among Saudi women, particularly focusing on breast self-examination and breast cancer awareness. These investigations consistently highlight the urgent need for improved education and awareness initiatives to strengthen early detection and prevention efforts..

Additionally, studies have focused on understanding the mortality rates due to breast cancer in Saudi Arabia and the factors that contribute to them. A significant study by Alotaibi et al. [13] aimed to model factors influencing breast cancer mortality in Saudi Arabia, utilizing data from the Saudi Arabian Cancer Registry. By examining both observed and unobserved factors, the study identified mortality-associated factors among breast cancer patients. Understanding these determinants can help pinpoint areas for intervention and advancement in breast cancer management, leading to a reduction in mortality rates

In addition to the mortality rate, studies have highlighted the barriers to breast cancer screening, including lack of knowledge and awareness among women [14]. In Saudi Arabia, research has shown that there is a need for improved awareness and knowledge of breast cancer screening methods among both the general population and healthcare workers [9, 15, 16]. Despite the availability of screening resources, the level of awareness about breast cancer screening remains low in Saudi Arabia [16]. Cultural barriers, lack of education, and inadequate social support have been identified as factors contributing to low screening rates [17, 10].

In conclusion, research conducted across various regions of Saudi Arabia has revealed a lack of information on breast cancer, highlighting the critical need for heightened awareness and early detection programs. These studies extensively examined the knowledge, attitudes, and awareness of breast cancer among Saudi women, as well as mortality and incidence rates, collectively emphasizing the importance of education, awareness, and early identification in reducing the burden of breast cancer in Saudi Arabia.

Materials and Methods

A cross-sectional study, 468 women residing in Al Baha, Saudi Arabia, were engaged to provide insights. They were asked to complete a questionnaire, which assessed their breast cancer awareness and knowledge, along with identifying potential barriers to screening. Recruitment spanned a year, commencing on May 17, 2022, and concluding on May 17, 2023, utilizing face-to-face interviews as the primary method for data collection to reach the participants in the Al Baha, Baljurashi, and Al-Qara.

The questionnaire, adapted from Boulos and Ghali (2014) and Alshahrani et al. [9], featured eight sections: personal information, breast cancer knowledge extent, risk factors knowledge, symptoms awareness, treatment awareness, early screening comprehension, screening barriers, and health information sources.).

Study Area

The research was carried out in the Al Baha, Baljurashi, and Al-Qara regions of Saudi Arabia.

Inclusion and Exclusion Criteria

The inclusion criteria comprised females aged 16 or older residing in the Al-Baha, Baljurashi, and Al-Qara regions, capable of communicating in Arabic or English. Exclusion criteria encompassed those under 16, unable to communicate in English or Arabic, and living outside the specified regions.

Sample Size and Sampling Technique

In determining the sample size for our study, which targets a population of 476,172 individuals, we initially calculated a sample size of approximately 384 using the standard formula for an infinite population. This calculation considered a 95% confidence level, a 50% population distribution, and a 5% margin of error. Given the considerable size of our population, we further refined our sample size estimation by applying the Finite Population Correction (FPC) formula. Despite the adjustment for the finite population size, our calculated sample size remained consistent at approximately 384. This rigorous method ensures that our sample adequately represents the unique characteristics of the finite population while preserving the desired level of precision in our study's findings.

Study Variables

The independent variables consisted of age, gender, location, marital status, educational level, and occupation, while the dependent variable was the level of awareness.

Data Collection

Study's data was collected through face-to-face interviews in hospitals, shopping areas, and parks.

Data entry and analysis

Data collection began with a Google Form, and the responses were downloaded into an Excel spreadsheet for analysis. This data was then imported into SPSS Version 25 for detailed examination. Descriptive statistics, such as frequencies and percentages, were initially conducted. Knowledge scores were calculated by summing correct answers out of 27 possible points, with scores 0-13 indicating insufficient knowledge and scores 14-27 indicating sufficient knowledge, following Alam et al. (2021)'s 50% correct answers criterion for knowledge assessment. Chi-square tests assessed relationships between variables, and binary logistic regression identified predictors of breast cancer knowledge. Statistical significance was set at a 0.05 margin of error with a 95% confidence interval.

Reliability analysis

We ensured questionnaire validity and reliability through a systematic validation process. The tool was developed based on literature and expert review for content validity, followed by a pilot test to refine it. For reliability analysis, we used Cronbach's alpha for the "Knowledge" variable, consisting of 27 items,

yielding a value of 0.868. This indicates strong internal consistency, affirming reliable measurement of breast cancer knowledge. With Cronbach's alpha exceeding the accepted threshold, our findings are stable and accurately represent knowledge construct.

Ethical Considerations

Participants provided consent after being informed of the study's objectives and aim on the initial page of the questionnaire. Their confidentiality was maintained as personal data implying their identities was not included in the questionnaires. Ethical approval for this study was granted by the College of Medicine at Al-Baha University, Al Baha, Saudi Arabia, ensuring participant anonymity. Approval was obtained from the Scientific Research & Ethics Committee (REC): Al Baha University, Faculty of Medicine, under approval number REC/SUR/BU-FM/2022/23.

Results

Baseline characteristics of the study participants

The study involved 468 women from Al Baha, Saudi Arabia, primarily aged 18-50, with 48.9% between 18-28. Most had university degrees (71.6%), 51.1% were married, and 43.2% single. Participants were mainly housewives (40%) and students (37.4%). Additionally, 90.4% had no previous breast issues, and 81.4% had no family breast cancer history, while 15.4% did, as detailed in Table 1.

Knowledge about Breast Cancer

In the study, 96.4% of participants acknowledged the importance of early breast cancer detection for better treatment outcomes, with only 0.9% disagreeing. Opinions varied on treatment effectiveness: 59.0% believed in its efficacy, 8.1% did not, and 32.9% were uncertain or unclear, as shown in Table 2.

Knowledge about risk factors of breast cancer

Participants in the study displayed varied awareness of breast cancer risk factors. While 38.2% recognized high-fat diets as risky, 45.5% acknowledged aging. Obesity and smoking were identified by 47.9% and 73.5% respectively. Radiation exposure risks were known to 68.6%, while 40.2% were aware of oral contraceptive risks.

Genetic factors and family history were recognized by 65.6%, with 70.7% acknowledging family history. Alcohol consumption risks were noted by 60.7%.

Regarding reproductive and hormonal factors, 56.2% identified never breastfeeding as risky. Only 18.2% recognized risks with first full-term pregnancy after 30, and 16.7% knew about never being pregnant risks. Early menarche and late menopause were recognized by 10.3% and 20.9% respectively (Table 3).

Knowledge about the signs and symptoms of breast cancer

The section shows varying awareness of breast cancer signs among participants. A breast mass was recognized by 82.5%, and changes in breast size or shape by 81.2%. About 67.3% knew about breast pain, and 66.5% were aware of changes in nipple size or retraction. Nipple discharge was recognized by 72%, but skin redness only by 56.2%. There was a mix of disagreement and uncertainty, indicating varied knowledge levels (Table 4).

Extent knowledge of breast cancer treatment

Table 5 reveals varying levels of understanding of breast cancer treatments among participants. Surgery was recognized by 80.3%, radiotherapy by 70.1%, and chemotherapy by 85.3%. However, awareness of hormonal therapy (32.1%) and targeted therapy (29.1%) was considerably lower, accompanied by significant uncertainty and disagreement. This underscores the need for enhanced education on all breast cancer treatment methods.

Extent knowledge of early breast cancer screening methods

In Table 6, 58.8% understand breast self-examinations. For mammography, 79.3% find it beneficial for early detection. Regarding breast ultrasound, 67.5% believe in its utility. This data reflects awareness and opinions on early breast cancer screening methods.

Barriers prevent women from breast cancer screening

Table 7 shows breast cancer screening barriers: Fear of positive results concerns 40.2%, societal judgment affects 11.1%, physical discomfort worries 27.1%, accessibility issues are noted by 27.4%, and the need for female doctors is a barrier for 31.2%. However, a majority in each category are either undeterred or don't find these issues problematic, with a small percentage uncertain in each case.

Sources of information about breast cancer

Healthcare workers inform 35.5% of individuals, health centers 26.3%, and universities 42.5%. Educational campaigns impact 50.9% of surveyed people, while books reach 36.5%. Magazines and newspapers each inform about 53.6% of the population. Friends and relatives contribute to the awareness of 31% and 36.3% respectively. Private clinics are the least utilized source, at 8.9%. This data, shown in Figure 1, provides insights into breast cancer information sources.

Breast Cancer Knowledge and Awareness Among Respondents

On average, participants scored 15.12 out of 27, with a standard deviation of 5.7, indicating moderate knowledge with variability. Scores ranged from 0 to 27, showing diverse understanding. It was found that, just, 61.8% with "sufficient knowledg." And 38.2% with "insufficient knowledge".

Relationship between participants knowledge and demographic characteristics

Table 8 illustrates the correlation between participants' breast cancer knowledge and their demographic characteristics. Regarding education, 75% of those without formal education lacked sufficient knowledge, contrasting

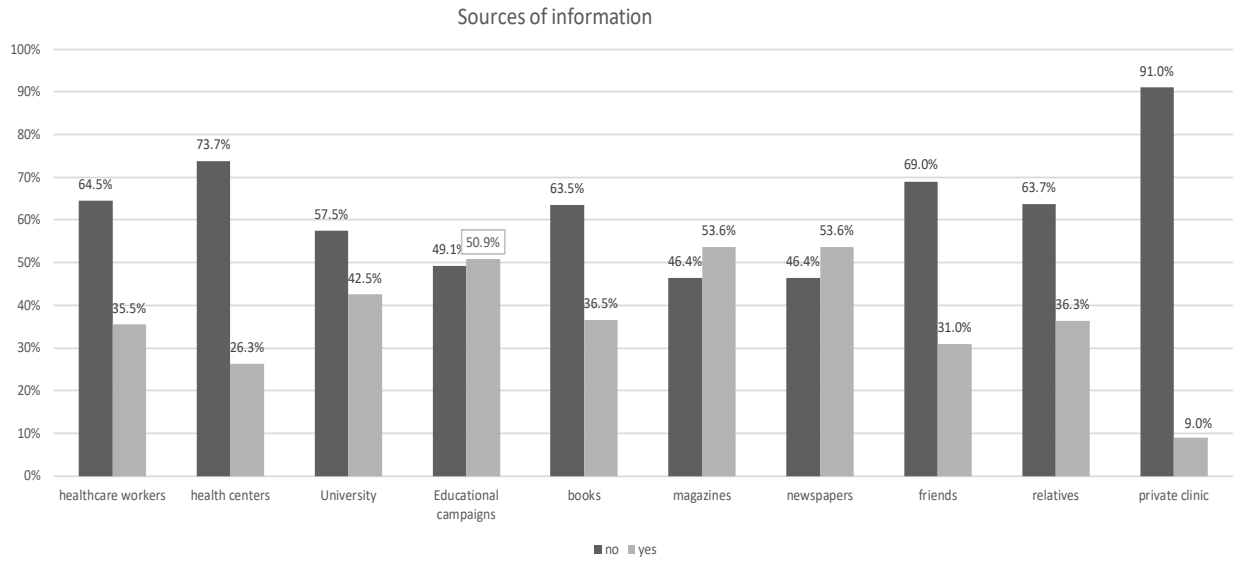

Figure 1. Sources of Information about Breast Cancer.

with 100% of primary school attendees who had sufficient knowledge. University attendees showed 66% with adequate knowledge, with a statistically significant relationship (p-value = 0.000). In terms of occupation, 70.8% of workers had sufficient knowledge, compared to 55.6% of housewives and 62.9% of students, with a statistically significant association (p-value = 0.035). However, variables like age, marital status, previous breast problems, and family history of breast cancer didn't show significant relationships, with p-values of 0.596, 0.708, 0.364, and 0.121, respectively.

Table 1. Baseline Characteristics of the Study Participants

Variable	N	%
Age		
18-28	229	48.9
29-39	90	19.2
40-50	140	29.9
> 50 years	9	1.9
Education		
None	16	3.4
Primary School	7	1.5
Intermediate School	31	6.6
Secondary School	79	16.9
University	335	71.6
Marital status		
Single	202	43.2
Married	239	51.1
Divorced	16	3.4
Widowed	11	2.4
Occupation		
Worker	106	22.6
Housewife	187	40.0
Student	175	37.4
Previous Breast Problem		
No	423	90.4
Do not know	21	4.5
Yes	24	5.1
Family History of Breast Cancer		
No	381	81.4
Do not know	15	3.2
Yes	72	15.4

Predictors of participants knowledge about breast cancer

Table 9 displays results from a logistic regression model examining predictors of breast cancer knowledge. Each predictor (age, education, marital status, occupation, previous breast problems, family history of breast cancer) has unadjusted and adjusted models. Odds ratios (OR) with 95% confidence intervals (CI) and p-values are provided.

In the unadjusted model, 'education' and 'occupation' significantly relate to breast cancer knowledge. Regarding 'education,' primary or intermediate schooling indicates lower odds of breast cancer knowledge compared to university education, with odds ratios of 0.172 (95% CI: 0.054-0.545) and 0.284 (95% CI: 0.131-0.613), respectively. This suggests a strong association with

Table 2. Knowledge about Breast Cancer

Variable	N	%
Early detection of breast cancer will improve treatment outcome		
No	4	0.9
Do not know	13	2.8
Yes	451	96.4
There is an effective treatment for breast cancer		
No	38	8.1
Do not know	154	32.9
Yes	276	59.0

Table 3. Knowledge about Risk Factors of Breast Cancer

Variable	N	%
High-fat diet		
No	131	28.0
Do not know	158	33.8
Yes (correct)	179	38.2
Aging		
No	121	25.9
Do not know	134	28.6
Yes(correct)	213	45.5
Obesity		
No	114	24.4
Do not know	130	27.8
Yes (correct)	224	47.9
Smoking		
No	52	11.1
Do not know	72	15.4
Yes (correct)	344	73.5
Expose to radiation		
No	65	13.9
Do not know	82	17.5
Yes (correct)	321	68.6
Oral contraceptive		
No	140	29.9
Do not know	140	29.9
Yes (correct)	188	40.2
Genetic factors		
No	58	12.4
Do not know	103	22.0
Yes (correct)	307	65.6
Family history of breast cancer		
No	59	12.6
Do not know	78	16.7
Yes (correct)	331	70.7
Alcohol		
No	70	15.0
Do not know	114	24.4
Yes (correct)	284	60.7
Never breastfed		
No	93	19.9
Do not know	112	23.9
Yes (correct)	263	56.2
First full term pregnancy >30 years		
No	201	42.9
Do not know	182	38.9
Yes (correct)	85	18.2
Never being pregnant		
No	202	43.2
Do not know	188	40.2
Yes (correct)	78	16.7
early menarche <12 years		
No	224	47.9
Do not know	196	41.9
Yes (correct)	48	10.3
late menopause >55 years		
No	183	39.1
Do not know	187	40.0
Yes (correct)	98	20.9

university education. In the adjusted model, these associations persist, with odds ratios of 0.136 (95% CI: 0.031-0.594) and 0.25 (95% CI: 0.106-0.595) for primary and intermediate schooling.

For 'occupation,' in the unadjusted model, 'housewives' have significantly lower knowledge odds (OR: 0.518; 95% CI: 0.312-0.861) compared to students. However, in the adjusted model, this significance diminishes (OR: 0.687; 95% CI: 0.386-1.223), suggesting the association weakens when considering other variables.

Other variables (age, marital status, previous breast problems, family history of breast cancer) show no relationship with breast cancer knowledge.

Table 4. Knowledge about the Signs and Symptoms of Breast Cancer

Variable	N	%
Breast mass		
No	39	8.3
Do not know	43	9.2
Yes (correct)	386	82.5
breast size or shape		
No	44	9.4
Do not know	44	9.4
Yes (correct)	380	81.2
breast pain		
No	78	16.7
Do not know	75	16.0
Yes (correct)	315	67.3
Change in nipple size or nipple retraction		
No	77	16.5
Do not know	80	17.1
Yes (correct)	311	66.5
Nipple discharge		
No	50	10.7
Do not know	81	17.3
Yes (correct)	337	72.0
Redness of breast skin		
No	99	21.2
Do not know	106	22.6
Yes (correct)	263	56.2

Table 5. Extent Knowledge of Breast Cancer Treatment

Variable	N	%
breast cancer may be treated by surgery		
No	41	8.8
Do not know	51	10.9
Yes (correct)	376	80.3
breast cancer may be treated by radiotherapy		
No	61	13.0
Do not know	79	16.9
Yes (correct)	328	70.1
breast cancer may be treated by chemotherapy		
No	23	4.9
Do not know	46	9.8
Yes (correct)	399	85.3
breast cancer may be treated by hormonal therapy		
No	142	30.3
Do not know	176	37.6
Yes (correct)	150	32.1
breast cancer may be treated by targeted therapy		
No	134	28.6
Do not know	198	42.3
Yes (correct)	136	29.1

Discussion

Our research focused on assessing the awareness, knowledge, and barriers related to breast cancer screening among women in the Al-Baha region. We found a substantial level of awareness, with 96.4% of participants acknowledging that early detection significantly improves treatment outcomes. This high level of awareness is consistent with studies from various regions of Saudi Arabia, indicating a nationwide recognition of the importance of early detection [15, 18].

Our study found that family history (70.7%), smoking (73.5%), and exposure to radiation (68.6%) as widely recognized risk factors for breast cancer. These findings corroborate those of previous studies; Alenezi et al. [15] and Alsowiyan et al. [19] highlighted the significance of family history and smoking. Moreover, Abdallah et al. [18] identified smoking as the primary risk factor for breast cancer, with 69.11% of their study participants acknowledging this, which is in close agreement with our results.

Table 6. Extent Knowledge of Early Breast Cancer Screening Methods

Variable	N	%
know how to do breast self-examination		
No	123	26.3
Do not know	70	15.0
Yes (correct)	275	58.8
think that breast mammography will help for early detection of breast cancer		
No	31	6.6
Do not know	66	14.1
Yes (correct)	371	79.3
breast ultrasound will help for early detection of breast cancer		
No	46	9.8
Do not know	106	22.6
Yes (correct)	316	67.5

Table 7. Barriers Prevent Women from Breast Cancer Screening

Variable	N	%
Being terrified of a positive result		
No	250	53.4
Do not know	30	6.4
Yes	188	40.2
Fear from society		
No	395	84.4
Do not know	21	4.5
Yes	52	11.1
Breast cancer screening is painful		
No	295	63.0
Do not know	46	9.8
Yes	127	27.1
Difficulty of getting an access to health care facilities		
No	313	66.9
Do not know	27	5.8
Yes	128	27.4
Lack female doctors		
No	284	60.7
Do not know	38	8.1
Yes	146	31.2
Economic status		
No	366	78.2
Do not know	28	6.0
Yes	74	15.8

However, the understanding of certain risk factors appears to vary. In our study, only 56.2% recognized never having breastfed as a risk factor. This contrasts starkly with the mere 2.9% in the study by Alsowiyan et al. [19] and the 1.83% identified by Abdallah et al. [18] concerning short breastfeeding periods. Additionally, the association of old age with breast cancer was recognized by only 8% in the Al-Zalabani et al. [20] study, indicating gaps in awareness of some risk factors across various regions in Saudi Arabia.

Concerning breast cancer signs and symptoms, our study revealed a high awareness among participants, with 82.5% recognizing a breast lump as a primary symptom. Comparable awareness levels were observed by Abdallah et al. [18] at 92.54%. Healthcare workers, as highlighted by Alenezi et al. [15], showed consistent recognition of non-painful breast lumps as a significant symptom. Additionally, Almutairi et al. [21] found substantial awareness of breast lumps (86.2%) and breast pain (93.7%) in different regions of Saudi Arabia.

Table 8. Relationship between Participants Knowledge and Demographic Characteristics

Variables	Knowledge about breast cancer		Chi	p-value
	Insufficient knowledge	Sufficient knowledge		
Age				
18-28	90 (39.3)	139 (60.7)	1.890	0.596
29-39	35 (38.9)	55 (61.1)		
40-50	49 (35)	91 (65)		
> 50	5 (55.6)	4 (44.4)		
Education				
None	12 (75)	4 (25)	27.374	0.000*
Primary school	0 (0)	7 (100)		
Intermediate school	20 (64.5)	11 (35.5)		
Secondary school	33 (41.8)	46 (58.2)		
University	114 (34)	221 (66)		
Marital status				
Single	82 (40.6)	120 (59.4)	1.389	0.708
Married	87 (36.4)	152 (63.6)		
Divorced	5 (31.3)	11 (68.8)		
Widowed	5 (45.5)	6 (54.5)		
Occupation				
Worker	31 (29.2)	75 (70.8)	6.710	0.035*
Housewife	83 (44.4)	104 (55.6)		
Student	65 (37.1)	110 (62.9)		
have any previous breast problem before				
No	164 (38.8)	259 (61.2)	2.021	0.364
Do not know	9 (42.9)	12 (57.1)		
Yes	6 (25)	18 (75)		
Presence of family history of breast cancer				
No	152 (39.9)	229 (60.1)	4.230	0.121
Do not know	7 (46.7)	8 (53.3)		
Yes	20 (27.8)	52 (72.2)		

Our research highlights considerable awareness among participants regarding breast cancer treatment modalities. A majority identified surgery (80.3%) and chemotherapy (85.3%) as key treatments, with radiotherapy acknowledged by 70.1%. However, awareness for hormonal and targeted therapies was notably lower, at 32.1% and 29.1% respectively, indicating a knowledge gap in these areas. Compared to Alsowiyan et al. [19]'s findings in AL-Qassim, where radiotherapy awareness was just 32%, our results suggest regional variations in treatment awareness, pointing to the need for targeted educational efforts. Alshareef et al. [22] further showed that among teachers, only 57% understood the stage-dependence of treatment, and awareness of surgery, chemotherapy, and radiotherapy was significantly lower. This emphasizes the impact of demographic and occupational factors on awareness and the importance of designing awareness programs to address these disparities.

The study also delves into the awareness and knowledge of early breast cancer screening among participants, revealing positive findings. A significant 58.8% demonstrated correct knowledge of breast self-examination (BSE), highlighting its role in early detection. Additionally, 79.3% of respondents affirmed their belief in the effectiveness of mammography, and 67.5% supported breast ultrasound as beneficial for early detection. These rates contrast with Al-Hanawi et al. [23], where only 30% recognized BSE as a screening tool, and awareness and practice of mammography were considerably lower, at 6.57% having undergone the procedure. This disparity underscores a considerable advancement in screening awareness and trust in diagnostic tools in our study, suggesting an improvement in public health education on breast cancer screening techniques.

Anxiety about receiving positive results was a significant barrier, with 40.2% of respondents viewing it as such, while societal judgment and physical discomfort were less concerning, noted by 11.1% and 27.1%, respectively. Access issues and the preference for female doctors were barriers for 27.4% and 31.2% of participants. Economic constraints were a concern for 15.8%. Studies like Alenezi et al. [15] and Al-Khamis [24] reflect similar fears and logistical issues, emphasizing the need for targeted awareness to address these barriers.

Table 9. Predictors of Participants Knowledge about Breast Cancer

Predictors	Unadjusted model		Adjusted model	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age				
18-28	Ref.	0.606	Ref.	0.815
29-39	1.017 (0.617-1.677)	0.946	0.976 (0.46-2.072)	0.950
40-50	1.202 (0.777-1.861)	0.408	1.286 (0.593-2.791)	0.524
> 50	0.518 (0.135-1.981)	0.336	0.916 (0.118-7.09)	0.933
Education				
None	0.172 (0.054-0.545)	0.003*	0.136 (0.031-0.594)	0.008*
Primary school	833321864.638 (0-0)	0.999	861576399.184 (0-0)	0.999
Intermediate school	0.284 (0.131-0.613)	0.001*	0.25 (0.106-0.595)	0.002*
Secondary school	0.719 (0.436-1.187)	0.719	0.724 (0.428-1.224)	0.228
University	Ref.	0.001*	Ref.	0.006*
Marital status				
Single	Ref.	0.709	Ref.	0.295
Married	1.194 (0.812-1.755)	0.367	1.909 (0.934-3.905)	0.076
Divorced	1.503 (0.504-4.488)	0.465	1.706 (0.502-5.794)	0.392
Widowed	0.82 (0.242-2.776)	0.820	3.454 (0.632-18.894)	0.153
Occupation				
Worker	Ref.	0.036*	Ref.	0.110
Housewife	0.518 (0.312-0.861)	0.011*	0.687 (0.386-1.223)	0.202
Student	0.699 (0.416-1.175)	0.177	1.408 (0.634-3.126)	0.401
have any previous breast problem before				
No	0.526 (0.205-1.354)	0.375	0.674 (0.245-1.852)	0.444
Do not know	0.444 (0.125-1.575)	0.183	0.644 (0.162-2.556)	0.532
Yes	Ref.	0.209	Ref.	0.741
Presence of family history of breast cancer	Ref.	0.209	Ref.	0.741
No	0.579 (0.333-1.009)	0.125	0.614(0.339-1.111)	0.107
Do not know	0.44 (0.141-1.372)	0.054	0.556 (0.164-1.889)	0.347
Yes	Ref.	0.157	Ref.	0.261

Embarrassment about breast-related tests was a barrier for 48.6% of their respondents, possibly related to societal judgment or discomfort during examinations. In Al-Khamis's study [24], securing a physician's appointment was a barrier for 39% of women, reflecting our findings on healthcare facility accessibility. Worry about potential breast cancer diagnosis (31%) resonates with anxiety concerns from our research. Alshahrani et al. [9] noted 57% of Najran women were unaware of mammograms, echoing our study's findings on awareness gaps.

Al-Zalabani et al. [20] and Abdel-Aziz et al. [25] highlighted the belief in the painful nature of mammography and fear of painful procedures as primary barriers, matching our finding where 27.1% perceived breast cancer screening as painful. Additionally, Al-Wassia et al. [26] and Yakout et al. [27] identified barriers from not considering mammography essential to a lack of information.

While fear and anxiety about a positive diagnosis remain consistent barriers, disparities exist in societal stigma, logistical issues, and awareness gaps. These differences may stem from regional cultures, health infrastructure, and study populations.

Educational campaigns proved effective, with 50.9% citing them as their knowledge source. Magazines/newspapers (53.6%) and universities (42.5%) played significant roles. In contrast, Alshahrani et al. [9] noted the dominance of social media (52.4%) as an information source, indicating its increasing influence. Ali et al. (2018) found health workers influential for 33.9%, with social media at 31.75%. Alsowiyan et al. [19] noted TV/internet (69.7%) as primary sources, with friends/family (52.5%) also significant. Interpersonal communications remained vital. Alsareii et al. [28] found a mere 11.3% gaining knowledge from healthcare professionals, suggesting room for improvement.

Our study suggests moderate knowledge levels, with 61.8% having "sufficient knowledge." Alenezi et al. [15] found only 22.5% with high knowledge, contrasting with our findings. Alshahrani et al. [9] noted 54.4% with poor knowledge, showing a significant awareness gap.

Education levels strongly correlated with knowledge, consistent with Allohaibi et al. [29], who found increasing

knowledge with higher education levels. Occupation also influenced awareness; workers were more knowledgeable than housewives/students, though housewives showed significantly lower knowledge.

Demographic factors like age, marital status, previous breast issues, and family history showed no significant knowledge relationship. Conversely, Alsareii et al. [28] found these factors predictive of good knowledge. Logistic regression confirmed education's significant influence, especially university education. Occupation's impact lessened when adjusted for other variables. Qedair et al. [30] showed regional, income, and employment status differences in breast cancer awareness. Tailored campaigns addressing demographic nuances are essential for bridging knowledge gaps.

The research's strength lies in its comprehensive data collection covering various aspects of breast cancer awareness in the Al-Baha region. With a sizable sample of 468 female participants, the findings gain reliability and generalizability, minimizing random variations' impact on conclusions. Employing descriptive statistics, logistic regression, and comparisons with prior studies offers a multifaceted analysis, enhancing understanding of factors influencing breast cancer awareness. However, while the insights are valuable, their generalizability beyond the region may be limited due to potential regional variations in awareness, culture, and healthcare infrastructure. Additionally, reliance on self-reported data introduces biases like recall and social desirability biases, potentially affecting information accuracy. The study's failure to deeply explore underlying reasons for certain screening barriers limits intervention design efficacy. Considering these limitations is crucial for accurate result interpretation. Finally, acknowledging the possibility of inaccurate self-reporting further highlights the need for cautious interpretation.

In conclusion, this study delves into breast cancer awareness, knowledge, and screening barriers in Al-Baha, revealing significant knowledge gaps about risk factors, symptoms, treatments, and screenings. It highlights education's crucial role in enhancing breast cancer awareness, pointing to the need for targeted educational campaigns. These efforts should leverage educational institutions and digital media, involve healthcare professionals more actively, and tailor programs to various demographics. Addressing barriers like anxiety, societal judgment, and accessibility is essential. The study calls for ongoing, focused educational initiatives to fill knowledge gaps and promote a thorough understanding of breast cancer among Al-Baha's women.

Author Contribution Statement

Ali G Alghamdi1wrote the first draft for this study and conducted the whole study by transmitting the questionnaires, Fatimah Abdulaziz AlGharsan and Mohammad Faisal Hussain analyzed the data and wrote all results comments for the whole manuscript, Raghad Abdullah Alzahrani, Raghad hassan Alghamdi, Abdularahman Awadh Alzahrani and, Yousef Khalid Alzahrani wrote the introduction, materials and methods, and discussion for the whole manuscript, while Ali G Alghamdi was the creator of the study idea and wrote the protocol and was the advisor throughout the whole study.

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Approval

The research conducted was not endorsed by any scientific body nor was it a component of an approved student thesis.

Ethical Declaration

Ethical approval was obtained or waived by all participants in this study. Scientific Research & Ethics Committee (REC): Al Baha University, Faculty of Medicine issued approval REC/SUR/BU-FM/2022/23.

Conflict of Interest

There is no conflict of interest in this research toward any association or another scientific field.

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