Barriers Against Mammographic Screening in a Socioeconomically Underdeveloped Population: A Population-based, Cross-sectional Study

Tolga Özmen[1], Salih Yüce[2], Tekin Güler[3], Canan Ulun[4], Nilufer Özaydın[5], Sandhya Pruthi[6], Nezih Akkapulu[7], Koray Karabulut[8], Atilla Soran[9], Vahit Özmen[10]

[1]Department of General Surgery, Marmara University School of Medicine, İstanbul, Turkey
[2]Genç Birikim Association, Muş, Turkey
[3]Association for Fight against Cancer, Muş, Turkey
[4]Department of Nurses, Muş Alparslan University High School of Nursing, Muş, Turkey
[5]Department of Public Health, Marmara University School of Medicine, İstanbul, Turkey
[6]Mayo Clinic, Rochester, USA
[7]Clinic of General Surgery, Ordu Training and Research Hospital, Ordu, Turkey
[8]Department of General Surgery, Fırat Universty School of Medicine, Elazığ, Turkey
[9]Magee Womens Hospital of UPMC, Pittsburgh, USA
[10]Department of General Surgery, İstanbul University İstanbul School of Medicine, İstanbul, Turkey

ABSTRACT

Objective: Mammography-screening (MS) rates remain low in underdeveloped populations. We aimed to find the barriers against MS in a low socioeconomic population.

Materials and Methods: Women aged 40-69 years who lived in the least developed city in Turkey (Mus), were targeted. A survey was used to question breast cancer (BC) knowledge and health practices.

Results: In total, 2054 women were surveyed (participation rate: 85%). The MS rate was 35%. Women aged 50-59 years (42%, p<0.001), having annual Obstetric-Gynecology (OB-GYN) visits (42%, p<0.001), reading daily newspaper (44%, p=0.003), having Social Security (39%, p=0.006) had increased MS rates. The most common source of information about BC was TV/radio (36%). Having doctors as main source of information (42%, p<0.001), knowing BC as the most common cancer in females (36%, p=0.024), knowing that BC is curable if detected early (36%, p=0.016), knowing that MS is free (42%, p<0.001) and agreeing to the phrase "I would get mammography (MG), if my doctor referred me" (36%, p=0.015) increased MS rates. Agreeing that MG exposes women to unnecessary radiation decreased MS rate (32%, p=0.002).

Conclusion: To increase the MS rate in low socioeconomic populations, clear messages about BC being the most common cancer in women, MS after 40 years of age not causing unnecessary radiation but saving lives through enabling early detection, and MS being free of charge should be given frequently on audiovisual media. Uninsured women and women aged 40-49 years should be especially targeted. Physicians from all specialties should inform their patients about BC.

Keywords: Breast cancer, screening, prevention, cross-sectional studies

Introduction

Breast cancer (BC) is the most common cancer in women and is a major health problem in the world (1, 2). BC incidence is the highest in developed countries (90:100 000); countries such as East Africa have the lowest incidence (19.3:100 000) and developing countries (e.g. Turkey) lie in between (50:100 000) (3). According to a Canadian study, BC mortality rate was reduced by 40% after inviting women aged more than 40 years to mammography screening (MS) (4, 5). Although countries such as Finland, Luxemburg, the Netherlands, and Sweden achieved high MS rates (85%), those in low-income countries remain very low (5%) (6-11). In July 2004, the Ministry of Health in Turkey issued BC screening guidelines and MS centers have been organized. Despite a decade has past, MS is still performed in Turkey primarily on an opportunistic basis rather than an organized basis with a small fraction of women undergoing screening. According to the literature, health literacy plays a major role in health behaviors. If the health beliefs of women are known, models can be customized to affect the beliefs and increase participation in MS programs (12-14).

Table 1. Descriptive characteristics of population

Age (y), (mean±SD [range])		49.5±8.3 [40-69]
BMI (kg/m²), (mean±SD [range])		29.7±4.9 [16-53]
Marital Status	Single	28 (1)
	Married	1724 (88)
	Widow	210 (11)
Literacy		865 (44)
Graduation	None	1213 (59)
	Elementary	562 (27)
	Middle/High school	232 (11)
	College/University	49 (3)
Reading at least one newspaper a day		161 (9)
Working status	Working	87 (5)
	Retired	46 (2)
	Never worked	1817 (93)
Insurance status	Social security	1269 (66)
	Green Card**	475 (24)
	Not insured	128 (7)
	Private Insurance	59 (3)
Income ($), (mean±SD [range])		687.2±444.7 [0-4187]
Diagnosed diseases	Cardiovascular diseases	539 (45)
	Diabetes Mellitus	234 (20)
	BC	18 (1)
	Other	404 (34)
Having regular menstrual cycles		1097 (56)
Menopausal status	Premenopausal	1141 (59)
	Perimenopausal	182 (9)
	Postmenopausal	618 (32)
Menarche age (y), (mean±SD [range])		13.6±1.5 [5-20]
Menopausal age (y), (mean±SD [range])		46±6.1 [45-60]
Annual OB-GYN visit		291 (15)
Having ≥1 pregnancy		1897 (93)
Total pregnancy count (mean±SD [range])		6.4±3.7 [1-22]
Age of first pregnancy (y), (mean±SD [range])		18.9±3.7 [14-45]
Having ≥1 induced abortion		668 (33)
Having ≥1 missed abortion		868 (42)
Having ≥1 breast symptom		468 (23)
Breast symptom	Pain	371 (65)
	Mass	102 (18)
	Swelling	49 (9)
	Other	44 (8)
Having screening MG in the last 2 years		678 (35)
The reason for not having screening MG	Did not know it was necessary	742 (75)
	Was embarrased	39 (4)
	Had financial issues	27 (3)
	Other	178 (18)

Table 1. Descriptive characteristics of population

Having ≥1 breast biopsy		68 (4)
Biopsy result	Benign	50 (77)
	Malign	9 (14)
	Did not remember	6 (9)
Family history of BC		260 (13)
BC diagnose age of family member (years), (mean±SD [range])		44.5±11.5 [19-80]
Having a friend with BC		421 (22)
Family history of cancer		586 (30)
Cancer diagnose age of family member (y), (mean±SD [range])		49.7±15.7 [2-100]

BMI: body mass index; BC: breast cancer; MG: mammography; SD: standard deviation

Data are presented as n (%) unless noted otherwise.

*Green Card: non-contributory health insurance program in Turkey for the poor and without formal social insurance coverage

There are major discrepancies in socioeconomic status between Western and Eastern regions of Turkey. Two-thirds of the population are concentrated in the west of the country in half the land area (15). The average income and rate of annual increase in Eastern Anatolia have always been the lowest of all other regions. This indicates that people in these regions are poorer on average than people in the other regions (16). The gross enrollment rate (GER) of pre-primary education is highest in western regions (19-22%) and lowest in the east (11%) (17). According to data of the Ministry of National Education, four of the five provinces with the lowest net enrollment rate (NER) to primary education were in eastern regions (Mus, Bitlis, Van and Hakkari) (18). According to the Ministry of Development, Mus (a city in Eastern Anatolia) is the least socioeconomically developed city in Turkey (19).

In the literature, MS rates and BC awareness of socio-economically higher status populations that live in the west of Turkey has been repeatedly studied, but socioeconomically lower status populations that live in Eastern Turkey remains unstudied. We aimed to find the MS rate and to study barriers against BC screening in Mus. We believe the results of our study will be useful in understanding breast health practices in underdeveloped populations and implementing successful customized MS programs in these populations.

Material and Methods

In this population-based cross-sectional study, women aged 40-69 years who lived in Mus formed the sample unit. According to the population list obtained from the Turkish Statistical Institute, there were 13 987 women met the above criteria. "Cluster sampling" was used as our random sampling method because of the characteristics of the area and to make the survey more applicable. The size of the sampling unit was calculated as 2416 women and 242 clusters were acquired. After obtaining Institutional Review Board approval, 10 randomly selected women from each cluster were informed and asked for their consent to participate in the study. Trained pollsters conducted the surveys. The survey was applied through face-to-face interviews by trained interviewers. Acceptance of the invitation to attend the survey was taken as evidence of informed consent.

Table 2. The association between descriptive factors and getting screening Mg in last 2 years

		MG (+)	MG (-)	p (univariate)	P (multivariate)
Age intervals (y)	40-49	320 (30)	749 (70)	<0.001	<0.001
	50-59	253 (42)	344 (58)		
	60-69	106 (36)	187 (64)		
Annual OB-GYN visit	Yes	184 (42)	256 (58)	0.001	<0.001
	No	498 (33)	999 (67)	OR 2.208	
				[1.716-2.841]	
Marital status	Married	596 (35)	1128 (65)	0.711	0.92
	Widow	76 (36)	134 (64)		
	Single	8 (29)	20 (71)		
Literacy	Yes	295 (34)	570 (66)	0.665	0.634
	No	383 (35)	710 (65)		
Graduation	None	396 (33)	817 (67)	0.605	0.669
	Elementary	190 (34)	372 (66)		
	Middle school	35 (34)	67 (66)		
	High school	40 (31)	90 (69)		
	University	21 (43)	28 (57)		
Reading ≥1 newspaper a day	Yes	71 (44)	90 (56)	0.007	0.003
	No	577 (34)	1142 (66)	OR** 1.561	
				[1.126-2.165]	
Working status	Working	31 (36)	56 (64)	0.168	0.485
	Retired	22 (48)	24 (52)		
	Never worked	626 (35)	1191 (75)		
Insurance status	Not insured	31 (24)	97 (76)	<0.001	0.006
	Social security	489 (39)	780 (61)		
	Green Card*	136 (29)	339 (71)		
	Private insurance	18 (31)	41 (69)		
Income	<HT	288 (34)	549 (66)	0.315	0.582
	HT-PT	243 (37)	422 (63)		
	>PT	20 (44)	25 (56)		

Data are presented as n (%) unless noted otherwise.

MG: Mammogram; OR: odds ratio; HT: hunger threshold (603 $ according to Confederation of Turkish Trade Unions; www.turkis.org.tr); PT: poverty threshold (1966 $ according to Confederation of Turkish Trade Unions; www.turkis.org.tr)

*Green Card; non-contributory health insurance program in Turkey for the poor and without formal social insurance coverage.

Individuals who were eligible for interview were all those randomly selected women aged 40-69 years, who were healthy, and had lived in the area for more than 5 years. The survey comprised 36 questions under 2 topics: (1) descriptive information, (2) BC awareness. Under the descriptive information of the women including age, marital status, literacy, graduation, newspaper reading habit, working status, insurance status, monthly income, body mass index (BMI), diagnosed diseases, menstrual cycle regularity, pregnancy, menopausal status, menarche age, menopausal age, abortions and miscarriages, and breast symptoms, prior mammography (MG) sequences, breast biopsy and cancer history of their families were collected. Under the BC awareness topic, the womens' information source on BC, knowledge on MG being free of cost, BC being the most common cancer in females, BC being curable if diagnosed early, and whether BC exposed women to unnecessary radiation was asked. Women were also asked if they agreed to the phrase, "I would get an MG if my doctor wanted me to." The

Table 3. Correlation between BC* awareness and getting a screening MG* in the last 2 years

		MG (+)	MG (-)	p
What is your information source on BC?	Doctors/Nurses	313 (42)	442 (58)	<0.001
	TV/Radio	303 (36)	545 (64)	OR 1.589
	Friends/Relatives	259 (32)	542 (68)	[1.306-1.934]
What is the most common cancer in women?	BC	612 (36)	1092 (64)	0.024
	Other cancers	63 (28)	160 (72)	OR 1.423
				[1.046-1.936]
Is BC curable if diagnosed early?	Yes	632 (36)	1138 (64)	0.016
	No	34 (25)	100 (75)	OR 1.633
				[1.094-2.439]
Did you know screening MG is free of cost?	Yes	384 (42)	532 (58)	<0.001
	No	298 (29)	725 (71)	OR 1.756
				[1.455-2.12]
MG exposes to unnecessary radiation	Yes	365 (32)	771 (68)	0.002
	No	291(39)	451 (61)	OR 1.363
				[1.124-1.653]
I would get MG if my doctor wanted me to.	Yes	628 (36)	1126 (64)	0.015
	No	37 (26)	107 (74)	OR 1.613
				[1.096-2.373]

MG: mammography; BC: breast cancer; OR: odds ratio

*Data are presented as n (%) unless noted otherwise.

correlation between having screening MG during the last 2 years and descriptive parameters and BC awareness were studied.

Statistical analysis
Descriptive statistics were used to generate mean and median in order to describe our population. The correlation between having an MG during the last 2 years and descriptive parameters was performed in univariate and multivariate analysis, and correlation between having an MG during the last 2 years and BC awareness was performed in univariate analysis. Student's t-test was used for continuous variables and the Chi-square test was used for categorical variables. Logistic regression analysis was used for multivariate analysis. The odds ratio (OR) was calculated during the analysis of categorical parameters with a confidence interval of 95%. The Statistical Package for Social Sciences version 20.0 software (SPSS Inc.; Chicago, IL, USA) was used for analysis. P values of less than 0.05 were considered as statistically significant.

Results

In our study, 2054 women accepted to be surveyed from January to July 2014; the participation rate was 85%. The mean age and mean BMI were 49.5±8.3 [40-69] years and 29.7±4.9 [16-53] kg/m², respectively. Eighty-eight (n=1724) percent of the women were married. Some 32% (n=618) of the population was postmenopausal. The mean menarche and menopausal age were 13.6±1.5 [5-20] years and 46±6.1 [45-60] years, respectively. The ratio of having an annual gynecologist visit was 15% (n=291), and 93% (n=1897) of the women had experienced at least one pregnancy; the mean delivery quantity was 6.4±3.7 [range, 1-22]. The mean age for the first pregnancy was 18.9±3.7 years [range, 14-45 years]. In our cohort, induced and missed abortion ratios were 33% (n=668) and 42% (n=868), respectively (Table 1).

The literacy ratio was 44% (n=865). In total, 59% (n=1213) of the women never went to school and 93% (n=1817) of the population never had a job. Only 9% (n=161) read at least one newspaper a day. Regarding social security, 93% (n=1803) of the women were insured. The average monthly income of the family was 687.2±444.7 $ [range, 0-4187 $] (Table 1).

In our survey, 23% (n=468) of the women had ≥1 breast symptom with pain being the most common (65%, n=371). BC incidence was 1% (n=18). The overall rate of having been MG screened during the last 2 years was 35% (n=678) in our cohort. The most commonly declared reason for not having an MG was being not aware of its necessity (75%, n=742). The rate of having a family member and a friend with BC was 13% (n=260) and 22% (n=421), respectively (Table 1).

Descriptive factors and having MG screening in the last 2 years
When we compared the rate of having MG screening in the last two years between the age groups, the highest rate was in the "50-59 years" group, the second highest was in the "60-69 years" group, and the lowest was in the "40-49 years" group (42% vs. 36% vs. 30%, respectively; p<0.001) both in the univariate and multivariate analyses.

Both in univariate and multivariate analyses, women who had annual Obstetric-Gynecology (OB-GYN) visits, who were insured with social security, and who read at least one newspaper a day were more likely to have had MG screening in the last two years (Table 2).

BC awareness and having MG screening in the last 2 years

In our survey, 36% (n=848) of the women reported that the TV/radio was their main information source on BC. Women who declared doctors/nurses as their main information source on BC were more likely to have had MG screening in the last two years (42%; OR 1.589; 95% CI:[1.306-1.934]; p<0.001). Women, who knew MS is free of charge, who knew BC is the most common cancer in females and BC is curable if detected at an early stage were more likely to get screening MG in the last two years (42%; OR 1.756; 95% CI:[1.455-2.12]; p<0.001; 36%; OR 1.423; 95% CI:[1.046-1.936] p= 0.024; 36%; OR 1.633; 95% CI:[1.094-2.439]; p=0.016, respectively). Women, who agreed to the phrase "MG exposes me to unnecessary radiation", were less likely to have had MG screening in the last two years (32%; OR 1.363; 95% CI:[1.124-1.653]; p=0.002). Some 92% of the population reported that they would go for MG screening if their doctor referred them and the MS rate in this group was higher (36%; OR 1.613; 95% CI:[1.096-2.373]; p=0.015) (Table 3).

Discussion and Conclusion

The breast cancer incidence rate is lower in underdeveloped and developing countries in comparison with the western world. Nevertheless, the rate of advanced and metastatic BC is higher in underdeveloped and developing countries mostly due to the lack of organized comprehensive MS programs (20). The characteristics of the population play major role in the population's breast health practices. If the population is carefully studied, screening models can be customized and participation to MS can be increased (12-14). The aim of this study was to evaluate MS rate and breast health practices in a population with a very low socioeconomic status. We believe the results of our study will help customize BC awareness and MS programs in socioeconomically underdeveloped populations.

In 2012, the Turkish Federation of Breast Diseases Societies analyzed the data of the National Breast Cancer Database. According to their report, 48% of all patients with BC in Turkey were aged less than 50 years (3). After this report, the initiation age to MS was decreased from 50 to 40 years of age. In our study, the MS rate was significantly higher in women aged over 50 years (42%). Only 44% of the population were aware of the change and responded correctly to the question about MS initiation age. The population living in Eastern Turkey has limited access to information. The literacy rate is 44%. Only 9% read daily newspapers. Audiovisual media is a major source of information; however, BC is not a commonly handled topic. We think that women who live in this area are not sufficiently informed about the change in initiation age to MS. With more programs in audiovisual media on breast cancer awareness, we believe more women aged between 40 and 50 years will participate in MS.

Previous studies reported an association between lower educational status, lower reading ability, and inadequate breast cancer screening knowledge. They argued that low literacy impacts women's ability to access written cancer screening material, benefit from instructions during clinical visit, and apply for health insurance to obtain preventive screening (21-23). In our population, most of the women had never worked (93%), and more than half had never been to school; the lit-

eracy ratio of our population was 44%. In concordance with the literature, the most commonly used source of information on BC was TV/radio (36%), followed by friends/relatives (33%) and doctors/nurses (31%). The MS rate was significantly higher in the group that reported doctors/nurses as their major source of information compared with those who said TV/radio and friends/relatives (42%, 36%, and 32%, respectively). Only 9% of our population read at least one newspaper a day, and the participation rate in MS was significantly higher in this group (42%). Today, with easy accessibility to information, the lower educated people can easily be misinformed on BC. Some 40% of our population believed that MG would expose them to unnecessary radiation, and the MS rate in this group was significantly lower (32%). Only 47% of our cohort was aware that MS was free-of-charge and the MS rate in this group was higher (42%). Women, who knew that BC is the most common cancer in women and BC is curable if diagnosed early had a higher MS rate (36% and 36%, respectively). The most commonly mentioned reason for not having MG was the lack of knowledge about MS being necessary over the age of 40 years (75%). We think that audiovisual media should be used more efficiently to increase the rate of MS in less educated populations. Clear and easy understandable messages about BC being the most common cancer in women, that MS after age 40 years does not cause unnecessary radiation instead being life-saving by enabling early detection of BC, and MS being free-of-charge should be given frequently. Several studies have reported that factors such as not having health insurance plays a major role in participation in MS programs (9, 10, 15, 24-27). Insured patients have a greater tendency to perform routine checkups, which remains the strongest predictor of screening behavior. A physician's recommendation increases the use of MG significantly, and it is believed that recommendations tend to be given less to minorities or low-income women (28-31). Our findings showed parallel results to the literature. In our study, women with social security had a higher MS rate (39%). Only 15% of our cohort visited OB-GYN doctors annually and the MS rate in this group was significantly higher (42%). Almost all of our surveyed women (92%) agreed that they would get MG if their doctors ordered them to do so. We think that expanding insurance coverage with social security in low socioeconomic populations would be an effective governmental health care strategy to increase BC awareness. Our results also show an important role for physicians from other specialties in breast health such as gynecologists. All physicians should be encouraged to educate their patients on BC and refer them to MS programs.

This study's limitations were the subjective information gathered via the questionnaire. The population-based model of the study, randomization, high response rate, and large sample size were the strengths of our study. To the best of our knowledge, this is the first population-based survey study to assess the success rate of MS and breast cancer knowledge in Eastern Anatolia. The population in this area mimics other underdeveloped populations in Africa, most of Middle Eastern countries and the former Soviet Union countries. We believe our results will help to adjust MS programs in these areas and will contribute to the literature.

We think that to increase MS rates in low socioeconomic populations, BC awareness and susceptibility should be increased via audiovisual media. Clear messages should be given on that BC is the most common cancer in women, MS after the age 40 years does not cause unnecessary radiation but saves lives by enabling early detection of BC, and that MS is free-of-charge should be given frequently. Uninsured women and women aged between 40-49 years should be especially

targeted. Lastly, physicians from all specialties should inform their patients on BC and refer them for MS. After such interventions and improvements in MS should be tested in the same region.

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Informed Consent: Informed consent was obtained from patients who participated in this study.

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References

1. World Health Statistics 2008. Available at: www.who.int/whosis/whostata
2. Ozmen V. Breast cancer in Turkey and in the world. J Breast Health 2008; 4:6-12.
3. Ozmen V. Breast Cancer in Turkey: Clinical and Histopathological Characteristics (Analysis of 13.240 Patients) J Breast Health 2014; 10:98-105.
4. Ozmen V. Breast Cancer in Turkey - Clinical and histopathological characteristics and standard prognostic factors. Yelken Basım Yayın ve Ticaret Ltd. Şti; 2012.p.24.
5. Canbulat N, Uzun O. Health beliefs and breast cancer screening behaviors among female health workers in Turkey. Eur J Oncol Nurs 2008; 12:148-156. (PMID: 18314391)
6. Coldman A, Phillips N, Wilson C, Decker K, Chiarelli AM, Brisson J, Zhang B, Payne J, Doyle G, Ahmad R. Pan-Canadian study of mammography screening and mortality from breast cancer. J Natl Cancer Inst 2014; 1:106-111. (PMID: 25274578)
7. Cole SR, Bryant CA, McDermott RJ, Sorrell C, Flynn M. Beliefs and mammography screening. Am J Prev Med 1997; 13:439-443. (PMID: 9415789)
8. Kaplan KM, Weinberg GB, Small A, Herndon JL. Breast cancer screening among relatives of women with breast cancer. Am J Public Health 1991; 81:1174-1179. (PMID: 1951830)
9. Lane DS, Polednak AP, Ann M. Breast cancer screening practices among users of county-funded health centers vs. women in the entire community. Am J Public Health 1992; 82:199-203. (PMID: 1739147)
10. Miller AM, Champion VL. Mammography in older women: one-time and three-year adherence to guidelines. Nursing Research 1996; 45:239-245. (PMID: 8700658)
11. Phillips JM, Wilbur J. Adherence to breast cancer screening guidelines among African–American women o differing employment status. Cancer Nursing 1995; 18:258-269. (PMID: 7664253)
12. Breast Cancer: Mortality and Screening. Part 1: Ten Highlights in Health Statistics. World Health Statistics 2008. Available at: http://www.who.int/whosis/whostat/EN_WHS08_Full.pdf (accessed March 7, 2009).
13. Cohen M. First-degree relatives of breast-cancer patients: cognitive perceptions, coping and adherence to breast self-examination. Behav. Med. 2002; 28:15-22. (PMID: 12244641)
14. Stefanek M, Wilcox P. First-degree relatives of breast cancer patients: screening practices and provision of risk information. Cancer Detect. Prev. 1991; 15:379-384. (PMID: 1751948)
15. European Commission. Regional features in Turkey. Available at: http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/pdf/p324_boxturkey_en.pdf.
16. Sahin I, Gulmez Y. Efficiency of education: The case in Eastern and South-Eastern Turkey. Social Indicators Research 2000; 49:213-236.
17. Erberber E. Analyzing Turkey's data from TIMSS 2007 to investigate regional disparities in eight-grade science achievement. (Unpublished doctoral dissertation). Boston College, Boston, Massachusetts, 2009.
18. Republic of Turkey Ministry of National Education (2009). National education statistics: Formal education 2008-2009
19. Republic of Turkey Ministry of Development. Socioeconomical development index (SEGE) study 2011. Available from: www.kalkinma.gov.tr.
20. Ozmen V, Ozaydin N, Cabioglu N, Gulluoglu BM, Unalan PC, Gorpe S, Oner BR, Aribal E, Thomas DB, Anderson BO. Survey on a Mammographic Screening Program in Istanbul, Turkey. The Breast Journal 2011; 17:260-267. (PMID: 21450016)
21. Davis TC, Arnold C, Berkel HJ, Nandy I, Jackson RH, Glass J. Knowledge and attitude on screening mammography among low-literate, low-income women. Cancer 1996; 78:1677-1682. (PMID: 8909311)
22. Davis TC, Williams MV, Marin E, Parker R, Glass J. Health literacy and cancer communications. CA Cancer J Clinc 2002; 52:134-149.
23. Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs, American Medical Association. Health literacy: report of the Council on Scientific Affairs. JAMA 1999; 281:552-557. (PMID: 10022112)
24. Salazar MK. Breast self-examination beliefs: a descriptive study. Public Health Nursing 1994; 11:49-56. (PMID: 8190694)
25. Miedema BB, Tatemichi S. Breast and cervical cancer screening for women between 50 and 69 years of age: what prompts women to screen? Women's Health Issues 2003; 13:180-184. (PMID: 14583166)
26. Petro-Nustas W, Mikhail BI. Factors associated with breast self-examination among Jordanian women. Public Health Nursing 2002; 19:263-270. (PMID: 12071900)
27. Champion VL. Relationship of age to mammography compliance. Cancer Supplement 1994; 74:329-335. (PMID: 8004604)
28. Han Y, Williams RD, Harrison RA. Breast cancer screening knowledge, attitudes, and practices among Korean American women. Oncology Nursing Forum 2000; 27:1585-1591. (PMID: 11103377)
29. Friedman LC, Neef NE, Webb JA. Early breast cancer detection behaviors among ethnically diverse low-income women. Psychooncology 1996; 5:283-289.
30. Lerman C, Rimer BK, Trock B. Factors associated with repeat adherence to breast cancer screening. Prev Med 1990; 19:279-290.
31. Rimer BK. Understanding the acceptance of mammography by women. Ann Behav Med 1992; 14:197-203.