# Organized Breast Cancer Screening Programs in Canada

## REPORT ON PROGRAM PERFORMANCE IN 2007 AND 2008

Alberta Health Services — Alberta Breast Cancer Screening Program

BC Cancer Agency — CARE + RESEARCH — An agency of the Provincial Health Services Authority — Screening Mammography Program

Breast Screening Program — Programme de dépistage ducancerdu sein

Government of Nunavut

Manitoba Breast Screening Program — Programme manitobain de dépistage du cancer du sein

New Nouveau Brunswick

Nova Scotia Breast Screening Program

ontario breast screening program — a cancer care ontario program

Prince Edward Island Breast Screening Program

Programme québécois de dépistage du cancer du sein

Screening Program for Breast Cancer — A program of the Saskatchewan Cancer Foundation

Women's Wellness — Breast Screening Program for Newfoundland & Labrador

Yukon Mammography Program

Canadian Partnership Against Cancer — Partenariat canadien contre le cancer

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**TO PROMOTE AND PROTECT THE HEALTH OF CANADIANS THROUGH LEADERSHIP, PARTNERSHIP, INNOVATION AND ACTION IN PUBLIC HEALTH.**

**— Public Health Agency of Canada**

The Canadian Partnership Against Cancer wishes to acknowledge the contribution of the Public Health Agency of Canada in the development of this report.

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# Acknowledgements

We would like to acknowledge the contribution of the following individuals:

**Editorial**

- The Editorial Committee of this report, which includes Riaz Alvi (Saskatchewan Cancer Agency), Judy Caines (Nova Scotia Breast Screening Program), Christina Chu (British Columbia Cancer Agency), Kathleen Decker (CancerCare Manitoba), Gregory Doyle (Breast Screening Program for Newfoundland and Labrador), Song Gao (Alberta Breast Cancer Screening Program), André Langlois (Programme Québecois de Dépistage du Cancer du Sein), Rene Shumak (Ontario Breast Screening Program), and Bin Zhang (New Brunswick Breast Screening Program).
- Provincial and territorial organized breast cancer screening programs which contribute to the Canadian Breast Cancer Screening Database at the Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada (Appendix A).
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**Public Health Agency of Canada Resource Team**

- Heather Limburg, Lisa Pogany (Editorial Committee Chair), Agata Stankiewicz, Centre for Chronic Disease Prevention and Control.

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On the occasion of their retirements, the National Committee of the Canadian Breast Cancer Screening Initiative (CBCSI) would like to acknowledge the significant contributions that have been made to the initiative by Dr. Rene Shumak and Dr. Diane Major.

Dr. Shumak, who was the Chief Radiologist of the Ontario Breast Screening Program, served as Chair of the Canadian Breast Cancer Screening Database Management Committee for over 6 years. She has also served on various subcommittees and working groups of the CBCSI over her many years of involvement.

Dr. Diane Major, a population health researcher at the Institut National de Santé Publique du Québec, served as the Chair of the CBCSI Quality Determinants Working Group for over 10 years and also served on various subcommittees and working groups, over her many years of involvement with the CBCSI.

Dr. Shumak and Dr. Major were dedicated to advancing the cause of population based breast cancer screening. They both recognized the importance of developing quality assurance programs and performance indicators for monitoring, evaluating, and ultimately, improving the quality of programmatic screening.

The National Committee thanks both Dr. Shumak and Dr. Major for their significant contribution to the initiative and to the women of Canada for their many years of dedicated service We wish them well in their future endeavours.

# Table of Contents

# Executive Summary

Breast cancer is the most common type of cancer and the second leading cancer cause of death among Canadian women with a projected 22,700 diagnoses and 5,100 deaths in 2012.[3] Incidence of breast cancer has risen steadily between 1980 and the early 1990's and now appears relatively stable at approximately 98 cases per 100,000 women.[3] In addition, the mortality rate due to breast cancer continues to decline and is almost 40% lower than its peak in 1986.[3] Although breast cancer can occur at any age, approximately half of new cases occur among women between 50 and 69 years of age.[3] Early detection through programmatic screening combined with effective treatment remains the best option available to continue reducing deaths from breast cancer in this age group.[3]

The monitoring and evaluation of organized breast cancer screening programs provides an opportunity to understand the impact of screening on breast cancer morbidity and mortality as well as the potential harms associated with screening. Systematic evaluation of organized programs helps to ensure that Canadian women have access to high-quality breast cancer screening programs. This document presents an evaluation of the performance of organized breast cancer screening programs in Canada for the calendar years 2007 and 2008. Data were obtained through the Canadian Breast Cancer Screening Database and include all provinces and one territory.

This report introduces several new or modified measures of breast cancer screening performance: proportion of women screened annually, sensitivity of the screening mammography program, biopsy with non-malignant result, and a more comprehensive description of diagnostic intervals. This will assist in better understanding how organized breast cancer screening performs in Canada.

Results indicate that most Canadian women are screened on a biennial basis; however, the majority of women 40 to 49 years of age who attended screening were likely to return within 18 months for an "annual screen" (60.3% and 75.9% of initial or subsequent screeners respectively). The sensitivity of screening mammography programs improves with increasing age which is corroborated by lower abnormal call rates and higher cancer detection rates as women age. The biopsy rate (core or open surgical) is highest among younger women (40–49 years) compared to older women (70+ years). In addition, women undertaking their first screening mammogram in an organized program have higher rates of biopsy compared to those who have had previous screening mammograms (18.3 per 1,000 versus 7.2 per 1,000 respectively). The percentage of biopsies that are invasive (open surgical biopsies) varies between programs but is lower among older women and has fallen dramatically over time from 24.5% in 2004 to 15.0% in 2008 for first screeners and 29.4% in 2004 to 17.9% in 2008 for subsequent screeners.

This report also examines trends in organized breast cancer screening from 1999 to 2008. In general, performance over time is remarkably consistent. Participation has gradually increased but falls short of the 70% target. Time to completion of diagnostic work-up has been stable and falls well below targets with resolution occurring in fewer than 80% of women in less than 5 weeks when no biopsy is required and in fewer than 50% of women in less than 7 weeks when a biopsy is required. In terms of screen-detected cancers, there is little variation in tumour size or the spread of cancer to the lymph nodes. Both measures remain within the targets for detecting smaller (≤15mm) and less advanced (node negative) cancers.

Organized breast cancer screening programs will continue to provide screening services to Canadian women in the coming years. Programs strive to achieve reductions in the morbidity and mortality associated with breast cancer while minimizing the harms of screening through program evaluation, ongoing research, and adaptation of program policy to reflect new evidence and technologies. The Canadian Breast Cancer Screening Initiative, which supports the production of this report, provides a venue for information sharing to solve screening program challenges. The information provided in this report is available to support governments, cancer agencies, screening program managers, health professionals, and other breast cancer stakeholders to enhance organized screening across Canada.

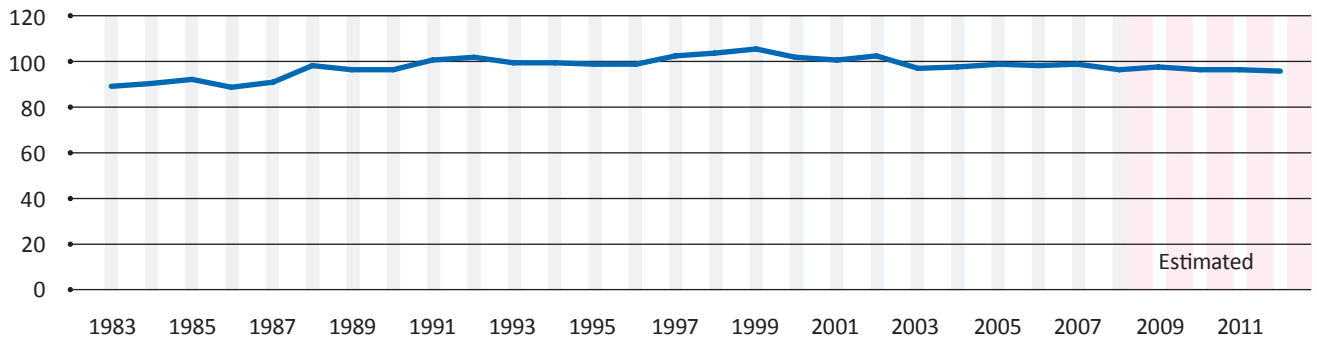
# Background

## Introduction

An estimated 22,700 women are projected to be diagnosed with breast cancer and 5,100 women to die from the disease in 2012.[3] This makes breast cancer the most common form of cancer[a] and the second leading cancer cause of death[b] in Canadian women.[3] Breast cancer incidence has risen steadily between 1980 and the early 1990's and now appears relatively stable at approximately 98 cases per 100,000 women (Figure 1A. pg 3).[3] In addition, the mortality rate due to breast cancer continues to decline and is now almost 40% lower than its peak in 1986 (Figure 1B. pg 4).[3]

FIGURE 1A

**Age-standardized incidence rates (ASIR) per 100,000 women for breast cancer in Canada, 1983–2012**




Notes:

1. Incidence rates are estimated for 2009–2012 (all provinces) and 2008–2012 (Québec). These estimates are based on long-term trends and may not reflect recent changes.
2. Rates are standardized to the age distribution of the 1991 population.

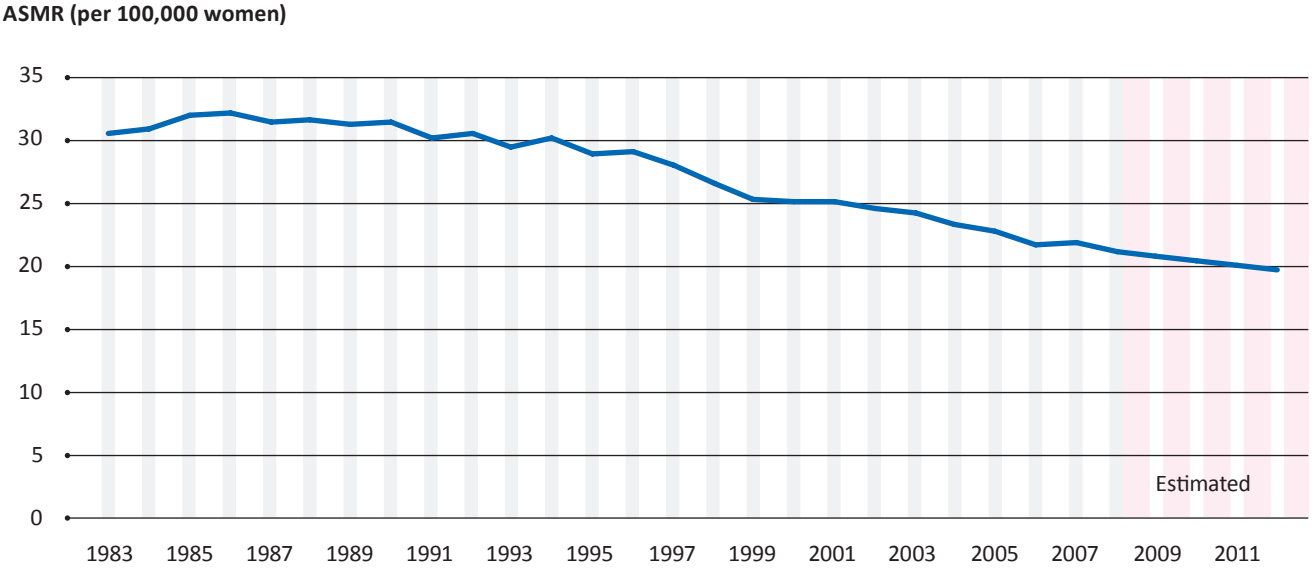
Source: Cancer Society's Steering Committee on Cancer Statistics. Canadian Cancer Statistics 2012. Toronto, ON: Canadian Cancer Society; 2012.

a) Incidence of non-melanoma skin cancer exceeds that of breast cancer in Canada. However, rates are typically not reported due to the difficulty estimating true incidence.

b) Deaths from lung cancer exceed that of breast cancer among women in Canada with 9,400 deaths expected in 2012.[3]

FIGURE 1B

**Age-standardized mortality rates (ASMR) per 100,000 women for breast cancer in Canada, 1983-2012**




Notes:

1. Mortality rates are estimated for 2008–2012 (all provinces/territories). These estimates are based on long-term trends and may not reflect recent changes.
2. Rates are standardized to the age distribution of the 1991 population.

Source: Cancer Society's Steering Committee on Cancer Statistics. Canadian Cancer Statistics 2012. Toronto, ON: Canadian Cancer Society; 2012.

The early detection of breast cancer, through organized mammography screening programs, is an effective method to reduce death and morbidity associated with breast cancer.[9] Currently, the primary prevention of breast cancer is limited since most known risk factors are not easily modifiable.

Of known risk factors, age has the strongest influence on breast cancer incidence; approximately half of all new cases are among women between 50 and 69 years of age.[3]

Modelling studies have shown that the delivery of high quality breast screening programs to this age group can reduce breast cancer deaths by as much as one third.[9] Among other considerations, this scientific information has influenced Canadian provinces and territories to provide organized breast cancer screening services to this age group. Some provinces and territories also provide screening mammography to other age groups but in a less targeted fashion.

# History of Breast Cancer Screening in Canada

In December 1992, the Canadian federal government launched the first phase of the Canadian Breast Cancer Initiative (CBCI). The CBCI included 25 million dollars over five years and included the Canadian Breast Cancer Screening Initiative (CBCSI) among its priorities. Federal funding has continued for the CBCSI, initially through Health Canada, and now through the Public Health Agency of Canada.

TABLE 1

## Breast cancer screening programs in Canada[a] – usual practices, 2007 and 2008 screen years

| Province/ territory | Program inception | Clinical breast examination on site | Program practices for women age 30+ in addition to biennial mammography for women 50–69 years | | |
|---|---|---|---|---|---|
| | | | Age group | Accept[b] | Recall |
| **Northwest Territories** | 2003 | No | 30–39 | No | N/A |
| | | | 40–49 | Yes | Annual |
| | | | 70+ | Yes | Biennial |
| **Yukon Territory** | 1990 | No | 30–39 | No | N/A |
| | | | 40–49 | Yes | None |
| | | | 70+ | Yes | Biennial |
| **British Columbia** | 1988 | No | 30–39 | Accept with physician referral | None |
| | | | 40–49 | Yes | Annual |
| | | | 70–79 | Yes | Biennial |
| | | | 80+ | Accept with physician referral | None |
| **Alberta** | 1990 | No | 30–39 | No | N/A |
| | | | 40–49 | Yes | Annual |
| | | | 70–74 | Yes | Biennial |
| | | | 75+ | Yes | None |
| **Saskatchewan** | 1990 | No | 30–39 | No | N/A |
| | | | 40–49 | No[c] | N/A |
| | | | 70–74 | Yes | Biennial[d] |
| | | | 75+ | Yes | None |
| **Manitoba** | 1995 | No | 30–39 | No | N/A |
| | | | 40–49 | Accept to mobile unit with physician referral | Biennial |
| | | | 70+[e] | Accept to mobile unit with physician referral | None |
| **Ontario** | 1990 | Yes[f] | 30–49 | Accept high risk women with physician referral who meet the eligibility criteria[g] | Annual |
| | | | 70–74 | Yes | Biennial |
| | | | 75+ | Yes | None |
| **Québec** | 1998 | No | 30–34 | No | N/A |
| | | | 35–49 | Accept with physician referral[h] | None |
| | | | 70+ | Accept with physician referral[h] | None |

| Province/ territory | Program inception | Clinical breast examination on site | Program practices for women age 30+ in addition to biennial mammography for women 50–69 years | | |
|---|---|---|---|---|---|
| | | | Age group | Accept[b] | Recall |
| **New Brunswick** | 1995 | No | 30–39 | No | N/A |
| | | | 40–49 | Accept with physician referral | None |
| | | | 70+ | Accept with physician referral | None |
| **Nova Scotia** | 1991 | Yes[i] | 30–39 | No | N/A |
| | | | 40–49 | Yes | Annual |
| | | | 70+ | Yes | None |
| **Prince Edward Island** | 1998 | No | 30–39 | Accept high risk women with physician referral who meet the eligibility criteria[j] | Annual |
| | | | 40–49 | Yes | Annual |
| | | | 70–74 | Yes | Biennial |
| | | | 75+ | No | N/A |
| **Newfoundland and Labrador** | 1996 | Yes[k] | 30–49 | No | N/A |
| | | | 70+ | Accept if previously enrolled in program | None |

a Nunavut has not developed an organized breast cancer screening program.

b Accept to program by self or physician referral but do not send out initial invitation letters.

c Accept age 49 on the mobile if they would be 50 in that calendar year.

d If previously enrolled in the program.

e As of 2009, women 70–74 years of age are recalled biennially and women 75+ are accepted for screening but not recalled.

f Nurse provides clinical breast examination at 47.1% of sites.

g High risk women aged 30–49 accepted as of July 2011. Women are considered high risk if they have one of (a) confirmed genetic mutation that increases risk (b) parent, sibling or child with this genetic mutation, (c) family history and ≥ 25% lifetime risk confirmed through genetic assessment, (d) received chest radiation therapy prior to age 30, and at least 8 years previously.

h Accept with physician referral if done at a program screening centre, but is not officially considered within the program.

i Modified examination only, performed by technologist at time of mammography.

j Women aged 30–39 are accepted if mother was diagnosed within 10 years of their age.

k Nurse.

# Organized Breast Cancer Screening Programs

Canada's first organized breast cancer screening program began in British Columbia in 1988 and was followed quickly by most provinces (Table 1. pg 5). Organized breast cancer screening programs now exist in all provinces, the Northwest Territories, and the Yukon Territory. Nunavut does not have an organized mammography screening program but provides opportunistic screening to women when appropriate.

All organized programs provide women 50 and 69 years of age, with no prior diagnosis of breast cancer a bilateral, 2-view mammogram biennially. Some programs also include women outside of this age group (Table 1. pg 5) and some provide screening at more frequent intervals for a variety of reasons. In 2007 and 2008, several programs provided clinical breast examination (CBE) by a nurse or technologist but most programs have removed the CBE based on scientific evidence.[1] Lastly, some programs screen breast cancer survivors but survivors were excluded from this report.

# The Screening Process

Organized breast cancer screening programs offer screening to women who are asymptomatic for breast cancer. Organized programs in Canada typically involve four steps:

- Identification and invitation of the target population,
- Provision of a screening test,
- Follow-up of any abnormalities detected at screening test, and
- Recall after a normal or non-malignant screening outcome.

Several methods are used to encourage women to be screened including population-based invitations, physician education to increase referrals, and mass-media campaigns. Women may participate in an organized programs through self or physician referral.

Screening mammograms are provided at fixed and mobile sites. Fixed sites are located in larger urban areas while mobile sites are used to provide service to rural and distant communities and to supplement services at fixed sites.

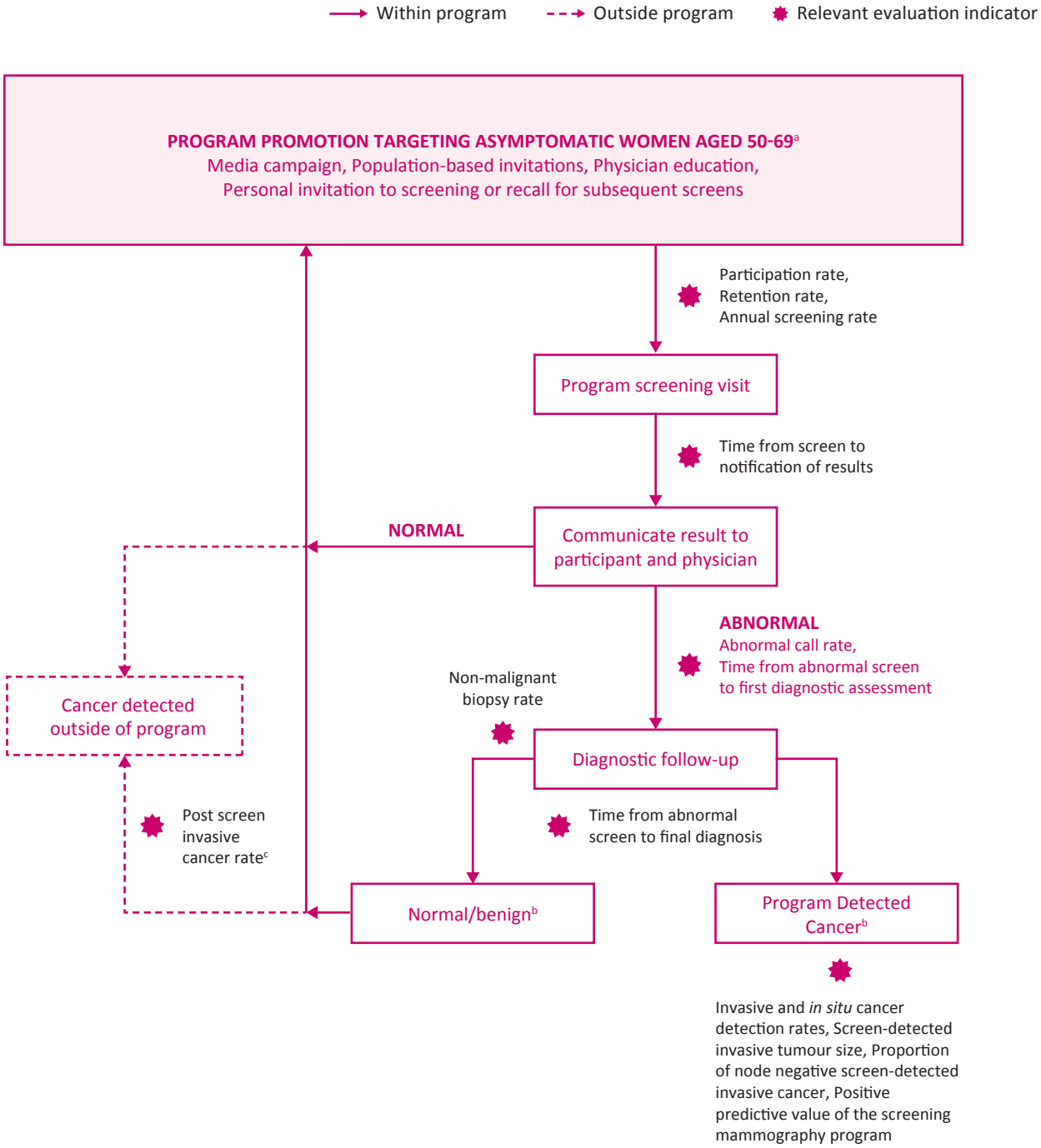
Screening results are provided to the woman and her primary health care provider. Women who have normal screening results are invited back for subsequent screening through a recall letter. Some women are recalled after 12 months based on age, breast density, family history, and results of previous mammograms. After a normal screening result, women are encouraged to follow-up with their health care provider if they become symptomatic prior to their next scheduled screening visit.

When the screening mammogram is abnormal, the woman's health care provider or the screening program coordinates the required follow-up diagnostic tests. This process varies by region. The follow-up process is complete when a final diagnosis of cancer or normal/non-malignant is determined (Figure 2. pg 8).

In addition to the systematic process through which a woman moves through an organized breast cancer screening program, organized screening offers additional advantages over opportunistic breast cancer screening including population-based recruitment, automatic recall/reminders for subsequent screening, coordinated follow-up for abnormal screening results, systematic quality assurance, and the ability to provide monitoring and evaluation of program performance.

FIGURE 2

## Pathway of a breast cancer screening program




a Some women also undergo screening (opportunistic screening or diagnostic mammograms) and are diagnosed with cancer outside program.

b Breast screening programs obtain final diagnoses from sources such as physicians, pathology reports, and cancer registries.

c Cancers detected six-months after a screening event are considered to be post screen cancers at the national level.

# Canadian Breast Cancer Screening Database (CBCSD)

Monitoring and evaluation of organized breast cancer screening programs through the systematic collection, analysis, and interpretation of data allows for continuous screening program improvement. The Canadian Breast Cancer Screening Database (CBCSD) provides a method to examine and assess organized breast cancer screening programs across provinces and at a national level. The CBCSD was established in 1993 and is operated and maintained by the Public Health Agency of Canada on behalf of the Canadian Breast Cancer Screening Initiative. Participating provincial and territorial screening programs contribute to the national database while retaining ownership over their data.

The CBCSD contains screening information from the inception of each organized screening program up to December 2006. At the present time, the Yukon does not submit records to the CBCSD and is therefore excluded from the database. At every screening event, data including demographic characteristics, risk factors, the screening test, screening results and subsequent referral, diagnostic tests, outcomes, and cancer information are collected.

The database is currently used for monitoring, evaluation, and applied screening research. Research priorities are identified on an ongoing basis and the CBCSD is made available to approved researchers external to the Canadian Breast Cancer Screening Initiative. The CBCSD is committed to respecting the privacy of contributors to the dataset. All data are depersonalized and sent securely from the participating programs to the Public Health Agency of Canada. Further, the CBCSD is housed securely at the Public Health Agency of Canada. While participating in the CBCSD, each province/territory owns their data and therefore has unrestricted rights over their data.

# Monitoring and Evaluation Using the CBCSD

Monitoring and evaluation of organized screening programs is essential to ensure that Canadian women receive high quality services. Higher quality services result in the reduction of morbidity and mortality from breast cancer while minimizing the harmful effects of screening. The results of monitoring and evaluation using the CBCSD enhance the performance of organized screening programs in Canada.

In order to provide fair evaluation for Canadian organized breast screening programs, standardized methods of evaluation have been developed. For detailed information please refer to the most recent Evaluation Indicators Working Group Report[c]. The current Program Performance Measures have been adapted and updated from the previous report.[12] In general, agreed upon performance indicators for women aged 50 to 69 include those related to recruitment and retention (participation rate, retention rate, annual screening rate), timeliness (diagnostic interval), mammography interpretation (abnormal call rate, positive predictive value), diagnosis (invasive and *in situ* cancer detection rate, percent of cancer classified as *in situ*, biopsy with non-malignant result), cancer diagnosis (tumour size and node negative rate in screen-detected invasive cancers, post-screen invasive cancer rate) and performance of the screening program (sensitivity) (Table 2. pg 10). Many of the evaluation indicators presented here only provide meaningful measures of program performance when considered in relation to each other and in a broader context. In some cases, meeting ideal targets involves achieving a balance rather than continually working to increase or decrease a particular rate or indicator.

c) The Evaluation Indicators Working Group Report: Guidelines for Monitoring Breast Screening Program Performance: 3rd edition (2012). Edition is available online at http://www.phac-aspc.gc.ca.

TABLE 2

## Evaluation Indicators for organized breast cancer screening programs in Canada, women aged 50–69

| Indicator | Definition | Target |
|---|---|---|
| **1. Participation rate** | Percentage of women who have a screening mammogram within a 30-month period as a proportion of the target population. | ≥70% of the target population within a 30-month period. |
| **2. Retention rate** | The estimated percentage of women age 50–67 who returned for screening within 30 months. | ≥ 75% screened within 30 months of an initial screen;<br>≥ 90% screened within 30 months of a subsequent screen. |
| **3. Annual screening rate** | The estimated percentage of women aged 50–68 who are screened within 18 months of their previous screen. | % women screened within 18 months of an initial screen;<br>% women screened within 18 months of a subsequent screen.<br>(Surveillance and monitoring purposes only) |
| **4. Abnormal call rate** | Percentage of mammograms that are identified as abnormal at program screen. | <10% (initial screen);<br><5% (subsequent screens). |
| **5. Invasive cancer detection rate**[a] | Number of invasive cancers detected per 1,000 screens. | >5 per 1,000 (initial screen);<br>>3 per 1,000 (subsequent screens). |
| **6. *In situ* cancer detection**[a] | (a) Number of ductal carcinoma *in situ* (DCIS) cancers detected per 1,000 screens<br>(b) Percentage of all cancers that are DCIS. | (a) per 1,000 screens (initial);<br>per 1,000 screens (subsequent screen);<br>(b) % of benign biopsies which were open (initial);<br>% of benign biopsies which were open (subsequent screen);<br>Surveillance and monitoring purposes only. |
| **7. Diagnostic interval**[a] | (a) Time from screen to notification of screen result.<br>Among abnormal screens:<br>(b) Time from abnormal screen to first diagnostic assessment.<br>(c) Time from abnormal screen to definitive diagnosis. | (a) ≥ 90% within 2 weeks;<br>(b) ≥ 90% within 3 weeks;<br>(c) ≥ 90% within 5 weeks if no tissue biopsy[b] performed;<br>≥ 90% within 7 weeks if tissue biopsy[b] performed. |
| **8. Positive predictive value of the screening mammography program**[a] | Proportion of abnormal cases with completed follow-up found to have breast cancer (invasive or *in situ*) after diagnostic work-up. | ≥5% (initial screen);<br>≥6% (subsequent screens). |

| Indicator | Definition | Target |
|---|---|---|
| **9. Non-malignant biopsy rate**[a] | (a) Proportion of non-malignant open[c] and core biopsies per 1,000 screens<br>(b) % of non-malignant biopsies which were open[c] | (a) per 1,000 screens (initial);<br>per 1,000 screens (subsequent screen);<br>(b) % of non-malignant biopsies which were open (initial);<br>% of non-malignant biopsies which were open (subsequent screen);<br>Surveillance and monitoring purposes only. |
| **10. Screen-detected invasive cancer tumour size**[a] | Percentage of screen-detected invasive cancers with a tumour size of ≤15mm in greatest diameter as determined by the best available evidence: 1) pathological, 2) radiological, and 3) clinical. | >50% screen-detected invasive tumours are ≤15mm. |
| **11. Proportion of node negative screen-detected invasive cancer**[a] | Proportion of screen-detected invasive cancers in which the cancer has not invaded the lymph nodes as determined by pathological evidence. | >70% screen-detected invasive cancers. |
| **12. Post-screen invasive cancer rate**[ad] | Number invasive breast cancers found after a normal or benign mammography screening episode within 0 to < 12 and 12–24 months of the screen date. | < 6 per 10,000 person-years (0 to < 12 months);<br>< 12 per 10,000 person-years (12–24 months). |
| **13. Sensitivity of the screening mammography program**[a] | Proportion of breast cancer cases (invasive or DCIS) that were correctly identified as having cancer during the screening episode. | % (subsequent screens). (0 to <12 months);<br>Surveillance and monitoring purposes only. |

a Resolution of an abnormal screen is set at a maximum of 6 months post screen.

b Tissue biopsy does not include fine needle aspiration (FNA).

c Open surgical biopsy includes cases that went directly to an open surgical biopsy as their primary diagnostic assessment and those who underwent an inconclusive core biopsy prior to a definitive diagnosis by open surgical biopsy.

d Post-screen cancers include all invasive cancers diagnosed after a normal or benign screen within 24 months (regardless of screening interval recommendation) or screen-detected (referred) cancers that took >6 months to diagnosis (beyond the 'normal screening episode').

Source: Public Health Agency of Canada. Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Cancer Screening Program Performance: Third edition. Ottawa: Minister of Health, 2012.

# 2007 and 2008 Results

*This report presents statistics for the 2007 and 2008 calendar years using data submitted up to November 2011. The outcomes presented in this report are based on the 3rd edition report by the Evaluation Indicators Working Group.[12] Unless otherwise noted, summary statistics include data from all 10 provinces and the Northwest Territories for women aged 50 to 69 years of age. These results are based on the experience of Canadian organized breast cancer screening programs (Appendix A) and not opportunistic breast cancer screening.*

## Participation in Organized Breast Cancer Screening Programs

### Participation Rate

Adequate participation in breast cancer screening is essential for reductions in mortality to occur in the target population. Based on principles of screening and extrapolation from randomized controlled trials, Canadian programs have established 70% as the target participation rate.[12] The participation rate presented is calculated over a 30 month time period.

Participation rates include all 10 provinces and the Northwest Territories. Overall, approximately 1.9 million Canadian women between 50 and 69 (Table 6. pg 27), and 2.4 million women 40 years of age and older[d] received a screening mammogram through a Canadian organized screening program in 2007 and 2008 (Table 7. pg 31). In 2009, 1.0 million women 50 to 69 years of age had a screening mammogram through an organized program

d) This value is underestimated because volume counts are not provided to the CBCSD under 50 years or over 69 years of age by some programs for women.

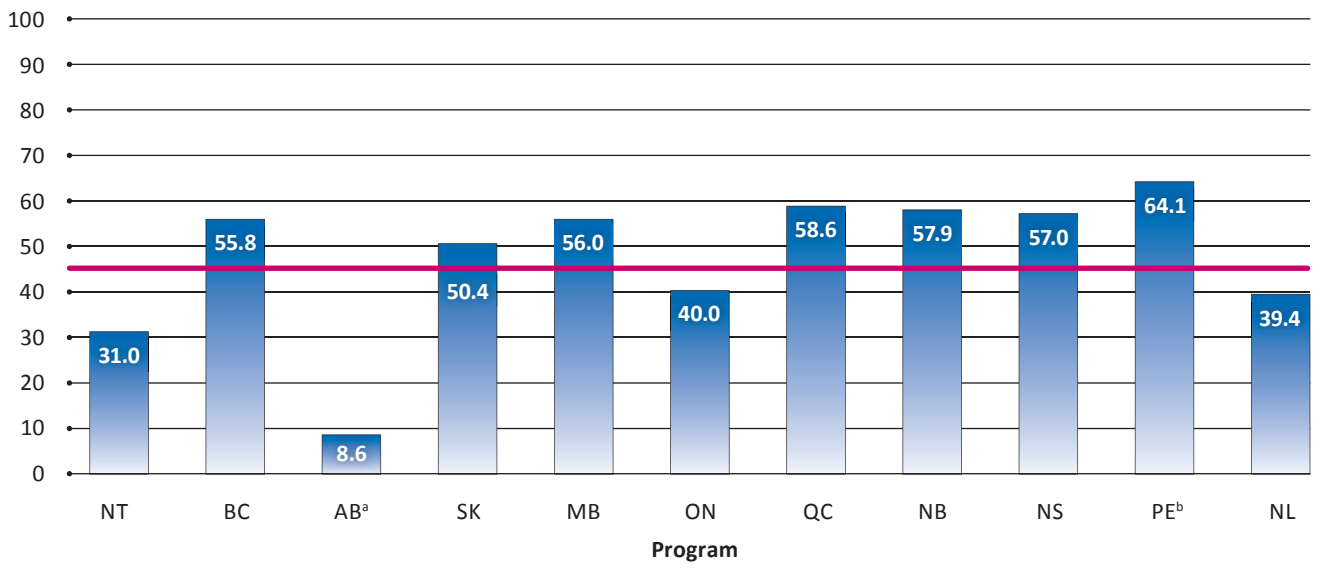
(Table 8. pg 34). Since the inception of the first Canadian organized screening program in British Columbia, over 12.4 million screening mammograms have been performed in organized screening programs.

Although these numbers appear high, the target participation rate of 70% among women 50 to 69 years for biennial screening was not reached through organized programs. In 2008, 45.9 % of the target population received a screening mammogram through an organized program over 30 months. The participation rate varies among organized programs from 8.6% to 64.1% (Figure 3A. pg 13). In 2009, this increased to 47.3% for women aged 50 to 69 years and ranged from 7.5% to 60.1% among organized programs (Figure 3B. pg 14).

Participation among women 50 to 69 years is influenced by the proportion of women outside of this age group who are screened. Although there is relative consistency among programs on acceptance of women outside of the 50 to 69 year age group (Table 1. pg 5), the extent of screening occurring outside the target age group (50 to 69) varied from 0% to 58.2% (Figure 4. pg 14).

FIGURE 3A

## Participation in organized breast cancer screening programs within a 30-month period, women aged 50–69 (2008)




a Alberta data were collected from the Screen Test program only. Screen Test is an organized program that conducts approximately 10–12% of screening mammograms in the province. A province-wide breast cancer screening program was implemented in March 2007.

b Information for Prince Edward Island was based on data external to the CBCSD and may differ from previous reports.

Notes:

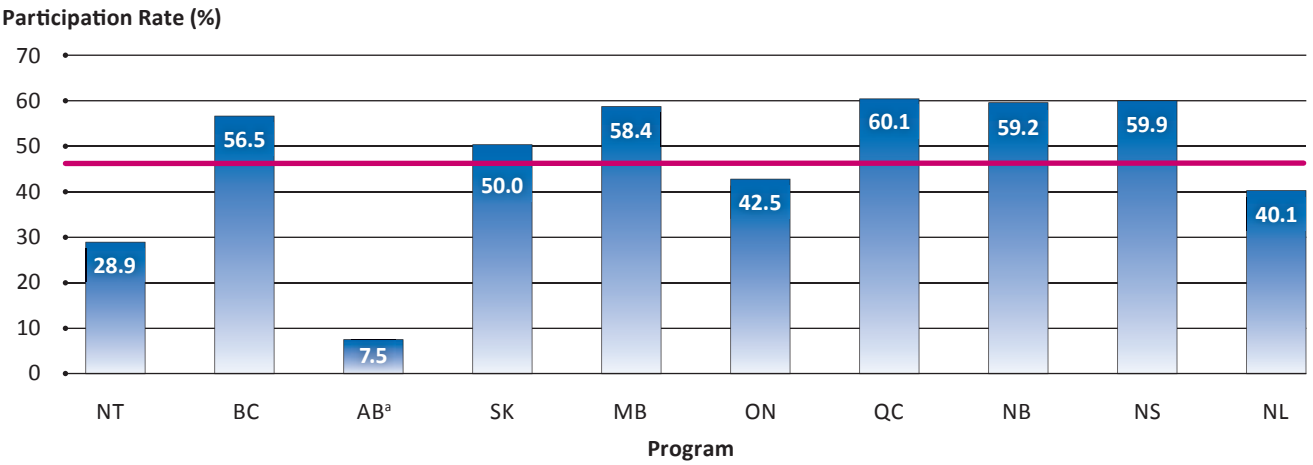
1. Population estimates (denominator) are adjusted to exclude prevalent cases of invasive breast cancer.
2. The national participation rate of 45.9 % is indicated by the horizontal bar.
3. 30 months includes screens from July 1, 2006 – December 31, 2008.

Source: Statistics Canada census data estimated for December 31, 2008 are used for denominator values.

Prevalent breast cancers were excluded from the denominator: Person based prevalence on Jan 1, 2008 of women diagnoses with invasive breast cancer or DCIS from 1992 to 2007, by province (excluding Québec) and attained age group. Based on the July 2011 Canadian Cancer Registry file using IARC multiple primary rules (Statistics Canada). Québec prevalence estimated from Canadian average.

FIGURE 3B

## Participation in organized breast cancer screening programs within a 30-month period, women aged 50–69 (2009)




a Alberta data were collected from the Screen Test program only. Screen Test is an organized program that conducts approximately 10–12% of screening mammograms in the province. A province-wide breast cancer screening program was implemented in March 2007.

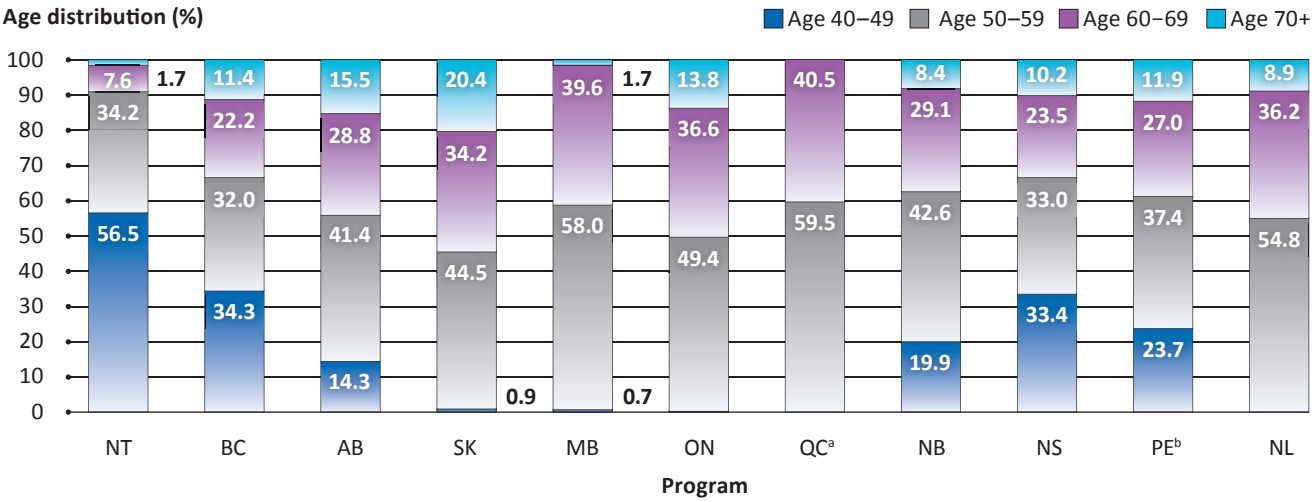
Notes:

1. Population estimates (denominator) are adjusted to exclude prevalent cases of breast cancer.
2. The national participation rate of 47.3 % is indicated by the horizontal bar.
3. 30 months includes screens from July 1, 2007 – December 31, 2009.
4. Prince Edward Island is not included in this analysis as data was unavailable.

Source: Statistics Canada census data estimated for December 31, 2009 are used for denominator values. Prevalent breast cancers were excluded from the denominator: Person based prevalence on Jan 1, 2008 of women diagnoses with invasive breast cancer or DCIS from 1992 to 2007, by province (excluding Québec) and attained age group. Based on the July 2011 CCR file using IARC multiple primary rules (Statistics Canada).Québec prevalence estimated from Canadian average.

FIGURE 4

## Age distribution of program screens by province, 2007 and 2008 screen years




a Although Québec accepts women aged 35–49 and 70+ with physician referral, they are not officially considered within the program and are not included in this table.

b Information for Prince Edward Island was based on data external to the CBCSD and may differ from previous reports.

# Alberta Breast Cancer Screening Program

The Alberta Breast Cancer Screening Program (ABCSP) was launched in 2008 with a mandate to implement organized breast cancer screening province-wide. It is coordinated by Alberta Health Services – Cancer Screening Programs in association with the Alberta Society of Radiologists. The ABCSP is dedicated to supporting eligible women to have regular screening mammograms and timely follow-up testing within a high quality, population-based-program. Prior to this, Alberta's Screen Test program provided organized screening to a small proportion of Alberta's population while most women had access to opportunistic screening. The transition to province-wide organized screening through the ABCSP will enable more fulsome reporting in the next edition of this report.

The development of the ABCSP will allow women across Alberta to access organized breast cancer screening services which include the following:

- Provision of consistent and accurate information and education;
- Direct correspondence including invitations and result letters;
- Reminders for subsequent screening (women only) and follow-up tests (women and primary care provider) to be implemented in the near future.

### Participation

While participation in organized screening mammography in Alberta has been less than 10% (1999 – 2008), the implementation of the ABCSP is enabling more women to access breast cancer screening within an organized program. Mammography utilization among women 50–69 within a 30 month period was approximately 72% as of 2008 (Figure 5).

### Future Directions

In the next reporting period, an accurate representation of women participating in organized breast cancer screening in Alberta will be available.

Alberta Health Services

Alberta Breast Cancer Screening Program

Importantly, these participation rates do not include women who receive their breast cancer screening from outside of an organized program. When mammography through opportunistic screening[e] in addition to organized screening is considered, screening mammography utilization substantively increases. Data for mammography utilization include women 50 to 69 years of age with bilateral mammography (including screening mammography in organized programs, screening mammography outside of organized programs, and bilateral diagnostic mammography in provinces that included this in their mammography billing code). The range of screening mammography utilization shows some variation among provinces (60.9% to 71.6%) but large variation in the proportion of utilization attributable to organized screening (12.0% to 93.6%). Programs which appear to have low participation when only organized screening is measured are often those programs which have higher levels of screening occurring outside the organized programs.

e) Data for opportunistic screening were provided through the Ministry of Health from participating provinces and not obtained from the CBCSD. Opportunistic screening may be overestimated due to double counting (when screening occurs in both the organized and opportunistic sectors) and incorrect categorization (a proportion of opportunistic bilateral mammograms are preformed on symptomatic women and therefore truly diagnostic).

TABLE 3

## Annual screening volume by program, age 30+, 1988 to 2009 screen years

| Year | Program | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NT | BC | AB | SK | MB | ON | QC[a] | NB | NS | PE | NL | Canada |
| **1988** | . | 4,391 | . | . | . | . | . | . | . | . | . | 4,391 |
| **1989** | . | 9,188 | . | . | . | . | . | . | . | . | . | 9,188 |
| **1990** | . | 22,481 | 616 | 6,355 | . | 590 | . | . | . | . | . | 30,042 |
| **1991** | . | 54,563 | 5,873 | 14,305 | . | 15,380 | . | . | 1,876 | . | . | 91,997 |
| **1992** | . | 80,892 | 15,442 | 15,778 | . | 40,294 | . | . | 4,345 | . | . | 156,751 |
| **1993** | . | 100,275 | 16,146 | 26,057 | . | 45,541 | . | . | 4,886 | . | . | 192,905 |
| **1994** | . | 118,878 | 15,372 | 25,540 | . | 55,480 | . | . | 8,459 | . | . | 223,729 |
| **1995** | . | 143,407 | 14,170 | 29,603 | 2,671 | 58,287 | . | 5,885 | 12,475 | . | . | 266,498 |
| **1996** | . | 166,738 | 14,679 | 28,901 | 13,594 | 67,729 | . | 18,165 | 15,531 | . | 3,120 | 328,457 |
| **1997** | . | 173,905 | 23,337 | 33,915 | 19,163 | 80,132 | . | 18,528 | 19,461 | . | 4,694 | 373,135 |
| **1998** | . | 189,959 | 18,887 | 34,093 | 23,457 | 98,597 | 44,101 | 26,198 | 25,436 | . | 5,521 | 466,249 |
| **1999** | . | 217,548 | 22,408 | 35,049 | 28,204 | 114,059 | 145,131 | 31,162 | 29,259 | 5,578 | 6,087 | 634,485 |
| **2000** | . | 223,599 | 21,716 | 35,264 | 28,566 | 138,308 | 153,000 | 32,703 | 35,232 | 6,268 | 6,790 | 681,446 |
| **2001** | . | 224,559 | 23,745 | 36,283 | 28,728 | 163,862 | 172,121 | 33,835 | 35,227 | 6,700 | 8,054 | 733,114 |
| **2002** | . | 234,871 | 23,342 | 34,457 | 29,263 | 192,159 | 194,432 | 37,352 | 38,573 | 6,267 | 8,859 | 799,575 |
| **2003** | . | 221,031 | 21,809 | 35,641 | 31,636 | 211,848 | 207,850 | 37,593 | 44,943 | 6,094 | 11,038 | 829,483 |
| **2004** | 1,103 | 230,838 | 23,095 | 35,950 | 32,301 | 248,466 | 220,882 | 37,469 | 48,578 | 6,060 | 9,819 | 894,561 |
| **2005** | 1,137 | 256,954 | 22,215 | 35,547 | 33,698 | 280,051 | 237,709 | 40,038 | 50,813 | 7,261 | 14,812 | 980,235 |
| **2006** | 1,268 | 266,804 | 22,105 | 34,829 | 36,585 | 318,316 | 253,274 | 37,883 | 58,138 | 7,727 | 15,249 | 1,052,178 |
| **2007** | 1,206 | 279,282 | 22,393 | 37,282 | 36,464 | 371,931 | 272,161 | 39,869 | 62,686 | 9,335 | 16,751 | 1,149,360 |
| **2008** | 1,147 | 287,017 | 19,679 | 37,340 | 40,356 | 421,035 | 285,588 | 39,939 | 73,586 | 7,471 | 19,392 | 1,232,550 |
| **2009** | 1,189 | 299,431 | 15,321 | 36,572 | 45,384 | 458,207 | 305,127 | 41,232 | 75,309 | 7,576 | 18,840 | 1,304,188 |
| **Total** | **7,050** | **3,806,611** | **362,350** | **608,761** | **430,070** | **3,380,272** | **2,491,376** | **477,851** | **644,813** | **51,955** | **149,026** | **12,434,517** |

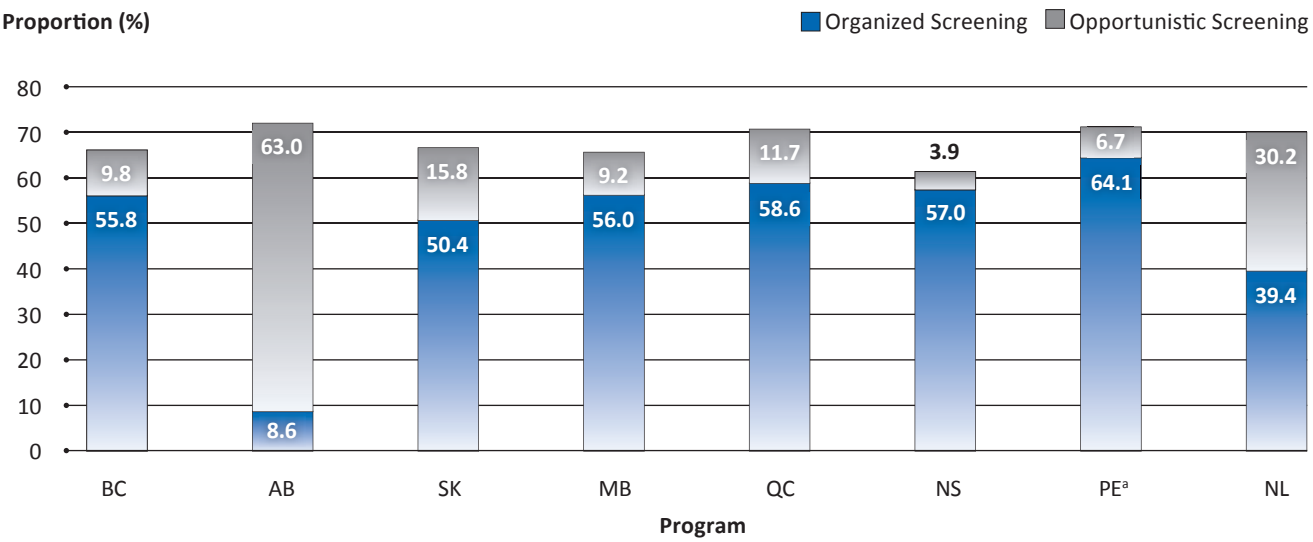
a Although Québec accepts women aged 35–49 and 70+ with physician referral, they are not officially considered within the program and are not included in this table.

Notes:

1. Nunavut does not have an organized screening program.
2. Data unavailable for Yukon.
3. Information for Prince Edward Island (2005–2009) was based on data external to the CBCSD and may differ from previous reports.
4. Data include all screens; figures have been updated and may vary slightly from previous reports.

FIGURE 5

## Mammography utilization among women 50–69 within a 30-month period by province in 2007–2008




a Organized screening data for Prince Edward Island was based on data external to the CBCSD and may differ from previous reports.

Notes:

1. Organized screening refers to participation in provincial organized breast cancer screening program within a 30-month period.

   Source: Canadian breast cancer screening database (CBCSD) July 1, 2006 – December 31, 2008.

2. Opportunistic screening refers to: (1) bilateral mammogam or (2) two unilateral mammograms performed the same calendar day. Both scenarios refer to mammograms performed outside the organized screening program and within a 30-month period. In all provinces, opportunistic screening includes some mammography on symptomatic women. In BC and SK opportunistic screening includes some women already counted in organized screening (double counting).

   Source: Provincial billing data July 1, 2006 – December 31, 2008.

3. Northwest Territories, Ontario and New Brunswick were not included in this analysis as data was unavailable.

### Retention Rate

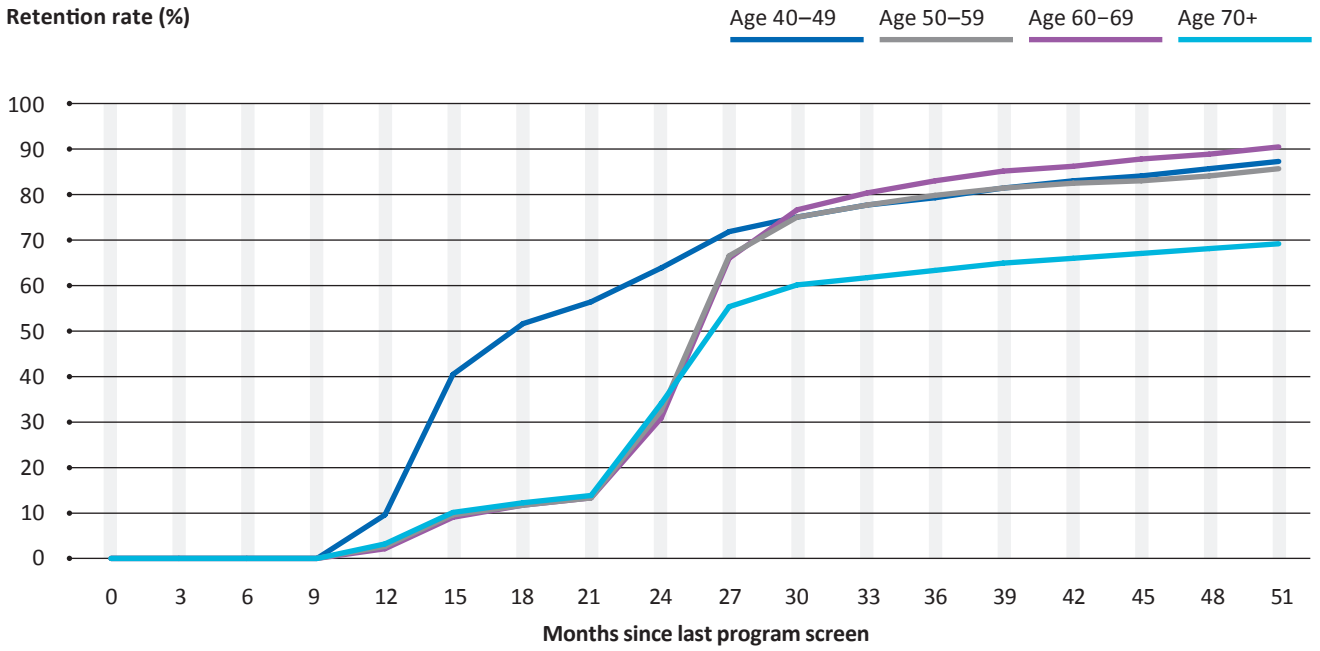
Optimal benefits from screening programs are achieved when regular participation occurs. Two targets have been set based on an understanding of participation rates, sojourn time, screening interval studies, and randomized controlled trials.[12] The first, for women undergoing their initial screening mammogram, states that ≥75% of women should return within 30 months. The second states that ≥90% of women undergoing a subsequent screen should return within 30 months. The retention rate for women aged 50 to 67 excludes women who did not return because of death, breast cancer, or age limit (greater than 67 years[f]).

Overall, most women aged 50 to 67 who received a screening mammogram between 2004 and 2005 were rescreened within 30 months until the year 2008. Among women who received their first screening mammogram in 2004 and 2005, 69.8% returned for a subsequent mammogram within 30 months. Among women aged 50 to 67 who received a subsequent screening mammogram in 2004 and 2005, 81.0% returned for a subsequent mammogram within 30 months (Table 6. pg 27, Table 7. pg 31, Table 8. pg 34).

In general, younger women (40 to 49 years) were more likely to return for subsequent screening within 30 months compared to older women (70+ years) regardless of whether it was an initial (70.1% and 45.9% respectively) or subsequent screen (82.0% and 62.0% respectively) (Table 7. pg 31). Women aged 40 to 49 who choose to have a screening mammogram are usually recommended for annual screens. Most women 50 to 67 years of age returned for subsequent screening between 21 and 27 months after their 2004 to 2005 screen but women between age 40 and 49 were more likely than older women to return between 12 and 15 months (Figure 6. pg 18).

FIGURE 6

**Cumulative probability of returning for a subsequent program screen by age group, 2004 and 2005 screen years**




Note:

1. Prince Edward Island is not included in this analysis as data was unavailable.

f) Women over the age of 67 are not considered eligible for the retention calculation because they are over the age of 69 in the subsequent screening cycle. In general, women over 69 are not the target population of this report.

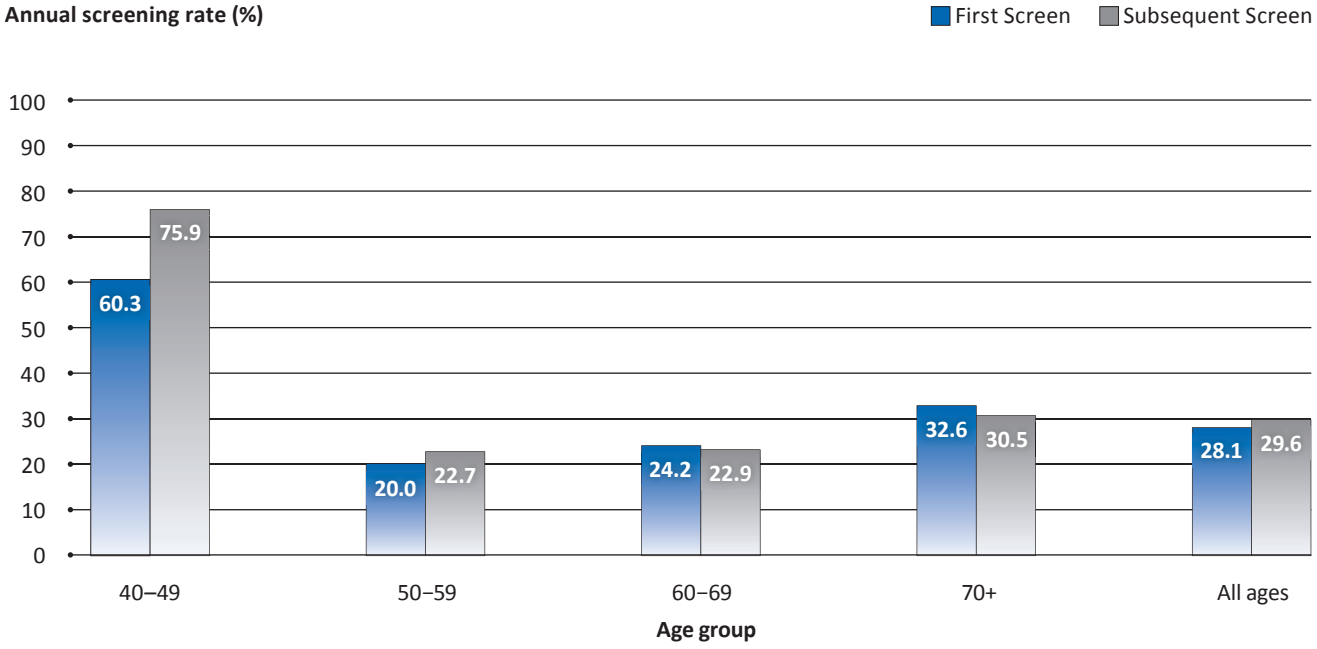
### Annual Screening Rate

Optimal benefits of screening are achieved by regular participation in a screening program. Therefore, most women are recalled every two years although some women are recalled on an annual basis for a variety of reasons including increased risk of breast cancer as defined by provincial screening policy. Although women recommended for annual screening are usually recalled within 12 months, any screens that occur up to 18 months are considered 'annual'.

Overall, most women aged 50 to 68 were classified as 'biennial screeners'. Among women who received their first screening mammogram in 2006, 20.8% returned for a subsequent mammogram within 18 months. Among women aged 50 to 68 who received a subsequent screening mammogram in the same time period, 22.8% returned for a subsequent mammogram within 18 months. (Table 6. pg 27, Table 7. pg 31, Table 8. pg 34) The majority of women aged 40 to 49 who were screening for their first or subsequent time were likely to be screened annually (60.3% and 75.9% respectively). (Figure 7. pg 19, Table 7. pg 31). There is also considerable variation between provinces ranging from 5.9% to 45.4% of women 50 to 69 years of age returning within 18 months.

FIGURE 7

**Cumulative probability of returning for a subsequent program screen within 18 months, by age group 2006 screen year**




Note:

1. Prince Edward Island is not included in this analysis as data was unavailable.

# Results of Organized Breast Cancer Screening Programs

The goals of organized screening programs are to identify disease in asymptomatic women and also to minimize the number of healthy women who receive abnormal screening results and associated follow-up tests. Both the abnormal call rate and the positive predictive value offer insight into the process of accurately identifying asymptomatic women with breast cancer.

## Abnormal Call Rate

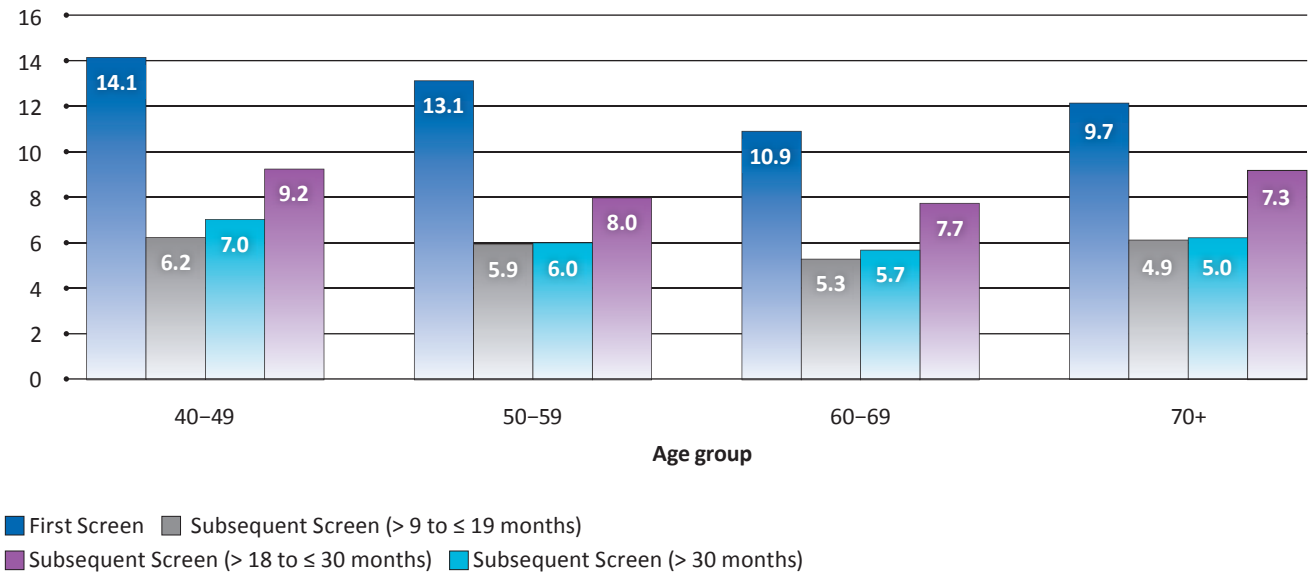
The abnormal call rate refers to the percentage of women screened who are referred for further testing because of abnormalities found during the screening mammogram.

The Canadian target is <10% for women undergoing their first screen and <5% of women undergoing their subsequent screen.[12]

Among women 50 to 69 years, the abnormal call rate for women receiving their first screening mammogram is 12.6% and for a subsequent screening mammogram is 6.0% (Table 6. pg 27). Radiologist inexperience and/or low reading volumes can contribute to unnecessarily high abnormal call rates, as can delays in rescreening. For all age groups, the abnormal call rate rises after a screening interval of 30 months indicating the importance of regular screening intervals (Figure 8. pg 20).

FIGURE 8

### Abnormal call rate by age group, 2007 and 2008 screen years




Notes:

1. The median time for women to return for screening and the total screens in each group is as follows:
   First screen: N=493,562 screens;
   Subsequent screen (>9 months – ≤18 months) by 12.7 months, N= 544,318 screens;
   Subsequent screen (>18 months – ≤30 months) by 24.4 months, N= 1,063,575 screens;
   Subsequent screen (>30 months) by 40.2 months, N= 252,726 screens.
2. Prince Edward Island is not included in this analysis as data was unavailable.

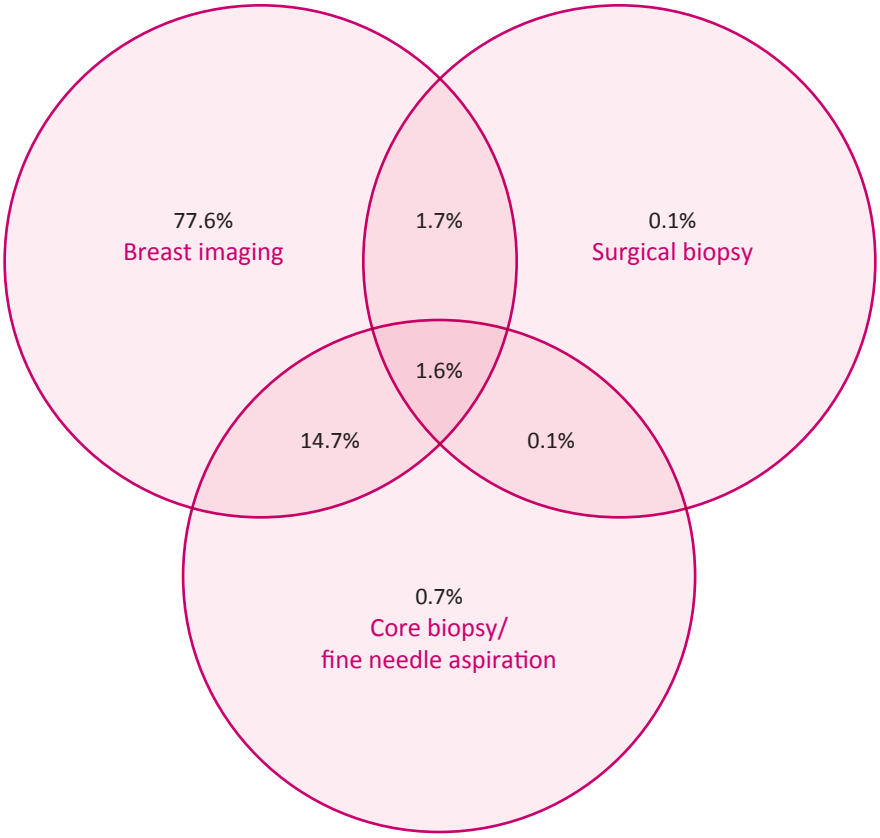
### Positive Predictive Value

The positive predictive value is the proportion of women with an abnormal call who are diagnosed with invasive or *in situ* cancer. A high positive predictive value reflects the minimization of unnecessary follow-up procedures. The Canadian target is ≥5% for first screens and ≥6% for subsequent screens.[12]

Among women aged 50 to 69 years, the positive predictive value meets the targets for subsequent screening (7.7%) and is close to meeting the target for initial screens (4.8%). Positive predictive value is sensitive to the age distribution of the screened population which is why Canadian targets are applicable for women 50 to 69 years of age. The positive predictive value increased dramatically with age from 2.2% for women between 40 and 49 years of age undergoing their initial screening mammogram to 14.1% for women over 70 years of age undergoing their a subsequent screening mammogram (Table 6. pg 27, Table 7. pg 31, Table 8. pg 34).

FIGURE 9

**Combinations of diagnostic procedures after an abnormal screen, women aged 50–69, 2007 and 2008 screen years**




3.6% of women had none of the above procedures[a].

a For women who had none of the above procedures, 91.9% had a diagnostic procedure of surgical consult, referral to primary care provider or other (not specified). Québec data included for all procedures above but not calculated for other diagnostic tests.

Note:

1. Prince Edward Island is not included in this analysis as data was unavailable.

# Diagnostic Process used by Organized Breast Cancer Screening Programs

As suggested by the positive predictive value, most women who receive abnormal screening results are not diagnosed with breast cancer; however, additional assessment is required to determine a definitive diagnosis. The provision of timely, well coordinated, and minimized follow-up assessment has been shown to reduce fear and anxiety associated with abnormal results.[2] Women who receive abnormal screening results require additional radiological or surgical assessment including diagnostic mammography, ultrasonography, core or open biopsy, and/or fine needle aspiration.

In 2007 and 2008, 77.6% of women who received an abnormal screen were followed-up with additional breast imaging only. Breast imaging includes diagnostic mammography, ultrasound, or magnetic resonance imaging (MRI). A further 14.7% received breast imaging combined with core biopsy or fine needle aspiration; similar to the 13.6% in the previous reported interval (2005 and 2006) (Figure 9. pg 21). Lastly, there continues to be a shift from the use of open biopsy to core biopsy in 2007 and 2008 compared to the previous reported interval 2005 and 2006. Core biopsy increased from 14.0% (15,757 women) to 15.5% (21,365 women) and open biopsy decreased from 4.3% (4,888 women) to 3.5% (4,798 women) (Table 4. pg 22).

### Diagnostic Interval

The diagnostic interval is the duration of time from the abnormal screening mammogram to a final diagnosis. Long diagnostic intervals can have negative psychological impact and potentially worsen prognosis.[2,11] The Canadian target is ≥90% of abnormal screens will be resolved with 5 weeks if no tissue biopsy is required and ≥90% within 7 weeks if a tissue biopsy is ever required during diagnostic follow-up.[12]

Nationally, 76.3% of women who did not require a tissue biopsy received resolution within five weeks and 47.7% of women who required a tissue biopsy received resolution within seven weeks. The proportion of women who did not require tissue biopsy and received resolution within five weeks has stabilized at approximately 76%. The proportion of women who required at least one tissue biopsy who received resolution within seven weeks has

**TABLE 4**

**Diagnostic procedures after an abnormal screen, women aged 50–69, 2007 and 2008 screen years**

| Diagnostic procedure | Number | %[a] | Range %[b] |
|---|---|---|---|
| **Diagnostic mammogram** | 111,989 | 81.2 | 58.4 – 93.5 |
| **Ultrasound**[c] | 78,215 | 56.7 | 30.7 – 78.2 |
| **Fine-needle aspiration** | 2,840 | 2.1 | 0.2 – 4.0 |
| **Core biopsy** | 21,365 | 15.5 | 11.6 – 31.3 |
| **Open biopsy with or without fine wire localization** | 4,798 | 3.5 | 1.1 – 8.1 |

a Proportion of all abnormal screens that had this diagnostic procedure.

b Range among provinces.

c Ultrasound may be underestimated in Québec as tests performed outside the program are not included.

Notes:

1. Proportions will not add up to 100% since a woman is likely to have a combination of procedures performed during her work-up.
2. Resolution of an abnormal screen is set at a maximum of 6 months post screen.
3. Prince Edward Island is not included in this analysis as data was unavailable.

also been relatively stable over time (Table 6. pg 27, Table 7. pg 31, Table 8. pg 34).

### Biopsy with Non-malignant Result

The rate of biopsy with non-malignant result can provide an indication of the quality of pre-surgical assessment but no target has been set for this indicator.[12] Programs should strive to limit the number of unnecessary tests while maximizing the screen-detected cancers. This indicator is most meaningful when considered in relation to the cancer detection rate and the post-screen-detected cancer rate. Abnormal screens and associated follow-up with biopsies will generally be higher for initial screens than for subsequent screens. The open and core biopsy rate were analyzed together as this provides a description of the number of biopsies women are exposed to following an abnormal screen. However, the percentage of non-malignant open surgical biopsies within the total number of benign biopsies should be considered when interpreting the biopsy rates. Variation in the use of open biopsy is reflected in the percentage of non-malignant biopsies which were open.

In 2007 and 2008, the rate of biopsy with non-malignant result was 18.3 and 7.2 per 1,000 screens (initial and subsequent screens respectively). The biopsy rate is lower among older women (70+ years) undergoing their first screening mammogram compared to younger women. The rates among women undergoing subsequent screening mammograms show little variation by age group (Table 6. pg 27, Table 7. pg 31, Table 8. pg 34). Lastly, approximately 15% to 20% of biopsies with non-malignant results were open surgical biopsies. This varied considerably with age, time period, and program. Younger women and women who received diagnostic work-up in more distant time periods had more open surgical biopsies. The use of open biopsies ranges from 7.7% to 39.8% among provinces likely reflecting differing practices.

# Cancer Detection by Organized Breast Cancer Screening Programs

In total, organized screening programs detected 9,266 cancers (invasive, *in situ* and unclassified types combined) among women aged 50 to 69 during 2007 and 2008 (Table 6. pg 27). In order to ensure consistency between provinces this report identifies screen-detected cancers as those diagnosed within 6 months from the screen date. Other breast cancers among Canadian women were detected by opportunistic screening (outside of an organized program) or when a woman became symptomatic.

Among all women diagnosed with cancer through an organized screening program (≥40 years), 80.0% (9,031 women) were diagnosed with invasive cancer and 20.0% (2,252 women) were diagnosed with *in situ* cancer. The proportion of women diagnosed with an invasive breast cancer increased with age; 67.2% of women aged 40 to 49 were diagnosed with an invasive cancers compared to 85.3% of women 70 years of age or older. Women aged 50 to 59 and 60 to 69 were diagnosed with 77.5% and 82.0% invasive respectively (Table 5. pg 24).

### *In Situ* Cancer Detection Rate

Ductal carcinoma *in situ* (DCIS) is a form of cancer detected through mammography screening but there is limited evidence supporting the transition of all forms of DCIS to invasive cancer. Because of this, no target has been set for *in situ* cancer detection rates in Canada.[12] However, it is important to monitor rates of detection until appropriate targets can be set.

In Canada, women (50 to 69 years) undergoing their first screen had a DCIS detection rate of 1.2 cases per 1,000 screens. Women undergoing subsequent screens had a DCIS detection rate of 0.9 cases per 1,000 screens (Table 6. pg 27).

TABLE 5

## Characteristics of screen-detected cancers by age group, 2007 and 2008 screen years

| | | Age group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 40–49 | | 50–59 | | 60–69 | | 70+ | | All ages | |
| | | n | % | n | % | n | % | n | % | n | % |
| **Number of cancers**[a] | Invasive | 367 | 67.2 | 3,377 | 77.5 | 3,829 | 82.0 | 1,458 | 85.3 | 9,031 | 80.0 |
| | DCIS | 179 | 32.8 | 981 | 22.5 | 841 | 18.0 | 251 | 14.7 | 2,252 | 20.0 |
| **TNM staging**[b] | 0 (*in situ*) | 177 | 34.2 | 599 | 23.0 | 568 | 19.8 | 250 | 16.7 | 1,594 | 21.3 |
| | I | 201 | 38.8 | 1,195 | 45.9 | 1,508 | 52.5 | 830 | 55.4 | 3,734 | 49.8 |
| | II | 109 | 21.0 | 662 | 25.4 | 659 | 22.9 | 336 | 22.4 | 1,766 | 23.6 |
| | III / IV | 31 | 6.0 | 149 | 5.7 | 139 | 4.8 | 81 | 5.4 | 400 | 5.3 |
| | Invasive (TNM stage missing)[c] | 26 | . | 1,397 | . | 1,541 | . | 214 | . | 3,178 | . |
| **Tumour size**[bd] | > 0 to < 2 mm | 10 | 2.9 | 34 | 2.0 | 33 | 1.8 | 11 | 1.0 | 88 | 1.7 |
| | 2 to 5 mm | 31 | 8.9 | 104 | 6.2 | 136 | 7.3 | 77 | 6.7 | 348 | 6.9 |
| | 6 to 10 mm | 71 | 20.3 | 411 | 24.5 | 463 | 24.8 | 312 | 27.3 | 1,257 | 25.0 |
| | 11 to 15 mm | 102 | 29.1 | 442 | 26.4 | 517 | 27.7 | 331 | 29.0 | 1,392 | 27.6 |
| | 16 to 20 mm | 48 | 13.7 | 290 | 17.3 | 312 | 16.7 | 167 | 14.6 | 817 | 16.2 |
| | ≥ 21 mm | 88 | 25.1 | 395 | 23.6 | 405 | 21.7 | 245 | 21.4 | 1,133 | 22.5 |
| | Size unknown[e] | 17 | . | 1,701 | . | 1,963 | . | 307 | . | 3,988 | . |
| | Median tumour size (mm) | 14 | . | 14 | . | 14 | . | 13 | . | 14 | . |
| **Positive nodes**[bdf] | 0 | 253 | 72.9 | 1,181 | 72.9 | 1,396 | 77.6 | 858 | 78.7 | 3,688 | 76.0 |
| | 1 to 3 | 69 | 19.9 | 343 | 21.2 | 312 | 17.4 | 177 | 16.2 | 901 | 18.6 |
| | 4+ | 25 | 7.2 | 95 | 5.9 | 90 | 5.0 | 55 | 5.0 | 265 | 5.5 |
| **Nodal status unknown**[ghi] | | 20 | . | 1,758 | . | 2,031 | . | 360 | . | 4,169 | . |

a Unclassified cancers are not included in this analysis.

b Saskatchewan, Manitoba and New Brunswick use a Collaborative Stage algorithm to determine tumour size, nodal status and stage.

c Québec and Prince Edward Island do not provide TNM staging and accounts for 76.9% and 1.7% of all cases in the 'Invasive TNM stage missing' category respectively.

d This analysis includes invasive cancers only.

e Ontario, Québec and Prince Edward Island do not routinely provide tumour size and account for 36.2% 61.3% and 1.4% of all cases in the 'Tumour size unknown' category respecitvely.

f Includes pathologically positive nodes only.

g Includes missing values (98.2%) and cases in which dissection was not done (1.8%) .

h Ontario and New Brunswick have 24.0% and 24.5% positive nodes respectively but number of positive nodes is not provided.

i Ontario, Québec, New Brunswick and Prince Edward Island do not routinely provide positive nodes and account for 36.3%, 58.6%, 2.7% and 1.3% of all cases in this category respectively.

Notes:

1. Alberta is not included in this analysis as data was unavailable.

### Invasive Cancer Detection Rate

The targets for invasive cancer detection rates established in Canada are >5 per 1,000 first screens and >3 per 1,000 subsequent screens.[12]

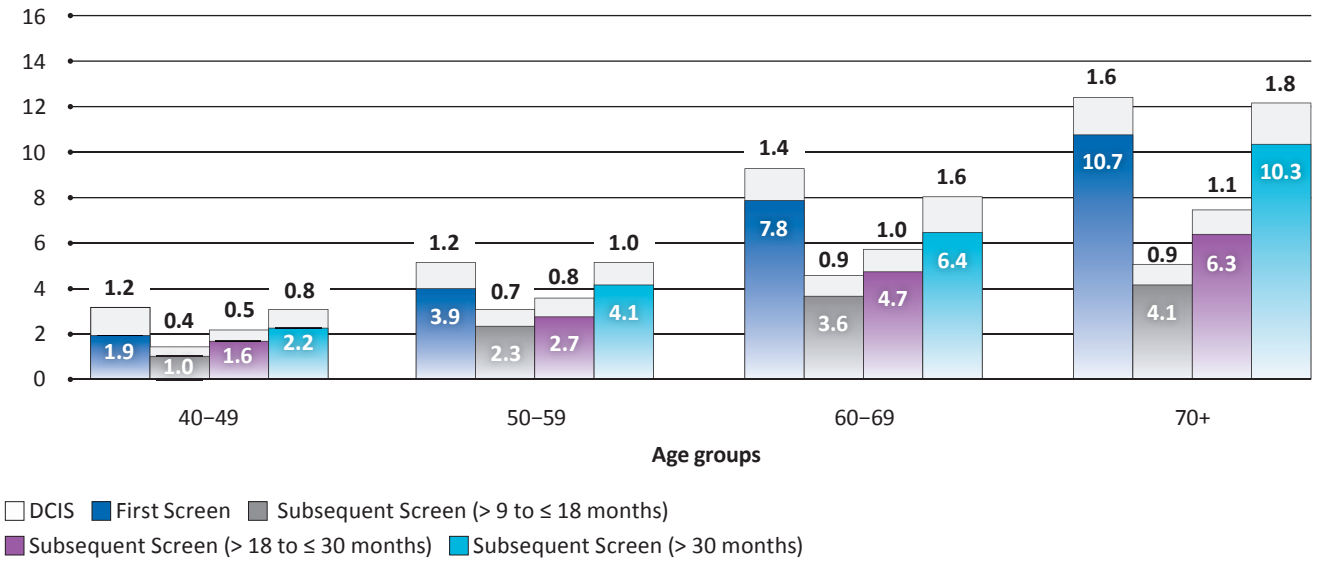
In Canada, women (50–69 years) undergoing their first screen had an invasive cancer detection rate of 4.7 cases per 1,000 screens. Women undergoing subsequent screens had an invasive cancer detection rate of 3.7 cases per 1,000 screens (Table 6. pg 27). As anticipated, the invasive cancer detection rates were highest among initial screens, increased in older women, and when subsequent screening was not timely (Figure 10. pg 25).

### Invasive Tumour Size and Negative Node Rate

Cancer detected at earlier stages has more treatment options, less recurrence, and improved survival. Research in Canada has shown that among women diagnosed with breast cancer, participants of organized breast cancer screening programs have more breast conserving surgery and receive less chemotherapy compared to non-participants.[4] In addition, 97.9% of women with stage I breast cancer survive at least five years while only 27.9% of women diagnosed in stage IV survive for five years.[17] Early stage cancer has smaller tumours and no lymph node involvement. The Canadian target is for greater than 50% of invasive tumours to be ≤15mm.[12] The second target is for >70% of women with invasive cancer to have no lymph node involvement.[12]

FIGURE 10

## Cancer detection (Invasive and *In situ*) rate per 1,000 screens by age group, 2007 and 2008 screen years




Notes:

1. The shaded area indicates the rate of invasive cancers detected, while the non-shaded area indicates the rate of DCIS cancers detected.
2. The median time for women to return for screening and the total screens in each group is as follows:
   First screen: N= 4843,794 screens;
   Subsequent screen (>9 months to ≤18 months) by 12.7 months, N=534,364 screens;
   Subsequent screen (>18 months to ≤30 months) by 24.4 months, N=1,042,781 screens;
   Subsequent screen (>30 months) by 40.1 months, N= 248,668 screens.
3. Alberta and Prince Edward Island are not included in this analysis as data was unavailable.

Among women greater than 40 years of age diagnosed with breast cancer in 2007 and 2008, 49.8% of tumours were classified as stage I and 5.3% were classified as stage III/IV (Table 5. pg 24). Among women aged 50 to 69, the proportion of invasive tumours less than 15 mm was 60.4% and over 75% of women had negative lymph nodes at diagnosis (Table 6. pg 27). A larger proportion of older women had tumours smaller than 15 mm at diagnosis (range: 59.1% to 64.0%) and negative lymph nodes at diagnosis (range: 72.6% to 78.4%) compared to younger women (Table 7. pg 31).

# Post-Screen Invasive Cancers

Post-screen invasive cancers are cancers that develop after a normal screening mammogram but before the next screen. The post-screen invasive cancer rate is an indicator of the sensitivity of the screening program. Post-screen invasive cancers include two types of cancers: those that occur after the recommended 24 months (12 months among some women) among women who do not return for their regular annual or biennial screen respectively ("non-compliant" cancers), or among women who become symptomatic before their next regular screen (interval cancers). Post-screen invasive cancer rates were calculated based on all women screened from 2004 to 2005 who developed an interval cancer during 2007 to 2008. In order to ensure consistency between provinces, this report also includes interval cancers detected by a screening mammogram that took longer than 6 months to diagnosis.

The target is for less than 6 women per 10,000 person years to be diagnosed with a post screen cancer within 12 months of screening and less than 12 women per 10,000 person years within 12–24 months.[12]

Nationally, the post-screen invasive cancer rate was 7.5 per 10,000 person years within 12 months and 11.7 per 10,000 person years between 12 and 24 months (Table 6. pg 27).

# Sensitivity of the Screening Mammography Program

Sensitivity indicates how well screening mammography detects cancers and is defined as the proportion of breast cancer cases that were correctly identified at the time of the screening mammogram. Programs with poor sensitivity are likely to have high post-screen invasive cancers rates. The calculation of sensitivity has an inherent weakness: true interval cancers can not be separated from cancer missed at screening which can make it more difficult for programs to report high levels of sensitivity. The follow-up period for determining interval cancers was also limited to 12 months to allow comparability between provinces with differing rates of annual screening. The sensitivity is affected by underlying incidence rates, age, rate of disease progression, opportunistic screening, and screening interval recommendation. In addition, the accuracy of this measure depends on the completeness of cancer registration.[12] Lastly, this indicator excludes women undertaking their first screening mammogram within an organized program.

Among women aged 50 to 69 years, the sensitivity for subsequent screening mammography is 84.4%. Sensitivity increased with age from 68.1% for women between 40 and 49 years of age to 87.8% in women over 70 years of age (Table 6. pg 27, Table 7. pg 31, Table 8. pg 34). Variation by province and territory is not extreme (82.1% to 90.7%) and higher values may reflect incomplete data within the cancer registry.

TABLE 6

## Evaluation indicators by program, women aged 50–69, 2007 and 2008 screen years

| Indicator | Target | Program | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NT | BC | AB | SK | MB | ON | QC | NB | NS | PE[a] | NL | Canada |
| **Number of screens** | | | | | | | | | | | | | |
| | N/A | 982 | 306,916 | 29,525 | 58,760 | 74,979 | 682,136 | 557,749 | 56,836 | 76,890 | 10,815 | 32,910 | 1,888,498 |
| **Number of first screens** | | | | | | | | | | | | | |
| | N/A | 148 | 24,050 | 5,883 | 9,778 | 15,278 | 199,016 | 122,492 | 4,675 | 9,796 | * | 6,385 | 397,501 |
| **Number of cancers**[bc] | | | | | | | | | | | | | |
| | N/A | x | 1,414 | 135 | 290 | 392 | 3,106 | 3,135 | 233 | 363 | 49 | 149 | 9,266 |
| **Participation rate within a 30-month period (%)**[d] | | | | | | | | | | | | | |
| | ≥70 | 31.0 | 55.8 | 8.6 | 50.4 | 56.0 | 40.0 | 58.6 | 57.9 | 57.0 | 64.1 | 39.4 | 45.9 |
| **Retention rate (% screened within 30 months of an initial screen)**[e] | | | | | | | | | | | | | |
| | ≥75 | 65.9 | 56.8 | 55.8 | 65.9 | 69.1 | 76.6 | 65.8 | 55.8 | 64.1 | * | 81.8 | 69.8 |
| **Retention rate (% screened within 30 months of a subsequent screen)**[eg] | | | | | | | | | | | | | |
| | ≥90 | N/A[k] | 80.5 | 73.8 | 81.9 | 82.7 | 85.9 | 79.2 | 73.1 | 75.6 | * | 84.6 | 81.0 |
| **Annual screening rate (% screened within 18 months of an initial screen)**[f] | | | | | | | | | | | | | |
| | N/A | 31.2 | 9.3 | 27.8 | 11.1 | 10.2 | 32.3 | 5.9 | 13.3 | 27.9 | * | 35.7 | 20.8 |
| **Annual screening rate (% screened within 18 months of a subsequent screen)**[f] | | | | | | | | | | | | | |
| | N/A | 30.8 | 17.9 | 19.3 | 25.3 | 10.4 | 39.0 | 7.9 | 24.7 | 35.0 | * | 45.4 | 22.8 |
| **Abnormal call rate (%)**[h] | | | | | | | | | | | | | |
| Initial screen | <10 | 14.9 | 16.0 | 7.3 | 13.0 | 9.1 | 11.2 | 15.1 | 15.3 | 10.9 | * | 11.2 | 12.6 |
| Subsequent screen | <5 | 8.6 | 5.7 | 2.9 | 4.3 | 4.3 | 5.9 | 7.2 | 6.7 | 4.6 | * | 5.0 | 6.0 |
| **Invasive cancer detection rate (per 1,000 screens)**[c] | | | | | | | | | | | | | |
| Initial screen | >5 | x | 6.6 | * | 4.7 | 4.6 | 4.2 | 5.0 | 3.4 | 6.3 | * | 5.0 | 4.7 |
| Subsequent screen | >3 | x | 3.3 | * | 3.7 | 4.1 | 3.5 | 4.2 | 3.0 | 3.5 | * | 3.4 | 3.7 |

| Indicator | Target | Program | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NT | BC | AB | SK | MB | ON | QC | NB | NS | PE[a] | NL | Canada |
| ***In situ* cancer detection**[c] | | | | | | | | | | | | | |
| Initial screen (per 1,000 screens) | N/A | x | 1.7 | * | 1.2 | 1.1 | 0.9 | 1.6 | 1.3 | 1.7 | * | x | 1.2 |
| Percentage *in situ* | N/A | x | 20.2 | * | 20.7 | 19.3 | 18.1 | 24.6 | 27.3 | 21.5 | * | x | 20.9 |
| Subsequent screen (per 1,000 screens) | N/A | x | 1.0 | * | 1.0 | 1.0 | 0.7 | 1.0 | 1.0 | 0.7 | * | 0.9 | 0.9 |
| Percentage *in situ* | N/A | x | 24.1 | * | 22.0 | 20.1 | 17.4 | 19.6 | 24.9 | 16.9 | * | 20.4 | 19.9 |
| **Diagnostic interval (%)** | | | | | | | | | | | | | |
| Notified of results within 2 weeks of screening exam | ≥90 | 70.7 | 94.2 | 95.0 | * | 98.9 | 95.3 | * | * | * | * | 95.4 | 95.2 |
| Completed first diagnostic assessment within 3 weeks[i] | ≥90 | 29.1 | 65.5 | 41.5 | 50.1 | 60.0 | 70.5 | 47.6[j] | 54.9 | 35.9 | * | 75.9 | 59.5 |
| Final diagnosis (with no tissue biopsy), within 5 weeks[ik] | ≥90 | 46.6 | 76.0 | 41.7 | 81.4 | 81.7 | 84.4 | 66.9[j] | 79.2 | 74.6 | * | 70.8 | 76.3 |
| Final diagnosis (with tissue biopsy), within 7 weeks[ik] | ≥90 | x | 47.2 | 49.4 | 47.4 | 54.5 | 56.7 | 39.0[j] | 46.4 | 51.9 | * | 46.6 | 47.7 |

| Indicator | Target | Program | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NT | BC | AB | SK | MB | ON | QC | NB | NS | PE[a] | NL | Canada |
| **Positive predictive value of the screening mammography program (%)[bc]** | | | | | | | | | | | | | |
| Initial screen | ≥5 | x | 5.2 | 8.0 | 4.6 | 6.4 | 4.8 | 4.5 | 3.1 | 7.4 | * | 5.1 | 4.8 |
| Subsequent screen | ≥6 | x | 7.6 | 15.1 | 11.1 | 11.8 | 7.3 | 7.4 | 6.1 | 9.2 | * | 8.6 | 7.7 |
| **Non-malignant biopsy rate[lm]** | | | | | | | | | | | | | |
| Initial screen (per 1,000 screens) | N/A | x | 24.0 | 12.9 | 17.9 | 20.0 | 13.8 | 23.4[j] | 21.0 | 35.7 | * | 12.5 | 18.3 |
| Percentage open | N/A | x | 34.1 | 14.5 | 30.3 | 21.3 | 14.0 | 13.0[j] | 30.6 | 7.7 | * | 26.3 | 15.9 |
| Subsequent screen (per 1,000 screens) | N/A | 10.8 | 5.9 | 3.3 | 4.5 | 6.0 | 6.0 | 9.2[j] | 7.3 | 12.2 | * | 5.0 | 7.2 |
| Percentage open | N/A | x | 39.8 | 17.9 | 29.9 | 19.5 | 16.3 | 13.4[j] | 22.5 | 8.9 | * | 27.1 | 19.1 |
| **Screen-detected invasive cancer tumour size (%)[cno]** | | | | | | | | | | | | | |
| ≤15 mm | >50 | x | 63.0 | * | 63.3 | 57.5 | 57.5 | * | 63.6 | 63.2 | * | 61.5 | 60.4 |
| **Proportion of node negative screen-detected invasive cancer (%)[cnop]** | | | | | | | | | | | | | |
| | >70 | x | 74.7 | * | 75.3 | 76.8 | 75.2 | * | 77.2 | 77.2 | * | 72.7 | 75.3 |
| **Post-screen invasive cancer rate (per 10,000 person-years)[q]** | | | | | | | | | | | | | |
| 0 to <12 months | <6 | * | 6.8 | * | 5.8 | 9.2 | 8.0 | * | 8.0 | 5.4 | * | 7.0 | 7.5 |
| 12 to 24 months | <12 | * | 12.5 | * | 16.3 | 11.9 | 10.4 | * | 16.2 | 9.4 | * | 7.5 | 11.7 |
| **Sensitivity of the screening mammography program (%)[r]** | | | | | | | | | | | | | |
| Subsequent screens | N/A | * | 85.2 | 90.7 | 88.5 | 84.5 | 82.1 | * | 83.5 | 86.2 | * | 88.3 | 84.4 |

a Information for Prince Edward Island was based on data external to the CBCSD and may differ from previous reports.

b Includes invasive, *in situ*, and unclassified cancers. Does not include bilateral cancers (Cases of bilateral cancer = BC (20), SK (4), MB (5), ON (86)).

c Excludes cancers diagnosed beyond 6 months post screen.

d Statistics Canada census data estimated for December 31, 2008 are used for denominator values. Prevalent breast cancers were excluded from the denominator.

e Data for 2004 and 2005 screen years are used.

f Data for 2006 is used.

g Northwest Territories is excluded from this measure as data is not available for rescreens in 2004–2005 (program began in 2004).

h Total abnormal screens (Intial + Rescreen)for Prince Edward Island = 961.

i Excludes tests beyond 6 months post screen.

j Québec data is based on aggregate numbers which may be calculated using a different method.

k Tissue biopsy does not include fine needle aspiration (FNA). Time to diagnosis is based on the date of the first pathological biopsy result of breast cancer (excludes FNA and all inconclusive procedures) or the date of the last benign test or pathological biopsy.

l Includes all core or open biopsies with a non-malignant test result (may include multiple tests per woman).

m Open biopsies include direct to open surgical biopsy diagnosis and cases who underwent an inconclusive core biopsy prior to a definitive diagnosis by open surgical biopsy.

n Missing values are excluded from calculations. Expressed as a proportion of screen-detected invasive cancers with complete data on tumour size or number of positive nodes.

o Saskatchewan, Manitoba and New Brunswick use a Collaborative Stage algorithm to determine tumour size and nodal status.

p Ontario (2007–2008) and New Brunswick (2007) and do not provide the number of pathologically positive nodes; rate is calculated based on N stage of disease data.

q Calculated based on all women screened from 2004–2005 who developed a post-screen cancer during 2004–2007. Post-screen cancers include all invasive cancers diagnosed <24 months after a normal or benign screen or screen-detected cancers (referred) that took >6 months to diagnosis (beyond the 'normal screening episode'). Post-screen cancers also include screen-detected cancers referred by CBE alone. This affects the rates for Manitoba, Ontario and Newfoundland and Labrador. This calculation method has been updated from previous reports.

r Calculated based on all women screened from 2004–2005 who developed a post-screen cancer during 2004–2006. Post-screen cancers include all invasive or DCIS cancers diagnosed <12 months after a normal or benign screen or screen-detected cancers (referred) that took >6 months to diagnosis (beyond the 'normal screening episode'). Post-screen cancers also include screen-detected cancers referred by CBE alone. This affects the rates for Manitoba, Ontario and Newfoundland and Labrador.

Notes:

* Province/territory is excluded from this measure (information unavailable). Canadian total excludes indicated province(s)/territory.

x Province/territory is excluded from this measure due to small values (Numerator <5 and/or denominator <30). Canadian total excludes indicated province(s)/territory.

TABLE 7

## Evaluation indicators by age group, 2007 and 2008 screen years

| Indicator | Target | Age group[a] | | | | |
|---|---|---|---|---|---|---|
| | | 40–49 | 50–59 | 60–69 | 70+ | All ages |
| **Number of screens**[b] | | | | | | |
| | N/A | 268,956 | 1,105,609 | 782,889 | 223,310 | 2,380,764 |
| **Number of first screens** | | | | | | |
| | N/A | 77,613 | 318,726 | 78,775 | 20,955 | 496,069 |
| **Number of cancers**[bcde] | | | | | | |
| | N/A | 561 | 4,486 | 4,780 | 1,767 | 11,594 |
| **Participation rate within a 30-month period (%)**[f] | | | | | | |
| | ≥70 | 7.1 | 42.8 | 50.2 | 15.9 | 27.2 |
| **Retention rate (% screened within 30 months of an initial screen)**[gh] | | | | | | |
| | ≥75 | 70.1 | 70.2 | 68.2 | 45.9 | 68.3 |
| **Retention rate (% screened within 30 months of a subsequent screen)**[egh] | | | | | | |
| | ≥90 | 82.0 | 80.6 | 81.7 | 62.0 | 77.3 |
| **Annual screening rate (% screened within 18 months of an initial screen)**[gi] | | | | | | |
| | ≥75 | 60.3 | 20.0 | 24.2 | 32.6 | 28.1 |
| **Annual screening rate (% screened within 18 months of a subsequent screen)**[gi] | | | | | | |
| | ≥90 | 75.9 | 22.7 | 22.9 | 30.5 | 29.6 |
| **Abnormal call rate (%)**[j] | | | | | | |
| Initial screen | <10 | 14.1 | 13.1 | 10.9 | 9.6 | 12.7 |
| Subsequent screen | <5 | 6.6 | 6.2 | 5.8 | 5.3 | 6.0 |
| **Invasive cancer detection rate (per 1,000 screens)**[dek] | | | | | | |
| Initial screen | >5 | 1.9 | 3.9 | 7.8 | 10.6 | 4.5 |
| Subsequent screen | >3 | 1.2 | 2.8 | 4.7 | 6.3 | 3.7 |
| ***In situ* cancer detection**[dek] | | | | | | |
| Initial screen (per 1,000 screens)[l] | N/A | 1.2 | 1.2 | 1.4 | 1.6 | 1.2 |
| Percentage *in situ*[l] | N/A | 38.7 | 23.4 | 15.5 | 12.8 | 21.7 |
| Subsequent screen (per 1,000 screens) | N/A | 0.5 | 0.8 | 1.1 | 1.1 | 0.9 |
| Percentage *in situ* | N/A | 28.9 | 22.1 | 18.4 | 15.1 | 19.4 |

| Indicator | Target | Age group[a] | | | | |
|---|---|---|---|---|---|---|
| | | 40–49 | 50–59 | 60–69 | 70+ | All ages |
| **Diagnostic interval (%)** | | | | | | |
| Notified of results within 2 weeks of screening exam[m] | ≥90 | 94.3 | 94.9 | 95.6 | 95.6 | 95.1 |
| Completed first diagnostic assessment within 3 weeks[no] | ≥90 | 59.1 | 58.7 | 60.9 | 66.7 | 60.0 |
| Final diagnosis (with no tissue biopsy), within 5 weeks[nop] | ≥90 | 75.7 | 75.8 | 77.2 | 81.1 | 76.5 |
| Final diagnosis (with tissue biopsy), within 7 weeks[enop] | ≥90 | 45.8 | 46.2 | 50.0 | 55.1 | 48.2 |
| **Positive predictive value of the screening mammography program (%)[cde]** | | | | | | |
| Initial screen | ≥5 | 2.2 | 4.0 | 8.6 | 13.3 | 4.6 |
| Subsequent screen | ≥6 | 2.6 | 5.8 | 10.0 | 14.1 | 7.8 |
| **Non-malignant biopsy rate[oqr]** | | | | | | |
| Initial screen (per 1,000 screens)[c] | N/A | 21.7 | 18.9 | 15.9 | 12.7 | 18.6 |
| Percentage open[e] | N/A | 22.2 | 15.7 | 16.9 | 15.1 | 17.1 |
| Subsequent screen (per 1,000 screens) | N/A | 7.0 | 7.2 | 7.1 | 5.6 | 7.0 |
| Percentage open[e] | N/A | 30.2 | 19.9 | 18.2 | 23.3 | 20.6 |
| **Screen-detected invasive cancer tumour size (%)[dest]** | | | | | | |
| ≤15 mm | >50 | 61.1 | 59.1 | 61.6 | 64.0 | 61.3 |
| **Proportion of node negative screen-detected invasive cancer (%)[detuv]** | | | | | | |
| | >70 | 72.7 | 72.6 | 77.7 | 78.4 | 75.9 |
| **Post-screen invasive cancer rate (per 10,000 person-years)[wx]** | | | | | | |
| 0 to <12 months | <6 | 6.5 | 6.8 | 8.5 | 8.7 | 7.5 |
| 12 to 24 months | <12 | 11.3 | 11.3 | 12.4 | 15.5 | 12.2 |
| **Sensitivity of the screening mammography program[yz]** | | | | | | |
| Subsequent screen | N/A | 68.1 | 82.9 | 85.6 | 87.8 | 84.1 |

a Prince Edward Island is excluded for all age groups unless otherwise indicated (information unavailable).

b Prince Edward Island is included in this indicator.

c Includes invasive, *in situ*, and unclassified cancers. Does not include bilateral cancers (Cases of bilateral cancer = 40–49 (8), 50–59 (59), 60–69 (56), 70+ (28)).

d Excludes cancers diagnosed beyond 6 months post screen.

e Northwest Territories is excluded from this measure due to small values or program start date (2004).

f Statistics Canada census data estimated for December 31, 2008 are used for denominator values. Prevalent breast cancers were excluded from the denominator.

g In the case of multiple screens, the last screen within the target population is used (40–49, 50–69 and 70+).

h Data for 2004 and 2005 screen years are used.

i Data for 2006 screen year is used.

j Total abnormal screens (Intial + Rescreen) for Prince Edward Island: 40–49 =490, 50–59 = 564, 60–69 =397, 70+ =184.

k Alberta is excluded from this measure as data was unavailable.

l Newfoundland and Labrador is excluded from this measure due to small values.

m Saskatchewan, Québec, Nova Scotia and New Brunswick are excluded from this measure as data was unavailable.

n Excludes tests beyond 6 months post screen.

o Québec data is based on aggregate numbers which may be calculated using a different method.

p Tissue biopsy does not include fine needle aspiration (FNA). Time to diagnosis is based on the date of the first pathological biopsy result of breast cancer (excludes FNA and all inconclusive procedures) or the date of the last benign test or pathological biopsy.

q Includes all core or open biopsies with a non-malignant test result (may include multiple tests per woman).

r Open biopsies include direct to open surgical biopsy diagnosis and cases who underwent an inconclusive core biopsy prior to a definitive diagnosis by open surgical biopsy

s Alberta, Québec and Ontario (partial data available) were excluded from this measure as data was unavailable.

t Missing values are excluded from calculations;
Expressed as a proportion of screen-detected invasive cancers with complete data on tumour size or number of positive nodes.

u Alberta and Québec were excluded from this measure as data was unavailable.

v Ontario (2007–2008) and New Brunswick (2007) do not provide complete data on the number of pathologically positive nodes; rate is calculated based on N stage of disease data.

w Northwest Territories, Alberta, Québec and Prince Edward Island were excluded from this measure as data was unavailable.

x Calculated based on all women screened from 2004–2005 who developed a post-screen cancer during 2004–2007. Post-screen cancers include all invasive cancers diagnosed <24 months after a normal or benign screen or screen-detected cancers (referred) that took >6 months to diagnosis (beyond the 'normal screening episode'). Post-screen cancers also include screen-detected cancers referred by CBE alone. This calculation method has been updated from previous reports.

y Northwest Territories, Québec and Prince Edward Island were excluded from this measure as data was unavailable.

z Calculated based on all women screened from 2004–2005 who developed a post-screen cancer during 2004–2006. Post-screen cancers include all invasive or DCIS cancers diagnosed <12 months after a normal or benign screen or screen-detected cancers (referred) that took >6 months to diagnosis (beyond the 'normal screening episode')

TABLE 8

## Evaluation indicators by year, women aged 50–69

| Indicator | Target | Screen year[a] | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| **Number of screens**[b] | | | | | | | |
| | N/A | 699,507 | 765,388 | 823,071 | 908,763 | 979,735 | 1,041,203 |
| **Number of first screens** | | | | | | | |
| | N/A | 162,551 | 172,647 | 187,519 | 197,101 | 200,400 | 196,187 |
| **Number of cancers**[bcde] | | | | | | | |
| | N/A | 3,449 | 3,732 | 4,012 | 4,511 | 4,755 | N/A[d] |
| **Participation rate within a 30-month period (%)**[gh] | | | | | | | |
| | ≥70 | 38.3 | 40.0 | 42.0 | 43.9 | 45.8 | 47.3 |
| **Retention rate (% screened within 30 months of an initial screen)** | | | | | | | |
| | ≥75 | 69.5 | 70.1 | N/A[f] | N/A[f] | N/A[f] | N/A[f] |
| **Retention rate (% screened within 30 months of a subsequent screen)**[e] | | | | | | | |
| | ≥90 | 78.9 | 82.6 | N/A[f] | N/A[f] | N/A[f] | N/A[f] |
| **Annual screening rate (% screened within 18 months of an initial screen)** | | | | | | | |
| | ≥75 | 17.2 | 19.1 | 20.8 | N/Af | N/A[f] | N/A[f] |
| **Annual screening rate (% screened within 18 months of a subsequent screen)** | | | | | | | |
| | ≥90 | 21.4 | 21.3 | 22.8 | N/A[f] | N/A[f] | N/A[f] |
| **Abnormal call rate (%)**[i] | | | | | | | |
| Initial screen | <10 | 12.2 | 12.2 | 12.2 | 12.5 | 12.8 | N/A[f] |
| Subsequent screen | <5 | 6.4 | 6.0 | 6.0 | 5.9 | 6.1 | N/A[f] |
| **Invasive cancer detection rate (per 1,000 screens)**[dej] | | | | | | | |
| Initial screen | >5 | 4.6 | 4.4 | 4.8 | 4.5 | 4.8 | N/A[f] |
| Subsequent screen | >3 | 3.6 | 3.7 | 3.7 | 3.8 | 3.5 | N/A[f] |
| ***In situ* cancer detection**[dej] | | | | | | | |
| Initial screen (per 1,000 screens)[k] | N/A | 1.3 | 1.2 | 1.1 | 1.2 | 1.3 | N/A[f] |
| Percentage *in situ*[k] | N/A | 22.0 | 21.5 | 19.1 | 20.8 | 21.1 | N/A[f] |
| Subsequent screen (per 1,000 screens) | N/A | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | N/A[f] |
| Percentage *in situ* | N/A | 21.9 | 20.2 | 19.0 | 19.3 | 20.5 | N/A[f] |

| Indicator | Target | Screen year[a] | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| **Diagnostic interval (%)** | | | | | | | |
| Notified of results within 2 weeks of screening exam[l] | ≥90 | 96.9 | 96.1 | 95.7 | 95.2 | 95.2 | N/A[f] |
| Completed first diagnostic assessment within 3 weeks[mn] | ≥90 | 61.0 | 60.4 | 59.7 | 61.1 | 58.0 | N/A[f] |
| Final diagnosis (with no tissue biopsy), within 5 weeks[mno] | ≥90 | 77.4 | 77.4 | 76.9 | 77.0 | 75.6 | N/A[f] |
| Final diagnosis (with tissue biopsy), within 7 weeks[emno] | ≥90 | 49.5 | 47.7 | 46.3 | 47.3 | 48.1 | N/A[f] |
| **Positive predictive value of the screening mammography program (%)[cde]** | | | | | | | |
| Initial screen | ≥5 | 4.9 | 4.6 | 4.9 | 4.7 | 4.9 | N/A[f] |
| Subsequent screen | ≥6 | 7.3 | 7.8 | 7.7 | 8.1 | 7.4 | N/A[f] |
| **Non-malignant biopsy rate[npq]** | | | | | | | |
| Initial screen (per 1,000 screens)[c] | N/A | 17.7 | 17.2 | 17.8 | 18.4 | 18.2 | N/A[f] |
| Percentage open[e] | N/A | 24.5 | 21.3 | 18.5 | 16.9 | 15.0 | N/A[f] |
| Subsequent screen (per 1,000 screens) | N/A | 8.0 | 7.1 | 7.0 | 7.2 | 7.1 | N/A[f] |
| Percentage open[e] | N/A | 29.4 | 27.2 | 24.4 | 20.3 | 17.9 | N/A[f] |
| **Screen-detected invasive cancer tumour size (%)[ders]** | | | | | | | |
| ≤15 mm | >50 | 63.9 | 63.6 | 62.6 | 60.2 | 60.8 | N/A[f] |
| **Proportion of node negative screen-detected invasive cancer (%)[destu]** | | | | | | | |
| | >70 | 74.0 | 74.3 | 73.4 | 74.4 | 76.3 | N/A[f] |
| **Post-screen invasive cancer rate (per 10,000 person-years)[vw]** | | | | | | | |
| 0 to <12 months | <6 | 7.5 | 7.5 | N/A[f] | N/A[f] | N/A[f] | N/A[f] |
| 12 to 24 months | <12 | 11.6 | 11.8 | N/A[f] | N/A[f] | N/A[f] | N/A[f] |
| **Sensitivity of the screening mammography program[xy]** | | | | | | | |
| Subsequent screen | N/A | 84.0 | 84.7 | N/A[f] | N/A[f] | N/A[f] | N/A[f] |

a Prince Edward Island is excluded for all years except 2004 unless otherwise indicated (information unavailable).

b Prince Edward Island is included in this indicator for all years.

c Includes invasive, *in situ*, and unclassified cancers. Does not include bilateral cancers (Cases of bilateral cancer: 2004 =22 , 2005 =30, 2006 =27, 2007 =38 , 2008 =77)

d Excludes cancers diagnosed beyond 6 months post screen.

e Northwest Territories is excluded from this measure due to small values or program start date (2004).

f Insufficient time for follow-up to ensure data completeness.

g Participation rate was calculated in two year intervals (30 months) due to biennial recall (Screen Years: 2003–2004, 2004–2005, 2005–2006, 2006–2007, 2007–2008, 2008–2009).

h Statistics Canada census data estimated for each year are used for denominator values. Prevalent breast cancers were excluded from the denominator.

i Total abnormal screens (Intial + Rescreen) for Prince Edward Island: 2005 =604, 2006 = 518, 2007 =444, 2008 =517.

j Alberta is excluded from this measure for 2005–2008 as data was unavailable for this time period.

k Newfoundland and Labrador is excluded from this measure (2007–2008) due to small values.

l Saskatchewan, Québec, Nova Scotia and, New Brunswick are excluded from this measure as data was unavailable.

m Excludes tests beyond 6 months post screen.

n Québec data is based on aggregate numbers which may be calculated using a different method.

o Tissue biopsy does not include fine needle aspiration (FNA). Time to diagnosis is based on the date of the first pathological biopsy result of breast cancer (excludes FNA and all inconclusive procedures) or the date of the last benign test or pathological biopsy.

p Includes all core or open biopsies with a non-malignant test result (may include multiple tests per woman).

q Open biopsies include direct to open surgical biopsy diagnosis and cases who underwent an inconclusive core biopsy prior to a definitive diagnosis by open surgical biopsy

r Excludes Alberta (2005–2008) , Ontario (partial data available) and Québec (2007–2008) and as data was unavailable.

s Missing values are excluded from calculations. Expressed as a proportion of invasive cancers with complete data on tumour size or number of positive nodes

t Alberta and Québec were excluded from this measure as data was unavailable.

u Ontario (2007–2008) and New Brunswick (2004–2007) do not provide complete data on the number of pathologically positive nodes; rate is calculated based on N stage of disease data.

v Northwest Territories, Alberta, Québec and Prince Edward Island were excluded from this measure as data was unavailable.

w Calculated based on all women screened from 2004–2005 who developed a post-screen cancer during 2004–2007. Post-screen cancers include all invasive cancers diagnosed <24 months after a normal or benign screen or screen-detected (referred) cancers that took >6 months to diagnosis (beyond the 'normal screening episode'). Post-screen cancers also include screen-detected cancers referred by CBE alone. This calculation method has been updated from previous reports.

x Northwest Territories, Québec and Prince Edward Island were excluded from this measure as data was unavailable.

y Calculated based on all women screened from 2004–2005 who developed a post-screen cancer during 2004–2006. Post-screen cancers include all invasive or DCIS cancers diagnosed <12 months after a normal or benign screen orscreen-detected cancers (referred) that took >6 months to diagnosis (beyond the 'normal screening episode') Post-screen cancers also include screen-detected cancers referred by CBE alone.

Notes:

1. Figures have been updated and may vary slightly from previous reports.

SPECIAL TOPIC

# Trends in the performance of organized breast cancer screening in Canada

*The Canadian Breast Cancer Screening Initiative (CBCSI) has reported on outcomes related to breast cancer screening since 2000 on the experience of women dating back to 1996. In that time, the ability of the CBCSI to report on indicators has improved immensely. Definitions of evaluation indicators have been modified to reflect current screening practices, statistical methodology, and international standards. The CBCSI is now able to present progress in organized breast cancer screening over time for all provinces and one territory.*

## Methods

Breast cancer screening performance was analyzed using agreed upon Canadian evaluation indicators and targets. The methods used for calculation are documented elsewhere.[12] Data from 1999 to 2008 were analyzed using SAS version 9.1 Enterprise Guide 4.1 platform.

The following indicators are reported: participation rate, retention rate, abnormal call rate, diagnostic interval, invasive and *in situ* cancer detection rates, percentage of cancers that are DCIS, proportion of small invasive tumour, and negative node rate. Each indicator was calculated for the cohort of women between 50 and 69 years of age and without a previous history of breast cancer. Most indicators are presented with the Canadian average, target, and provincial range (highest and lowest) for each time period. The provincial range may represent different provinces across the time periods.

Results generated from values ≤5 for the numerator and ≤30 for the denominator respectively are suppressed to ensure privacy as well as to improve statistical stability. Despite this, regions with small populations are vulnerable to large variability in rates and proportions relative to their absolute changes. This is observed most notably in the reporting of cancer detection rates.

The data are presented as crude numbers and rates that represent the actual Canadian organized screening population. This may not be comparable to the entire Canadian population or international rates reported with age-standardization. However, it allows comparison with previous biennial reports and denotes the true values for organized screening programs over time.

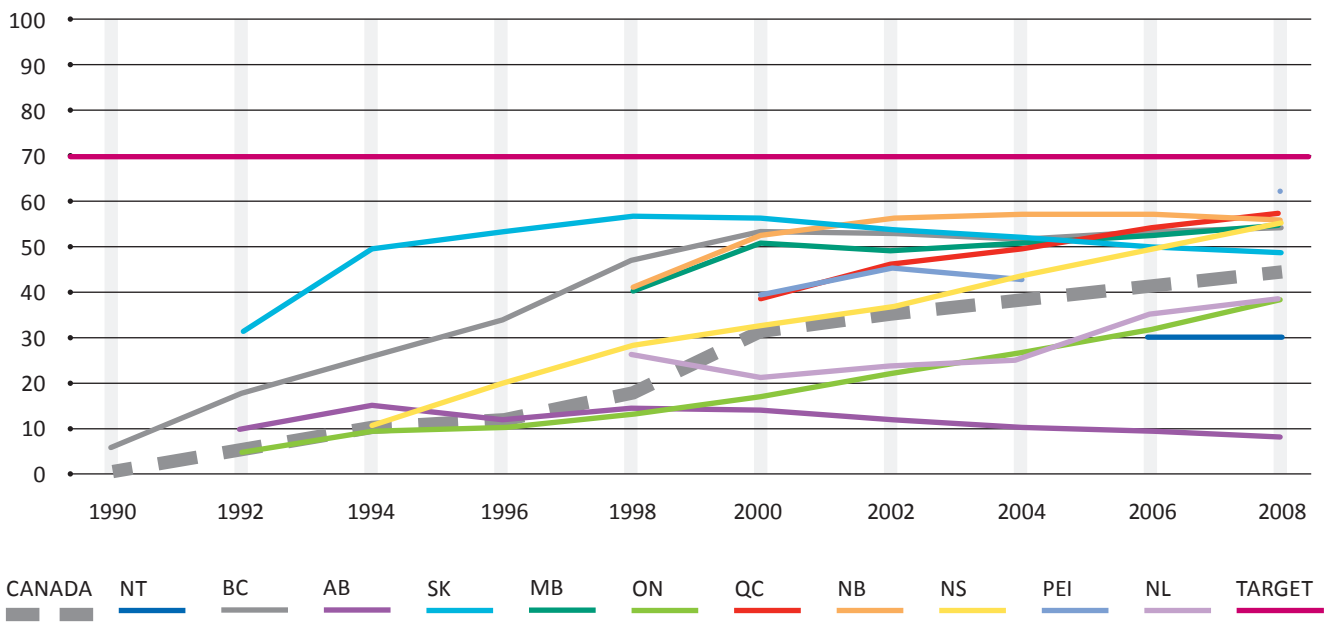
# Participation Rate

- *Percentage of women who have a screening mammogram (within a 30-month period) as a proportion of the target population.*

Participation is an important short-term proxy estimate for the long-term benefits of screening such as a reduction in morbidity and mortality.[9,15] Participation in organized breast cancer screening across Canada began in British Columbia in 1988 and most provinces/territories followed quickly. Overall, participation increased to 44.6% of the eligible population in 2007 to 2008.

Most programs have gradually increased capacity with resulting increases in participation. In 2007 to 2008, participation ranged from 8.3% to 62.2% which does not meet the target of 70%. This is due primarily to the continued use of opportunistic screening. In many provinces and territories, participation reaches 70% when bilateral mammography, regardless of source (organized or opportunistic screening), is considered (Figure 5 main report).[5]

**Participation in organized breast screening programs, within 30 months, women aged 50 to 69 (1989 to 2008 screen years)**




Notes:

1. Alberta data were collected from the Screen Test program only. Screen Test is an organized program that conducts approximately 10–12% of screening mammograms in the province. A province-wide breast cancer screening program was launched in March 2008.
2. Information for Prince Edward Island in 2008 was based on data external to CBCSD and may differ from previous reports.
3. Population estimates (denominators) are not adjusted to exclude prevalent cases of invasive breast cancer.

# Retention Rate

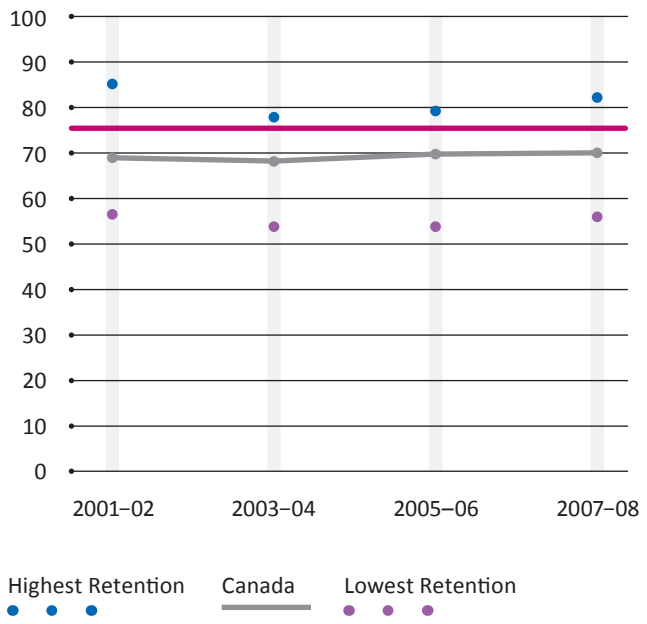
- *Estimated percentage of women aged 50–67 who returned for screening within 30 months.*

Retention is important as the benefits of screening are incurred over repeated timely screening mammography. Retention to organized breast cancer screening consistently varies between first time attendees and those women who have had two or more screens (subsequent screeners). Subsequent screeners are more likely to continue screening in the future than first time screeners.[13,14]

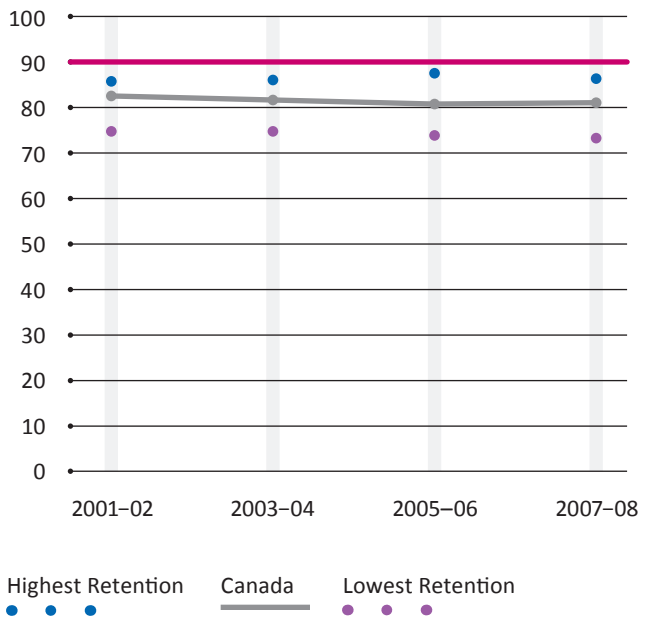
Across Canada, new attendees to organized breast cancer screening show consistent retention at close to 70% across all reporting periods; however, variability between programs is quite wide and ranges from 55.7% to 81.8% in the most recent reporting time period.

Women who attended for their subsequent screening visit had high retention at more than 80%. There are few differences between the programs with the range spanning 73.1% to 85.9%. Retention was consistent across all reporting periods.

**Probability of returning for a subsequent screen within 30 months, among initial screeners (1999 to 2006 screen years)**




**Probability of returning for a subsequent screen within 30 months, among subsequent screeners (1999 to 2006 screen years)**




* The provincial range may represent different provinces across the time periods.

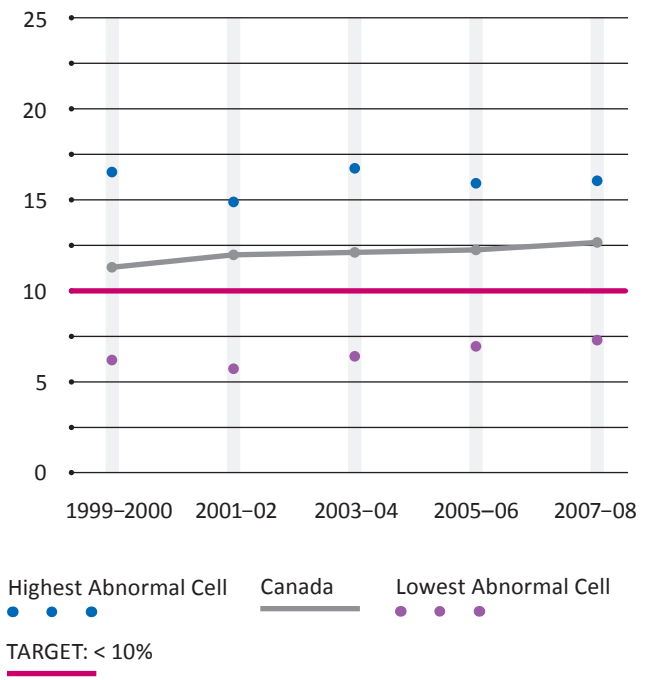
# Abnormal Call Rate

- *Percentage of mammograms that are identified as abnormal at program screen*

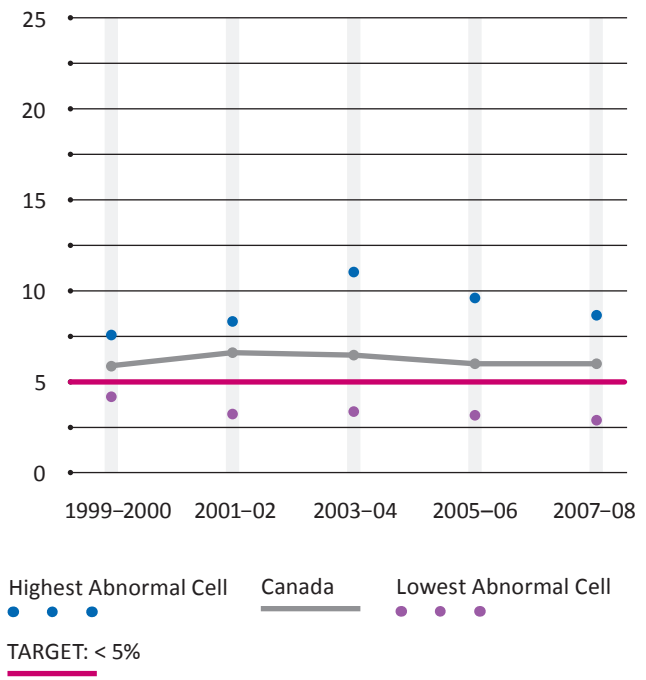
Abnormal call rate is an important indicator of the quality of the mammography image and interpretation. A high abnormal call rate can increase the false positive rate and result in unnecessary tests but a low abnormal call rate can reduce cancer detection and result in higher numbers of post-screen-detected cancers.[7]

In Canada, the abnormal call rate is consistent across time periods at 12% for first time screeners and 6% for subsequent screeners. Individual programs show little variability but there is a considerable range between programs. A high abnormal call rate may reflect the challenge of reporting for small regions where a minor change in the absolute number of abnormal screening mammograms results in a more extreme value when compared to other regions.

**Abnormal call rate among initial screeners, women aged 50–69 (1999 to 2008 screen years)**




**Abnormal call rate among subsequent screeners, women aged 50–69 (1999 to 2008 screen years)**




* The provincial range may represent different provinces across the time periods.

# Diagnostic Interval

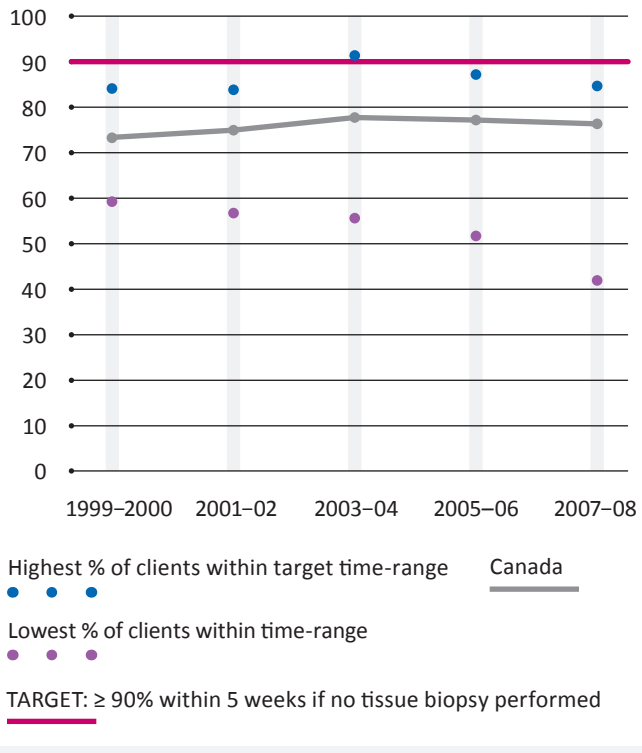
- *Percentage of women meeting established target from "Time from abnormal screen to definitive diagnosis".*

Excessively long diagnostic intervals can contribute to poor outcomes by allowing disease progression to occur while waiting for diagnostic testing.[6,11] Further, delays of any nature can create anxiety for the women and her family even when the outcome is non-cancerous.[8,10]

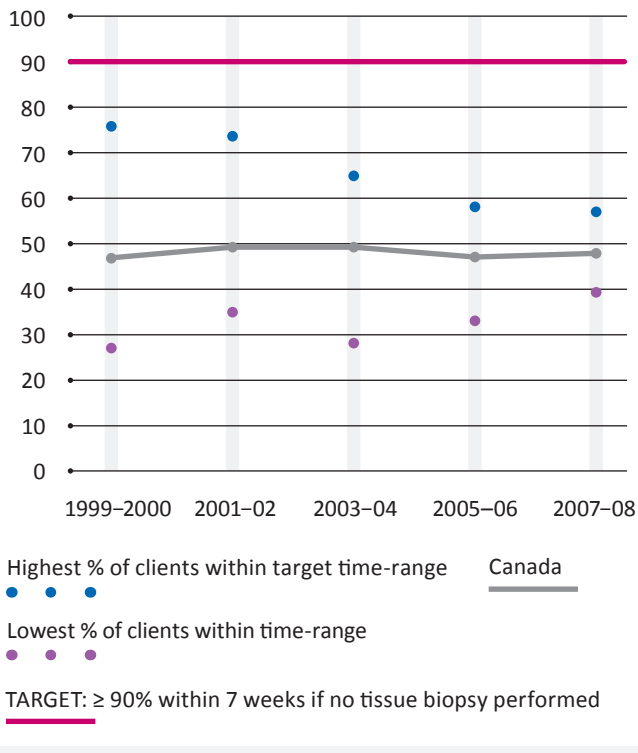
The ability to resolve an abnormal screening mammogram in a timely manner varies by the type of diagnostic intervention required: invasive tests (core biopsy, open biopsy, or fine needle aspiration) will take longer than non-invasive tests (diagnostic mammography, ultrasound, or other imaging). Current targets state that 90% of women will have resolution of an abnormal screening mammogram within 5 weeks if no invasive test occurred and 7 weeks if a core or open biopsy was required.

Programs consistently report intervals below the established targets for all time periods regardless of the type of diagnostic tests required. In cases where non-invasive testing was required, there was a small and gradual improvement in the diagnostic interval from 73.3% to 76.3% receiving resolution within 5 weeks. However, this ranges from 41.7% for 2007 to 2008 to 91.0% for 2003 to 2004. In cases where invasive testing was required, almost 50% of women receive resolution within 7 weeks across all time periods. In 2007 to 2008, the range between provinces and territories was 39.0% to 56.7%. Since 1999 to 2000, provincial results have moved towards the mean.

**Proportion of women with resolution of abnormal mammogram within 5 weeks (no tissue testing required), women aged 50–69, 1999 to 2008 screen years**




**Proportion of women with resolution of abnormal mammogram within 7 weeks (tissue testing required), women aged 50–69, 1999 to 2008 screen years**




* The provincial range may represent different provinces across the time periods.

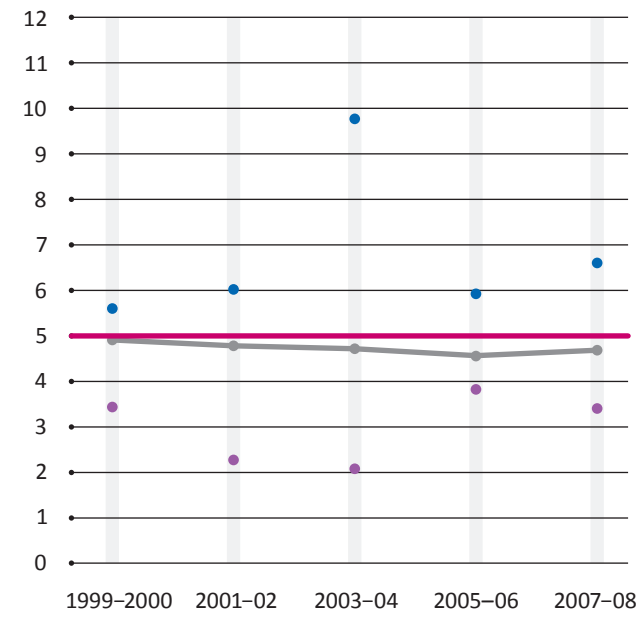
# Cancer Detection

### Invasive Cancer Detection Rate

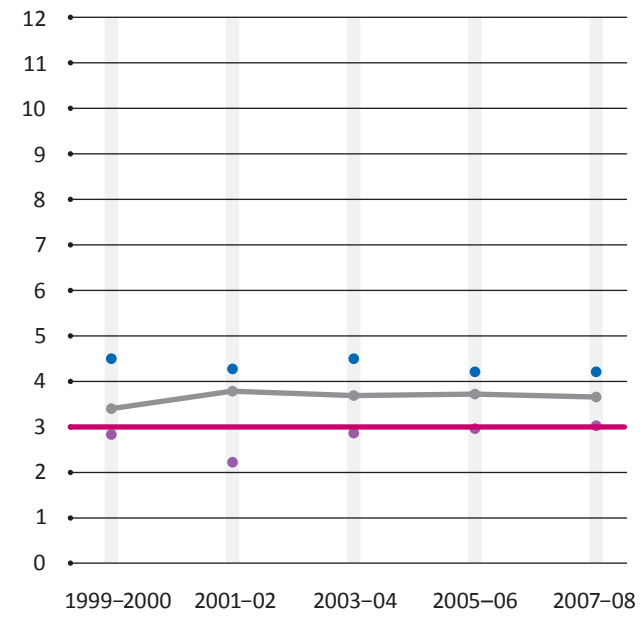
- *Number of invasive cancers detected per 1,000 screens.*

The rate of invasive cancers detected per 1,000 screens for Canada has remained consistent over the past 10 years at approximately 4.6 to 4.9 cases per 1,000 screens. Variability between the programs in initial screeners is related to the small number of screens and cancers detected in small regions. The unusually high cancer detection rate in 2003 to 2004 was related to statistical variation in a small region as it did not continue into the following screening years (see Appendix E). Among subsequent screeners, the invasive cancer detection rate was lower due to the removal of prevalent cancers from the population and was stable over time ranging from 3.4 to 3.8 cases per 1,000 screens.

**Rate of invasive cancers among initial screeners, women aged 50–69 (1999 to 2008 screen years)**




**Rate of invasive cancers among subsequent screeners, women aged 50–69 (1999 to 2008 screen years)**



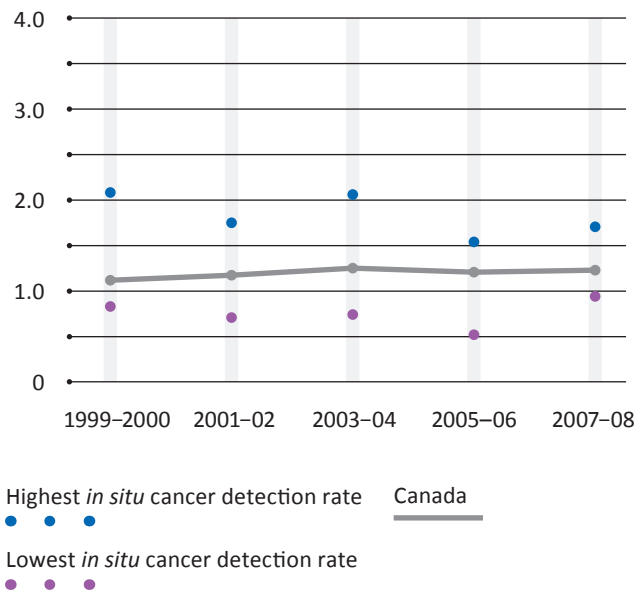

* The provincial range may represent different provinces across the time periods.

### *In situ* Cancer Detection Rate

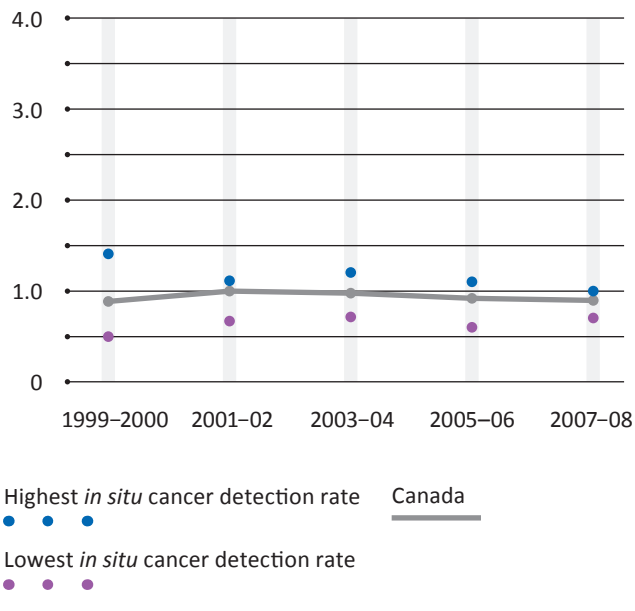
- *Number of ductal carcinoma* in situ *(DCIS) cancers detected per 1,000 screens*

The rate of *in situ* cancers detected by screening has remained consistent over the past 10 years at approximately 1.1 to 1.3 cases per 1,000 screens. Variability between the programs in initial screeners is related to the small number of screens and cancers detected in small regions despite suppressing several data points due to very small numbers. The *in situ* cancer detection rate for subsequent screens is similar to those among initial screeners because the rate is affected by the removal of prevalent *in situ* cancers. The Canadian rate ranges from 0.9 to 1.0 cases per 1,000 screens.

**Rate of *in situ* cancers among initial screeners, women aged 50–69 (1999 to 2008 screen years)**




**Rate of *in situ* cancers among subsequent screeners, women aged 50–69 (1999 to 2008 screen years)**



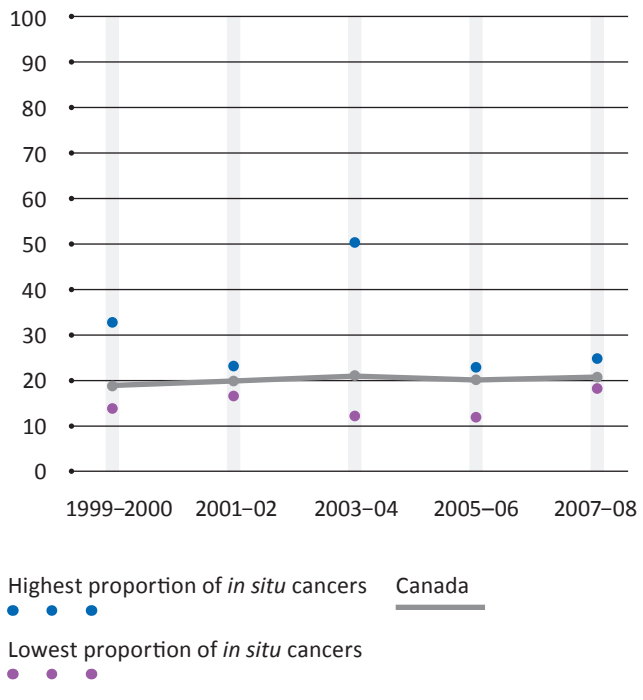

* The provincial range may represent different provinces across the time periods.

### Percentage of Cancers that are DCIS

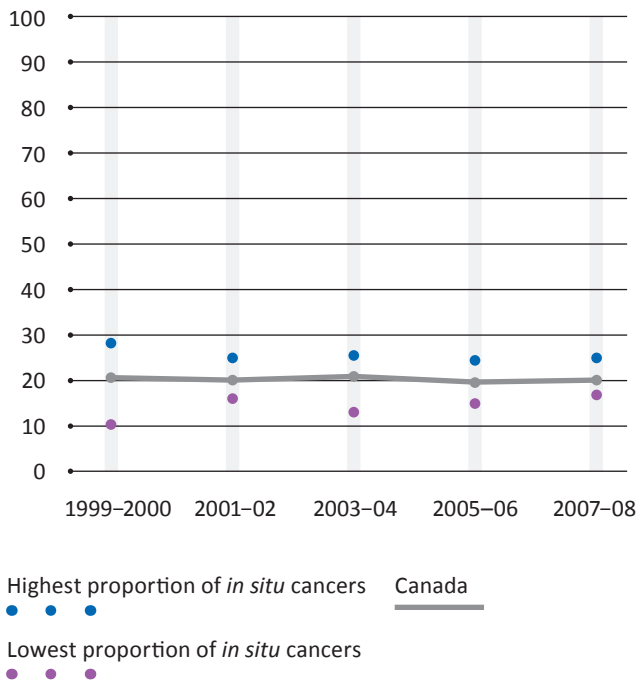
- *Percentage of all cancers that are classified as ductal carcinoma* in situ *(DCIS).*

The proportion of screen-detected cancers classified as DCIS has remained consistent over time at approximately 20% for both initial and subsequent screeners. One unusually high value occurred in a small region (see Appendix E).

**Proportion of screen-detected cancers classified as *in situ* among initial screeners, women aged 50–69 (1999 to 2008 screen years)**




**Proportion of screen-detected cancers classified as *in situ* among subsequent screeners, women aged 50–69 (1999 to 2008 screen years)**




* The provincial range may represent different provinces across the time periods.

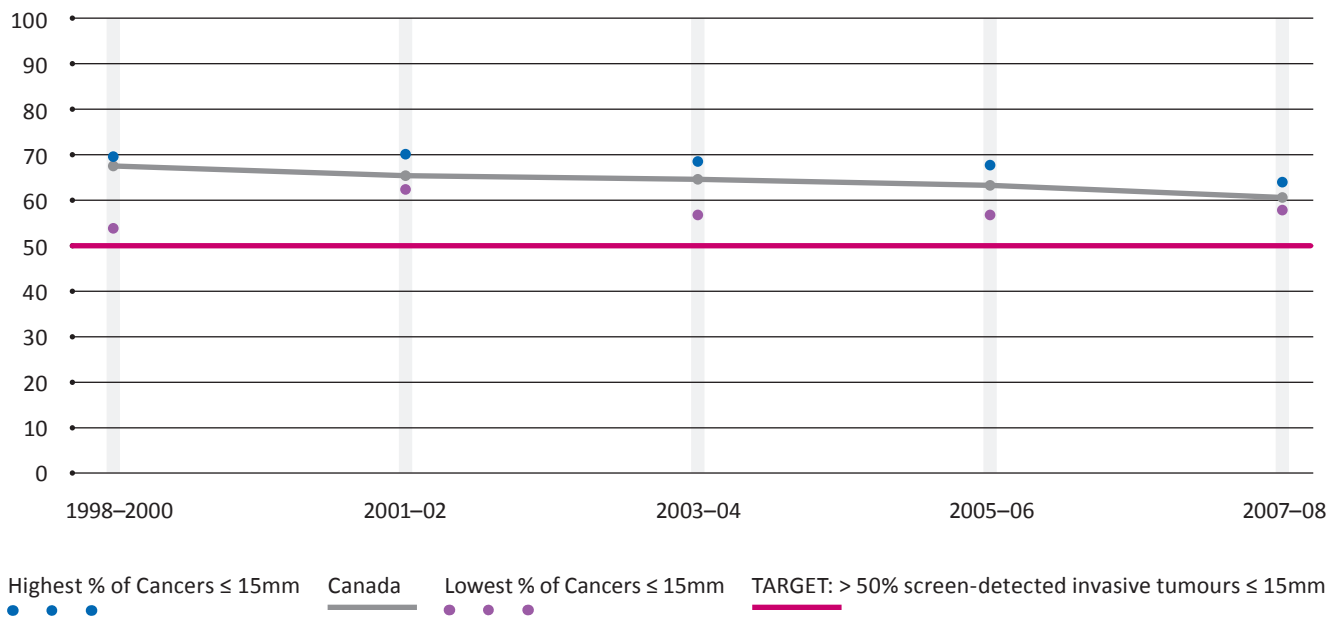
# Cancer Characteristics

### Screen-Detected Invasive Cancer Tumour Size

- *Percentage of screen-detected invasive cancers with tumour size ≤ 15 mm in greatest diameter as determined by the best available evidence: 1) pathological, 2) radiological, and/or 3) clinical.*

The purpose of breast cancer screening is to detect tumours in a smaller and more treatable state. There has been a decline in the percentage of tumours diagnosed less than or equal to 15 mm in diameter from 67.5% to 60.4%. However, this continues to be above the target for all regions and all time periods. The proportion of small tumours is similar to those reported in other countries.[12,16]

**Proportion of screen-detected invasive cancers classifed as small, women aged 50–69 (1999 to 2008 screen years)**



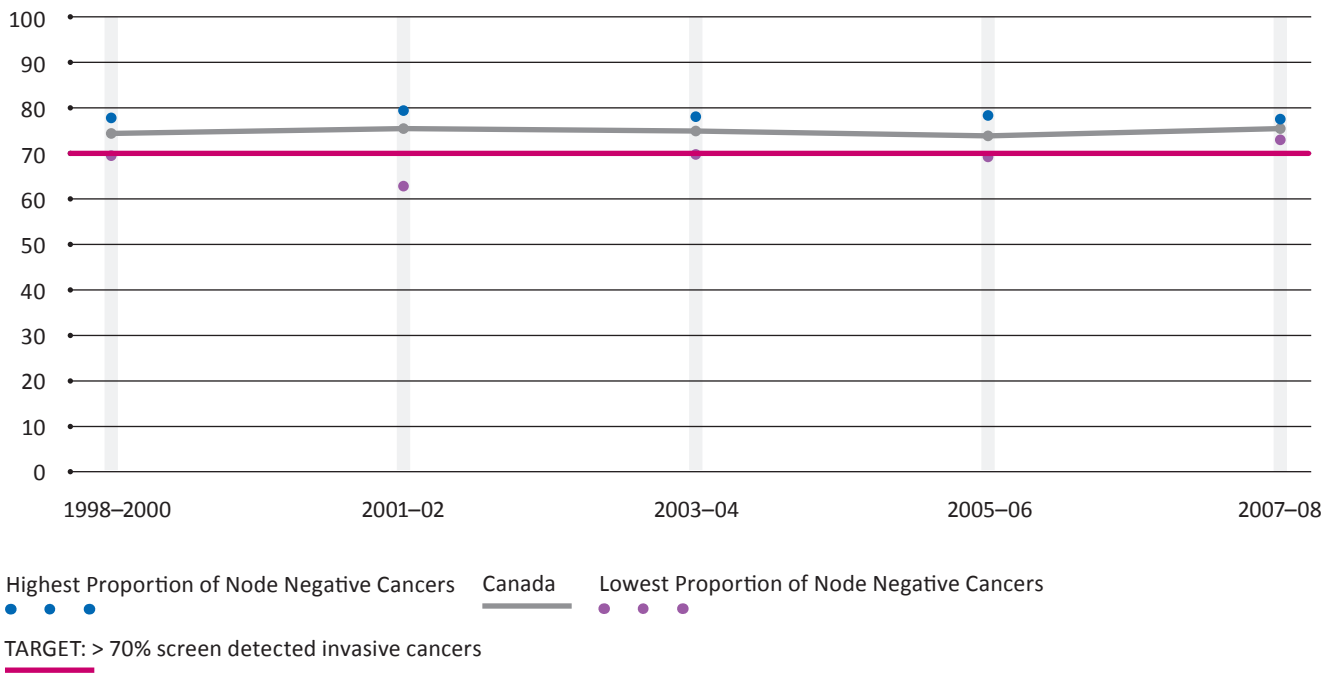

* The provincial range may represent different provinces across the time periods.

### Proportion of Node Negative Screen-Detected Invasive Cancer

- *Proportion of screen-detected invasive cancers in which the cancer has not invaded the axillary lymph nodes as determined by pathological evidence.*

The percentage of women diagnosed with cancers that have not invaded the axillary lymph nodes is stable at approximately 75% over all time periods. With the exception of one unusually low value, the range between provinces is small.

**Proportion of screen-detected invasive cancers without nodal invasion, women aged 50–69 (1999 to 2008 screen years)**




* The provincial range may represent different provinces across the time periods.

# Summary and Conclusions

Since the onset of population-based, organized breast cancer screening in Canada, more than 12.4 million screening mammograms have been performed. The Canadian Breast Cancer Screening Initiative (CBCSI) has reported on outcomes related to breast cancer screening since the early 2000's on the experience of women dating back to 1997. Overall, the performance from 1999 to 2008 has remained consistent. Participation has gradually increased over time but still falls short of the 70% target.

Time to completion of diagnostic work-up has gradually improved but is still below the targets. However, these levels have been maintained despite increases in participation and volume. Encouragingly, screening programs continue to exceed the target for detecting smaller, less advanced cancers.

# Appendix A

## Contributing Organized Breast Cancer Screening Programs

| | |
|---|---|
| **Breast Screening Program of Newfoundland and Labrador** | St. John's: (709) 777-5070<br>Gander: (709) 256-5597<br>Corner Brook: (709) 634-8558<br>Toll Free: 1-800-414-3443 |
| **Nova Scotia Breast Screening Program** | www.breastscreening.ns.ca<br>1-800-565-0548 |
| **Prince Edward Island Breast Screening Program<br>Health and Wellness** | P.O. Box 3000, Summerside, PEI: C1N 2A9<br>1-888-592-9888 |
| **New Brunswick Breast Cancer Screening Services<br>New Brunswick Cancer Network<br>(New Brunswick Department of Health)** | P.O. Box 5100, 2nd Floor HSBC Place, 520 King Street<br>Fredericton, New Brunswick, E3B 5G8 |
| **Programme québécois de dépistage du cancer du sein<br>Ministère de la Santé et des Services sociaux du Québec** | www.msss.gouv.qc.ca/sujets/santepub/pqdcs/index.php?accueil |
| **Ontario Breast Screening Program:<br>A Cancer Care Ontario Program** | www.cancercare.on.ca<br>1-800-668-9304 |
| **BreastCheck Manitoba** | 25 Sherbrook Street: Unit 5<br>Winnipeg, Manitoba R3C 2B1<br>(204) 788-8633/1-800-903-9290<br>www.cancercare.mb.ca |
| **Screening Program for Breast Cancer:<br>A Program of the Saskatchewan Cancer Foundation** | South Saskatchewan: 1-800-667-0017<br>North Saskatchewan: 1-800-567-7271 |
| **Alberta Health Services<br>Alberta Breast & Cervical Cancer Screening Programs<br>Health Promotion, Disease and Injury Prevention<br>Population and Public Health – Alberta Health Services** | Holy Cross Site: 2202-2nd Street S.W.<br>Calgary, Alberta, T2S 3C1<br>www.screeningforlife.ca |
| **The BC Cancer Agency's<br>Screening Mammography Program** | Vancouver, British Columbia<br>Phone: (604)-877-6187 (Lower Mainland),<br>1-800-663-9203 (Rest of British Columbia)<br>www.smpbc.ca |
| **Breast Screening Program:<br>Stanton Territorial Health Authority** | Northwest Territories<br>Yellowknife, Northwest Territories<br>Phone: (867) 873-0452<br>Fax: (867) 873-2109<br>www.srhb.org/services/contact_program.php?id=10 |

# Appendix B

## Database Management Committee of the CBCSI

This Committee advises on the content, management process, and use of the Canadian Breast Cancer Screening Database. It is responsible to the National Committee for the Canadian Breast Cancer Screening Initiative, and works in collaboration with the Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada.

| | |
|---|---|
| **Dr. Rene Shumak (Chair 2004 to 2011)** | Ontario Breast Screening Program, Regional Radiology Coordinator, Greater Toronto Region<br>100 Sheppard Ave. East #140, Toronto, Ontario, M2N 6N5 |
| **Dr. Jennifer Payne (Chair 2011 to present)** | Associate Professor, Dalhousie University<br>1276 South Park St, Rm 3016 Victoria South, Halifax, Nova Scotia, B3H 2Y9 |
| **Dr. Rukshanda Ahmad (Jay Onysko prior to April 2011)** | Acting Manager, Public Health Agency of Canada<br>7th Floor, 785 Carling Avenue, Ottawa, Ontario, K1A 0K9 |
| **Johanne Albert** | Coordonnatrice, Programme québécois de dépistage du cancer du sein<br>Unite de prévention clinique<br>Direction de la prévention des maladies chroniques et des traumatismes.<br>1075 chemin Ste-Foy, 11ieme étage, Québec, Québec, G1S 2M1 |
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| **Marcia Campbell** | Program Coordinator, Breast Screening Program<br>Stanton Territorial Health Authority<br>550 Byrne Road, PO BOX 10, Yellowknife, North West Territories, X1A 2N1 |
| **Dr. K.A. Canil** | Chief of Surgery, Department of Health and Social Services: Qikitani General Hospital<br>P.O. Box 1000 Station 1036, Iqaluit, Nunavut, X0A 0H0 |
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| **Sangeeta Gupta** | Manager, Screening Program for Breast Cancer: Population Health Division<br>952 Albert Street, Regina, Saskatchewan, S4R 2P7 |
| **Heather Limburg** | Epidemiologist, Public Health Agency of Canada<br>7th Floor, 785 Carling Avenue, Ottawa, Ontario, K1A 0K9 |
| **Marnie Mackinnon** | Director of Preventive & Screening Operations, Cancer Care Ontario<br>18-505 University Avenue, Toronto, Ontario, M5G 1X3 |
| **Dr. Laura McDougall** | Medical Lead, Alberta Breast & Cervical Cancer Screening Program:<br>Alberta Health Service<br>2202-2nd Street Southwest, Calgary, Alberta, T2S 3C1 |
| **Heather Milford** | MRT (R), Yukon Mammography Program<br>5 Hospital Road, Whitehorse General Hospital, Whitehorse, Yukon, Y1A 3H7 |

| | |
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| **Norah Smith** | Coordinator, PEI Breast Screening Program: Queen Elizabeth Hospital:<br>Dept. of Diagnostic Imaging<br>P.O. Box 6600, 60 Riverside Drive, Charlottetown, Prince Edward Island, C1A 8T5 |
| **Sandy Williamson** | Manager, Program Operations, BreastCheck Manitoba<br>5-25 Sherbrook Street, Winnipeg, Manitoba, R3C2B1 |
| **Dr. Bin Zhang** | Epidemiologist, New Brunswick Cancer Network: Department of Health<br>P.O. Box 5100, 2nd Floor, 520 King Street, Fredericton, New Brunswick, E3B 5G8 |

# Appendix C

## Technical Sub-committee of the CBCSI

This Committee develops and implements the strategies for the uniform collection and sharing of data in the Canadian Breast Cancer Screening Database. It is responsible to the Database Management Committee, and works in collaboration with the Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada.

| | |
|---|---|
| **Heather Limburg (Chair)** | Epidemiologist, Screening and Early Detection: Public Health Agency of Canada<br>7th Floor, 785 Carling Avenue, Ottawa, Ontario, K1A 0K9 |
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| **Christina Chu** | Biostatistical Analyst, Cancer Surveillance and Outcomes, Population Oncology<br>British Columbia Cancer Agency<br>801-686 West Broadway, Vancouver, British Columbia, V5Z 1G1 |
| **Kurt Combden** | Project Manager: Portfolio Management Office, Information Management,<br>Information Technology Directorate, Public Health Agency of Canada<br>130 Colonnade Road, Ottawa, Ontario, K1A 0K9 |
| **Theresa Comeau** | Programmer, Information Technology Services: New Brunswick Department of Health<br>P.O. Box 5100, 7th Floor HSBC Place, 520 King Street,<br>Fredericton, New Brunswick, E3B 5G8 |
| **Charles Dendy** | Senior Technical Analyst: Operations Division, Information Management, Information Technology Directorate, Public Health Agency of Canada<br>130 Colonnade Road, Ottawa, Ontario, K1A 0K9 |
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| **Theresa Foley** | Program Manager, Nova Scotia Breast Screening Program<br>7001 Mumford Rd, Unit 603L, Halifax, Nova Scotia, B3L 2H8 |
| **Song Gao** | Team Lead Statistical Specialist, Screening Programs: Alberta Health Services<br>2202-2nd Street South West, Calgary, Alberta, T2S 3C1 |
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| | |
|---|---|
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# Appendix D

## Glossary

### Asymptomatic

A woman who does not report symptoms and appears without signs of disease.

### Breast cancer

Includes malignant invasive and ductal carcinoma *in situ* (DCIS) of the breast.

### Clinical breast examination (CBE)

A physical examination of the breasts performed by a trained health professional.

### Core biopsy

A needle biopsy of the breast used to remove samples of tissue for microscopic evaluation. Most core biopsies are image guided.

### Definitive diagnosis

Definitive diagnosis of cancer is the first core or open surgical biopsy that confirms cancer. In rare occasions fine needle aspiration (FNA) biopsy may also be used as a definitive diagnosis of cancer. Definitive diagnosis of benign cases is the last benign test up to 6 months following an abnormal screen.

### Ductal carcinoma *in situ* (DCIS)

A non-invasive tumour of the breast, arising from cells that involve the lining of a breast duct. The cells have not spread outside the duct to other tissues in the breast. DCIS is also referred to as stage 0 cancer.

### Fine-needle aspiration biopsy

A needle is inserted into a lesion and cells are drawn out using a syringe. The cells are stained and examined by a cytologist in a laboratory to determine if there are any malignant cells.

### Initial screen

The first screening mammogram provided to a woman by a Canadian organized breast screening program.

### Interval cancer

Any invasive breast cancer diagnosed during the interval between a normal screen/ benign diagnostic test and before the next scheduled screening examination.

### Invasive cancer

Cancerous cells invading beyond the basement membrane of the milk duct or lobule. A ductal carcinoma *in situ* component may also be present in cases of invasive cancer. Invasive cancer includes stage I–IV.

### Normal screening episode

A screening episode that concludes with normal (non-cancer) findings. This includes both a normal screening mammogram and an abnormal screening mammogram with a normal (non-cancer) finding.

### Open surgical biopsy

Surgical removal of a breast abnormality under local anesthesia for subsequent microscopic examination by a pathologist.

### Post-screen cancer

Cancers that occur after the recommended 12 or 24 months in women who do not return for their regular annual or biennial screen respectively (non-compliant cancers) or women who become symptomatic before their next regular screen (interval cancers).

### Prevalent cancer

The proportion of the population with cancer at a given point in time.

### Screen

Includes mammography, or both clinical breast examination and mammography, delivered by a program.

### Screening episode (completed)

A normal/negative screening episode is defined as the date of the last screen. For abnormal screens, the screening episode is completed at the date of first pathologic or cytologic (core or open surgical biopsy) diagnosis of cancer. Screening episode completion for benign cases is the last benign test up to 6 months following an abnormal screen. A "negative screening episode" can include all follow-up, provided that the end result is negative (normal).

### Rescreening

Subsequent screening after the initial (first) screening under the program. This includes women who return after missing a scheduled round of screening.

### Screen-detected cancer

Cancer detected as a result of a positive (abnormal) test with histologic confirmation attributed to the screening findings of the program.

### Sojourn time

The time interval between the onset of detectable pre-clinical disease and symptomatic disease.

### Total person-years at risk

Within a 12 or 24-month period after a negative (normal) screening episode, women are considered at risk for post-screen-detected cancer. Women contribute a count in the denominator for each year or fraction of a year within the period of interest before a post-screen-detected cancer or the next regular program screen.

# Appendix E

**Special topic: Evaluation indicators by time period and program, women aged 50–69**

| Indicator | Target | Program | Time Period | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1999–2000 | 2001–2002 | 2003–2004 | 2005–2006 | 2007–2008 |
| **Retention rate (% screened within 30 months after an initial screen)** | **≥75** | **NL** | N/A | 71.3 | 73.9 | 74.5 | **81.8** |
| | | **PEI** | N/A | **84.7** | 75.7 | * | * |
| | | **NS** | N/A | 72.3 | 64.8 | 69.2 | 64.1 |
| | | **NB** | N/A | 65.0 | 59.4 | 56.1 | **55.7** |
| | | **QC** | N/A | 66.9 | 65.9 | 65.8 | 65.8 |
| | | **ON** | N/A | 77.5 | **77.4** | **78.9** | 76.6 |
| | | **MB** | N/A | 67.5 | 65.7 | 68.5 | 69.0 |
| | | **SK** | N/A | 68.5 | 69.1 | 68.8 | 65.9 |
| | | **AB** | N/A | **56.3** | **53.5** | **53.6** | 55.8 |
| | | **BC** | N/A | 66.1 | 58.7 | 55.5 | 56.8 |
| | | **NWT** | N/A | * | * | * | 65.9 |
| | | **Canada** | N/A | 68.7 | 67.9 | 69.6 | 69.8 |
| **Retention rate (% screened within 30 months after a subsequent screen)** | **≥90** | **NL** | N/A | 82.4 | 84.6 | 83.2 | 84.6 |
| | | **PEI** | N/A | * | 85.5 | * | * |
| | | **NS** | N/A | 84.5 | 77.2 | 77.6 | 75.6 |
| | | **NB** | N/A | 76.9 | 76.5 | 76.3 | **73.1** |
| | | **QC** | N/A | * | 80.4 | 77.2 | 79.2 |
| | | **ON** | N/A | **85.5** | **85.8** | **87.1** | **86.1** |
| | | **MB** | N/A | 83.1 | 82.0 | 81.2 | 82.7 |
| | | **SK** | N/A | 84.8 | 83.9 | 84.0 | 81.9 |
| | | **AB** | N/A | **74.5** | **74.4** | **73.6** | 73.8 |
| | | **BC** | N/A | 81.4 | 80.8 | 79.5 | 80.5 |
| | | **Canada** | N/A | 82.5 | 81.6 | 80.6 | 81.0 |

| Indicator | Target | Program | Time Period | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1999–2000 | 2001–2002 | 2003–2004 | 2005–2006 | 2007–2008 |
| **Abnormal call rate (%) – Initial screen** | **<10** | **NL** | 11.0 | 12.5 | 11.6 | 7.4 | 11.2 |
| | | **PEI** | **6.2** | 7.9 | **16.7** | * | * |
| | | **NS** | 9.4 | 8.6 | 7.6 | 8.3 | 10.9 |
| | | **NB** | 12.2 | 12.0 | 13.2 | 15.4 | 15.3 |
| | | **QC** | 11.5 | 13.2 | 14.2 | 15.0 | 15.1 |
| | | **ON** | 11.1 | 10.7 | 10.2 | 10.5 | 11.2 |
| | | **MB** | 9.8 | 9.7 | 9.4 | 9.2 | 9.1 |
| | | **SK** | **16.5** | **14.9** | 16.3 | 13.8 | 13.0 |
| | | **AB** | 7.7 | **5.7** | **6.3** | **6.9** | **7.3** |
| | | **BC** | 11.8 | 14.1 | 15.4 | **15.9** | **16.0** |
| | | **NWT** | * | * | * | 8.1 | 14.9 |
| | | **Canada** | 11.3 | 12.0 | 12.1 | 12.2 | 12.6 |
| **Abnormal call rate (%) – Subsequent screen** | **<5** | **NL** | 6.4 | 7.3 | 6.2 | 4.9 | 5.0 |
| | | **PEI** | 4.2 | 6.9 | **11.0** | * | * |
| | | **NS** | 5.0 | 4.5 | 4.2 | 4.3 | 4.6 |
| | | **NB** | **7.6** | 7.5 | 7.2 | 6.9 | 6.7 |
| | | **QC** | 6.9 | **8.3** | 8.1 | 7.3 | 7.2 |
| | | **ON** | 6.0 | 6.4 | 6.0 | 5.5 | 5.9 |
| | | **MB** | 6.3 | 5.9 | 4.8 | 4.6 | 4.3 |
| | | **SK** | 6.7 | 6.6 | 6.2 | 5.3 | 4.3 |
| | | **AB** | **4.1** | **3.2** | **3.3** | **3.1** | **2.9** |
| | | **BC** | 5.5 | 5.8 | 5.8 | 5.7 | 5.7 |
| | | **NWT** | * | * | * | **9.6** | **8.6** |
| | | **Canada** | 5.9 | 6.6 | 6.5 | 6.0 | 6.0 |

| Indicator | Target | Program | Time Period | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1999–2000 | 2001–2002 | 2003–2004 | 2005–2006 | 2007–2008 |
| **Diagnostic interval (%) – Final diagnosis (with no tissue biopsy), within 5 weeks** | **≥90** | **NL** | 70.5 | 67.2 | 72.3 | 74.8 | 70.8 |
| | | **PEI** | **83.8** | 76.1 | **55.3** | * | * |
| | | **NS** | 79.9 | 73.2 | 77.8 | 75.3 | 74.6 |
| | | **NB** | 79.6 | 72.7 | **91.0** | 86.2 | 79.2 |
| | | **QC** | 68.4 | 70.4 | 71.5 | 70.4 | 66.9 |
| | | **ON** | 81.5 | **83.6** | 85.7 | **86.9** | **84.4** |
| | | **MB** | 69.0 | 74.2 | 79.9 | 74.3 | 81.7 |
| | | **SK** | 66.1 | 68.3 | 62.1 | 67.3 | 81.4 |
| | | **AB** | **59.0** | **56.6** | 58.6 | **51.4** | **41.7** |
| | | **BC** | 76.0 | 76.2 | 81.0 | 74.8 | 76.0 |
| | | **NWT** | * | * | * | 71.2 | 46.6 |
| | | **Canada** | 73.3 | 74.9 | 77.6 | 77.2 | 76.3 |
| **Diagnostic interval (%) – Final diagnosis (with tissue biopsy), within 7 weeks** | **≥90** | **NL** | **27.0** | 37.8 | 35.7 | 45.3 | 46.6 |
| | | **PEI** | **75.6** | **73.3** | 48.0 | * | * |
| | | **NS** | 62.3 | 56.4 | **64.5** | **57.9** | 51.9 |
| | | **NB** | 40.2 | 44.8 | 49.2 | 42.6 | 46.4 |
| | | **QC** | 46.4 | 46.8 | 45.7 | 41.6 | **39.0** |
| | | **ON** | 59.3 | 57.6 | 57.0 | 57.4 | **56.7** |
| | | **MB** | 40.2 | 40.9 | 40.1 | 39.3 | 54.5 |
| | | **SK** | 31.5 | **34.7** | **27.9** | **32.9** | 47.4 |
| | | **AB** | 50.0 | 47.3 | 57.3 | 50.2 | 49.4 |
| | | **BC** | 36.1 | 48.5 | 49.2 | 43.3 | 47.2 |
| | | **NWT** | * | * | * | ^ | ^ |
| | | **Canada** | 46.8 | 49.2 | 49.3 | 47.0 | 47.7 |

| Indicator | Target | Program | Time Period | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1999–2000 | 2001–2002 | 2003–2004 | 2005–2006 | 2007–2008 |
| **Invasive cancer detection rate (per 1,000 screens) – Initial screen** | **>5** | **NL** | 4.8 | 5.2 | 4.9 | **3.8** | 5.0 |
| | | **PEI** | **3.4** | 4.6 | **9.7** | * | * |
| | | **NS** | 4.3 | **6.0** | 4.7 | 5.1 | 6.3 |
| | | **NB** | 5.2 | 5.0 | 4.1 | 4.2 | **3.4** |
| | | **QC** | 4.9 | 5.0 | 5.1 | 5.0 | 5.0 |
| | | **ON** | 5.0 | 4.4 | 4.5 | 4.1 | 4.2 |
| | | **MB** | **5.6** | 5.6 | 5.3 | 5.5 | 4.7 |
| | | **SK** | 4.6 | 4.2 | **2.1** | 4.3 | 4.7 |
| | | **AB** | 5.0 | **2.3** | 4.1 | * | * |
| | | **BC** | 4.5 | 5.9 | 5.4 | **5.9** | **6.6** |
| | | **Canada** | 4.9 | 4.8 | 4.7 | 4.6 | 4.7 |
| **Invasive cancer detection rate (per 1,000 screens) – Subsequent screen** | **>3** | **NL** | 3.2 | 3.4 | 3.4 | 3.4 | 3.4 |
| | | **PEI** | ^ | **2.2** | 3.9 | * | * |
| | | **NS** | 3.0 | 3.4 | **2.9** | 3.8 | 3.5 |
| | | **NB** | 3.2 | 3.2 | 3.5 | **3.0** | **3.0** |
| | | **QC** | 4.2 | **4.3** | 4.3 | **4.2** | **4.2** |
| | | **ON** | 3.9 | 3.8 | 3.5 | 3.4 | 3.5 |
| | | **MB** | 4.1 | 4.2 | 3.7 | **4.2** | 4.1 |
| | | **SK** | 3.1 | 3.7 | 3.9 | 4.1 | 3.7 |
| | | **AB** | **4.5** | 3.0 | **4.5** | * | * |
| | | **BC** | **2.8** | 3.5 | 3.2 | 3.4 | 3.3 |
| | | **Canada** | 3.4 | 3.8 | 3.7 | 3.7 | 3.7 |

| Indicator | Target | Program | Time Period | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1999–2000 | 2001–2002 | 2003–2004 | 2005–2006 | 2007–2008 |
| ***In situ* cancer detection – Initial screen (per 1,000 screens)** | **N/A** | **NL** | ^ | ^ | 1.6 | **0.5** | ^ |
| | | **PEI** | 0.9 | ^ | ^ | * | * |
| | | **NS** | **2.1** | 1.2 | 1.3 | 1.0 | **1.7** |
| | | **NB** | **0.8** | ^ | ^ | 1.2 | 1.3 |
| | | **QC** | 1.1 | 1.4 | 1.5 | **1.5** | 1.6 |
| | | **ON** | 0.9 | 0.9 | 1.0 | 1.0 | **0.9** |
| | | **MB** | 1.3 | 1.3 | **0.7** | 1.1 | 1.1 |
| | | **SK** | 1.3 | 1.1 | **2.1** | 1.1 | 1.2 |
| | | **AB** | 1.2 | **0.7** | ^ | * | * |
| | | **BC** | 1.4 | **1.8** | 1.8 | 1.4 | 1.7 |
| | | **Canada** | 1.1 | 1.2 | 1.3 | 1.2 | 1.2 |
| ***In situ* cancer detection – Percentage *in situ* – Initial screen** | **N/A** | **NL** | ^ | ^ | 25.0 | **11.9** | ^ |
| | | **PEI** | ^ | ^ | ^ | * | * |
| | | **NS** | **32.7** | **16.7** | 21.1 | 16.2 | 21.5 |
| | | **NB** | **13.8** | ^ | ^ | ^ | ^ |
| | | **QC** | 18.4 | 21.2 | 22.5 | **22.8** | **24.6** |
| | | **ON** | 15.1 | 16.8 | 18.4 | 19.1 | **18.1** |
| | | **MB** | 18.3 | 19.3 | **12.2** | 16.5 | 19.3 |
| | | **SK** | 22.7 | 20.9 | **50.0** | 20.4 | 20.7 |
| | | **AB** | 19.7 | ^ | ^ | * | * |
| | | **BC** | 24.2 | **23.1** | 24.8 | 19.1 | 20.2 |
| | | **Canada** | 18.6 | 19.8 | 21.3 | 20.2 | 20.9 |

| Indicator | Target | Program | Time Period | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1999–2000 | 2001–2002 | 2003–2004 | 2005–2006 | 2007–2008 |
| ***In situ* cancer detection – Subsequent screen (per 1,000 screens)** | **N/A** | **NL** | 0.8 | **0.7** | 1.1 | **0.6** | 0.9 |
| | | **PEI** | ^ | ^ | ^ | * | * |
| | | **NS** | 1.2 | **1.1** | 1.0 | 0.8 | **0.7** |
| | | **NB** | **0.5** | **0.7** | 1.0 | 0.7 | **1.0** |
| | | **QC** | **1.4** | **1.1** | **1.2** | 1.0 | **1.0** |
| | | **ON** | 0.8 | 0.8 | **0.7** | 0.7 | **0.7** |
| | | **MB** | 0.8 | 0.9 | 1.1 | 0.9 | **1.0** |
| | | **SK** | 0.8 | **0.7** | 0.9 | 0.9 | **1.0** |
| | | **AB** | **0.5** | 0.9 | **0.7** | * | * |
| | | **BC** | 1.0 | **1.1** | 1.1 | **1.1** | **1.0** |
| | | **Canada** | 0.9 | 1.0 | 1.0 | 0.9 | 0.9 |
| ***In situ* cancer detection – Percentage *in situ* – Subsequent screen** | **N/A** | **NL** | 20.6 | 16.3 | 25.0 | **14.9** | 20.4 |
| | | **PEI** | ^ | ^ | ^ | * | * |
| | | **NS** | **28.1** | **24.8** | **25.5** | 17.5 | **16.9** |
| | | **NB** | 14.0 | 18.4 | 21.9 | 19.1 | **24.9** |
| | | **QC** | 25.0 | 19.6 | 21.2 | 19.5 | 19.6 |
| | | **ON** | 17.6 | 16.8 | 17.0 | 17.2 | 17.4 |
| | | **MB** | 16.4 | 18.4 | 22.4 | 18.1 | 20.1 |
| | | **SK** | 20.4 | **16.0** | 18.4 | 18.2 | 22.0 |
| | | **AB** | **10.3** | 23.0 | **13.1** | * | * |
| | | **BC** | 25.3 | 23.9 | 25.2 | **24.5** | 24.1 |
| | | **Canada** | 20.7 | 20.0 | 20.9 | 19.6 | 19.9 |

| Indicator | Target | Program | Time Period | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1999–2000 | 2001–2002 | 2003–2004 | 2005–2006 | 2007–2008 |
| **Screen-detected invasive cancer tumour size (%): <15mm** | **>50** | **NL** | 64.4 | 68.3 | 65.3 | **56.6** | 61.5 |
| | | **PEI** | * | * | * | * | * |
| | | **NS** | 66.7 | 63.1 | 66.3 | 59.7 | 63.2 |
| | | **NB** | 65.2 | 64.2 | **56.5** | 60.0 | **63.6** |
| | | **QC** | **69.2** | 67.2 | **68.4** | 65.5 | * |
| | | **ON** | 68.5 | **62.0** | 61.9 | 60.7 | **57.5** |
| | | **MB** | 64.9 | 65.9 | 61.0 | 58.4 | **57.5** |
| | | **SK** | **53.7** | **69.7** | 62.2 | **67.5** | 63.3 |
| | | **AB** | 63.3 | 63.8 | 59.3 | * | * |
| | | **BC** | 66.7 | 65.4 | 65.0 | 65.0 | 63.0 |
| | | **Canada** | 67.5 | 65.2 | 64.6 | 63.1 | 60.4 |
| **Node negative rate in cases of screen-detected invasive cancer (%)** | **>70** | **NL** | 69.6 | 78.7 | **77.8** | **69.0** | **72.7** |
| | | **PEI** | * | * | * | * | * |
| | | **NS** | 76.7 | 75.0 | **77.8** | 75.1 | **77.2** |
| | | **NB** | 75.5 | 77.3 | **69.5** | 76.1 | **77.2** |
| | | **QC** | 72.6 | 73.6 | 74.1 | 71.8 | * |
| | | **ON** | **77.5** | 75.9 | 75.2 | 74.2 | 75.2 |
| | | **MB** | **69.4** | 75.8 | 76.9 | **78.0** | 76.8 |
| | | **SK** | 73.6 | **79.2** | 76.8 | 77.2 | 75.3 |
| | | **AB** | 71.2 | **62.5** | 72.7 | * | * |
| | | **BC** | 76.3 | 78.4 | 75.1 | 75.2 | 74.7 |
| | | **Canada** | 74.4 | 75.5 | 74.8 | 73.8 | 75.4 |

* Data unavailable. Canada total excludes indicated province/territory

^ Data suppressed due to small numbers: numerator <5 and/or denominator <30. Canada total excludes indicated province/territory

In **bold**: highest and lowest evaluation indicator data point in a biennial period (there may be more than one highest or lowest data point for a given evaluation indicator in a biennial period)

# References


1. Bancej, C., K. Decker, A. Chiarelli, M. Harrison, D. Turner, and J. Brisson. 2003. Contribution of clinical breast examination to mammography screening in the early detection of breast cancer. J. Med. Screen. 10:16-21.
2. Brett, J., C. Bankhead, B. Henderson, E. Watson, and J. Austoker. 2005. The psychological impact of mammographic screening. A systematic review. Psychooncology. 14:917-938.
3. Canadian Cancer Society's Steering Committee on Cancer Statistics. 2012. Canadian Cancer Statistics 2012.
4. Coldman, A., N. Phillips, and C. Speers. 2007. A retrospective study of the effect of participation in screening. A systematic review. International Journal of Cancer. 120:2185-2190.
5. Doyle, G. P., D. Major, C. Chu, A. Stankiewicz, M. L. Harrison, L. Pogany, V. M. Mai, and J. Onysko. 2011. A review of screening mammography participation and utilization in Canada. Chronic. Dis. Inj. Can. 31:152-156.
6. Ganry, O., J. Peng, and A. Dubreuil. 2004. Influence of abnormal screens on delays and prognostic indicators of screen-detected breast carcinoma. J. Med. Screen. 11:28-31.
7. Gur, D., J. H. Sumkin, L. A. Hardesty, R. J. Clearfield, C. S. Cohen, M. A. Ganott, C. M. Hakim, K. M. Harris, W. R. Poller, R. Shah, L. P. Wallace, and H. E. Rockette. 2004. Recall and detection rates in screening mammography. Cancer. 100:1590-1594.
8. Hislop, T. G., S. Haris, J. Jackson, S. Thorne, E. Rousseau, A. Coldman, J. Vestrup, C. Wright, and I. Olivotto. 2002. Satisfaction and anxiety for women during investigation of an abnormal screening mammogram. Breast Cancer Res. Treat. 76:245-254.
9. International Agency for Research on Cancer. 2002. Breast cancer screening. In H. Vainio and F. Bianchini (eds.), IARC Handbooks of Cancer Prevention vol. 7. IARC Press, Lyon.
10. Lampic, C., E. Thurfjell, J. Bergh, and P. Sjoden. 2001. Short- and long-term anxiety and depression in women recalled after breast cancer screening. Eur. J. Cancer. 37:463-469.
11. Olivotto, I., A. Gomi, C. Bancej, J. Brisson, J. Tonita, L. Kan, Z. Mah, M. Harrison, and R. Shumak. 2002. Influence of delay to diagnosis on prognostic indicators of screen-detected breast carcinoma. Cancer. 94:2143-2150.
12. Public Health Agency of Canada. 2012. Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Cancer Screening Program Performance (Third Edition).
13. Public Health Agency of Canada. 2008. Organized breast cancer screening in Canada: Report on program performance 2003-2004.
14. Public Health Agency of Canada. 2011. Organized Breast Cancer Screening Programs in Canada: Report on Program Performance 2005-2006.
15. Tabar, L., B. Vitak, M. F. Yen, H. H. Chen, R. A. Smith, and S. W. Duffy. 2004. Number needed to screen: lives saved over 20 years of follow-up in mammographic screening. J. Med. Screen. 11:126-129.
16. The Australian Institute of Health and Welfare, and The Australian Government Department of Health and Ageing for BreastScreen Australia Program. 2009. BreastScreen Australia monitoring report 2005-2006. CAN 44.
17. Ugnat, M., L. Xie, J. Morriss, R. Semenciw, and Y. Mao. 2004. Survival of women with breast cancer in Ottawa, Canada: variation with age, stage, histology, grade and treatment. British Journal of Cancer. 90:1138-1143.

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