



CODEN [USA]: IAJPB

ISSN : 2349-7750

## INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES

SJIF Impact Factor: 7.187

<http://doi.org/10.5281/zenodo.4642367>

Available online at: <http://www.iajps.com>

Research Article

### BARRIERS TO MAMMOGRAM SCREENING AMONG WOMEN IN TAIF CITY, SAUDI ARABIA

Amal Badr Alotaibi,<sup>1</sup>Attyah Yahia Alzhrani<sup>2</sup>

<sup>1</sup>Family Medicine Program, Ministry of Health, Taif City, Kingdom of Saudi Arabia

<sup>2</sup>Family Medicine department, Ministry of Health, Taif City, Kingdom of Saudi Arabia

**Article Received:** February 2021 **Accepted:** February 2021 **Published:** March 2021

**ABSTRACT:**

**BACKGROUND:** Regular mammogram screening has been used to detect breast cancer at early stages and has been shown to be effective in reducing breast cancer deaths

**OBJECTIVES:** To assess mammography use, its determinants and define barriers to mammogram screening among women in Taif city.

**SUBJECTS AND METHODS:** A cross sectional study was conducted at primary healthcare centers that have breast cancer screening program in the Taif city, western Saudi Arabia. It included a sample of adult women, who were referred to hospitals for mammogram screening but not attended during the study period (1<sup>st</sup> -31<sup>st</sup> October, 2019). Data collected by phone regarding socio-demographic data, history of previous breast lesions, and barriers to mammogram screening.

**RESULTS:** The study included 163 women. The age of almost half of them (49.7%) ranged between 40 and 50 years whereas that of 35.6% of them exceeded 50 years. Previous history of mammogram screening was reported by 47.7% of the participants. Duration since the last done mammogram was one year or less among most of those reported mammogram screening (71.6%). Regarding the age of performing screening mammogram, 44.6% performed it between the age of 40 and 50 years whereas 35.1% did it after the age of 50 years. Results of multivariate logistic regression analysis showed that non-Saudi women were 88% less likely to not performing screening mammogram. However, the p-value was borderline insignificant,  $p=0.057$ . Women with no family history of breast cancer were more likely to not performing screening mammogram compared to those with family history of breast cancer (adjusted odds ratio "AOR" =3.24, 95% confidence interval "CI" =1.35-7.76,  $p=0.009$ ). Personal history of breast cancer was not significantly associated with performing screening mammogram after control for confounders. The commonest reported barriers for screening mammogram were lack of time (31.2%), fear of finding out something wrong (20.6%), mammogram is too embarrassing (20.6%) and too painful (20.6%)

**CONCLUSION:** Refusal to perform screening mammography is a relatively common health problems encountered by adult women attending primary healthcare centers and referred to perform it in specialized hospitals in Taif. Overcoming the reported barriers to perform mammography is essential for women's health.

**Keywords:** Mammogram, Barriers, Determinants, Saudi Arabia

**Corresponding author:**

**Amal Alotaibi,**

Family Medicine Program,

Ministry of Health, Taif City, Kingdom of Saudi Arabia

Mobile: 00966565542323

e-mail: [dr.amalotb@gmail.com](mailto:dr.amalotb@gmail.com)

QR code



Please cite this article in press Amal Badr Alotaibi et al., *Barriers To Mammogram Screening Among Women In Taif City, Saudi Arabia*, Indo Am. J. P. Sci, 2021; 08(03).

**INTRODUCTION:**

Breast cancer is the most frequent cancer among women, impacting 2.1 million women each year, and also causes the greatest number of cancer-related deaths among women. In 2018, it is estimated that 627,000 women died from breast cancer – that is approximately 15% of all cancer deaths among women. While breast cancer rates are higher among women in more developed regions, rates are increasing in nearly every region globally. <sup>[1]</sup>

Breast cancer is the most common type of cancer among Saudi females as a total of 3629 cases of breast cancer were diagnosed among women in 2018, representing 29.7 % of all newly diagnosed cancers. <sup>[2]</sup>

Additionally, in Saudi Arabia, the International Agency for Research on Cancer estimated that the age-standardized incidence rate (ASIR) for breast cancer was 27.3 per 100,000 women in 2018, and the age-standardized mortality rate was 7.5 per 100,000 women. <sup>[2]</sup>

Regular mammogram screening has been used to detect breast cancer at early stages and has been shown to be effective in reducing breast cancer deaths. <sup>[3]</sup>

The Centers for Disease Control and Prevention (CDC) recommend mammography for breast cancer screening at least every two years for women aged 50–74 years old. <sup>[4]</sup>

Although mammography has been available in all regions of KSA since 2005, the national Saudi Health Interview Survey (SHIS) 2015, had reported a very low rate of breast cancer screening (BCS) where out of 10,735 participants, 1,135 were 50 years or older women, 89% of them reported not having a clinical breast examination (CBE) and 92% never had mammogram in the past year. <sup>[5]</sup>

Many barriers To breast cancer screening with the underutilization of services have been studied worldwide. <sup>[6]</sup>

Previous research, described such factors as fear and pain surrounding the procedure, low levels of income and education, older age as barriers to mammogram screening. <sup>[7]</sup>

Mammography utilization and knowledge are low in Saudi Arabia despite the availability of free of charge screening program with limited studies have been

carried out about barriers of mammogram utilization among women. <sup>[7, 8]</sup>

The present study was carried out to explore the barriers associated with mammography screening among women in Taif city, Saudi Arabia.

**METHODS:****Study design:**

It was a cross sectional study.

**Study area/settings:**

The study was conducted in Taif governorate, in the western region of Saudi Arabia. It is located in the Makkah Province at an elevation of 1700-2500 meters above sea level. The estimated population is 1,750,00 according to 2014 census. <sup>[16 9]</sup> In Taif, there are 27 PHCCs have breast cancer screening program. This study was conducted in the PHCCs centers that have breast cancer screening program in the city.

**Study population/inclusion criteria:**

All adult women who were referred to hospitals for mammogram screening but not attended during the study period in Taif city

**Exclusion criteria:**

- Women who not answered by phone
- Women's phones are out of service after 3 attempts of calling

**Study period:**

The field work of this study was conducted during the period of 1<sup>st</sup> -31<sup>st</sup> October, 2019.

**Sample size:**

- Number of women that referred for mammogram screening during October 2019 but not attended is approximately 219 women
- The estimated prevalence of mammogram screening among women is 27.7%, according to a recent Saudi study carried out in Riyadh. <sup>[17 10]</sup>
- 3) Tolerable error 5%.
- 4) Confidence level = 95%.

The minimum sample size was 139 women

**Sampling technique:**

In the first level, out of 27 PHCCs that have breast cancer screening program in Taif city, four PHCCs were randomly selected. Women who were eligible for mammogram screening were referred to King Faisal hospital (KFH) or King Abdulaziz Specialized hospital (KAASH).

The data of all cases who were referred to hospital were recorded in cancer screening program.

The women who were referred to mammogram screening in hospitals, the administration of these hospitals sent the list of women who attend mammogram screening or not attend to public health administration on a monthly basis. All women who not attended mammogram screening in hospital were selected.

#### Data collection method

Women who agreed to participate were contacted by phone number and Arabic questionnaire was used for collection data

The questionnaire was initially designed based on previously validated questionnaires.<sup>[8, 11]</sup>

It is originally designed in English and then was translated into Arabic language and was validated in a pilot study before finally utilized.

It has three sections:

- The first section is on Socio-demographic data of the participants: age in years, nationality, educational and employment status, marital status.
- The second section on history of previous breast lesions: personal and family history of any breast cancer and previous history of mammogram screening: date of screening, age at screening.
- The third section on barriers to Mammogram screening:

For each barrier, multiple options were provided in the form of yes, no and not sure. The studied barriers were fears of screening consequences, screening for breast cancer is painful, mammogram screening is too embarrassing, fears of hospitals and health facilities, previous bad experience with screening, and lack of time, health facilities offer screening are far with transportation problems, and the

appointments of Mammogram screening are too far away.

#### Ethical considerations

- All necessary official permissions from ethical committee and director of Joint program of family Medicine were secured before data collection.
- The collected data were kept strictly confidential.

#### Data Analysis

- Statistical package for social sciences (SPSS) software, version 26 was used for data entry and analysis.
- Descriptive statistics (e.g. number, percentage) were applied.
- Chi square test or Fischer exact test (in case of having an expected frequency of less than five in one or more of the cells) were used to investigate the association between two categorical variables.
- Multivariate logistic regression analysis was done (fixed model) including significant factors from bivariate analysis to control for confounders and results were expressed as adjusted odds ratio and 95% confidence interval
- The significance was determined at p value < 0.05 and Confidence interval of (95%CI) does not include one.

#### RESULTS:

##### Socio-demographic characteristics

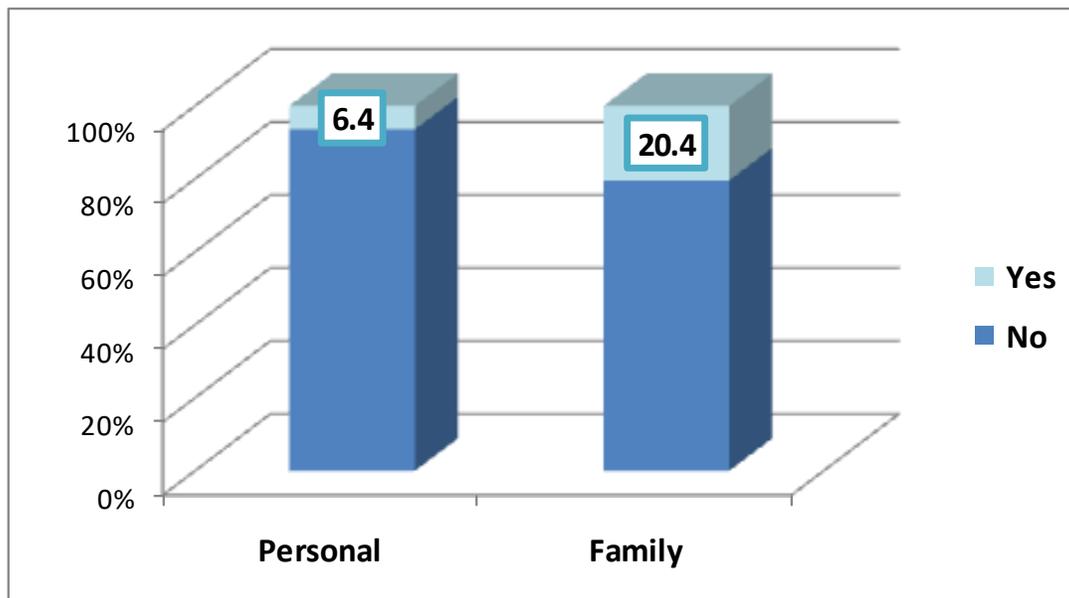
The study included 163 women. Table 1 presents their socio-demographic characteristics. The age of almost half of them (49.7%) ranged between 40 and 50 years whereas that of 35.6% of them exceeded 50 years. Most of them (77.8%) were married and majority (92.6%) was Saudi nationals. More than one-quarter of the women (27%) were university or above graduated while 18.4% were illiterates. Most of them (76.7%) were not working.

**Table 1: Socio-demographic characteristics of the participants (n=163)**

Socio-demographic variables	Frequency	Percentage
<b>Age (years)</b>		
<40	24	14.7
40-50	81	49.7
>50	58	35.6
<b>Marital status</b>		
Single	12	7.4
Married	127	77.8
Divorced	12	7.4
Widowed	12	7.4
<b>Nationality</b>		
Saudi	151	92.6
Non-Saudi	12	7.4
<b>Level of education</b>		
Illiterate	30	18.4
Primary school	29	17.8
Intermediate school	21	12.9
Secondary school	39	23.9
University and above	44	27.0
<b>Employment status</b>		
Not working	125	76.7
Working	38	23.3

**History of breast cancer**

Personal and family histories of cancer were reported by 6.4% and 20.4% of the participated women, respectively as illustrated in Figure 1.

**Figure 1: History of any breast cancer among the participants (n=157)**

### History of mammogram screening

Previous history of mammogram screening was reported by 47.7% of the participants and the duration since the last done mammogram was one year or less among most of those reported mammogram screening (71.6%). Regarding the age of performing screening mammogram, 44.6% performed it between the age of 40 and 50 years whereas 35.1% did it after the age of 50 years.

### Factors associated with mammogram screening

#### -Socio-demographic factors:

Non-Saudi women were more likely to perform screening mammogram compared to Saudi women (88.9% versus 45.2%),  $p=0.012$ . Other studied factors (Age, marital status, level of education and employment status) were not significantly associated with performing screening mammogram. Table 2

-History of breast cancer

Women with personal history of breast cancer were more likely to perform screening mammogram than others (80% versus 45.5%),  $p=0.036$ . Also, those with family history of breast cancer were more likely to perform it compared to their counterparts (71.9% versus 41.5%),  $p=0.002$ , Table 3

Results of multivariate logistic regression analysis showed that non-Saudi women were 88% less likely to not performing screening mammogram. However, the  $p$ -value was borderline insignificant,  $p=0.057$ . Women with no family history of breast cancer were more likely to not performing screening mammogram compared to those with family history of breast cancer (adjusted odds ratio "AOR" =3.24, 95% confidence interval "CI"=1.35-7.76,  $p=0.009$ ). Personal history of breast cancer was not significantly associated with performing screening mammogram after control for confounders. Table 4

**Table 2: Participants` socio-demographic factors associated with performing mammogram screening.**

	Previous history of mammogram screening		p-value
	Yes N=74 N (%)	No N=81 N (%)	
<b>Age (years)</b>			
<40 (n=22)	9 (40.9)	13 (59.1)	0.209 <sup>†</sup>
40-50 (n=77)	33 (42.9)	44 (57.1)	
>50 (n=56)	32 (57.1)	24 (42.9)	
<b>Marital status</b>			
Single (n=10)	4 (40.0)	6 (60.0)	0.793 <sup>†</sup>
Married (n=122)	57 (46.7)	65 (53.3)	
Divorced (n=11)	6 (54.5)	4 (45.5)	
Widowed (n=12)	7 (58.3)	5 (41.7)	
<b>Nationality</b>			
Saudi (n=146)	66 (45.2)	80 (54.8)	0.012*
Non-Saudi (n=59)	8 (88.9)	1 (11.1)	
<b>Level of education</b>			
Illiterate (n=30)	15 (50.0)	15 (50.0)	0.299 <sup>†</sup>
Primary school (n=28)	17 (60.7)	11 (39.3)	
Intermediate school (n=21)	9 (42.9)	12 (57.1)	
Secondary school (n=35)	12 (34.3)	23 (65.7)	
University and above (n=41)	21 (51.2)	20 (48.8)	
<b>Employment status</b>			
Not working (n=122)	59 (48.4)	63 (51.6)	0.767 <sup>†</sup>
Working (n=33)	15 (45.5)	18 (54.5)	

\*Fischer exact test

<sup>†</sup>Chi-square test

**Table 3: Association between history of breast cancer and performing screening mammogram among the participants**

	Previous history of mammogram screening		p-value
	Yes N=74 N (%)	No N=81 N (%)	
<b>Personal history of breast cancer</b> Yes (n=10) No (n=145)	8 (80.0) 66 (45.5)	2 (20.0) 79 (54.5)	0.036*
<b>Family history of breast cancer</b> Yes (n=32) No (n=123)	23 (71.9) 51 (41.5)	9 (28.1) 72 (58.5)	0.002 <sup>†</sup>

\*Fischer exact test

<sup>†</sup>Chi-square test**Table 4: Predictors of not performing screening mammogram among the participants: Multivariate logistic regression analysis**

	Adjusted odds ratio	95% confidence interval	p-value
<b>Nationality</b> Saudi (n=146) Non-Saudi (n=59)	1.0 0.12	0.01-1.05	0.057
<b>Personal history of breast cancer</b> Yes (n=10) No (n=145)	1.0 2.39	0.44-13.15	0.318
<b>Family history of breast cancer</b> Yes (n=32) No (n=123)	1.0 3.24	1.35-7.76	0.009

**Barriers of mammogram screening**

As evident from Table 5, the commonest reported barriers for screening mammogram were lack of time (31.2%), fear of finding out something wrong (20.6%), mammogram is too embarrassing (20.6%) and too painful (20.6%).

Barriers of fear to find out something wrong, the appointments of mammogram screening are too far away, mammogram is too embarrassing, and too painful were more significantly reported among women with history of ever performing mammogram while barrier of lack of time was more observed among those who never performed it. Table 6

**Table 5: Barriers of mammogram screening among the participants**

<b>Barriers of mammogram screening</b>	<b>Yes N (%)</b>	<b>Not sure N (%)</b>	<b>No N (%)</b>
I am afraid to have a mammogram because I might find out something is wrong.	29 (20.6)	6 (4.3)	106 (75.1)
I am afraid to have a mammogram because I don't understand what will be done.	19 (13.5)	9 (6.4)	113 (80.1)
Having a mammogram is too embarrassing.	29 (20.6)	12 (8.5)	100 (70.9)
Having a mammogram is too painful.	29 (20.6)	25 (17.7)	87 (61.7)
Fears of hospitals and health facilities	22 (15.6)	8 (5.7)	111 (78.7)
I had previous bad experience with screening	8 (5.7)	4 (2.8)	129 (91.5)
I dont have time for mammogram screening (lack of time)	44 (31.2)	17 (12.1)	80 (56.7)
Health facilities offer screening are far with transportation problems	24 (17.0)	9 (6.4)	108 (76.6)
The appointments of mammogram screening are too far away	25 (17.7)	16 (11.3)	100 (71.0)

**Table 6: Comparison between women who never with those who ever performed screening mammogram regarding to barriers to perform it**

	<b>Previous history of performing screening mammogram</b>		<b>p-value</b>
	<b>Yes N=74 N (%)</b>	<b>No N=81 N (%)</b>	
I am afraid to have a mammogram because I might find out something is wrong.	20 (29.4)	9 (12.3)	0.018
I am afraid to have a mammogram because I don't understand what will be done.	11 (16.2)	8 (11.0)	0.056
Having a mammogram is too embarrassing.	21 (30.9)	8 (11.0)	0.006
Having a mammogram is too painful.	28 (41.2)	1 (1.4)	<0.001
Fears of hospitals and health facilities	12 (17.6)	10 (13.7)	0.694
I dont have time for mammogram screening (lack of time)	14 (20.6)	30 (41.1)	<0.001
Health facilities offer screening are far with transportation problems	10 (14.7)	14 (19.2)	0.740
The appointments of mammogram screening are too far away	18 (26.5)	7 (9.6)	0.001

**DISCUSSION:**

Mammography is an important screening test for breast cancer as it provides early diagnosis of the disease as well as ensure better chance for therapy and good prognosis.<sup>[12, 13]</sup> The Centers for Disease Control and Prevention (CDC) recommend performing mammography screening test for breast cancer at least every two years for females aged between 50 and 74 years old;<sup>[4]</sup> in the Kingdom of Saudi Arabia (KSA), this group formed 5.1% of the 20 million Saudi females.<sup>[14]</sup>

Despite in KSA, screening mammogram is offered free of charge, it is suboptimal undertaken<sup>[15]</sup>, therefore the present study was carried out to address mainly the barriers for mammogram up taking among women who referred from primary health care centers to hospitals for mammogram screening.

It was reported in the present study that 47.7% of women had performed screening mammogram before. In AlHassa (KSA), only 16.2% of women had been ever screened for breast cancer.<sup>[8]</sup> In Najran (2017), only 15% of women received mammogram.<sup>[16]</sup> In Madinah, 27.7% women attended primary healthcare centers reported that they ever received a mammography during their life.<sup>[17]</sup> However, comparison is not practical between these studies, including the present one as we included in the present survey only women who refused to do further screening mammogram and also these studies were carried out in different settings at different times. In Malaysia, the practice of mammography screening among the general population was 25.5%.<sup>[18]</sup> In Jordan,<sup>[19]</sup> 87.6% of women had never undergone mammography screening. Variation between these studies must be interpreted in the light of having participants of different socio-demographic background as well as conduction of the studies at different times.

Regarding the age of performing screening mammogram, 44.6% performed it between the age of 40 and 50 years whereas 35.1% did it after the age of 50 years. In another Saudi study carried out in Al-Madinah, women >50 years old, Saudi, employed, higher educated, having higher family income, and those who reported a family history and friend history of breast cancer were more likely to perform screening mammogram than their peers.<sup>[17]</sup>

The commonest reported barriers for screening mammogram in the current study were lack of time (31.2%), fear of finding out something wrong (20.6%), mammogram is too embarrassing (20.6%) and too painful (20.6%). In another study carried out

in KSA (2015), main reasons for not performing screening mammogram were the belief that the examination was not important (31%) and worries about the results (25%).<sup>[7]</sup> Another Saudi study (2015) revealed that the barriers to perform breast cancer screening at primary care settings were considering people's thoughts (29.2%), transportation problems (28.9%), and perceived fears from hospitals and health care facilities (21.1%).<sup>[8]</sup> In Najran (2017), the most common barriers for screening of breast cancer was that patients were being unaware of half of the screening methods and being afraid of the results.<sup>[16]</sup> In Almadinah (2017), barriers to mammography were incorrect beliefs about mammography and its procedures and a belief that mammography is painful.<sup>[17]</sup> In United States of America, the barriers for performing screening mammogram were lack of patients understanding of the appropriate frequency of screening, and knowledge of where to obtain a mammogram, insufficient patient education regarding screening guidelines and patient dissatisfaction with the mammography experience.<sup>[20]</sup> In Lebanon, lack of knowledge about screening mammogram was the most commonly recorded barrier.<sup>[21]</sup>

In the present study, barriers of fear to find out something wrong in mammogram, the appointments of mammogram screening are too far away, mammogram is too embarrassing, and too painful were more significantly reported among women with history of ever performing mammogram while barrier of lack of time was more observed among those who never performed it. In a study carried out in Alhassa, the significant barriers among never screened women were encountered regarding stigma following the diagnosis of cancer, shyness, lack of specialized clinics, being busy with lack of time for screening. However, among ever screened, the barriers were fear of consequences and previous bad experience with healthcare workers.<sup>[8]</sup> In Malaysia, the barriers towards mammography screening among those who had never done it before were lack of time, lack of knowledge, not knowing where to go for the test and a fear of the test's result.<sup>[18]</sup> In Jordan, the most commonly reported barriers for women who never underwent screening were: fear of results; no support from surrounding environment; cost of the test; and religious belief.<sup>[19]</sup>

**Strengths and limitations**

**Study strengths:** Up to our knowledge, this is the first study to investigate barriers to perform screening mammography in Taif, which could have significance for decision makers.

**Main study limitations:** The cross-sectional design of the study made it impossible to confirm the causal relationship between practice of screening mammogram and its possible associated factors. The study included only women who were referred to hospitals for mammogram screening but not attended during the study period in Taif city, therefore, it is not practical to generalize the results over the entire population of women in Taif. Finally, rate of performing screening mammogram cannot be computed in this study as we included only those who refused to perform it.

### CONCLUSION:

Previous history of mammogram screening was reported by almost half of women who referred from primary healthcare centers to do mammography at specialized hospitals and refused to that. Most of them performed it between the age of 40 and 50 years or after the age of 50 years. Non-Saudi women were more likely to perform screening mammogram compared to Saudi women. Women with family history of breast cancer were more likely to perform screening mammogram than others.

Refusal to perform screening mammography is a relatively common health problems encountered by adult women attending primary healthcare centers and referred to perform it in specialized hospitals in Taif. The commonest reported barriers for screening mammogram were lack of time, fear of finding out something wrong, mammogram is too embarrassing and too painful.

Barriers of fear to find out something wrong, the appointments of mammogram screening are too far away, mammogram is too embarrassing and too painful were more significantly reported among women with history of ever performing mammogram while barrier of lack of time was more observed among those who never performed it.

### Recommendations

Based on the study results, the following are recommended:

1. Primary healthcare physicians should have a role in encouraging women at or over age of 50 years to perform screening mammography as recommended.
2. Health education campaigns should be implemented to alert women about the importance of early recovery of breast cancer and importance of doing screening mammography and correct their misconception regarding it.

3. Mammogram should be available in more hospitals to shorten the waiting list.
4. Further study included all women over 50 years in Taif to estimate the true rate of performing screening mammogram among them

### Acknowledgements

The authors would like to thank Mashael Eidhah ALSufyani, Rawan Abdullah Al-Talhi, Amal Abdulhadi Aljuaid, Ghadikhalid Alsaadi, Lama Talal Althobaiti, Raghad Khalid Alsherbi, Hatun Abdullah Althagafi, Anhar Hassan Alhamyani, Amani Hassan Alrumaym, Mashael Abdulrahman Alamri, Doha Abdulrahman Alsukhayri, Tayf Majed Alrefi, Waad Mohammed ALQurashi, Ghadah Homood Al-swat, Hanun Mohammed Aljuaid, Rana Mohammed albalawi, Saad Eidhah Althwaybi and Ghadeer Fawaz Althubaiti for helping in collection and entry of data.

### REFERENCES:

1. World health organization. Breast cancer. WHO, 2018.
2. International Agency for Research on Cancer (IARC) [Online]. Available: <https://www.iarc.fr/>. [Accessed: 25-Jan-2019].
3. American Cancer Society (ACS). Breast cancer early detection recommendations. [Online]. Available: <https://www.cancer.org/cancer/breast-cancer/screening-tests-and-early-detection/american-cancer-society-recommendations-for-the-early-detection-of-breast-cancer.html>. [Accessed: 25-Jan-2019].
4. Center for Disease Prevention and Control (CDC). What is breast cancer Screening? [Online]. Available: [https://www.cdc.gov/cancer/breast/basic\\_info/screening.htm](https://www.cdc.gov/cancer/breast/basic_info/screening.htm). [Accessed: 25-Jan-2019].
5. El Bcheraoui C, Basulaiman M, Wilson S, Daoud F, Tuffaha M, AlMazroa MA, et al. Breast cancer screening in Saudi Arabia. free but almost no takers. *PLoS One*. 2015 Mar 16;10(3):e0119051. doi: 10.1371/journal.pone.0119051.
6. WHO. World Health Statistics 2008. pp. 1–112, 2008.
7. Al-Wassia RK, Farsi NJ, Merdad LA, Hagi SK. Patterns, knowledge, and barriers of mammography use among women in Saudi Arabia. *Saudi Med. J*. 2017 Sep;38(9): 913–921.
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 Mar;59(1):. E20–E2. doi: 10.15167/2421-

- 4248/jpmh2018.59.1.689.
9. Taif Chamber [Online]. Available: <http://taifchamber.org.sa/index.php/pages18/>. [Accessed: 25-Jan-2019].
  10. Binhussien BF, Ghoraba M. Awareness of breast cancer screening and risk factors among Saudi females at family medicine department in security forces hospital, Riyadh. *J Family Med Prim Care*. 2018 Nov-Dec; 7(6): 1283-1287. doi: 10.4103/jfmpc.jfmpc\_286\_18.
  11. Colliver K. Factors Influencing Participation in Screening Mammography Among Rural Women, 2016. Doctor of Nursing Practice Scholarly Projects. 20. [https://digitalcommons.otterbein.edu/stu\\_doc/20](https://digitalcommons.otterbein.edu/stu_doc/20)
  12. Tabár L, Gad A, Holmberg LH, Ljungquist U, Fagerberg CJG, Baldetorp L, et al. Reduction in mortality from breast cancer after mass screening with mammography: Randomised trial from the Breast Cancer Screening Working Group of the Swedish National Board of Health and Welfare. *The Lancet* 1985;325: 829-832. doi: 10.1016/S0140-6736(85)92204-4
  13. Verbeek ALM, Holland R, Sturmans F, Hendriks JHCL, Avunac M, Day NE, et al. Reduction of breast cancer mortality through mass screening with modern mammography: First results of the Nijmegen Project, 1975-1981. *The Lancet* 1984; 323: 1222-1224. doi: 10.1016/S0140-6736(84)91703-3
  14. U.S. Preventive Services Task Force. Screening for breast cancer, Topic Page. July 2010. <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/breast-cancer-screening1>
  15. El Bcheraoui C, Basulaiman M, Wilson S, Daoud F, Tuffaha M, AlMazroa MA, et al. Breast cancer screening in Saudi Arabia: Free but almost no takers. *PLoS ONE* 2015;10(3): e0119051. doi:10.1371/journal.pone.0119051
  16. Alshahrani M, Alhammam SYM, Al Munyif HAS, Alwadei AMA, Alwadei AMA, Alzamanan SSM, et al., Knowledge, attitudes, and practices of breast cancer screening methods among female patients in primary healthcare centers in Najran, Saudi Arabia. *J. Cancer Educ* 2019; 34:1167-1172
  17. Al-Zalabani AH, Alharbi KD, Fallatah NI, Alqabshawi RI, Al-Zalabani AA, Alghamdi SM. Breast cancer knowledge and screening Practice and barriers among women in Madinah, Saudi Arabia. *J. Cancer Educ*. 2018 Feb;33(1): 201-207.
  18. Al-Naggar RA, Bobryshev YV, Practice and barriers of mammography among Malaysian women in the general population. *Asian Pac. J. Cancer Prev*. 2012; 13(8):. 3595-600.
  19. Abu-Helalah MA, Alshraideh HA, Al-Serhan AAA, Kawaleet M, Nesheiwat AI. Knowledge, barriers and attitudes towards breast cancer mammography screening in Jordan. *Asian Pac. J. Cancer Prev*. 2015;16(9): 3981-90.
  20. Davis J, Liang J, Petterson MB, Roh AT, Chundu N, Kang P, et al. Risk Factors for late screening mammography, *Curr Probl Diagn Radiol*. 2019 Jan;48(1):40-44.
  21. Bourdeanu, L, Alatrash M, Ketchedjian N, Pate B. Perceived fears, barriers, and benefits regarding breast cancer screening: A comparison of Lebanese and Lebanese-American women. *JCO Glob Oncol*. 2020; 6: GO.20.00019. doi: 10.1200/GO.20.00019.