



## Patterns and determinants of mammography screening in Lebanese women

Nadia Elias <sup>a</sup>, Ibrahim R. Bou-Orm <sup>b,\*</sup>, Salim M. Adib <sup>b</sup>

<sup>a</sup> Faculty of Medicine, Saint-Joseph University, Beirut, Lebanon

<sup>b</sup> Faculty of Health Sciences, American University of Beirut, Lebanon

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### ABSTRACT

The associations of ever using and/or repeating a mammography test with psychosocial and socio-demographic factors were surveyed in 2014 among Lebanese women  $\geq 40$ .

A sample of 2400 women was selected across Lebanon. Variables with significant bivariate associations with various types of behaviors were entered in multivariate analysis.

Of the total, 105 women (4.4%) had never heard of mammography as a tool for early breast cancer detection. Among the remaining 2295, 45% had ever used it, of whom 10% had obtained it for the first time within the 12 months preceding the survey. Repeaters were 67% of 926 women who had the time opportunity to do so (median lifetime frequency: 2). Older age, higher socio-economic status (SES) and living within the Greater Beirut (GB) area were significantly associated with ever-use. Within GB, psychosocial factors such as perceived susceptibility and benefits were most strongly associated with ever-use. Outside GB, socio-economic advantage seemed to mostly affect ever-use. Only 4% reported opposition from husbands to their mammography, and husband's support was significant for adherence to mammography guidelines mostly outside GB. Higher education emerged also as a significant socio-demographic determinant for ever-repeating in all regions. Perceived comfort of the previous test strongly affected the likelihood of repeating it.

Providing mammography free-of-charge may alleviate some obstacles among women with socio-economic disadvantage. Stressing that good results one year do not make the cancer less likely or repeating the test less important, as well as improving the comfort of mammography testing could ensure test repeating.

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### 1. Introduction

Breast cancer is the most commonly diagnosed cancer in women around the globe (Ferlay et al., 2010). In Lebanon, it has topped the list of cancers among women for the past 50 years, and accounts annually for about one-third of all reported cases (Shamseddine et al., 2004; Ministry of Public Health. National Cancer Registry, 2015). The worldwide rise in breast cancer incidence is inevitable, since it is related to major changes in reproductive life patterns (Lakkis et al., 2010). The age-standardized incidence rate in Lebanon has increased from 16.4 per 100,000 in 1965 (Abou-Daoud, 1966) to 95.7 in 2008 (Ministry of Public Health. National Cancer Registry, 2015). Several screening tools allow an early diagnosis of breast cancer, rendering the possibility of efficient treatment and definite cure very likely. Of those, mammography is a cost-effective screening tool which improves the prognosis and reduces mortality (White et al., 2004; Barth et al., 2005).

Since 2002, annual awareness campaigns have been conducted in Lebanon to obtain a wider adoption of mammography screening. In

2009, national guidelines for screening were established calling for annual mammography for women aged 40 and above with no family history of breast cancer (Adib et al., 2008). Lifetime utilization has been increasing steadily from 28.9% in 2005 to 43% in 2013. In contrast, regular re-utilization has moved only slightly over time from about 18% in 2005 to about 21% in 2013, ultimately reaching a plateau level in some regions of Lebanon (Haddad et al., 2015). Lower utilization rates may be associated with two large categories of obstacles. The first includes logistical/structural determinants such as the availability and accessibility of a screening center, and test affordability. The other large category includes psychosocial factors such as values, expectations and beliefs which affect the way women transform knowledge regarding mammography into actual behavior. Socio-demographic determinants affect the way structural and psychosocial factors predict mammography utilization (Adib et al., 2009).

The Health Belief Model (HBM) is one psychosocial model which has been used in several studies as a theoretical framework to predict breast cancer detection behaviors (Petro-Nustas, 2001; Secginli and Nahcivan, 2006; Arevian et al., 2011; Wu and Ronis, 2009). In this paper, data from the 2014 assessment survey that followed the 2013 campaign in Lebanon were used to assess the effect of psychosocial factors derived from the HBM. The immediate aim was to optimize the educational content

\* Corresponding author: American University of Beirut, Department of Epidemiology and Population Health, P.O. Box 11-0236, Riad El-Solh, Beirut 1107 2020, Lebanon.

E-mail address: [ibrahim.bouorm@gmail.com](mailto:ibrahim.bouorm@gmail.com) (I.R. Bou-Orm).

of advertisement messages which accompany the annual campaigns, whereas the ultimate one was to promote a cognitive status in favor of annually repeating the screening mammography.

## 2. Objectives

In reaching the aims, this analysis has targeted the following objectives:

1. To assess the levels of practice of screening mammography among Lebanese women aged 40 and above.
2. To describe these levels by relevant socio-demographic variables.
3. To measure the association between HBM psychosocial factors and the various levels of practice under consideration.

## 3. Methods

### 3.1. Study design and sampling procedures

The study utilizes a cross-sectional sample survey design, targeting the female population of Lebanon between the ages of 40 and 75. Sampling was carried out in 10 regions (or *cazas*) across Lebanon: Beirut city and suburbs (Greater-Beirut or GB); Akkar and Batroun in North Lebanon; Chouf and Kesrouan in the central Mount Lebanon; Sour (Tyre) and Nabatieh in South Lebanon; and Zahleh and Baalbeck in the eastern inner Bekaa valley. In each district, the two *cazas* selected presented specific socio-cultural particularities to ensure that all subgroups of the diversified Lebanese population are represented (Fig. 1).

In each region, an equal number of participants were selected, using the basic equation in random sampling:

$$N \geq [(Z\alpha)^2 p(1 - p)] / \delta^2$$

where  $Z\alpha = 1.96$  for a tolerated error of  $\alpha = 0.05$ ;

$p$  = prevalence of mammography obtained in the previous 12 months as measured in 2005 = 18% (Adib et al., 2009);

$\delta$  = degree of precision expected around the estimation of the prevalence = 5%.

Under these conditions, a minimum number of women to be selected in each region was 226, with a total of 2260 women. The targeted number was inflated to 240 to compensate for potential missing data.

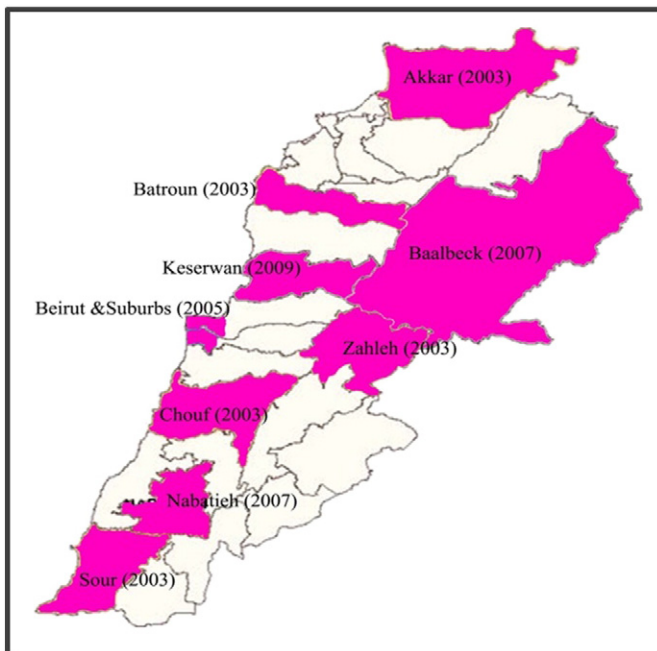


Fig. 1. Districts “cazas” in Lebanon included in the serial surveys to assess mammography utilization patterns and rates. Dates in brackets are years when this district was first included in the surveys.

Within each *caza*, all entities: towns and villages were enumerated according to their population weights, with larger entities obtaining more numbers, thus a larger probability of selection, in the list. Participants were selected using a multi-stage random cluster sampling technique. Women were excluded if they had been residing in the area for < 12 months preceding the survey. Subsequently, numbers were randomly selected, each indicating a cluster of 24 women to be identified, to reach 10 numbers per *caza*. Within each entity then a central place was defined by the research team from which the area was canvassed in a clock-ward fashion. Each building encountered was canvassed from bottom to top to recruit one eligible woman who accepted to participate. The process was repeated until the 24 needed women were identified and interviewed.

### 3.2. Instrument and variables

The instrument used was a self-administered questionnaire, prepared in Arabic, pilot-tested for ease of comprehension, and conducted in the privacy of the respondents' homes in the presence of the research assistant who remained available to provide support especially for women who could not easily read or write. It consisted of three parts:

- A behavioral component which included 7 items related to mammography practice;
- A psychosocial component which included four items inspired from the Health Belief Model and measured on a 5-point Likert scale ranging from strong disagreement (1) to strong agreement (5): perceived susceptibility of breast cancer, perceived seriousness of breast cancer, perceived benefits of mammography (perception of efficacy of the test), perceived barriers: perceived cost, perceived comfort of previous mammography, perceived difficulty to access a center, perceived support from spouse;
- A socio-demographic component which included variables such as age, marital status, educational level (elementary, secondary, and university), working situation, and socio-economic status (SES) derived from the distribution of the household crowding index (number of people per room in the same household). The lowest quartile of the crowding distribution was considered as highest SES, the highest as the lowest SES while the intermediate distribution was categorized as middle SES.

### 3.3. Statistical analysis

The first part of the analysis included the detailed description of all variables measured in the questionnaire. The outcome/dependent variable was categorized in four patterns:

- 1- Ever heard of mammography (vs. never heard)
- 2- Ever used mammography (vs. never used) among those who had heard of the test
- 3- Ever repeated mammography (vs. never repeated) among those who ever used, excluding those who had used the mammography test for the first time in the year preceding this survey
- 4- Repeating the mammography in the previous year (as recommended) vs. at an earlier time among those who had ever repeated the test

The prevalence rates of various patterns were calculated with their corresponding 95% confidence intervals (95% CI).

The second part of the analysis assessed the association of socio-demographic variables with ever-using, ever-repeating, and repeating the mammography in the previous year. The association of psychosocial variables was assessed only with the latter two outcomes. Associations found to be statistically significant ( $P$ -value  $\leq 0.05$ ) were eventually included in two multivariate logistic regression models to determine their joint effects. Associations were measured with an adjusted odds-ratio ( $OR_{adj}$ ) and a corresponding 95% CI. An association was deemed not significant if the 95% CI around the  $OR_{adj}$  included the value 1.

**Table 1**  
Socio-demographic distribution of the sample of Lebanese women selected in 2014 (N = 2400)<sup>a</sup>.

Variable		
Age	Mean in years (SD)	49.6 (11.0)
	Range	40–75
Crowding index	Mean in person/room (SD)	1.2 (0.7)
Socio-economic status (SES) (n %)	Low class	691 (28.8)
	Middle class	1196 (49.8)
	High class	513 (21.4)
Education (n %)	Less than high school	1285 (53.5)
	High school or technical	641 (26.7)
	University	474 (19.8)
Region (n %)	Greater Beirut (city + suburbs)	480 (20.0)
	Outside Greater Beirut	1920 (80.0)
Marital status (n %)	Ever married	1994 (83.1)
	Never married	406 (16.9)

<sup>a</sup> Some numbers may not add up to 2400 due to missing values.

### 3.4. Ethical considerations

At the time of the visit, the aim of the study was clearly presented to respondents. They were assured of the privacy and confidentiality of their responses and informed that data would be strictly used for scientific purposes. Participants were asked for oral consent before completing the survey questionnaire. The study has been reviewed and

obtained an ethical clearance from an ad-hoc Ethical Committee at the Ministry of Public Health, specifically tasked with overseeing activities related to the Breast Cancer Awareness Campaigns.

## 4. Results

### 4.1. General characteristics of the group

A total of 2400 women were recruited, 20% from Greater Beirut and the rest from all other areas, with a mean age of 50 years; of whom 83% had ever been married (Table 1). Of the total, 105 women (4.4%) had never heard of mammography as a tool for screening and early detection of breast cancer (Table 2). Compared to those who had ever heard of the test, the former were significantly less educated, of lower SES, and living outside Greater Beirut. Age and marital status at time of study did not make any difference between the two groups (data not shown in Tables).

### 4.2. Lifetime mammography use

Lifetime mammography use was analyzed in the 2295 women who had ever heard of the test. Of those, 1033 (45.0%; 95% CI: 43.0–47.0) had ever used it (Table 2). Compared to “never-use”, ever-use was significantly higher in older women, those from higher SES and those living in the GB area. Lowest levels of ever-use were significantly associated with lower education and never-married status (Table 3).

**Table 2**  
Prevalence of mammography-associated behaviors in Lebanese women (2014) (N = 2400).

Variable	Greater Beirut (GB)		Outside GB		Total	
	n (%)	95% CI	n (%)	95% CI	n (%)	95%CI
Ever heard	470 (97.9)	[96.6–99.2]	1825 (95.1)	[94.1–96.0]	2295 (95.6)	[94.8–96.4]
Ever used (n = 2295)	253 (53.8)	[49.3–58.3]	780 (42.7)	[40.5–45.0]	1033 (45.0)	[43.0–47.0]
Ever repeated (n = 926) <sup>a</sup>	185 (76.1)	[70.8–81.5]	433 (63.4)	[59.8–67.0]	618 (66.7)	[63.7–69.7]
Repeated at one-year interval (n = 618)	102 (55.1)	[48.0–62.3]	262 (60.5)	[55.9–65.1]	364 (58.9)	[55.0–62.7]

<sup>a</sup> Excluding those whose first use was in the previous year (n = 107).

**Table 3**  
Prevalence of mammography screening among Lebanese women (2014) by selected variables (N = 2295)<sup>a</sup>.

	Life-time prevalence of mammography use	Total		P-value
		Ever	Never	
Socio-demographic variables				
n (%)		<b>1033 (45.0)</b>	<b>1262 (55.0)</b>	<b>2295</b>
Age	Mean in years (SD)	51.3 (10.0)	48.0 (11.3)	49.5 (10.9)
Crowding index	Mean in person/room (SD)	1.1 (0.6)	1.2 (0.7)	1.2 (0.6)
Region (n, %)	Greater Beirut	253 (53.8)	217 (46.2)	470 (20.5)
	Outside Greater Beirut	780 (42.7)	1045 (57.3)	1825 (79.5)
Education (n, %)	Less than high school	490 (40.9)	707 (59.1)	1197 (52.2)
	High school or technical	329 (52.1)	303 (47.9)	632 (27.5)
	University	214 (45.9)	252 (54.1)	466 (20.3)
Marital status (n, %)	Ever married	926 (48.6)	980 (51.4)	1906 (83.1)
	Never married	107 (27.5)	282 (72.5)	389 (16.9)
Psychosocial variables				
Perceived susceptibility	Low	597 (39.3)	923 (60.7)	1520 (66.2)
	Medium–High	436 (56.3)	339 (43.7)	775 (33.8)
Perceived severity	Low–Medium	176 (36.6)	305 (63.4)	481 (21.2)
	High	831 (46.6)	952 (53.4)	1783 (78.8)
Perceived benefits	Low–Medium	180 (28.9)	443 (71.1)	623 (27.6)
	High	827 (50.4)	814 (49.6)	1641 (72.5)
Perceived cost	Low	355 (51.6)	333 (48.4)	688 (30.4)
	Medium–High	652 (41.4)	924 (58.6)	1576 (69.6)
Accessibility	Low–Medium	441 (25.8)	791 (64.2)	1232 (54.4)
	High	566 (54.8)	466 (45.2)	1032 (45.6)
Husband's attitudes <sup>b</sup>	Neutral	190 (42.2)	260 (57.8)	450 (29.6)
	Encouragement	565 (52.9)	504 (47.1)	1069 (70.4)

Bold represents the total number of participants involved in each specific column.

<sup>a</sup> Some numbers may not add up to 2295 due to missing values.

<sup>b</sup> Only 51 husbands (3.4% of total) were reported as objecting to the mammography of their spouses.

Higher perceived susceptibility of getting breast cancer was significantly associated with ever-use, as were higher perceived severity and higher perceived benefits from mammography. Women who perceived the declared cost of a mammography (25 USD) to be adequate were significantly more likely to be “ever-users”. Perceived ease of access was also associated with ever-use. Only a small proportion of women (3.2%) had encountered an objection from husbands for doing the test. All others perceived the attitudes of their husbands to be either neutral or encouraging, but those receiving encouragement were significantly more likely to engage in breast cancer screening. Details are presented in Table 3.

#### 4.3. Ever repeating the mammography

Of 1033 women who had ever had a mammography, 107 (10%) had obtained it for the first time within the 12 months preceding the survey, and therefore did not have the time to re-do it according to guidelines. The mean age of those “first-timers” was about 47 years, significantly lower than those who had the opportunity to repeat the test (about 52 years) (data not shown in tables). Among 926 women who had the time opportunity to repeat their test, 618 women (66.7%) had ever done so (Table 2).

Compared to “non-repeaters”, “repeaters” were significantly older. Higher education, higher SES, and living in Greater Beirut were also associated with repeating the mammography. Of the HBM psychosocial variables, higher perceived susceptibility of the disease, ease of access and higher perceived comfort of the previous mammography experience were significantly associated with repetition. Details are presented in Table 4.

#### 4.4. Recent mammography repeating

Among 618 women who had more than one mammography, about 60% (n = 364) had repeated their last two tests within a 12-month interval as recommended. Of all the socio-demographic and psychosocial variables considered, only low perceived cost, encouraging (versus neutral) husband’s attitude and higher perceived comfort of the first test were significantly associated with the regular repetition of mammography (Table 5).

#### 4.5. Multivariate modeling of mammography-associated behaviors

All variables that showed significance in the bivariate analysis were entered in two models of multivariate logistic regression for each level of behavior detailed above, one for women in GB and one for those outside GB. The stratified approach by location was decided in view of the differences found in behaviors between the two sub-groups.

In the GB model, most significant associations with ever-use were found with psychosocial rather than socio-economic variables. Of those, the strongest were with ease of access ( $OR_{adj} = 1.54 [1.12-2.11]$ ) and perceived benefits attached to mammography ( $OR_{adj} = 1.59 [1.10-2.28]$ ). Ever-repeating a mammography was significantly associated with higher education ( $OR_{adj} = 1.76 [1.13-2.76]$ ), perceived susceptibility ( $OR_{adj} = 1.68 [1.10-2.59]$ ) and perceived comfort of the first mammography ( $OR_{adj} = 1.70 [1.21-2.39]$ ). Regular repetition was significantly associated with husband’s encouragement only ( $OR_{adj} = 2.26 [1.03-4.99]$ ) (Table 6A).

Several variables were significantly associated with mammography ever-use among women in outside GB. These included higher SES, perceived benefits, ease of access, and husband’s support. The strongest

**Table 4**  
Prevalence of mammography re-utilization among ever-users (2014) by selected variables (n = 926)<sup>a</sup>.

		Ever repeated		Total	P-value
		Yes	No		
Socio-demographic variables					
n (%)		<b>618 (66.7)</b>	<b>308 (33.3)</b>	<b>926</b>	
Age	Mean in years (SD)	52.6 (9.8)	50.4 (10.2)	51.8 (10.0)	0.002
Crowding index	Mean in person/room (SD)	1.0 (0.5)	1.2 (0.6)	1.1 (0.6)	<0.001
Region (n, %)					
	Greater Beirut	185 (76.1)	58 (23.9)	243 (26.2)	<0.001
	Outside Greater Beirut	433 (63.4)	250 (36.6)	683 (73.8)	
Education (n, %)					
	Less than high school	253 (57.2)	189 (42.8)	442 (47.7)	<0.001
	High school or technical	217 (73.8)	77 (26.2)	294 (31.7)	0.002
	University	148 (77.9)	42 (22.1)	190 (20.6)	<0.001
Marital status (n, %)					
	Ever married	563 (67.7)	269 (32.3)	832 (89.8)	0.095
	Never married	55 (58.5)	39 (41.5)	94 (10.2)	
Psychosocial variables					
Perceived susceptibility					
	Low	338 (63.2)	197 (36.8)	535 (57.8)	0.009
	Medium	132 (65.0)	71 (35.0)	203 (21.9)	0.615
	High	148 (78.7)	308 (33.3)	188 (20.3)	<0.001
Perceived severity					
	Low	37 (56.1)	29 (43.9)	66 (7.3)	0.076
	Medium	66 (73.3)	24 (26.7)	90 (10.0)	0.201
	High	492 (66.0)	253 (34.0)	745 (82.7)	0.408
Perceived benefits					
	Low	58 (59.8)	39 (40.2)	97 (10.8)	0.155
	Medium	45 (70.3)	19 (29.7)	64 (7.1)	0.623
	High	492 (66.5)	248 (33.5)	740 (82.1)	0.812
Perceived cost					
	Low	222 (69.4)	98 (30.6)	320 (35.5)	0.244
	Medium	202 (62.0)	124 (38.0)	326 (36.2)	0.028
	High	171 (67.1)	84 (32.9)	255 (28.3)	0.961
Accessibility					
	Low	94 (60.3)	62 (39.7)	156 (17.3)	0.073
	Medium	141 (59.5)	96 (40.5)	237 (26.3)	0.008
	High	360 (70.9)	148 (29.1)	508 (56.4)	0.004
Husband’s attitudes					
	Neutral	116 (65.2)	62 (34.8)	178 (25.8)	0.685
	Encouragement	332 (67.2)	162 (32.8)	494 (71.6)	0.800
Perceived comfort <sup>b</sup>					
	Low	231 (58.5)	164 (41.5)	395 (43.8)	<0.001
	Medium	33 (64.7)	18 (35.3)	51 (5.7)	0.870
	High	331 (72.7)	124 (27.3)	455 (50.5)	<0.001

Bold represents the total number of participants involved in each specific column.

<sup>a</sup> Excluding those whose first use was in the previous year – some numbers may not add up to 926 due to missing values.

<sup>b</sup> Experience from the first test.

**Table 5**  
Prevalence of regular mammography repetition among ever-repeaters (2014) by selected variables (n = 618)<sup>a</sup>.

		Repeated at one-year interval		Total	P-value
		Yes	No		
<b>Socio-demographic variables</b>					
n (%)		<b>364 (58.9)</b>	<b>254 (41.1)</b>	<b>618</b>	
Age	Mean in years (SD)	52.3 (9.6)	53.0 (10.1)	52.6 (9.8)	0.395
Crowding index	Mean in person/room (SD)	1.1 (0.5)	1.0 (0.6)	1.0 (0.5)	0.209
Region (n, %)	Greater Beirut	102 (55.1)	83 (44.9)	185 (29.9)	0.248
	Outside Greater Beirut	262 (60.5)	171 (39.5)	433 (70.1)	
Education (n, %)	Less than high school	140 (55.3)	113 (44.7)	253 (40.9)	0.157
	High school or technical	129 (59.4)	88 (40.6)	217 (35.1)	0.906
	University	95 (64.2)	53 (35.8)	148 (24.0)	0.160
Marital Status (n, %)	Ever married	331 (58.8)	232 (41.2)	563 (91.1)	0.976
	Never married	33 (60.0)	22 (40.0)	55 (8.9)	
<b>Psychosocial variables</b>					
Perceived susceptibility	Low	203 (60.1)	135 (39.9)	338 (54.7)	0.574
	Medium	79 (59.8)	53 (40.2)	132 (21.4)	0.881
	High	82 (55.4)	66 (44.6)	148 (23.9)	0.371
Perceived severity	Low	26 (70.3)	11 (29.7)	37 (6.2)	0.201
	Medium	40 (60.6)	26 (39.4)	66 (11.1)	0.868
	High	284 (57.7)	208 (42.3)	492 (82.7)	0.283
Perceived benefits	Low	38 (65.5)	20 (34.5)	58 (9.7)	0.349
	Medium	26 (57.8)	19 (42.2)	45 (7.6)	0.999
	High	286 (58.1)	206 (41.9)	492 (82.7)	0.505
Perceived cost	Low	143 (64.4)	79 (35.6)	222 (37.3)	0.045
	Medium	114 (56.4)	88 (43.6)	202 (34.0)	0.435
	High	93 (54.4)	78 (45.6)	171 (28.7)	0.187
Accessibility	Low	50 (53.2)	44 (46.8)	94 (15.8)	0.268
	Medium	76 (53.9)	65 (46.1)	141 (23.7)	0.202
	High	224 (62.2)	136 (37.8)	360 (60.5)	0.057
Husband's attitudes	Neutral	59 (50.9)	57 (49.1)	116 (25.3)	0.065
	Encouragement	212 (63.9)	120 (36.1)	332 (72.5)	0.009
Perceived comfort <sup>b</sup>	Low	120 (51.9)	111 (48.1)	231 (38.8)	0.009
	Medium	25 (75.8)	8 (24.2)	33 (5.6)	0.066
	High	205 (61.9)	126 (38.1)	331 (55.6)	0.118

Bold represents the total number of participants involved in each specific column.

<sup>a</sup> Some numbers may not add up to 618 due to missing values.

<sup>b</sup> Experience from the first test.

association was found for perceived susceptibility (OR<sub>adj</sub> = 1.56 [1.31–1.85]). Variables significantly associated with ever-repeating a mammography were higher SES, perceived susceptibility, and perceived comfort. The strongest association was with higher education (OR<sub>adj</sub> = 1.71 [1.35–2.15]). Husband's support and perceived comfort were associated with regular repetition, but the association failed to reach strict significance at the 95% confidence level (Table 6B).

### 5. Discussion

Breast cancer annual screening campaigns are evaluated using bi-annual surveys. The 2014 survey involved 2400 women of about

50 years from all areas of the country. A very small proportion of those women (4.4%) had never heard of mammography as a screening tool for breast cancer. They were mostly vulnerable women either in terms of socioeconomic disadvantage or geographical distance from the central Capital district of Greater-Beirut. Components of personal disadvantage also affected the life-time performance of a mammography. In 2014, 45% of surveyed women had ever obtained a mammography. This prevalence is still low compared to other developed countries. For instance, the prevalence of mammography use in the US in 2010 was 67% (Howard and Adams, 2012). However, ever-use is on the rise across all areas of Lebanon, as indicated by serial assessments, showing that Lebanese women are moving towards better acceptance and utilization of mammography (Haddad et al., 2015).

**Table 6A**  
Determinants of mammography-associated behaviors among Lebanese women residing in Greater Beirut (2014) (Multivariate logistic model).

Variable	Ever-use OR <sub>adj</sub> [95% CI]	Ever-repetition OR <sub>adj</sub> [95% CI]	Regular repetition <sup>a</sup> OR <sub>adj</sub> [95% CI]
n	<b>470</b>	<b>243</b>	<b>185</b>
Age	1.05 [1.02–1.08]	1.05 [1.01–1.09]	NS
Crowding index	1.06 [0.65–1.72]	0.80 [0.44–1.46]	NS
Education	1.06 [0.76–1.48]	<b>1.76 [1.13–2.76]</b>	NS
Perceived susceptibility	<b>1.39 [1.33–1.91]</b>	<b>1.68 [1.10–2.59]</b>	NS
Perceived severity	<b>0.54 [0.36–0.81]</b>	NS	NS
Perceived benefits	<b>1.59 [1.10–2.28]</b>	NS	NS
Perceived cost	1.39 [0.99–1.95]	NS	0.78 [0.49–1.24]
Ease of access	<b>1.54 [1.12–2.11]</b>	1.03 [0.70–1.53]	NS
Husband's support	1.61 [0.94–2.77]	NS	<b>2.26 [1.03–4.99]</b>
Perceived comfort	–	<b>1.70 [1.21–2.39]</b>	1.13 [0.76–1.66]

Bold represents the total number of participants involved in each specific column.

<sup>a</sup> Mammography repeated at one-year interval.

**Table 6B**  
Determinants of mammography-associated behaviors among Lebanese women residing outside Greater Beirut (2014) (Multivariate logistic model).

Variable	Ever-use OR <sub>adj</sub> [95% CI]	Ever-repetition OR <sub>adj</sub> [95% CI]	Regular repetition <sup>a</sup> OR <sub>adj</sub> [95% CI]
N	<b>1825</b>	<b>683</b>	<b>433</b>
Age	1.04 [1.03–1.05]	1.02 [1.00–1.04]	NS
Crowding index	<b>0.77 [0.63–0.95]</b>	<b>0.66 [0.49–0.88]</b>	NS
Education	1.18 [0.99–1.40]	<b>1.71 [1.35–2.15]</b>	NS
Perceived susceptibility	<b>1.56 [1.31–1.85]</b>	<b>1.41 [1.13–1.76]</b>	NS
Perceived severity	1.07 [0.87–1.32]	NS	NS
Perceived benefits	<b>1.43 [1.20–1.70]</b>	NS	NS
Perceived cost	0.89 [0.75–1.05]	NS	0.81 [0.61–1.09]
Ease of access	<b>1.47 [1.26–1.72]</b>	1.17 [0.93–1.46]	NS
Husband's support	<b>1.45 [1.10–1.93]</b>	NS	1.28 [0.75–2.17]
Perceived comfort	–	<b>1.31 [1.10–1.56]</b>	1.19 [0.94–1.51]

Bold represents the total number of participants involved in each specific column.

<sup>a</sup> Mammography repeated at one-year interval.

Higher relative socioeconomic status was associated with ever-use most prominently outside GB. This reflects the relative availability and ease of access to mammography within the GB urban area, which is still not the case everywhere else. Outside GB, accessing a mammography requires finding culturally congenial modes of transportation for targeted middle-aged women. Hence the importance of the husband's support, very likely in facilitating access, found outside but not within GB. This result clearly shows that the campaigns should continue to focus on women of lower economic means everywhere in the country. Part of that special focus has been to provide since 2007 screening mammography free-of-charge in public hospitals during the period of the campaign, to further encourage women to obtain the test. Public facilities are more available than private screening centers in areas further away from the GB area, and thus this measure is more effective in those areas compared to GB.

In addition to socio-economic obstacles, psychosocial factors play a role in determining choices for mammography use (Peek and Han, 2004). Psychosocial elements of the Health Belief Model such as higher perceived susceptibility of breast cancer, and higher perceived benefits were all significantly associated with life-time performance, whether inside or outside GB. Of importance is the absence of effect associated with perceived severity. This finding reinforces a previous decision by

the campaign team to focus the message more on a note of hope such as overcoming a common risk, rather than on a message of doom such as being threatened by a deadly disease. The note of hope is certainly the accurate one in confronting a highly curable disease such as breast cancer.

Several researchers, including Mayne and Earp, (2003), have already argued that obtaining an initial mammography and repeating the mammography are different behaviors and have different predictors, a statement which is supported in our analysis. Once obtained for a first time, HBM elements lose their relative determining effect in favor of socio-economic considerations. Two elements stand out however in this regard, which can be capitalized in future campaigns. Repetition of the test is more likely among more educated women in all regions. Women who perceive themselves as susceptible tended to repeat the test, which indicates the importance of continuously stressing that “good” test results one year do not make the cancer less likely and the test less important. Another psychosocial factor which emerged as a potential obstacle to re-using was an uncomfortable previous experience. The importance of past experience in shaping future behavior has been considered in several behavioral models, most notably in the Theory of Planned Behavior developed by Ajzen and Fishbein, (1980) in the mid-1970s. The importance of a positive first experience of mammography as a determinant for re-use has already been found in at least one paper in the USA (Gierisch et al., 2010). An older paper had reported the effect of previous experience on future re-use among women in New Zealand (Elwood et al., 1998). Efforts to improve the experience of women undergoing the procedure, especially if doing so for the first time, should be made. This may include encouraging the participation in mammography provision of female nurses and doctors whose empathy with the clients' perceptions may improve the overall comfort of the test.

The role of husbands in encouraging or obstructing women's access to screening may be an important issue in traditional societies (Salman, 2012). In this survey, only 4% of women reported that their husbands ever opposed their desire to screen, while >2/3rd of husbands were clearly supportive. Husband's positive support as well as educational level were determinants of women's participation in breast cancer screening activities in Jordan (Petro-Nustas, 2001) In our results, women who perceived a positive spousal attitude (versus a neutral one) were significantly more likely to ever-obtain a mammography, especially outside GB. Spousal support was the only variable which appeared to affect regular adherence to yearly mammography. Recognizing the importance of support from spouses, the campaign has adopted in 2014 a message of “responsabilizing” men to encourage women for screening (Fig. 2).

Selection bias might have occurred at different levels of this survey. Non-participants are believed to have higher mammography use than participants (Dupont et al., 2008), which may mean that all levels of



**Fig. 2.** Advertisement message of the National Breast Cancer Awareness Campaign 2014: “She reminds you of everything ... Remind her of the mammography.” (Retrieved from the Facebook page of the campaign “Breast Cancer Lebanon”, on December 22, 2015)

utilization behaviors measured here are under-estimates. Nevertheless, the declared aim was to explore the determinants of mammography-related behaviors and not to assess the actual prevalence rates. This aim was largely served by the national sample selected for the survey.

## 6. Conclusions

Fighting breast cancer in Lebanon focuses on promoting the impact of screening campaigns to prevent the occurrence of the disease. Future campaigns should emphasize the susceptibility of women aged 40 years and above to get breast cancer regardless of their family history of the disease, and even if their previous results were comforting. The regular adherence to these campaigns commands that financial and access obstacles faced by Lebanese women are removed. Moreover, the comfort of mammography should continue to be improved to ensure test repeating. Finally, the campaign contents should continue to engage direct family relatives, spouses and others given their major role in the behavioral choices of Lebanese women.

## Authorship contribution

Adib SM planned the study and secured funding. Elias N and Bou-Orm IR analyzed the data. Elias N and Bou-Orm IR wrote several drafts of the manuscript. Adib SM revised and approved the final one.

## Conflict of interest

None of the co-authors declared any conflict of interest.

## Role of the funding source

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