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# Predictors of mammography based on Health Belief Model in Khorramabad women

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## Abstract:

**BACKGROUND:** Health beliefs play an important role in people's willingness to participate in health-promoting behaviors. Given the role of beliefs in women's function and the importance of the benefits of mammogram, and because the predictors of a behavior are a major prerequisite to codification of an effective prevention program, the present study was conducted with the aim of predicting mammography based on Health Belief Model (HBM) in women in Khorramabad.

**Materials and Methods:** In this cross-sectional study, 262 women referring to health centers in Khorramabad, Lorestan province, in 2018, were selected by randomly sampling. The data collection tool was a four-part questionnaire including demographic information, knowledge on breast cancer and mammography, Champion's Health Belief Model, and Champion's Self-Efficacy Questionnaire for Mammography. Validity and reliability of the tool were investigated and confirmed. Data were analyzed by version 16 of SPSS software using descriptive statistics, Chi-squared test, and multiple logistic regression.

**RESULTS:** The mean (standard deviation) age of the participants was 49.26 ( $\pm 7.79$ ) years. Seventy-nine (30.85%) of the 262 participants reported mammography. Constructs' sensitivity, benefits, barriers, and perceived self-efficacy were significantly different in terms of performing mammography ( $P < 0.05$ ). Participants with a history of breast cancer (odds ratio [OR] = 11.18, 95% confidence interval [CI] = [3.73–33.46]) had lower perceived barriers (OR = 3.54, 95% CI = [1.77–7.09]), were more likely to undergo mammography than women with no family history of breast cancer, and had moderate-to-high perceived barriers ( $P < 0.001$ ).

**CONCLUSION:** The results of this study indicate that health managers are required to pay more attention to training and promoting screening methods. Understanding the barriers to mammography in women by managers can help design and implement effective programs that enhance mammography in women.

## Keywords:

Breast cancer, breast cancer screening, Health Belief Model, mammography

## Introduction

The survival rate of breast cancer varies across the world, which is  $>80\%$  in the United States, about  $60\%$  in Sweden, and  $<40\%$  in low-income countries.<sup>[1]</sup> There is no official screening program for mammography in Iran. Unfortunately,  $70\%$  of Iranian women are diagnosed in

advanced stages of cancer when it is late for proper treatment.<sup>[2,3]</sup> The low survival rate of breast cancer in developing countries is characterized by a lack of awareness and lack of early detection programs, which leads to a high proportion of women presenting with symptoms of end-stage disease and a lack of adequate facilities for diagnosis and treatment.<sup>[1,4]</sup> Continuous increase in breast cancer deaths in Iranian

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women may be due to the low use of screening tests for breast cancer.<sup>[5]</sup> At present, the opportunities for primary prevention of breast cancer are limited, and due to the importance of early diagnosis for improving quality of life and survival rates, screening patients is the best secondary prevention strategy.<sup>[6]</sup> Breast cancer screening in women includes mammography, breast clinical examination, and breast self-examination.<sup>[3]</sup> Mammography reduces up to 65% of mortality from breast cancer.<sup>[7]</sup> Mammography identifies the growing cancer before it develops and can be touched.<sup>[7]</sup> Despite the potential benefits of screening for breast cancer detection, many women still do not perform screening tests. Although the use of mammography has increased in developed countries, the use of mammography is low in Iranian women.<sup>[3]</sup> Understanding and improving the factors associated with women's screening behaviors is beneficial in preventing breast cancer. Identifying these factors also helps researchers plan and implement appropriate interventions to change behaviors.<sup>[8]</sup> The Health Belief Model (HBM) is a social-psychological model that attempts to explain and predict preventive behaviors and is one of the models that is widely used to explain health behaviors such as screening.<sup>[9]</sup> Based on this model, to take preventive actions, people should first perceive the risk of developing cancer (perceived susceptibility), and then understand the depth of this risk and the severity of its various physical, psychological, social, and economic complications (perceived severity) by positive symptoms that they receive from their surroundings or their environment (cues to action); believe that the cancer prevention program is useful and applicable (perceived benefits); and perceive the factors preventing from taking action as less costly than its benefits (perceived barriers) to ultimately take action to prevent cancer.<sup>[10]</sup>

Many studies have been conducted on the application of the HBM in mammography screening behavior in Iran. For example, findings from the study of Tavafian *et al.* showed that the perceived benefits and self-efficacy of women who perform breast self-examination are significantly higher than that of women who did not perform breast self-examination.<sup>[11]</sup> In addition, Taymoori and Habibi<sup>[12]</sup> and Noroozi *et al.*<sup>[13]</sup> reported self-efficacy as the most important predictor of mammography. In the study of Darvishpour *et al.*, perceived barriers predicted mammography behavior.<sup>[14]</sup> Kung Hur *et al.* using two behavioral change models, namely HBM and meta-theoretical model in South Korea, found that perceived benefits, perceived sensitivity, and perceived barriers were important predictors of mammography screening.<sup>[15]</sup> However, no studies have so far been conducted on breast cancer screening using mammography in Khorramabad. Health beliefs play

an important role in people's willingness to engage in health-promoting behaviors.<sup>[16]</sup> Given the high incidence of breast cancer in Iranian women and the important role of beliefs in women's function and the importance of the benefits of mammogram, and because the predictors of a behavior are a major prerequisite to codification of an effective prevention program, the present study was conducted with the aim of predicting mammography based on HBM in women in Khorramabad. The results of this study can help increase awareness, correct inappropriate beliefs and behaviors, and consequently reduce the cost of health care for women and the health system.

## Materials and Methods

### Design

This cross-sectional study was conducted on a sample of women in Khorramabad, Western Iran, to determine the predictors of mammography based on the HBM constructs. Participants included 280 eligible women referring to health centers in Khorramabad who were selected by cluster sampling in 2018 and enrolled in the study.

First, Khorramabad was divided into three regions, and four health centers were randomly selected from the list of health centers in each region according to the required sample size. Then, after attending each clinic and making coordination with the officials of the health centers, samples were selected from eligible women by simple random sampling. Inclusion criteria were (1) Having a household health file in health centers; (2) being aged 40 or older; and (3) willingness to participate in the study. Therefore, all those who did not have one of the above conditions were excluded. Considering confidence interval (CI) of 95%, maximum standard deviation (SD) of the HBM structures equating  $S = 7.72$  and the standard error of measurement of 1.1, the sample size was determined to consist 188 individuals.<sup>[17]</sup> Because of the cluster sampling, 188 was multiplied by 1.5, and therefore a total of 280 people were enrolled in the study.

### Ethical considerations

In order to observe the research ethics, the women participating in the study were assured that their information would be kept confidential, the completion of the questionnaires did not require identifying information, and the results of the research would appear as anonymous. Questionnaires were completed by the participants in the presence of the researcher, and all women participated in the study with full consent. The study protocol was approved by the Ethics Committee of Yazd University of Medical Sciences by IR.SSU.SPH.REC.1395.134 code.

## Instrument

Data collection instrument was a four-part questionnaire including demographic information, knowledge on breast cancer and mammography, Champion's Self-Efficacy Questionnaire for Mammography, and Champion's Health Belief Model (CHBM) scale. The validity was evaluated by an expert panel of health education and promotion and fertility health professors. They were asked to comment on the questions in terms of difficulty, inappropriateness, and ambiguity. The questionnaire was given to 15 participants, and they were asked to fill it again after 2 weeks. The reliability of the questions was measured by Cronbach alpha calculation.

The four parts of the data collection instrument are as follows:

1. Demographic data: They include variables such as age, marital status, education level, occupation, history of breast cancer in first-grade relatives (mother, sister, grandmother, and aunt), and performing mammography
2. Questionnaire on awareness of breast cancer and mammography: This questionnaire was developed by Hatefnia and Niknami in 2010. Its validity and reliability were confirmed.<sup>[18]</sup> The instrument include 15 questions that measure the knowledge of the respondents on breast cancer and the behavior of mammography screening.

Correct answers are scored 1 and wrong answers and the choice of no idea were scored 0. The Cronbach's alpha was reported as 0.78 for the awareness questionnaire.

3. CHBM scale.<sup>[19]</sup> This scale was designed by Champion to assess the perception on mammography screening for breast cancer. The tool includes subscales such as perceived sensitivity (4 items), perceived severity (4 items), perceived benefits (5 items), perceived barriers (12 items), and motivation for health (5 items). Each of the constructs was measured by a 5-point Likert scale (absolutely agree to absolutely disagree). The validity and reliability of this tool for Iranian women have been investigated by Taymoori and Berry in 2009.<sup>[20]</sup> The Cronbach's alpha is 0.85
4. Champion's Self-Efficacy Questionnaire for Mammography: This questionnaire was developed by Champion in 2005<sup>[21]</sup> and consists of 10 items that are rated on a 5-point Likert scale from very unlikely (scored 1) to very likely (scored 5). Validity and reliability of this tool have been investigated in studies in Iran.<sup>[22]</sup> The Cronbach's alpha is 0.89.

## Statistical analysis

Descriptive statistics (frequency and percentage) were used to analyze the collected data. Chi-squared test was used to investigate the relationship between two ordinal variables. In addition, multiple logistic regression was used to detect the factors influencing behavior. Data analysis was performed using spss software version 16.0 (SPSS Inc.,

Chicago, IL, USA). In this study, significance level ( $P$ ) was considered to be  $<0.05$ .

## Results

### Mammography behavior and demographic characteristics

A total of 280 eligible women were enrolled in the study. Eighteen questionnaires were excluded because they had not been filled out completely. Hence, statistical analysis was performed on the data drawn from 262 questionnaires. The mean age  $\pm$  SD of women was  $49.74 \pm 8.38$ . Almost 83.1% of women were married and 67.6% had under high school diploma and high school diploma education. Approximately 76.8% of women were homemakers, 10.7% had a family history of breast cancer, and only 30.2% had a history of mammography [Table 1]. Demographic variables were compared between the two groups of women in order to detect the predictor variables of the mammography behavior. In the mammography group, 62.8% of the participants and in the other group, 69.7% had under high school diploma and high school diploma education. Chi-square analysis demonstrated that education had a significant relationship with mammography behavior ( $P = 0.02$ ). In the mammography group, 73.4% and in the other group 78.3% were homemakers. Almost 86.1% of women in mammography group and 81.7% in the other group were married. The results showed that 28.2% of women in the mammography group and 71.8% in the other group had a history of breast cancer, and Chi-square analysis demonstrated that there was a significant relationship between family history of breast cancer and mammography behavior ( $P < 0.001$ ). Nearly 53.2% of women in the mammography group had a high awareness of breast cancer and mammography; however, in the other group, 30.4% of the participants had a high awareness. Chi-square analysis demonstrated that there was a significant relationship between women's awareness and mammography behaviors ( $P = 0.001$ ) [Table 1].

### Health Belief Model structures and mammography behavior

Findings of the study showed that in the mammography group, 22.8% of women and in the other group, 9.7% had had a high perceived susceptibility to mammography. In addition, there was a significant relationship between mammography behavior and perceived susceptibility ( $P = 0.001$ ). Approximately 65.8% of the participants in the mammography group and 44% in the other group perceived the behavior as very useful. There was a significant relationship between perceived benefits and mammography behaviors ( $P = 0.001$ ). According to our findings, 56.4% of women in mammography group and 36% in the other group had greater perceived

**Table 1: Association of the demographic and Health Belief Model factors with mammography behavior**

Independent continuous variable	Mammography			P
	Yes, n (%)	No, n (%)	Total, n (%)	
Age, mean±SD	49.49±6.39	49.74±8.38	49.62±7.79	0.79
Education				
Lower than high school diploma/high school diploma	49 (62.8)	122 (69.7)	171 (67.6)	0.02
University education	29 (37.2)	53 (30.3)	82 (32.4)	
Employment				
Employed	21 (26.6)	38 (21.7)	59 (23.2)	0.24
Homemakers	58 (73.4)	137 (78.3)	195 (76.8)	
Marital status				
Married	68 (86.1)	143 (81.7)	211 (83.1)	0.80
Single	4 (5.1)	9 (5.1)	13 (5.1)	
Divorce/widow	7 (8.9)	23 (13.1)	30 (11.8)	
Family history of breast cancer				
Yes	22 (28.2)	5 (71.8)	27 (10.7)	<0.001
No	56 (2.9)	170 (97.1)	226 (89.3)	
Mammography	79 (30.2)	175 (66.8)	254 (96.9)	
Knowledge				
Low/moderate	36 (46.8)	119 (69.6)	155 (62.5)	0.001
High	41 (53.2)	52 (30.4)	93 (37.5)	
Perceived susceptibility				
Low	26 (32.9)	96 (54.9)	122 (48)	0.001
Moderate	35 (44.3)	62 (35.4)	97 (38.2)	
High	18 (22.8)	17 (9.7)	35 (13.8)	
Perceived severity				
Low/moderate	45 (58.4)	96 (54.9)	141 (56)	0.68
High	32 (41.6)	79 (45.1)	111 (44)	
Perceived benefit				
Low/moderate	27 (34.2)	98 (56)	125 (49.2)	0.001
High	52 (65.8)	77 (44)	129 (50.8)	
Perceived barriers				
Low	39 (50)	38 (22.1)	77 (30.8)	<0.001
Moderate/high	39 (50)	134 (77.9)	173 (69.2)	
Perceived self-efficacy				
Low	34 (43.6)	112 (64)	146 (57.7)	0.002
Moderate/high	44 (56.4)	63 (36)	107 (42.3)	
Health motivation				
Low	8 (10.1)	20 (11.4)	28 (11)	0.57
Moderate/high	71 (89.9)	155 (88.6)	226 (89)	

SD=Standard deviation

self-efficacy for mammography. There was a significant relationship between self-efficacy and mammography behavior ( $P = 0.002$ ). In addition, 50% of women in the mammography group and 77.9% in the other group perceived barriers to performing mammography as moderate/high. A statistically significant relationship between the perceived barriers and mammography behavior was observed ( $P < 0.001$ ) [Table 1].

Regression results showed that participants with a history of breast cancer (OR = 11.18, 95% CI = [3.73–33.46]) had lower perceived barriers (OR = 3.54, 95% CI = [1.77–7.09]), were more likely to undergo mammography than women with no family history of breast cancer, and had moderate-to-high perceived barriers ( $P < 0.001$ ) [Table 2].

## Discussion

The purpose of this study was to investigate the predictors of mammography behavior among a group of women referring to health centers in Khorramabad, Western Iran. The present study showed that there was a low proportion of women participating in mammography (30%). However, this rate was higher than those reported in previous studies in Iran.<sup>[23,24]</sup> One possible cause for this difference may be the high level of awareness of women in the study. However, this was higher than that of other studies in developing countries such as Turkey<sup>[25]</sup> but lower than that in developed countries.<sup>[26]</sup> A possible explanation for the low rate of mammography in Iranian women compared to developed countries may be the lack of

**Table 2: Factors associated with mammography based on multivariate logistic regression model**

Independent variable	OR (95% CI)	P
Family history of breast cancer		
Yes	11.18 (3.73-33.46)	<0.001
No	Reference	NA
Knowledge		
Low/moderate	Reference	NA
High	1.62 (0.82-3.18)	0.161
Perceived susceptibility		
Low	Reference	NA
Moderate	1.91 (0.94-3.86)	0.071
High	1.92 (0.74-5.01)	0.178
Perceived benefit		
Low/moderate	Reference	NA
High	1.71 (0.87-3.40)	0.117
Perceived barriers		
Low	3.54 (1.72-7.09)	<0.001
Moderate/high	Reference	NA
Perceived self-efficacy		
Low	Reference	NA
Moderate/high	0.99 (0.48-2.00)	0.981

CI=Confidence interval, NA=Not applicable, OR=Odds ratio

facilities available for screening breast cancer with mammography.

The constructs' susceptibility, benefits, perceived barriers and self-efficacy, and motivation for health and awareness were significantly associated with mammography behavior. Regarding knowledge, the results showed a significant relationship with mammography behavior, which indicates that awareness plays an important role in accepting and performing health-promoting behaviors. A study in Turkey showed that awareness of breast cancer and awareness of breast cancer screening methods are related to the breast self-examination behaviors.<sup>[27]</sup> The results of a study conducted by Elsie *et al.*<sup>[28]</sup> in Uganda and Okolie<sup>[29]</sup> in Nigeria showed a significant relationship between the participants' awareness of breast cancer and the frequency of breast self-examination. Having adequate knowledge of breast cancer's risk factors is the basis of the primary prevention of breast cancer.<sup>[30]</sup> Women's awareness cannot always save them from illness and other health issues. Awareness is necessary but not sufficient. In addition to awareness, people's beliefs about health issues and preventive behaviors play an important role in facilitating or preventing the health-promoting behaviors.<sup>[31]</sup>

Regarding perceived susceptibility, the results of a study showed that women's attitude toward screening plays a vital role in their participation in mammography, and they are more likely to participate in screening if they believe that they are at risk of developing breast cancer. Therefore, health-care providers need to emphasize the extent and risks of breast cancer, but much

emphasis must be put with caution, as much concern about this issue makes women unable to participate in screening mammography.<sup>[32]</sup> Regarding perceived benefits, the positive impact of the perceived benefits of mammography in enhancing the performance of breast screening behaviors in Iranian women has been documented, including regularly undergoing mammography.<sup>[33]</sup> Lagerlund *et al.* reported that women's understanding of the benefits of mammography is one of the effective factors in the use of mammography. They also believe that increasing women's awareness of mammography is one of the effective factors in the formation of their attitudes.<sup>[34]</sup> In addition, a study by Shir Yazdi *et al.* in Iran showed that employees who perform breast self-examination and mammography had higher perceived benefits than those who were not involved in these behaviors.<sup>[35]</sup> In the study of Secginli and Nahcivan, perceived benefits had a significant relationship with mammography. The authors also reported that screening behaviors should be emphasized on education the benefits of screening in warning people based on the relationship between health beliefs and performing screening behaviors.<sup>[36]</sup> In the present study, there was a significant relationship between perceived barriers and mammogram's behavior. Another study showed that there was a significant relationship between perceived barriers and performing mammography,<sup>[11]</sup> which is in line with the findings of this study. The results of this study showed a significant association between perceived self-efficacy and mammography behavior. In other studies, self-efficacy has been found to be significantly associated with mammography.<sup>[37]</sup> In addition, in the study of Kessler on Indian women, emphasis has been placed on self-efficacy enhancement approaches for promoting mammography screening.<sup>[38]</sup> Considering the motivation of health, the results of the current study are consistent with the results of Navabi Rigi *et al.*'s studies. The outcomes revealed that there is a significant relationship between motivation for health and breast self-examination.<sup>[39]</sup>

Considering the frequency of mammography behavior, perceived barriers and having a family history of breast cancer were predictor variables for mammography behavior. The results of this study are consistent with the results of studies by other researchers, including Aflakseir and Abbasi, Avci and Gozum, and Tavafian *et al.*, which showed that perceived barriers are the most significant variables to predict mammography behavior.<sup>[11,24,40]</sup> Perceived barriers include lack of time to perform mammography, not knowing where mammography is performed, fear of finding mumps by mammography, lack of affording mammography, and mammography pain. The findings of this study showed that sensitivity, severity, and perceived benefits did not predict the motivation for health and

self-efficacy of mammography behavior in women. In their study, Aflakseir and Abbasi also did not predict the perceived benefits and perceived susceptibility of mammogram's behavior,<sup>[24]</sup> but in another study, these two structures predicted mammogram's behavior.<sup>[41]</sup> In the study of Canbulat and Uzum, perceived sensitivity, barriers, and self-efficacy, but not other constructs, were predictors of breast cancer screening behaviors.<sup>[27]</sup> It seems that the reason for the effect of perceived barriers, compared to the other model's constructs, is mainly that women were likely to pay more attention to the barriers to breast cancer preventive behaviors rather than to the barriers to performing mammography. In this study, having a family history of breast cancer was found as a predictor of mammography, which is in line with the findings of other studies.<sup>[42]</sup> The result of a meta-analysis showed that higher perceived risk was associated with high levels of performing mammography screening.<sup>[43]</sup> As with other studies, our study also suffered from certain limitations. First, this study was a cross-sectional study that only investigated the relationship between variables and could not examine the causes and effects of relationships between variables. Second, the findings of this study can only be generalized to similar populations.

## Conclusion

Perceived barriers and having a family history of breast cancer were predictors of performing mammography among women. Understanding the barriers to mammography in women by planners can help design and implement effective programs that increase mammography in women. Therefore, it is recommended to plan for reducing barriers and creating grounds for encouraging women to perform mammography and providing conditions for health professionals to provide free minimum facilities for screening mammography.

Kerlikowske *et al.* reported that breast cancer screening can be increased in women by providing free mobile facilities in different parts of the community.<sup>[44]</sup> The results of this study can be applied to take effective steps in health policy and to plan for prevention programs to encourage women to participate in the evaluation for cancer and to perform cancer screening, which will eventually lead to a reduction in the incidence and mortality rate.

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## Conflicts of interest

There are no conflicts of interest.

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