

Screening Mammography Outcomes in One Community-Based Initiative in Lebanon

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Abstract

Introduction and objectives: The outcomes of a screening mammography initiative implemented by a Lebanese NGO over several years are analyzed to assess 1. the socio-demographic and reproductive characteristics associated with repeating a screening mammography after receiving reassuring results from a first one, and 2, to estimate the proportion of suspicious mammograms resulting from a mass screening activity.

Methods: A total of 2885 women participated in the screening initiative between 1997 and 2013, during which they were able to obtain repeated annual mammograms free of charge.

Results: A steady significant decrease in mean age at first mammography was found from 2002 (59.1 years) to 2013 (48.4 years). Given enough time span, 44% repeated the test at least once after receiving reassuring results. Factors associated with test repetition were older age and retired employment status. Mammography results were suspicious (ACR4 or 5) in 2.3% of cases.

Discussion and conclusions: The proportion of suspicious mammography results is close to those reported from countries with similar incidence rates of breast cancer. This suggests that mammography quality in Lebanon is acceptable globally, although gaps may be detected for specific centers. The percentage of annual test repetition (44%) was much lower than in other developing (Brazil: 90%) or developed countries (USA: 82%), even when financial barriers were cancelled. Among non-retired women, household worries and/or professional activities may be competing with self-care, compared to retired women. Mammography centers should be encouraged to adopt flexible opening hours to facilitate the access to working women.

Keywords: Arab; Middle-East; Breast cancer; Mammogram; Cost-benefit analysis

Introduction

Rationale

Breast cancer has been the most frequent cancer among women in Lebanon since data started being published in the late 1950s [1]. In the past few decades, its incidence has been increasing. Latest estimates by the National Cancer Registry indicate an increased incidence rate from 71.8 cases per 100,000 women in 2003 to 86.9 per 100,000 in 2007. It remains the most frequently diagnosed cancer in Lebanon, accounting alone for about 20% of the entire national cancer case-load. The mean age at which a breast cancer is diagnosed in Lebanese women (54.9 years) is generally lower than that of all other cancers (56.3 years) [2]. This epidemiological feature, consistent with previous studies, has prompted the establishment of national guidelines for breast cancer screening based on annual mammographies starting age 40 and for as long as a woman is in good health [3].

Currently, there is no publicly-funded breast screening program in Lebanon. Both public and private insurance schemes rarely cover preventive procedures. Mammography screening is mostly covered by

out-of-pocket payment, except when the physician agrees to “pretend” that the test is actually diagnostic. This financial obstacle may have affected the uptake of screening mammography in the past. Other obstacles are associated with the negative image of cancer in the traditional culture of Lebanon. Until recently, patients and their care providers shied away from even mentioning the word “cancer”.

The stigma and silence barrier has been slowly eroding as a result of intense awareness campaigns conducted every year since 2002 during the international Breast Cancer month in October and over the subsequent months till the end of the year [4]. These campaigns, and other grass-root initiatives such as the one analyzed here, which amplify the awareness effect throughout the year, have had a measurable impact on mammography utilization especially among relatively younger women (40-60), with about 45% of women 40 and older reporting one mammography for screening purposes at least once in a life-time [5]. In addition to younger age and lower perception of financial burden, factors associated with higher likelihood of obtaining a mammography among Lebanese women have also included the urban or suburban residency and higher awareness regarding breast cancer’s natural history [4].

However, serial bi-annual surveys have also indicated that regular performance of mammography may be reaching a plateau, despite

continued messages disseminated during the annual campaigns [5]. Factors associated with the likelihood of repeating a mammography as recommended by the national guidelines in Lebanon are still not explored.

The annual volume of screening mammographies remains unknown in Lebanon, in view of the large spectrum of public, private and community-based facilities offering this service, and the absence of a central repository where all data can be pooled together.

However, indirect data suggest that breast cancer is being detected increasingly at earlier stages, very likely as a consequence of heightened vigilance and improved care-seeking behavior among Lebanese women [6]. The proportion of confirmed malignancies detected through mammographies performed in asymptomatic women is also unknown. This proportion is important in building the cost-benefit analysis leading to financial coverage of this preventive procedure directly from public funds.

Aims and objectives

The aim of this report was to describe the outcomes of a screening mammography initiative implemented by “Faire-Face”, a Lebanese non-governmental organization (NGO). A direct objective was to utilize the data accumulated with this initiative to assess the sociodemographic and reproductive characteristics associated with repeating a screening mammography after receiving reassuring results from a first one. Another objective was to generate, for the first time in Lebanon, evidence on proportions of mammographies suggesting malignancy, which could be obtained from a mass screening activity among Lebanese women.

Background

“Faire Face” (“Confront”) is a non-profit NGO based in Beirut, with activities throughout the Lebanese territory. “Faire Face” provides breast cancer patients and survivors with a space to share informal experiences obtained in facing a common problem, and to break the isolation which these patients may be experiencing as a result of their disease.

It was founded by an oncologist in 1994 and comprises now physicians and non-physician members, of whom several are survivors of breast cancer. “Faire Face” membership is open for “everyone with a mission to support cancer patients through his or her journey to find courage and strength in the face of adversity”. “Faire Face” offers free wigs and mammary prostheses to cancer patients.

Every month, it holds a conference or a debate concerning breast cancer awareness in one of the main cities of Lebanon. It facilitates regular support group sessions where survivors share their problems in facing the disease. “Faire Face” also offers psychological support for patients. This NGO began seeking donations and offering free mammography as early as 1997, when 59 women first benefited from the screening. Participating women can obtain a mammography from a conveniently located radiology center, and costs are directly and completely covered by “Faire-Face”. Until the end of 2013, 2885 women had profited from the free mammography initiative.

Methods

Target population

Participants were women included in the “Faire Face” screening initiative since 1997. No eligible participants were ever excluded on the basis of age, religion, nationality, profession or address. Detailed data have been computerized since 2002. This case-series included all the records of visitors to the center who had used mammography services.

Study variables

The sociodemographic and reproductive characteristics of participants in the mammography initiative were obtained before the first procedure. Every woman was given a reference number and asked to complete a questionnaire. Participation in the questionnaire was completely free and was explicitly dissociated from obtaining the free service.

All participants agreed that their data can be used anonymously in generating cumulative statistics and analyses. The questionnaire contained different categories of variables: demographic, reproductive and procedure-specific. Once enrolled, women were constantly encouraged to repeat the mammography annually. Information was updated where relevant at subsequent annual visits.

Plan of analysis

All data were tabulated and presented as frequencies and percentages for categorical variables, and as means, standard deviations (SD), medians and intervals for continuous ones. Prevalence rates (P) were presented with their corresponding 95% confidence intervals (95% CI). Since this is a descriptive analysis of secondary data already available in the center’s records, there are no missing data to be considered. Associations of various factors with the likelihood of repeating a mammography were tested using either the Chi-square or the Student t-test.

Associations were considered significant when the statistical test revealed a corresponding p-value ≤ 0.05 . Variables significantly associated with likelihood of repeating a mammography were entered in a multivariate logistic regression to assess their adjusted odds-ratio (ORadj). The ORadj were presented with their corresponding 95% CI. In the adjusted model, significant determinants were those with a 95% CI that did not include the value 1. All data were entered and analyzed using SPSS16.

Results

Data were available on 2885 women who participated in the “Faire Face” Breast Cancer screening initiative between 1997 and 2013. These participants received a mammography in centers distributed geographically all over Lebanon, with higher rates drawn from centers in the lower socio-economic areas in the suburbs of Beirut. The three centers with highest intakes: Bourj Hammoud (18.9%), Bourj Brajneh (15.4%) and Chiah (8.0%) were all located in the vulnerable suburbs (Table 1). The area known as Greater-Beirut, which includes the city and suburbs, is home to about 60% of the Lebanese population.

Sociodemographic and reproductive characteristics of participants

At the time of their first mammography through this initiative, about 25.3% women were partly or fully employed outside their homes. The mean age was 49.8 years, 43.5% of participants were

between 40 and 49, while about 29.9% were between 50 and 59. The mean age at menarche was 12.8 years. For women already in menopause, signs had appeared at a mean age of 47.5 years. Of all women in the series, 5% had had no children at all while 41.7% had had more than three (Table 1).

Variables	n (%)	mean (SD); median [interval]
Catchment Center		
Beirut city	406 (14.1)	
Beirut suburbs	1651(57.3)	
Other areas	828 (28.6)	
Employment		
Housewife	1589 (55.1)	
Retired	570 (19.7)	
Part time employment	433 (15.1)	
Full time employment	293 (10.2)	
Age at first Mammography		
<40 years	329 (11.7)	49.8 (9.6); 48.8 [17 - 82]
40-49	1219 (43.5)	
50-59	838 (29.9)	
60-69	325 (11.6)	
≥ 70 years	90 (3.21)	
Age at menarches (n=1746)		12.8 (1.5); 13 [8 - 19]
Number of children (n=2500)		
None	125 (5.0)	3.3 (1.8); 3 [0 - 17]
1	156 (6.2)	
2	513 (20.5)	
3	663 (26.5)	
>3	1043 (41.7)	
Age at menopause (n=1056)		47.5 (5.8); 49 [21 - 60]

Table 1: Sociodemographic and reproductive characteristics of women in a screening mammography program in Lebanon 1997-2013 (n=2885).

Table 2 shows that the age at first mammography has declined from the mid-fifties before 2005 to the upper forties in latest years, which reflects alignment with the national guidelines.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	All
n	36	79	247	173	69	72	200	427	398	370	319	143	2885
Mean age (SD)	59.1 (11.3)	54.5 (11.8)	55.4 (9.5)	50.9 (8.5)	48.4 (9.6)	49.5 (8.3)	47.9 (9.3)	49.5 (11.4)	48.1 (11.1)	50 (10.2)	49.5 (10.7)	48.4 (10.1)	47.5 (5.8)

Table 2: Age at first mammography by year among women participating in a screening initiative (Lebanon 2002-2013).

Experience with breast cancer screening

Of participating women, 22.1% had a family history of breast cancer. After entering the program, about 54% obtained only 1

mammography. For repeaters, the mean interval between the last two screenings was 19.2 months.

Based on the American College of Radiologists (ACR) classification 7, 1.9% (n=50) of women received a highly suspicious (ACR4) result at any time, and an additional 0.4% (n=12) a definitely malignant (ACR5)

result (Table 3). The cumulative prevalence of suspicious results was therefore 2.3% (95% CI: 1.7-3.1).

Variables [#]	n (%)	mean (SD); median [interval]
Family history of breast cancer	619 (22.1)	
Screenings obtained		
1	1303 (53.7)	
2	492 (20.2)	
3	262 (10.7)	
4	135 (5.6)	
>4	239 (9.8)	
Interval between last two screenings (in months)		19.2 (10.8); 15.6 [1.2–64.8]
Results of last available mammography [*]		
ACR1 (Definitely healthy)	923 (34.9)	
ACR2	1345 (50.9)	
ACR3	312 (11.8)	
ACR4	50 (1.9)	
ACR5 (Definitely malignant)	12 (0.4)	
[#] Numbers do not always add up because of missing data		
[*] Among 1406 women for whom those results were available using the American College of Radiology (ACR) Classification system.		

Table 3: Experience of women in a screening mammography program 1997-2013 (n=2801).

Factors associated with mammography results

Program participants were divided into 2 comparison groups, the first including those with results at last mammography definitely not suspicious (ACR1 to ACR3) (n=2600), and the second those with suspicious ones (ACR4 and ACR5) (n=62). Reproductive factors,

including age at menarches, number of children, older age at last mammography, and older proportion of post-menopausal women, and employment status were all not significantly different between the 2 groups (Table 4).

Suspicious results	No [*]	Yes ^{**}	p-value
n (%)	2600 (97.7)	62 (2.3)	---
Age at last mammography (SD)	51.3 (10.1)	52.2 (10.15)	0.488
Menopausal (%)	754 (29.0)	17 (27.4)	0.887
Number of children (SD)	3.3 (1.8)	3.0 (1.4)	0.193
Age at menarches (SD)	12.8 (1.5)	12.7 (1.4)	0.603
EMPLOYMENT			
Housewife	780 (30.5)	22 (35.3)	0.401
Retired	762 (29.3)	16 (25.1)	0.672
Employed	1058 (40.2)	24 (39.6)	0.795
[*] American College of Radiology (ACR) Classification levels 0-3			
^{**} ACR Classification levels 4-5			

Table 4: Factors associated with last mammography results among women enrolled in a screening initiative (Lebanon 2002-2013) (n=2662 women).

Determinants of test repetition

Among women for whom results were never suspicious, those who underwent the screening more than 1 time were compared to those who had done it only once. Women who underwent their first mammography in the year 2013 were excluded, because these women did not have the chance to repeat the mammography at the time of the analysis. Repeaters were 44.2% of the 2742 women remaining under consideration. On multivariate analysis, non-repeaters were significantly younger at time of first mammography (adj. OR= 0.66; 95%CI: 0.52-0.85) and had less children on average (adj. OR= 0.81; 95%CI: 0.72-0.90) than repeaters.

Mean age at menarches and menopausal status did not have a significant effect on repetition behaviors. Previously employed women are more likely to be repeaters than to those who had always been housewives (adj. OR= 0.90; 95% CI: 0.73-1.80), while currently employed women were less likely to repeat a first mammography (adj. OR= 1.13; 95% CI: 1.03-1.24). All other independent variables were not significantly associated with mammography repetition on bivariate analysis, and were not considered in the multivariate model (Table 5).

	Once	Repeaters	p-value	Adjusted OR (95% CI)**
n (%)	1530 (55.8)	1212 (44.2)	---	
Mean age at last mammography (SD)	49.2 (11.5)	53.1 (8.9)	<0.001	0.66 (0.52-0.85)
Mean age at menarches (SD)	12.8 (1.5)	12.9 (1.6)	0.99	NS
Mean number of children (SD)	2.9 (2.1)	3.0 (1.9)	<0.001	0.81 (0.72-0.90)
Menopausal (%)	393 (25.7)	376 (31.0)	0.002	NS
Mean age at menopause (n=769) (SD)	46.7 (6.7)	48.1 (4.9)	<0.001	NS
Employment				
Housewife	851 (53.8)	730 (46.2)	0.016	reference
Retired	358 (58.3)	256 (41.7)	0.166	0.90 (0.73–1.08)
Employed	421 (65.1)	226 (34.9)	<0.001	1.13 (1.03-1.24)
NS= Not significant				
* These are women who joined the program before 2013 and therefore had an opportunity to actually repeat the screening on any following year.				
**The multivariate analysis included only variables with a significant p-value on bivariate analysis.				

Table 5: Reproductive factors associated with repeated screening mammographies (n= 2742)*.

Discussion

The incidence of breast cancer is increasing in Lebanon, similar to other nations where reproductive patterns are changing [3]. Mammography remains the tool of choice for mass screening and early detection of the disease [7]. Breast cancer national campaigns, held in the last quarter of every year since 2002, have contributed to a trend towards diagnosis at earlier stages [6]. Grass-root efforts have also accompanied the national campaigns, and prolonged their impact over the rest of the year through activities implemented by concerned NGOs. The contribution of NGOs has been crucial to lower the financial obstacles in a country where preventive procedures are rarely reimbursed by third-party payers. Outcomes of an NGO-based program offering free mammography have been analyzed to contribute to a first effort towards a cost-benefit analysis of mammography screening in Lebanon. While the NGO program may attract women from lower SES, the potential selection bias thus generated is not expected to affect the internal validity of the analysis regarding the proportion of results which require further investigation, nor the assessment of variables associated with likelihood of repeating the mammography as recommended.

The proportion of “suspicious” (ACR 4 or 5) mammograms uncovered in this large series of procedures performed in a geographically diverse group health centers in Lebanon was 2.3%. Only

one other study has ever assessed the rate of abnormal findings in screening mammography in Lebanon. It was conducted at one general hospital in suburban Beirut, and reported results of 900 women who underwent screening mammograms during the screening campaign in October-December 2012.

This study found less than 1% of suspicious mammography results [8]. In both series, the estimated suspicious proportion is likely to be an under-representation, as an additional portion of results currently classified as “not suspicious” may actually be “false negatives” which should have required investigation. No work has been published out of any country in the Middle-East regarding the proportions of false-negative or false-positive findings, knowing that the implications of false-negative mammograms remain, from a clinical and a public health point of view, much more of concern than those of false-positive ones. The 2012 study in Lebanon was able to trace six out of eight patients having suspicious mammograms and found a ratio of 1/6 of false positive [8]. If this ratio is applied to our findings, it would lower the proportion of suspicious mammograms to 1.9%.

Suspicious findings in screening mammography in Lebanon:

Implications on cost-benefit analysis (CBA)

Within the same historical period, the breast cancer incidence rate is most likely to determine the proportion of suspicious findings in

screening mammography in any given country. When findings do not parallel incidence rates, one may incriminate difference in technical performance quality between countries. The figure found in this Lebanese series is close to those reported in a cohort in Germany between 2001-2005 (2.2%) [7] and in Turkey in 2005 (1.7%) [9] but higher than figures from Japan in 2008 (0.9%) [10]. In the USA, the rate of suspicious results in a cohort of women from an underserved area with a predominance for African-American women was 1.8% in 2010 [11]. The incidence rates of breast cancer were 36.5 per 100,000 in Turkey [10] and 125 in the USA in 2005 [12], 87 per 100,000 in Lebanon [2], 86 in Japan [10] and 114 in Germany [13] in 2007. In this enumeration, Lebanon and Germany have rankings for suspicious results relatively at par with their respective incidence rates. Lower suspicion proportions compared to the incidence (as would be the case in the USA) may indicate a tendency towards frequent false-negative results, while higher proportions may indicate a tendency towards higher false-positive results (as would be the case in Turkey). This suggests that for Lebanon at least, the quality of mammograms is acceptable globally, although gaps can be detected for specific centers [8]. These potential gaps should be measured and addressed.

As breast cancer incidence continues its upwards trend, the proportion of suspicious findings will very likely increase. This first baseline assessment of 23 suspicious views per 1000 mammograms is an important element in building a CBA equation within the specific context of Lebanon. Other indicators remain to be measured:

The proportion of cancer cases positively identified out of the suspicious screenings referred to further investigation.

The proportion of false-negative mammograms leading to missed or delayed diagnosis.

The average annual cost of screening mammograms incurred, compared to costs saved from detecting cancers at stages 1 and 2.

Research designs are currently at various stages of planning or implementation, aiming at providing these indicators useful for the full CBA, with expectations that this analysis would reinforce public policies for screening mammography, until new technologies/procedures, if any, have been tested and approved.

Initiation of mammography in this case-series

Since 2002, there has been a slow increase in mammography utilization for breast cancer screening in Lebanon. However, the mean age at first mammography, estimated at 49.8 years in this case-series, remains relatively late, despite the national guidelines calling for initiation at 40. This finding was consistent with earlier reports indicating that the highest first-time utilization rates were to be found in the 50-59 age-group [5]. The Lebanese figures show that the initiation of screening remains delayed when compared to more advanced nations. In the USA, the actual age of first mammography was 40.4 in 2004 [14]. Nevertheless a steady and significant decrease in mean age at first mammography was detected between 2002 (59.1 years) and 2013 (48.4 years). This may be largely attributed to the positive impact of the repeated national breast cancer campaigns on women's awareness concerning the importance of early screening.

Determinants of repeating a mammography

Factors leading to a woman's decision to repeat a mammography annually have not yet been analyzed in Lebanon, despite evidence to irregular compliance [5]. In this series, 56% of women did not repeat

their screening despite having had the time opportunity of doing so, and being offered the repeated test free of charge. The percentage of test repetition (44%) is much lower than in other countries both developing like Brazil (90%) [15] or developed like the USA (82%) [16]. Expectedly, repeaters tended to be older on average than non-repeaters. However, employed women or housewives tended to repeat the mammography less than retired women, and this association remained significant even after adjustment for age. The likely explanation is that preoccupations among non-retired women with children, household worries and/or professional activities, successfully compete with self-care compared to retired women. The latter are probably more at ease to plan and carry out their annual screening test.

Conclusions

This analysis shows that the effectiveness of mammograms in detecting silent disease in Lebanon is largely comparable to more advanced nations, despite differences in cancer incidence and in technical capacity. It is important to maintain and improve efforts to promote the use of mammography as early as possible starting 40, as indicated by our national guidelines, while continuously re-assessing the expected outcomes as utilization/re-utilization rates reach "acceptable" levels.

Women in Lebanon are increasingly aware of the threat of breast cancer and of the advantages inherent in detecting it at its earliest possible stage. Given the opportunity, younger women are willing to undergo the required annual test, and to repeat it. Several issues have to be debated nationally to improve the uptake of breast cancer screening. Lowering the financial barriers, as done by the NGO program, is one such issue. It can be attained if third-party payers accept to reimburse this procedure as a preventive rather than curative one. This step is currently under consideration by the Ministry of Public Health in Lebanon. Another issue would be to lower the logistical barriers confronting working women who desire to obtain a mammography but do not find the time to do so. This may be accomplished by encouraging mammography centers that are interested in attracting a larger volume of activities to adopt more flexible opening hours such as afternoons and early evenings, when those working women find themselves relatively freer to care for their own health and well-being.

References

1. Azar HA (1962) Cancer in Lebanon and the Near East. *Cancer* 15: 66-78.
2. Ministry of Public Health (2014) National Cancer Registry. *Cancer in Lebanon 2005-2007*, Beirut.
3. Adib SM, El Saghir NS, Ammar W (2009) Guidelines for breast cancer screening in Lebanon Public Health Communication. *J Med Liban* 57: 72-74.
4. Adib SM, Sabbah MA, Hlais S, Hanna P (2009) Research in action: mammography utilization following breast cancer awareness campaigns in Lebanon 2002-05. *East Mediterr Health J* 15: 6-18.
5. Haddad FG, Kourie HR, Adib SM (2015) Trends in mammography utilization for breast cancer screening in a Middle-Eastern country: Lebanon 2005-2013. *Cancer epidemiol* 39: 819-824.
6. El Saghir NS (2005) An update on recent cancer trends in Lebanon. *Ethn Dis* 15: S9-S10.
7. Schaefer FK, Waldmann A, Katalinic A, Wefelnberg C, Heller M, et al. (2010) Influence of additional breast ultrasound on cancer detection in a cohort study for quality assurance in breast diagnosis--analysis of 102,577 diagnostic procedures. *Eur Radiol* 20: 1085-1092.

8. Kourie HR, Daher A, Matar D, Antoun J, Salloum L, et al. (2014) Outcome of breast cancer screening: a Lebanese single institution experience. *Asian Pac J Cancer Prev* 15: 9471-9473.
9. Tunçbilek I, Ozdemir A, Gültekin S, Oğur T, Erman R, et al. (2007) Clinical outcome assessment in mammography: an audit of 7,506 screening and diagnostic mammography examinations. *Diagn Interv Radiol* 13: 183-187.
10. Uchida K, Yamashita A, Kawase K, Kamiya K (2008) Screening ultrasonography revealed 15% of mammographically occult breast cancers. *Breast Cancer* 15: 165-168.
11. Centers for Disease Control and Prevention (2012) Cancer screening-United States, 2010. *MMWR* 61: 41-45.
12. Parkin DM, Bray F, Ferlay J, Pisani P (2005) Global cancer statistics, 2002. *CA Cancer J Clin* 55: 74-108.
13. American College of Radiology (2016) Breast imaging categories.
14. Colbert JA, Kaine EM, Bigby J, Smith DN, Moore RH, et al. (2004) The age at which women begin mammographic screening. *Cancer* 101: 1850-1859.
15. Marchi AA, Gurgel MS (2010) Adherence to the opportunistic mammography screening in public and private health systems. *Rev Bras Ginecol Obstet* 32: 191-197.
16. Boudreau DM, Luce CL, Ludman E, Bonomi AE, Fishman PA (2007) Concordance of population-based estimates of mammography screening. *Prev Med* 45: 262-266.