ORIGINAL ARTICLE

Perceived Barriers and Knowledge of Mammography Screening Among Saudi Women Attending Primary Health Centers

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ABSTRACT

Objective: To assess the knowledge and barriers of mammography screening among Saudi women attending primary health centers in Saudi Arabia.

Study Design: Descriptive cross-sectional.

Place and Duration of the Study: Conducted in the central region of the Kingdom of Saudi Arabia from 10th May 2024 to 31st October 2024.

Materials and Methods: The study was conducted among women attending the primary healthcare centers in the central region of Saudi Arabia. An Arabic questionnaire assessing sociodemographic, breast cancer awareness, and perceptions about mammographic screening was utilized. Data was analyzed in the Software Sciences (SPSS) version 26.

Results: Of the 349 Saudi women, 64.2% were married, and 61.3% were between 18 and 40 years old. Smoking behavior was identified as the most common breast cancer risk factor (75.1%), while fear of radiation was recognized as the most common personal barrier to mammographic screening (61.9%). Low levels of knowledge about cancer risk factors and mammographic screening were found in 51.9% of the women, whereas 9.5% were considered to have a high level of barrier toward MS. Increased knowledge and barrier scores were associated with being married, better education, and being an employee.

Conclusion: Saudi women have limited knowledge of the risks of breast cancer and have few perception barriers to mammogram screening too. Married women with better education and working status demonstrated a better understanding of the BC risk factors. Still, at the same time, they may exhibit high levels of barriers toward MS which needs to be focused on.

Key Words: *Breast Cancer, Mammography Screening, Knowledge, Saudi Women.*

Introduction

Breast cancer, which accounts for 30% of all new cancer cases worldwide, is the most frequent cancer among women, with an estimated 2.3 million new cases worldwide in 2020, according to the Global Cancer Statistics Report [1]. Therefore, it is the most common reported cancer (14.2%) in Saudi Arabia, and cancer-related fatalities among women have an annual incidence of 3.01% and a mortality rate of 0.93%.[2]

In the literature, well known strategies to detect breast cancer early, including regular physical exams, increased education about breast cancer, and routine mammography, have been promoted because there is compelling evidence linking early detection to a better prognosis and a decrease in breast cancer deaths.[3] Global recommendations for breast cancer screening vary; the US Preventative Services Task Force and the United Kingdom National Screening Committee both advise beginning mammography imaging screening at age fifty. However, as breast cancer is the most frequent cancer among Saudi women and a major cause of female fatalities, the suggested beginning age in Saudi Arabia is 40 years old.[4] Although mammography has been available in all regions of KSA since 2005, the Saudi Health Interview Survey 2015 showed a very low rate of breast cancer

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screening (BCS). Among the 10,735 participants, 1,135 were 50 years or older women, 89% of whom had never had a clinical breast examination and 92% hadn't had a mammogram in the past year.[9]

Mammography is a sophisticated established screening tool for lowering the death rate from breast cancer(BC), and is well used in developed countries than in underdeveloped ones, but it is crucial to recognize the psychological effects of women's worries about the results of the mammography.[5] As of right now, mammography stands as the gold standard for early BC identification and screening, and its use has been shown to lower treatment costs and minimize BC-related mortality.[6]

Improving screening rates in various demographics begins with raising awareness of the aspects related to mammography. In each nation and area, the cultural, social, and economic conditions are shaped in large part by knowledge, attitudes, and beliefs around breast cancer screening. Consequently, before developing and putting into action a plan to attain widespread coverage of breast cancer screening programs, it is essential to assess the obstacles and enablers of screening in various communities.[7]

Women should be informed about the importance and benefits of mammographic screening (MS) as an effective method for detecting breast cancer early. However, due to lack of awareness and knowledge about MS, many Saudi women were diagnosed with BC at an advanced stage.[8] Despite the availability of free breast cancer screenings to the general population in Saudi Arabia the rate of screening is low.[9] Factors that influence women's knowledge about MS, include their socio-demographic characteristics, awareness of BC risk factors, and having exposure of family members with BC.[10] MS has various barriers, which are categorized into three main groups: personal, health system, and economic barriers. According to Saudi Arabian cultural norms, women may not be allowed to use MS due to concerns about modesty, how they interact with men other than their husbands, and beliefs regarding the privacy of the body.[11]

Research conducted in the northern, western, and eastern regions of Saudi Arabia showed that a large number of women are still not sufficiently informed about the value, frequency, and advantages of mammograms. Low adherence to screening criteria is also influenced by individual factors such as cultural beliefs, misconceptions, and fear.[4,5,6,8] Therefore, this study aims to determine the knowledge gaps and perceived obstacles related to mammography screening among Saudi women who visit primary healthcare facilities in the central region of Saudi Arabia. It has shed light on how healthcare-related, financial, and personal barriers interact to influence screening uptake in this region. Furthermore, this study would assist in determining whether provider interventions and focused awareness campaigns can enhance screening adherence.

Materials and Methods

The study employs a cross-sectional, quantitative descriptive design to explore awareness, perceived barriers, and factors influencing mammography screening among Saudi women attending primary health centers (PHCs). Research approval was taken from the University's Deanship of Research: KFU-REC-2024-MAR- ETHICS2058. The data was collected by data collectors in primary health care centers through an online, self-administered questionnaire featuring structured questions to gather quantitative data on perceived barriers to mammography screening, levels of awareness, demographic information, and factors influencing screening decisions. The eligibility criteria included Saudi females, age 18 years and above, living in central region of Saudi Arabia. To ensure data is collected exclusively from PHCs, the designated data collectors in various PHCs distributed the survey link to the eligible females, guided them through the process, and ensured completeness. The minimum sample size of 385 was calculated using the Raosoft sample size calculator (Raosoft Inc., Seattle, WA, USA), based on a population estimate of approximately 32,175,224 according to the General Authority for Statistics in the Kingdom of Saudi Arabia, considering a 95% confidence interval, a 5% margin of error, and a 50% response distribution.

Questionnaire Criteria

The questionnaire comprised sections on sociodemographic features, knowledge evaluation of mammography screening, and risk factors for breast cancer. Additionally, had assessment of healthcare-related, financial, and personal barriers

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to mammography screening.

A pilot study was conducted beforehand to verify the feasibility and dependability of the original research. The overall Cronbach's alpha score for the questionnaire was 0.76, indicating strong item reliability and internal consistency.

The knowledge about BC risk factors and MS has been assessed using a 14-item questionnaire with "yes" coded with 1 and "no/I don't know" coded with 0 as the answer options. The total knowledge has been calculated by adding all 14 items. A possible score ranging from 0 to 14 points has been generated. The higher the score, the higher the knowledge about BC risk factors and MS. By using 50% and 75% as cutoff points to determine the level of knowledge, women were considered to have low knowledge if the total score was less than 50%, 50% to 75% were moderate and above 75% were considered as having high knowledge level.

Likewise, the barrier toward MS has been assessed using a 19-item questionnaire with "yes" coded with 1 and "no/I don't know" coded with 0 as the answer options. By summing up 19 items, we got scores ranging from 0 to 19 points. Similar criteria were applied following the knowledge representing the level of barrier: low barrier (<50% points), Average (50% to 75% points), and high (>75% points).

The data were presented by numbers and percentages for all categorical variables, while means and standard deviations were given to all continuous variables. The knowledge and barrier scores were compared with the socio-demographic characteristics of the women by using the Mann-Whitney Z-test. Normal tests have been performed using the Kolmogorov-Smirnov test. Based on the plot, both knowledge and barrier scores follow the non-normal distribution. Thus, a non-parametric test was applied. Further, the Spearman correlation coefficient has been conducted to determine the correlation between the knowledge and barrier scores. Statistical significance was set to $p<0.05$ level. All data analyses were performed using Statistical Packages for Software Sciences (SPSS) version 26 Armonk, New York, IBM Corporation.

Results

A total of three hundred and forty-nine Saudi women responded to our survey. Table 1 presents the socio-demographic characteristics of the women. 61.3% were between 18 and 40 years old. Most of the women lived in the Urban area (92.8%). With respect to marital status, 64.2% were married, and more than half (54.7%) had university or postgraduate degrees. Unemployed women constitute 67.3% of the total respondents, and those who earned less than 5,000 SAR per month constituted 60.5%. In addition, 17.5% had a family history of breast cancer.

Table I: Socio Demographic Characteristics of the Saudi Women (n=349)

Study variables	n (%)
Age group	
• 18 – 40 years	214 (61.3%)
• 41 – 50 years	103 (29.5%)
• 51 – 60 years	29 (08.3%)
• >60 years	03 (0.90%)
Residence	
• Urban	324 (92.8%)
• Rural	25 (07.2%)
Marital status	
• Single	108 (30.9%)
• Married	224 (64.2%)
• Divorced or widowed	17 (04.9%)
Educational level	
• Illiterate	04 (01.1%)
• Primary/Preparatory	67 (19.2%)
• Secondary/Diploma	87 (24.9%)
• University/Postgraduate	191 (54.7%)
Occupation	
• Employed	114 (32.7%)
• Unemployed	235 (67.3%)
Monthly income (SAR)	
• <5,000	211 (60.5%)
• 5,000 – 7,000	40 (11.5%)
• >7,000	98 (28.1%)
Family history of breast cancer	
• Yes	61 (17.5%)
• No	288 (82.5%)

Regarding the assessment of the knowledge of BC risk factors and MS (Table 2), the top 3 BC risk factors where women showed good knowledge were "smoking behavior" (75.1%), followed by "consuming unhealthy food" (66.8%) and "family history of BC" (65%). In contrast, women showed poor knowledge of other BC risk factors, such as "early menarche (19.5%), "first pregnancy after the age of 30 years" (22.9%), and "late menopause" (35.5%). Regarding knowledge about MS, the results showed gaps, particularly related to the frequency of doing MS (19.5%). The overall mean knowledge score was 6.52 (SD 3.56), with low, average, and high knowledge constituting 51.9%, 32.7%, and 15.5%, respectively.

Table II: Assessment of the knowledge regarding BC risk factors and MS (n=349)

Knowledge BC risk factors	n (%)
1. Smoking behavior	262 (75.1%)
2. Consuming unhealthy food	233 (66.8%)
3. Family history of BC	227 (65.0%)
4. Age of 35 years or older	199 (57.0%)
5. Overweight and obesity	171 (49.0%)
6. Non-lactating women	156 (44.7%)
7. Hormonal replacement therapy	150 (43.0%)
8. No exercise	145 (41.5%)
9. Late menopause	124 (35.5%)
10. First pregnancy after the age of 30 years	80 (22.9%)
11. Early menarche	68 (19.5%)
Knowledge of MS	
12. MS is the ideal method for detecting BC	204 (58.5%)
13. MS is recommended for over 40 years	189 (54.2%)
14. Frequency of doing MS	68 (19.5%)
Total knowledge score (mean ± SD)	**6.52 ± 3.56**
Levels of knowledge	
• Low	181 (51.9%)
• Average	114 (32.7%)
• High	54 (15.5%)

Regarding the assessment of the barriers to MS (Table 3), the top three personal barriers based on women's ratings were "fear of radiation" (61.9%), "fear of pain" (59.3%), and "fear of discovery of BC" (59%), while "MS is not safe" (28.1%) and "lack of time" (39.5%) were the personal barriers with the lowest ratings. Regarding economic barriers, most items showed poor ratings, with "MS is too costly" being the lowest (20.6%). Finally, regarding health system barriers, only two items showed good ratings: "fear of errors in diagnosis" (57.9%) and "I will not do MS except recommended by the doctor" (52.1%). The rest of the health system barrier items had ratings below 50%, most notably about "no female doctor/nurse" (23.8%), "not considering privacy during the examination" (26.6%), and "The site that provides is far" (28.9%). The overall mean barrier score was 7.93 (SD 5.11). Accordingly, low, average, and high barriers were found in 60.7%, 29.8%, and 9.5%, respectively.

Table III: Assessment of the barriers regarding MS (n=349)

Personal barrier	n (%)
1. Fear of radiation	216 (61.9%)
2. Fear of pain	207 (59.3%)
3. Fear of discovery of BC	206 (59.0%)
4. Lack of information about MS	197 (56.4%)
5. Fear of cancer treatment	190 (54.4%)
6. The embarrassment of breast examination	189 (54.2%)
7. Do not know where MS done	151 (43.3%)
8. Busy with no free time	138 (39.5%)
9. MS is not safe	71 (28.1%)
Economic barrier	
10. Transport problems	103 (29.5%)
11. Taking sick leave from work is difficult	98 (28.1%)
12. MS is too costly	72 (20.6%)
Health system barrier	
13. Fear of errors in diagnosis	202 (57.9%)
14. I will not do MS except if recommended by the doctor	182 (52.1%)
15. Too long time to get a medical appointment	158 (45.3%)
16. No adequate description of MS by the doctor	109 (31.2%)
17. The site that provides is far	101 (28.9%)
18. Not considering privacy during the examination	93 (26.6%)
19. No female doctor/nurse	83 (23.8%)
Total barrier score (mean ± SD)	**7.93 ± 5.11**
Level of barrier	
• Low	212 (60.7%)
• Average	104 (29.8%)
• High	33 (09.5%)

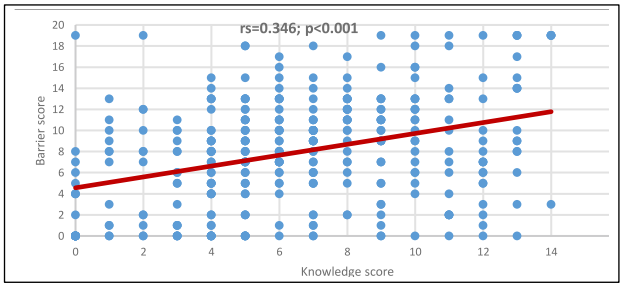

Figure 1: Correlation between knowledge and barrier score

Figure 1 depicts a positive significant correlation between knowledge and barrier scores (rs=0.346; p<0.001), suggesting that the increase in knowledge score correlates with the increase in barrier score.

Exploring the association between knowledge and barrier scores concerning the socio-demographic characteristics of the women found that higher knowledge scores were associated with being older (p=0.008), being married (p<0.001), being more educated (p<0.001), employed (p<0.001) and

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Table IV: Association between knowledge and barriers scores with the Socio-demographic characteristics of Saudi Women (n=349)

Factor	Knowledge Score (14) Mean ± SD	Barrier Score (19) Mean ± SD
Age group		
• ≤40 years	6.17 ± 3.65	7.64 ± 5.14
• >40 years	7.07 ± 3.36	8.38 ± 5.06
Z-test; p-value §	***2.663; 0.008 *****	***1.237; 0.216***
Residence		
• Urban	6.43 ± 3.53	7.82 ± 5.14
• Rural	7.72 ± 3.88	9.24 ± 4.70
Z-test; p-value §	***1.763; 0.078***	***1.241; 0.215***
Marital status		
• Unmarried	5.67 ± 3.55	7.05 ± 5.06
• Married	6.99 ± 3.49	8.42 ± 5.09
Z-test; p-value §	***3.488; <0.001 *****	***2.650; 0.008 *****
Educational level		
• Diploma or below	5.22 ± 3.48	7.20 ± 4.93
• University or higher	7.59 ± 3.27	8.52 ± 5.19
Z-test; p-value §	***6.361; <0.001 *****	***2.312; 0.021 *****
Occupation		
• Employed	7.67 ± 3.41	9.38 ± 5.18
• Unemployed	5.97 ± 3.51	7.22 ± 4.94
Z-test; p-value §	***4.428; <0.001 *****	***3.637; <0.001 *****
Monthly income (SAR)		
• <5,000	6.09 ± 3.49	7.65 ± 5.17
• ≥5,000	7.18 ± 3.58	8.35 ± 5.01
Z-test; p-value §	***2.912; 0.004 *****	***1.388; 0.165***
Family history of breast cancer		
• Yes	6.95 ± 3.05	8.13 ± 4.77
• No	6.43 ± 3.66	7.88 ± 5.19
Z-test; p-value §	***1.186; 0.236***	***0.377; 0.706***

§ P-value has been calculated using Mann Whitney Z-test.
** Significant at p<0.05 level.

increasing monthly income (p=0.004). Regarding barrier scores, higher barrier scores were associated with being married (p=0.008), having better education (p=0.021), and being an employee (p<0.001). No significant differences were observed between the knowledge and barrier scores with residence and family history of BC (Table IV).

Discussion

Breast cancer is one of the most prevalent cancers globally, and early detection through mammograms is crucial in improving survival rates. However, the effectiveness of MS can be influenced by both knowledge about BC risk factors and barriers to screening. Evaluating these factors can help outline interventions to improve awareness and partaking in BC screening programs.

The findings of this study showed gaps in the knowledge of BC risk factors and screening. According to the given criteria, more than half of the women (51.9%) were below the threshold of satisfactory ratings (mean score: 6.52 out of 14 points). Several studies documented an unfavorable knowledge about BC risk factors, symptoms, and MS.[2,6,10] In contrast, studies conducted by Hamshari et al.[12] and Bawazir et al.[13] documented an adequate understanding of women regarding BC and MS, while in a study by Amkongo et al. an average knowledge about BC risk factors and MS were detected among women attending two health facilities in Windhoek, Namibia.[11] The differences in knowledge levels are mainly attributed to study methodologies, regional settings, and the research focus.

Among BC risk factors, lack of understanding was seen in the early menarche, first pregnancy after the age of 30 years, and late menopause, while the knowledge of MS had a poor rating on the frequency of doing MS with only 19.5%. Consistent with our results, Abdel-Salam et al. also found low ratings on the following BC risk factors such as early menarche (14.9%), late pregnancy (>30 years old) (18%) and late menopause (18.7%). Regarding MS, approximately half of the women correctly recognized mammograms as the ideal modality for detecting BC.[3] In contrast, Bakarman et al. reported that the most common BC risk factors recognized by the women were having a close relative with BC (49.5%) and previous history of BC (44.9%).[5] In our study, smoking behavior, followed by consuming unhealthy food and a family history of BC, were the most recognized risk factors for BC, which did not coincide with previous reports.

Data from this study suggest that increasing age, being married, having higher education, being an employee, and increasing monthly income are the factors associated with increased knowledge. Corroborating these reports, studies done in the Jouf region found that age, healthcare workers category, education, and residence location were the influential knowledge factors.[2,3] However, conflicting reports enunciated in Yemen revealed that lower educational levels, unemployed, and women who

never performed self-breast examinations were associated with limited knowledge of BC risk factors.[13] Growing evidence shows that age, education, and marital status are key contributors to knowledge about BC. The most common reason for this effect was that older women had more exposure to health-related information about BC, while women with better education may possess better health literacy than women who were less educated. Similarly, married women may have better social support from their partner than unmarried women.

Although participating women in this study were considered to have poor knowledge, the barriers toward MS yielded favorable results. Only 9.5% were deemed to have high levels of barriers; the rest were low to average levels (90.5%), and the overall mean barrier score was 7.93 out of 19 points. Limited studies have been done across publications stratifying barrier scores into levels. Hence, further investigations are necessary to confirm this result.

Assessing the details of the barrier toward MS, we noted "fear of radiation," "fear of pain," "fear of discovery of BC," "lack of information about MS," "fear of cancer treatment," and "embarrassment" were the most prominent personal barriers being identified by the women. "Transport problems" and "being on leave from work" are rated as the top 2 most common economic barriers, whereas "fear of errors in diagnosis" and "non-adherence to MS, except if advised by doctors," have been recognized as the most common health system barriers. Across the literature, there was ample evidence that the barriers related to MS were mostly likely associated with stigma, including "fear of radiation exposure," "fear of BC discovery," "fear of BC diagnosis," and "fear of pain".[2-5,8,13,14] Other prominent barriers to MS reported by the publication include the absence of symptoms [11,14], the lack of knowledge about the method and its importance [15,16], race/ethnicity, and low socioeconomic and educational levels.[17] Addressing these barriers is critical to early detection and management to reduce mortality associated with BC.

The analysis of confounding variables with barriers to screening suggested that higher barrier levels were associated with being married, having a university or higher degree, and being an employee. However, this study finds no differences between the barrier scores to age, residence, monthly income, and family history of BC ($p>0.5$). The most compelling reason for these effects was that married women may have to balance work and family, and MS adherence will be of less priority, while the lack of perception of older women regarding MS could be attributed to the fear of detecting BC. On the other hand, employees may have been associated with high barriers to MS due to a lack of employer support and limited access to healthcare. These factors must be addressed to improve adherence to MS. The factors influencing barriers identified in this study are almost following the study of Abdel-Aziz et al. This reflected low utilization of BC screening had positive associations with a woman's age, better education, increased family income, using hormonal contraception, and previous history of BC.[8]

We further detected a positive significant correlation between knowledge and barrier scores, indicating that whenever the knowledge of women increases, the barrier toward MS will also likely increase. This positive association could be due to complex reasons, such as women's fear of BC and increased awareness about the risks, cultural or social beliefs, and deep-rooted misinformation or knowledge. Contradicting these reports, studies done in the Jouf region documented an inverse correlation between knowledge and barrier scores, suggesting that the increase in knowledge correlates with the decrease in barriers.[2,6]

Conclusion

Despite a lack of knowledge regarding BC risk factors and MS, Saudi women's general perception of the barriers to MS achieved better ratings. Younger women who were unmarried and had a lower monthly income were more likely to exhibit a poor understanding of the BC risk factors; however, participants who had better education and were currently working could demonstrate high barriers toward mammogram screening which is alarming and needs to improve Saudi women's knowledge of the basic facts of BC.

Study Limitations

The generalizability of the findings is subject to mild study limitations as cross-sectional research unable to determine cause and effect and cannot be used to measure behavior over time.

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Recommendation

Health education among women visiting primary health centers could bridge knowledge gaps and eliminate barriers. Addressing these obstacles through targeted outreach, policy changes, and healthcare system improvements can enhance early detection rates and decrease breast cancer mortality.

REFERENCES

1. Omari M, Amaadour L, Zarrouq B, Al-Sheikh YA, El Asri A, Kriya S, et al. Evaluation of psychological distress is essential for patients with locally advanced breast cancer prior to neoadjuvant chemotherapy: Baseline findings from Cohort Study. *BMC women's health*. 2023; 23(445):1-10 doi: 10.1186/s12905-023-02571-1.
2. Alenezi AM, Thirunavukkarasu A, Wani FA, Alenezi H, Alanazi MF, Alruwaili AS, et al. Female Healthcare Workers' knowledge, attitude towards breast cancer, and perceived barriers towards mammogram screening: A multicenter study in North Saudi Arabia. *Curr Oncol*. 2022;29(6):4300-4314. doi: 10.3390/curroncol29060344.
3. Abdel-Salam DM, Mohamed RA, Alyousef HY, Almasoud WA, Alanzi MB, Mubarak AZ, et al. Perceived Barriers and Awareness of Mammography Screening Among Saudi Women Attending Primary Health Centers. *Risk Manag Healthc Policy*. 2020;13:2553-2561. doi: 10.2147/RMHP.S277375.
4. AlAbdulKader A, Gari D, Al Yousif G, Alghamdi A, AlKaltham S, AlDamigh F, et al. Perceived barriers and facilitators to breast cancer screening among women in Saudi Arabia. *Breast cancer (Dove Medical Press)*.2023;15:505-513. doi: 10.2147/BCTT.S406029.
5. Bakarman M, Kalthoum D, Wahby Salem I, Alshuaibi RO, Almohammadi TA, Beser RA, et al. Barriers to using breast cancer screening methods among adult females in Jeddah, Saudi Arabia: A cross-sectional study. *Cureus*. 2023;15(7): e41739. doi: 10.7759/cureus.41739 .
6. Alanazi MF, Thirunavukkarasu A, Alrowily M, Alaqel N, Alaqel A, Alruwaili M, et al. A cross-sectional evaluation of knowledge about breast cancer and perceived barriers to the uptake of mammogram screening among northern Saudi women: A population-based study. *Breast cancer (Dove Medical Press)*.2023;15(1):451–460. doi: 10.2147/BCTT.S414635.
7. Momenimovahed Z, Tiznobaik A, Taheri S, Hassanipour S, Salehiniya H. A review of barriers and facilitators to mammography in Asian women. *E cancer medical science*. 2020; 14(1s):e1146. doi: 10.3332/ecancer.2020.1146.
8. Abdel-Aziz SB, Amin TT, Al-Gadeeb MB, Alhassar AI, Al-Ramadan A, Al-Helal M, et al. Perceived barriers to breast cancer screening among Saudi women at primary care setting. *J Prev Med Hyg*. 2018;59(1): E20-E29. doi: 10.15167/2421-4248/jpmh2018.59.1.689.
9. Moridi A, Mahmoodi S, Rahmati N, Fathi M, Naeiji Z. Comparison of Awareness Level about Breast Cancer Risk Factors, Presentations, and Screening Rules and Tools: A Cross-sectional Study on General Female Population. *Journal of Obstetrics, Gynecology and Cancer Research*. 2021;6(4):188-94. doi: 10.30699/jogcr.6.4.188.
10. Prusty RK, Begum S, Patil A, Naik DD, Pimple S, Mishra G. Knowledge of symptoms and risk factors of breast cancer among women: a community-based study in a low socioeconomic area of Mumbai, India. *BMC women's health*. 2020;20(1):1-2. doi: 10.1186/s12905-020-00967-x.
11. Amkongo M, Karera A, Kalondo L, Nakweenda M, Namene M, Shilumba M, Izaacs LA. A correlational study on the awareness of breast cancer screening methods and risk factors among women attending two health facilities in Windhoek, Namibia. *PAMJ-One Health*. 2023;12(4). doi; 10.11604/pamj-oh.2023.12.4.39770.
12. Hamshari S, Nazzal Z, Altell M, Nanaa I, Jbara R, Sabri R. Mammogram uptake and barriers among Palestinian women attending primary health care in North Palestine. *European Journal of General Practice*. 2021;27(1):264-270. doi: 10.1080/13814788.2021.1985996.
13. Bawazir A, Bashateh N, Jradi H, Breik AB. Breast cancer screening awareness and practices among women attending primary health care centers in the Ghail Bawazir District of Yemen. *Clinical breast cancer*. 2019 Feb 1;19(1): e20-29. doi: 10.1016/j.clbc.2018.09.005.
14. Jones T, Wisdom-Chambers K, Freeman K, Edwards K. Barriers to mammography screening among black women at a community health center in South Florida, USA. *Medical research archives*. 2023 ;11(4). doi: 10.18103/mra.v11i4.3814.
15. Joho AA, Mdoe MB, Masoi TJ, Yahaya JJ. Perceived barriers and factors influencing uptake of breast cancer screening among women: a population-based cross-sectional study. *Scientific Reports*. 2024 ;14(1):12291. doi: 10. 1038/s 41598-024-62218-5.
16. van den Broek-Altenburg EM, Leslie AA, Benson JS, DeStigter KK. Disparities in Mammography Screening: Analyzing Barriers to Access Using Individual Patient Perspectives and the Health Belief Model. *Cancer Control*. 2024; 31:10732748241248367. doi: 10.1177/107327 48241248367.
17. Ponce-Chazarri L, Ponce-Blandón JA, Immordino P, Giordano A, Morales F. Barriers to breast cancer-screening adherence in vulnerable populations. *Cancers*. 2023 Jan 18;15(3):604. doi: 10.3390/cancers15030604.

CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon request.

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