ABSTRACT

Among women aged 50 to 69 years, regular screening by mammography in combination with clinical examination, can substantially decrease the morbidity and mortality associated with breast cancer by facilitating early detection. Unfortunately, many Canadian women are not screened in accordance with current guidelines. Research to date is based primarily on large surveys conducted in the United States and less is known about the relevance of specific barriers to mammography screening among Canadian women.

Multivariate results from the 1994-95 National Population Health Survey (NPHS) indicate that younger (40-49) and older (70+) women, those who are socioeconomically disadvantaged, and minority women are least likely to report having had a mammogram. Conversely, women with positive health behaviours, high social support, and positive mental health attributes are more likely to participate in mammography screening. These findings are discussed in terms of the implications for developing successful intervention programs for Canadian women and for setting priorities for further research.

ABRÉGÉ

Des examens réguliers de mammographie peuvent diminuer substantiellement la morbidité et la mortalité associées au cancer du sein en facilitant le dépistage le plus tôt possible, chez les femmes âgées de 50 à 69 ans. Malheureusement, conformément aux lignes directrices actuelles, beaucoup de femmes canadiennes ne subissent pas de test de dépistage. La recherche à ce jour est basée principalement sur des études à grande échelle menées aux États-Unis et on en sait très peu sur la relation entre les barrières spécifiques et les tests de dépistage de mammographie chez les femmes canadiennes.

Les résultats multivariés de l'Enquête nationale sur la santé de la population de 1994-1995 indiquent que les femmes plus jeunes (40-49) et plus âgées (70+), celles qui sont socio-économiquement désavantagées, et les femmes minoritaires sont les moins susceptibles de rapporter avoir passé une mammographie. Inversement, les femmes avec des comportements de santé positifs, un soutien social élevé, et des attributs de santé mentale positive sont plus susceptibles de participer à des examens de dépistage par mammographie. Ces résultats sont discutés en fonction des implications au niveau du développement de programmes d'intervention à succès pour les femmes canadiennes et au niveau de l'établissement des priorités pour les recherches futures.

Factors Important in Promoting Mammography Screening Among Canadian Women

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It is estimated that one of every nine Canadian women will develop breast cancer during her lifetime, and that breast cancer is the second leading cause of female cancer death in Canada.¹ Five-year survival rates are significantly higher if the disease is detected in its earliest stages. Mammograms may facilitate earlier diagnosis by allowing for the detection of a relatively small breast mass that may be missed by a clinical breast examination or breast self-examination.^{2,3} Annual mammograms, combined with clinical examinations, are recommended for Canadian women between the ages of 50 and 69 as the relative contribution of either procedure alone has not been fully ascertained, nor has the optimal frequency been determined by rigorous scientific evidence.⁴

Despite increased publicity emphasizing the importance of regular mammography, existing data suggest that a significant proportion of Canadian women have never had a mammogram and that among ever users, many have not participated in time-appropriate screening. A 1991 survey of a representative sample of women aged 50-69 living in the Ottawa-Carleton region, reported biannual screening rates of only 47%.⁵ The current research illustrates that women who are older, or from minority

groups, disadvantaged socioeconomic backgrounds, and rural areas are less likely to have had a mammogram.⁶⁻¹² The same is true of women without a partner or with few social ties, women who practice poor preventive health behaviours, have relatively poor knowledge and attitudes about the need and benefits of screening mammography and who do not have a regular physician (primarily an internist or gynecologist) or make regular physician visits.¹²⁻¹⁶ These data suggest that along with key demographic factors (e.g., income, education), various sociocultural and psychological characteristics, and the interactions among these variables, may contribute to significant variations in mammography use among Canadian women.

Much of the published research in this area is based on studies conducted in the United States or on small-scale investigations in Canada.^{5,8,13} At present, little is known about the relevance of these and other barriers to mammography screening among Canadian women. Also, the importance of selected variables of interest (e.g., immigration status, birth place) has been relatively unexplored from a Canadian perspective.

Based on 1994-95 National Population Health Survey (NPHS) data, the present study provides a comprehensive examination of the barriers to breast cancer screening among a national representative sample of Canadian women aged 40 years and older. This study also provides an opportunity to replicate the findings reported from the United States using similar comprehensive national data sets.^{6,7,9,11} Such comparisons are useful because they permit increased confidence in the generalizability of findings to the population of interest, Canadian women.

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METHODS

National Population Health Survey

Data from the health survey portion of the NPHS were used to examine the relation of selected sociodemographic, health and lifestyle factors to mammography history. The NPHS is a longitudinal household survey conducted by Statistics Canada and involves a representative sample of the non-institutionalized Canadian population 12 years of age and older living in the 10 provinces. The proportion of persons interviewed in each province is generally reflective of the population percentage in each province.

In all households surveyed in 1994-95, some limited information about all members (20,725 respondents, representing a household response rate of 89%) was obtained from a knowledgeable household member. For the health survey, a respondent over 11 years was randomly selected from each house surveyed and given an in-depth questionnaire regarding various sociodemographic, psychosocial, behavioural and health characteristics. The sample size for the health survey was 17,626 respondents (response rate 96%). Five thousand and thirty (5,030) women 40 years and older were included in the present analysis (1,497 aged 40-49; 2,160 aged 50-69; 1,373 aged 70+ years). A comprehensive review of the NPHS survey design and methodology appears elsewhere.¹⁷

Measures

The survey included three questions regarding mammography screening: 1) "Have you ever had a mammogram, that is, a breast x-ray?" ; 2) "When was the last time (less than 6 months ago, 6 months to less than 1 year ago, 1 year to less than 2 years ago, 2 years or more ago)?" ; and 3) "Why did you have your last mammogram (breast problem, check-up, other)?" Responses to these questions were used to determine the screening characteristics of women and to provide a binary outcome variable for mammogram history (ever/never). Women who reported having a mammogram because of a breast problem were excluded from the analyses.

The NPHS variables identified from the literature as potential barriers or facilitators

TABLE 1
Percent Distribution* of Mammography Screening Characteristics Among Women Aged 40+ Years (NPHS, 1994-95) by Age Group

Variable	Total	Age Group		
		40 - 49	50 - 69	70 +
Mammogram Status†‡				
Regular checkup / other	55 (83)	46 (75)	65 (86)	49 (86)
Breast problem	12 (17)	15 (25)	11 (14)	8 (14)
Never had one	34	39	25	43
Mammogram History**				
Ever	62	54	72	53
Never	38	46	28	47
Time appropriateness of Mammogram**				
< 2 years	72	69	77	62
2+ years	29	31	24	38

* Based on weighted percentages

† May not sum to 100% due to rounding

‡ Percentage estimates in parentheses represent distribution among the total sample of women who reported having a mammogram

** Percentage estimates based on sample excluding those reporting a mammogram because of a breast problem

Figure 1. Mammogram history by region.

to participation in mammography screening were grouped as: sociodemographic (age, region, urban/rural residence, birth place, languages spoken, years since immigration, household income, education, marital status, and social network variables including perceived social support, social contact frequency and participation in a voluntary group); health (self-rated health, long-term chronic conditions, psychological well-being as reflected by level of self-esteem and sense of control, and indicators of health care use including having a regular medical doctor, number of medical consultations in the past year and unmet health care needs); and lifestyle or behavioural characteristics (last blood pressure check,

frequency of physical activity, smoking status, alcohol use and hormone drug use).

Analyses

The relevant associations were investigated at the bivariate level using cross-tabulations and chi-square tests of significance, and with simple (adjusted for age only) logistic regression models.¹⁸ Multivariate logistic regression techniques were used to examine the relative importance of each variable to mammogram history (ever/never had a mammogram). Only significant variables at the bivariate level ($p < 0.05$) were included in the multivariate model. All analyses were performed using the SAS (version 6.10) software packages.¹⁹

TABLE II
Estimated Odds Ratios (and 95% Confidence Intervals) of Reporting Never Having Had a Mammogram Among Women Aged 40 +, by Sociodemographic, Health and Lifestyle Variables (NPHS, 1994-95)

Variable	Age-Adjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI) [†]
Sociodemographic		
Age Group		
40-44	2.99 (2.52,3.56)****	3.35 (2.74,4.09)****
45-49	1.59 (1.32,1.91)****	1.74 (1.41,2.15)****
50-69	1.00	1.00
70-74	1.64 (1.32,2.05)****	1.55 (1.21,1.98)***
75-79	2.34 (1.80,3.05)****	2.20 (1.64,2.94)****
80+	3.92 (3.00,5.12)****	3.32 (2.45,4.51)****
Household Income		
Not stated	0.92 (0.69,1.24)	0.95 (0.68,1.32)
Low	1.22 (1.03,1.45)*	0.92 (0.76,1.13)
Moderate	1.00	1.00
High	0.60 (0.51,0.72)****	0.72 (0.59,0.88)***
Education		
Elementary/some secondary	1.00	1.00
Secondary graduate/some post secondary	0.64 (0.55,0.75)****	0.78 (0.66,0.92)**
Post secondary degree	0.52 (0.44,0.61)****	0.65 (0.54,0.80)****
Languages Spoken		
English only	1.00	1.00
French only	1.16 (0.97,1.40)\$	0.96 (0.78,1.19)
Bilingual	0.60 (0.49,0.74)****	0.62 (0.49,0.77)****
Other	1.02 (0.86,1.21)	0.83 (0.66,1.05)
Birth Place[‡]		
North America	1.00	1.00
Europe & Australia	0.90 (0.75,1.09)	0.92 (0.73,1.16)
South America & Africa	1.35 (0.92,2.00)	1.46 (0.95,2.23)\$
Asia	2.04 (1.52,2.73)****	2.41 (1.64,3.53)****
Marital Status		
Married/common-law/partner	1.00	1.00
Widowed/separated/divorced	1.17 (1.01,1.36)*	1.05 (0.88,1.25)
Single	1.97 (1.51,2.57)****	1.78 (1.32,2.40)****
Member of Voluntary Group		
No	1.00	1.00
Yes	0.68 (0.60,0.78)****	0.85 (0.74,0.99)*
Perceived Social Support		
High/moderate	1.00	1.00
Low	1.51 (1.16,1.96)**	1.32 (0.99,1.75)\$
Health and Lifestyle		
Have a Regular Medical Doctor		
Yes	1.00	1.00
No	2.45 (1.93,3.11)****	1.56 (1.18,2.06)**
Number of Consultations with a Medical Doctor in the Past Year		
None	2.92 (2.41,3.55)****	1.85 (1.48,2.32)****
1-3 visits	1.00	1.00
4+ visits	1.24 (1.08,1.43)**	1.17 (1.00,1.36)*
Last Blood Pressure Check		
< 2 years	1.00	1.00
Never/2+ years	2.99 (2.38,3.75)****	1.99 (1.52,2.61)****
Frequency of Physical Activity		
Regular/occasional	1.00	1.00
Infrequent	1.59 (1.38,1.82)****	1.34 (1.15,1.56)***
Current Smoking Status		
Never/former	1.00	1.00
Daily/occasional	1.48 (1.27,1.72)****	1.30 (1.10,1.55)**
Hormone Drug Use		
No	1.00	1.00
Yes	0.41 (0.33,0.52)****	0.52 (0.41,0.67)****
Self Esteem		
High	1.00	1.00
Moderate	1.40 (1.22,1.61)****	1.18 (1.01,1.38)*
Low	1.75 (1.43,2.15)****	1.31 (1.03,1.67)*
Sense of Control		
High	1.00	1.00
Moderate	1.34 (1.16,1.56)****	1.27 (1.08,1.50)**
Low	1.80 (1.51,2.13)****	1.43 (1.17,1.75)***

[†] Obtained from multivariate logistic regression model, adjusted for all other variables listed in the table.

[‡] Birth Place can be substituted with Years Since Immigration as these two variables are highly correlated.

\$ p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001; **** p ≤ 0.0001

A weight variable is provided in the NPHS that adjusts for non-response and specifies the number of persons in the population the sampled individual represents.²⁰ Weighting inflates the sample size to such an extent that even small differences are likely to be statistically significant. Thus, to take the effects of weighting into account without inflating the sample size, all data were "down-weighted" by multiplying the sample weight by the ratio of the unweighted total sample size to the weighted total sample size.

RESULTS

Table I presents the percentage distribution of screening characteristics among women aged 40 years and older. The majority of women (83% of ever screened) report having a mammogram as part of a check-up. Younger women (40-49 years) are more likely than older women to report having a mammogram because of a breast problem (25% compared with 14%). Women aged 50-69 years are most likely to ever have a mammogram and to have had one within the last two years.

Most regions of Canada displayed similar mammogram participation rates except for the Atlantic provinces (see Figure 1). The age-adjusted odds ratios (data not shown) indicate a significantly higher risk for never having a mammogram for residents of the Atlantic provinces (OR = 1.94, 95% CI = 1.54,2.46) compared with Ontario residents. Women residing in rural areas are also significantly more likely than women in urban areas to report never having a mammogram (45% vs. 36%). A large portion of the sample, however, is excluded from this analysis since the location of residence is unavailable for Ontario and the interior region of British Columbia (representing 39% of the study sample).

Table II presents the age-adjusted and adjusted odds ratios (and 95% confidence intervals) of never having a mammogram for women aged 40 years and older by the sociodemographic, health and lifestyle variables. These data illustrate that women outside of the target age group, with low levels of income or education, and those born in Asia or South America

and Africa are at a significantly higher risk of never having a mammogram. The adjusted model also indicates that bilingual women are significantly more likely than English only women to report ever having a mammogram. The number of years since immigration was removed from the multivariate model because it was found to be significantly correlated with birth place. As evident in Figure 2, a greater proportion of recent immigrants are born in Asia, while those who immigrated 10 or more years previously are primarily from Europe/Australia. Consequently, birth place and years since immigration can easily be substituted for one another as a risk factor for never having a mammogram.

Women with low social support (no partner, no involvement in a volunteer group, low perceived social support), a low sense of control and low self-esteem are at a significantly greater risk for never having a mammogram. Negative health and lifestyle characteristics (no regular medical doctor, no consultation with a doctor in the past year, no recent blood pressure check, infrequent participation in physical activity, smoking) are also significant risk factors for never having a mammogram. Conversely, women who use hormone drugs are at a significantly lower risk of never having a mammogram.

DISCUSSION

Consistent with reports from comparable U.S. national studies,^{6,7,9-11} the NPHS data indicate that Canadian women in the youngest and oldest age groups, and those with relatively low income and education levels and living in rural settings, represent particularly vulnerable subgroups with respect to the underutilization of screening mammography. Unfortunately, the relevance of urban/rural residence is unclear in the present analyses since the large percentage of missing data for this variable precluded its inclusion in the multivariate model. However, other investigators⁸ have demonstrated that the increased risk observed among rural women remains even after adjustment for various potentially confounding factors, including socioeconomic status. Such data suggest that the

relative underutilization of mammography among rural women may be related to a number of factors, including the lack of accessibility or availability of mammogram services, differences in screening practices by physicians in rural settings, or attitudinal differences toward cancer and screening.

Contrary to recent analyses based on the U.S. National Health Interview Survey (NHIS) data which indicate that racial/ethnic differences in mammography rates have disappeared in recent years,^{6,7} the NPHS data suggest that beyond socioeconomic status, sociocultural indices (e.g., birth place and language) may represent significant predictors of mammography screening among Canadian women aged 40 years and older. Specifically, women who reported being bilingual (French and English) were at significantly less risk for never having had a mammogram than women who were unilingual, even after adjustment for education and income. Further, women reporting a birth place of Asia (and to a lesser extent South America/Africa) were significantly less likely to report ever having a mammogram. Caution, however, is necessary in interpreting this finding since the NPHS only reports country of birth collapsed into large regions and as illustrated in Figure 2, birth place is strongly correlated with years since immigration. Consequently, no clear statement can be

made regarding the role of ethnicity. Nevertheless, the increased risk of never being screened evident among Asian-born women living in Canada is of interest given the potential role that unique cultural beliefs and attitudes about cancer risk and prevention may play in determining mammography participation.^{7,12}

Limited access to health care, as measured by not having a regular physician nor any medical consultations over the past year, significantly reduces the probability of a woman's having had a mammogram. Although these findings are consistent with the health care predictors of screening mammography (especially the importance of physician referral) identified in the U.S. literature,^{12,16} it is of interest that the present analyses also show a slightly increased risk for never having had a mammogram among Canadian women with frequent physician contacts (four or more consults in the past year). This finding may result from physicians concentrating primarily on the presenting health problem(s) to the exclusion of screening practices.

Canadian women who engage in other preventive behaviours, such as having a recent blood pressure check, exercising regularly and not smoking, were significantly more likely to report ever having had a screening mammogram. Not surprisingly, a significantly increased risk for ever having had a mammogram was also evident among women receiving prescribed hormonal drug treatment. It is unclear

whether positive preventive behaviours reduce the risk of never having a mammogram because of an increased likelihood of having contact with a physician (and thus, a referral for mammography), more favourable attitudes and referral practices of physicians toward such women, more positive health beliefs among such women, or because of some combination of these factors.

Single women were significantly more likely than women in the other marital status categories to report never having had a mammogram. Having a significant other in a relationship may facilitate mammography use by motivating women to be screened or by increasing their compliance with recommended preventive health behaviours.^{12,14} Similarly, widowed, separated or divorced women may still be benefiting from a social network that resulted from being in a relationship with a significant other.

Canadian women who perceived themselves as having low social support were also at slightly greater risk for never having had a mammogram. The importance of social support as a facilitator for mammography participation was also evident from the finding that women who were members of a voluntary group were significantly less likely than nonmembers to report never having had a mammogram.

Psychological well-being was also found to be significantly associated with mammography participation among Canadian women. That is, women reporting moderate or low levels of self-esteem or perceived sense of control were at greater risk for never having had a mammogram. Such findings are consistent with the notion that women who have negative self concepts or believe that external factors control their health are less likely to engage in preventive health behaviours.

CONCLUSION

This study clearly indicates that a significant proportion of Canadian women have never had a mammogram. Even when done, the mammograms for many women are time inappropriate. In order to increase participation rates, policies and programs must be developed to target specific groups of women who are less likely to participate in breast cancer screening. For example, it is imperative that programs and services be developed in a manner sensitive to the socioeconomic and sociocultural circumstances of Canadian women. It is also evident from this and other investigations^{14,15} that intervention programs should optimize women's perceived level of social support, particularly from voluntary groups, and target women who have limited support networks. Although the NPHS data did not allow for an examination of physician characteristics related to screening mammography, it is clear that physicians need to be educated as to their role as facilitators for appropriate screening procedures. Further research in this area should attempt to explore the underlying dynamics behind specific barriers to screening evident among Canadian women, such as language, birth place and immigration status.

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