

# Knowledge, attitudes, and practices related to breast cancer screening among women visiting primary care centers in Abu Dhabi

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## Abstract

Breast cancer is the most common type of cancer among women in the United Arab Emirates. Screening for breast cancer can reduce morbidity and mortality and improve women's survival rate. Low knowledge levels and poor practices related to breast cancer screening could be due to many factors; therefore, we assessed the knowledge, attitudes, and practices related to breast cancer screening of women visiting primary care centers in the Abu Dhabi region. A cross-sectional study was conducted in 2017 using a questionnaire to measure breast cancer screening awareness. Six primary healthcare centers within 40 km of Abu Dhabi were included. Participants were 383 women aged 40–65 years. Facilities that screen for breast cancer were underutilized by women. Although many women had a high knowledge of breast cancer (45.7%), they were not obtaining mammograms regularly (52.2%). Compared to their counterparts, women with higher education, employment, and a family history of breast cancer had significantly better knowledge ( $P$ s < .001, .018, and .013, respectively), while women aged > 49 years followed better practice of obtaining mammograms ( $P$  < .001).

Women who visited clinics inside Abu Dhabi island had better knowledge and practices than did those visiting clinics outside the island, while the opposite was true concerning attitudes. Education level, age, and region played a role in women's knowledge, attitudes, and practices related to breast cancer screening. Primary care providers often have the first contact with women and should utilize this opportunity to spread awareness. Social media and public service campaigns can also be employed, and free mammograms could be offered to lower-income women. Disseminating awareness about screening will also reduce the burden of breast cancer treatment on national healthcare systems. Research should be done on the degree of utilization of mammograms and the impact of screening on the healthcare system.

**Key words:** breast cancer, screening, knowledge, attitudes, practice, Abu Dhabi

## Introduction

Breast cancer is a major health burden worldwide, impacting 2.1 million women annually, and is a leading cause of death among women. "In 2018, it was estimated that 627,000 women died from breast cancer; that is approximately 15% of all cancer deaths among women" [1]. According to the International Agency for Research on Cancer, "Among females, breast cancer is the most commonly diagnosed cancer and the leading cause of cancer death, followed by colorectal and lung cancer (for incidence), and vice versa (for mortality); cervical cancer ranks fourth for both incidence and mortality" [2].

Globally, breast cancer incidence and mortality are expected to increase by 50% between 2002 and 2020. The highest incidence remains in the developed world; however, incidence rates are increasing in other areas of the world [3]. Incidence rates vary globally, ranging from 91.6 per 100,000 women in North America to 43 per 100,000 in the Middle East and Northern Africa [2].

Breast cancer remains a major public health threat among women in the Arab world, with the United Arab Emirates (UAE) ranking seventh in the increase in incidence rate [4]. Further, breast cancer is the most common cancer and the leading cause of death among women in the UAE, according to a 2014 report released by the Department of Health in Abu Dhabi [4]. Breast cancer is also the second leading cause of death among women in Abu Dhabi, comprising 20.3% of the five most common cancers in 2014 [5–7].

The impact of breast cancer can be reduced through various practices including performing breast self-examinations, undergoing clinical breast examinations, and obtaining mammograms. The UAE government has made great efforts in promoting early cancer detection through various health authorities. The Health Authority of Abu Dhabi established a breast cancer screening program in 2008. Despite this, screening rates have not yet reached ideal levels.

A recent study conducted in 2014 in Al Ain, UAE showed that a lack of knowledge about breast cancer is not the only reason for the delay in early presentation; other factors such as personal, social, and cultural issues also contribute to the delay [8]. Furthermore, a 2010 study conducted in Dubai, UAE revealed insufficient breast cancer screening practices among local women, in addition to a lack of awareness of the common risk factors and signs and symptoms of breast cancer [8].

No other studies have assessed the impact of breast cancer screening in Abu Dhabi. Therefore, we measured the knowledge level, attitudes, and practices related to breast cancer screening of women visiting primary healthcare centers in Abu Dhabi, UAE.

## Materials and methods

### Study design and participants

This cross-sectional study was conducted among women visiting six primary healthcare clinics in Abu Dhabi; Al Bateen, Zafaranah, Rowda, Maqta, Mohammed Bin Zayed, and Baniyas, between August 2016 and August 2017 using a self-administered questionnaire.

The target population was women aged 40–65 years who visited primary care centers within 40 km of Abu Dhabi, regardless of their nationality. Stratified random sampling was used to calculate the sample size for each clinic. We excluded women who were non-Abu Dhabi residents, non-English or non-Arabic speaking individuals, and women who had a personal history of breast cancer. Monthly income was subjectively reported by participants as being sufficient, sufficient and saving, or insufficient.

The estimated target population size was 168,286 women, aged 40–65 years, based on the 2015 statistical yearbook of Abu Dhabi [3]. The sample size ( $N = 383$ ) was calculated using an online sample size calculator (Newcombe formula) using a 95% confidence interval and a 5% margin of error. At each clinic, questionnaires were distributed to women who met the inclusion and exclusion criteria, using a stratified random collection, until the required numbers were attained.

### Study instrument and ethical approval

Arabic and English versions of the questionnaire were developed, which were adapted from a validated questionnaire used in a study similar to ours in Dubai City [9]. The questionnaire was revised to meet our objectives by modifying some of the questions (S1 Appendix). The self-administered questionnaire contained 102 questions and was divided into four parts that addressed participants' sociodemographic characteristics (17 questions) breast cancer screening knowledge (28 questions), attitudes (5 questions), and practices (7 questions). A scale scoring system was used to categorize knowledge, attitudes, and practices as follows: knowledge = good (19–27 points), fair (9–18 points), or poor (0–8 points); attitudes = positive (4 points), neutral (2–3 points), or negative (0–1 points); and practices = good (2 points) or bad (0–1 points).

Questions intended to assess breast cancer screening knowledge included risk factors of breast cancer, age group with the highest risk for cancer, symptoms of breast cancer, different methods of screening, and how frequently the method needs to be repeated. Questions intended to assess attitudes toward mammogram screening and opinions about mammograms asked about their importance for early detection, increased anxiety, ease of performing, and whether they should be performed regularly. Questions intended to assess breast cancer screening practices asked about women's practice and frequency of obtaining mammograms. Obtaining mammograms every 2 years was considered good practice.

Informed consent forms were attached to each questionnaire for the participants to read and sign if they were willing to participate. Questionnaires and consent forms were drafted in English and Arabic. A pilot study was conducted after ethical approval was granted from Ambulatory Healthcare Services Research Committee in Al Ain City to assess the comprehensibility of the questionnaire. Twenty questionnaires were distributed among women who visited primary care centers and met our criteria, and modifications were made to the questionnaire to meet our aim accordingly.

### Data collection

Questionnaires were printed and then proportionally distributed to the six primary healthcare clinics in Abu Dhabi. The charge nurses at these health centers were briefed regarding the questionnaire and given training regarding participants' anonymity and informed consent. The charge nurse at each clinic was asked to distribute the questionnaires randomly to patients who matched the inclusion criteria. After completion, the nurses collected and sealed the questionnaires in envelopes to ensure participants' confidentiality. After the end of the study period, the charge nurse was asked to return the completed questionnaires to the authors.

### Data analyses

After collection of the questionnaires, the obtained data were organized using Microsoft Excel, and coded and analyzed using SPSS version 18. Means and standard deviations were used for numerical data, and percentages for categorical data. First, chi-squared ( $\chi^2$ ) tests were

conducted to assess the effect of various factors on breast cancer screening knowledge, attitudes, and practices. Factors analyzed in this study included age, education, employment status, marital status, monthly income, menopause history, age of menopause, family history of breast cancer, age at first pregnancy, details of living children, and breastfeeding practice.

## Results

### Participants' demographic characteristics

A total of 383 questionnaires were distributed. Participants' demographics are displayed in Table 1.

### Breast cancer screening knowledge

Table 2 shows the percentages of correctly answered questions regarding knowledge of breast cancer screening among the participating women. Overall, 45.7% had good knowledge about breast cancer screening, 48.8% had fair knowledge, and 5.5% had poor knowledge. Additional details are provided below.

### Factors affecting breast cancer screening knowledge

Table 3 shows that, as women's education level increased, their level of knowledge regarding breast cancer screening significantly improved. Moreover, better breast cancer screening knowledge was found among women who were employed and those who had a family history of breast cancer, than did their counterparts. Women who had good or fair knowledge were found to have better attitudes and practices regarding breast cancer screening than those with poor knowledge.

**Table 1: Participants' sociodemographic characteristics**

	n	%
<b>Age (years; n = 378)</b>		
40–48	222	58.7
49–58	113	29.9
59–65	43	11.4
<b>Nationality (n = 378)</b>		
Local	205	54.2
Non-local	173	45.8
<b>Education (n = 380)</b>		
Primary or less	94	24.7
Secondary	115	30.3
University or above	171	45.0
<b>Employment status (n = 371)</b>		
Employed	167	45.0
Unemployed	204	55.0
<b>Marital status (n = 371)</b>		
Single	35	9.20
Married	287	75.5
Divorced/widowed	58	15.3
<b>Monthly income (n = 357)</b>		
Sufficient and saving	45	12.6
Sufficient	250	70
Insufficient	62	17.4

Table 2: Breast cancer screening knowledge of women visiting primary care centers in Abu Dhabi (N = 383)

	No. of correct answers	% of correct answers
<b>Most common cancer among women</b>	371	96.8
<b>Risk factors of breast cancer</b>		
Breast cancer is not related to age.	241	62.9
Breast cancer is not related to size of breast.	324	84.6
Having a first-degree relative with breast cancer increases one's risk.	304	79.4
Stress is not a risk factor.	208	54.3
Using Hormone Replacement Therapy increases the risk.	154	40.2
Breastfeeding reduces the risk.	351	91.6
Early menarche increases the risk.	38	9.90
<b>Symptoms of breast cancer</b>		
Bloody discharge from nipple	195	50.9
Painless mass	305	79.6
Pelvic pain is not a symptom.	328	85.6
Absence of period is not a symptom.	313	81.7
Nipple retraction	165	43.1
<b>Breast cancer screening methods</b>		
Breast self-examination	259	67.6
Clinical breast examination	195	50.9
Mammogram	289	75.5
Ultrasound is not a screening method.	268	70.0
Magnetic Resonance Imaging is not a screening method.	330	86.2
Computed Tomography is not a screening method.	327	85.4
Breast self-examinations should be done once a month.	161	42.0
Self-examinations should be done at the end of menses.	190	49.6
Mammograms can detect breast cancer early.	312	81.5
Mammograms should be done every two years.	155	40.5
<b>Groups that must regularly obtain mammograms</b>		
All women aged > 40 years	299	78.1
Women with a family history of breast cancer	219	57.2
Women with a personal history of breast cancer	124	32.4
Women aged $\geq$ 18 years should not obtain regular mammograms	314	82.0
<b>Participants' overall knowledge</b>		
Good	175	45.7
Fair	187	48.8
Poor	21	5.5
<b>Participants' sources of information about breast cancer screening</b>		
Television or radio	119	31.1
Magazine or brochure	119	31.1
Hospital doctor	104	27.2
Primary healthcare provider	157	41
Other	56	14.6

Table 3: Factors affecting breast cancer screening knowledge

Variable	Good n (%)	Fair n (%)	Poor n (%)	P
<b>Age (years; n = 378)</b>				
40–48	109 (49.1)	102 (45.9)	11 (5.0)	.393
49–58	47 (41.6)	57 (50.4)	9 (8.0)	
59–65	18 (41.9)	24 (55.8)	1 (2.3)	
<b>Education (n = 380)</b>				
Primary or less	25 (26.6)	62 (66.0)	7 (7.4)	< .001
Secondary	48 (41.7)	59 (51.3)	8 (7.0)	
University or above	102 (59.5)	63 (36.8)	6 (3.7)	
<b>Employment status (n = 371)</b>				
Employed	90 (53.9)	67 (40.1)	10 (6.0)	.018
Unemployed	82 (40.2)	112 (54.9)	10 (4.9)	
<b>Marital status (n = 380)</b>				
Single	13 (37.2)	20 (57.1)	2 (5.7)	.367
Married	137 (47.7)	133 (46.4)	17 (5.9)	
Divorced or widowed	24 (41.4)	33 (56.9)	1 (1.7)	
<b>Monthly income (n = 374)</b>				
Sufficient and saving	23 (51.1)	19 (42.2)	3 (6.7)	.925
Sufficient	114 (45.6)	123 (49.2)	30 (5.3)	
Insufficient	28 (45.2)	30 (48.4)	4 (6.4)	
<b>Menopause history (n = 343)</b>				
Yes	66 (45.5)	72 (49.7)	7 (4.8)	.929
No	86 (43.4)	102 (51.5)	10 (5.1)	
<b>Age of menopause (years; n = 147)</b>				
< 50	36 (46.8)	38 (49.4)	3 (3.8)	.007
50–55	23 (41.8)	31 (56.4)	1 (1.8)	
> 55	5 (45.5)	3 (27.3)	7 (27.2)	
<b>Family history of breast cancer (n = 379)</b>				
Yes	25 (67.6)	12 (32.4)	0 (0.0)	.013
No	149 (43.6)	172 (50.3)	21 (6.1)	
<b>Age at first pregnancy (years; n = 326)</b>				
< 30	113 (44.1)	132 (51.6)	11 (4.3)	.191
≥ 30	37 (52.9)	28 (40.0)	5 (7.1)	
<b>Have living children (n = 356)</b>				
Yes	156 (46.7)	161 (48.1)	17 (5.2)	.530
No	8 (36.4)	12 (54.5)	2 (9.1)	
<b>Breastfed children (n = 345)</b>				
Yes	141 (45.6)	152 (49.2)	16 (5.20)	.609
No	14 (38.9)	19 (52.8)	3 (8.30)	
<b>Attitudes toward breast cancer screening (n = 383)</b>				
Positive	65 (63.1)	37 (35.9)	1 (1.00)	< .001
Neutral	90 (41.3)	118 (54.1)	10 (4.60)	
Negative	20 (32.3)	32 (51.6)	10 (16.1)	
<b>Obtain mammograms regularly (n = 383)</b>				
Good	94 (52.2)	80 (44.4)	6 (3.40)	.025
Bad	81 (39.9)	107 (52.7)	15 (7.40)	

### Breast cancer screening attitudes

Table 4 shows participants' attitudes toward breast cancer screening. Approximately one-quarter held positive attitudes about breast cancer screening, while most held neutral attitudes.

**Table 4: Breast cancer screening attitudes of women visiting primary care centers in Abu Dhabi (N = 383).**

	n	%
Screening is important for early detection.	349	91.1
Screening is a painful procedure.	101	30.6
Screening should be done regularly.	302	78.9
Screening is easy to perform	234	74.1
Screening is associated with increased anxiety	144	37.6
<b>Overall attitude</b>		
Positive	103	26.9
Neutral	218	56.9
Negative	62	16.2

### Factors affecting breast cancer screening attitudes

Table 5 shows that older women held better attitudes toward breast cancer screening than did their younger counterparts. Positive breast cancer screening attitudes were also found among women who were unemployed, had living children, and breastfed their children. Women who held positive and neutral attitudes were found to have better practices regarding breast cancer screening than those with negative attitudes.

Table 5: Factors affecting women's breast cancer screening attitudes

Variable	Positive n (%)	Neutral n (%)	Negative n (%)	P
<b>Age (years; n = 378)</b>				
40–48	61 (27.5)	118 (53.2)	43 (19.3)	.016
49–58	24 (21.2)	75 (66.4)	14 (12.4)	
59–65	18 (41.9)	22 (51.1)	3 (7.0)	
<b>Education (n = 380)</b>				
Primary or less	28 (29.8)	56 (59.6)	10 (10.6)	.591
Secondary	30 (26.1)	64 (55.7)	21 (18.2)	
University or above	45 (26.3)	96 (56.1)	30 (17.6)	
<b>Employment Status (n = 371)</b>				
Employed	39 (23.4)	93 (55.6)	35 (21.0)	.017
Unemployed	63 (30.9)	119 (58.3)	22 (10.8)	
<b>Marital Status (n = 344)</b>				
Single	7 (20.0)	20 (57.1)	8 (22.9)	.540
Married	79 (27.5)	126 (56.4)	46 (16.1)	
Divorced/widowed	17 (29.3)	35 (60.3)	6 (10.4)	
<b>Monthly income (n = 357)</b>				
Sufficient and saving	13 (28.0)	26 (57.8)	6 (13.3)	.990
Sufficient	70 (28.0)	141 (56.4)	39 (15.6)	
Insufficient	16 (25.8)	36 (58.1)	10 (16.1)	
<b>Underwent menopause (n = 343)</b>				
Yes	35 (24.1)	91 (62.8)	19 (13.1)	.437
No	54 (27.3)	111 (56.1)	33 (16.6)	
<b>Age of menopause (years; n = 145)</b>				
< 50	19 (24.7)	48 (62.3)	10 (13.0)	.299
50–55	17 (30.9)	30 (54.5)	8 (14.6)	
> 55	0 (00.0)	9 (81.8)	2 (18.2)	
<b>Family history of breast cancer (n = 379)</b>				
Yes	12 (32.4)	23 (62.2)	2 (5.40)	.180
No	91 (26.6)	193 (56.4)	58 (17.0)	
<b>Age at first pregnancy (years; n = 326)</b>				
< 30	80 (31.2)	139 (54.3)	37 (14.5)	.528
≥ 30	17 (24.3)	42 (60.0)	11 (15.7)	
<b>Have living children (n = 356)</b>				
Yes	98 (29.3)	185 (55.4)	51 (15.3)	.041
No	1 (4.5)	16 (72.7)	5 (22.8)	
<b>Breastfed children (n = 345)</b>				
Yes	93 (30.1)	169 (54.7)	47 (15.2)	.039
No	4 (11.1)	27 (75.0)	5 (13.9)	
<b>Practices (n = 383)</b>				
Good	63 (35.0)	99 (55.0)	18 (10.0)	< .001
Bad	40 (19.7)	119 (58.6)	44 (21.7)	

**Breast cancer screening practices**

Table 6 shows participants' breast cancer screening practices. Only about half had good practices and obtained mammograms. Additional details are provided in Table 6.

**Table 6: Breast cancer screening practices of women visiting primary care centers in Abu Dhabi (N = 383)**

	n	%
<b>Practice breast self-examinations</b>	222	59.7
<b>Frequency of breast self-examinations</b>		
Regularly	93	41.0
Monthly	56	24.7
Irregularly	78	34.4
<b>Reasons for not practicing breast self-examinations</b>		
Lack of knowledge	56	35.0
Fear of finding something abnormal	32	20.0
No risk	23	14.5
No time	25	15.6
Do not know	42	26.4
Other reasons	16	10.1
<b>Practice clinical breast examinations</b>	178	48.9
<b>Frequency of clinical breast examinations</b>		
Once a year	85	47.0
Once every 2–3 years	65	35.9
Once every > 5 years	31	17.1
<b>Obtain mammograms</b>	238	64.5
<b>Mammogram frequency</b>		
Once every 1–3 years	184	78.3
Once every 4–5 years	38	16.2
Once every ≥ 6 years	13	5.5.0
<b>Overall practice of obtaining mammograms</b>		
Good	180	47.0
Bad	203	53.0

### Factors affecting breast cancer screening practices

Table 7 shows that older women had good practices regarding obtaining mammograms. Good breast cancer screening practices were also found among women who were married, post-menopausal, and had a family history of breast cancer.

**Table 7: Factors affecting women's breast cancer screening practices**

Variable	Good	Bad	P
	n (%)	n (%)	
<b>Age (years; n = 378)</b>			< .001
40–48	83 (37.4)	139 (62.6)	
49–58	71 (62.8)	42 (37.2)	
59–65	25 (58.1)	18 (41.9)	
<b>Education (n = 380)</b>			.728
Primary or less	47 (50.0)	47 (50.0)	
Secondary	55 (47.8)	60 (52.2)	
University or above	77 (45.0)	94 (55.0)	
<b>Employment status (n = 371)</b>			.377
Employed	75 (44.9)	92 (55.1)	
Unemployed	101 (49.5)	103 (50.5)	
<b>Marital status (n = 380)</b>			.006
Single	10 (28.6)	25 (71.4)	
Married	133 (46.3)	154 (53.7)	
Divorced/widowed	36 (62.1)	22 (37.9)	
<b>Monthly income (n = 357)</b>			.674
Sufficient and saving	22 (48.9)	23 (51.1)	
Sufficient	114 (45.6)	136 (54.4)	
Insufficient	32 (51.6)	30 (48.4)	
<b>Menopause history (n = 343)</b>			< .001
Yes	84 (57.9)	61 (42.1)	
No	77(38.9)	121 (61.1)	
<b>Age of menopause (years; n = 143)</b>			.292
< 50	43 (55.8)	34 (44.2)	
50–55	34 (61.8)	21 (38.2)	
> 55	4 (36.4)	7 (63.6)	
<b>Family history of breast cancer (n = 379)</b>			.024
Yes	24 (64.9)	13 (35.1)	
No	155 (45.3)	187 (54.7)	
<b>Age at first pregnancy (years; n = 326)</b>			.744
< 30	119 (46.5)	137 (53.5)	
≥ 30	31 (44.3)	39 (55.7)	
<b>Have living children (n = 356)</b>			.129
Yes	162 (48.5)	172 (51.5)	
No	7 (31.8)	15 (68.2)	
<b>Breastfed children (n = 345)</b>			.783
Yes	147 (47.6)	162 (52.4)	
No	18 (50.0)	18 (50.0)	

## Knowledge, attitudes, and practices across primary care clinics in Abu Dhabi

When comparing clinics within and outside Abu Dhabi, the best knowledge level and breast cancer screening practices were found in Rowdah, followed by Zafrana and Al Bateen. However, the most positive attitudes were found in Baniyas, followed by Al Bateen and Maqta. These results were significant (Table 8).

**Table 8: Knowledge, attitudes, and practices between primary care clinics in Abu Dhabi.**

	Al Bateen	Rowdah	Zafrana	Maqta	MBZ <sup>a</sup>	Baniyas	P
	n (%)	n (%)					
<b>Overall knowledge</b>							
Good	27 (47.3)	29 (63.0)	48 (50.5)	20 (37.0)	15 (28.3)	36 (46.2)	< .001
Fair	29 (50.9)	16 (34.8)	38 (40.0)	34 (63.0)	30 (56.6)	40 (51.2)	
Poor	1 (1.80)	1 (2.20)	9 (9.50)	0 (0.00)	8 (15.1)	2 (2.60)	
<b>Overall attitudes</b>							
Positive	20 (35.1)	10 (21.7)	16 (16.8)	14 (25.9)	5 (9.40)	38 (48.7)	< .001
Neutral	28 (49.1)	30 (65.2)	58 (61.1)	30 (55.6)	34 (64.2)	38 (48.7)	
Negative	9 (15.8)	6 (13.1)	21 (22.1)	10 (18.5)	14 (26.4)	2 (2.60)	
<b>Overall practice of obtaining mammograms</b>							
Good	29 (50.9)	30 (65.2)	52 (53.7)	26 (48.1)	17 (32.1)	27 (34.6)	.003
Bad	28 (49.1)	16 (34.8)	44 (46.3)	28 (51.9)	36 (67.9)	51 (65.4)	

a. MBZ: Mohamed Ben Zayed

## Recommendation

This study examined the knowledge, attitudes, and practices related to breast cancer screening among women in the Abu Dhabi region. We will compare our results with those of studies conducted in Ras Al Khaimah [10] and Al Ain, UAE [8] and Najran, Saudi Arabia [11].

The level of knowledge about breast cancer in our study was 45.7%, compared to 10.2% in Saudi Arabia and 5% in Al Ain. The higher percentage found in this study could be attributed to the fact that most women included were younger and had access to evidence-based medicine through the Internet. Another reason could be that women were influenced by social media or becoming more trusting of their primary care providers regarding health-related problems.

Surprisingly, we found a similar outcome as that of the Al Ain study regarding knowledge about risk factors of breast cancer. Our results showed that women knew that breast cancer is the most common cancer among women in the UAE and that breastfeeding is protective against breast cancer; however, they were not sure when mammograms should be obtained. Both our results and those of the Al Ain study showed that being younger and educated were associated with improved knowledge levels than were being older and less educated.

Our findings and those from Saudi Arabia showed that higher education level, being employed, and having a personal or family history of breast cancer had a significant impact on knowledge about breast cancer screening. The reason for this could be that primary care doctors are providing effective consultations. This is reflected in our findings, which showed that primary healthcare providers were the primary source of information for women in Abu Dhabi.

Social media also plays a role in spreading news about the importance of breast cancer screening. Findings from Saudi Arabia showed that most women get their information from social media (52.4%) and only 8.8% received it from a primary care doctor. Furthermore, in the Al Ain study, it was revealed that 38% women obtained their information from their healthcare provider. Moreover, public service campaigns in universities, schools, and communities can be employed to spread awareness of the importance of breast cancer screening.

On comparing those living on or around the island of Abu Dhabi, women living on the island were found to have the most knowledge. The reason for this could be that more campaigns about cancer occur on the island than in areas around it. Women who live around the island (rural places) are more likely to be homemakers and have less education.

This study showed that regardless of having access to free mammograms, there was a lack of knowledge and underutilization of the service. Similar results were found in the studies done in Al Ain and Saudi Arabia. In our study, 47% of the women were obtaining mammograms, as compared to 44.9% in the Al Ain study [8], 37.6% in the Ras Al Khaimah study [10], and 15% in the Saudi Arabia study [11]. The higher percentage than those of prior studies could be attributed to the awareness campaigns that are conducted by the UAE health authorities, and that free mammograms are offered from October to November (breast cancer awareness month) for women with insurance, which does not cover mammograms.

Although the current study revealed the highest rate of obtaining mammograms, overall, it was still considered to be poor. Reasons for this could include that some women do not feel comfortable being examined by doctors, and only seek medical advice when they discover something abnormal about their breasts, or are too busy.

Both our study and the one conducted in Al Ain showed that women aged 49 years or older were more likely to obtain mammograms than were their younger counterparts. Reasons for this could be that younger women think they are not the target for the screening program. Older women may also have chronic diseases that they seek medical advice for; consequently, their primary healthcare providers may offer mammograms more often simply because they see them more often.

When comparing between clinics, regions played an important role. Women located in Abu Dhabi had obtained mammograms more frequently than did those around Abu Dhabi. Perhaps women who live in the city tended to be more knowledgeable and aware of the importance of breast cancer screening than women around the city. Moreover, more campaigns are implemented in Abu Dhabi than around it.

## Conclusion

In our study, we found that, despite having the modalities and services for breast cancer screening, women were still underutilizing these options. The participating women had a good knowledge about breast cancer but poor practice of obtaining mammograms. Education level, age, and region all played a key role in women's knowledge, attitudes, and practices related to breast cancer screening.

Primary care providers, who are often women's first point of contact, should help spread awareness concerning breast cancer screening. Strategies that can be implemented include utilizing social media, implementing more public service campaigns, and offering free mammograms to women who cannot afford to pay for them. Hopefully, these measures will also reduce the burden of breast cancer treatment on national healthcare systems.

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