

# Predictive Factors for Diagnosis and Treatment Delay in Iranian Women with Breast Cancer

Nastaran Mirfarhadi,<sup>1</sup> Atefeh Ghanbari,<sup>1,\*</sup> Malahat Khalili,<sup>1</sup> and Abbas Rahimi<sup>2</sup>

<sup>1</sup>Social Determinants of Health Research Center, Guilan University of Medical Sciences, Rasht, IR Iran

<sup>2</sup>Department of Oncology, Guilan University of Medical Sciences, Rasht, Iran

\*Corresponding author: Atefeh Ghanbari, Social Determinants of Health Research Center, Guilan University of Medical Sciences, Rasht, IR Iran. Tel: +98-1333506570, Fax: +98-1333520149, E-mail: at\_ghanbari@gums.ac.ir

Received 2015 January 31; Revised 2016 August 03; Accepted 2016 August 20.

## Abstract

**Background:** The growing trend of breast cancer in Iran and the adverse consequences arising from the delay in diagnosis and treatment in females has been a challenge.

**Objectives:** This study was conducted to identify the predictors for diagnosis and treatment delay in females with breast cancer in the north of Iran.

**Methods:** This cross-sectional study was performed on 232 patients with a definite diagnosis of breast cancer at Razi Hospital, which is the main referral centre in Guilan Province, Iran, using sequential sampling methods. Data were collected using a six-section questionnaire through interviews and medical records of the patients. Data were analyzed using descriptive statistics, logistic regression and chi square test.

**Results:** Delays of more than one month was observed in 53% of patients and more than three months delay was observed in 31%. Of the patients with a definite diagnosis of breast cancer, 87% returned within seven days for treatment interventions. Three variables of: stage of disease (stage II: P = 0.002, OR = 7.19 and stage III: P = 0.034, OR = 1.95), lack of complementary insurance (P = 0.007, OR = 2.26) and primary insurance (P = 0.067, OR = 3.52) were important risk factors for patient delay. Knowledge and attitude regarding the symptoms of breast cancer (P = 0.007), the most important method for breast cancer diagnosis (P = 0.004), and the importance of self-examination was significantly different between patients with and without delay in the onset of treatment.

**Conclusions:** This study showed that about one-third of patients with breast cancer had a patient delay of more than three months. In addition, 16.8% and 13% of patients experienced system delay in diagnosis and treatment, respectively. The government is responsible to not only teach people on the signs of breast cancer, but also to establish a powerful screening system for breast cancer.

**Keywords:** Breast Neoplasm, Delay Treatment, Diagnosis, Iran, Female

## 1. Background

Breast cancer is the most common malignancy in females (1) and a concerning public health problem (2). In the United States (US), it is responsible for one out of every three diagnosed malignancies in females (3). Its incidence is also increasing in developing countries (4, 5) including Iran, so that about 5,000 new cases are diagnosed annually (6). Unfortunately most cases are detected at more advanced stages and at lower ages in comparison with western countries (7, 8). Some studies from Iran have attributed the problem to a lack of education and lack of a regular screening program and a delay in diagnosis and receiving medical treatment (9, 10).

Such a delay might be categorized to patient delay and healthcare provider (system) delay. The interval between detection of the first symptoms by the patient and the first physician visit is known as patient delay (11), however, the interval between the first visit and receiving treatment is regarded as the system delay (12). Any delay in diagnosis

and treatment can result in disease progression, increased mortality, and decreased survival rate (5, 13, 14)

Several studies are available on the reasons for patient delay and a number of factors such as patients' low knowledge and education, low socioeconomic status, and family history of breast cancer have been cited in this regard (15-18). However, sociocultural aspects of cancer treatment or cancer treatment seeking behaviors might be different in developing countries (13), and these two factors play an important role in timely diagnosis and treatment. One of the nurse's roles as educators of health behaviors should be to promote true beliefs and attitudes in relation to breast cancer and its treatment in the general population (19, 20).

Recently, Khakbazan et al. investigated the help seeking behaviors of females with self-discovered breast cancer symptoms in Iran (21). However, no comprehensive studies are available on sociocultural aspects of breast cancer treatment and the breast cancer patients' treatment seeking behaviors in Iran.

## 2. Objectives

This study was conducted on breast cancer patients referred to Razi educational and treatment center, north of Iran, to identify the causes of patient and system delay in diagnosis and the treatment of breast cancer.

## 3. Materials and Methods

### 3.1. Study Design

This cross-sectional study was performed from September to November 2013 on patients with a definite diagnosis of breast cancer, who had referred for check up, to the Razi hospital in Rasht city. This is the main referral and governmental center for cancer chemotherapy and radiotherapy in Guilan Province with coverage of all insurance companies.

### 3.2. Sampling

In a recent study, Harirchi et al. reported that 68% of Iranian breast cancer patients had a delay of more than one month (13). Then, with a type I error of 0.05,  $P = 0.68$  and sampling error of 0.06, a total of 232 subjects were recruited in the study. A sequential sampling method was used to identify the samples. Inclusion criteria were a definite diagnosis of cancer within the last two years, and willingness to participate in the study.

### 3.3. Measurement and Data Collection

Using the Harirchi et al. questionnaire (13) a six-section instrument was developed. The first part comprised of eight questions on patients' age, place of residence, education level, marital status, average monthly income, number of children, and the status of primary and complementary insurance. The second part included eight questions related to family history of breast cancer, type of family relationship between the patient and the family member with a history of breast cancer, history of performing mammography before the onset of illness, number of mammography examinations (once a year, every six months), attending regular physician visits, the first symptom of the tumor, the interval between the first suspicious symptom and the first medical consultation, and the first person the patient was referred to. The third part consisted of three items on patients' knowledge and four items on her attitude toward breast problems. These items are scored based on their frequencies. The fourth section was a checklist on disease stage, tumor size, and treatment status, which were derived from the patients' records. The fifth part consisted of 10 questions for assessing the causes of patient delay and the sixth section consisted of three questions on

the causes of system delay. An interval of more than one month between detection of the first symptoms by the patient and the first medical consultation was regarded as patient delay. Moreover, the time between the first consultation with a physician and the start of treatment was regarded as the provider/system delay.

To determine the validity of the questionnaire, it was evaluated by ten experts in this field. Test-retest method with a two-week interval was also conducted for 30 patients to evaluate the reliability of the questionnaire ( $r = 0.91$ ). Questionnaires were completed through face-to-face interviews when the patients attended the oncology and radiotherapy clinic of Razi hospital for check up.

### 3.4. Ethical Considerations

This study was approved by the Ethics Committee of Research Deputy, of Guilan University of Medical Sciences (grant number = 481). Written informed consent was obtained from all participants at the beginning of the study. All participants were informed of the voluntary nature of participation and were assured about the confidentiality of their personal information.

### 3.5. Data Analysis

SPSS-13 software (Spss Inc, Chicago, IL, USA) was used for data analysis. First, data was analyzed descriptively using frequency, mean and standard deviation indices. Factors affecting patient delay were also studied through univariate logistic regression, and odds ratio was determined. Having a delay was considered as a dependent variable and other variables were considered as factors (i.e. age, (< 40 years, 40 - 50 and > 50 years) including, status of residence (urban, village), education (illiterate, primary education, high school diploma and academic degrees), marital status (single, married and widowed/divorced), number of children (0, 1 - 3 and 4 <), monthly incomes, having an active insurance (yes, no), having complementary insurance (yes, no), family history of breast cancer (yes, no), history of performing a mammography (yes, no) and stage of disease (I, II and III). Variable with  $P$  values of  $\leq 0.2$  were entered in the multivariate logistic regression model (i.e. education, having an insurance, having complementary insurance, family history of breast cancer, history of mammography and stage of disease). Chi-square was also used to evaluate the relationship between delay and patients' knowledge and attitude.  $P$  values of less than 0.05 were considered statistically significant.

## 4. Results

In this study, 113 patients (48.7%) were above 50 years of age. The mean age was  $49.82 \pm 10.23$  years. They were

mostly (85.5%) married and had elementary school education (3707%). In logistic regression, only having an active insurance, having complementary insurance and history of performing mammography, were predictive (preventive factor) for patient delay. Moreover, a significant relationship was observed between the disease stage and the delay ([Table 1](#)).

Sixty percent (n = 129) of the patients had a tumor larger than 5 cm and 46% had lymph node involvement at the time of diagnosis.

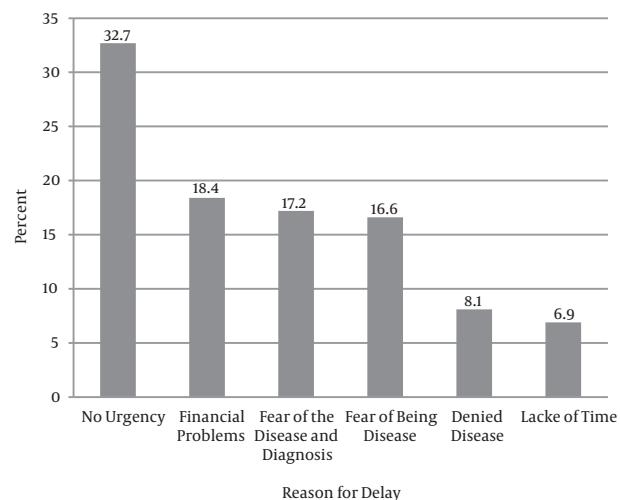
The disease was detected through breast self-examination (BSE) in 211 patients (91%) and finding a lump was the first symptom for visiting the physician in 66% of the patients. Pain (19.8%), ulceration (1.3%), nipple discharge and bleeding (2.6%) and asymmetric breasts (4.7%) were other symptoms that resulted in a diagnosis of cancer in the rest of the patients. Moreover, 44.8% and 37.1% of the patients visited a general surgeon and a gynecologist on their first visit, respectively. In total, 123 patients (53%) had a delay of more than one month and 31% had a delay of more than three months in their first visits. The mean patient delay was  $117.53 \pm 238.82$  days with a median of 21 days.

In multivariate logistic regression, two variables of complementary insurance ( $P = 0.007$ , OR = 2.260) and primary insurance coverage ( $P = 0.06$ , OR = 3.521) were important preventive factors for patient delay, so that patient delay was lower in those with complementary and primary insurance coverage. In addition, the ratio of delay was 7.188 and 1.948 times more in the second and third stages of the disease in comparison with patients in the first ([Table 2](#)).

Moreover, significant differences were observed between patients with and without delay in terms of knowledge of the signs of breast cancer ( $P = 0.007$ ), the most common cancers in women ( $P = 0.004$ ), the most important methods for the diagnosis of breast cancer ( $P = 0.004$ ), attitude towards breast cancer ( $P = 0.009$ ), importance of BSE ( $P = 0.03$ ) and familiarity with the techniques of BSE ( $P = 0.04$ ) ([Table 3](#)).

In the provider/system delay part, 16.8% of cases (n=39) had a delay between the diagnosis and biopsy examination with a mean of  $160.02 \pm 192.40$  days and 13.0% (n = 30) had a delay between biopsy examination and treatment with a mean of  $114.81 \pm 240.08$  days ([Table 4](#)).

According to the patients, the most important reasons for a patient delay of more than one month were feeling no urgency to see a physician (32.7%), fear of the disease and diagnosis (17.2%), and financial problems (18.4%).



**Figure 1.** Reasons for the Patient Delay

## 5. Discussion

In the present study, 53% and 31% of the patients with breast cancer reported a patient delay of less than one month and more than three months, respectively. The rate of delay in the present study was somewhat less than what was reported by a previous study in Iran ([22](#)). However, patient delay was more in our study when compared with other countries such as Thailand (17.0%) ([23](#)), Colombia (20.3%) ([2](#)) and the United States (17.0%) ([24](#)).

Based on the results of the present study, lack of insurance, specially lacking a complementary insurance was an important risk factor for patient delay particularly in low-income patients. Therefore, it is necessary for health insurance programs to cover the cancer diagnostic examinations and treatment procedures. Moreover, similar to other studies ([23, 25, 26](#)), low education level and low income were risk factors for patient delay. So that more low-income patients referred to physicians in stage III. These findings were consistent with previous studies ([3, 27, 28](#)).

In the present study, 60% of patients had a tumor larger than 5 cm and 46% had lymph node involvement at the time of diagnosis, which apparently showed the delay. Moreover, only a few patients had a previous history of mammography screening while the risk of delay was lower in patients with a history of mammography, which indicates the role of mammography in early diagnosis and treatment of breast cancer. In addition, only 41.4% of our patients were familiar with BSE. All these findings not only confirmed the females' low knowledge on the importance of BSE and screening tests but also showed the weak performance of the healthcare system in community educa-

**Table 1.** The Result of Univariate Logistic Regression Analysis on Patient Delay<sup>a</sup>

Predictive Variable	Delay		Univariate Analysis	
	Yes	No	OR (95% CI)	P Value
<b>Age, y</b>				
< 40	17 (13.8)	14 (12.8)	1 (Baseline)	
40 - 50	43 (35.0)	45 (41.3)	1.27 (0.56 - 2.89)	0.568
> 50	63 (51.2)	50 (45.9)	0.96 (0.43 - 2.14)	0.928
<b>Place of residence</b>				
Urban	77 (62.6)	75 (68.8)	1 (Baseline)	
Village	46 (37.4)	34 (31.2)	1.32 (0.76 - 2.27)	
<b>Education level</b>				
Illiterate	35 (28.5)	15 (13.8)	0.34 (0.11 - 1.04)	0.059
Primary education	44 (35.8)	42 (38.5)	0.76 (0.27 - 2.12)	0.605
High school diploma	36 (29.2)	42 (38.5)	0.93 (0.33 - 2.61)	0.896
Academic Degrees	8 (6.5)	10 (9.2)	1 (Baseline)	
<b>Marital status</b>				
Single	7 (5.7)	5 (4.6)	1 (Baseline)	0.966
Married	103 (83.7)	95 (87.2)	1.03 (0.25 - 4.31)	0.530
Widowed/divorced	13 (10.6)	9 (8.3)	1.33 (0.25 - 3.26)	
<b>Number of Children</b>				
No children	10 (8.1)	9 (8.3)	1 (Baseline)	0.935
1 - 3	79 (64.2)	74 (67.9)	1.04 (0.40 - 2.71)	0.758
4 <	34 (27.6)	26 (23.9)	0.85 (0.30 - 2.39)	
<b>Monthly income (Rls)</b>				
< 5,000,000	75 (61.0)	45 (41.3)	0.60 (0.12 - 3.10)	0.542
5,000,000 - 7,500,000	38 (30.9)	47 (43.1)	1.24 (0.24 - 6.48)	0.801
7,500,000 - 10,000,000	7 (5.7)	14 (12.8)	2.00 (0.32 - 12.59)	0.460
10,000,000 <	3 (2.4)	3 (2.8)	1 (Baseline)	
<b>Having an insurance coverage</b>				
Yes	110 (89.4)	106 (97.2)	1 (Baseline)	
No	13 (10.6)	3 (2.8)	4.17 (1.16 - 15.07)	
<b>Having complementary insurance</b>				
Yes	38 (30.9)	53 (48.6)	1 (Baseline)	
No	85 (69.1)	56 (51.4)	2.18 (1.24 - 3.62)	
<b>Family history of breast cancer</b>				
Yes	24 (19.5)	33 (30.3)	1.79 (0.98 - 3.28)	
No	99 (80.5)	76 (69.7)	1 (Baseline)	
<b>History of mammography</b>				
Yes	10 (8.1)	22 (20.2)	0.35 (0.16 - 0.78)	
No	113 (91.9)	87 (79.8)	1 (Baseline)	
<b>Stage of disease</b>				
I	4 (3.3)	14 (12.8)	1 (Baseline)	
II	69 (56)	67 (61.5)	6.25 (1.87 - 20.83)	0.003
III	50 (40.7)	28 (25.7)	1.73 (0.98 - 3.07)	0.059

<sup>a</sup>Values are expressed as No. (%).

**Table 2.** The Result of Multivariate Logistic Regression Analysis on Patient Delay

Predictive Variable	S.E.	Wald	P Value	OR (95% CI)
<b>Primary insurance (No)</b>	0.69	3.35	0.067	3.52 (0.91 - 13.46)
<b>Complementary insurance (No)</b>	0.30	7.40	0.007	2.26 (1.25 - 4.05)
<b>Family history of breast cancer (No)</b>	0.33	2.79	0.095	1.74 (1.09 - 3.32)
<b>History of mammography (No)</b>	0.44	2.96	0.085	2.11 (0.88 - 5.00)
<b>Stage of disease</b>				
Stage I (Baseline)		10.58	0.005	-
Stage II	0.65	9.24	0.002	7.19 (2.01 - 25.80)
Stage III	0.31	4.51	0.034	1.95 (1.06 - 3.56)

**Table 3.** Knowledge and Attitude Towards Breast Cancer<sup>a</sup>

Phrases	Delay		P Value
	No	Yes	
<b>Knowledge of Breast Cancer Symptoms</b>			
Breast and axillary lump	42 (38)	38 (31)	0.007
Lump and other symptoms	24 (22)	13 (11)	
I do not know	43 (40)	72 (58)	
<b>Knowledge of most common cancers in women</b>			
Breast cancer is the most prevalent cancer in females	72 (66)	55 (45)	0.004
Another cancer except Breast cancer, is the most prevalent cancer	2 (2)	6 (5)	
I don't have any information	35 (32)	62 (50)	
<b>The most important method for the diagnosis of breast cancer</b>			
Breast self-examination	42 (38)	29 (23)	
Physician	38 (35)	58 (48)	
Mammography	24 (22)	21 (17)	
Blood tests	4 (4)	3 (2)	
I do not know	1 (1)	12 (10)	
<b>Attitude towards breast cancer</b>			
Breast cancer is curable	82 (75)	67 (54)	
Breast cancer is fatal	4 (4)	8 (7)	
It depends on individual's fate	15 (14)	36 (29)	
I don't have any information	8 (7)	12 (10)	
<b>Importance of self-examination</b>			
Breast self-examination is important	62 (57)	53 (43)	0.03
Breast self-examination is unimportant	47 (43)	70 (57)	
<b>Familiarity with self-examination</b>			
Yes	52 (47)	44 (36)	
No	57 (53)	79 (64)	
Total	109 (100)	123 (100)	

<sup>a</sup>Values are expressed as No. (%).

**Table 4.** The Reasons for Delay in Treatment and Diagnostic Procedure After Visiting the Physician

Variable of Provider/System Delay	No. (%)
<b>Diagnostic procedures 7 days after visiting the physician</b>	
Yes	194 (83.2)
No	39 (16.8)
<b>Reasons for not doing the diagnostic procedures</b>	
Lack of access to mammography / sonography	2 (0.9)
Assurance of the physician that the symptoms were not important	32 (13.8)
Waiting on the list for specialist physicians	5 (2.2)
<b>Treatment within 7 days of definite diagnosis</b>	
Yes	202 (87)
No	30 (13)
<b>Reasons for not doing treatment procedures</b>	
Lack of access to chemotherapy and radiotherapy	2 (1)
Costs of treatment	10 (4.5)
Loss of time for the patient insurance	1 (0.5)
Waiting on the list for treatment	17 (7)

tion and in disease screening. Previous studies in Iran have shown that the rate of BSE is as low as 6% - 17% (8, 29, 30). Consistently, a study in Colombia reported that 24.5% of the women in the age group 18 - 69 years performed BSE

regularly (2). However, this rate is 75% among US women (31), which is clearly different from developing countries. Although the patients related factors such as low socioeconomic status, low education level, and lack of knowledge regarding breast cancer and BSE are usually cited as the most important reasons for female's weak practice in BSE, however, the weak performance of the governmental healthcare systems should not be overlooked.

In this study, the majority of patients (58% and 40% of the patients with and without delay) had no information about the symptoms of cancer. Moreover, 43% and 57% of the patients with and without delay were not aware of the importance of self-assessment. Moreover, only a few patients were aware of the role of mammography in screening for breast cancer. These findings are in line with the results of the previous studies in Iran (8, 32) and in other developing countries (2, 33, 34). A previous study emphasized on the role of the media (8) and education systems in making people, and especially all women above 20 years of age, familiar with the symptoms of breast cancer and BSE (35). However, despite the striking fact of Iran's rank in breast cancer, there is still no organized screening program for breast cancer in Iran.

The present study showed a significant relationship between patient delay and disease stage at the time of diagnosis so that patients with delay were mostly at advanced stages at the time of diagnosis. This finding was consistent with what was reported by previous studies (2, 12).

In the present study, the most important reasons for patient delay were feeling no urgency to see the physician, minimizing and trivializing the symptoms of the disease, financial concerns, and fear of incurability. Other studies from Iran (22, 36) and other developing countries (2, 33) have also reported similar findings. Moreover, the results of studies on patients with various cancers showed that incorrect interpretation and trivializing the symptoms and fear of visiting a physician were important reasons for patient delay (37, 38). These findings again confirm the patients' low knowledge about the symptoms of breast cancer and its effect of their treatment seeking behavior. Fear of incurability may not only keep patients from seeking medical treatment despite certain changes in their body, but also may keep them from searching for information (20, 39).

System delay comprised a great proportion of delays in the present study, so that assurance of the physician that the symptoms were not important was the reason for detecting breast cancer at more advanced stages in 13.8% of the cases. Moreover, waiting on the list for chemotherapy and radiotherapy comprised 7% of the reasons for delay. The reason could be that there is only one governmental center with chemotherapy facilities in Guilan Province,

north of Iran. Bilimoria et al. also reported an increase in the interval between the diagnosis and treatment of cancers due to the increase in the load of cancers (40).

One of the limitations of this research that can be noted is gathering samples at a governmental center. Also, evaluation of system delay through assessing only three variables can be considered as a research limitation.

Further multicenter studies with larger sample sizes and inclusion of patients referring to the private system are suggested. Moreover, designing improved instruments for assessing knowledge and attitude of patients and also considering the time period during which patients have refused treatment initiation, as part of the reason of system delay is recommended.

In conclusion, this study showed that about one-third of patients with breast cancer had a patient delay of more than three months. In addition 16.8% and 13% of patients experienced system delay in diagnosis and treatment, respectively. Amongst the investigated factors, lack of insurance coverage and specially lacking a complementary insurance, low education level and low income were risk factors for patient delay. Considering the results of the present study, the government is responsible to establish an organized screening program for breast cancer nationwide. The government and also all education systems are also responsible to not only teach people about the signs of breast cancer, but also to establish a continues public training system to educate all girls and women on the importance and methods of regular screening of breast cancer such as BSE and mammography. Moreover, the government is responsible to provide insurance for all people and also it is necessary for health insurance programs to cover cancer diagnostic examinations and treatment procedures.

## Acknowledgments

The researchers would like to express their gratitude to the vice chancellor for research of Guilan University of Medical Sciences. The authors would like to extend their gratitude to the patients, who participated in this study and all the personnel of Razi medical hospital who helped us during this research.

## Footnotes

**Authors' Contribution:** All authors contributed to the study conception. Nastaran Mirfarhadi and Abbas Rahimi contributed to the process of data collection. Atefeh Ghanbari and Malahat Khalili contributed to the study design, the data analysis. Nastaran Mirfarhadi wrote the first draft

of the paper. Nastaran Mirfarhadi, Atefeh Ghanbari and Malahat Khalili contributed to write the final draft of the paper.

**Financial Disclosure:** There were no conflicts of interest.

**Funding/Support:** The project was funded by the vice-chancellor for research of Guilian University of Medical Sciences (Grant No. 481).

## References

- Gurm BK, Stephen J, MacKenzie G, Doll R, Barroetavena MC, Cadell S. Understanding Canadian Punjabi-speaking South Asian women's experience of breast cancer: a qualitative study. *Int J Nurs Stud.* 2008;45(2):266-76. doi: [10.1016/j.ijnurstu.2006.08.023](https://doi.org/10.1016/j.ijnurstu.2006.08.023). [PubMed: 17049350].
- Pineros M, Sanchez R, Cendales R, Perry F, Ocampo R. Patient delay among Colombian women with breast cancer. *Salud Publica Mex.* 2009;51(5):372-80. [PubMed: 19936550].
- DeSantis C, Siegel R, Bandi P, Jemal A. Breast cancer statistics, 2011. *CA Cancer J Clin.* 2011;61(6):409-18. doi: [10.3322/caac.20134](https://doi.org/10.3322/caac.20134). [PubMed: 21969133].
- Sadjadi A, Nouraei M, Ghorbani A, Alimohammadian M, Malekzadeh R. Epidemiology of breast cancer in the Islamic Republic of Iran: first results from a population-based cancer registry. *East Mediterr Health J.* 2009;15(6):1426-31. [PubMed: 20218134].
- Youldeen DR, Cramb SM, Dunn NA, Muller JM, Pyke CM, Baade PD. The descriptive epidemiology of female breast cancer: an international comparison of screening, incidence, survival and mortality. *Cancer Epidemiol.* 2012;36(3):237-48. doi: [10.1016/j.canep.2012.02.007](https://doi.org/10.1016/j.canep.2012.02.007). [PubMed: 22459198].
- Asadzadeh Vostakolaei F, Broeders MJ, Mousavi SM, Kiemeney LA, Verbeek AL. The effect of demographic and lifestyle changes on the burden of breast cancer in Iranian women: a projection to 2030. *Breast.* 2013;22(3):277-81. doi: [10.1016/j.breast.2012.07.002](https://doi.org/10.1016/j.breast.2012.07.002). [PubMed: 22835919].
- Mousavi SM, Montazeri A, Mohagheghi MA, Jarrahi AM, Harirchi I, Najaifi M, et al. Breast cancer in Iran: an epidemiological review. *Breast J.* 2007;13(4):383-91. doi: [10.1111/j.1524-4741.2007.00446.x](https://doi.org/10.1111/j.1524-4741.2007.00446.x). [PubMed: 17593043].
- Montazeri A, Vahdaninia M, Harirchi I, Harirchi AM, Sajadian A, Khaleghi F, et al. Breast cancer in Iran: need for greater women awareness of warning signs and effective screening methods. *Asia Pac Fam Med.* 2008;7(1):6. doi: [10.1186/1447-056X-7-6](https://doi.org/10.1186/1447-056X-7-6). [PubMed: 19099595].
- Taghavi A, Fazeli Z, Vahedi M, Baghestani AR, Pourhoseingholi A, Barzegar F, et al. Increased trend of breast cancer mortality in Iran. *Asian Pac J Cancer Prev.* 2012;13(1):367-70. [PubMed: 22502702].
- Bustami RT, Shulkin DB, O'Donnell N, Whitman ED. Variations in time to receiving first surgical treatment for breast cancer as a function of racial/ethnic background: a cohort study. *JRSM Open.* 2014;5(7):2042533313515863. doi: [10.1177/2042533313515863](https://doi.org/10.1177/2042533313515863). [PubMed: 25057404].
- Rauscher GH, Ferrans CE, Kaiser K, Campbell RT, Calhoun EE, Warnecke RB. Misconceptions about breast lumps and delayed medical presentation in urban breast cancer patients. *Cancer Epidemiol Biomarkers Prev.* 2010;19(3):640-7. doi: [10.1158/1055-9965.EPI-09-0997](https://doi.org/10.1158/1055-9965.EPI-09-0997). [PubMed: 20200436].
- Unger-Saldana K, Miranda A, Zarco-Espinosa G, Mainero-Ratchelous F, Bargallo-Rocha E, Miguel Lazaro-Leon J. Health system delay and its effect on clinical stage of breast cancer: Multicenter study. *Cancer.* 2015;121(13):2198-206. doi: [10.1002/cncr.29331](https://doi.org/10.1002/cncr.29331). [PubMed: 25809536].
- Harirchi I, Ghaemmaghami F, Karbakhsh M, Moghimi R, Mazararie H. Patient delay in women presenting with advanced breast cancer: an Iranian study. *Public Health.* 2005;119(10):885-91. doi: [10.1016/j.puhe.2004.11.005](https://doi.org/10.1016/j.puhe.2004.11.005). [PubMed: 15913679].
- El-Shinawi M, Youssef A, Alsara M, Aly MK, Mostafa M, Yehia A, et al. Assessing the level of breast cancer awareness among recently diagnosed patients in Ain Shams University Hospital. *Breast.* 2013;22(6):1210-4. doi: [10.1016/j.breast.2013.08.010](https://doi.org/10.1016/j.breast.2013.08.010). [PubMed: 24054904].
- Noonan B. Understanding the reasons why patients delay seeking treatment for oral cancer symptoms from a primary health care professional: an integrative literature review. *Eur J Oncol Nurs.* 2014;18(1):118-24. doi: [10.1016/j.ejon.2013.07.005](https://doi.org/10.1016/j.ejon.2013.07.005). [PubMed: 24012186].
- Siminoff L, Thomson M, Dumenci L. Factors associated with delayed patient appraisal of colorectal cancer symptoms. *Psychooncology.* 2014;23(9):981-8. doi: [10.1002/pon.3506](https://doi.org/10.1002/pon.3506). [PubMed: 24615789].
- Brzozowska A, Duma D, Mazurkiewicz T, Brzozowski W, Mazurkiewicz M. Reasons for delay in treatment of breast cancer detected due to breast self-examination in women from the Lubelskie region [in Polish]. *Ginekol Pol.* 2014;85(1):14-7. [PubMed: 24505958].
- Forbes LJ, Warburton F, Richards MA, Ramirez AJ. Risk factors for delay in symptomatic presentation: a survey of cancer patients. *Br J Cancer.* 2014;111(3):581-8. doi: [10.1038/bjc.2014.304](https://doi.org/10.1038/bjc.2014.304). [PubMed: 24918824].
- Taioli E, Joseph GR, Robertson L, Eckstein S, Ragin C. Knowledge and prevention practices before breast cancer diagnosis in a cross-sectional study among survivors: impact on patients' involvement in the decision making process. *J Cancer Educ.* 2014;29(1):44-9. doi: [10.1007/s13187-013-0540-7](https://doi.org/10.1007/s13187-013-0540-7). [PubMed: 24022520].
- Unger-Saldana K, Infante-Castaneda CB. Breast cancer delay: a grounded model of help-seeking behaviour. *Soc Sci Med.* 2011;72(7):1096-104. doi: [10.1016/j.socscimed.2011.01.022](https://doi.org/10.1016/j.socscimed.2011.01.022). [PubMed: 21388729].
- Khakbazan Z, Taghipour A, Latifnejad Roudsari R, Mohammadi E. Help seeking behavior of women with self-discovered breast cancer symptoms: a meta-ethnographic synthesis of patient delay. *PLoS One.* 2014;9(12):e110262. doi: [10.1371/journal.pone.0110262](https://doi.org/10.1371/journal.pone.0110262). [PubMed: 25470732].
- Harirchi I, Ebrahimi M, Zamani N, Jarvandi S, Montazeri A. Breast cancer in Iran: a review of 903 case records. *Public Health.* 2000;114(2):143-5. doi: [10.1038/sj.ph.1900623](https://doi.org/10.1038/sj.ph.1900623). [PubMed: 10800155].
- Poum A, Promthet S, Duffy SW, Parkin DM. Factors associated with delayed diagnosis of breast cancer in northeast Thailand. *J Epidemiol.* 2014;24(2):102-8. [PubMed: 24335087].
- Stuver SO, Zhu J, Simchowitz B, Hassett MJ, Shulman LN, Weingart SN. Identifying women at risk of delayed breast cancer diagnosis. *Jt Comm J Qual Patient Saf.* 2011;37(12):568-75. [PubMed: 22235542].
- Fowler BA. Neighborhood-level Influences on Delays in Diagnostic Follow-up from Mammography Screening in African-American Women: A Systematic Review. *J Women's Health Care.* 2014;03(02) doi: [10.4172/2167-0420.1000151](https://doi.org/10.4172/2167-0420.1000151).
- Ghazali SM, Othman Z, Cheong KC, Hock LK, Wan Mahiyuddin WR, Kamaluddin MA, et al. Non-practice of breast self examination and marital status are associated with delayed presentation with breast cancer. *Asian Pac J Cancer Prev.* 2013;14(2):1141-5. [PubMed: 23621202].
- Unger-Saldana K, Infante-Castaneda C. Delay of medical care for symptomatic breast cancer: a literature review. *Salud Publica Mex.* 2009;51 Suppl 2:s270-85. [PubMed: 19967283].
- Wiesner C. Determinantes psicologicos, clinicos y sociales del diagnostico temprano del cancer de mama en Bogota, Colombia [in Spanish]. *Rev Colomb Cancerol.* 2007;11(1):13-22.
- Noroozi A, Jomand T, Tahmasebi R. Determinants of breast self-examination performance among Iranian women: an application of the health belief model. *J Cancer Educ.* 2011;26(2):365-74. doi: [10.1007/s13187-010-0158-y](https://doi.org/10.1007/s13187-010-0158-y). [PubMed: 20859775].
- Tavafian SS, Hasani L, Aghamolaei T, Zare S, Gregory D. Prediction of breast self-examination in a sample of Iranian women: an application of the Health Belief Model. *BMC Womens Health.* 2009;9:37. doi: [10.1186/1472-6874-9-37](https://doi.org/10.1186/1472-6874-9-37). [PubMed: 20040093].

31. Tu SP, Reisch LM, Taplin SH, Kreuter W, Elmore JG. Breast self-examination: self-reported frequency, quality, and associated outcomes. *J Cancer Educ.* 2006;21(3):175-81. doi: [10.1207/s15430154jce2103\\_18](https://doi.org/10.1207/s15430154jce2103_18). [PubMed: [17371185](https://pubmed.ncbi.nlm.nih.gov/17371185/)].
32. Heidari Z, Mahmoudzadeh-Sagheb HR, Sakhavar N. Breast cancer screening knowledge and practice among women in southeast of Iran. *Acta Med Iran.* 2008;46(4):321-8.
33. Ukwonye AY, Yusufu LM, Nmadu PT, Garba ES, Ahmed A. Delayed treatment of symptomatic breast cancer: the experience from Kaduna, Nigeria. *SAfr J Surg.* 2008;46(4):106-10. [PubMed: [19051953](https://pubmed.ncbi.nlm.nih.gov/19051953/)].
34. Karayurt O, Ozmen D, Cetinkaya AC. Awareness of breast cancer risk factors and practice of breast self examination among high school students in Turkey. *BMC Public Health.* 2008;8:359. doi: [10.1186/1471-2458-8-359](https://doi.org/10.1186/1471-2458-8-359). [PubMed: [18928520](https://pubmed.ncbi.nlm.nih.gov/18928520/)].
35. Hacihasanoglu R, Gozum S. The effect of training on the knowledge levels and beliefs regarding breast self-examination on women attending a public education centre. *Eur J Oncol Nurs.* 2008;12(1):58-64. doi: [10.1016/j.ejon.2007.06.005](https://doi.org/10.1016/j.ejon.2007.06.005). [PubMed: [17950665](https://pubmed.ncbi.nlm.nih.gov/17950665/)].
36. Rastad H, Khanjani N, Khandani BK. Causes of delay in seeking treatment in patients with breast cancer in Iran: a qualitative content analysis study. *Asian Pac J Cancer Prev.* 2012;13(9):4511-5. [PubMed: [23167370](https://pubmed.ncbi.nlm.nih.gov/23167370/)].
37. Chang HJ, Chen WX, Lin EC, Tung YY, Fetzer S, Lin MF. Delay in seeking medical evaluations and predictors of self-efficacy among women with newly diagnosed breast cancer: a longitudinal study. *Int J Nurs Stud.* 2014;51(7):1036-47. doi: [10.1016/j.ijnurstu.2013.10.024](https://doi.org/10.1016/j.ijnurstu.2013.10.024). [PubMed: [24315542](https://pubmed.ncbi.nlm.nih.gov/24315542/)].
38. Smith IK, Pope C, Botha JL. Patients' help-seeking experiences and delay in cancer presentation: a qualitative synthesis. *Lancet.* 2005;366(9488):825-31. doi: [10.1016/S0140-6736\(05\)67030-4](https://doi.org/10.1016/S0140-6736(05)67030-4). [PubMed: [16139657](https://pubmed.ncbi.nlm.nih.gov/16139657/)].
39. O'Mahony M, Hegarty J. Help seeking for cancer symptoms: a review of the literature. *Oncol Nurs Forum.* 2009;36(4):178-84. doi: [10.1188/09.ONFN178-E184](https://doi.org/10.1188/09.ONFN178-E184). [PubMed: [19581221](https://pubmed.ncbi.nlm.nih.gov/19581221/)].
40. Bilimoria KY, Ko CY, Tomlinson JS, Stewart AK, Talamonti MS, Hynes DL, et al. Wait times for cancer surgery in the United States: trends and predictors of delays. *Ann Surg.* 2011;253(4):779-85. doi: [10.1097/SLA.0b013e318211cc0f](https://doi.org/10.1097/SLA.0b013e318211cc0f). [PubMed: [21475020](https://pubmed.ncbi.nlm.nih.gov/21475020/)].