

## Original Research Article

# Evaluation of women in high-risk groups accepting prophylactic mastectomy and the options for reconstructive surgery in Saudi Arabia

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**Received:** 24 January 2026

**Revised:** 07 May 2026

**Accepted:** 11 May 2026

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## ABSTRACT

**Background:** Breast cancer is the most common type of cancer in women. The choice to undergo prophylactic bilateral mastectomy (BPM) in high-risk patients to prevent breast cancer can intersect with social, cultural, and religious considerations. This study aimed to determine the knowledge, attitudes, and acceptability of BPM among high-risk patients in Saudi Arabia, as well as the available options for breast reconstruction.

**Methods:** A cross-sectional study in Saudi Arabia involved 371 high-risk patients, and data was collected through an online questionnaire.

**Results:** The mean BMI of respondents was 24.68±9.8. Participants aged between 20 and 25 constituted 53.1% (n=197) of the study population. A majority of participants (75.5%) had academic qualifications. Ninety-six (25.8%) reported a family history of breast cancer. Overall, 65.8% of participants were aware of BPM, yet 48.1% had a negative attitude towards it due to fear of losing their self-image. A significant proportion (65.2%) preferred alternative treatments to BPM. There was no significant association between age or qualification and knowledge of BPM ( $p>0.05$ ).

**Conclusions:** While awareness of breast cancer and BPM is moderate among high-risk Saudi women, the acceptability of BPM is low, primarily due to concerns about body image and self-esteem. Age and educational qualifications do not significantly impact knowledge levels about BPM.

**Keywords:** BPM, Breast cancer, High risk, Mastectomy, Reconstructive

## INTRODUCTION

Prophylactic mastectomy, specifically BPM, is increasingly recognized as one of the most effective preventive measures for women at high risk of developing breast cancer. This procedure involves the surgical removal of both breasts, significantly reducing the risk of breast cancer by up to 90% in individuals with a strong family history, BRCA1 or BRCA2 gene mutations, or other predisposing factors.<sup>1</sup> Unlike reactive treatments that target existing cancer, BPM is a

preemptive strategy designed to prevent the onset of the disease, making it a critical option for women seeking to manage their cancer risk proactively.<sup>2</sup>

Genetic susceptibility plays a central role in breast cancer risk, with endogenous hormonal factors and hereditary patterns significantly influencing disease development.<sup>3</sup> Advances in genetic testing and counseling have enabled earlier identification of women with inherited cancer predisposition syndromes, particularly BRCA1 and BRCA2 mutations.<sup>4</sup> These women are often faced with

complex choices between intensive surveillance, chemoprevention, or surgical risk reduction.<sup>5</sup>

Risk perception varies widely among high-risk women and strongly affects preventive decision-making. Some individuals underestimate their lifetime risk or rely heavily on screening modalities such as mammography and magnetic resonance imaging, despite evidence that surveillance alone does not prevent cancer development.<sup>6</sup> Clinical management factors and physician recommendations also contribute significantly to the decision to undergo BPM.<sup>7</sup>

The decision to undergo BPM is associated with substantial psychological and emotional considerations. Concerns related to body image, femininity, sexuality, and fear of surgical complications frequently influence women's choices.<sup>8</sup> Long-term psychosocial outcomes demonstrate that while BPM reduces cancer-related anxiety, emotional adjustment remains a critical aspect of postoperative recovery.<sup>9</sup>

Family history and personal experiences with breast cancer further shape women's attitudes toward prophylactic surgery. Women with affected first-degree relatives are more likely to consider BPM due to heightened risk awareness and lived experience with the disease.<sup>10</sup> Conversely, lack of familial or spousal support may discourage women from pursuing preventive surgical options.<sup>11</sup>

In Saudi Arabia, breast cancer is the most commonly diagnosed cancer among women and a leading cause of cancer-related mortality.<sup>12</sup> Cultural norms emphasizing modesty and body integrity can limit open discussion about breast health and preventive surgical interventions, thereby affecting awareness and acceptance of BPM.<sup>13</sup> National data highlight the importance of culturally tailored health education programs to improve early risk assessment and prevention strategies.<sup>14</sup>

Religious beliefs also influence health-related decision-making within Saudi society. Although Islamic principles support disease prevention and preservation of life, misconceptions regarding surgical alteration of the body may persist among some women.<sup>15</sup> Addressing these concerns through culturally sensitive counseling can facilitate informed and ethically acceptable medical decisions.

Breast reconstruction has become a key factor in improving acceptance of BPM by alleviating concerns related to body image and quality of life. Implant-based reconstruction has increased significantly over recent years, reflecting advances in surgical techniques and patient preference.<sup>16</sup> Autologous reconstruction has also demonstrated favorable long-term patient-reported outcomes.<sup>17</sup>

Despite these advances, disparities in access to

reconstructive services remain. In Saudi Arabia, differences in healthcare infrastructure and surgical expertise may limit reconstructive options for some women, particularly outside major urban centers.<sup>18</sup>

Patient satisfaction studies emphasize the importance of individualized reconstructive planning and comprehensive preoperative counseling.<sup>19</sup>

Understanding the medical, psychological, cultural, and reconstructive factors influencing acceptance of BPM in Saudi Arabia is essential for optimizing preventive breast cancer care. Evaluating women's knowledge, attitudes, and perceptions can guide targeted interventions aimed at improving shared decision-making and long-term outcomes for high-risk women.<sup>20</sup>

### ***Aims***

This study aims to assess the knowledge, attitudes, and acceptability of bilateral prophylactic mastectomy among high-risk women in Saudi Arabia. By examining these factors, the study seeks to identify key barriers and facilitators influencing decision-making regarding BPM. In addition, it explores awareness and perceptions of available breast reconstruction options, which are critical in addressing concerns related to body image, disfigurement, and loss of feminine identity that may deter women from considering preventive surgery.

### **METHODS**

This study employed a cross-sectional design using data collected through an online questionnaire. The study was executed in Saudi Arabia from December 2023 to July 2025. The target population consisted of women residing in Saudi Arabia who were considered at high risk of developing breast cancer. Inclusion criteria comprised women with established high-risk factors, older age groups, individuals with a personal history of breast cancer, those with specific non-cancerous breast conditions, women with a family history of breast cancer, and those who had accepted or shown willingness toward prophylactic mastectomy. Exclusion criteria included women younger than 20 years of age, those with no personal or family history of breast disease, and individuals not residing in Saudi Arabia. The sample size was calculated based on the latest breast cancer statistics from the Saudi Ministry of Health, which reported 16,859 total cases, including 7,358 cases among Saudi women; using a 95% confidence interval, the required sample size was determined to be 366 participants. A purposive sampling technique was used to recruit participants, focusing specifically on women with known high-risk factors for breast cancer to ensure relevance to the study objectives.

### ***Data collection procedure***

Data were collected using a standardized questionnaire

and distributed to participants via an online survey tool. Participants were informed about the purpose of the study and voluntarily participated. The collected data were recorded in an MS excel sheet.

**Data analysis**

Data analysis was performed using IBM SPSS Statistics software (IBM Corp., Armonk, NY). Descriptive statistics were initially used to calculate frequencies and percentages of demographic details and awareness, acceptability, and attitude toward breast cancer preventive measures. A chi-square test was used to identify associations between age, qualification, and knowledge about breast cancer. A p value of less than 0.05 was considered statistically significant.

**Ethical considerations**

Ethical approval for conducting the study was obtained from the Al-Rayan research ethics committee (registered with the national bioethics committee in KACST, Saudi Arabia). The study ID was HA-03-M-122-068 dated 30, December, 2023. Online consent from the participants

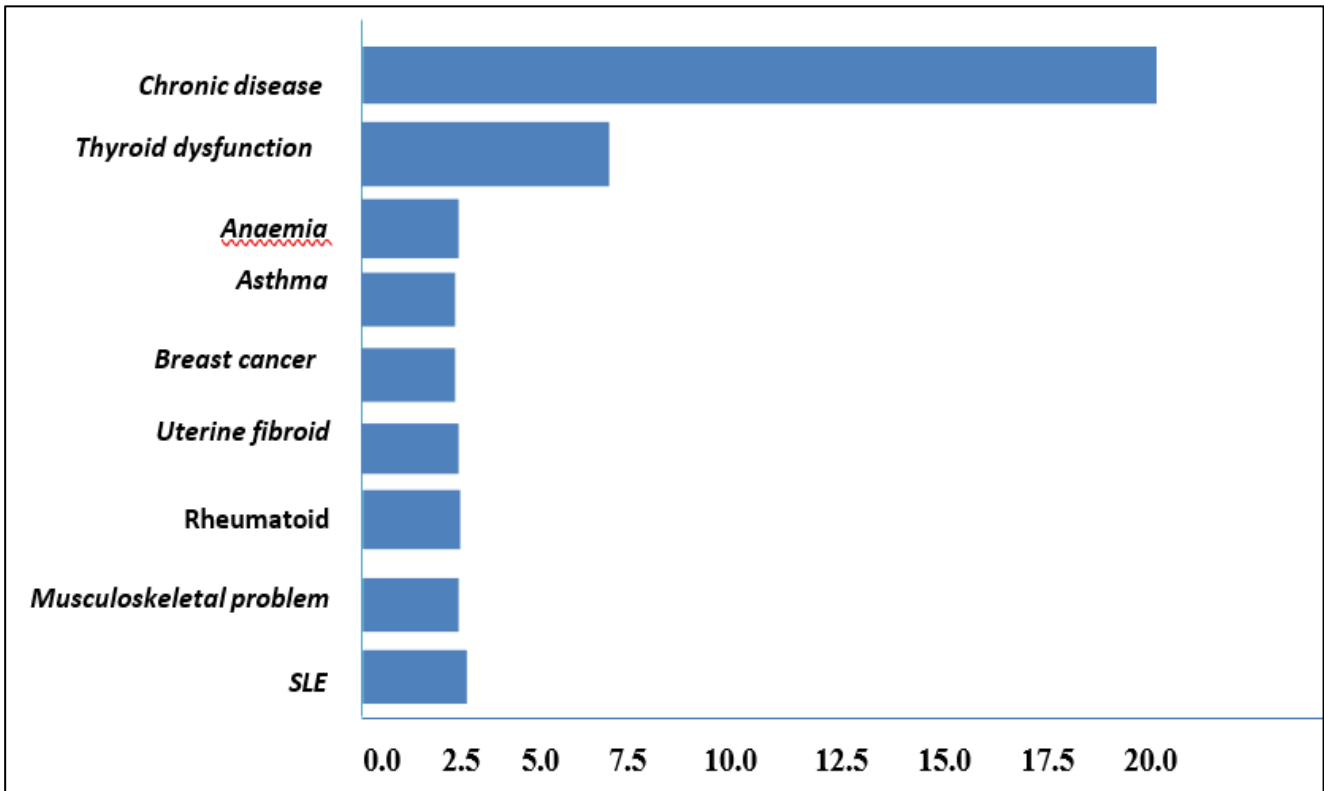
was obtained. Questions were asked, and approval was taken in Arabic. They were independent in deciding whether they wanted to fill out the form. The personal data of participants was kept confidential.

**RESULTS**

Data was collected from 371 women with a mean BMI of 24.68±9.8. Participants were divided into five age groups. There were 197 (53.1%) aged 20-25, 46 (12.4%) aged 25-30, 34 (9.2%) aged 30-35, 37 (10%) aged 35- and 57 (15.4%) aged older than 40, as shown in Table 1.

Participants were asked about their education levels; 280 (75.5%) had academic qualifications, 77 (20.8%) had education until high school, 11 (3%) had education until middle school and three (0.8%) had studied until primary levels, as shown in Table 2.

Participants were asked about comorbidities; 32 (8.6%) reported having other health problems, whereas 339 (91.4%) reported having no other health problems. The health problems reported by participants are summarized in Figure 1.



**Figure 1: Health problems reported by participants.**

In the second part of the study, participants were asked if their family had a breast cancer history 275 (74.2%) didn't have, whereas 96 (25.8%) had a family history of cancer.

There were four levels of kinship derived, so only 11 (3%) had it on 1<sup>st</sup> degree kinship, 21 (5.7%) had 2<sup>nd</sup> level,

31 (8.4%) had 3<sup>rd</sup>-level, and 33 (8.9%) had 4<sup>th</sup>-degree kinship relation with the cancer patient shown in Table 3.

The family history of ovarian cancer was also asked, and 37 (10%) participants reported yes. Six (1.6%) had 1<sup>st</sup>-degree kinship, four (1.1%) had 2<sup>nd</sup>-degree kinship, 13

(3.5%) had 3<sup>rd</sup>-degree kinship, and 14 (3.6%) had 4<sup>th</sup>-degree kinship with an ovarian cancer patient, as shown in Table 4.

Based on the awareness level, 214 (57.7%) of women were aware of breast cancer, 267 (72%) knew the screening methods, 251 (67.7%) were mindful of bilateral prophylactic mastectomy, which cuts off the two breasts, 220 (59.3%) knew that it doesn't alter the image of a woman's body, and 270 (72.8%) were aware that it is a good treatment option. Overall, the knowledge index was 65.8%, as shown in Table 5.

Results of the acceptance of BPM among participants found that 48.2% of women cannot change their body shape for anything, 84.4% believed removing breasts will affect their self-esteem, only 16.4% considered live with cancer else than getting BPM, 24.8% thought they are just afraid of the surgery so they will not get their breasts removed, 65.2% believed to prefer other treatment

options on BPM, 16.2% thought they have cultural restraints and 14.3% stated their religion doesn't allow to have treatment like BPM show in Table 6.

Awareness related to reconstruction options was evaluated: 228 (62.5%) were aware of restoration, 260 (70.1%) knew about implants, 243 (65.5%) were aware that the shape and size of implant would be similar, 216 (58.2%) believed breast should not be removed without restoration, and 105 (28.3%) stated that they could not afford restoration. Overall, 65.4% agreed that implants could be done, and they knew about it, shown in Table 7.

A chi-square test was performed to assess the association of qualification and age with knowledge of breast cancer. No significant association was found between qualification and knowledge of BPM (p=0.516)/between age and knowledge of BPM (p=0.907). A p value of less than 0.05 was considered significant, as shown in Tables 8-9.

**Table 1: Age distribution and BMI of participants.**

Age group (in years)	N
20-25	197 (53.1%)
25-30	46 (12.4%)
30-35	34 (9.2%)
35-40	37 (10.0%)
Older than 40	57 (15.4%)
Total	371 (100%)
Mean BMI (Mean±StD)	24.68±9.8

**Table 2: Educational levels of high-risk patients.**

Education level	N (%)
Academic	280 (75.5)
High school	77 (20.8)
Middle school	11 (3.0)
Primary school	3 (0.8)
Total	371 (100)

**Table 3: Family history of breast cancer.**

Variables	N	Percentage
<b>Family history of breast cancer</b>		
No	275	74.2
Yes	96	25.8
<b>Level of kinship</b>		
1 <sup>st</sup> degree	11	3.0
2 <sup>nd</sup> degree	21	5.7
3 <sup>rd</sup> degree	31	8.4
4 <sup>th</sup> degree	33	8.9

**Table 4: Family history of ovarian cancer.**

Variables	N	Percentage
<b>Family history of ovarian cancer</b>		
No	334	90
Yes	37	10

Continued.

Variables	N	Percentage
<b>Level of kinship</b>		
1 <sup>st</sup> degree	6	1.6
2 <sup>nd</sup> degree	4	1.1
3 <sup>rd</sup> degree	13	3.5
4 <sup>th</sup> degree	14	3.6

**Table 5: Awareness of breast cancer in high-risk patients.**

Variables	Responses	N	Percentage
<b>Aware of breast cancer</b>	I don't know	157	42.3
	Yes I know	214	57.7
<b>I do know the screening methods for the breast cancer</b>	I don't know	104	28.0
	Yes I know	267	72.0
<b>Awareness that bilateral prophylactic mastectomy involves cutting off the two breasts</b>	I don't know	120	32.3
	Yes I know	251	67.7
<b>BPM does not alter the body image of the woman</b>	I don't know	151	40.7
	Yes I know	151	59.3
<b>BPM is a good option for people who are at the high risk of having the breast cancer</b>	I don't know	101	27.2
	Yes I know	270	72.8

**Table 6: Acceptance of BPM in high-risk patients.**

Variables	Responses	N	Percentage
<b>I cannot alter my body shape for any reason</b>	Agree	120	32.3
	Disagree	162	43.7
	Strongly agree	59	15.9
	Strongly disagree	30	8.1
<b>Removing my breasts might affect my self-esteem.</b>	Agree	195	52.6
	Disagree	51	13.7
	Strongly agree	118	31.8
	Strongly disagree	7	1.9
<b>I'd rather live with the cancer than remove my breasts</b>	Agree	42	11.3
	Disagree	218	58.8
	Strongly agree	20	5.4
	Strongly disagree	91	24.5
<b>I am scared of surgery; therefore, I cannot remove my breasts to prevent any disease.</b>	Agree	64	17.3
	Disagree	211	56.9
	Strongly agree	28	7.5
	Strongly disagree	68	18.3
<b>I would rather take other options for breast cancer prevention than the bilateral prophylactic mastectomy</b>	Agree	158	42.6
	Disagree	108	29.1
	Strongly agree	84	22.6
	Strongly disagree	21	5.7
<b>My culture does not permit me to remove my breast to prevent any sickness</b>	Agree	40	10.8
	Disagree	205	55.3
	Strongly agree	20	5.4
	Strongly disagree	106	28.6
<b>My religion forbids me from removing my breasts to prevent any disease.</b>	Agree	31	8.4
	Disagree	211	56.9
	Strongly agree	22	5.9
	Strongly disagree	107	28.8

**Table 7: Awareness in high-risk patients about reconstruction after BPM.**

Variables	Responses	N	Percentage
<b>I am aware of restoration options</b>	Agree	228	61.5
	Disagree	143	38.5
	Strongly agree	260	70.1
	Strongly disagree	111	29.9
<b>I know about implants.</b>	Agree	243	65.5
	Disagree	128	34.5
	Strongly agree	216	58.2
	Strongly disagree	155	41.8
<b>Aware that shape and size will be similar</b>	Agree	105	28.3
	Disagree	266	71.7
	Strongly agree	228	61.5
	Strongly disagree	143	38.5
<b>Removing breast should not be done without restoration.</b>	Agree	260	70.1
	Disagree	111	29.9
	Strongly agree	243	65.5
	Strongly disagree	128	34.5
<b>I cannot afford restoration</b>	Agree	216	58.2
	Disagree	155	41.8
	Strongly agree	105	28.3
	Strongly disagree	266	71.7

**Table 8: Qualification vs. knowledge related to BPM.**

Qualification	I don't know	Yes I know	P value	Chi-square value
<b>Academic</b>	118	162	0.340	0.91
<b>High school</b>	31	46	0.590	0.29
<b>Mid school</b>	7	4	0.241	1.37
<b>Primary school</b>	1	2	0.739	0.11
<b>Total</b>	157	214	0.516	2.284

**Table 9: Age vs. knowledge related to BPM.**

Age (in years)	I don't know	Yes I know	P value	Chi-square value
<b>20-25</b>	83	114	0.907	0.01
<b>25-30</b>	17	29	0.483	0.49
<b>30-35</b>	14	20	0.977	0.00
<b>35-40</b>	17	20	0.553	0.35
<b>Older than 40 years</b>	26	31	0.689	0.16
<b>Total</b>	157	214	0.907	1.016

## DISCUSSION

Comprehending the prevalence of mastectomy and reconstructive operations among high-risk patients in Saudi Arabia is a significant issue in society. Breast cancer remains a major global health concern, and identifying effective preventive strategies is essential for reducing disease incidence and improving survival rates. Therefore, the acceptability of prophylactic mastectomy and reconstructive surgery among women at high risk is critical for enhancing preventive healthcare outcomes. The present study provides a descriptive investigation conducted among women in Saudi Arabia who are at high risk of developing breast cancer.

According to the findings of this study, many participants considered bilateral prophylactic mastectomy (BPM) to be one of the most effective preventive strategies against breast cancer, which may reflect an increased level of awareness regarding risk-reducing surgery. Nevertheless, complete understanding of prophylactic BPM remains limited, as approximately 57% of women were unable to provide adequate knowledge regarding the procedure. This lack of awareness may contribute to misconceptions about breast cancer risk and reduce the utilization of preventive and early screening methods. Similar findings were reported by Carbine et al and Howard-McNatt et al who emphasized the importance of patient education and informed decision-making regarding risk-reducing mastectomy among high-risk women.<sup>21</sup> A key finding of

this study is the degree of awareness and acceptance of prophylactic mastectomy among Saudi women at elevated risk for breast cancer. The study explored participants' attitudes, beliefs, and perceptions toward BPM and reconstructive surgery. Although awareness levels were relatively high, increased knowledge alone may not necessarily translate into preventive behavior or reduced disease incidence. Previous studies conducted in Saudi Arabia demonstrated that despite improved awareness of breast cancer, many women still exhibited inadequate preventive practices and delayed healthcare-seeking behaviors.<sup>22</sup> This highlights the importance of culturally sensitive educational programs and preventive interventions tailored to local community needs.

A similar study conducted in Nigeria reported that only 44.9% of participants were aware of BPM, whereas 65.3% of participants in the current study demonstrated awareness of the procedure. However, misinformation and misconceptions regarding breast cancer and prophylactic surgery continue to negatively influence preventive healthcare utilization, particularly among younger women who may underestimate their personal risk.<sup>23</sup> A considerable proportion of women in the current study recognized the role of surgical breast removal in reducing the risk of breast cancer-related complications. However, many participants still perceived unilateral or BPM as a radical and emotionally challenging procedure. Nearly half of the respondents preferred alternative preventive approaches such as lifestyle modification, hormonal therapy, or regular screening instead of BPM.

Similar observations were reported in international studies evaluating women's attitudes toward preventive surgery and breast cancer risk management. Questionnaire-based studies from France, Britain, Canada, and Australia demonstrated that women were generally more accepting of screening programs and pharmacological prevention than prophylactic surgery.<sup>24</sup> Additionally, studies from Singapore and other international populations revealed considerable variation in attitudes toward prophylactic mastectomy depending on social, educational, and geographic factors.<sup>25</sup> Urban populations appeared more accepting of aggressive preventive surgical strategies than rural populations. These findings demonstrate the complexity of factors influencing women's attitudes toward breast cancer prevention and risk-reducing surgery.

Overall, the findings of this study emphasize the importance of improving public awareness, patient counseling, and culturally appropriate educational interventions regarding BPM and breast reconstruction. Informed decision-making should remain a cornerstone of breast cancer prevention strategies among high-risk women. Enhancing knowledge and addressing misconceptions may promote healthier attitudes, improve preventive behaviors, and support proactive healthcare-seeking practices among Saudi women.

### Limitations

Despite the insights gained from this study, several limitations warrant consideration: While representative, the sample size may not fully generalize to all high-risk patients in Saudi Arabia due to regional variations and access to healthcare; The reliance on self-reported data introduces potential biases, such as social desirability bias, which could influence participants' responses regarding their awareness and preferences for prophylactic mastectomy; The study's cross-sectional nature limits our ability to establish causal relationships between awareness levels and actual healthcare utilization behaviors.

Future research could benefit from longitudinal designs that track participants over time to assess changes in awareness and decision-making regarding risk-reducing strategies.

### CONCLUSION

Saudi female residents had average knowledge and attitude towards BPM as a preventive treatment for breast cancer. The acceptability of BPM among Saudi women residents was low due to issues with self-image and self-esteem. Knowledge did not appear to be associated with age or qualification.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee no. HA-03-M-122-068 /20/01/2025*

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**Cite this article as:** Suliman O, Alajlan HY, Alamri HA, Almutairi AS, Alsamiri SF, Alraddadi AM, et al. Evaluation of women in high-risk groups accepting prophylactic mastectomy and the options for reconstructive surgery in Saudi Arabia. *Int J Community Med Public Health* 2026;13:2626-33.