

RESEARCH ARTICLE

Differences in Breast and Cervical Cancer Screening Rates in Jordan among Women from Different Socioeconomic Strata: Analysis of the 2012 Population-Based Household Survey

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Abstract

Background: The burden of breast and cervical cancer is changing over time in developing countries. Regular screening is very important for early detection and treatment. In this study, we assessed inequalities in breast and cervical cancer screening rates in women according to household wealth status, and analyzed the potential predictors associated with a low cancer screening rate in Jordan. **Materials and Methods:** A nationwide population-based cross-sectional survey collected information on different variables at the national level. All ever-married women (the phrase is used throughout the text to refer to women who had ever married) aged 15–49 years were included in the survey. Analysis of breast self-examination (BSE) and clinical breast examination (CBE) at least once in the previous year was carried out in 11,068 women, while lifetime Pap-smear testing was carried out in 8,333 women, aged 20–49 years. **Results:** Over 39% and 19% of ever-married Jordanian women reported having undergone a breast examination during the previous year and Pap smear examination at least once in their lifetime, respectively. The rate of BSE in the previous year was 31.5%, that of CBE in the previous year was 19.3%, and that of Pap smear examination at least once in life was 25.5%. The adjusted OR was higher for performing BSE (aOR 1.22, 95% CI 1.04–1.43), undergoing CBE (aOR 1.31, 95% CI 1.08–1.60) and undergoing Pap smear examination (aOR 2.38, 95% CI 1.92–2.93) among women in the highest wealth-index quintile as compared to those in the lowest quintile. The concentration index was 0.11 for BSE, 0.01 for CBE, and 0.27 for Pap smear examination. Women in their twenties, living in rural or the southern region of Jordan, with an elementary school education or less, who listened to the radio or read the newspaper not more than a few times a year, and nulliparous women were less likely to undergo breast and cervical cancer screening. **Conclusions:** The rates of breast and cervical cancer screening are low in Jordan. Reducing the sociodemographic and economic inequalities in breast and cervical cancer screenings requires concerted outreach activities for women living under socially deprived conditions.

Keywords: Breast self-examination - clinical breast examination - cervical cancer - cancer screening - Jordan

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Introduction

Worldwide, cancers are among the leading causes of morbidity and mortality. An estimated 14 million new cases were diagnosed and 8.2 million cancer-related deaths were recorded in 2012, with an expected rise in the annual cancer cases to 22 million within the next 20 years (World Cancer Report, 2014). In the developed nations, the incidence rate of cancer has been declining as a result of reduction in different risk factors, along with improvements in the screening and treatment strategies (Elovainio et al., 1997; Breen et al., 2001; Porter 2009; Jemal et al., 2010). Developing countries still suffer from an increasing trend in the cancer rate (Wilson et al., 2004; Thun et al., 2010). More than 60 and 70% of the world's new cancer cases and deaths occur in Africa, Asia, and

Central and South America (World Cancer Report, 2014). Increase in the tobacco smoking rate and unfavorable changes in lifestyle behaviors have been considered to be associated with the steady rise in rates of cancers in developing countries (Althuis et al., 2005; Porter, 2008; Parkin et al., 2010; Thun et al., 2010).

Breast and cervical cancer are among the most common of all cancers in developing countries (Parkin et al., 2008; Sankaranarayanan and Boffetta, 2010; Jemal et al., 2011). Both breast and cervical cancers have high cure rates when detected and treated early (World Cancer Report, 2014). According to one report, in developing countries, only 2.2% of women aged 40–69 years were screened for breast cancer during the previous five years, while only 4.1% of women aged 18–69 years were screened for cervical cancer during the previous three

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years (Akinyemiju, 2012). The breast cancer screening coverage rate ranged from 0% in Mali to 26% in Congo, while that cervical cancer screening rate was 1.1% in Bangladesh and 57.6% in Congo (Akinyemiju, 2012). On the other hand, the reported cervical cancer screening rate is over 60% in developed countries (Gakidou et al, 2008).

In Jordan, both the morbidity and mortality of breast cancer have been consistently increasing, and this cancer is the most commonly encountered malignancy afflicting women. The number of diagnosed breast cancer cases rose from 926 in 2009 to 1237 in 2012, accounting for 37.9% incidence rate of all diagnosed cancers in females (age standardized rate 61.0 per 100,000 women). Moreover, there were a total of 426 deaths from breast cancer in 2012, accounting for 25.3% of all cancer-related deaths in females (age standardized rate 21.8 per 100,000 women). Overall, from 2008 to 2012, out of the 8,413 cases of cancer diagnosed among females, 4,260 were breast cancers, accounting for a 5-year diagnosis rate of 50.6% of all the cases of cancer (GLOBOCAN, 2012). In Jordan, cervical cancer ranks as the 10th most frequently encountered cancer among women (ICO, 2013).

From 2007 to 2012, women in Jordan experienced several sociodemographic changes. The percentage of women with an elementary education or less slightly decreased from 11.0% to 9.9%, the employment rate increased by 35%, women living in the poorest households declined from 20.3% to 18.8%, whereas the tobacco smoking rate in women increased from 13.1% to 18.0% (Jordan Population and Family Health Survey 2007 and 2012). The last local study carried out to examine breast and cervical cancer screening coverage was limited to a small sample of women aged ≥ 35 years; according to this study, 27.1% of women performed breast self-examination (BSE) on a monthly basis, one-fifth had undergone clinical breast examination (CBE) at least once in their lifetime, 12.4% had undergone mammography at least once in their lifetime, and 27.8% of married women reported having undergone screening for cervical cancer at least once in their lifetime.

The socioeconomic condition is a key social determinant of health. Living under socioeconomically deprived conditions hampers access of women to preventive healthcare services (Marmot et al., 2008; Akinyemiju, 2012). Two recent studies examined the impact of income inequality on cervical cancer screening in 57 and 67 countries (McKinnon et al, 2011; GLOBOCAN, 2012). Jordan was not among these countries. To contribute to the literature on the inequalities in breast and cervical cancer screenings depending on the household socioeconomic status (SES), this study sought to assess the inequalities in breast and cervical cancers screening rates among ever-married women aged 20-49 years according to the household wealth status in Jordan and to analyze the possible social predictors contribute substantially to a low cancer screening rate.

Materials and Methods

According to the guidelines of the Jordan Breast Cancer Program (JBCP) established in 2007, all women aged ≥ 20

years should perform a monthly BSE, women aged 20-39 years should undergo CBE once every 1-3 years, and women aged ≥ 40 years should undergo an annual CBE. Mammography is recommended only once every 1-2 years for women aged ≥ 40 years (Jordan breast cancer program, 2007). Screening for cervical cancer is carried out by Papanicolaou smear (Pap smear) examination to detect the oncogenic effect of the human papilloma virus (HPV) (Zur Hausen, 2009). It is recommended that sexually active women or women aged ≥ 21 years should undergo an annual Pap smear examination (Jordan Population and Family Health Survey, 2012).

Data source

This study utilized the data from the 2012 Jordan Population and Family Health Survey (JPFHS). The survey followed a two-stage sampling design. A sample of 15,190 households was randomly selected, and 11,673 ever-married women aged 15-49 years were identified. Full interviews were completed with 11,352 such women (Jordan Population and Family Health Survey, 2012).

Survey instruments

The model questionnaires developed by the DHS-program, with some modifications, were used to collect information from all ever-married women aged 15-49 years who had slept in the household the night before the interview (Jordan Population and Family Health Survey, 2012).

Subjects

The JPFHS included three questions, two about breast cancer screening, to determine if the women had undergone BSE or CBE at least once in the previous year, or a Pap smear examination at least once in their lifetime. The analysis was limited to 11,089 (weighted, 11,068) ever-married women aged 20-49 years who gave a reply of "yes" or "no" to the question of whether they had undergone BSE or CBE in the previous 12 months, after excluding 24 women who gave a reply of "Don't Know," and of 239 women who were aged < 20 years, because none of the screening techniques is recommended for women under the age of 20 years. Analysis of lifetime Pap smear examination was limited to the 8,333 women who reported having heard of Pap smear examination.

Study variables

Three binary outcome variables were measured: (1) performing BSE and (2) undergoing CBE at least once in the year preceding the survey, and (3) lifetime Pap-smear testing. The JPFHS did not collect information on screening by mammography.

The household wealth index was calculated using easy-to-collect data on the household's assets and was defined as a composite measure of a household's relative economic status. The wealth-index quintile (poorest, poor, middle-class, rich, and richest) was derived from the wealth index score of women who lived in the household (Rutstein and Johnson, 2004).

Different independent variables that might influence the likelihood of the women undergoing cancer screening

Table 1. Descriptive Statistics of Women by the Frequencies of Breast Examinations and Lifetime Pap-smear Testing, Weighted Frequencies (Percentages)

	Breast cancer screening				Cervical cancer screening			
	N	BSE %	P-value	CBE %	P-value	N	Pap smear %	P-value
All	11,068	31.5		19.3		8,333	25.5	
Age, years			<0.001		<0.001			<0.001
20-29	3,211	24.6		13.3		2,038	10.5	
30-39	4,232	31.5		19.8		3,318	24.2	
40-49	3,625	37.4		24.2		2,977	37.2	
Residence			<0.001		<0.001			<0.001
Urban	9,207	32.2		20.2		7,040	26.3	
Rural	1,861	27.5		15.2		1,293	21	
Geog. location			<0.001		<0.001			<0.001
South	1,033	27.6		13.5		658	13.7	
North	3,031	34.2		20.3		2,370	24.6	
Central	7,004	30.8		19.9		5,305	27.3	
Education			<0.001		<0.001			0.354
Elementary or less	1,111	20.7		13.7		623	23.8	
Secondary	6,489	30.9		19.3		4,898	25.2	
Higher	3,469	36		21.2		2,812	26.3	
Partner's education			<0.001		<0.001			<0.001
Elementary and below	1,452	25.3		14.8		905	19.4	
Secondary	6,428	30.4		17.8		4,819	23	
Higher	3,179	36.5		24.6		2,603	32.3	
N/A	10							
Employment			<0.001		0.006			0.955
No	9,216	30.3		18.9		6,793	25.5	
Yes	1,852	37		21.7		1,540	25.5	
Wealth-index quintile			<0.001		<0.001			<0.001
Poorest	2,073	23.9		13		1,251	18.1	
Poor	2,272	26.8		17.1		1,628	18.8	
Middle	2,387	34.2		21.2		1,843	20.4	
Rich	2,280	34.8		19.6		1,802	27.3	
Richest	2,056	37.3		25.6		1,807	40	
Tobacco usage			0.015		<0.001			<0.001
No	9,072	31		18.6		6,806	24.2	
Yes	1,995	33.7		22.8		1,528	31	
Listen to radio			<0.001		<0.001			<0.001
Never/few times a year	4,884	28.7		16.2		3,576	21.6	
≥Once a week/a month	3,938	31.3		19.5		2,948	25.1	
Almost everyday	2,246	37.6		25.7		1,808	33.8	
Read the newspaper			<0.001		<0.001			<0.001
Never/few times a year	3,461	24.6		14.9		2,317	22.6	
≥Once a week/a month	6,233	33.9		20.4		4,911	25.3	
Almost everyday	1,091	42.3		29.3		965	34	
N/A	282					140		
Parity			<0.001		<0.001			<0.001
Nulliparous	958	25.8		18.4		625	18.1	
Primiparous	1,194	23.1		12.9		806	14.4	
Multiparous	8,916	33.2		20.3		6,902	27.5	
Pregnant			0.021		0.829			<0.001
No/Unsure	10,061	31.8		19.3		7,626	26.5	
Yes	1,006	28.2		19.1		707	14.1	
Heard of Pap smear			<0.001		<0.001			-
No	2,735	19		11.2		-	-	
Yes	8,333	35.5		22		-	-	
Performed BSE			-		<0.001			<0.001
No	7,587	100		11.6		5,373	21	
Yes	3,481	100		36.1		2,960	33.5	
Underwent CBE			<0.001		-			<0.001
No	8,927	24.9		-		6,499	19.9	
Yes	2,138	58.8		-		1,832	45.4	
N/A	3							

BSE: Breast self-examination; CBE, Clinical breast examination; Pap smear, Papanicolaou smear; N, number of women who reported performing BSE, undergoing CBE, or undergoing Pap smear examination; %, percentage of women in each category by outcome; P-value, obtained from cross-tabulation between each category and each outcome

Table 2. Adjusted ORs for BSE, CBE (n = 10,776) and Lifetime Pap smear Examination (n= 8185) in Relation to the Women's Characteristics in Women Aged 20–49 years in Jordan

	Breast cancer screening		Cervical cancer screening
	Performed BSE aOR (95% CI)	Undergone CBE aOR (95% CI) ^a	Undergone Pap smear aOR (95% CI) ^b
Age, years			
20-29	1.00	1.00	1.00
30-39	1.30 (1.16-1.46)***	1.48 (1.29-1.71)***	2.39 (2.00-2.86)***
40-49	1.70 (1.51-1.91)***	1.77 (1.52-2.05)***	4.00 (3.33-4.80)***
Residence			
Urban	1.00	1.00	1.00
Rural	0.86 (0.76-0.97)*	0.82 (0.70-0.95)*	1.04 (0.88-1.23)
Geographical location			
South	1.00	1.00	1.00
Central	1.04 (0.90-1.22)	1.33 (1.08-1.63)**	2.15 (1.67-2.77)***
North	1.38 (1.17-1.63)***	1.46 (1.18-1.81)**	2.28 (1.76-2.96)***
Education			
Elementary or less	0.65 (0.53-0.79)***	1.02 (0.80-1.30)	1.19 (0.92-1.55)
Secondary	0.88 (0.79-0.98)*	1.08 (0.95-1.23)	1.12 (0.97-1.28)
Higher	1.00	1.00	1.00
Partner's education			
Elementary or less	0.91 (0.77-1.06)	0.74 (0.61-0.90)**	0.70 (0.56-0.87)**
Secondary	0.95 (0.86-1.05)	0.80 (0.71-0.91)**	0.94 (0.83-1.08)
Higher	1.00	1.00	1.00
Employment			
No	1.00	1.00	1.00
Yes	1.08 (0.96-1.21)	0.91 (0.79-1.06)	0.76 (0.65-0.88)***
Wealth-index quintile			
Poorest	1.00	1.00	1.00
Poor	1.04 (0.90-1.20)	1.27 (1.06-1.53)**	0.96 (0.78-1.18)
Middle	1.39 (1.21-1.60)***	1.42 (1.19-1.70)***	1.03 (0.84-1.26)
Rich	1.29 (1.11-1.49)**	1.15 (0.96-1.38)	1.56 (1.28-1.90)***
Richest	1.22 (1.04-1.43)*	1.31 (1.08-1.60)**	2.38 (1.92-2.93)***
Tobacco usage			
No	1.00	1.00	1.00
Yes	1.07 (0.96-1.20)	1.16 (1.02-1.33)*	1.09 (0.95-1.25)
Listen to radio			
Never/few times a year	1.00	1.00	1.00
≥Once a week/a month	1.39 (1.25-1.53)***	1.16 (1.03-1.31)*	0.91 (0.79-1.04)
Almost everyday	1.69 (1.44-1.97)***	1.53 (1.27-1.84)***	1.0 (0.82-1.23)
Read the newspaper			
Never/few times a year	1.00	1.00	1.00
≥Once a week/a month	1.04 (0.95-1.15)	1.19 (1.06-1.35)**	1.16 (1.02-1.31)*
Almost everyday	1.21 (1.08-1.36)**	1.42 (1.24-1.63)***	1.39 (1.19-1.60)***
Parity			
Nulliparous	1.00	1.00	1.00
Primiparous	0.88 (0.71-1.07)	0.74 (0.57-0.95)*	1.08 (0.79-1.48)
Multiparous	1.29 (1.10-1.51)**	0.94 (0.77-1.13)	1.31 (1.03-1.67)*
Pregnant			
No/do not know	1.00	1.00	1.00
Yes	1.11 (0.95-1.29)	1.37 (1.14-1.64)**	0.73 (0.57-0.93)*
Performed BSE ^c			
No	-	1.00	1.00
Yes	-	3.06 (2.74-3.43)***	1.39 (1.24-1.55)***
Undergone CBE ^d			
No	-	-	1.00
Yes	-	-	2.71 (2.37-3.04)***

* P ≤ 0.05; ** P < 0.01; *** P < 0.001. BSE: breast self-examination; CBE, clinical breast examination; aOR; adjusted odds ratio; ^a, adjusted also for BSE; ^b, adjusted also for BSE and CBE; ^c adjusted also for Pap smear examination for determining the odds ratio for CBE, and adjusted also to CBE for determining the odds ratio for Pap smear examination, ^d adjusted also for BSE

were included in the analysis (Montazeri et al., 2008; Maqsood et al., 2009; Sim et al., 2009; Nsour et al., 2012). These variables included the age (20-29, 30-39, or 40-49 years), residence (urban, rural), geographic location

(south, north, or central), the women's and their partners' education (elementary or less, secondary, or higher), employment (yes, no), tobacco usage (yes, no), listening to the radio or reading newspapers (never/few times a

year, \geq once a week/a month, almost every day), parity (nulliparous, primiparous, multiparous), and pregnancy (yes, no/do not know).

Statistical analysis

Using the Statistical Package for the Social Sciences (SPSS, version 18), weighted calculations were expressed as frequencies and percentages for the sample as a whole and for each outcome, separately. Potential differences between subjects in the rates of BSE, CBE and Pap smear were evaluated for each measured characteristic, using the Chi-square tests.

Multivariate regression models were used to assess the strength of the association between a measured covariate and each of the outcomes by estimating the adjusted odds ratios (aORs). Adjustment was carried out for all the measured independent variables simultaneously. To assess the association between BSE with CBE, and between BSE or CBE and Pap smear examination, three additional multivariate models were used separately. The statistical significance level was set at $\alpha \leq 0.05$.

The concentration index was used to estimate the inequalities of each outcome variable according to the wealth index. It provides a summary measure of the magnitude of economic status-related inequality in a health variable of interest and defined as twice the area between the concentration curve and the line of equality. A concentration index of 0 indicates perfect equality while a value of "1 or -1" indicates perfect inequality (O'Donnell et al., 2008; Wagstaff, 2011). Positive values of the concentration index indicate concentration of the health variable among the rich, while a negative value indicates concentration of the health variable among the poor.

Ethical approval: In the JPFHS and after full explanation about purpose, procedure, confidentiality, voluntarily participation and anonymity of the data, interviewers acquired witnessed verbal consent from adult respondents. The JPFHS design and survey protocol and consent procedure was approved by government in Jordan."

Results

The mean age of the women was 34.9 years (SD 7.88). Nearly 17% were residing in rural areas. Of the subjects, 10% of women had elementary education or less, the majority (83.3%) were unemployed, 39.3% lived in poor households (poorest and poor quintiles), 18.0% were current tobacco users, and 44.1% and 31.3% listened to the radio or read newspapers "never/a few times a year"

(Table 1).

The overall rate of BSE or CBE in the previous year was 39.7%. The rate of BSE (31.5%) was higher than that of CBE (19.3%). Only 11.5% of the women had both performed BSE and undergone CBE in the previous year. Almost three-quarters (75.6%) of the women had heard about Pap smear examination, a quarter of whom, representing 19.4% of all the subjects, reported having undergone Pap smear examination at least once in their lifetime. Only 4.6% of the women had had the experience of all the three of BSE, CBE and Pap smear examination (Table 1).

Subjects in the age group 20-29 years, residing in rural or the southern regions of the country, with or married to a partner with elementary school education or less, belonging to the 'poorest' and 'poor' households, non-smokers, listening to the radio or reading the newspaper "never/few times a year", and who were primiparous/nulliparous showed lower rates of breast and cervical cancer screenings. Of the pregnant women, 28.2%, 19.1% and 14.1% had performed BSE, undergone CBE and undergone Pap smear examination, respectively. More than one-third (36.1%) of the women who had performed BSE had also undergone CBE. The Pap smear examination rate was higher among the women who had also undergone CBE than among the women who had performed BSE alone (45.4% vs. 33.5%, $P < 0.001$) (Table 1).

The results of multivariate analysis of the factors associated with BSE, CBE and Pap smear examination practices using binary logistic regression are shown in Table 2. Age 40-49 years was significantly associated with increased odds for BSE (aOR, 1.7; $P < 0.001$), CBE (aOR, 1.77; $P < 0.001$) and Pap smear examination (aOR, 4.0; $P < 0.001$). Living in rural areas was negatively associated with BSE (aOR, 0.8; $P < 0.001$) or CBE (aOR, 0.8; $P < 0.001$).

Belonging to households in the richest wealth-index quintile was significantly associated with a higher likelihood of BSE (aOR, 1.2; $P < 0.01$), CBE (aOR, 1.3; $P < 0.001$) and Pap smear examination (aOR 2.4; $P < 0.001$). Tobacco smoking was significantly correlated with the likelihood of CBE (aOR, 1.2, $P < 0.01$), but not with that of BSE (aOR, 1.1, $P > 0.05$) or Pap smear examination. Listening to the radio or reading the newspaper "almost every day" was positively associated the likelihood of BSE (aOR, 1.7; 1.2, respectively) and CBE (aOR, 1.5; 1.4, respectively). Pregnant women were 37% more likely to undergo CBE, while they were 27% less likely to undergo Pap smear examination than non-pregnant women (Table 2).

Table 3. Wealth-related Inequalities in Breast and Cervical Cancer Screening Practices

Indicator	N	% Performed screening(s)	Wealth index					Equity ratio (Richest/Poorest)	Concentration index
			Poorest	Poorer	Middle	Richer	Richest		
BSE	3,481	31.5	23.9	26.8	34.2	34.8	37.3	1.56	0.11
CBE	2,138	19.3	13	17.1	21.2	19.6	25.6	1.97	0.01
Pap smear	2,124	25.5	18.1	18.8	20.4	27.3	40	2.21	0.27
Both SBE/CBE	1,257	11.4	7.9	8.5	14	11.7	14.6	1.85	0.11
At least one screening ^a	4,516	54.2	44.4	47.4	52.9	58.2	64.5	1.45	0.13

^a(N = 8,331)

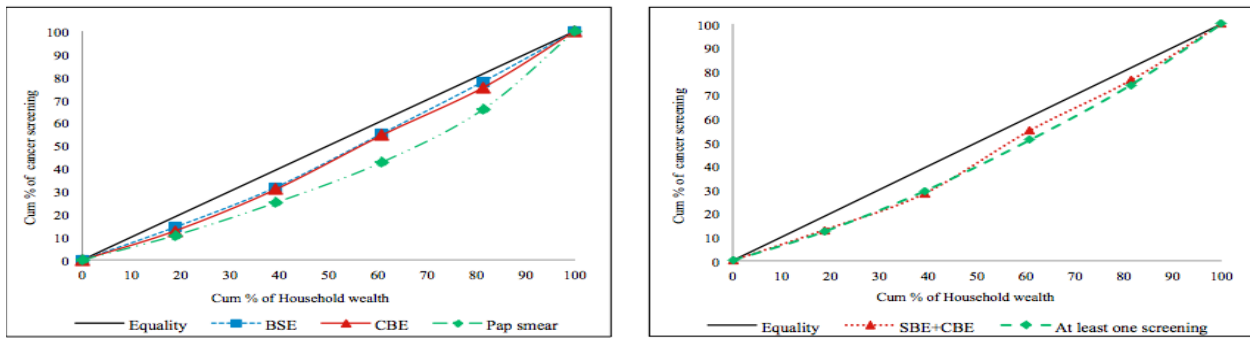


Figure 1. Household Wealth Index Concentration Curves for Breast and Cervical Cancer Screening in Jordan. Concentration Index (CI). BSE: CI = 0.11; CBE: CI = 0.01; Pap-smear: CI = 0.27; SBE + CBE: CI = 0.11; at least one cancer screening: CI = 0.13

As shown also in Table 2, women who performed BSE had a higher likelihood of also undergoing CBE (aOR, 3.1) or Pap smear examination (aOR, 1.4), and women who underwent CBE showed a higher likelihood of undergoing Pap smear examination (aOR, 2.7) ($P < 0.001$ for all).

Analysis of the rate of each outcome measure among the women in the richest households as compared to that among the women in the poorest households showed that the women with a wealth index in the “richest” quintile were 56%, 97%, and 121% more likely to practice BSE, and undergo CBE and Pap smear examination (concentration indices: 0.11, 0.01, and 0.27, respectively), and 45% more likely to undergo at least one of BSE, CBE or Pap smear examination (Table 3). The magnitudes of the inequalities in the cancer screening rates are also depicted graphically in Figure 1.

Discussion

The study was conducted to assess the rates of breast and cervical cancer screening and the factors associated with breast and cervical cancer screenings in a nationally representative sample of ever-married Jordanian women. This cohort of Jordanian ever-married women showed insufficient rates of breast and cervical cancer screening. The study also confirmed the existence of pro-rich bias in the rates of breast and cervical cancer screening, indicating that women living in the lower socioeconomic strata were less likely to benefit from early cancer detection and intervention programs.

Inequalities in the rates of breast and cervical cancer screening persist in Jordan despite the country-wide effort to improve the socioeconomic status and primary healthcare coverage of the population. In Jordan, the per capita GDP rose from 4,289 US\$ in 2005 to 6,100 US\$ in 2012 (Jordan Economy Profile 2014), the maternal mortality rate declined from 86 in 1990 to 50/100,000 live births in 2013 (Jordan profile, 2015), and the number of healthcare facilities has increased along with an increase in the national health insurance coverage (Library of Congress, 2006). In 2007, the JBCP was established and it introduced mammographic screening services in many healthcare facilities. The JBCP implemented several beneficial programs, and in 2010, it launched the phase III of a nationwide program aimed at raising the

health awareness of the public and first-line healthcare providers (Jordan breast cancer program). However, the present data still revealed low rates of BSE and CBE, with no significant changes since 2007 (Jordan Population and Family Health Survey, 2012). The findings were comparable to the low screening rates in many other low- and middle-income countries (Sim et al., 2009; Maqsood, Zeeshan, Rehman et al., 2009; Tfayli et al., 2010).

Higher rates of cancer screening were found among the women in the higher socioeconomic strata. Older age, residence in urban areas, higher education level and being married to a partner with higher education, belonging to wealthier households, and listening to the radio and the reading the newspaper “almost every day” were significantly associated with a higher likelihood of breast and cervical screenings. Women of older age are more likely to experience more health issues and to visit healthcare providers. The relationship between age with breast cancer examination is in line with previous reports (Montazeri et al., 2008; Sim et al, 2009). Higher level of education and belonging to higher economic strata are associated with healthier lifestyles, more likely due to easier access to advanced healthcare services. These findings are parallel to those from Jordan and other countries in the region (Maaita and Barakat, 2002; Al Sairafi and Mohamed, 2009; Sim et al, 2009; Al-Meer et al., 2011).

We found that living in the rural and the southern regions of the country was a negative predictor of cancer screenings. The nationwide JBCP activities supposedly had to eliminate this geographical disparity that still persists since 2007 (Nsour et al., 2012). The positive influence of national media in the rate of breast cancer screening was obvious in this study. Listening to the radio or reading the newspaper “almost every day” was found to be positively associated with the likelihood of breast cancer screening. Public media can provide clear health warning texts, as well as information on the places where clinical and laboratory tests are performed. However, since only less than one-third and a little less than 10% of the women have access to the radio or newspapers, respectively, continuing to focus on these two means may possibly not help in increasing the rate of cancer screenings. Jordan is a Muslim country, where every Friday, large numbers gather to pray and listen to the

Friday sermon. (Underwood et al., 2013).

The study revealed that approximately three-quarters of the women had heard of Pap smear examination. This finding confirms an increase in the proportion of women who have heard of Pap smear as compared to previous reports (Amarin et al., 2008; Underwood et al., 2013). Nevertheless, less than a quintile of women reported Pap smear testing at least once in their lifetime. The fact that this disease is primarily a sexually transmitted disease is the main reason that perhaps explains the low Pap smear testing rate (Nsour et al., 2012). Women of older ages were more likely to undergo Pap smear examination; this finding is contradictory to the findings of studies reported from Qatar (Al-Meer et al., 2011) and Kuwait (Al Sairafi and Mohamed, 2009). This contradiction could perhaps be explained as follows: 1) those two studies were limited to specific groups of the general population using convenient sampling, whereas the present study is a large-scale and nationally representative study that provided robust estimates, and 2) those women of older age were more likely to seek healthcare for other reasons which could have led to opportunistic Pap smear testing (Amarin et al., 2008).

Although pregnant women were more likely to undergo CBE, they were less likely to undergo Pap smear examination. In Jordan, 99.1% of women have paid at least one antenatal care visit during their pregnancies (Jordan Population and Family Health Survey, 2012). Hence, the recommendation that features prominently here is to seize the opportunity of having women at the health facility to train them to perform BSE, and encouraging them to undergo CBE and Pap smear examination. The study also revealed that performing BSE was associated with undergoing CBE, and both BSE and CBE were independently associated with Pap smear examination. This finding supports the findings of previous studies that reported that BSE empowers women to seek CBE (Sim et al, 2009; Yoo et al., 2012), and patients undergoing CBE are trained to practice BSE (Dahlui et al., 2011). Integration of cervical cancer screening to the JBCP would provide a potential dual action in empowering women to seek cancer screenings simultaneously.

The study has different major strengths. It assessed the wealth status and inequality of breast and cervical cancer screenings and identified several socioeconomic and geographical factors associated with low rates of cancer screenings. The study was carried out in a nationally representative sample of Jordanian women aged 20-49 years who are recommended to undergo cancer screenings. Limiting screening questions to the previous 12 months and lifetime Pap smear examination, which are difficult-to-forget tests, minimized the possibility of recall bias. It also assessed the inequality of screenings in relation to the income based on the household wealth index calculated using composite indicators to measure the economic status of the surveyed women, and the concentration index, which is a relevant measurement for determining the magnitude of economic-related inequalities.

The study limitations include the cross-sectional nature of the study design, which precludes the establishment of causal relationships. The cultural barriers and shyness

against answering such sensitive questions could have resulted in a response bias. To minimize this potential bias, female interviewers were employed to personally interview the subjects. Although the results showed that there was an influence of practicing BSE on CBE or Pap smear examination, since no information was collected in this survey on which factor comes first, the direction of association could not be determined. A previous study suggested that when a female undergoes CBE, she is usually taught how to perform BSE (Dahlui et al., 2011). Pap smear examination is often underreported since many physicians might order Pap smear examination without informing the women about the purpose of this test.

In conclusion, the study highlighted the existence of socioeconomic inequalities in breast and cervical cancer screenings among Jordanian women. Low uptake and disparities in cancer screenings could be attributed to the low level of awareness about the importance of early screening, which places a high proportion of women under the risk of late detection. Practicing BSE was associated with an increased likelihood of CBE, and CBE was also associated with an increased likelihood of Pap smear examination, which lends support to the necessity of empowering women about their own health through practicing self-examination. The study implies the need for actionable strategies to increase the rate of cancer screenings through reducing socio-economic inequalities.

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