Breast Cancer Screening in Canada

Monitoring & Evaluation of Quality Indicators - Results Report

JANUARY 2009 - DECEMBER 2010

Alberta Health Services
Alberta Breast Cancer Screening Program

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

Northwest Territories
Breast Screening Program - Stanton

Nunavut

BreastCheck
CancerCare Manitoba

New Nouveau Brunswick

NOVA SCOTIA
BREAST SCREENING
PROGRAM

Ontario
Cancer Care Ontario
Ontario Breast Screening 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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Introduction

Breast cancer is the leading incident cancer and second leading cause of cancer death among Canadian women.[1] While breast cancer can be diagnosed at any age, over half of all new cases occur in women aged 50 to 69 years. Early detection through programmatic screening, combined with effective treatment, remains the best option available to reduce mortality from breast cancer in this age group.

Monitoring of organized breast cancer screening programs provides an opportunity to understand the impact of organized screening programs on breast cancer morbidity and mortality, and potential harms associated with screening. This knowledge supports screening programs, and helps to ensure that Canadian women have access to high-quality organized breast screening services.

As of April 1, 2013, the Public Health Agency of Canada (PHAC) transferred the hosting of the Canadian Breast Cancer Screening Initiative (CBCSI) to the Canadian Partnership Against Cancer (CPAC). When the CBCSI was transferred to CPAC, several key changes were made to the organizational structure of the CBCSI. The former National Committee is now known as the Canadian Breast Cancer Screening Network (CBCSN). The former Database Management Committee (DMC) and former Database Technical Subcommittee were amalgamated into the Monitoring & Evaluation Working Group (M&E).

The M&E Working Group of the CBCSN is responsible for managing the process and production of results reporting of the established quality indicators.

PHAC continues to house and maintain the Canadian Breast Cancer Screening Database (CBCSD); the data submission process remains as a function coordinated between the provinces/territories and the database manager. This process is supported and facilitated by the M&E Working Group.

Data from the CBCSD are presented for organized breast cancer screening programs in all ten provinces and the Northwest Territories for the calendar years 2009 and 2010. These data will be released electronically in 2015, and subsequently included in a combined 2009-2014 report. Although Yukon has a breast cancer screening program, it does not submit data to the CBCSD. Nunavut does not yet have a breast screening program.

2009 – 2010 Results Summary

In 2009-2010, organized breast cancer screening programs delivered more than 3 million screens to Canadian women aged 30 years and above (Table 1). Participation in women aged 50 to 69 years was 53.2% in 2010, up slightly from 52.1% in 2009 (Figure 2). While this remains substantially below the target of 70%, participation varied widely by jurisdiction, from 31.7% to 64.6% in 2010. In 2009, the majority of women aged 50 to 67 years returned to screening within 30 months (67.2% and 84.4% for initial and subsequent screens, respectively) (Table 5).

Over 95% of women were notified of their screening result within two weeks (Table 4). The majority of women with an abnormal result were followed up with a diagnostic mammogram (80.8%) and/or ultrasound

(47.1%). Relatively fewer women had more invasive diagnostic procedures, including: fine needle aspiration (1.7%), core biopsy (14.9%) or open biopsy (2.1%) (Table 2). Only 60% of women had their first diagnostic assessment within 3 weeks of an abnormal mammogram - a full 30% below the national program target (Table 4). However, this proportion ranged widely by jurisdiction, from 21.1% to 74.6%. Time to final diagnosis also remained below program targets; 77.7% of women who did not require a biopsy received a final diagnosis within 5 weeks, and 52.2% of women who required biopsy received a diagnosis within 7 weeks (Table 4).

In 2009-2010, organized screening programs detected 11,073 cancers (invasive, *in situ* and unclassified types) among women aged 50 to 69 years (Table 4). The positive predictive value (PPV) and invasive cancer detection rate for subsequent screens met the national program target, while the PPV and invasive cancer detection rate for initial screens, as well as abnormal call rates for both initial and subsequent screens were close to the target (Table 4). In all age groups, the abnormal call rate (Figure 5) and invasive cancer detection rate (Figure 7) rose when the screening interval exceeded 30 months, highlighting the importance of regular screening intervals. The sensitivity of screening mammography programs exceeded 80% in nearly all reporting jurisdictions (Table 4), and increased for each successive age group (Table 6). For screen-detected cancers, all reporting jurisdictions remained well within the program target for detecting smaller (≤ 15mm) tumours (Table 4). While the proportion of node negative screen-detected cancers met the program target (>70%) nationally, this proportion varied by jurisdiction, from 65.5 to 81.3% (Table 4). Post-screen invasive cancer rates were close to the target, at 7.3 per 10,000 person-years within 12 months, and 11.7 per 10,000 person-years between 12-24 months (Table 4).

Note: Prior to 2007, Alberta's Screen Test program provided organized screening to only a small proportion of the population, while most women had access to opportunistic screening. The transition to province-wide organized screening through the Alberta Breast Cancer Screening Program (ABCSP) has enabled a more accurate representation of women participating in organized breast cancer screening in Alberta compared with the earlier 2007-2008 report.

Conclusions

Organized breast cancer screening programs continue to provide services to Canadian women. Programs strive to achieve reductions in morbidity and mortality from breast cancer, while minimizing screening harms through program evaluation, ongoing research, and adaptation of program policy to reflect new evidence and technologies. The CBCSN provides a venue for provinces and territories to share information, to enable comparison of results and collaboration to solve program challenges. This information is made available to governments, cancer agencies, screening program managers, health professionals, and other breast cancer stakeholders to support the activities of organized cancer screening programs across Canada.

References:

1. Canadian Cancer Society's Advisory Committee on Cancer Statistics. Canadian Cancer Statistics 2015. Toronto, ON: Canadian Cancer Society; 2015.

TABLE 1

Screening volume by program, age 30+, 1988 to 2010 screen years

Year	Program											
	NT	BC	AB	SK	MB	ON[a]	QC[b]	NB	NS[c]	PE	NL[d]	CA
1988	N/A	4,391	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4,391
1989	N/A	9,188	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9,188
1990	N/A	22,481	N/A	6,355	N/A	587	N/A	N/A	N/A	N/A	N/A	29,423
1991	N/A	54,563	N/A	14,305	N/A	15,211	N/A	N/A	1,876	N/A	N/A	85,955
1992	N/A	80,892	N/A	15,778	N/A	40,051	N/A	N/A	4,345	N/A	N/A	141,066
1993	N/A	100,275	N/A	26,057	N/A	45,370	N/A	N/A	4,886	N/A	N/A	176,588
1994	N/A	118,878	N/A	25,540	N/A	55,301	N/A	N/A	8,459	N/A	N/A	208,178
1995	N/A	143,407	N/A	29,603	2,671	58,096	N/A	5,885	12,475	N/A	N/A	252,137
1996	N/A	166,738	N/A	28,901	13,594	67,569	N/A	18,501	15,531	N/A	3,117	313,951
1997	N/A	173,906	N/A	33,915	19,163	79,929	N/A	18,529	19,461	N/A	4,691	349,594
1998	N/A	189,959	N/A	34,093	23,457	98,397	44,088	26,196	25,436	N/A	5,513	447,139
1999	N/A	217,548	N/A	35,049	28,204	113,873	145,082	31,161	29,259	5,578	6,083	611,837
2000	N/A	223,599	N/A	35,264	28,566	138,061	152,934	32,701	35,232	6,268	6,782	659,407
2001	N/A	224,559	N/A	36,283	28,728	163,619	172,081	33,835	35,227	6,700	8,048	709,080
2002	N/A	234,871	N/A	34,457	29,263	191,862	194,312	37,350	38,573	6,267	8,856	775,811
2003	N/A	221,031	N/A	35,640	31,636	211,512	207,733	37,593	44,943	6,094	11,035	807,217
2004	1,103	230,838	N/A	35,950	32,301	248,115	220,765	37,470	48,578	6,060	9,816	870,996
2005	1,137	256,954	N/A	35,547	33,698	279,561	237,599	40,037	50,813	6,500	14,811	956,657
2006	1,143	266,799	N/A	34,830	36,586	317,766	253,156	37,886	58,128	7,004	15,246	1,028,544
2007	1,206	279,270	203,121	37,279	36,465	371,390	272,046	39,872	62,677	9,337	16,749	1,329,412
2008	1,147	286,998	204,101	37,338	40,351	417,334	285,458	39,957	73,555	7,471	19,387	1,413,097
2009	1,188	299,410	227,571	36,570	45,382	454,769	302,562	41,654	75,289	7,578	18,831	1,510,804
2010	1,215	303,132	224,943	38,451	43,536	487,719	315,588	48,876	72,609	13,021	20,638	1,569,728
All Years	8,139	4,109,687	859,736	647,205	473,601	3,856,092	2,803,404	527,503	717,352	87,878	169,603	14,260,200

a Ontario does not accept women younger than 50 years of age. Nurses provide clinical breast examination at 39% of sites.
b 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.
c Nova Scotia has modified clinical breast examination on site, performed by technologists at time of mammography.
d Newfoundland and Labrador does not accept women younger than 50 years of age. Clinical breast examination is provided by a nurse examiner.

Notes:
1. Nunavut does not have an organized breast cancer screening program.
2. Yukon does not submit data to the CBCSD.
3. Alberta Breast Cancer Screening Program (ABCSP) began collecting community clinics' data in 2007. In previous reports, Alberta data were limited to those obtained from the Screen Test program which conducts about 10 to 12% of screening mammograms in the province.
4. Annual screening figures have been updated and may vary slightly from previous reports.

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TABLE 2

Diagnostic procedures after an abnormal screen, women aged 50-69, 2009 and 2010 screen years

Diagnostic Procedure	Number	Percent[a]	Range[b]
Diagnostic mammogram	130,390	80.8	57.4-91.7
Ultrasound[c]	76,059	47.1	15.6-71.2
Fine-needle aspiration	2,760	1.7	0.1-3.4
Core biopsy	23,975	14.9	10.2-26.2
Open biopsy with or without fine wire localization	3,352	2.1	0.2-4.3

a. Proportion of all abnormal screens that had this diagnostic procedure.
b. Range among programs is not included.
c. Ultrasound may be underestimated in Québec as tests performed in private clinics are not included. A new code for ultrasound was created and is missing in the Québec 2009-2010 data.

Notes:

1. Proportion of all abnormal screens that had this diagnostic procedure within 6 months of the screen.
2. Alberta is excluded for data quality reasons.

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TABLE 3

Characteristics of screen-detected cancers by age group, 2009 and 2010 screen years

		Age group (years)									
		40 to 49		50 to 59		60 to 69		70+		Total (40+)	
		N	%	N	%	N	%	N	%	N	%
Number of cancers	Invasive	560	70.8	4,060	79.2	4,905	82.8	1,947	85.3	11,472	81.2
	DCIS	231	29.2	1,065	20.8	1,016	17.2	336	14.7	2,648	18.8
	unknown behavior	*	N/A	12	N/A	15	N/A	*	N/A	31	N/A
TNM staging	0 (in situ)	231	31.1	668	20.8	667	17.7	316	16.0	1,882	19.4
	I	299	40.2	1,490	46.5	2,042	54.1	1,124	57.0	4,955	51.1
	II	173	23.3	813	25.4	857	22.7	435	22.0	2,278	23.5
	III/IV	40	5.4	236	7.4	206	5.5	98	5.0	580	6.0
	unknown stage[a]	49	N/A	1,930	N/A	2,164	N/A	313	N/A	4,456	N/A
Tumour size[b]	>0 to <2 mm	11	2.9	29	2.7	24	1.7	11	1.4	75	2.1
	2 to 5 mm	39	10.1	85	7.9	107	7.8	51	6.6	282	7.8
	6 to 10 mm	75	19.5	254	23.7	359	26.1	225	29.1	913	25.3
	11 to 15 mm	95	24.7	275	25.7	394	28.6	230	29.8	994	27.6
	16 to 20 mm	59	15.3	170	15.9	212	15.4	129	16.7	570	15.8
	>=21 mm	106	27.5	257	24.0	281	20.4	127	16.4	771	21.4
	Size unknown[c]	175	N/A	2,990	N/A	3,528	N/A	1,174	N/A	7,867	N/A
	Median tumour size (mm)	15		14		13		13		13	
Positive nodes[b,d]	0	277	71.0	750	70.6	1,070	78.2	620	81.9	2,717	75.9
	1 to 3	88	22.6	234	22.0	239	17.5	113	14.9	674	18.8
	4+	25	6.4	79	7.4	60	4.4	24	3.2	188	5.3
	Nodal status unknown[e]	170	N/A	2,997	N/A	3,536	N/A	1,190	N/A	7,893	N/A

a Stage is unknown for QC and SK. Number of screen-detected invasive cancers with unknown stage by program: NL(1), PE(3), NS(12), NB(162), QC(3376), ON(405), MB(3), SK(335), AB(10) and BC(149).
b This analysis includes invasive cancers only.
c Tumor size is unknown for QC, and AB. Exact tumor size is unknown for ON. Number of screen-detected invasive cancers with unknown tumour size by program: NL(2), NS(12), NB(37), QC(2665), ON(3830), MB(31), SK(2), AB(1259) and BC(29).
d Includes pathologically positive nodes only.
e Nodal status is unknown for QC, and AB. Number of positive nodes is unknown for ON. Number of screen-detected invasive tumours with unknown positive nodes by program: NL(2), PE(67), NS(29), NB(16), QC(2665), ON(3830), MB(18), SK(6), AB(1259) and BC(1).

Notes:
1. * suppressed due to small values (numerator <5 and/or denominator <30).

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TABLE 4

Quality indicators by program, women aged 50-69, 2009 and 2010 screen years

Indicator	Target	Program											
		NT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	CA
Number of screens													
	N/A	1,151	332,752	266,844	59,978	81,658	812,519	618,150	63,883	86,342	13,450	35,110	2,371,837
Number of first screens[a]													
	N/A	136	23,387	62,808	9,519	15,479	193,079	119,836	6,216	6,624	1,410	5,114	443,608
Number of screen-detected cancers[b,c]													
	N/A	5	1,572	972	230	420	3,604	3,376	289	412	74	119	11,073
Participation rate within a 30-month period (%)[d]													
	≥70	31.7	57.4	60.9	48.1	59.0	43.8	61.2	62.4	60.1	64.6	39.9	53.2
Retention rate (% screened within 30 months of an initial screen)[a,e]													
	≥75	56.7	57.2	62.5	64.6	66.7	75.5	66.6	59.7	60.4	68.3	78.9	68.7
Retention rate (% screened within 30 months of a subsequent screen)[e,f]													
	≥90	72.5	80.5	79.5	83.0	84.0	86.1	80.9	75.8	80.8	86.1	87.4	82.4
Annual screening rate (% screened within 18 months of an initial screen)[a,g]													
	N/A	*	13.7	33.7	16.5	12.7	36.1	9.1	21.8	30.1	16.4	41.8	26.3
Annual screening rate (% screened within 18 months of a subsequent screen)[f,g]													
	N/A	38.4	18.2	55.2	33.0	11.3	44.4	11.7	28.9	44.0	29.9	48.4	32.2
Abnormal call rate (%), initial screen[a]													
	<10	14.7	16.5	10.5	11.5	8.7	12.3	16.2	17.4	12.2	13.2	12.4	13.2
Abnormal call rate (%), subsequent screen													
	<5	7.5	5.9	5.6	4.0	3.9	6.4	7.3	9.1	4.7	7.9	5.3	6.3
Invasive cancer detection rate (per 1,000 screens), initial screen[a,c]													
	>5	*	6.5	4.7	4.1	4.2	4.3	4.4	5.0	4.8	7.1	3.7	4.5
Invasive cancer detection rate (per 1,000 screens), subsequent screen[c]													
	>3	*	3.6	2.5	3.1	4.3	3.5	4.3	3.5	3.9	4.5	2.3	3.6
In situ cancer detection, initial screen (per 1,000 screens)[a,c]													
	N/A	*	2.0	0.9	0.8	1.2	1.0	1.4	0.8	0.8	*	1.4	1.1
In situ cancer detection, initial screen, % in situ[a,c]													
	N/A	*	23.4	16.2	17.0	21.7	18.9	23.4	13.9	13.5	*	*	20.1
In situ cancer detection, subsequent screen (per 1,000 screens)[c]													
	N/A	*	0.9	0.6	0.5	0.8	0.7	1.1	0.9	0.8	0.7	0.8	0.8
In situ cancer detection, subsequent screen, % in situ[c]													
	N/A	*	20.0	19.9	13.7	15.4	16.4	20.0	20.6	16.5	14.3	25.8	18.5
Diagnostic interval (%), notified within 2 weeks of screen													
	≥90	86.0	98.7	N/A	N/A	98.8	96.1	N/A	N/A	80.0	42.3	95.1	95.3
Diagnostic interval (%), first diagnostic assessment within 3 weeks[h,i]													
	≥90	28.3	71.2	N/A	57.1	66.5	74.6	39.0	58.4	43.3	21.1	71.8	59.8
Diagnostic interval (%), final diagnosis (with no tissue biopsy) within 5 weeks[h,i,j]													
	≥90	55.1	77.2	N/A	86.0	85.3	88.1	62.6	80.3	75.9	50.2	69.2	77.7
Diagnostic interval (%), final diagnosis (with tissue biopsy) within 7 weeks[h,i,j]													
	≥90	*	51.4	N/A	67.8	67.4	63.4	39.4	55.3	54.2	33.8	56.5	52.2
Positive predictive value (%), initial screen[a,b,c]													
	≥5	*	5.2	6.0	4.3	6.2	4.4	3.6	3.3	4.6	6.0	4.2	4.4

Indicator	Target	Program											
		NT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	CA
Positive predictive value (%), subsequent screen[b,c]													
	≥6	*	7.6	6.3	9.2	13.2	6.6	7.4	4.9	10.2	6.7	5.9	7.2
Non-malignant biopsy rate, initial screen (per 1,000 screens)[a,i,k,l]													
	N/A	*	26.6	N/A	14.1	17.3	13.5	24.4	19.6	31.9	26.3	16.3	18.4
Non-malignant biopsy rate, initial screen, % open[a,i,k,l]													
	N/A	*	21.1	N/A	11.9	11.2	10.6	8.0	26.2	5.2	*	26.5	10.7
Non-malignant biopsy rate, subsequent screen (per 1,000 screens)[i,k,l]													
	N/A	8.9	7.6	N/A	4.1	5.2	5.7	9.0	8.6	8.7	8.6	5.3	7.2
Non-malignant biopsy rate, subsequent screen, % open[i,k,l]													
	N/A	*	22.8	N/A	20.3	12.2	12.1	9.5	22.5	6.0	*	18.9	13.4
Screen-detected invasive cancer tumour size (%), <=15 mm[c,m]													
	>50	*	60.8	N/A	64.1	63.4	N/A	63.5	68.9	64.0	65.6	53.5	62.4[n]
Percentage of node negative screen-detected invasive cancer (%)[c,m]													
	>70	*	76.4	N/A	76.4	75.4	73.8	73.5	71.5	74.6	81.3	65.5	74.6[n]
Post-screen invasive cancer rate (per 10,000 person-years), 0 to <12 months[o]													
	<6	*	7.6	6.5	6.2	6.1	8.0	N/A	6.3	4.1	N/A	10.0	7.3
Post-screen invasive cancer rate (per 10,000 person-years), 12 to 24 months[o]													
	<12	*	13.0	14.5	13.4	12.6	10.6	N/A	9.8	10.9	N/A	6.2	11.7
Sensitivity of the screening mammography program, subsequent screen[p]													
	N/A	*	83.6	81.2	82.4	88.7	82.3	N/A	86.3	89.7	N/A	73.2	83.3

a Alberta Breast Cancer Screening Program (ABCSP) began collecting community clinics' data in 2007, resulting in all initially registered women being classified as "first screens" when they may have been screened in the past. This may bias Alberta and national estimates for "first screens" during the initial years of data collection by the Alberta program.

b Includes invasive, in situ, and unclassified cancers. Bilateral cancer is counted as one cancer. Each woman is counted once.

c Excludes cancers diagnosed beyond 6 months.

d Statistics Canada census data estimated for December 31, 2010 are used for denominator values. Prevalent breast cancers were excluded from the denominators. Participation rate was calculated for the 30 months ending Dec 31 of the screen year.

e Data based on 2008 and 2009 screen years.

f In the case of multiple subsequent screens, the last screen during the reference period was used.

g Data based on 2010 screen year.

h Excludes procedures beyond 6 months.

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

j 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.

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

l 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.

m 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.

n Results for Canada do not include Québec. Québec's estimate was internally calculated and provided to the Canadian Partnership Against Cancer, whereas Canada's estimate was obtained using data in the National Breast Cancer Screening Database.

o 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 Ontario, Nova Scotia and Newfoundland and

Labrador.
p 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 Ontario, Nova Scotia and Newfoundland and Labrador. This calculation method has been updated from previous reports.

Note:
* suppressed due to small values (numerator <5 and/or denominator <30).

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TABLE 5

Quality indicators by year, women aged 50-69

Indicator	Target	Screen year[a]						
		2004	2005	2006	2007	2008	2009	2010
Number of screens[b]								
	N/A	682,611	748,717	806,649	1,008,479	1,080,694	1,157,435	1,214,402
Number of first screens[c]								
	N/A	158,261	170,456	185,166	310,306	270,250	231,531	212,077
Number of screen-detected cancers[b,d,e]								
	N/A	3,262	3,580	3,867	4,483	5,014	5,369	5,704
Participation rate within a 30-month period (%)[f]								
	≥70	40.8	42.8	45.2	47.5	49.6	52.1	53.2
Retention rate (% screened within 30 months of an initial screen)[c]								
	≥75	69.9	70.4	70.8	72.2	70.0	67.2	N/A[g]
Retention rate (% screened within 30 months of a subsequent screen)								
	≥90	83.2	83.0	83.3	83.3	84.6	84.4	N/A[g]
Annual screening rate (% screened within 18 months of an initial screen)[c]								
	N/A	16.3	18.0	18.9	29.8	25.2	23.0	26.3
Annual screening rate (% screened within 18 months of a subsequent screen)								
	N/A	21.2	20.9	22.0	23.1	27.5	29.2	32.2
Abnormal call rate (%), initial screen[c]								
	<10	12.4	12.3	12.3	10.3	11.5	12.7	13.7
Abnormal call rate (%), subsequent screen								
	<5	6.4	6.1	6.0	6.0	6.1	6.2	6.4
Invasive cancer detection rate (per 1,000 screens), initial screen[c,e]								
	>5	4.5	4.3	4.7	3.3	4.5	4.4	4.7
Invasive cancer detection rate (per 1,000 screens), subsequent screen[e]								
	>3	3.5	3.7	3.6	3.8	3.4	3.6	3.6
In situ cancer detection, initial screen (per 1,000 screens)[c,e]								
	N/A	1.3	1.2	1.1	0.8	1.1	1.1	1.1
In situ cancer detection, initial screen, % in situ[c,e]								
	N/A	22.2	21.4	18.9	19.4	19.2	20.6	19.5
In situ cancer detection, subsequent screen (per 1,000 screens)[e]								
	N/A	1.0	0.9	0.9	0.9	0.9	0.8	0.8
In situ cancer detection, subsequent screen, % in situ[e]								
	N/A	22.0	20.2	19.2	19.1	20.6	18.8	18.2
Diagnostic interval (%), notified within 2 weeks of screen[h]								
	≥90	96.9	95.8	96.5	96.5	94.8	94.9	95.7
Diagnostic interval (%), first diagnostic assessment within 3 weeks [i,j,k]								
	≥90	59.1	57.7	57.5	59.2	55.9	57.2	62.3
Diagnostic interval (%), final diagnosis (with no tissue biopsy) within 5 weeks[i,j,k,l]								
	≥90	77.5	77.4	76.9	77.0	75.4	76.0	79.1
Diagnostic interval (%), final diagnosis (with tissue biopsy) within 7 weeks [i,j,k,l]								
	≥90	49.2	47.7	47.4	48.4	48.6	51.0	53.3

Indicator	Target	Screen year[a]						
		2004	2005	2006	2007	2008	2009	2010
Positive predictive value (%), initial screen[c,d,e]								
	≥5	4.7	4.5	4.8	5.1	5.0	4.4	4.3
Positive predictive value (%), subsequent screen[d,e]								
	≥6	7.0	7.6	7.5	7.8	7.1	7.3	7.1
Non-malignant biopsy rate, initial screen (per 1,000 screens)[c,j,k,m,n]								
	N/A	17.7	17.2	18.2	18.3	18.2	17.9	19.0
Non-malignant biopsy rate, initial screen, % open[c,j,k,m,n]								
	N/A	24.9	21.3	17.3	15.8	14.3	11.3	10.2
Non-malignant biopsy rate, subsequent screen (per 1,000 screens)[j,k,m,n]								
	N/A	8.0	7.2	7.6	7.5	7.2	7.1	7.2
Non-malignant biopsy rate, subsequent screen, % open[j,k,m,n]								
	N/A	29.8	27.2	21.8	19.1	16.3	13.9	12.9
Screen-detected invasive cancer tumour size (%), <=15 mm[e,k,o,p,q]								
	>50	64.2	64.0	62.3	61.9	61.0	64.3	60.6
Percentage of node negative screen-detected invasive cancer (%)[e,k,o,q,r,s,t]								
	>70	74.1	74.3	73.0	73.6	76.5	74.7	74.4
Post-screen invasive cancer rate (per 10,000 person-years), 0 to <12 months[t,u,v]								
	<6	7.6	7.9	7.2	6.6	7.1	7.2	7.5
Post-screen invasive cancer rate (per 10,000 person-years), 12 to 24 months[t,u,v]								
	<12	11.6	11.9	12.6	12.0	12.3	11.8	11.7
Sensitivity of the screening mammography program, subsequent screen[t,u,w]								
	N/A	83.3	83.2	84.3	85.5	83.1	83.8	82.8

a Prince Edward Island is excluded for all years except 2004, 2010 unless otherwise indicated (information unavailable).
b Prince Edward Island is included in this indicator for all years.
c Alberta Breast Cancer Screening Program (ABCSP) began collecting community clinics' data in 2007, resulting in all initially registered women being classified as "first screens" when they may have been screened in the past. This may bias national estimates for "first screens" during the initial years of data collection by the Alberta program.
d Includes invasive, in situ, and unclassified cancers. Bilateral cancer is counted as one cancer. Each woman is counted once.
e Excludes cancers diagnosed beyond 6 months.
f Statistics Canada census data estimated for December 31, 2010 are used for denominator values. Prevalent breast cancers were excluded from the denominators. Participation rate was calculated for the 30 months ending Dec 31 of the screen year.
g Insufficient time for follow-up to ensure data completeness.
h Alberta, Saskatchewan, Québec and New Brunswick are excluded from this measure as data were unavailable.
i Excludes procedures beyond 6 months.
j Québec data are based on aggregate numbers which may be calculated using a different method.
k Alberta is excluded from this measure as data were unavailable.
l 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 procedure) or the date of the last benign test or pathological biopsy.
m Includes all core or open biopsies with a non-malignant test result (may include multiple tests per woman).
n 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.
o 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.

p Excludes Alberta (all years), Ontario (2009-2010), Québec (2008-2010) and Northwest Territories (2008-2010) as data were unavailable.
q National estimates are based on non-missing data from all programs. Consequently, the programs contributing to the national estimate may vary from screen year to screen year.
r Excludes Alberta (all years), Québec (2008-2010) and Northwest Territories (2008-2010) as data were unavailable.
s 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.
t Québec was excluded from this measure as data were unavailable.
u Prince Edward Island is excluded from this measure as data were unavailable.
v 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 Ontario, Nova Scotia and Newfoundland and Labrador.
w 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 Ontario, Nova Scotia and Newfoundland and Labrador

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TABLE 6

Quality indicators by age group, 2009 and 2010 screen years

Indicator	Age group (years)				
	40 to 49	50 to 59	60 to 69	70+	Total (40+)
Number of screens					
	408,279	1,361,671	1,010,166	299,162	3,079,278
Number of first screens[a]					
	121,813	353,591	90,017	29,631	595,052
Number of screen-detected cancers[b,c]					
	792	5,137	5,936	2,286	14,151
Participation rate within a 30-month period (%)[d]					
	11.1	49.9	57.8	20.0	33.5
Retention rate (% screened within 30 months of an initial screen)[a,e,f]					
	64.0	68.9	66.9	47.7	66.2
Retention rate (% screened within 30 months of a subsequent screen)[e,f]					
	80.5	81.7	79.3	63.1	78.7
Annual screening rate (% screened within 18 months of an initial screen)[a,f,g]					
	62.1	25.7	29.2	34.5	33.7
Annual screening rate (% screened within 18 months of a subsequent screen)[f,g]					
	74.8	32.7	31.9	39.5	38.2
Abnormal call rate (%), initial screen[a]					
	13.8	13.6	11.6	9.4	13.2
Abnormal call rate (%), subsequent screen					
	6.9	6.5	6.1	5.6	6.3
Invasive cancer detection rate (per 1,000 screens), initial screen[a,c]					
	2.0	3.8	7.4	9.9	4.2
Invasive cancer detection rate (per 1,000 screens), subsequent screen[c]					
	1.1	2.7	4.6	6.2	3.6
In situ cancer detection, initial screen (per 1,000 screens)[a,c]					
	0.8	1.1	1.4	1.6	1.1
In situ cancer detection, initial screen, % in situ[a,c]					
	27.9	22.0	15.9	14.2	20.3
In situ cancer detection, subsequent screen (per 1,000 screens)[c]					
	0.5	0.7	1.0	1.1	0.8
In situ cancer detection, subsequent screen, % in situ[c]					
	30.2	20.2	17.3	14.8	18.3
Diagnostic interval (%), notified within 2 weeks of screen[h]					
	94.3	95.1	95.5	95.8	95.2
Diagnostic interval (%), first diagnostic assessment within 3 weeks[i,j,k]					
	63.9	58.7	61.7	71.8	61.2
Diagnostic interval (%), final diagnosis (with no tissue biopsy) within 5 weeks[i,j,k,l]					
	76.9	77.3	78.2	83.1	77.9
Diagnostic interval (%), final diagnosis (with tissue biopsy) within 7 weeks[i,j,k,l]					
	46.6	49.8	55.4	62.3	52.7

Indicator	Age group (years)				
	40 to 49	50 to 59	60 to 69	70+	Total (40+)
Positive predictive value (%), initial screen[a,b,c]					
	2.1	3.6	7.9	13.1	4.2
Positive predictive value (%), subsequent screen[b,c]					
	2.4	5.3	9.4	13.2	7.2
Non-malignant biopsy rate, initial screen (per 1,000 screens)[a,j,k,m,n]					
	23.5	19.0	15.6	12.8	19.0
Non-malignant biopsy rate, initial screen, % open[a,j,k,m,o]					
	16.8	10.7	11.1	13.0	11.9
Non-malignant biopsy rate, subsequent screen (per 1,000 screens)[j,k,m,n]					
	7.7	7.3	7.0	6.6	7.2
Non-malignant biopsy rate, subsequent screen, % open[j,k,m,n]					
	20.5	14.2	12.5	15.7	14.3
Screen-detected invasive cancer tumour size (%), <=15 mm[c,o,p]					
	57.1	60.1	64.2	66.9	62.8
Percentage of node negative screen-detected invasive cancer (%)[c,p,q]					
	71.2	71.0	77.4	79.7	75.5
Post-screen invasive cancer rate (per 10,000 person-years), 0 to <12 months[r,s]					
	6.4	6.6	8.3	11.1	7.6
Post-screen invasive cancer rate (per 10,000 person-years), 12 to 24 months[r,s]					
	11.5	10.3	13.7	15.3	12.2
Sensitivity of the screening mammography program, subsequent screen[r,t]					
	66.9	81.4	84.6	85.8	82.7

a Alberta Breast Cancer Screening Program (ABCSP) began collecting community clinics' data in 2007, resulting in all initially registered women being classified as "first screens" when they may have been screened in the past. This may bias national estimates for "first screens" during the initial years of data collection by the Alberta program.

b Includes invasive, in situ, and unclassified cancers. Bilateral cancer is counted as one cancer. Each woman is counted once.

c Excludes cancers diagnosed beyond 6 months.

d Statistics Canada census data estimated for December 31, 2010 are used for denominator values. Prevalent breast cancers were excluded from the denominators. Participation rate was calculated for the 30 months ending Dec 31 of the screen year.

e Data based on 2008 and 2009 screen years.

f In the case of multiple subsequent screens, the last screen during the reference period was used.

g Data based on 2010 screen year.

h Alberta, Saskatchewan, Québec and New Brunswick are excluded from this measure as data were not available.

i Excludes procedures beyond 6 months.

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

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

l 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.

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

n 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.

o Alberta, Ontario, Québec and Northwest Territories were excluded from this measure as data were not available.

p 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.
q Alberta, Québec and Northwest Territories were excluded from this measure as data were not available.
r Québec and Prince Edward Island were excluded from this measure as data were not available.
s 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 Ontario, Nova Scotia and Newfoundland and Labrador.
t 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 Ontario, Nova Scotia and Newfoundland and Labrador. This calculation method has been updated from previous reports.

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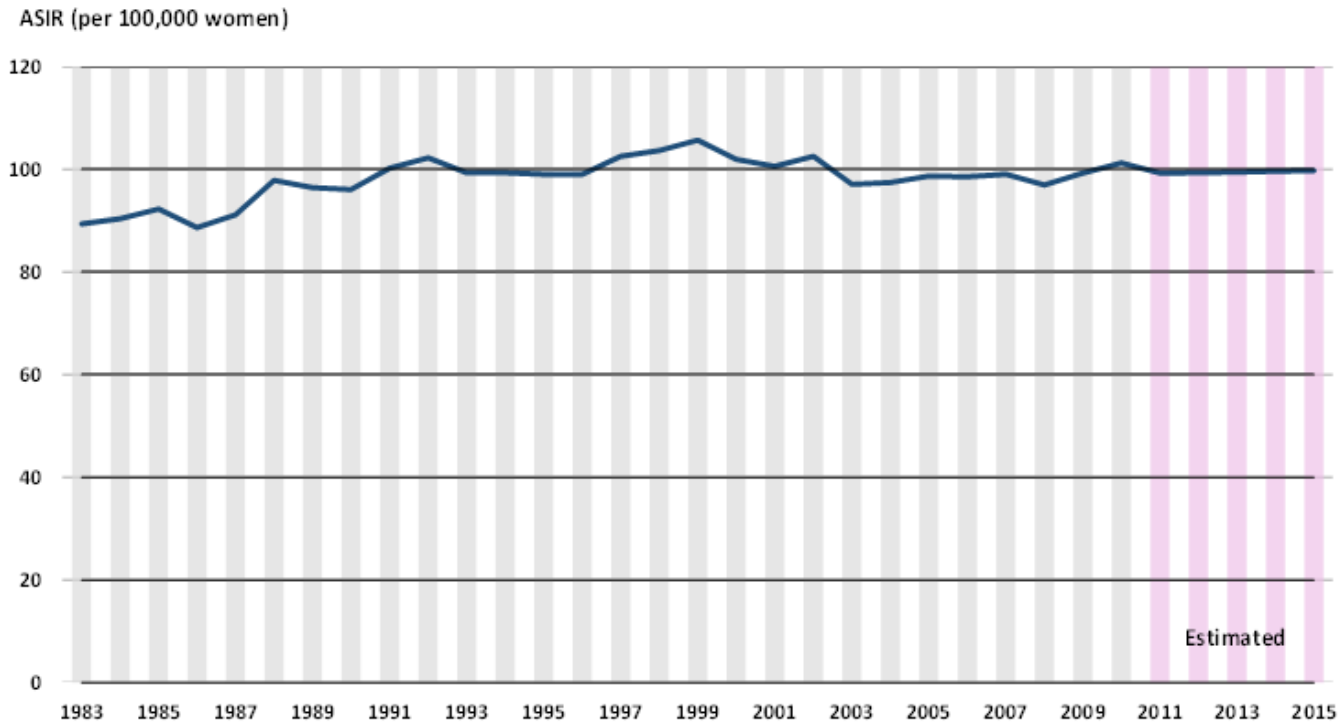
FIGURE 1A

Age-standardized incidence rates (ASIR) per 100,000 women for breast cancer in Canada, 1983-2015



Notes:
1. Incidence rates are estimated for 2011-2015 (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 2015. Toronto, ON: Canadian Cancer Society; 2015.

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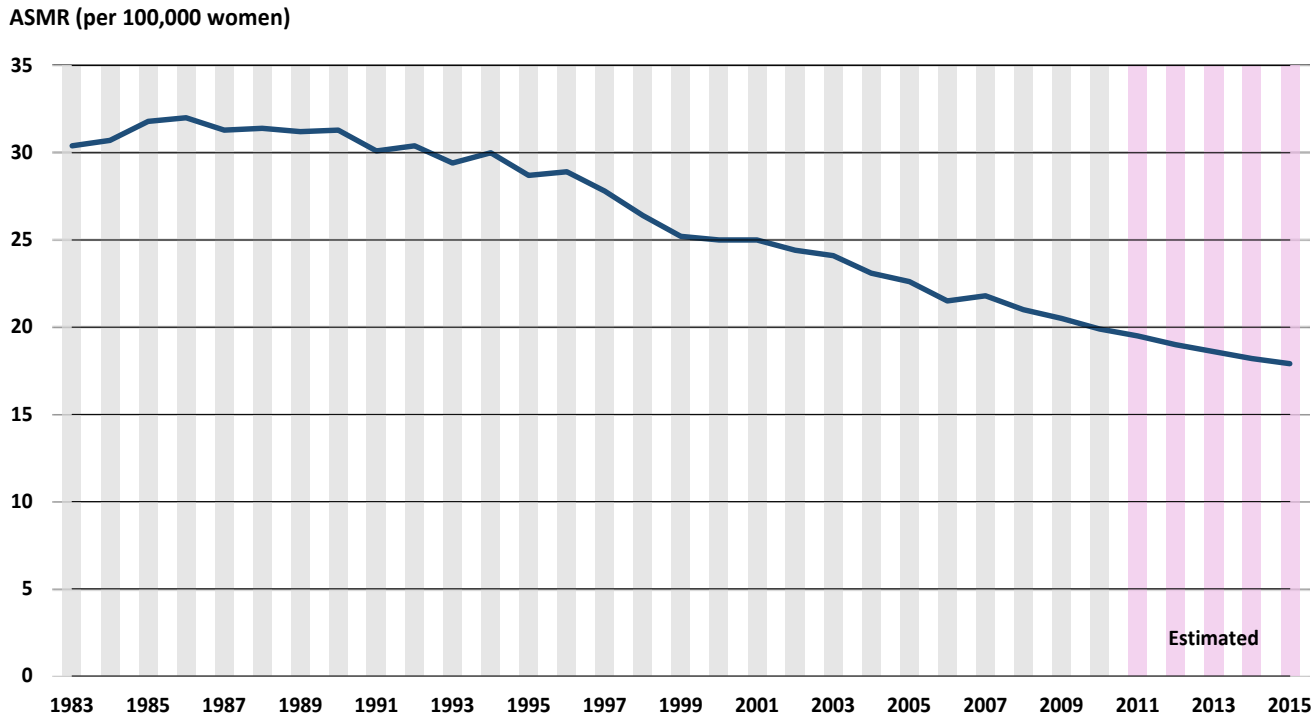
FIGURE 1B

Age-standardized mortality rates (ASMR) per 100,000 women for breast cancer in Canada, 1983-2015



Notes:
1. Mortality rates are estimated for 2011-2015 (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 2015. Toronto, ON: Canadian Cancer Society; 2015.

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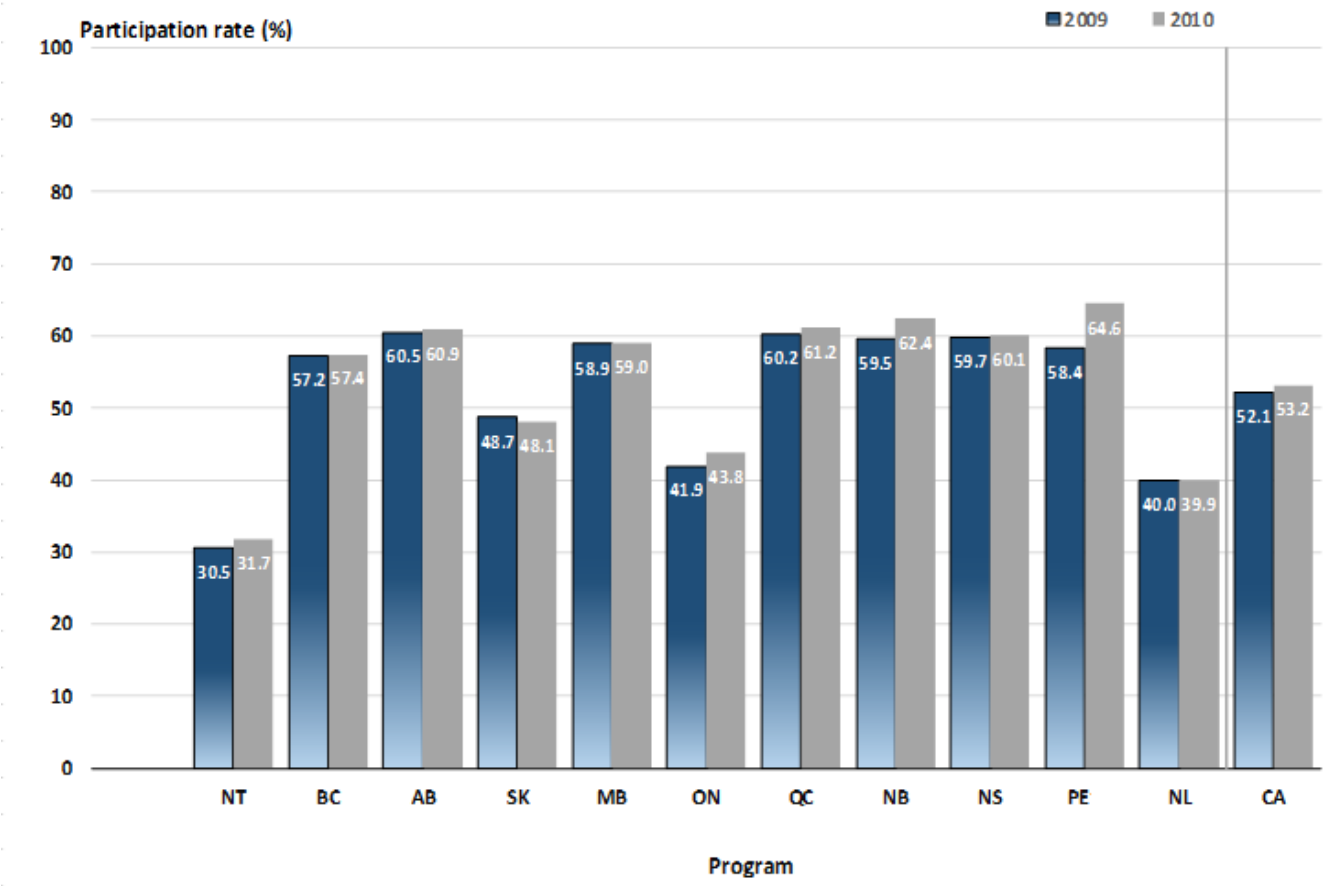
FIGURE 2

Participation in organized breast cancer screening programs within a 30-month period, women aged 50-69 (2009 - 2010)



Notes:
1. Population estimates (denominator) are adjusted to exclude prevalent cases of breast cancer.
2. Rate for 2009 includes screens in the 30-month period July 1, 2007 - December 31, 2009; Rate for 2010 includes screens in the 30-month period July 1, 2008 - December 31, 2010.

Source: Statistics Canada census data estimated for December 31, 2009 and December 31, 2010 are used for denominator values in 2009 and 2010 respectively.

Prevalent breast cancers were excluded from the denominator: Person-based prevalence on Jan. 1, 2010/2011 of women diagnosed with invasive breast cancer or DCIS from 1992, by province (excluding Québec) and attained age group, was estimated using the November 2012 Canadian Cancer Registry (CCR) file. Breast cancer prevalence estimates are underestimated for Ontario because in-situ cancers were not registered at the time the CCR file was created. Québec prevalence estimated from Canadian average (excluding Québec).

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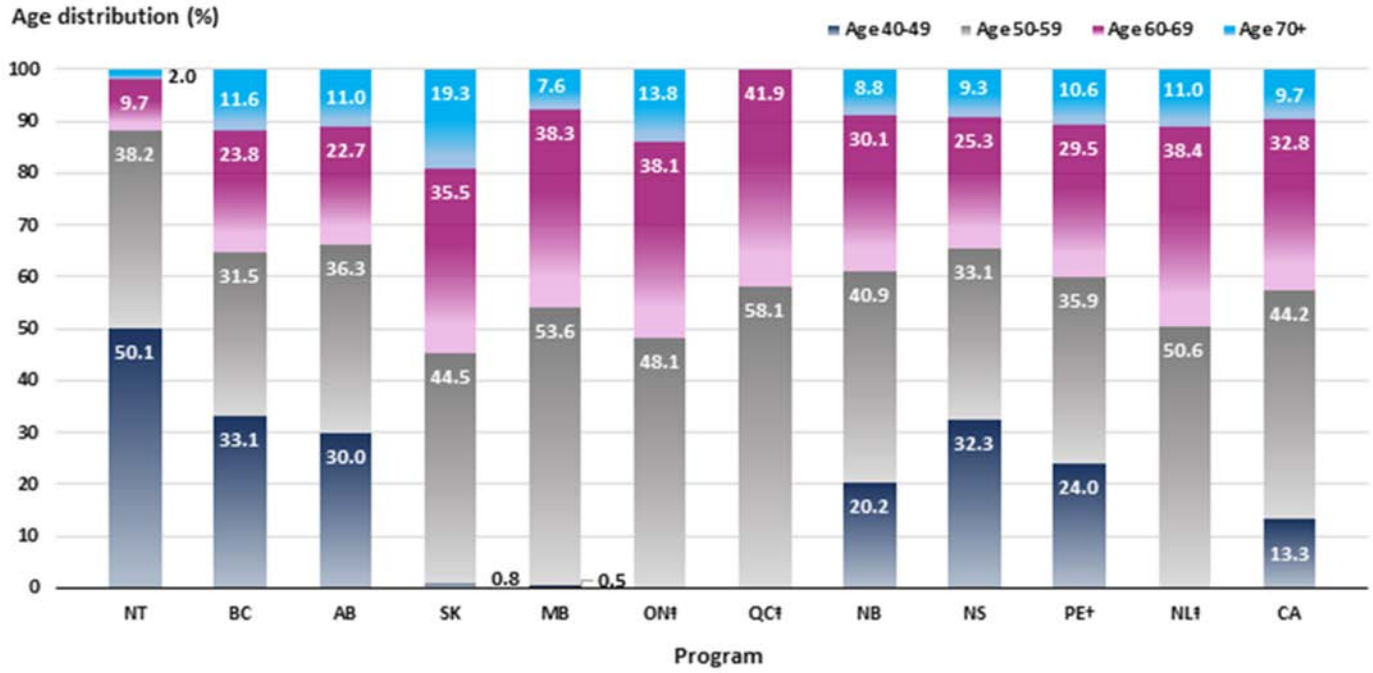
FIGURE 3

Age distribution of program screens by province, 2009 and 2010 screen years



‡ Ontario, and Newfoundland and Labrador do not accept women younger than 50 years of age. Although Québec accepts women aged 35-49 and 70+ years with physician referral, they are not officially considered within the program and are not included in this table.

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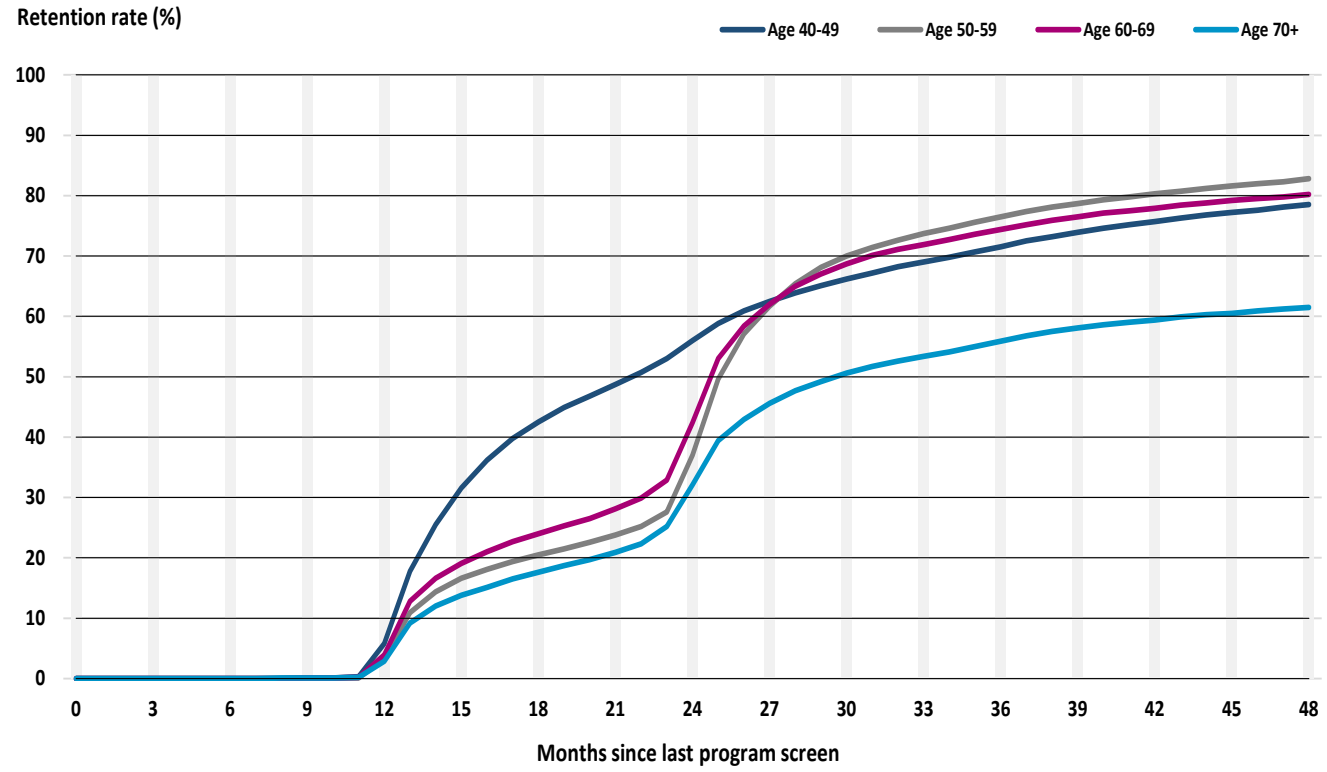
FIGURE 4A

Cumulative probability of returning for a second screen by age group, 2008 screen year



Notes:

1. Alberta breast cancer screening program (ABCSP) began collecting community clinics' data in 2007, resulting in all initially registered women being classified as "first screens" when they may have been screened in the past. This may bias national estimates for "first screens" during the initial years of data collection by the Alberta program.

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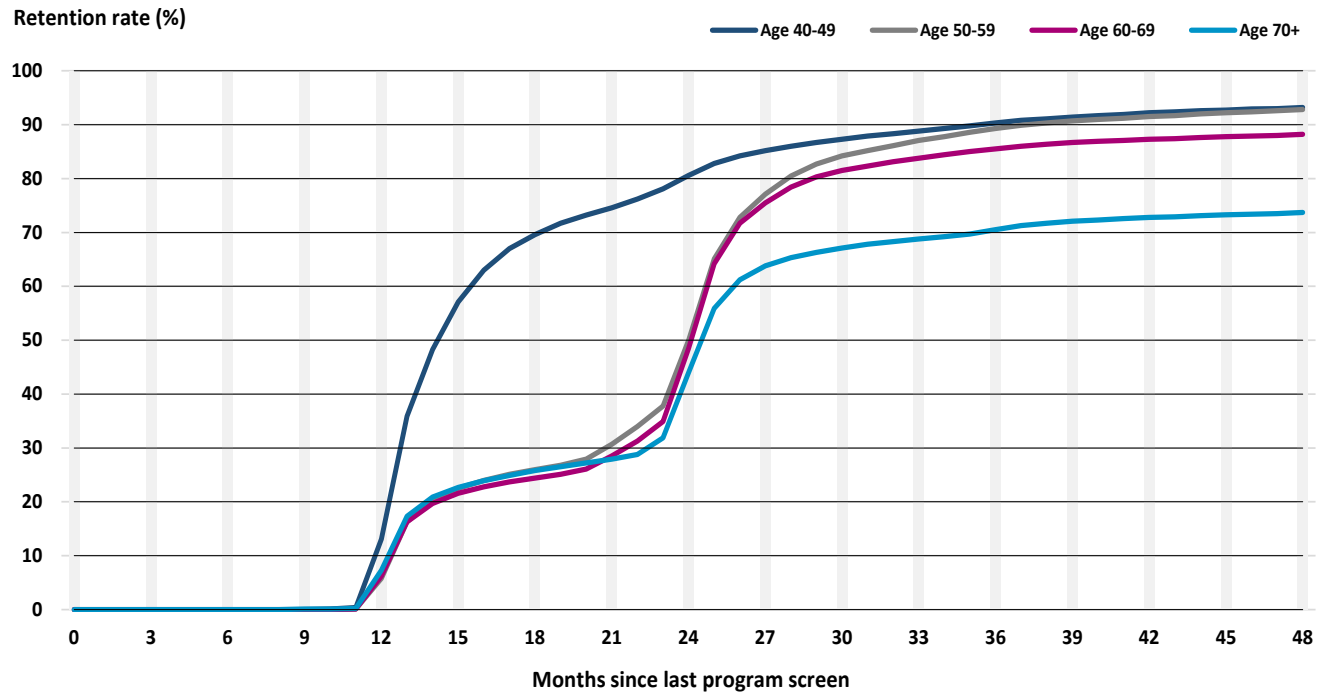
FIGURE 4B

Cumulative probability of returning for a third or greater screen by age group, 2008 screen year



Notes:

1. Alberta breast cancer screening program (ABCSP) began collecting community clinics' data in 2007, resulting in all initially registered women being classified as "first screens" when they may have been screened in the past. This may bias national estimates for "first screens" during the initial years of data collection by the Alberta program.

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FIGURE 5

Abnormal call rate by age group and time from last screen, 2009 and 2010 screen years

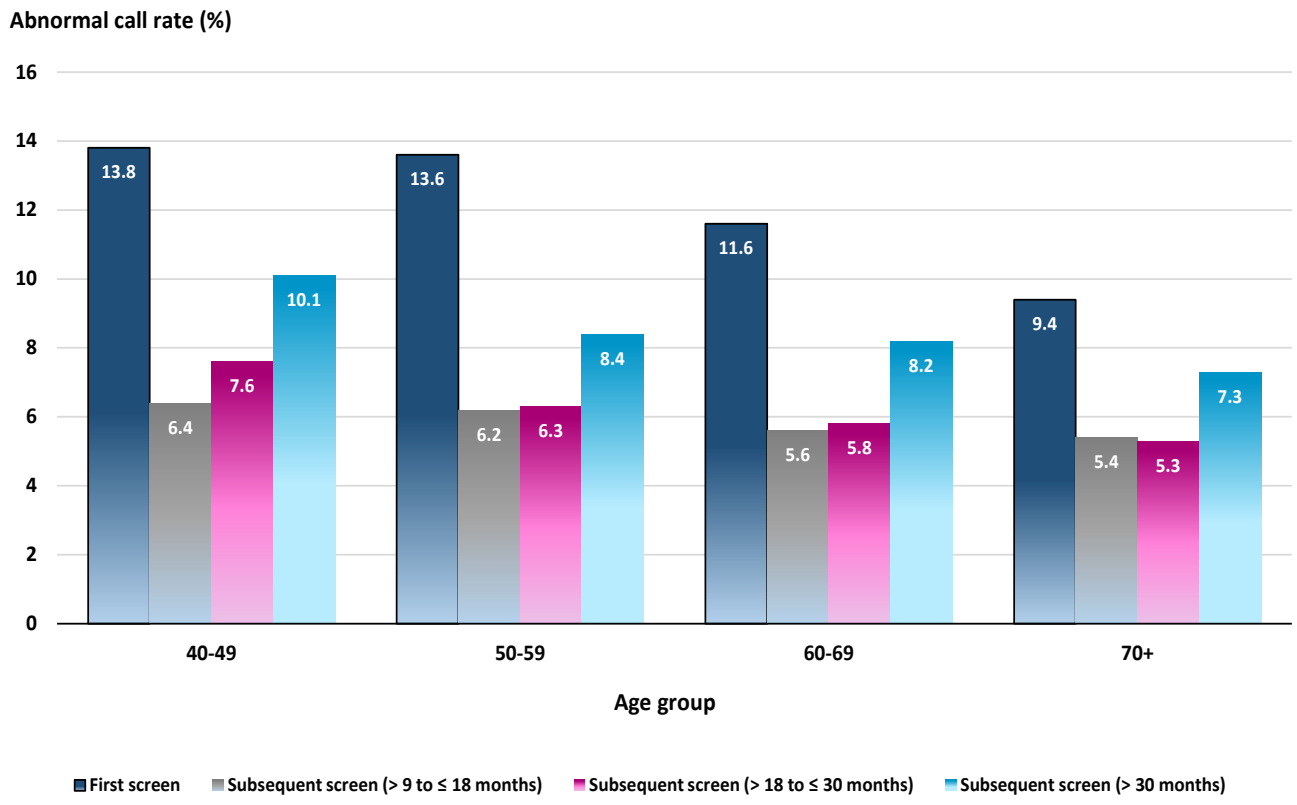

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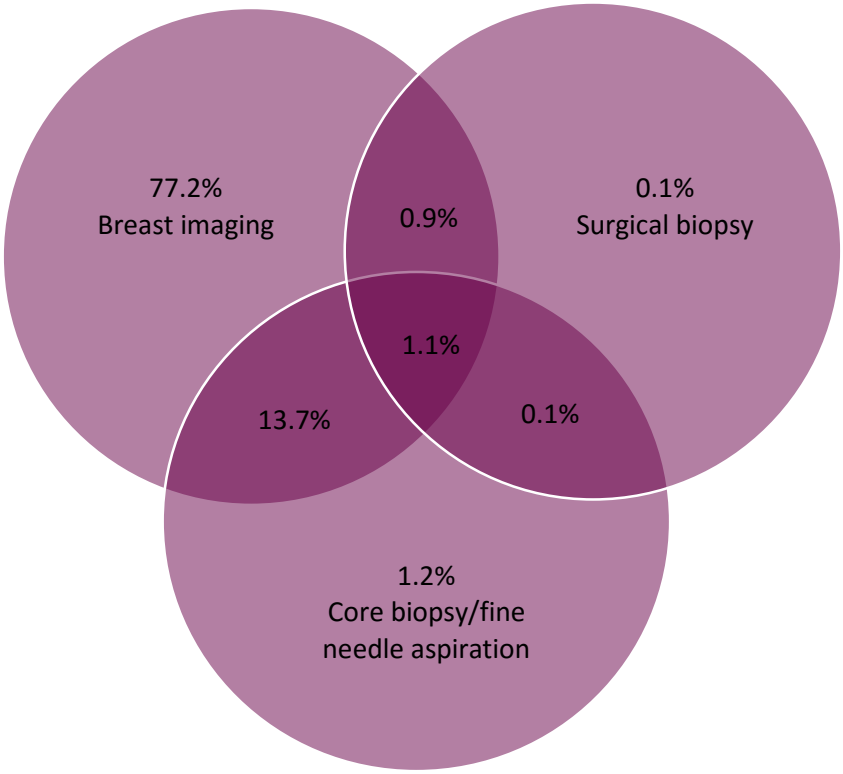
FIGURE 6

Combinations of diagnostic procedures after an abnormal screen, women aged 50 to 69, 2009 and 2010 screen years



5.8% of women had none of the above procedures

Notes:

1. Alberta is excluded for data quality reasons.
2. Figures reflect diagnostic procedures within 6 months of the screen.

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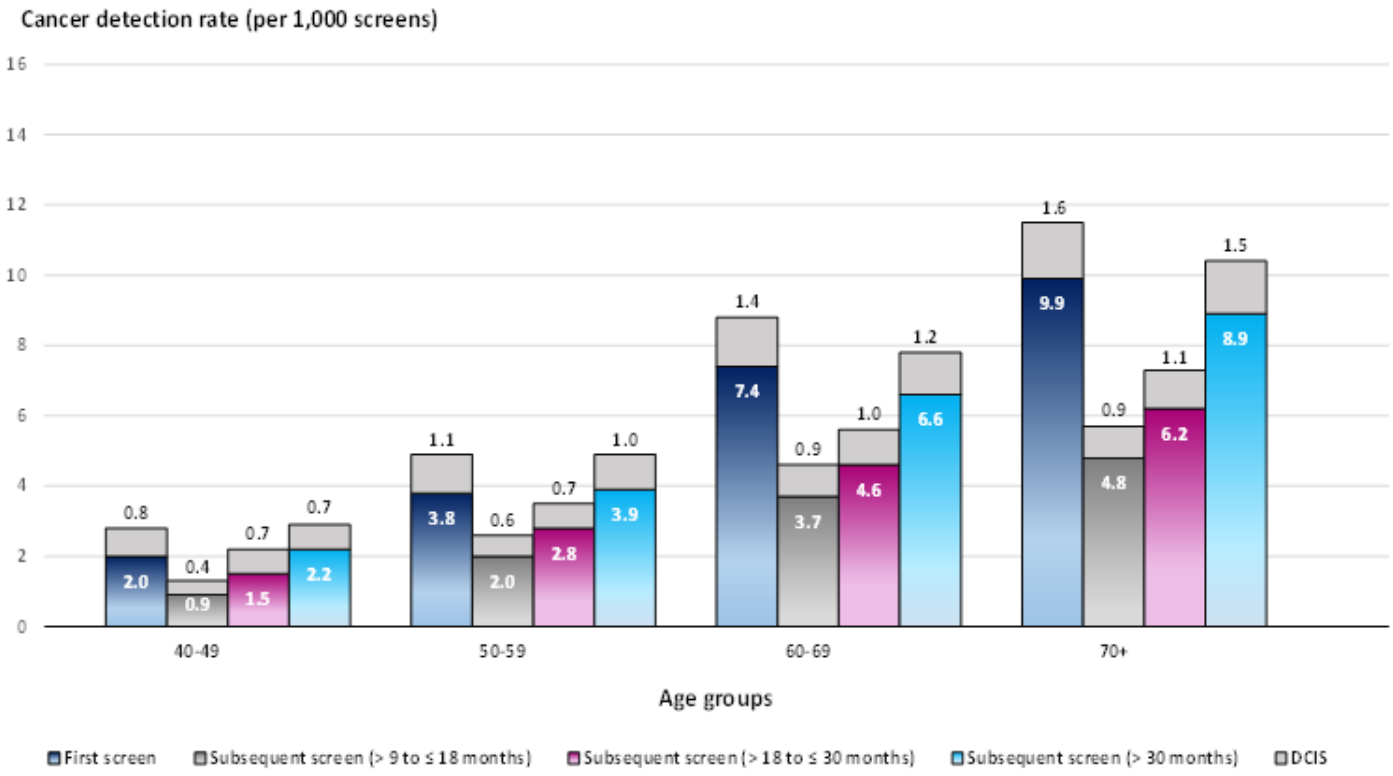
FIGURE 7

Cancer detection (Invasive and In situ) rate per 1,000 screens by age group and time from last screen, 2009 and 2010 screen years



Notes:
1. The shaded area indicates the rate of invasive cancers detected, while the non-shaded area indicates the rate of DCIS cancer detected.

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1 University Avenue, 3rd Floor
Toronto, Ontario, Canada M5J 2P1
tel: 416.915.9222 toll-free: 1.877.360.1665
www.partnershipagainstcancer.ca

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