Research Article

Prevalence And Barriers To Mammography Screening Among Healthcare Personnel In Al-Hillah City: A Study On Awareness And Practice

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Abstract

Background: Breast cancer is a leading cause of female mortality worldwide. Despite Iraq offering a free national breast cancer screening program, participation rates in the community remain low. The participation of female healthcare workers, who are key to promoting this program also questionable. Objective: To assess the prevalence of adherence to mammography among female healthcare personnel and identify barriers and predictors related.

Methods: A cross-sectional study was conducted from 1st of January to the end of October, 2025, targeting female health care staff aged 40 years or older. A total of 250 participants were selected via convenience sampling. Data were collected through a structured self-administered questionnaire and analyzed using SPSS v27 (significance: $P \leq 0.05$).

Results: The mean age of Participants was 48.17±5.97 years. There is a notable Gap between knowledge, attitude, and practice. Although 75% of the female health care personnel had a positive attitude toward screening, 63% lacked essential knowledge, and alarmingly, 60% had never had a mammogram, and only 22% screened regularly. False sense of security due to absence of symptoms (40%) or family history of breast cancer (44%) represents predominant barriers, while others feared radiation (34%) or neglected the issue. Medical professionals appeared to demonstrate a higher level of awareness (OR=8.761, p=0.002) and screening rates (OR=10.773, p=0.007). Additionally, working in primary health care seemed to be associated with increased screening practices (OR=4.008, $p \leq 0.001$).

Conclusion: Mammography uptake appeared critically low among female HCPs in Al-Hillah city, with key barriers that specifically rely on misconceptions highlighting a need for targeted interventions ensuring HCPs serve as effective advocates for early detection.

Keywords: Breast cancer; Mammography; Health care personnel; Al-Hilla City; Barrier

Introduction

Cancer is a large societal, public health, and economic burden in the 21st century, with approximately one-in-four (22.8%) deaths from non-communicable diseases (NCD) occurring worldwide [1]. In women, breast cancer (BC) is the most commonly diagnosed malignancy and remains the principal cause of cancer related death [2]. One in twelve women is expected to develop BC during her lifetime [3]. The burden of BC is projected to rise to more than 3 million new cases and about 1 million deaths per year by 2040 merely due to population growth and ageing [4]. In addition to health costs, the global economic costs from the period of 2020 to 2050 of breast cancer have been projected to be approximately ($1,964 billion), ranking the third largest contributor of other common cancers [5]. In Iraq, the annual report of the Cancer Registry released in 2023 indicated that Breast cancer was the most frequently diagnosed cancer, with an incidence of 20.4 per 100,000 population. It's the second most common cause of cancer related death after lung cancer, responsible for (24.2%) cancer deaths among females, in Babylon governorate. Breast cancer was the most common cancer represent (18.7%) of total cancer cases, with an incidence rate (IR) 33.8/100,000, and the mean age at diagnosis was 53.7 years [6]. Screening for breast cancer continues to be a crucial tool in reducing both mortality and the morbidity associated with treatment, and to be effective, it needs to be applied to over (70%) of the target population at risk to achieve a major effect on mortality [7]. Fourteen screening guidelines published between 2014 and 2022 were found, and all agree that mammography is the gold standard for average-risk women screening [8]. Mammography can detect non-palpable (occult) and minimal Breast cancers, which encompass non-invasive intraductal carcinoma and minimally invasive carcinoma not exceeding (0.5 cm) in diameter. There are multiple types of mammography machines; the modern machines administer extremely low doses and result in an average total dose of about 0.4 mSv radiation [7]. According to the American College of Radiologists (ACR) recommendation, screening should start at 40 years old and be annual for average-risk women [9]. In Iraq, because the unique occurrence in premenopausal women is not rare, starting screening mammography at age 40 with once a year recommended. People are reminded that patients with a high risk of BC should have mammography and ultrasound examination every year after the age of 30 years, till the end of their life [7]. Iraq's National Program for Early Detection of Breast Cancer, initiated by the Ministry of Health in 2000, established specialized breast clinics and referral centers across all governorates, providing early detection services including CBE, BSE, mammography, ultrasonography, and FNAC, and was later expanded to

include primary health care centers [10]. However, utilization of screening program globally varies significantly across regions and demographic groups, In High Income Countries, like Scotland and Australia mammography screening rates were (75%), and (83%) respectively [11].

Screening rates were lowest in Africa and Low- and Middle-Income Countries (LMICs) with uptake remaining stable or dropping slightly over time [12]. Some studies show that in low-income populations, who don't have access to the offered cancer screening because they do not know what it consists of and are unaware of the disease risk factors, signs, or symptoms. However, low levels of health literacy and inadequate knowledge about cancer screening, reported among women belonging to vulnerable populations, represent a serious concern [13]. In Iraq, a survey carried out among women from the general population in Baghdad city showed that a majority of them (i.e. >40 years of age) had never undergone mammography at all.

Only 7.6% declared adherence to regular (annual) mammography screening, as recommended by the American Cancer Society (ACS) [14]. Women encountered several obstacles presented by the individual barriers, like unawareness of preventive approaches initiated in local health agencies and the nature of prevention; the majority of the women don't attend the health care unit without the presence of any sign or symptom for BC, and are unclear about who will be visiting as a specialist, gynecologist, surgeon, radiologist, or oncologist. Economic barriers, high cost, and financial barriers, distance and access problems were found, and socio-cultural barriers, including shame of examination and discouragement from others, are also reported [15]. Thus, there are persistent challenges in the utilization of early detection services, so the first step in deciding what kind of intervention is required for effectiveness is to understand the current level of awareness. In addition, it is especially meaningful to begin with healthcare staff because they are the base on which any development in this area can be built. They play a role as educators and trainers for the community, rendering them an important group in advancing early detection efforts. Therefore, this study aims to assess the prevalence of mammography screening, level of knowledge, barriers, and sociodemographic predictors of adherence among female healthcare personnel in Al-Hillah city.

Subjects and method

Design of the study

This research employed a cross-sectional study design.

Study Setting and Time

The study took place in Iraq, Al-Hillah city situated 100 km south of the capital, Baghdad, serving as the administrative center of Babylon Governorate, the study target female health care personnel greater than or equal to 40 years old in the two main Teaching Hospitals (Al-Hilla teaching Hospital and Babil Teaching Hospital for Maternity and Children) and primary healthcare centers located within the first and second health sectors of Al-Hillah city.

The time of the study extends from 1st of January to the end of October 2025.

Data collection was conducted over the period commencing on the 10th of February 2025 to the 12th of August, 2025.

Study population

The study adopted the CDC definition of Healthcare Personnel [16], which encompasses both professional and non-professional workers within healthcare settings who have the potential for exposure to patients or infectious materials. This inclusive sampling strategy, including nurses, physicians, technicians, therapists, and administrative staff in our study, ensures that the study population remains consistent with international public health standards, thereby enhancing the comparability of the findings with global medical literature. Although administrative staff may not provide direct clinical care, their presence in healthcare facilities integrates them into the same organizational culture, frequently making them primary points of contact for health-related inquiries within their social circles.

Sampling criteria

Inclusion criteria

Female healthcare personnel equal to or above 40 years old who are willing to take part and provide informed consent.

Exclusion criteria

Women currently or previously diagnosed with Breast cancer, pregnant and breastfeeding women.

Sampling technique and sample size

The study participants were recruited by using a convenience sample method. Sample size was calculated by the single population proportion formula (Cochran's formula):

With 95% confidence level (Z = 1.96), a margin of error of (5%), and the estimated prevalence of mammography practice relay on a study carried out in Saudi Arabia [17] where it was approximately 18%, hence there is a paucity of local literature and absence of previous studies investigating mammography screening among healthcare personnel in Iraq, ultimately 250 participants were enrolled in the study.

Tool of the study

Based on a review of previous studies and relevant literature [17,18,19], we adapted a modified structured questionnaire, which has been adjusted to meet the objectives of this study. The questionnaire was self-reported, and each participant completed it on their own. A group of specialists in oncology, surgery, family medicine, and community health reviewed, revised, and approved the questionnaire. The questionnaire was prepared in English and translated into Arabic under the supervision of a specialist.

The questionnaire consisted of four sections:

1- Socio-demographic data and medical history: Age, education, marital status, and family history of breast cancer.
2- Knowledge-related questions on BC and screening.
3- Attitude-related question on BC.
4- Practices regarding mammograms and barriers to participation.

Knowledge was measured using 25 structured questions. Each correct response received a score of one, whereas incorrect or "I do not know" answers were scored zero. Individual knowledge scores were calculated by dividing the total number of correct responses by the maximum possible score (25) and multiplying by 100 to express the result as a percentage.

Attitudes were assessed using 10 items on a five-point Likert scale, ranging from 0 (strongly disagree) to 4 (strongly agree), with a maximum total score of 40. Each participant's attitude score was calculated by dividing their obtained score by 40 and multiplying by 100 to express it as a percentage.

Both knowledge and attitude scores were categorized as high (≥80% of the total score), medium (60–79%), and low (<60%). This classification follows the original Bloom's cut-off points and is supported by previous research conducted among healthcare workers [18].

Pilot study

The pilot study demonstrated acceptable internal consistency, with Cronbach's alpha values of 0.862 for knowledge, 0.637 for attitude, 0.669 for practice, and barriers.

The overall Cronbach's alpha for the questionnaire was 0.728.

Statistical analysis

The data was entered and analyzed with Microsoft Excel and Statistical Package for the Social Sciences (SPSS) version 27. Results were presented using descriptive statistics (frequencies, percentages, means, and standard deviations). Univariable binary logistic regression was first conducted to assess the association between variables. Subsequently, all variables analyzed in the univariable phase were included in the multivariable model simultaneously using the Enter method. This selection was based on their importance in the literature, ensuring control for potential confounders regardless of their individual significance level in the univariable analysis. The results were reported as odds ratios (OR), 95% confidence intervals (CI), and P values. Spearman's rank correlation was used to test for the association between knowledge, attitude, and practice. In all tests, a p-value less than 0.05 was set as statistically significant (two-sided).

Ethical considerations

The study was carried out after obtaining ethical approval from the Iraqi Council of Medical Specialization and the College of Medicine, University of Kufa. In addition, official permissions and facilitation letters were secured from the Babylon Health Directorate to implement the study.

Participation in the study was wholly voluntary. The researcher provided a detailed explanation of the study's objectives to all participants, and verbal informed consent was subsequently secured. Strict confidentiality of data was maintained throughout the study. All information collected was used solely for research purposes.

Results

The study included 250 female healthcare personnel, the majority of whom were nurses and health staff (66%), those worked in primary healthcare centers represent (61.2%). The mean age was 48.17 ± 5.97 years. Most participants were married and held a diploma or lower qualification (56.4%), a minority reported a family history of breast cancer, and half of them had a history of hormonal therapy, including oral contraceptive pills, hormone replacement therapy, menstrual regulator medications (Table 1).

Assessment of knowledge revealed that more than half of respondents correctly identified several major risk factors, particularly genetic or ethnic background 158 (63.2%), aging 141 (56.4%), and positive family history 133 (53.2%). However, 198 (78%), 187 (74%) responded by "No" or "Don't know" about early menstruation and late menopause, respectively, as risk factors. Also, uncertainty persisted regarding other reproductive factors, such as multiple births and getting the first child after the age of 30.
Most respondents correctly identified key Signs and Symptoms as breast lump 203 (81.2%), changes in breast size or shape 195 (78%), and nipple discharge 184 (73.6%), while some still misattributed fever and night sweats to breast cancer.
Concerning mammography, the majority recognized it as the most appropriate screening method 180 (72%) and were aware of the recommended age and frequency 175 (70%) and 172 (68.8%), respectively. Nonetheless, less than half of 108 (43.2%) knew it was a low-dose radiological technique,
Attitude assessment was generally satisfactory, revealing that a large proportion of respondents strongly agreed that early detection increases the chances of recovery and prolongs life 240 (95.2%), and mammography is an appropriate step for early detection 219 (87%). About two-thirds, 144 (56.8%) disagreed that breastfeeding does not reduce the risk of cancer, and 171 (68%) disagreed that examining one's breast at home is sufficient for screening. Moreover, 166 (66%) declined the sentence that there is no reason to examine my breast for signs of cancer.
The final assessment of the knowledge shows that more than half of the participants, 159 (63.6%) demonstrated poor knowledge, while nearly one-third, 76 (30.4%) showed a fair level of knowledge, and only a small proportion, 15 (6%) achieved a good level of knowledge. Regarding attitude, 188 (75.2%) of healthcare personnel achieved a positive attitude, while 62 (24.8%) fell into the moderate category, and none were classified as having a negative attitude. The mean attitude score of (79.27±10.773) is shown in Table 2.
With respect to mammography practice, 149 (60%) had never undergone mammography, while only 46 (18%) reported having done so once or occasionally after consultation, and just 55 (22%) performed it regularly at the recommended intervals, as illustrated in Figure 1.
The main barriers reported in the study were the absence of a family history of breast cancer 87 (44.62%), lack of symptoms 78 (40%), and fear of radiation exposure 67 (34.36%). Other frequently cited obstacles included neglecting the issue 54 (27.69%) and fear of bad results 53 (27.18%).
In contrast, factors such as the unavailability of mammography services, family rejection, and lack of awareness about the test were less commonly reported (Table 3).
In the univariable analysis, the characteristics that were significantly associated with the knowledge subcategories were job (OR=9.5, 95% C.I.=3.453-26.14, p<0.001, for medical profession), education (OR=0.177, 95% C.I.=0.081-0.387, p<0.001, for diploma or less), (OR=0.305, 95% C.I.=0.132-0.704, p=0.005, for bachelor's), in multivariable logistic regression analysis, job retained a strong positive effect, medical profession was more knowledgeable (OR=8.761, 95% C.I.=2.289-33.523, p=0.002) than health and administrative profession, also age appears as predictors for knowledge (OR=0.479, 95% C.I.=0.258-0.888, p=0.019), Table 4.
The job category is also a statistically significant predictor of attitude after adjusting for all other factors. Nursing health professionals demonstrated higher odds of positive attitude (OR=3.043, 95% C.I.=1.272-7.279, p=0.012) than medical and administrative employees, but years of experience lost its association after adjustment in Table 5.
Regarding factors associated with practice, by univariable and multivariable analysis, participants working at primary health care centers are more likely to adhere to mammogram screening (OR=4.008, 95% C.I.=1.843–8.771, p<0.001) compared with those working in hospitals. Also, those in the medical profession were more likely to perform mammography (OR=10.773, 95% C.I.=1.941–59.794, p=0.007) than those working in nursing/ health (OR=4.236, 95% C.I.= 1.125-15.943, p=0.033) and administrative professions (Table 6).
the correlation between knowledge, attitude and practice (rho=0.076, p=0.234), (rho=0.112, p=076) being weak and not significant, table 7.

Discussion

The present cross-sectional study reveals a notable paradox among female healthcare personnel (HCP) in Al-Hillah City. Although more than three-quarters of participants demonstrated a favorable attitude toward mammography, only a small proportion showed good knowledge, and most had never undergone screening. The overall mean knowledge score (50.5%) indicates a strikingly low awareness level among female health care staff that's comparable to a study conducted in Saudi Arabia, where approximately half of the participants had a low knowledge level [18]. However, it contrasts with findings from Palestine and Pakistan, where good knowledge predominated [19,20], possibly due to differences in access to awareness programs and the inclusion of physicians only in the Pakistani study.
Younger participants demonstrated lower knowledge levels, which may reflect generational differences in access to health information, workshop and training sessions, alongside their shorter years of experience compared to older participants.

Another significant predictor of knowledge was the Job category, as medical staff (physicians, pharmacists, and dentists) demonstrated higher awareness than other employees, likely due to their stronger academic background. Similarly, a Saudi study reported higher awareness among medical professionals [18].

Interestingly, participants in medical professions were also more likely to practice mammography than those in nursing, health, or administrative fields, possibly because frequent exposure to clinical cases enhances perception of disease severity and early detection. Comparable findings were reported in studies from Nigeria [21]. In contrast, a Turkish study found no significant variation across professional groups, suggesting that institutional culture, service accessibility, or extent of health education may explain differences between settings [22].

While knowledge differed by profession, attitudes showed a somewhat different pattern. Individuals working in health-related professions may benefit from more frequent exposure to preventive education and health promotion activities, which can positively influence their attitude.

Approximately three-quarters of participants demonstrated a positive attitude toward screening (mean score 79.3 ± 10.8), consistent with several regional studies reporting generally favorable attitudes among healthcare workers regardless of profession [18,20,22].

Despite these positive attitudes, only 22% reported regular mammography use, whereas 78% did not. Among non-users, 60% had never undergone screening, and 18% did so only after symptoms and diagnostic referral. This indicates markedly low engagement and highlights a substantial gap between positive perception and actual preventive behavior. Comparable low practice rates have been reported in neighboring and developing countries, including Saudi Arabia (18.7%), Turkey (25%), and India (7%) [17,22,23], underscoring persistently limited uptake even among healthcare professionals expected to act as role models for the community.

Local initiatives in Al-Hillah City may partially explain regression findings showing a significant association between workplace and mammography utilization. Participants working in primary healthcare centers were about three times more likely to undergo screening than those in hospitals. This difference may reflect stronger implementation of directives from the Babil Health Directorate encouraging screening among female health employees, which appears more consistently applied in primary healthcare settings, emphasizing preventive and educational activities than in hospitals focused mainly on curative services.

In contrast to our findings and those of many studies in developing countries showing low uptake, participation rates are generally higher in developed countries, though barriers still exist. For example, a European study in Croatia showed healthcare workers had higher participation than the general population (92% vs. 60%), yet practical constraints such as insufficient information and inflexible working hours still limited full participation [24]. Similarly, in the United States, national data indicate an overall participation rate of about 76% among eligible women, with lack of insurance or limited financial coverage remaining a major barrier for some groups [25].

The correlation between knowledge, attitude, and practice, although positive, is much weaker and insignificant; this might suggest poor translation of knowledge and attitude into actual screening behavior that may be explained by culture and deep-rooted beliefs within the community that influence preventive health behavior. Moreover, this observation is supported by the findings of the present study and several other investigations, which identified multiple obstacles that are considered as major factors preventing translation of personal attitudes into effective screening practice.

The most frequently reported barriers in this study were the absence of family history, lack of symptoms, fear of radiation exposure, and fear of unfavorable results. Comparable patterns were observed regionally. A Saudi study [18] identified fear of discovering cancer and radiation as major deterrents, while Nigerian studies [26] reported that low perceived risk among asymptomatic individuals reduced preventive behavior. A Palestinian study also identified a lack of perceived susceptibility as a major barrier [19].

Low perceived risk across several regional studies may stem from overemphasis on hereditary factors. Many women considered themselves at low risk if they had no family history, despite evidence from the American Cancer Society indicating that most breast cancer cases occur in women without affected relatives, although risk increases with close family history [27].

Financial barriers are widely recognized determinants of screening uptake worldwide. Studies in Indonesia [28] and Nigeria [21] reported that the lack of insurance or free services substantially limited participation. In Al-Hillah City, however, financial constraints were not a leading obstacle, likely due to free public hospital services.

Embarrassment regarding breast examinations was another notable barrier, particularly in conservative societies, where cultural norms, modesty, and uncertainty about provider gender contribute to hesitation. In the present study, embarrassment remained substantial even among female healthcare personnel, comparable with the Saudi study [18] that cited it as a major barrier. Finally, a small proportion of participants had never heard of mammography or believed it was unavailable, highlighting gaps in institutional communication. These findings emphasize that improving screening participation requires not only increasing knowledge through targeted educational interventions, but also correcting risk perception and addressing emotional concerns and fear related to screening procedures.

Study limitations

This study is limited by its cross-sectional design, which prevents establishing direct causality. Data were collected via self-administered questionnaires, introducing potential recall and response biases. Non-random sampling and voluntary participation may limit external validity, and the study was restricted to specific facilities within the Babylon Health Directorate, affecting generalizability. Future research should use larger, randomized, multi-center samples and longitudinal designs to assess the long-term impact of awareness and practice initiatives.

Conclusion

The study concludes that overall awareness of mammography screening is low among healthcare workers, and positive attitudes do not consistently translate into practice, with only 22% participating in routine screening. Knowledge and practice levels varied by job category and workplace. Prominent barriers included absence of symptoms, lack of family history, and fear of radiation, highlighting the need for targeted interventions. Educational workshops should be implemented for all healthcare staff, particularly nursing/ health and administrative personnel, to improve knowledge on screening, risk factors, and hereditary misconceptions. Physicians' attitudes should be addressed by clarifying mammography techniques, actual radiation risks, and promoting preventive behaviors in their clinical practices. Best practices from primary healthcare centers should be implemented in hospitals to ensure effective participation. while all healthcare staff should be empowered to act as role models for the community in adherence to screening programs.

Table 1. Distribution of Participants' Sociodemographic and Medical Characteristics (n=250)

Variable	Category	n (%)	Mean and S.D.
Age (years)	<50	152 (60.8)	48.172 ± 5.965
	>=50	98 (39.2)	
Workplace	Primary Health Care Center	153 (61.2)	
	Hospital	97 (38.8)	
Job*	Medical	51 (20.4)	
	Nursing/ health	165 (66)	
	Administrative	34 (13.6)	
Years of experience	0-10	25 (10)	20.5 ± 7.688
	>10	225 (90)	
Marital Status	Married	217 (86.8)	
	Non- married	33 (13.2)	
Education	Diploma or less	141 (56.4)	
	Bachelor's	72 (28.8)	
	Higher degree	37 (14.8)	
Family history of Breast Cancer.	She has a family history	57 (22.8)	
	She has no family history	193 (77.2)	
Breast-Related Symptoms (Breast pain, Nipple discharge, Changes in size and shape)	She has symptoms	18 (7.2)	
	She has no symptoms	232 (92.8)	
Use of Hormone Therapy (menstrual regulators, hormone replacement therapy, birth control pills)	Yes	109 (43.6)	
	No	188 (56.4)	

* Medical = Doctor, Dentist, and Pharmacist; Nursing/ health = Nurse, Medical Assistant, Medical Technician, Laboratory, laboratory assistant, Health researcher, and Midwife; Administrative = Clerks, Managers, Senior executive managers, Auditors, Accountants, and Data supervisors.

Table 2: Distribution of Knowledge and Attitude Scores Toward Breast Cancer Screening Among Female Healthcare Personnel (n=250)

	Categories	n (%)
Knowledge Score	Poor (<60%)	159 (63.6)
	Fair (60–79%)	76 (30.4)

	Good (≥80%)	15 (6)
	Mean and S.D.	50.5 ± 19.912
Attitude Score	Negative (<60%)	0 (0)
	Neutral (60–79%)	62 (24.8)
	Positive (≥80%)	188 (75.2)
	Mean and S.D.	79.27 ± 10.773

Figure 1. Distribution of Participants According to Breast Cancer Screening Practice (n=250)

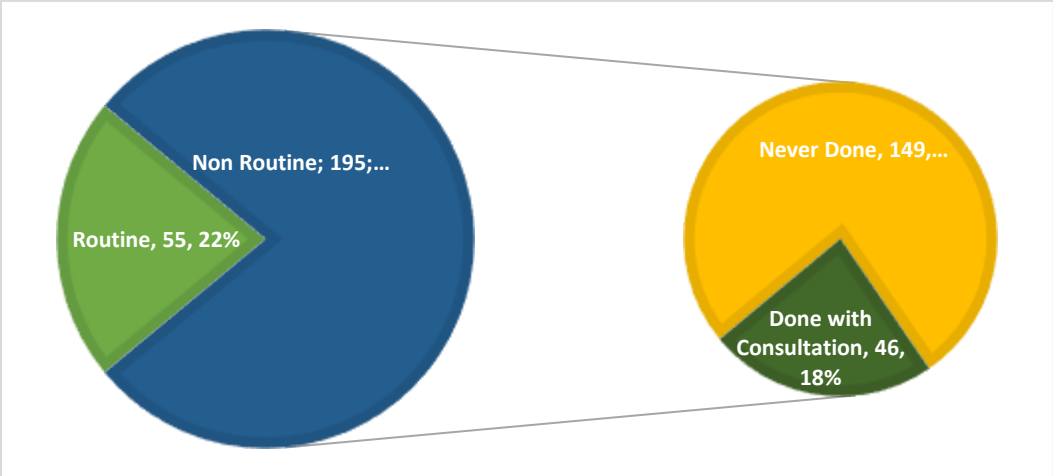

Table 3. Barriers Toward Breast Cancer Screening among Participants (n=195)*

Barriers	n (%)
Not old enough.	33 (16.92)
Financial constraints.	20 (10.26)
Mammography is not available.	9 (4.62)
I do not know who to consult for undergoing this test.	28 (14.36)
I am afraid of the bad results.	53 (27.18)
I have neglected this issue in my life.	54 (27.69)
I do not have a family history of breast cancer.	87 (44.62)
Family rejection of undergoing a mammogram.	11 (5.64)
Embarrassment about breast-related tests.	37 (18.97)
Fear of radiation exposure.	67 (34.36)
I believe that screening is not necessary for me.	14 (7.18)
I do not have any symptoms of breast cancer.	78 (40)
I am too busy.	39 (20)
I believe that health and sickness are determined by God.	39 (20)
I believe that no cure for cancer has been identified in the early stages.	10 (5.13)
I have never heard of this test before.	4 (2.05)

* n=195 represents the participants who reported facing barriers to screening.

Table 4. Univariable and Multivariable Analysis of Factors Associated with Knowledge.

Variables	Tota l	Weak	Mod.\ High	Unadjusted OR (95% C.I.)	p-value	Adjusted OR (95% C.I.)	p-value
Age							
<50	152	103	49	0.634 (0.375-1.072)	0.089	0.479 (0.258-0.888)	0.019
>=50	98	56	42	Ref			

Workplace							
PHC Center	153	101	52	0.766 (0.453-1.296)	0.32	1.084 (0.573-2.053)	0.803
Hospital	97	58	39	Ref			
Job							
Medical	51	13	38	9.5 (3.453-26.14)	0	8.761 (2.289-33.523)	0.002
Nursing/ health	165	120	45	1.219 (0.514-2.89)	0.653	1.398 (0.54-3.616)	0.49
Administrative	34	26	8	Ref			
years of experience							
<=10	25	20	5	0.404 (0.146-1.116)	0.081	0.785 (0.259-2.382)	0.669
>10	225	139	86	Ref			
Marital Status							
Married	217	140	77	0.746 (0.355-1.571)	0.441	0.715 (0.31-1.651)	0.432
Non-Married	33	19	14	Ref			
Education							
Diploma or less	141	103	38	0.177 (0.081-0.387)	0	0.511 (0.165-1.588)	0.246
Bachelor's	72	44	28	0.305 (0.132-0.704)	0.005	0.518 (0.185-1.453)	0.211
Higher degree	37	12	25	Ref			
Family History of BC							
Yes	57	32	25	1.503 (0.824-2.744)	0.184	1.251 (0.632-2.478)	0.521
No	193	127	66	Ref			
Breast-Related Symptoms							
Yes	18	11	7	1.121 (0.419-3.002)	0.82	0.685 (0.21-2.23)	0.53
No	232	148	84	Ref			
Use of Hormonal Therapy							
Yes	109	69	40	1.023 (0.609-1.72)	0.932	1.271 (0.699-2.308)	0.432
No	141	90	51	Ref			

*Variables adjusted using multivariable logistic regression (enter method).

Table 5. Univariable and Multivariable Analysis of Factors Associated with Attitude.

Variables	Total	Neutral	Positive	Unadjusted OR (95% C.I.)	p-value	Adjusted OR (95% C.I.)	p-value
Age							
<50	152	42	110	0.672 (0.366-1.231)	0.198	0.566 (0.29-1.104)	0.095
>=50	98	20	78	Ref			
Workplace							
PHC Center	153	41	112	0.755 (0.414-1.377)	0.359	1.014 (0.507-2.028)	0.97
Hospital	97	21	76	Ref			
Job							
Medical	51	8	43	4.778 (1.738-13.137)	0.002	2.693 (0.682-10.634)	0.157
Nursing/ health	165	38	127	2.971 (1.383-6.383)	0.005	3.043 (1.272-7.279)	0.012
Administrative	34	16	18	Ref			
years of experience							
<=10	25	11	14	0.373 (0.16-0.872)	0.023	0.471 (0.179-1.24)	0.127
>10	225	51	174	Ref			

Marital Status							
Married	217	56	161	0.639 (0.251-1.628)	0.348	0.593 (0.227-1.553)	0.288
Non-Married	33	6	27	Ref			
Education							
Diploma or less	141	40	101	0.395 (0.144-1.084)	0.071	0.363 (0.096-1.376)	0.136
Bachelor's	72	17	55	0.506 (0.17-1.501)	0.219	0.458 (0.134-1.562)	0.212
Higher degree	37	5	32	Ref			
Family History of BC							
Yes	57	12	45	1.311 (0.642-2.676)	0.457	1.185 (0.559-2.511)	0.657
No	193	50	143	Ref			
Breast-Related Symptoms							
Yes	18	4	14	1.167 (0.369-3.685)	0.793	0.792 (0.232-2.701)	0.71
No	232	58	174	Ref			
Use of Hormonal Therapy							
Yes	109	27	82	1.003 (0.562-1.789)	0.992	1.02 (0.545-1.909)	0.95
No	141	35	106	Ref			

*Variables adjusted using multivariable logistic regression (enter method).

Table 6. Univariable and Multivariable Analysis of Factors Associated with Practice.

Variables	**Total**	**Non-routine**	**Routine**	**Unadjusted OR (95% C.I.)**	**p-value**	**Adjusted OR (95% C.I.)**	**p-value**
Age							
<50	152	117	35	1.167 (0.628-2.168)	0.626	0.988 (0.5-1.955)	0.973
>=50	98	78	20	Ref			
Workplace							
PHC Center	153	111	42	2.445 (1.234-4.843)	0.01	4.008 (1.843-8.717)	<0.001
Hospital	97	84	13	Ref			
Job							
Medical	51	35	16	4.724 (1.256-17.763)	0.022	10.773 (1.941-59.794)	0.007
Nursing/ health	165	129	36	2.884 (0.833-9.978)	0.094	4.236 (1.125-15.943)	0.033
Administrative	34	31	3	Ref			
years of experience							
<=10	25	21	4	0.65 (0.213-1.98)	0.448	1.645 (0.463-5.847)	0.441
>10	225	174	51	Ref			
Marital Status							
Married	217	166	51	2.227 (0.748-6.635)	0.15	2.732 (0.831-8.977)	0.098
Non-Married	33	29	4	Ref			
Education							
Diploma or less	141	113	28	0.669 (0.29-1.542)	0.346	1.232 (0.346-4.383)	0.747
Bachelor's	72	55	17	0.835 (0.337-2.067)	0.696	1.378 (0.461-4.125)	0.566
Higher degree	37	27	10	Ref			
Family History of BC							

Yes	57	42	15	1.366 (0.689-2.709)	0.372	1.577 (0.747-3.327)	0.232
No	193	153	40	Ref			
Breast-Related Symptoms							
Yes	18	11	7	2.439 (0.898-6.627)	0.08	1.67 (0.551-5.06)	0.364
No	232	184	48	Ref			
Use of Hormonal Therapy							
Yes	109	79	30	1.762 (0.964-3.22)	0.066	1.85 (0.952-3.596)	0.069
No	141	116	25	Ref			

*Variables adjusted using multivariable logistic regression (enter method).

Table 7. Correlation between knowledge, attitude, and practice variables

No.	Variable tested	rho*	p-value
1	Knowledge × Attitude	0.464	< 0.001
2	Knowledge × Practice	0.076	0.234
3	Attitude × Practice	0.112	0.076

* Spearman's rank Correlation Coefficient

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