

Who doesn't get a mammogram?

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Abstract

Objectives

This article examines the characteristics associated with getting or not getting a mammogram, focusing on women aged 50-69.

Data source

The data are from the 1994/95 National Population Health Survey conducted by Statistics Canada.

Analytical techniques

Multivariate logistic regressions were run to determine the odds of ever having had a mammogram, and among women who had, the odds of having done so in the last two years.

Main results

In 1994/95, 75% of Canadian women aged 50-69 had had a mammogram at some time, but a quarter of those who ever had one had not done so within the previous two years, as is recommended. Characteristics significantly associated with having had a mammogram were province of residence, contact with a physician, marital status, educational attainment, employment status, and country of birth.

Conclusion

The characteristics of women aged 50-69 who have never received a mammogram, or have not done so as often as recommended, indicate the groups to whom programs encouraging compliance should be directed.

Key words

mammography, breast cancer, mass screening

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The use of mammography to detect breast cancer has grown dramatically, especially after mammographic screening was linked to decreased breast cancer mortality.¹ From just 162,000 mammograms in 1981, the annual number performed in Canada rose to approximately 1.4 million in 1994.²

The Canadian Cancer Society recommends that women aged 50-69 have a mammogram every two years. According to Statistics Canada's 1994/95 National Population Health Survey (NPHS), three-quarters of women in this age group had had at least one mammographic examination. However, this left more than 630,000 women aged 50-69 who had never had a mammogram. As well, almost one-quarter of the women who had had a mammogram had not done so in the previous two years.

With data from the 1994/95 NPHS, this article identifies demographic and socioeconomic characteristics and health practices associated with women aged 50-69 getting, or not getting, a mammogram (see *Methods*). The analysis counts all

Methods

Data source

The data used in this article are from Statistics Canada's 1994/95 National Population Health Survey (NPHS).³ Female respondents aged 35 and over were asked, "Have you ever had a mammogram, that is, a breast x-ray?" Those who answered "yes" were asked, "When was the last time?"

This analysis focuses on respondents in the age group now targeted for mammograms (ages 50-69) who answered the first question. These 2,111 respondents represented 2,551,674 non-institutionalized women in the 10 Canadian provinces. Some information is also presented for women aged 40-49 (1,471 respondents, representing 2,002,949 non-institutionalized women). Respondents with unknown mammogram histories were excluded.

The survey enquired about all mammograms and did not distinguish between those received in organized breast screening programs and those received from other sources.

New Brunswick, Manitoba, and Newfoundland began organized screening programs after NPHS data were collected. Therefore, this analysis does not reflect the effects that these programs may have had on mammography rates.

Starting dates of provincial breast screening programs and timing of the National Population Health Survey (NPHS)

Province	Starting date
British Columbia	July 1988
Saskatchewan	April 1990
Ontario	June 1990
Alberta	October 1990
Nova Scotia	June 1991
NPHS: June 1994 - June 1995	
New Brunswick	June 1995
Manitoba	July 1995
Newfoundland	January 1996
Prince Edward island	...
Quebec	...

Analytical techniques

Multivariate logistic regressions were run to predict the odds of ever having had a mammogram, as well as the odds, among women who had had a mammogram, of having done so in the last two years. Most of the independent variables were based on demographic and socioeconomic characteristics and health practices identified in earlier studies as being associated with mammographic utilization. The regressions were weighted to represent the Canadian population by rescaling the survey weights to sum to the number of survey respondents.

The independent variables in the regressions were marital status, province, residence/non-residence in a census metropolitan area (CMA), education, household income, main activity, place of birth, physician contact in the last year, and having cancer. CMAs are urban centres with at least 100,000 inhabitants in their urbanized core. There are 25 CMAs in Canada.⁴ Household income is a derived measure of income adequacy based on household size. Main activity refers to the principal way in which the respondent reported spending most of her time. Physician contact was recorded if the woman had seen or talked on the telephone to a general practitioner in the last 12 months. The cancer variable was included in the model to adjust the other results for whether or not the woman had this disease. A respondent who had ever had cancer was not recorded as having it at the time of the survey if the diagnosis occurred at least five years earlier, and she had been told that the disease was cured.

Limitations

Mammography data from the NPHS are subject to the problems inherent in self-reported data. Women who agree to participate in a survey such as the NPHS may be more likely than non-respondents to have engaged in health-promoting behaviour such as having a screening mammogram. Some respondents may wish to provide a socially desirable answer, and so may have said that they had had a mammogram, when in fact, they had not. Also, some respondents may have replied affirmatively, assuming that a chest x-ray or other breast examination was actually a mammogram. As well, respondents might not have remembered the exact date of their last mammogram.²

mammograms, not just those received in formal screening programs, and thus assesses the combined results of all efforts to encourage compliance with the recommendations.

Factors associated with getting a mammogram that have been identified in previous studies include age, race, income, education, location of residence, physician advice, knowledge about health maintenance, and medical coverage.⁵⁻¹⁴ This analysis of NPHS data shows that the likelihood of women in the targeted age group having mammograms varies significantly by marital status, province, educational attainment, employment status, country of birth, recency of physician contact, and a diagnosis of cancer. Some of these variables have a much stronger effect on mammographic utilization than do others, and so have implications for reaching women who have been targeted but have not been screened.

Breast cancer

The most recent actual data show that breast cancer mortality among women aged 50-69 is declining (see *Update on breast cancer mortality, 1995* in this issue).¹⁵ Nonetheless, an estimated 3,600 women in their fifties will be diagnosed with the disease in 1997 and 810 will die from it.¹⁶ The estimated 1997 incidence rate is 240 new cases per 100,000 women aged 50-59, and the mortality rate is 54 deaths per 100,000. Among women in their sixties, numbers and rates are higher, with 4,400 new cases and 1,050 deaths anticipated for 1997, yielding estimated incidence and mortality rates of 364 and 87 per 100,000 women aged 60-69, respectively.

Formal screening programs

Whether a woman will get a mammogram depends to some extent on the availability and coordination of the service. In 1988, the Workshop on the Early Detection of Breast Cancer, which included representatives of the government and of volunteer and professional groups across the country, recommended biennial mammographic screening for women

aged 50-69. The Workshop Report also recommended the establishment of dedicated screening centres.¹

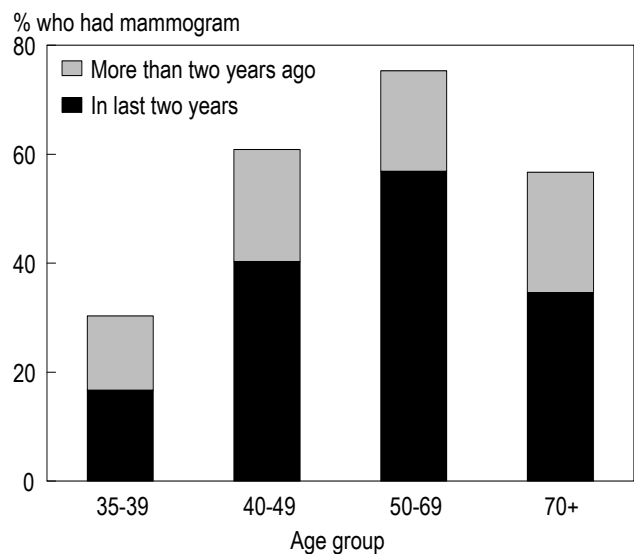
As a result of initiatives from the medical community and Health Canada, formal breast screening programs have been set up in all provinces except Quebec and Prince Edward Island, both of which are in the process of developing them. The first province to organize a program was British Columbia in 1988; Newfoundland, in 1996, was the latest to do so.

All formal provincial breast screening programs now target women in their fifties and sixties for biennial screening, British Columbia having dropped the 40-49 age group from its program in 1995 (see *When should breast screening start?*). The recommended upper age limit in all formal screening programs is now 69. Several provinces accept women older than 69 on request.^{2,17}

High rates for targeted age group

In 1994/95, the lifetime mammography rate was highest—75% (1.9 million)—for women in the targeted age group, 50-69 (Chart 1). The rate for

Chart 1
Mammography rates, by age group, Canada, 1994/95



Data source: National Population Health Survey, 1994/95

women aged 40-49 was 61%. Many of the latter group may have had diagnostic (as opposed to screening) mammograms because of a family history of breast cancer or to investigate breast problems. As well, some of them were targeted for screening, because in 1994/95, British Columbia was still recommending that women in their forties have mammograms.

At older ages, mammographic utilization falls. The lifetime rate for women aged 70 and over was 57%. These results are consistent with earlier studies.^{5,6,11}

When should breast screening start?

Whether breast screening should begin at age 40 or 50 has been the subject of discussion.¹⁸⁻²⁷ In Canada, breast cancer incidence and mortality rates among women in their forties are low compared with rates for older women. Nonetheless, the numbers are still considerable. In 1997, an estimated 3,200 women aged 40-49 will be diagnosed with breast cancer, and 570 women in this age group will die of it.¹⁶

The debate about when women should start having regular mammograms has recently intensified with the release of new recommendations in the United States. In April 1997, the U.S. National Cancer Institute joined the American Cancer Society in recommending annual screening of women in their forties.²⁸

Recommendations vary in other countries, although the focus is on women aged 50 and over.

In Canada, the National Breast Screening Study, which began in 1980, is following a cohort of 90,000 women, who were in their forties and fifties when they entered the study, to determine the efficacy of mammography in detecting early breast cancer, and ultimately, reducing mortality. Initial results have not shown decreased breast cancer mortality among women who were screened in their forties.¹⁸

According to the 1994/95 National Population Health Survey, 1.2 million women in their forties have had a mammogram. The rates were highest in Quebec (71%) and British Columbia (66%), the latter of which targeted 40-49-year-olds in its screening program until 1995.² Some of these women would have been referred for a diagnostic mammograms.

The Canadian Cancer Society recommends biennial screening for women aged 50-69. All formal provincial breast screening programs now target this age group.

Despite the high rate for 50-69-year-olds, 25% of them had never had a mammogram. Moreover, lifetime mammography rates tell only part of the story, as screening guidelines recommend a mammogram every second year for this age group. Around 24% of women in the targeted age range who had had a mammogram had not done so in the previous two years. Consequently, an estimated 1.1 million women aged 50-69 had either never had a mammogram or had had one, but not as recently as recommended.

Provincial rates and odds

Although screening programs account for a relatively small share of all mammograms (16% in 1994),² the two provinces with the longest-running programs—British Columbia and Saskatchewan—had the highest lifetime mammography rates for women aged 50-69 (Appendix, Table A). On the other hand, lifetime rates for this age group were low in Newfoundland, New Brunswick, and Manitoba.

Compared with Saskatchewan (which had the highest odds), the odds were significantly low that women aged 50-69 in Newfoundland, New Brunswick, and Manitoba would have ever had a mammogram (Table 1). Nonetheless, the NPHS was conducted before these three provinces had set up breast screening programs, so the effects of these programs would not be evident in 1994/95 mammography rates.

In Nova Scotia, where a formal breast screening program had been established in 1991, the odds were also low, compared with Saskatchewan, that women aged 50-69 would ever have had a mammogram (odds ratio .28). This is likely related to the fact that the program is still expanding and is not province-wide.

Table 1
Odds ratios for mammogram utilization, women aged 50-69, 1994/95

Independent variable	Category	Ever had mammogram		If ever had mammogram, had one in last two years	
		Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Marital status	Single (never married) [†]	1.00	...	1.00	...
	Now married	2.15**	1.4, 3.4	1.21	.66, 2.2
	Common-law/living with partner	2.07	.73, 5.9	.99	.30, 3.3
	Separated or divorced	1.41	.85, 2.3	.73	.38, 1.4
	Widowed	2.29**	1.4, 3.8	.78	.40, 1.5
Province of residence	Saskatchewan [†]	1.00	...	1.00	...
	British Columbia	.82	.40, 1.7	.84	.34, 2.0
	Alberta	.76	.36, 1.6	1.18	.44, 3.2
	Quebec	.74	.39, 1.4	.26**	.12, .59
	Ontario	.74	.38, 1.4	.48	.21, 1.1
	Prince Edward Island	.73	.12, 4.7	1.40	.10, 20.7
	New Brunswick	.41*	.18, .94	.55	.18, 1.7
	Manitoba	.40*	.18, .90	.23**	.09, .64
	Nova Scotia	.28**	.13, .63	.46	.16, 1.3
	Newfoundland	.23**	.09, .57	.39	.10, 1.5
Resides in census metropolitan area?	No [†]	1.00	...	1.00	...
	Yes	1.23	.97, 1.6	1.63**	1.2, 2.1
Education	Less than secondary [†]	1.00	...	1.00	...
	Secondary	1.53*	1.1, 2.1	.83	.57, 1.2
	Beyond high school	1.27	.95, 1.7	1.02	.72, 1.5
	College or university	2.15**	1.6, 2.9	1.16	.82, 1.7
Household income	Low [†]	1.00	...	1.00	...
	Lower middle	.74	.55, 1.0	.72	.49, 1.1
	Upper middle	1.00	.71, 1.4	.78	.52, 1.2
	High	.98	.62, 1.5	1.07	.63, 1.8
Main activity	Working [†]	1.00	...	1.00	...
	Working and caregiving	.72	.47, 1.1	.92	.56, 1.5
	Caregiving	.53**	.38, .75	.74	.50, 1.1
	Looking for work	.58	.24, 1.4	.20**	.07, .60
	Retired (includes at school and ill)	.56**	.40, .78	.77	.54, 1.1
Place of birth	Canada [†]	1.00	...	1.00	...
	Other North America, Europe, Australia,	.81	.59, 1.1	1.45	.97, 2.2
	South America, Central America, Caribbean, Africa	.33**	.19, .59	.27**	.13, .58
	Asia	.29**	.17, .49	3.39	.99, 11.6
Visited doctor in last 12 months?	No [†]	1.00	...	1.00	...
	Yes	3.08**	2.4, 4.0	3.43**	2.4, 4.9
Has cancer?	No [†]	1.00	...	1.00	...
	Yes	2.85**	1.4, 5.7	1.80	.90, 3.6
Number of observations		2,111	...	1,532	...

Data source: National Population Health Survey, 1994/95

Note: Odds ratios are from two multivariate logistic regressions. Reference categories are the same for both regressions, and the reference categories do not always have the lowest or highest odds. The odds ratio for one category relative to another is equal to the ratio of their respective odds ratios. "Unknown" categories for the following variables were included in the model but are not shown here: resides in CMA, income, place of birth, and visited doctor in last 12 months.

[†] Identifies reference category, for which odds ratio is always 1.00.

... Figures not appropriate or not applicable

* 0.01 < p ≤ 0.05

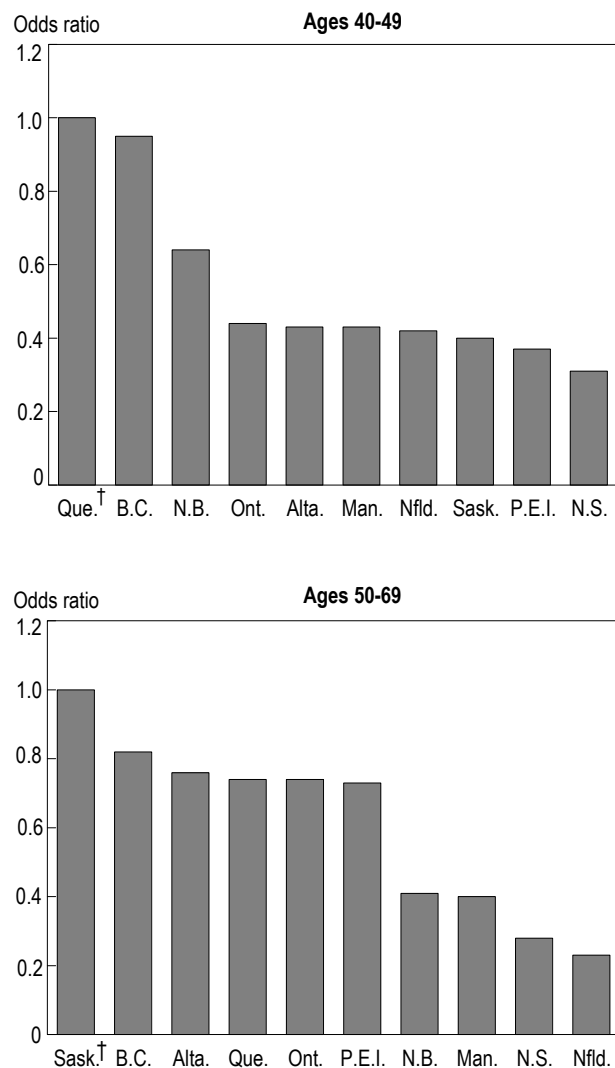
** p ≤ 0.01

Targeting

Ideally, a province with a breast screening program that targets women in a specific age range would show relatively high odds for women of those ages ever having had a mammogram, and low odds for other ages. This was the case for Saskatchewan, which had the highest lifetime mammography odds for women aged 50-69 and the third-lowest odds for women

Chart 2

Odds ratios for ever having had a mammogram, by age and province, 1994/95



Data source: National Population Health Survey, 1994/95

Note: Odds ratios for ages 40-49 are from the same regression model as that in Table 1 for ages 50-69; the numerical values are not shown in this article.

† Identifies reference category for which odds ratio is always 1.0.

aged 40-49 (Chart 2). British Columbia, which at the time of the NPHS was also targeting women in their forties, had high odds for both age groups.

On the other hand, Newfoundland had the lowest lifetime mammography odds for the targeted age group, and was in the mid-range for ages 40-49. Quebec had the highest lifetime odds for ages 40-49, and was in the mid-range for ages 50-69. New Brunswick was near the top (third-highest odds) for ages 40-49, but among the four lowest for ages 50-69. Nova Scotia's odds were low for both age groups.

Doctor's advice?

Doctors often advise women to have a mammogram, and in some cases, mammograms can only be obtained through physician referral. According to the NPHS, women who had not seen doctors recently were less likely to have had a mammogram than were those who had consulted a doctor in the past year. The odds of ever having had a mammogram differed significantly for these two groups by a factor of more than three (odds ratio 3.08). And at 15%, the percentage of women aged 50-69 who had not contacted a doctor in the previous year was noteworthy (Table 2).

Marital status

Compared with women who were married (including common-law and living with a partner) and formerly married (separated/divorced or widowed), those who were single had lower odds of ever having had a mammogram. However, at ages 50-69, only 6% of women were single.

Socioeconomic effects notable

A number of socioeconomic characteristics are related to the likelihood of having a mammogram.^{6,8,11,12,29} Women aged 50-69 who were caregiving or retired^a had significantly low odds of ever having had a mammogram, compared with women whose main activity was

^a This category also includes women who were ill or attending school.

paid employment. Those who were caregiving or retired made up over 60% of all women aged 50-69.

Lifetime mammography odds tended to rise with educational attainment. The odds among women who had not graduated from high school differed from those of women with university or college completion by a highly significant factor of more than two (odds ratio 2.15). As well, about four out of ten women aged 50-69 had less than high school graduation.

Unlike main activity and education, household income alone had no significant effect on whether a woman would ever have had a mammogram.

Country of birth

Compared with Canadian-born women, the odds of having had a mammogram were significantly lower for women who had immigrated from Asia (odds ratio .29) or from South or Central America, the Caribbean, or Africa (odds ratio .33). These are areas where breast cancer rates are considerably lower than in Canada. Moreover, women from these parts of the world accounted for just 7% of all women aged 50-69.

Cancer diagnosis

As might be expected, being diagnosed with cancer was strongly associated with having had a mammogram. Women aged 50-69 who had cancer (of any form, not necessarily breast cancer) had almost three times the odds (odds ratio 2.85) of ever having had a mammogram as did women without cancer.^b This variable adjusts the other results of the analysis for whether or not the women having mammograms had cancer. However, women with cancer made up only a small proportion (just over 4%) of all women aged 50-69.

^b Women diagnosed with cancer five or more years earlier, but who had been told it was cured, were not counted among those with cancer.

Table 2
Percentage distributions[†] of characteristics,
women aged 50-69, 1994/95

	%
Marital status	
Single (never married)	6.0
Now married	68.0
Common-law/living with partner	1.4
Separated or divorced	11.8
Widowed	12.8
Other	0.2
Province of residence	
Newfoundland	1.7
Prince Edward Island	0.4
Nova Scotia	3.3
New Brunswick	2.8
Quebec	27.8
Ontario	37.6
Manitoba	3.4
Saskatchewan	3.4
Alberta	7.4
British Columbia	12.4
Resides in census metropolitan area?	
No	39.5
Yes	60.2
Unknown	0.4
Education	
Less than secondary	38.5
Secondary	15.3
Beyond high school	20.7
College or university	25.5
Unknown	0.1
Household income	
Low	18.7
Lower middle	29.9
Upper middle	32.0
High	13.7
Unknown	5.8
Main activity	
Working	19.6
Working and caregiving	12.2
Caregiving	32.7
Looking for work	1.3
Retired (includes at school and ill)	34.2
Place of birth	
Canada	77.1
Other North America, Europe, Australia	15.6
South America, Central America, Caribbean, Africa	3.0
Asia	4.0
Unknown	0.4
Visited doctor in last 12 months?	
No	14.9
Yes	84.7
Unknown	0.3
Has cancer?	
Yes	4.3
No	95.7

Data source: National Population Health Survey, 1994/95

[†] Distributions weighted to represent 2,551,674 non-institutionalized women aged 50-69 in the 10 provinces. Excludes respondents with unknown mammogram histories.

Within the last two years

For women aged 50-69, compliance with Canadian breast screening guidelines involves not only getting a mammogram, but doing so at regular two-year intervals. Given that a woman has had a mammogram, several variables were significantly related to having had one in the two previous years.

Women in Prince Edward Island had the highest odds that those who had had a mammogram would have done so within the recommended period (odds ratio 1.40). Women in Alberta, Saskatchewan, and British Columbia ranked next. Those in Manitoba, Quebec and Newfoundland had the lowest odds.

Unlike earlier studies,^{6,8,13,29} NPHS data did not indicate that urban residence was significantly associated with ever having had a mammogram. But given that a woman had done so, the odds of having one within the last two years were significantly high if she lived in a census metropolitan area (odds ratio 1.63).

Women who had consulted a doctor in the previous year had significantly high odds of ever having had a mammogram, and given that they had had one, of doing so within the recommended period (odds ratio 3.43).

While educational attainment and main activity were significantly associated with ever having had a mammogram, these variables were generally not significant predictors of doing so in the recommended period. The exception was the small group (just over 1% of women in this age range) who were looking for work. If a woman had had a mammogram, the odds that she would have had one in the previous two years were significantly low for those seeking employment (odds ratio .20).

Women from Asia had the lowest odds of ever having had a mammogram, but those who had done so had the highest odds of having had one within the past two years. By contrast, women from South and Central America, the Caribbean, and Africa had low odds not only of ever having had a mammogram, but also of having had one in the past two years. The pattern among Asian-

born women may indicate a higher level of awareness of and compliance with screening guidelines among those who have had a mammogram.

Implications

Canadian guidelines recommend that women aged 50-69 get mammograms and that they get them at certain ages and with a certain frequency. But despite gains in recent years, a large number of Canadian women in the targeted age group do not get mammograms, or do not get them as often as recommended.

Earlier studies found that women who have never had a mammogram tended to be older, non-white, poorer, less educated, and to reside in rural areas. They have tended not to have been advised by a physician to get a mammogram and not to know that asymptomatic women should be screened.

In the United States, having health insurance is an important factor,^{5,29} and socioeconomic disparities in breast screening rates have been noted there. However, one Ontario study also found that universal health care was not enough to overcome socioeconomic disparities in mammography utilization.³⁰

NPHS data show several factors to be predictors of whether a woman in the 50-69 age group will get a mammogram. The odds of doing so were significantly low for women who were single, who had relatively little education, who were not in the paid workforce, who were not in recent contact with a physician, and who were immigrants from South or Central America, the Caribbean, Africa, and Asia.

Some groups with low lifetime mammography odds represented large shares of the 50-69-year-old female population: women with less than high school education or who were out of the labour force. And even women with high lifetime mammography odds had not necessarily been examined as recently as recommended.

Finally, although a variety of inter-related personal characteristics influence whether a woman will get a mammogram and the

frequency with which she will do so, some provinces have had less success than others in reaching the targeted age group.

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Appendix

Table A
Mammography rates, women aged 50-69, 1994/95

	Ever had mammogram [†]	Had mammogram in last two years [‡]
	%	
Marital status		
Single (never married)	62.7	72.2
Now married	76.6	77.7
Common-law/living with partner	80.2	76.6
Separated or divorced	73.7	70.1
Widowed	74.9	70.5
Province of residence		
Saskatchewan	82.3	86.7
British Columbia	79.5	85.2
Alberta	79.0	89.4
Quebec	75.9	63.9
Ontario	76.2	78.2
Prince Edward Island	76.3	87.7
New Brunswick	64.8	75.6
Manitoba	67.4	63.7
Nova Scotia	57.6	74.3
Newfoundland	48.2	69.3
Resides in census metropolitan area?		
No	72.6	70.2
Yes	77.0	79.0
Education		
Less than secondary	68.4	71.4
Secondary	79.1	73.7
Beyond high school	75.8	77.4
College or university	83.1	80.7
Household income		
Low	71.2	72.8
Lower middle	69.7	70.0
Upper middle	80.1	75.6
High	83.2	84.1
Main activity		
Working	82.6	77.5
Working and caregiving	77.4	80.3
Caregiving	72.4	76.0
Looking for work	63.4	43.9
Retired (includes at school and ill)	73.6	73.4
Place of birth		
Canada	76.6	73.8
Other North America, Europe, Australia	76.1	83.7
South America, Central America, Caribbean, Africa	55.4	54.4
Asia	64.2	94.4
Visited doctor in last 12 months?		
No	56.0	50.3
Yes	78.8	78.8
Has cancer?		
No	74.6	75.1
Yes	89.2	86.0

Data source: National Population Health Survey, 1994/95

Note: Univariate rates weighted to represent 2,551,674 non-institutionalized women aged 50-69 and 1,920,239 women aged 50-69, who ever had a mammogram. Excludes unknown categories and respondents with unknown mammogram histories.

[†] As a percent of women aged 50-69 in the 10 provinces

[‡] As a percent of women aged 50-69 in the 10 provinces, who had ever had a mammogram