BC CANCER BREAST SCREENING

Provincial Health Services Authority

BC Cancer Breast Screening

2023 Program Results

September 2025

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MESSAGE FROM THE DIRECTORS

Message from the Medical Director and Screening Operations Director

As we reflect on 2023, we are pleased to share the continued progress and achievements of the BC Cancer Breast Screening Program. This year has been marked by significant developments in our team, innovative program enhancements, and our unwavering commitment to providing accessible, high-quality breast screening services to the people of British Columbia.

Program Innovations and Enhancements
Building on the foundation established in 2022, our Higher Risk Surveillance Program has continued to evolve, providing enhanced care pathways for screening participants at elevated risk. This specialized service ensures that high-risk individuals receive appropriate screening intervals and follow-up care through facilitated referrals for diagnostic mammograms.

The PHSA Image Transfer Server project represents another technological advancement that will enhance our operational efficiency and data management capabilities, supporting our ability to deliver coordinated, high-quality care across the province.

Continuing Our Collaborative Approach
Reflecting on the Coast Salish teachings that continue to guide our work - Tee ma thit "Do Your Best" and Nuts a maht "We are One" - we recognize that our achievements this year have been possible through the collaborative efforts of our entire team and partners across the healthcare system. These teachings remind us that when we work together and each contribute our best efforts, we inspire excellence in others and achieve outcomes that benefit all.

As we continue to build on the successes of 2023, we remain focused on our core mission of reducing breast cancer mortality through early detection. The innovations implemented this year position us well to serve BC's diverse population with the personalized, accessible care they deserve.

Looking ahead to 2024, we are excited to be planning our Breast Screening Forum, which will bring together the diverse members of our Program including technologists, screeners, and other community members with an interest in breast screening. This forum will provide an invaluable opportunity for knowledge sharing, professional development, and strengthening the collaborative relationships that are fundamental to our Program's success.

We extend our heartfelt gratitude to all team members, healthcare partners, community members, technologists and screeners who have contributed to another successful year. Together, we continue to make a meaningful difference in the lives of the people we serve.

Dr. Charlotte Yong-Hing and Rableen Nagra, MA

PROGRAM OVERVIEW

1. About the Breast Screening Program

Regular breast cancer screening is an important part of an individual's health routine. Here in BC we have some of the best survival outcomes in Canada for those who are diagnosed with breast cancer. This success is largely due to improved cancer treatments and participation in breast cancer screening.

Obtaining a regular mammogram is a key component of early detection – regular breast cancer screening can find cancer when it is small, which means:

- There may be more treatment options
- It is less likely to spread
- There is a better chance of treating the cancer successfully

An individual's risk of breast cancer increases with age; over 80% of breast cancers in BC are found in individuals 50 years and older. BC Cancer is committed to finding breast cancers early through breast cancer screening by its population-based program. The Breast Screening Program utilizes standard two-view bilateral mammography (x-ray of the breast) for breast cancer screening. The Program is available through self-referral to eligible individuals starting at age 40; however it is recommended that by age 50 average risk individuals have a screening mammogram every two years. Individuals are not eligible for a screening mammogram in BC if they have had breast cancer or breast implants, or if they currently have breast symptoms requiring a diagnostic investigation. These individuals must speak with their health care provider who may refer them for a diagnostic mammogram.

BC's provincial breast screening recommendations are consistent with current evidence-based research findings, effective Feb 4, 2014. Recommendations encompass the use of mammography, MRI, breast self-examination, and clinical breast examination to screen for breast cancer. Information about the BC breast screening recommendations may be found in Appendix 2 and online at bccancer.bc.ca/screening/breast.

Screening Centres and Mobile Services

There are 37 fixed centres across the province, and three mobile vans that visit over 170 smaller BC and First Nations communities. Visit the clinic locator on our website for Mobile locations and schedules: screeningbc.ca/clinic-locator.

The Screening Workflow

The breast screening pathway consists of six stages:

1. Program Intake: target population identified and referred to the Program (either through PCP or self-referral)
2. Assessment and Booking: individual must meet eligibility criteria prior to booking an appointment
3. Screening Appointment: screening mammogram takes place
4. Results Distribution: participant and their PCP receive results notices from Program
5. Facilitated Diagnostic Referral: participant with abnormal screen is referred to a diagnostic facility for follow-up procedures and investigation; referral is facilitated by Program on behalf of participant's PCP.
6. Retention: screening reminder issued at appropriate interval; returning participant must be reassessed for eligibility prior to screening

"FAST TRACK" – Facilitated Referral to Diagnostic Imaging for Work-up of Abnormal Findings

On average approximately 9% of participants who attend for screening will require additional diagnostic testing. Recognizing the importance of timely follow up, the Fast Track referral system was established in 1999 whereby the Program facilitates referrals on behalf of the provider for those who require further testing. The term "Fast Track" refers to the reduced time it takes for a referral to be sent to a diagnostic facility; there is no need for the screening participant to visit their health care provider after an abnormal result to receive a requisition.

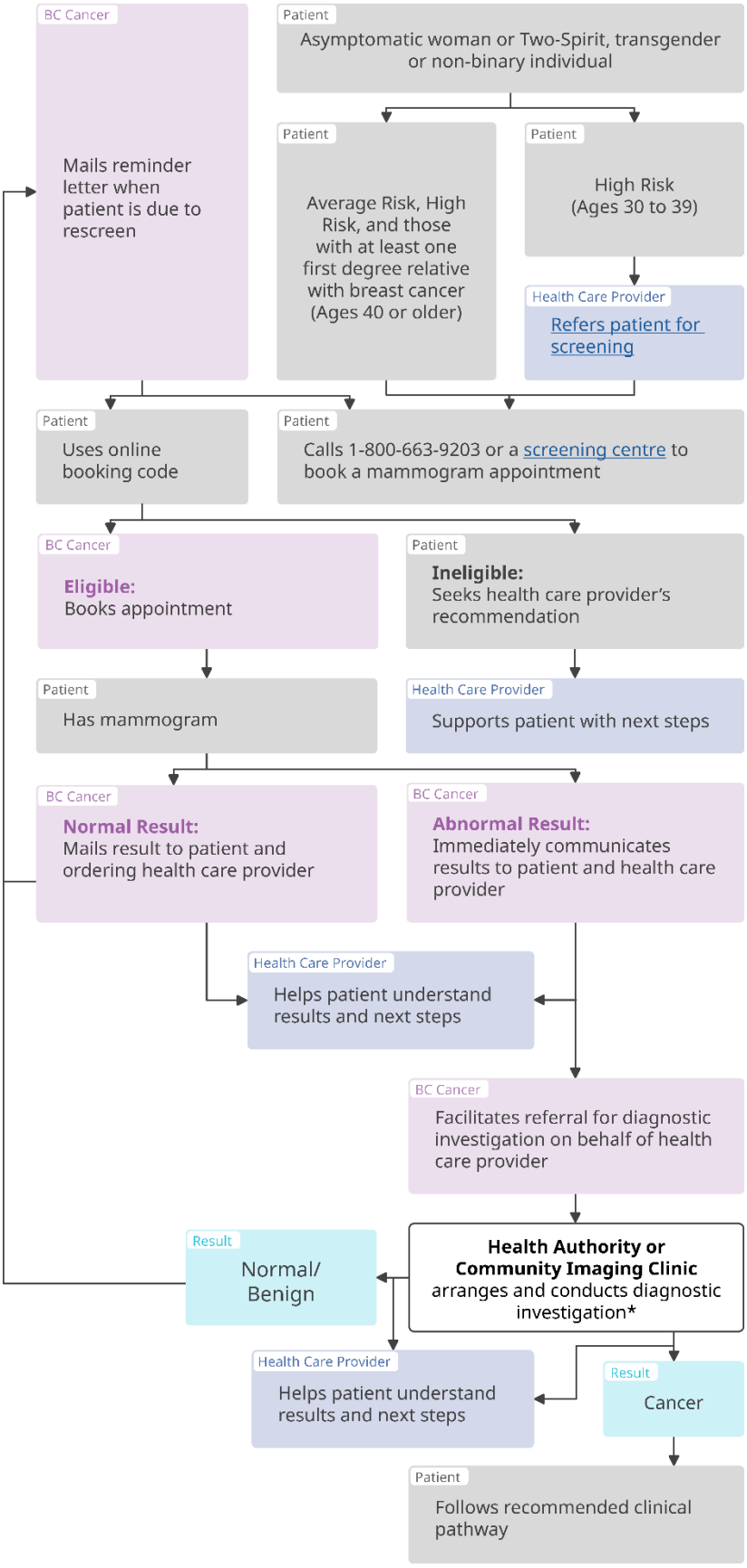
Fast Track Overview

- At the time of screening, participants are informed that if further tests are required, they will be called directly by a diagnostic facility to book their appointment
- If further testing is required i.e. additional mammographic views or breast ultrasound, the particiant is booked at the Fast Track diagnostic clinic closest to the screening site, usually at the same location
- The screening images and results are transferred to the diagnostic office prior to the appointment
- The Program notifies the participant's health care provider where their patient has been referred for additional testing
- The diagnostic facility makes every effort to contact the participant within one week of receiving the referral and book an appointment
- Standardization of the Fast Track referral system ensures that all participants benefit from the shortened time between an initial abnormal screening result and the first appointment for diagnostic assessment

Higher Risk Surveillance (HRS) Service

Participants who have received a non-cancerous diagnosis of Atypical Ductal Hyperplasia (ADH), Atypical Lobular Hyperplasia (ALH) and classical Lobular Carcinoma In Situ (LCIS) are at increased risk for subsequent breast cancer. The individual and their health care provider are informed about the higher risk status and enrollment into the Service which involves an annual facilitated referral for a diagnostic mammogram.

FIGURE 1 – BREAST SCREENING PATHWAY



2. Program Evaluation

Data is collected and analyzed on an ongoing basis to monitor the Program's effectiveness and to identify areas for improvement. Breast Screening Program evaluation indicators, quality standards and systems are based on national and international guidelines and recommendations, including the 3rd edition of the *Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Cancer Screening Program Performance,* published in February 2013[1].

Results of this analysis are presented in the "PROGRAM RESULTS" section of this report. Age-specific breast cancer incidence and mortality rates are provided by the BC Cancer Registry.

3. Quality Assurance

A team of Medical Physicists, a Provincial Practice Leader for Mammography Technologists, and a Quality Management Coordinator are dedicated to quality assurance at all Breast Screening Centres across the province. This team supports imaging quality assurance and provides professional direction in equipment selection, acceptance testing, troubleshooting, quality control testing and accreditation. The Program also supports continuing education for radiologists and technologists.

The Breast Screening workforce is comprised of certified technologists from across BC who are trained and experienced in breast imaging. The Provincial Practice Leader has developed various initiatives to support the professional development of our dedicated technologists, including:

- Certification in breast imaging scholarship program;
- Educational webinars throughout the year;
- A biannual QA Summary for Joint Operations Leaders across the province;
- An educational event at the biennial Breast Screening Program Forum with continuing medical education (CME) credits that is also open to BCIT students comprised of up-to-date topics and speakers that are relevant to the profession;
- Mammography positioning and Patient Care In-Service presentations (CME credits) at the centres;
- Annual image assessments;
- A comprehensive Breast Screening Program Technologist Manual with information to support a technologist's day-to-day duties.

Quality assurance and monitoring is a critical component of an organized screening program. Standards and systems in the Breast Screening Program are developed based on guidelines and recommendations from the Canadian Association of Radiologists (CAR), Public Health Agency of Canada (PHAC), the Canadian Association of Medical Radiation Technologists (CAMRT), the Breast Screening Program Quality Assurance Support Group, and scientific literature.

- **Accreditation:** Accreditation is the certification of competence in an area of expertise. CAR Mammography Accreditation is mandatory for all Breast Screening Program Centres. Centres participate in accreditation renewals every three years and are required to have an annual update. The QA team provides support and guidance for centres as they pursue accreditation. Accredited sites display a CAR certificate for all participants attending the service to view.

[1] Canadian Partnership against Cancer. Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Cancer Screening Program Performance (3rd edition). Toronto: Canadian Partnership Against Cancer; February, 2013

- **Image Quality Assurance:** The Breast Screening Program Quality Assurance Support Group provides leadership and technical support to centres for their quality control practices which are standardized and monitored regularly. All centres undergo regular annual equipment testing by a Program Medical Physicist and are also supported through site visits, training, and comprehensive manuals. The team also provides support for centres during equipment replacement.

Based on best practices, the Program has developed and implemented a comprehensive, harmonized quality control (QC) program specific for digital mammography equipment, as well as digital mammography-specific phantoms and a web based 'MammoQC' program. Technologists are trained to perform these QC tests through site visit demonstrations. Access to the QC website allows technologists and physicists to review test results on site or remotely. The Breast Screening Program continues to work with other provinces to champion standardization of quality control programs for digital mammography.

4. Regular Promotion and Education Activities

Ongoing promotion activities include:

- New promotional tools, such as brochures, posters, marketing giveaways, bookmarks and postcards that effectively communicate the benefits of mammography
- Collaboration with Indigenous organizations and those supporting under-served populations to develop customized materials and culturally-sensitive approaches to increase understanding and interest in screening
- The annual Provider to Patient Letter Initiative, where health care providers voluntarily sign reminder letters to encourage their patients to get screened
- Regular media advertisements to promote the mobile mammography service
- A "@BCCancer" Instagram account that promotes relevant information about cancer screening including upcoming mobile visits in communities around the province.
- A Facebook page (@BCCancerScreeningandPrevention) that promotes relevant information about breast screening including upcoming mobile visits, an open platform for information sharing and video promotions.
- A website (www.screeningbc.ca/breast) to support informed decision making about breast screening

In 2023, additional activities included:

- Partnering with the Indigenous Cancer Control's Health Promotion Specialist to bring breast screening information to Indigenous communities throughout BC
- Sharing information and answering questions about the Breast Screening Program at health care provider events
- Celebrating Breast Cancer Awareness Month in October with multiple promotions, such as:
    - Collaborating with a social media influencer/breast cancer survivor to share reels and photos about their cancer journey;
    - Running digital programmatic ads in Punjabi, Traditional Chinese, and Simplified Chinese in Surrey, Langley, and Richmond;
    - Playing radio ads about accessing screening mammograms in Northern Health on Canada's First Nations Radio and Pure Country BCNorth; and
    - Serving digital ads in Salmon Arm to celebrate the opening of the new breast screening centre

2023 PROGRAM RESULTS

This section shares outcomes for various indicators including coverage, participation, follow-up, quality of screening, detection, and disease extent at diagnosis. The indicators used are adapted from the Canadian Partnership Against Cancer Guidelines for Monitoring Breast Cancer Screening Program Performance[2].

The program results include outcomes, where applicable, for participants who have indicated they have a family history (higher than average risk individuals). In section 4.8, the Breast Screening Program performance measures are presented against the national targets set for Canadian breast cancer screening programs.

1. Screening Volume

The Breast Screening Program provided 262,233 examinations in 2023. During this period 36,844 (14%) of those examinations were provided to first time attendees. First time attendees are categorized as those who have not had a screening mammogram in the previous 10 year period. Figure 2 shows that the total number of screening exams performed through the Program in 2023 increased slightly compared to 2022.

FIGURE 2 - ANNUAL SCREENING VOLUME YEARS: 2019-2023

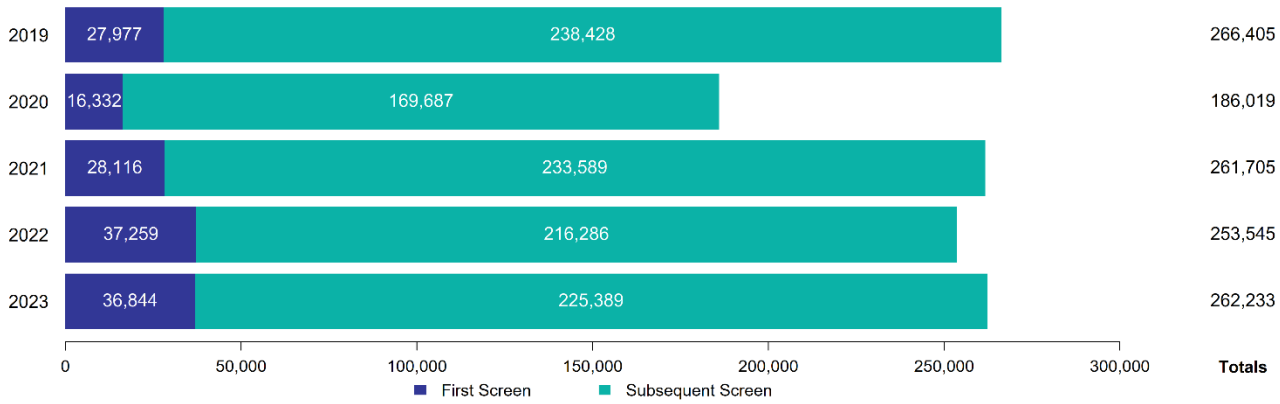
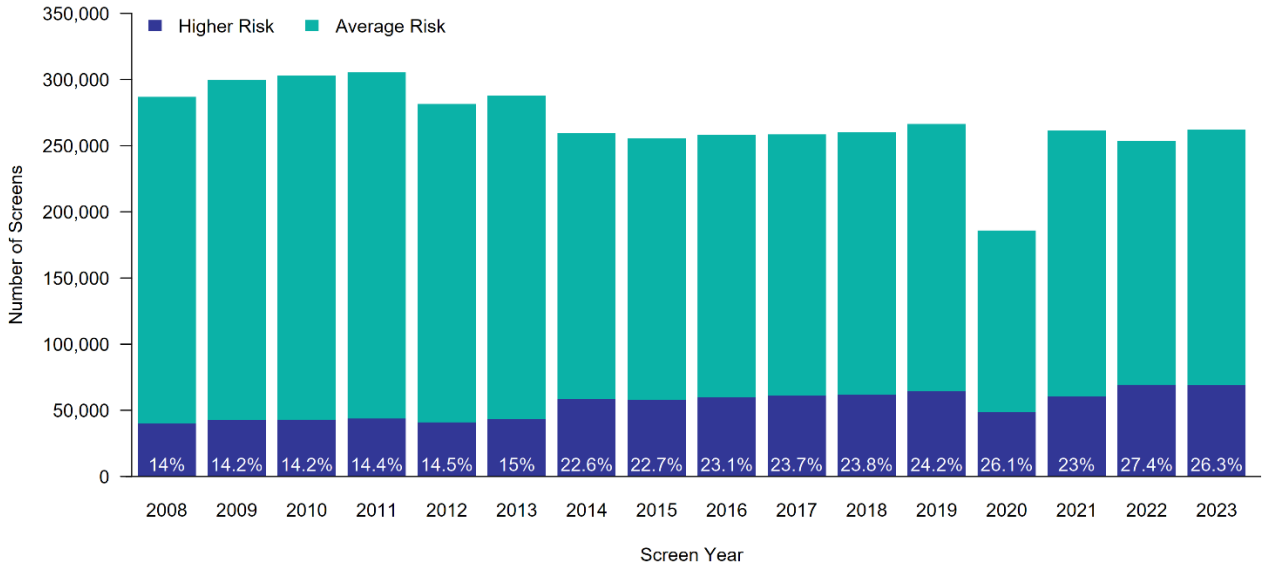


Figure 3 shows the percentage of participants who are at higher risk stayed relatively consistent at 26.3% of the total number of individuals screened in 2023.

[2] http://www.cancerview.ca/idc/groups/public/documents/webcontent/guideline_monitoring_breast.pdf

FIGURE 3 - ANNUAL SCREENING VOLUME BY RISK AND SCREEN YEARS: 2008-2023



Notes

1. Breast Screening Program data extraction date: March 28, 2025.

Volume by Health Service Delivery Area: 2023

The age distribution of all exams and first exams performed in 2023 by Health Services Delivery Areas (HSDA) are displayed in Table 1.

- The majority of exams (65%) are performed for individuals between ages 50 to 69 in all HSDAs. This is the same as 2022.
- A screening mammogram is considered as the baseline screen (first exam) if the participant has not been screened in the last 10 years.
- The majority of first time mammograms were for those under 50 years of age; however, there are regional variations ranging from 37% in East Kootenay and Kootenay Boundary to 60% of first time attendees being under 50 years of age in Fraser North and Vancouver.

TABLE 1: VOLUME BY HEALTH SERVICE DELIVERY AREA YEAR: 2023

		Age Distribution of All Exams			First Exams		Age Distribution of First Exams		
HSDA	Total Exams	<50	50-69	70+	n	% Total	<50	50-69	70+
East Kootenay	4,267	12%	68%	20%	622	15%	37%	57%	6%
Kootenay Boundary	4,190	13%	67%	19%	618	15%	40%	54%	6%
Okanagan	23,014	13%	66%	21%	2,951	13%	42%	51%	7%
Thompson Cariboo Shuswap	12,754	14%	66%	20%	1,543	12%	52%	44%	5%
Interior	44,225	13%	66%	21%	5,734	13%	44%	50%	6%
Fraser East	13,819	19%	64%	17%	1,931	14%	58%	38%	4%
Fraser North	36,626	21%	65%	14%	5,204	14%	60%	36%	3%
Fraser South	41,706	22%	63%	15%	6,328	15%	61%	36%	4%
Fraser	92,151	21%	64%	15%	13,463	15%	60%	36%	4%
Richmond	12,946	19%	65%	16%	1,872	14%	55%	41%	4%
Vancouver	33,420	22%	63%	15%	5,005	15%	61%	36%	3%
North Shore / Coast Garibaldi	17,297	19%	64%	17%	2,522	15%	58%	38%	4%
Vancouver Coastal	63,663	21%	64%	16%	9,399	15%	59%	38%	3%
South Vancouver Island	22,891	14%	65%	21%	3,162	14%	44%	50%	6%
Central Vancouver Island	17,830	11%	64%	24%	2,107	12%	41%	51%	7%
North Vancouver Island	8,765	12%	66%	22%	1,169	13%	42%	51%	7%
Vancouver Island	49,486	13%	65%	22%	6,438	13%	43%	51%	7%
Northwest	3,231	17%	66%	16%	441	14%	52%	44%	3%
Northern Interior	7,436	16%	68%	15%	1,026	14%	55%	42%	3%
Northeast	1,982	18%	71%	11%	311	16%	49%	50%	1%
Northern	12,649	17%	68%	15%	1,778	14%	53%	44%	3%
Unknown	59	31%	51%	19%	32	54%	47%	50%	3%
British Columbia	**262,233**	**18%**	**65%**	**17%**	**36,844**	**14%**	**54%**	**42%**	**4%**

Notes

1. Breast Screening Program data extraction date: March 28, 2025.

The age and volume distribution of all screens performed for participants who self-identified as having a family history (higher risk) or other high risk factor are displayed in Table 2. The majority of higher risk exams (80%) are performed for individuals between ages 50 to 74 across all HSDAs.

TABLE 2: AGE AND VOLUME DISTRIBUTION FOR HIGHER RISK IDIVIDUALS BY HEALTH SERVICE DELIVERY AREA: 2023

			Age Distribution of Higher Risk Exams			
HSDA	**Number of Higher Risk Exams**	**% Higher Risk Exams**	**<40**	**40-49**	**50-74**	**75+**
East Kootenay	1,175	28%	1%	11%	82%	6%
Kootenay Boundary	1,304	31%	0%	13%	82%	5%
Okanagan	6,897	30%	0%	10%	83%	6%
Thompson Cariboo Shuswap	3,702	29%	0%	10%	83%	6%
Interior	13,078	30%	0%	11%	83%	6%
Fraser East	3,610	26%	1%	14%	80%	5%
Fraser North	8,822	24%	1%	16%	79%	4%
Fraser South	9,702	23%	1%	16%	78%	5%
Fraser	22,134	24%	1%	16%	79%	5%
Richmond	2,927	23%	1%	14%	80%	5%
Vancouver	7,998	24%	1%	18%	76%	5%
North Shore / Coast Garibaldi	4,761	28%	1%	15%	79%	5%
Vancouver Coastal	15,686	25%	1%	16%	78%	5%
South Vancouver Island	6,604	29%	1%	12%	81%	6%
Central Vancouver Island	5,314	30%	1%	10%	81%	9%
North Vancouver Island	2,570	29%	1%	10%	83%	6%
Vancouver Island	14,488	29%	1%	11%	81%	7%
Northwest	893	28%	1%	14%	80%	6%
Northern Interior	2,090	28%	0%	12%	83%	4%
Northeast	553	28%	1%	16%	80%	2%
Northern	3,536	28%	1%	13%	82%	4%
Unknown	14	24%	0%	14%	71%	14%
British Columbia	**68,936**	**26%**	**< 1%**	**14%**	**80%**	**6%**

Notes

1. Breast Screening Program data extraction date: March 28, 2025
2. A new row named 'Unknown' is added to this table because of participants who have unknown geographic information.

2. Screening Participation

Screening participation reflects the percentage of BC individuals who have completed a Breast Screening Program screening mammogram at least once within 30 months as a proportion of the prevalence adjusted population.

The biennial screening participation rates are shown by HSDA for each age group in Table 3.

- In the 30-month period between July 1, 2021 and December 31, 2023, 337,050 individuals ages 50-69 participated in the Breast Screening Program.
- Participation improved compared with July 1, 2020 and December 31, 2023 (47% compared to 45% previously).
- The North Shore/Garibaldi, Richmond, Vancouver and Fraser North HSDAs had the highest participation rates at 51%.

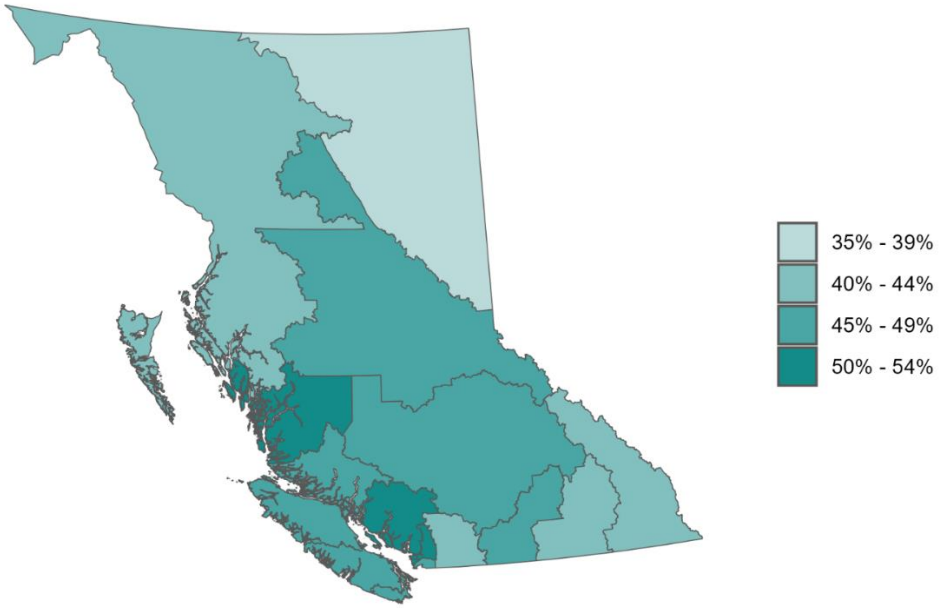
TABLE 3: REGIONAL 30-MONTH PARTICIPATION RATES BY 10-YEAR AGE GROUPS ENDING DECEMBER 31, 2023 INCLUSIVE

	10-Year Age Groups					
HSDA	**40-49**	**50-59**	**60-69**	**70-74**	**Ages 50-69**	**Ages 50-74**
East Kootenay	16%	36%	49%	48%	43%	44%
Kootenay Boundary	16%	35%	47%	46%	41%	42%
Okanagan	21%	43%	54%	56%	49%	50%
Thompson Cariboo Shuswap	22%	42%	50%	49%	46%	47%
Interior	20%	41%	51%	52%	47%	48%
Fraser East	22%	39%	46%	46%	43%	43%
Fraser North	26%	47%	55%	52%	51%	51%
Fraser South	26%	45%	47%	44%	46%	45%
Fraser	25%	45%	50%	47%	47%	47%
Richmond	28%	47%	55%	61%	51%	52%
Vancouver	25%	51%	51%	56%	51%	52%
North Shore/Coast Garibaldi	26%	48%	54%	49%	51%	51%
Vancouver Coastal	26%	49%	53%	55%	51%	52%
South Vancouver Island	20%	45%	53%	53%	49%	50%
Central Vancouver Island	21%	40%	53%	55%	47%	49%
North Vancouver Island	20%	41%	53%	55%	48%	49%
Vancouver Island	20%	43%	53%	54%	48%	49%
Northwest	21%	41%	43%	45%	42%	43%
Northern Interior	20%	43%	50%	51%	46%	47%
Northeast	12%	33%	38%	39%	36%	36%
Northern	18%	40%	46%	47%	43%	44%
Unknown	NA	NA	NA	NA	NA	NA
British Columbia	24%	45%	51%	51%	48%	48%

Notes

1. Population data source: P.E.O.P.L.E. 2024 population projections (Mar 2024), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
2. Breast Screening Program data extraction date: March 28, 2025.

FIGURE 4: BIENNIAL SCREENING PARTICIPATION BY INDIVIDUALS AGES 50-69 OVER 30-MONTH PERIOD BETWEEN JULY 1, 2020 AND DECEMBER 31, 2023



Notes

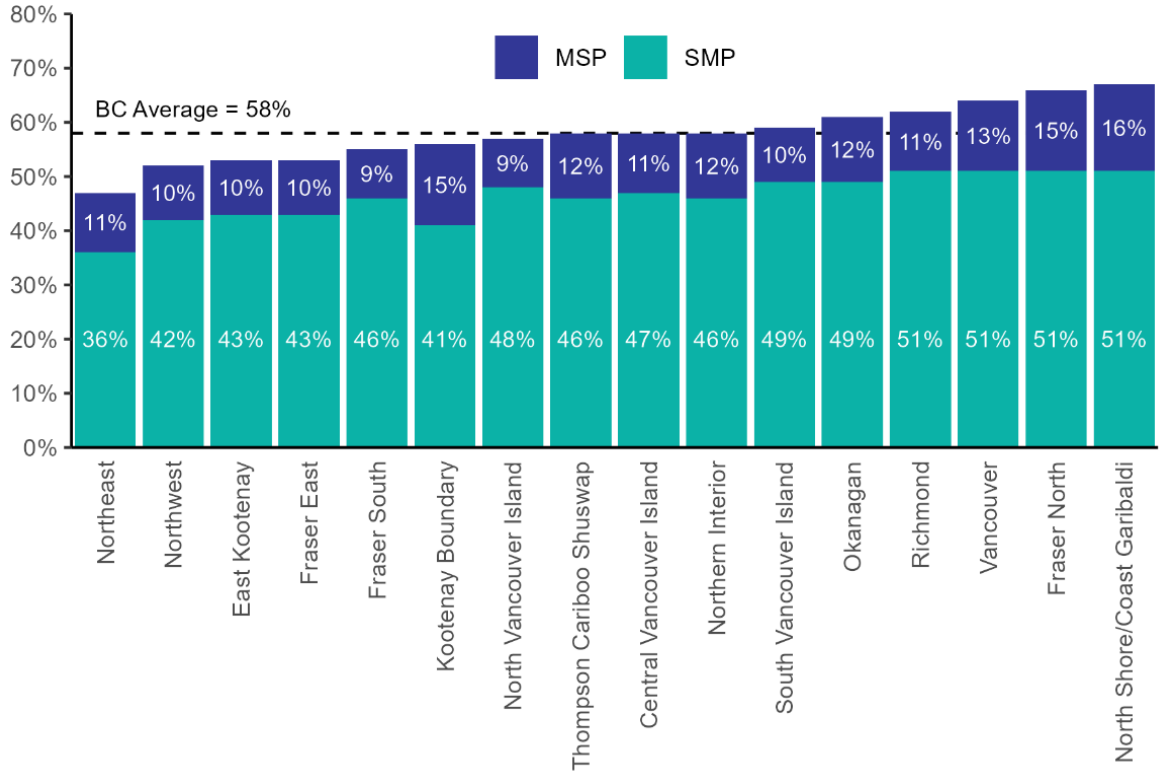
1. Population data source: P.E.O.P.L.E. 2024 population projections (Mar 2024), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
2. Breast Screening Program data extraction date: March 28, 2025.

Bilateral mammography may be used for both screening and diagnostic purposes. A proportion of the bilateral mammography services paid through the Medical Services Plan (MSP) are directly related to screening. Data on bilateral mammography utilization were obtained from MSP. Figure 5 shows the proportion of individuals receiving bilateral mammography services through either the Breast Screening Program or MSP over a 30-month period.

Some individuals may have had bilateral mammograms through both the Breast Screening Program and MSP. Thus, the proportions presented here may be slightly higher than the actual figures due to this possible duplication.

During the 30-month reporting period, 58% of BC individuals ages 50 to 69 received bilateral mammography services through either the Program or MSP (Figure 5). The percentage of individuals ages 50 to 69 receiving bilateral mammography ranged from 46% to 67% across the province. Overall, the Breast Screening Program provided 80% of the bilateral mammography services for this age group.

FIGURE 5: BILATERAL MAMMOGRAPHY UTILIZATION BY INDIVIDUALS AGES 50-69 IN BC BETWEEN JULY 1, 2021 AND DECEMBER 31, 2023 INCLUSIVE



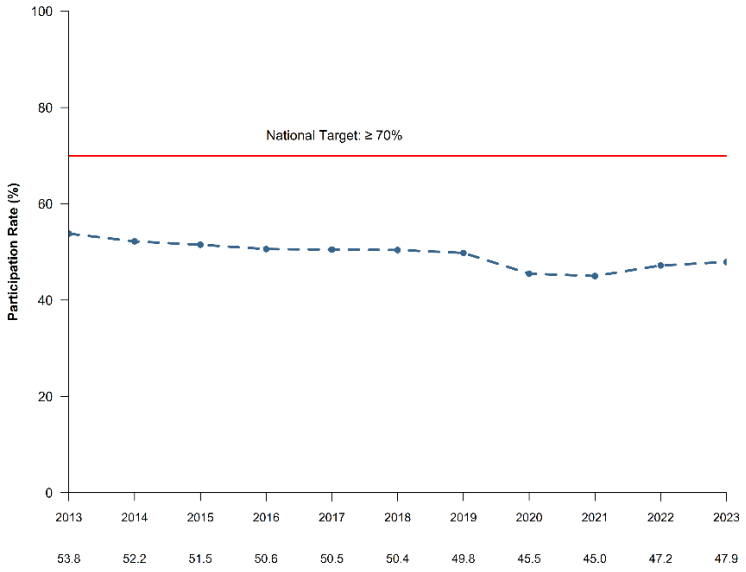
Notes

1. MSP data includes only MSP Fee-For-Service item 8611 on female patients; all out of province claims are excluded.
2. MSP data contains payment date to June 30, 2022 for services provided between July 1, 2021 and December 31, 2023.
3. Breast Screening Program data includes single and multiple screens per individual provided between July 1, 2021 and December 31, 2023.
4. Population data source: P.E.O.P.L.E. 2024 population projections (Mar 2024), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
5. Breast Screening Program data extraction date: March 28, 2025.

Trends in Screening Participation

There are 37 fixed and 3 mobile mammography centres enabling all BC individuals to have reasonable access to screening services. Participation has ranged from ~50-55% between 2013 to 2023. In 2020 there was a drop in participation due in part to the COVID-19 10-week screening suspension. As the Program recovers from COVID 19 suspension, the participation rate has continued to recover to 48% in 2023 from 47% in 2022.

FIGURE 6: BREAST SCREENING PROGRAM PARTICIPATION RATES (%) FOR INDIVIDUALS AGES 50-69 BY CALENDAR YEAR: 2013-2023



Notes

1. Breast Screening Program data extraction date: March 28, 2025.

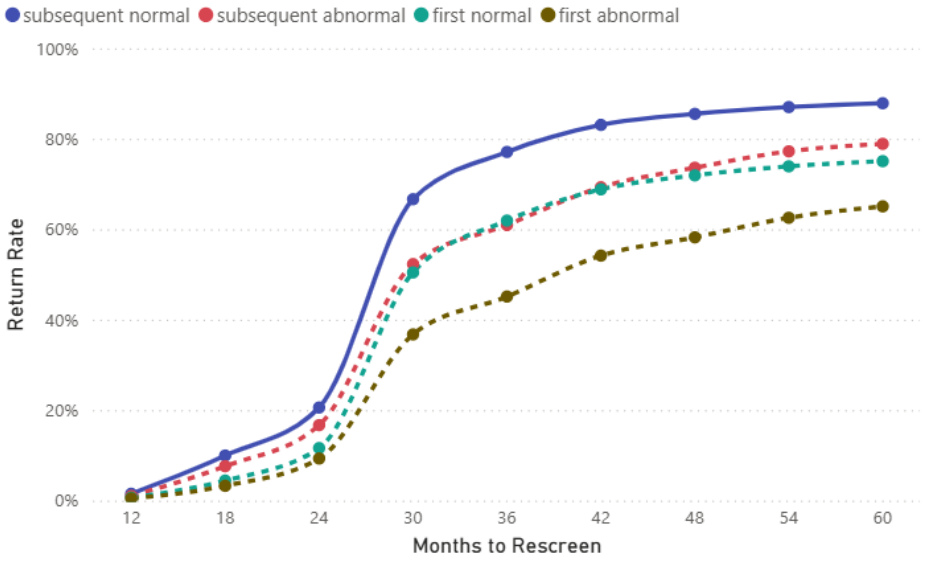
Screening Return Rates

Retention rate is the percentage of screen-eligible individuals that had a subsequent Breast Screening Program mammogram within 30 months of their previous program mammogram.

Regular attendance for screening is important in order to benefit from a reduction in breast cancer mortality. The Program sends reminder notices to participants when they are due for their next screening interval. A first notice is sent six weeks from the due date and the second notice is sent five weeks later if there is no appointment scheduled yet. A third letter is sent nine months after the due date if there has been no response.

Figures 7-9 and Tables 5-7 show return rates for participants aged 40 to 49, 50 to 69 and 40-74 respectively, who attended breast screening between 2020 and 2022. By 24 months, when program reminder mailing is active, participants with normal results are more likely to respond to the reminders than participants who previously had an abnormal result. First time attendees have a lower rate of return than those who have had two or more subsequent visits. By 30 months, 59% of average risk participants with a previous normal result and 43% of participants with a previous abnormal result had returned to screening (Table 7). The Program has developed support material for the technologists to share with participants at their first appointment to encourage them to return when they are due for screening.

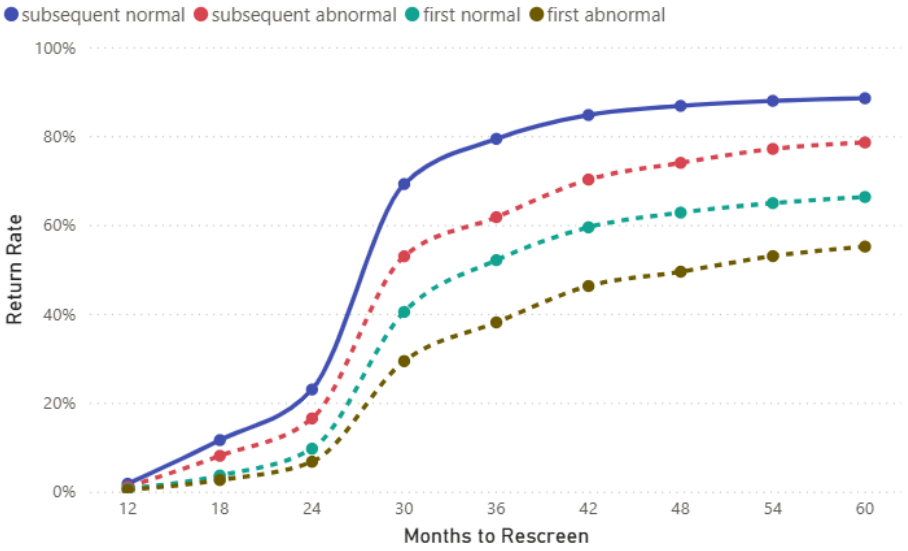
FIGURE 7: SCREENING RETURN RATES FOR WOMEN AGES 40-49: 2020-2022



Notes

1. Breast Screening Program data extraction date: March 28, 2025.

FIGURE 8: SCREENING RETURN RATES FOR WOMEN AGES 50-69: 2020-2022



Notes

1. Breast Screening Program data extraction date: March 28, 2025.

TABLE 5: SCREENING RETURN RATES FOR PARTICIPANTS AGES 40-49: 2020-2022

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	26,289	6,597	51,090	6,245	**77,379**	**12,842**
Returned by 12 months	1%	0%	2%	1%	**1%**	**1%**
18 months	4%	3%	10%	8%	**8%**	**5%**
24 months	12%	9%	21%	17%	**18%**	**13%**
30 months	50%	37%	67%	52%	**61%**	**44%**
36 months	62%	45%	77%	61%	**72%**	**53%**

Notes

1. Breast Screening Program data extraction date: March 28, 2025.
2. The last screen of each client in the time range was used to calculate the retention rates.

TABLE 6: SCREENING RETURN RATES FOR PARTICIPANTS AGES 50-69: 2020-2022

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	20,969	5,695	290,191	24,386	**311,160**	**30,081**
Returned by 12 months	1%	0%	2%	1%	**2%**	**1%**
18 months	4%	3%	12%	8%	**11%**	**7%**
24 months	10%	7%	23%	16%	**22%**	**15%**
30 months	40%	29%	69%	53%	**67%**	**48%**
36 months	52%	38%	79%	62%	**78%**	**57%**

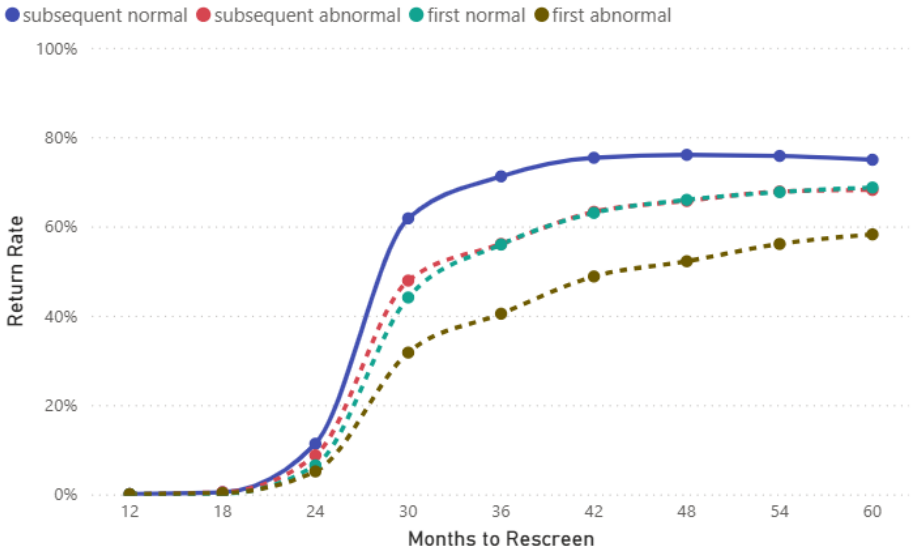
Notes

1. Breast Screening Program data extraction date: March 28, 2025.
2. The last screen of each client in the time range was used to calculate the retention rates.

Screening Return Rates by Risk Group

Figure 10 shows a graph of return rates for participants aged 40 to 74 who self-identified as having a family history of breast cancer (higher risk) and attended breast screening between 2020 and 2022. Participants in this cohort are recommended to screen annually rather than every two years. By 18 months, 56% of participants with a previous normal result and 37% of participants with a previous abnormal result had returned to screening (Table 8). By 30 months, 70% of higher risk participants who had a normal screen have returned for screening compared with 59% of average risk participants..

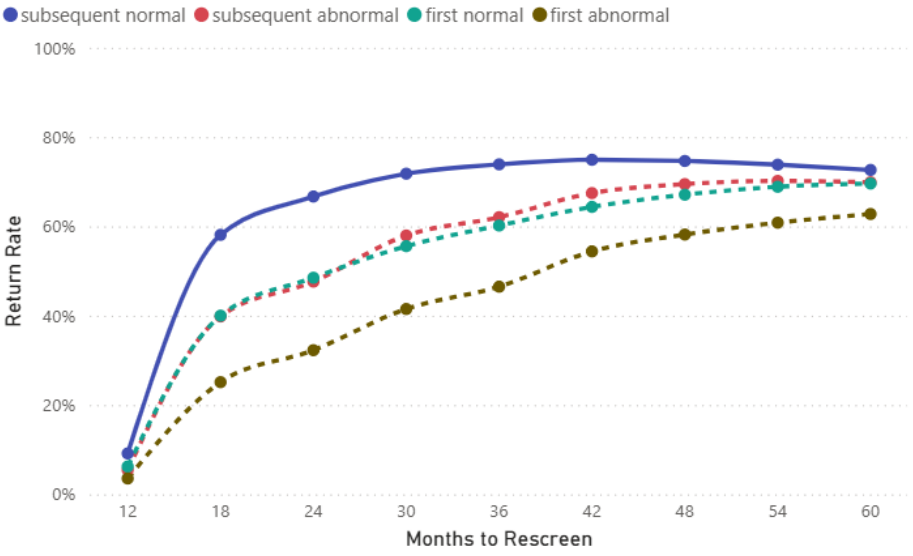
FIGURE 9: RETURN RATES FOR AVERAGE RISK PARTICIPANTS AGES 40-74 BY FIRST/SUBSEQUENT SCREEN AND SCREEN RESULT: 2020-2022



Notes

1. Breast Screening Program data extraction date: March 28, 2025.

FIGURE 10: RETURN RATES FOR HIGHER RISK PARTICIPANTS AGES 40-74 BY FIRST/SUBSEQUENT SCREEN AND SCREEN RESULT: 2020-2022



Notes

1. Breast Screening Program data extraction date: March 28, 2025.

TABLE 7: SCREENING RETURN RATES FOR AVERAGE RISK PARTICIPANTS AGES 40-74: 2020-2022

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	44,122	11,322	331,616	28,723	**375,738**	**40,045**
Returned by 12 months	0%	0%	0%	0%	**0%**	**0%**
18 months	0%	0%	0%	0%	**0%**	**0%**
24 months	6%	5%	11%	9%	**11%**	**8%**
30 months	44%	32%	62%	48%	**59%**	**43%**
36 months	56%	40%	71%	56%	**69%**	**51%**

Notes

1. Breast Screening Program data extraction date: March 28, 2025.
2. The last screen of each client in the time range was used to calculate the retention rates

TABLE 8: RETURN RATES FOR HIGHER RISK PARTICIPANTS AGES 40-74: 2020-2022

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	4,837	1,413	76,628	7,097	**81,465**	**8,510**
Returned by 12 months	6%	4%	9%	5%	**9%**	**5%**
18 months	40%	25%	57%	39%	**56%**	**37%**
24 months	48%	32%	65%	47%	**64%**	**44%**
30 months	55%	42%	70%	57%	**70%**	**54%**
36 months	60%	47%	73%	61%	**72%**	**59%**

Notes

1. Breast Screening Program data extraction date: March 28,2025.
2. The last screen of each client in the time range was used to calculate the retention rates

3. 2023 Screening Results

Table 9 summarizes the outcome indicators for screening exams provided in 2023 by 10-year age groups:

- Of the 262,233 screening mammograms performed, 20,631 (7.9%) had an abnormal result.
- There were 1,511 breast cancers reported in 2023 as of January 31, 2025 (5.8 per 1,000 exams).
- The 2023 overall cancer detection rate decreased slightly compared with 2022, from 5.7 to 5.8 cancers detected per 1000 individuals screened.
- The overall cancer detection rate is highest on first screens for participants who reported a family history (mother, sister, daughter).
- The proportion of cancers detected per 1000 individuals screened increases with age.

Abnormal Call Rate

Abnormal Call Rate is the percentage of individuals who were referred for further testing because of an abnormal screening mammogram result.

- The overall screen abnormal call rate (first and subsequent screens) decreased slightly in 2023 (7.9%) compared to 2022 at 8.4%.
- The abnormal call rate is higher on first screens than on subsequent screens.
- The overall abnormal call rate decreases with age, from 12.7% for ages 40 to 49 to 6.0% for ages 70 to 74.

Cancer Detection Rate

Cancer Detection Rate is the number of individuals with a screen detected cancer per 1,000 individuals who had a screening mammogram. Cancer detection rates may be presented as invasive cancer detection rates, in-situ cancer detection rates and overall cancer detection rates.

- The overall cancer detection rate increased slightly in 2023 compared to 2022 (from 5.7 per 1000 screens to 5.8 per 1000).
- The cancer detection rate for higher risk individuals was greater than that for average risk individuals for first screens.
- The overall DCIS detection rate remained the same in 2023 compared to 2021 and 2022 at 1.4 per 1000 individuals screened.

Positive Predictive Value

Positive Predictive Value (PPV) is the percentage of individuals with an abnormal mammogram result who were diagnosed with breast cancer (DCIS or invasive) after completion of diagnostic work-up.

- The overall positive predictive value increased in 2023 compared to 2022 (from 6.8% to 7.4%).

TABLE 9: BREAST SCREENING PROGRAM OUTCOME INDICATORS BY 10-YEAR AGE GROUPS: 2023

		Age at Exam					
		40-49	50-59	60-69	70-74	75+	All
Number of Exams		46,235	77,190	92,712	35,640	9,816	262,233
on first screens		42.2%	12.6%	6.0%	3.3%	4.5%	14.1%
on higher risk screens		20.7%	22.8%	28.2%	31.5%	38.9%	26.3%
Number of Cancers		185	357	560	267	141	1,511
on first screens		53.5%	27.2%	17.1%	9.4%	14.2%	22.4%
on higher risk screens		17.3%	21.3%	28.9%	28.5%	36.9%	26.4%
Abnormal Call Rate		12.7%	8.0%	6.1%	6.0%	7.6%	7.9%
on first screens	Overall	17.9%	18.6%	17.1%	18.4%	21.1%	18.0%
	Higher Risk	18.4%	18.2%	16.6%	19.2%	20.0%	18.0%
	Average Risk	17.8%	18.6%	17.1%	18.2%	21.4%	18.0%
on subsequent screens	Overall	8.9%	6.5%	5.4%	5.5%	6.9%	6.2%
	Higher Risk	8.7%	5.9%	5.1%	5.2%	6.6%	5.8%
	Average Risk	9.0%	6.7%	5.5%	5.7%	7.2%	6.4%
Overall Cancer Detection Rate (per 1,000)		4.0	4.6	6.0	7.5	14.4	5.8
on first screens	Overall	5.1	10.0	17.2	21.1	44.9	9.2
	Higher Risk	5.4	10.7	22.8	10.1	31.6	10.3
	Average Risk	5.0	9.9	16.2	23.3	48.6	9.0
on subsequent screens	Overall	3.2	3.9	5.3	7.0	12.9	5.2
	Higher Risk	2.7	3.9	5.6	6.7	13.2	5.5
	Average Risk	3.4	3.8	5.2	7.2	12.8	5.1
DCIS Detection Rate (per 1,000)		1.6	1.2	1.4	1.3	3.3	1.4
on first screens	Overall	2.1	2.8	5.0	2.5	9.0	2.8
	Higher Risk	2.7	3.9	4.8	5.1	10.5	3.7
	Average Risk	2.0	2.6	5.1	2.0	8.6	2.7
on subsequent screens	Overall	1.2	1.0	1.2	1.2	3.0	1.2
	Higher Risk	1.0	1.0	1.3	1.4	3.2	1.3
	Average Risk	1.3	1.0	1.2	1.1	2.8	1.2
Positive Predictive Value		3.2%	5.8%	10.0%	12.6%	19.1%	7.4%
on first screens	Overall	2.9%	5.4%	10.1%	11.6%	21.3%	5.1%
	Higher Risk	3.0%	5.9%	13.9%	5.3%	15.8%	5.8%
	Average Risk	2.8%	5.4%	9.5%	12.9%	22.7%	5.0%
on subsequent screens	Overall	3.6%	6.0%	10.0%	12.7%	18.7%	8.4%
	Higher Risk	3.1%	6.7%	11.1%	12.8%	20.0%	9.4%
	Average Risk	3.8%	5.8%	9.5%	12.6%	18.0%	8.0%
Core Biopsy Yield Ratio		23.3%	39.0%	53.2%	60.1%	69.2%	44.3%
on first screens		18.8%	32.3%	44.8%	57.1%	66.7%	30.2%
on subsequent screens		31.6%	42.2%	55.3%	60.5%	69.6%	51.0%
Open Biopsy Yield Ratio		19.2%	11.9%	27.3%	23.1%	16.7%	19.2%
on first screens		26.7%	9.1%	50.0%	33.3%		25.7%
on subsequent screens		9.1%	12.9%	22.2%	20.0%	16.7%	16.5%

Notes

1. See glossary in the Appendix for definitions of terms.
2. Overall Cancer Rate includes ductal carcinoma in situ (DCIS).
3. An additional 89 abnormal screens had incomplete or lost to follow-up. Information from these screens is excluded from all entries in the table other than exam counts and abnormal call rates.
4. The final number of cancers is still to be determined.
5. 640 exams were performed for women <40 years old and 1 cancer was detected for this age group.
6. The "All" column includes women less than 40 years of age.
7. Breast Screening Program data extraction date: March 28, 2025.

Diagnostic procedure information is available to date on 20,542 (99.6%) of the screening mammograms with abnormal findings. Table 10 shows the proportion of participants receiving specific diagnostic procedures as part of the work-up on their screen-detected abnormalities. Overall, 18% and 5% of participants with abnormal screening mammograms had core biopsy and surgical biopsy, respectively.

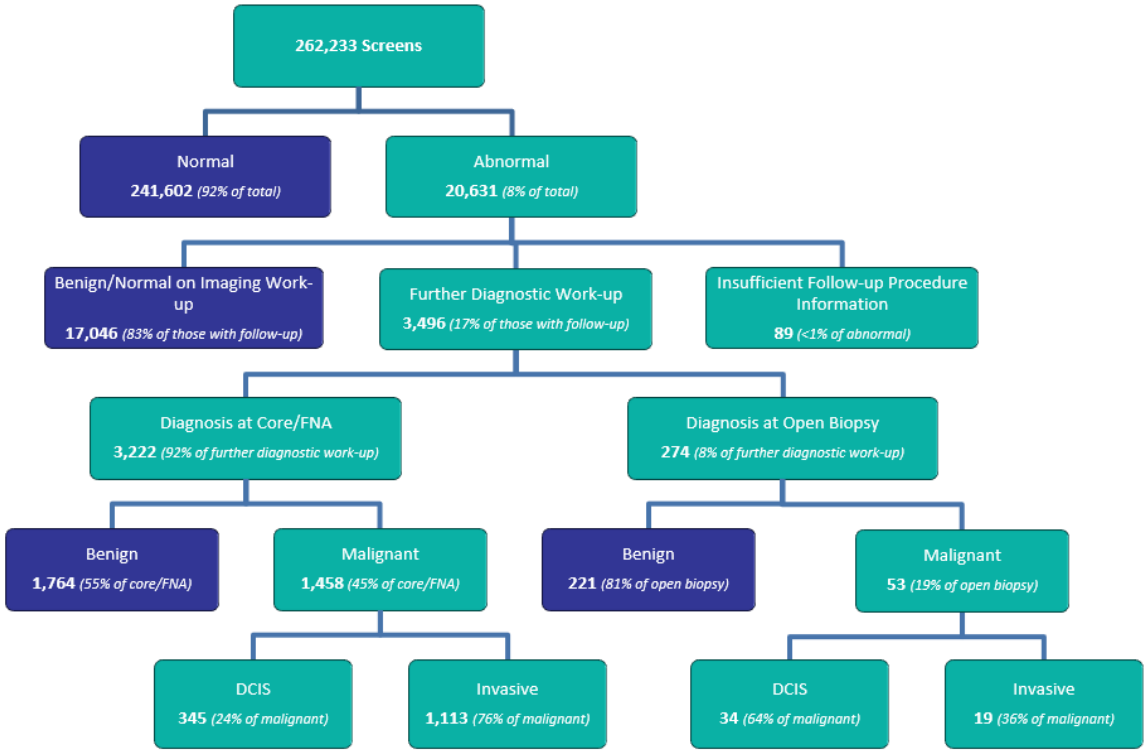
TABLE 10: DIAGNOSTIC PROCEDURES RECEIVED BY BREAST SCREENING PROGRAM PARTICIPANTS WITH ABNORMAL SCREENING MAMMOGRAMS: 2023

	Age at Exam						
Procedure	**<40**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**All**
Diagnostic Mammogram	93%	94%	94%	95%	94%	91%	94%
Ultrasound	77%	79%	77%	75%	71%	81%	76%
Fine Needle Aspiration		0%	0%	0%	1%		< 1%
Core Biopsy	8%	15%	17%	20%	24%	28%	18%
Surgical Biopsy	1%	3%	5%	7%	8%	5%	5%
with Localization	1%	3%	4%	6%	7%	1%	5%
Number of cases with diagnostic assessment information available	73	5,846	6,153	5,604	2,669	197	20,542

Notes

1. Breast Screening Program data extraction date: March 28, 2025
2. The procedures in this table are not mutually exclusive; an individual may have multiple procedures performed

FIGURE 11: SCREENING OUTCOME SUMMARY: 2023



4. 2022 Cancer Detection

Histologic features of breast cancers detected by the Breast Screening Program in 2023 are summarized by 10-year age groups in Table 11. Histologic features of breast cancer cases were obtained from the pathology reviews, if available. Otherwise, they were obtained from the original diagnostic reports. Invasive tumour size was determined from the best available source: (1) pathological, (2) radiological, or (3) clinical.

- Overall, 25% of cancers detected were in situ
- Of the invasive cancers detected, 58% were ≤15 mm, 78% did not have invasion of the regional lymph nodes, and 43% were grade 3 (i.e. poorly differentiated) tumours, ≤ 15mm.

These overall outcome indicators met the international targets[3] recommended for screening programs.

Table 11: HISTOLOGIC FEATURES OF BREAST CANCERS DETECTED BY BREAST SCREENING PROGRAM: 2023

	Age at Exam									
Histological Features	**40-49**		**50-59**		**60-69**		**70-79**		**Age 40-79**	
Number of Cancers	187		360		566		371		1,484	
in situ	75	40%	93	26%	137	24%	69	19%	374	25%
invasive	112	60%	267	74%	429	76%	302	81%	1,110	75%
Invasive Cancers Tumour Size										
≤ 5 mm	4	4%	17	7%	21	5%	14	5%	56	5%
6-10 mm	19	19%	56	23%	88	21%	73	26%	236	23%
11-15 mm	27	27%	58	24%	139	34%	88	31%	312	30%
16-20 mm	14	14%	43	18%	60	15%	39	14%	156	15%
> 20 mm	35	35%	70	29%	103	25%	67	24%	275	27%
unknown size	13		23		18		21		75	
Invasive Cancers with tumour ≤ 15 mm	50	51%	131	54%	248	60%	175	62%	604	58%
Node Involvement in Invasive Cancers										
no	57	65%	157	71%	320	80%	210	83%	744	78%
yes	31	35%	63	29%	78	20%	43	17%	215	22%
no nodes sampled / unknown	24		47		31		49		151	
Histologic Grade of Invasive Cancers										
1 - well differentiated	20	20%	60	24%	105	25%	94	33%	279	26%
2 - moderately differentiated	57	56%	144	57%	232	56%	154	53%	587	56%
3 - poorly differentiated	24	24%	48	19%	78	19%	41	14%	191	18%
unknown grade	11		15		14		12		52	
Grade 3 tumour ≤ 15 mm	15	63%	24	50%	41	53%	23	56%	103	54%

Notes

1. Targets: >50% invasive tumours ≤15mm, >70% with negative nodes, >30% grade 3 tumours ≤15mm.
2. Breast Screening Program data extraction date: March 28, 2025

[3] Tabàr L, Fagerberg G, Duffy SW, Day NE, Gad A, Gröntoft O. Update of the Swedish two-country program of mammographic screening for breast cancer. Radiol Clin North am. 1992 Jan:30(1):187-210

PROGRAM OUTCOMES

1. Outcome Indicators by Calendar Year: 2019-2023

Table 12 shows the outcome indicators for screening exams provided over five years.

- Cancer detection and abnormal call rates have been stable for the last five years.
- Sensitivity, specificity and interval cancer rate calculations are currently not available.

Regular record linkage with the British Columbia Cancer Registry enables the Breast Screening Program to determine the number of non-screen detected (interval) cancers occurring in Breast Screening Program participants. Sensitivity (i.e. probability of finding individuals with breast cancer) and specificity (i.e. probability of a negative mammogram in individuals without breast cancer) by calendar year are shown in Table 12. The Breast Screening Program conducts formal reviews, both blinded and retrospective, of ~50% of interval cancers in Breast Screening Program participants as a quality assurance process.

Comparison of prevalence rate at first screen with the historical incidence rate prior to the onset of screening practice provides another measure of program performance. The expected age-specific incidence rates in the absence of screening were derived from the 1982 breast cancer incidence data reported for British Columbia. Since screening may be obtained outside of the Breast Screening Program, the definition of prevalent screens has been restricted to those individuals with no previous outside mammogram within 24 months of their first screening encounter.

TABLE 12: BREAST SCREENING PROGRAM OUTCOME INDICATORS BY CALENDAR YEAR: 2019-2023

Outcome Indicators	Calendar Year					5-Year Cumulative
	2019	2020	2021	2022	2023	
Number of Exams	266,405	186,019	261,705	253,545	262,233	**1,229,907**
on first screens	10.5%	8.8%	10.7%	14.7%	14.1%	**11.9%**
Number of Cancers	1,574	1,062	1,602	1,481	1,511	**7,230**
on first screens	13.1%	12.1%	12.7%	20.2%	22.4%	**16.3%**
Abnormal Call Rate	8.9%	8.7%	8.7%	8.4%	7.9%	**8.5%**
on first screens	20.2%	19.7%	19.5%	18.3%	18.0%	**19.0%**
on subsequent screens	7.5%	7.6%	7.4%	6.7%	6.2%	**7.1%**
Overall Cancer Detection Rate (per 1,000)	5.9	5.7	6.1	5.8	5.8	**5.9**
on first screens	7.4	7.9	7.3	8.0	9.2	**8.0**
on subsequent screens	5.7	5.5	6.0	5.5	5.2	**5.6**
DCIS Detection Rate (per 1,000)	1.1	1.1	1.5	1.4	1.4	**1.3**
on first screens	1.7	1.4	1.7	1.7	2.8	**2.0**
on subsequent screens	1.1	1.1	1.5	1.4	1.2	**1.2**
Positive Predictive Value	6.7%	6.6%	7.1%	7.0%	7.4%	**7.0%**
on first screens	3.7%	4.0%	3.7%	4.4%	5.1%	**4.3%**
on subsequent screens	7.7%	7.3%	8.1%	8.2%	8.4%	**7.9%**
Core Biopsy Yield Ratio	43.9%	43.5%	42.7%	41.4%	44.3%	**43.1%**
on first screens	12.9%	22.4%	17.2%	5.3%	25.7%	**16.1%**
on subsequent screens	51.0%	49.1%	48.1%	48.6%	51.0%	**49.5%**
Open Biopsy Yield Ratio	30.7%	25.7%	24.2%	18.3%	19.2%	**25.4%**
on first screens	12.9%	22.4%	17.2%	5.3%	25.7%	**16.1%**
on subsequent screens	36.3%	26.5%	26.0%	23.1%	16.5%	**28.2%**
Interval Cancer Rate (per 1,000 normal screens)						
0-12 months	0.8	0.8	0.6			
after first screens	1.0	1.0	0.6			
after subsequent screens	0.8	0.8	0.6			
13-24 months	1.0	0.9				
Sensitivity (1 - false negative rate)	88.6%	88.1%	92.0%			
Specificity (1 - false positive rate)	91.7%	91.9%	91.9%			

Notes

1. See glossary in the Appendix for definitions of terms.
2. Overall Cancer Detection Rate includes ductal carcinoma in situ (DCIS).
3. The final number of cancers in 2023 is still to be determined.
4. Number of cancers and related rates do not include data for individuals whose follow-up is incomplete.
5. Interval Cancer Rate, Sensitivity, and Specificity results are not complete because the data is not available yet.
6. Breast Screening Program data extraction date: March 28, 2025.

2. Outcome Indicators by 10-Year Age Groups: 2019-2023 Cumulative

Table 13 shows the outcome indicators for exams provided in a five-year period by 10-year age groups.

- From 2019 to 2023, the Breast Screening Program provided 1,229,907 breast screening examinations, and detected 7,230 breast cancers.
- Approximately 90% of the cancers detected during this five-year period were in individuals 50 years of age or older. The screen-to-cancer ratio ranges from 112:1 for individuals in their 70s to 287:1 for individuals in their 40s.
- Although the risk of breast cancer increases with age, the abnormal call rates were higher in the younger age groups.
- The abnormal-to-cancer ratio ranges from 8:1 for individuals in their 70s to 38:1 for individuals in their 40s.
- The cancer detection rate and positive predictive value increases for individuals as they get older.
- Interval Cancer Rate, Sensitivity and Specificity results are not complete because the data is not available yet.

TABLE 13: BREAST SCREENING PROGRAM OUTCOME INDICATORS BY 10-YEAR AGE GROUPS: 2019-2023

	Age at Exam					
Outcome Indicators	**40-49**	**50-59**	**60-69**	**70-79**	**80+**	**All**
Number of Exams	211,924	380,454	430,967	195,816	8,588	**1,229,907**
on first screens	37.8%	10.1%	4.8%	2.8%	3.8%	**11.9%**
Number of Cancers	738	1,826	2,767	1,744	147	**7,230**
on first screens	49.1%	20.0%	11.0%	7.3%	6.8%	**16.3%**
Abnormal Call Rate	13.1%	8.5%	6.9%	6.9%	8.8%	**8.5%**
on first screens	18.6%	19.9%	18.5%	19.7%	21.2%	**19.0%**
on subsequent screens	9.7%	7.2%	6.3%	6.5%	8.3%	**7.1%**
Overall Cancer Detection Rate (per 1,000)	3.5	4.8	6.4	8.9	17.1	**5.9**
on first screens	4.5	9.5	14.7	23.6	30.9	**8.0**
on subsequent screens	2.9	4.3	6.0	8.5	16.6	**5.6**
DCIS Detection Rate (per 1,000)	1.2	1.2	1.4	1.6	3.3	**1.3**
on first screens	1.5	2.2	3.0	3.7		**2.0**
on subsequent screens	1.0	1.1	1.3	1.5	3.4	**1.2**
Positive Predictive Value	2.7%	5.7%	9.3%	13.0%	19.7%	**7.0%**
on first screens	2.4%	4.8%	8.0%	12.1%	14.7%	**4.3%**
on subsequent screens	2.9%	5.9%	9.5%	13.1%	20.1%	**7.9%**
Core Biopsy Yield Ratio	19.9%	38.2%	53.4%	60.1%	66.7%	**43.1%**
on first screens	16.3%	27.6%	41.7%	49.0%	55.6%	**25.9%**
on subsequent screens	25.2%	42.4%	55.3%	61.2%	67.7%	**49.5%**
Open Biopsy Yield Ratio	15.5%	23.5%	31.2%	36.7%	18.2%	**25.4%**
on first screens	17.6%	10.3%	19.4%	30.8%		**16.1%**
on subsequent screens	13.3%	26.9%	32.4%	37.3%	22.2%	**28.2%**
Interval Cancer Rate (per 1,000 normal screens)						
0-12 months	0.9	0.7	0.7	0.9	0.3	**0.7**
after first screens	0.6	0.8	1.8	0.8		**0.9**
after subsequent screens	0.9	0.7	0.7	0.9	0.3	**0.7**
13-24 months	1.1	0.8	0.9	1.2	2.5	**1.0**
Sensitivity (1 - false negative rate)	82.3%	88.7%	90.9%	91.6%	98.6%	**89.7%**
Specificity (1 - false positive rate)	87.1%	91.7%	93.3%	93.7%	92.6%	**91.8%**

Notes

1. See glossary in the Appendix for definitions of terms.
2. Overall cancer detection rate includes ductal carcinoma in situ (DCIS).
3. Number of cancers and related rates do not include data for women whose follow-up is incomplete.
4. The final number of cancers in 2023 is still to be determined.
5. The total for all ages includes women less than 40 years of age.
6. Interval Cancer Rate, Sensitivity, and Specificity results are not complete because the data is not available yet.
7. Breast Screening Program data extraction date: March 28, 2025.

3. Outcome Indicators by HSDA: 2019-2023 Cumulative

Outcome indicators for 2019 to 2023 are summarized by HSDA in Table 14.

- South Vancouver Island region has the lowest abnormal call rate (6%); North Shore / Coast Garibaldi has the highest (11%).
- Northeast has the lowest cancer detection rate (4.0 per 1,000), while Northwest has the highest (6.9 per 1,000).
- Northeast has the lowest positive predictive value (4%) and South Vancouver Island has the highest (10%).
- All of the HSDAs meet the national targets[4] recommended for screening programs for invasive tumour detection size (target > 50%); nine out of the twenty two HSDAs meet the national target recommended for percentage of cases with negative nodes (target > 70%).

[4] Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Screening Program Performance third Edition. Health Canada 2013

TABLE 14: BREAST SCREENING PROGRAM OUTCOME INDICATORS BY HEALTH SERVICE DELIVERY AREA (HSDA): 2019-2023

HSDA	% Called Abnormal	Cancer Detection Rate (per 1,000)	PPV	In-Situ : Invasive (number)	% Invasive ≤ 15 mm	% Invasive with -ve nodes
East Kootenay	9%	5.3	6%	20 : 85	51%	81%
Kootenay Boundary	8%	5.0	6%	26 : 64	52%	67%
Okanagan	8%	6.3	8%	142 : 532	59%	70%
Thompson Cariboo Shuswap	10%	6.3	6%	68 : 296	63%	69%
Interior	8%	6.1	7%	256 : 977	59%	71%
Fraser East	10%	6.5	7%	99 : 342	60%	71%
Fraser North	10%	5.7	6%	262 : 708	56%	67%
Fraser South	9%	5.8	7%	261 : 865	56%	70%
Fraser	9%	5.9	6%	622 : 1915	57%	69%
Richmond	8%	5.5	7%	89 : 242	48%	66%
Vancouver	8%	5.5	7%	249 : 632	55%	69%
North Shore / Coast Garibaldi	11%	5.8	5%	107 : 369	62%	74%
Vancouver Coastal	9%	5.6	6%	445 : 1243	56%	70%
South Vancouver Island	6%	5.8	10%	99 : 543	50%	71%
Central Vancouver Island	7%	6.3	9%	113 : 407	59%	78%
North Vancouver Island	8%	6.5	8%	29 : 216	60%	68%
Vancouver Island	6%	6.1	9%	241 : 1166	55%	73%
Northwest	9%	6.9	8%	24 : 85	55%	61%
Northern Interior	9%	6.3	7%	45 : 165	62%	74%
Northeast	10%	4.0	4%	2 : 38	50%	74%
Northern	9%	6.1	7%	71 : 288	58%	70%
Unknown	11%	8.2	8%	2 : 1	100%	0%
British Columbia	**8%**	5.9	7%	1637 : 5590	57%	70%

Notes

1. See glossary in the Appendix for definitions of terms.
2. Targets: >50% invasive tumours ≤15mm, >70% with negative nodes.
3. Breast Screening Program data extraction date: March 28, 2025.

4. Cancer Characteristics by Age: 1988-2023

From the start of the Program in July 1988 to December 2023, 35,478 participants were found to have breast cancer through screening-initiated work-up. Histologic features of breast cancers detected by the Breast Screening Program, cumulative up to and including 2023, are summarized by 10-year age groups in Table 15. Internationally recommended targets have been achieved.

Overall, invasive cancers found in participants ages 40 to 49 tend to be larger and more likely to have node involvement than cancers found in older participants.

TABLE 15: HISTOLOGIC FEATURES OF BREAST CANCERS DETECTED BY BREAST SCREENING PROGRAM: 1988-2023

	Age at Exam											
Histological Features	**40-49**		**50-59**		**60-69**		**70-79**		**80+**		**Age 40+**	
Number of Cancers	4,988		9,738		12,230		7,934		588		**35,478**	
in situ	1,564	31%	2,400	25%	2,508	21%	1,396	18%	80	14%	**7,948**	**22%**
invasive	3,424	69%	7,338	75%	9,722	79%	6,538	82%	508	86%	**27,530**	**78%**
Invasive Cancers Tumour Size												
≤ 5 mm	327	10%	668	9%	855	9%	475	7%	37	7%	**2,362**	**9%**
6-10 mm	626	19%	1,585	22%	2,532	26%	1,863	29%	126	25%	**6,732**	**25%**
11-15 mm	871	26%	2,003	28%	2,780	29%	1,895	29%	136	27%	**7,685**	**28%**
16-20 mm	515	16%	1,200	17%	1,459	15%	962	15%	89	18%	**4,225**	**16%**
> 20 mm	980	30%	1,715	24%	1,938	20%	1,238	19%	112	22%	**5,983**	**22%**
unknown size	(105)		(167)		(158)		(105)		(8)		**(543)**	
Invasive Cancers with tumour size ≤ 15 mm	1,824	55%	4,256	59%	6,167	64%	4,233	66%	299	60%	**16,779**	**62%**
Node Involvement in Invasive Cancers												
no	2,101	69%	4,939	73%	7,062	78%	4,729	81%	297	80%	**19,128**	**76%**
yes	951	31%	1,796	27%	1,953	22%	1,110	19%	76	20%	**5,886**	**24%**
no nodes sampled / unkno	(369)		(599)		(704)		(696)		(135)		**(2,503)**	
Histologic Grade of Invasive Cancers												
1 - well differentiated	783	25%	2,055	30%	2,974	32%	2,143	35%	178	38%	**8,133**	**32%**
2 - moderately differentiate	1,442	46%	2,996	44%	4,302	47%	2,904	47%	211	45%	**11,855**	**46%**
3 - poorly differentiated	922	29%	1,779	26%	1,894	21%	1,103	18%	84	18%	**5,782**	**22%**
unknown grade	(274)		(503)		(546)		(383)		(35)		**(1,741)**	
Grade 3 tumour ≤ 15 mm	377	41%	784	44%	909	48%	521	47%	33	39%	**2,624**	**45%**

Notes

1. Targets: >50% invasive tumours ≤15mm, >70% with negative nodes, >30% grade 3 tumours ≤15mm.
2. Breast Screening Program data extraction date: March 28, 2025.

5. Comparison with Canadian Standards

The Canadian Breast Cancer Screening Initiative (CBCSI) was launched in 1992. Under this initiative, Health Canada (now Public Health Agency of Canada) facilitated a federal/provincial/territorial network that enabled collaboration in the implementation and evaluation of breast cancer screening programs in Canada. In 2012 the CBCSI component transferred to the Canadian Partnership Against Cancer (CPAC).

The Canadian Breast Cancer Screening Database (CBCSD) was first established in 1993. All provincial and territorial programs in Canada contribute data to the CBCSD. The first evaluation report on Organized Breast Cancer Screening Programs in Canada was published in 1999, and prompted the creation of the Evaluation Indicators Working Group to begin the task of defining performance measures for Canadian breast cancer screening programs. Biennial evaluation reports are now produced regularly from the CBCSD by CPAC.

In this section, the Breast Screening Program performance measures are presented against the targets set for Canadian breast cancer screening programs[5]. This document defined a set of performance measures that were developed on the basis of recognized population screening principles, evidence from randomized controlled trials, demonstration projects, and observational studies.

The Breast Screening Program achieves national targets in invasive cancer detection rates, positive predictive values, invasive tumour sizes, and node negative rates. Improvements are needed to: increase participation and retention rates; and reduce abnormal call rates, diagnostic intervals, and benign to malignant open biopsy ratio.

- There was a decrease in the first screen abnormal call rate compared to 2022 (18.0% compared with 18.8% in 2022).
- There was an increase in the first screen retention rate (38.2% compared with 33.7% in 2022).

Comparison of Breast Screening Program Performance with Canadian Breast Screening Standards for Ages 50 to 69 is summarized in Table 16.

[5] Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Screening Program Performance third Edition. Health Canada 2013

TABLE 16: COMPARISON OF BREAST SCREENING PROGRAM PERFORMANCE WITH CANADIAN BREAST SCREENING STANDARDS FOR INDIVIDUALS AGES 50-69 YEARS

Performance Measure	National Target	Breast Screening Program
Participation Rate (1)	≥ 70% of the eligible population	47.9% + 11.7% MSP
Retention Rate (2)		
Initial Re-screen	≥ 75% initial re-screen within 30 months	38.2%
Subsequent Re-screen	≥ 90% subsequent re-screen within 30 months	68.1%
Abnormal Call Rate (3)		
First Screens	< 10% first screens	18.0%
Subsequent Screens	< 5% re-screens	5.9%
Invasive Cancer Detection Rate (3)		
First Screens	> 5.0 per 1,000 first screens	9.0 per 1,000
Subsequent Screens	> 3.0 per 1,000 re-screens	3.6 per 1,000
DCIS Detection Rate (3)		
First Screens	Surveillance and monitoring only	3.6 per 1,000
Subsequent Screens	Surveillance and monitoring only	1.1 per 1,000
Diagnostic Interval (3)		
no tissue biopsy performed	90% within 5 weeks if no tissue biopsy performe	81.0%
tissue biopsy performed	≥ 90% within 7 weeks if tissue biopsy performed	57.3%
Positive Predictive Value (3)		
First Screens	≥ 5% first screens	7.1%
Subsequent Screens	≥ 6% re-screens	8.0%
Benign Core Biopsy Rate (3)		
First Screens	Surveillance and monitoring only	20.0 per 1,000
Subsequent Screens	Surveillance and monitoring only	4.6 per 1,000
Benign to Malignant Core Biopsy Ratio (3)		
First Screens	Surveillance and monitoring only	1.7 : 1
Subsequent Screens	Surveillance and monitoring only	1.0 : 1
Benign Open Biopsy Rate (3)		
First Screens	Surveillance and monitoring only	0.8 per 1,000
Subsequent Screens	Surveillance and monitoring only	0.3 per 1,000
Benign to Malignant Open Biopsy Ratio (3)		
First Screens	≤ 1 : 1	3.3 : 1
Subsequent Screens	≤ 1 : 1	4.8 : 1
Invasive Cancers Tumour Size ≤ 10 mm (3)	> 25%	26.1%
Invasive Cancers Tumour Size ≤ 15 mm (3)	> 50%	54.5%
Node Negative Rate in Cases of Invasive Cancer (3)	> 70%	68.5%

Notes

1. Screen years: (1) = July 1, 2021 - December 31, 2023, (2) = 2020 - 2022, (3) = 2023.
2. Population data source: P.E.O.P.L.E. 2024 population projection (Mar 2024), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
3. Breast Screening Program data extraction date: March 28, 2025.

6. Cost Analysis

The BC Cancer Breast Screening Program is funded by the provincial Ministry of Health through the Provincial Health Services Authority (PHSA). The Breast Screening Program contracts with regional health authorities and private community imaging clinics to provide screening mammography services, including mobile services, throughout the province.

Overall program administration and coordination is provided by the Breast Screening Program Central Office, including: promotion, a provincial toll-free call centre, mobile service coordination and staff travel, result mail-out to participants and physicians, invitation and recall reminder system, follow-up tracking, quality management, program evaluation, and research support.

Costing analysis by fiscal year is summarized in Table 17. Financial reports for PHSA and BC Cancer are available at the PHSA website: www.phsa.ca/AboutPHSA/PHSA_Budget_Financials/default.htm

TABLE 17: COST COMPARISON BY FISCAL YEAR

Indicator	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
Total Cost	**$21,242,674**	**$18,812,835**	**$21,748,666**	**$22,382,828**	**$24,064,437**
Total Cost per Screen	$82.40	$95.39	$83.39	$88.28	$89.55
Central Services	$17.18	$24.79	$20.99	$17.18	$18.30
Screen Provision Costs	$50.08	$55.38	$47.10	$55.34	$54.98
Professional Reading Fees	$15.14	$15.22	$15.30	$15.76	$16.27
Cost per Cancer Detected	**$14,539.82**	**$15,677.36**	**$13,704.26**	**$15,404.56**	**$15,366.82**

Notes

1. Program Expenses are audited through PHSA Finance annually.
2. Screen Provision Costs includes, but are not limited to, staffing costs, equipment related costs, and mobile operation costs.
3. The professional reading fee was $16.27 per screen effective April 1, 2023.
4. Cost per cancer detected is based upon screens with complete follow-up. 2020-2021 includes 10 week closure due to COVID
5. The cost per screen is exclusive of salary and benefit increases to public screening centers which, commencing in fiscal 2006, have gone directly to the Health Authority.
6. Breast Screening Program data extraction date: March 28,2025.

APPENDICES

1. Cancer Screening Program Overview

Definition of Screening

Screening is one part of a prevention strategy, with the goal of identifying cancer before symptoms or signs develop. Primary cancer prevention strategy involves changes of behaviour or habits that reduce a risk, for example, stopping smoking, fat reduction in the diet, etc. Screening for cancer is a secondary prevention strategy. Secondary cancer prevention strategy targets disease in process[6]. A secondary prevention can reduce cancer morbidity and mortality by: diagnosing invasive disease at an earlier, more favourable prognostic stage; and, detecting precursor lesions associated with some cancers that once eliminated, prevent progression to invasive disease. Screening is "the application of various tests to apparently healthy individuals to sort out those who probably have risk factors or are in the early stages of specified conditions."[7]

Limitations of Screening

The decision to screen an at-risk population for pre-clinical signs of cancer is based on well-established criteria related to cancer and the screening tests that may be used to identify individuals who may have occult disease.[8],[9],[10]

The overall objective of a screening program is to reduce morbidity and mortality from cancer. The goal of screening is to "apply a relatively simple, inexpensive test to a large number of persons in order to classify them as likely or unlikely to have the cancer". The emphasis on likelihood underscores the limits of what should be expected from screening (i.e. screening tests are not diagnostic tests).

A person with an abnormal screening test does not have a definitive diagnosis until additional, more sophisticated diagnostic tests are completed. The emphasis on likelihood also is important because screening tests are inherently limited in their accuracy, which varies by test, cancer site, and individual characteristics. Although most of screening interpretations are accurate, it is inevitable that some individuals are identified as possibly having cancer when they do not (false-positive screen), and screening tests may fail to identify some individuals who do have the disease (false-negative screen).

The comparative evaluation of accuracy versus misinterpretation cannot be considered in absolute terms, but rather should be evaluated in terms of the relative consequences of one or the other kind of error.

[6] US Preventive Services Task Force: Guide to Clinical Preventive Services, Ed 2. Baltimore, Williams & Wilkins, 1996
[7] Morrison A: Screening in Chronic Disease. New York, Oxford Press, 1992
[8] Cole P, Morrison AS: Basic issues in cancer screening. In Miller AB (ed); Screening in Cancer. Geneva, International Union Against Cancer, 1978, P7
[9] Miller AB; Fundamentals of Screening. In Screening for Cancer. Orlando, Academic Press, 1985, P3
[10] Wilson JMG, Junger G; Principles and Practice of Screening for Disease. Geneva, World Health Organization, 1968

Organized Population Screening Program

To reduce morbidity and mortality from cancer in a population by screening, there must be coordinated and effective strategies to ensure acceptance and utilization of the established screening test. Since screening is targeted at asymptomatic individuals, the fine balance between maximizing benefits and minimizing undesirable effects must be maintained.

An organized approach to screening ensures that the target population has access to the screening service and that it accepts and uses the services offered. This is achieved by including the following six program components:

1. Health Promotion
2. Professional Development/Education
3. Recruitment & Retention
4. Screening Test & Reporting
5. Follow-up

2. 2023 Breast Screening Program Screening Services

In 2023, the Program provided screening mammography to individuals aged 40 and over. The recall frequency shown below was used to calculate the program results for the period of January 1, 2023 – December 31, 2023.

Age	Recall Frequency*
<40	Will accept with primary health care provider referral, recalled annually
40-74 Average risk	Recalled at 24-month anniversary to age 74.
40-74 Higher Risk	Recalled at 12-month anniversary to age 74
75+	Will accept but no further recalls provided

Eligibility Criteria:

- Have no breast health concerns*
- Have not had a mammogram on both breasts within last 12 months
- Have not had breast cancer
- Do not have breast implants
- Are not pregnant or currently breast feeding

* *If there is a new lump, thickening or discharge, we recommend seeing a health care provider immediately, even if the last mammogram was normal.*

3. Map of Screening Centres

4. Screening Centres Contact Information

Abbotsford	604-851-4750
Burnaby	604-436-0691
Campbell River	250-286-7100 x67477
Chilliwack	604-795-4122
Comox	250-331-5949
Coquitlam	604-927-2130
Cranbrook	250-417-3585
Dawson Creek	250-784-7320
Delta	604-946-1121 x783511
Duncan	250-737-2030 x44027
Fort St John	250-261-7424
Kamloops	250-828-4916
Kelowna	250-861-7560
Langley	604-514-6044
Nanaimo	250-716-5904
IK and NLM Mobile	604-877-6232
North Vancouver	604-903-3860
Penticton	250-770-7573
Port Alberni	250-724-8811
Powell River	604-485-3282
Prince George	250-645-6654
Prince Rupert	250-622-6172
Quesnel	250-985-5680
Richmond	604-244-5505
Salmon Arm	250-833-3607 x6
Sechelt	604-885-2224 x4213
Smithers	250-847-6214
Surrey – JPOCSC	604-582-4592
Terrace	250-638-4046
Vernon	250-549-5451
White Rock	604-535-4512 x757479
Williams Lake	250-302-3220 x4
Vancouver	
BC Women's Health Centre	604-775-0022
Mount St Joseph Hospital	604-877-8388
5752 Victoria Drive	604-321-6770
#505 – 750 West Broadway	604-879-8700
Victoria	
Victoria General Hospital	250-727-4338
305-1990 Fort St	250-952-4232

Mobile Screening Service Delivery Areas

Mobile Screening Communities:			
100 Mile House	Grandforks	Old Massett	Sparwood
Agassiz	Hope	Oliver	Squamish
Armstrong	Houston	Osoyoos	Stewart
Ashcroft	Hudson's Hope	Parksville	Summerland
Barriere	Invermere	Pemberton	Trail
Bella Bella	Kamloops	Pender Island	Tumbler Ridge
Bella Coola	Kelowna	Penticton	Ucluelet
Bowen Island	Kimberley	Pitt Meadows	Valemount
Burns Lake	Kitimat	Port Alberni	Vanderhoof
Castlegar	Ladysmith	Port Alice	Vernon
Chemainus	Lake Cowichan	Port Clements	Westbank
Chetwynd	Lillooet	Port Hardy	Whistler
Clearwater	Lumby	Port McNeil	Winifield
Clinton	Mackenzie	Princeton	
Creston	Maple Ridge	Qualicum Beach	
Dease Lake	Massett	Queen Charlotte	
Elkford	McBride	Radium	
Fernie	Merritt	Revelstoke	
Fort Nelson	Mill Bay	Saanichton	
Fort St. James	Mission	Salmon Arm	
Fraser Lake	Mount Currie	Salt Spring Island	
Gabriola Island	Nakusp	Sayward	
Galiano	Nelson	Skidegate	
Gold River	New Hazelton	Sointula	
Golden	New Westminster	Sooke	

Lower Mainland locations change from time to time. Latest visits include: Agassiz, Hope, Maple Ridge, Mission, New Westminster, Pitt Meadows

First Nations Communities

Community	Area
Alexis Creek (Anaham)	Alexis Creek
Anahim Lake	Anahim Lake
Burns Lake-Southside	Southside
Canim Lake Band	Canim Lake
Fountain	Lillooet
Fort Nelson First Nation	Fort Nelson
Gingolx	Kincolith
Gitlaxt'aamiks (New Aiyansh)	New Aiyansh
Gitwinksihlk	Gitwinksihlk
Haisla First Nation	Kitimat
Kispox	Hazelton
Laxgatls'ap (Greenvile)	Greenville
Lower Kootenay Band	Creston
Lower Nicola	Merritt
McLeod Lake	McLeod Lake
Musqueam Indian Band	Vancouver

Community	Area
Nak'Azdli	Fort St. James
Okanagan Indian Band	Vernon
Qwemtsin	Kamloops
Saik'uz	Vanderhoof
Saulteau First Nation	Chetwynd
Seabird	Agassiz
Simpcw First Nation	Barriere
Skeetchestn	Savona
Spences Bridge	Spences Bridge
Splatsin	Enderby
Stellat'En	Fraser Lake
Sto:lo Nation	Chilliwack
Stone-Yunesit'in	Hanceville
Sts'ailes	Agassiz
Tachie-TI'azt'en Nation	Fort St. James
Tatla Lake	Tatla Lake
Tiget-T'It'Q'Et First Nation	Lillooet
Tobacco Plains	Grasmere
Toosey-TI'Esqox	Riske Creek
Tsleil-Waututh	North Vancouver
Upper Nicola	Merritt
Urban Native Health Clinic	Kamloops
Westbank First Nation	Westbank
Witset-Moricetown	Moricetown
Penelakut	Chemainus
Songhees	Victoria
Stz'uminus	Ladysmith

5. Educational Materials Order Form

The online materials order form can be found online at screeningbc.ca/order-materials.

BC CANCER SCREENING
Provincial Health Services Authority

Order Form

BC Cancer Screening: Promotional and Program Support Materials

Bolded brochures are available as translated fact sheets in additional languages including French, Traditional Chinese, Simplified Chinese, Punjabi, Tagalog, Korean, Persian, Spanish, Vietnamese, and German. To view and print these translated fact sheets, visit our online Materials Order Form at: www.screeningbc.ca/order-materials.

The following materials are intended for primary care providers (e.g. family doctors, walk-in clinics, nurse practitioners, naturopaths, and midwives) to promote cancer screening at their office or clinic.

For All Screening Programs:		
Provider Resource	Screening Guidelines	Quantity:
	Health Gateway Poster	Quantity:
	Health Gateway Postcard	Quantity:
	Health Gateway Rack Card	Quantity:
Breast Screening		**Please specify quantity:**
Patient Education Materials	**Brochure – "Answering Your Questions About Screening Mammography"** (25 copies per bundle)	# of bundles:
	Brochure – "Answering Your Questions About Breast Density Score" (25 copies per bundle)	# of bundles:
	Poster – "Why Mammograms Work"	Quantity:
	Poster – "Why the Pressure?"	Quantity:
Provider Resources	Discussion Guide: Breast Density	Quantity:
	Breast Screening Tear-Off Referral Pad (50 sheets per pad)	# of pads:
Colon Screening		**Please specify quantity:**
Patient Education Materials	**Brochure – "Answering Your Questions About Colon Screening"** (25 copies per bundle)	# of bundles:
	Brochure – "Answering Your Questions About An Abnormal FIT" (25 copies per bundle)	# of bundles:
	Brochure – "Answering Your Questions About Colonoscopy" (25 copies per bundle)	# of bundles:
	Brochure – "Preparing For Your Colonoscopy" (25 copies per bundle)	# of bundles:
Provider Resources	FIT Decision Table Fact Sheet	Quantity:
	Colon Screening Program Fact Sheet	Quantity:
	Colonoscopy Referral Form (50 sheets per pad)	# of pads:
Cervix Screening		**Please specify quantity:**
Patient Education Materials	**Brochure – "Cervix Self-Screening"** (25 copies per bundle)	# of bundles:
	Brochure – "Answering Your Questions About HPV Results and the Pap Test" (25 copies per bundle)	# of bundles:
	Brochure – "Answering Your Questions About HPV Results and Colposcopy" (25 copies per bundle)	# of bundles:
	Brochure – "Answering Your Questions About LEEP" (25 copies per bundle)	# of bundles:
	Poster – "Cervix Self-Screening" (11 in x 17 in)	Hands Holding Swab:
		Patient at Home:
		People on Stairs:
	Postcard – "Cervix Self-Screening" (4 in x 6 in)	Quantity:
Provider Resources	HPV Primary Screening Provider Resource Guide	Quantity:
	Cervix Self-Screening Tear-Off Pad (50 sheets per pad)	# of pads:
Lung Screening		**Please specify quantity:**
	Brochure – "Answering Your Questions About Lung Screening" (25 copies per bundle)	# of bundles:

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6. Glossary

Abnormal Call Rate: Proportion of screening mammography examinations determined to require further diagnostic assessment (i.e. called "abnormal").

$$\text{Abnormal Call Rate} = \frac{\text{Number of exams called abnormal}}{\text{Total number of exams}} \times 100\%$$

Benign Core Biopsy Rate: Proportion of cases with complete follow-up that resulted in a benign core biopsy for diagnostic purposes, where each core biopsy represents a case.

Benign Open Biopsy Rate: Proportion of cases with complete follow-up that resulted in a benign open biopsy for diagnostic purposes, where each open biopsy represents a case.

Benign to Malignant Core Biopsy Ratio:

$$\text{Benign to Malignant Core Biopsy Ratio} = \frac{B_b}{M_b} : 1$$

B_b Number of benign cases detected by core biopsy, where each core biopsy performed represents a case.

M_b Number of malignant cancers cases detected by core biopsy, where each core biopsy represents a case.

Benign to Malignant Open Biopsy Ratio:

$$\text{Benign to Malignant Open Biopsy Ratio} = \frac{B_b}{M_b} : 1$$

B_b Number of benign cases detected by core biopsy, where each open biopsy performed represents a case.

M_b Number of malignant cancers cases detected by core biopsy, where each open biopsy represents a case.

Core Biopsy Yield Ratio: Proportion of cases with core biopsy that resulted in a diagnosis of breast cancer, where each core biopsy performed represents a case.

$$\text{Core Biopsy Yield Ratio} = \frac{M_b}{B_b + M_b} \times 100\%$$

B_b Number of diagnostic core biopsies without breast cancer diagnosis.

M_b Number of diagnostic core biopsies with breast cancer diagnosis.

DCIS (or In Situ Cancer) Detection Rate: Number of ductal carcinoma in situ (DCIS) cases detected per 1,000 screens with complete follow-up.

Diagnostic Interval: Percentage of individuals with an abnormal screening mammogram result who were diagnosed (benign or cancer) within the recommended time interval from the abnormal screen date.

- ≤ 5 weeks without a tissue biopsy
- ≤ 7 weeks with a tissue biopsy

Invasive Cancer Detection Rate: Number of invasive cancer cases detected per 1,000 screens with

complete follow-up.

Interval Cancer Rate: Number of individuals being diagnosed with post-screen breast cancer at a breast location which was called normal at previous screen within the specified period of time per 1,000 screens.

Node Negative Rate in Cases of Invasive Cancer: Proportion of invasive cancers in which the cancer has not invaded the lymph nodes.

Open Biopsy Yield Ratio: Proportion of cases with open biopsy that resulted in a diagnosis of breast cancer, where each open biopsy performed represents a case.

$$\text{Open Biopsy Yield Ratio} = \frac{M_b}{B_b + M_b} \times 100\%$$

B_b Number of diagnostic open biopsies without breast cancer diagnosis.

M_b Number of diagnostic open biopsies with breast cancer diagnosis.

Overall Cancer Detection Rate: Number of cancer cases detected per 1,000 screens with complete follow-up.

Participation Rate: The percentage of individuals who have a screening mammogram within 30 months as a proportion of the prevalence adjusted population.

Positive Predictive Value (PPV) of Screening Mammography: Proportion of “abnormal” cases found to have breast cancer after diagnostic workup.

$$\text{PPV} = \frac{\text{Number of screen-detected cancers}}{\text{Number of "abnormal" cases with complete follow-up}}$$

Prevalence to Expected Incidence Ratio: Comparison between incidence rates at first (prevalent) screen with historical incidence rate prior to onset of screening practice. Prevalent screens have been restricted to those individuals with no previous outside mammogram within 24 months of their first program screens. The 1982 incidence rates by five-year age group obtained from the BC Cancer Registry were chosen as the comparison reference.

$$\text{P : I Ratio} = \frac{\sum_i Ca_i}{\sum_i N_i R_i}$$

Where Ni is the number of prevalent screens for age group i, Cai is the number of cancers detected in prevalent screens for age group i and Ri is the expected incidence rate for age group i. Prevalence to expected incidence ratio for ages 50 to 79 would be calculated by summing over age groups 50 to 54, 55 to 59, 60 to 64, 65 to 69, 70 to 74, and 75 to 79 in the numerator and denominator.

Retention Rate (Return Rate): The estimated percentage of individuals without history of breast cancer diagnosis returned for rescreen within a certain period of time from their previous screen. This rate is estimated using Fine & Grey competing risk survival analysis method.

Sensitivity: Probability of interpreting screening mammograms of breast cancer cases as “abnormal”. It measures how well screening mammography determines the presence of breast cancer.

$$\text{Sensitivity} = \frac{TP}{TP + FN}$$

TP Number of screen-detected breast cancer cases.

FN Number of breast cancer cases called “normal” and diagnosed within 12 months post screen.

SMP: Screening Mammography Program now officially known as Breast Screening Program

Specificity: Probability of interpreting screening mammograms of cases with no evidence of breast cancer as “normal”. It measures how well screening mammography determines the absence of breast cancer.

$$\text{Specificity} = \frac{TN}{TN + FP}$$

TN Number of cases with “normal” screening mammograms that remained without evidence of breast cancer before the next screening visit, or within 12 months after the last screening visit.

FP Number of cases with no evidence of breast cancer but whose screening mammograms were called “abnormal”.

7. Acknowledgements

The Breast Screening Program would like to thank its partners who have supported and contributed to the Program over the years. The success of the Program depends on an integrated system of:

- Community health professionals promoting the benefits of screening
- Dedicated and highly trained staff to perform and interpret the screening mammograms
- Health care providers and medical specialists to provide diagnostic follow-up and treatment
- Community facilities providing space and personnel to support mammography

We would like to thank the following organizations for their ongoing support (alphabetical):

BC Cancer Foundation
BC Radiological Society
Canadian Cancer Society
Canadian Partnership Against Cancer
College of Physicians and Surgeons of BC
Doctors of BC
Divisions of Family Practice
Society of General Practitioners
University of British Columbia

8. Committees (Effective March 2024)

Alphabetical listing by surname:

Quality Management Committee (QMC)	Quality Management Support Group
Ms. Rachel Berns Dr. Cathy Clelland Dr. Stephen Chia Dr. Zuzana Kos Dr. Fabio Feldman Ms. Amanda Hunter Mr. Javis Lui Ms. Sheila MacMahon Ms. Rableen Nagra Ms. Mary Nagy Dr. Linda Warren Dr. Charlotte Yong-Hing – Chair	Ms. Amanda Hunter Ms. Shelley Pietraroia Ms. Sheila MacMahon Ms. Moira Pearson Dr. Rasika Rajapakshe Dr. Derek Wells

Screener's Advisory Committee (SAC)	
Dr. Eleanor Clark Dr. Marie-Josee Cloutier Dr. Jennifer Dolden Dr. Brenda Farnquist Dr. Fabio Feldman Dr. Dellano Fernandes Ms. Amanda Hunter Dr. Kevin Irish Dr. Dennis Janzen Dr. Rob Johnson Dr. Tahir Khalid Dr. John Lai Dr. Grant Larsen Dr. Brent Lee Dr. Colin Mar Dr. Darryn Maisonneuve	Dr. Peter McNicholas Ms. Rableen Nagra Ms. Mary Nagy Dr. David O'Keeffe Dr. Amie Padilla-Thornton Dr. Catherine Phillips Dr. Rasika Rajapakshe Dr. Karen Seland Dr. Stuart Silver Dr. Phil Switzer Dr. Beth Tanton Dr. Claire Thugur Dr. Linda Warren Dr. Peggy Yen Dr. Charlotte Yong-Hing– Chair

9. Radiologists Screeners (Effective March 2024)

Alphabetical listing by surname:

Abbotsford & Chilliwack	**Kelowna**	Dr. Dennis Janzen*
Dr. Amarjit Bajwa	Dr. Brenda Farnquist*	Dr. Dennis Lee
Dr. Joseph Chooi	Dr. Trent Orton	Dr. Amir Neyestani
Dr. Tahir Khalid*	Dr. Michael Partrick	**Vancouver BC Women's Health Centre**
Dr. Chung Ko	Dr. Cathy Staples	Dr. Marie-Josee Cloutier*
Burnaby & Richmond	**Langley**	Dr. Rashin Rastegar
Dr. Theodore Blake	Dr. Joseph Chooi	**Vancouver – Mount St. Joseph Hospital**
Dr. Andy Chan	Dr. Tahir Khalid	Dr. Roberta Dionello
Dr. Tracey Chandler	Dr. Chung Ko	Dr. Jessica Farrell
Dr. Bill Collins	Dr. John Lai*	Dr. Amie Padilla-Thornton*
Dr. Vanindar (Vee) Lail	Dr. Jerome Wong	**Vancouver – Victoria Drive**
Dr. Kelly MacLean	Dr. Xing Wong	Dr. Jennifer Jessup
Dr. Beth Tanton*	**Nanaimo/Islands & Coastal Mobile**	Dr. Connie Siu
Dr. Betty Tuong	Dr. David Coupland	Dr. Phil Switzer*
Comox	Dr. Robert Johnson*	**Vancouver – #505 – 750 West Broadway**
Dr. Grant Larson*	Dr. Zenobia Kotwall	Dr. Nicola Lapinsky
Dr. Jennifer Waterhouse	Dr. David O'Keefe	Dr. Nicholas Murray
Dr. Peggy Yen	Dr. Paul Trepanier	Dr. Linda Warren*
Coquitlam	Dr. Peggy Yen* (Mobile Chief Screener)	Dr. Charlotte Yong-Hing
Dr. Vishal Anand	**North Vancouver & Sechelt**	**Vernon / Salmon Arm**
Dr. Debra Chang	Dr. Sven Aippersbach	Dr. Glenn Scheske
Dr. Rita Chiu	Dr. Simon Bicknell	Dr. Claire Thurgur*
Dr. Jennifer Dolden*	Dr. Bobbi-Jo Coldwell*	Dr. Adam Weathermon
Dr. Jian Li	Dr. Patrick Llewellyn	Dr. Chad Wherry
Dr. Anita McEachern	Dr. Catherine Phillips	**Victoria General Hospital / Victoria Ft. St.**
Dr. Robert van Wiltenburg	Dr. David Spouge	Dr. Richard Eddy
Cranbrook	**Penticton**	Dr. Nicola Finn
Dr. Daryn Maisonneuve*	Dr. Peter McNicholas*	Dr. Chris King
Interior / Northern &	Dr. Meghan Van Vliet	Dr. Jonathan Hickle
Lower Mainland Mobile	**Prince George (UHNBC)**	Dr. Brent Lee*
Dr. Kevin Ibach	Dr. Shyr Chui	Dr. Stuart Silver*
Dr. Colin Mar	Dr. Sarah Harvie	Dr. Frederick Smither
Dr. Tetyana Martin	Dr. Gurpreet Narang	Dr. Paul Sobkin
Dr. Charlotte Yong-Hing*	Dr. Karen Seland*	**White Rock & Delta**
Kamloops	**Surrey – JPOC**	Dr. Eleanor Clark*
Dr. Dellano Fernandes*	Dr. Sanjiv (Sonny) Bhalla	Dr. Jeff Hagel
Dr. Vipal Vedd	Dr. Guy Eriksen	Dr. Tarek Helou

*Indicates Chief Screener

10.Publications and Presentations

Publications

Charlotte Yong-Hing

1. Sharma S, Hillier T, Parsons M, Glanc P, Miller E, Nguyen ET, Doria AS, Dhillon S, Seely JM, Borgaonkar J, Yong-Hing CJ. Promoting Equity, Diversity, and Inclusion in Medicine: A Comprehensive Toolkit for Change in Radiology. Can Assoc Radiol J. 2024 May;75(2):323-329. doi: 10.1177/08465371231214232. Epub 2023 Dec 8. PMID: 38063367.
2. Bentley H, Yuen J, Roberts J, Martin T, Yong-Hing C, Nicolaou S, Murray N. Underreported and underrecognized: a comprehensive imaging review of breast injury. Emerg Radiol. 2023 Dec;30(6):777-789. doi: 10.1007/s10140-023-02167-0. Epub 2023 Nov 9. PMID: 37943412.
3. Boerkoel P, Yan TD, Abbas A, Jamieson B, Khosa F, Yong-Hing CJ. Disability, an often-overlooked aspect of equity, diversity, and inclusion among radiology departments in Canada and the United States. Clin Imaging. 2023 Dec;104:110007. doi: 10.1016/j.clinimag.2023.110007. Epub 2023 Oct 13. PMID: 37862911.
4. Hillier E, Hodgson CS, Lebel K, Spalluto LB, Trop I, Yap WW, Hillier T, Darras KE, Sharma S, Yong-Hing CJ. Canadian radiology workforce demographics: Results from a national survey. Heliyon. 2023 Aug 11;9(8):e18852. doi: 10.1016/j.heliyon.2023.e18852. PMID: 37636473; PMCID: PMC10448061.
5. Taylor J, Sharma S, Supersad A, Miller E, Lebel K, Zabihaylo J, Glanc P, Doria AS, Cashin P, Hillier T, Yong-Hing CJ. Recommendations for Improvement of Equity, Diversity, and Inclusion in the CaRMs Selection Process. Can Assoc Radiol J. 2023 Nov;74(4):624-628. doi: 10.1177/08465371231174897. Epub 2023 May 12. PMID: 37173872.
6. McKee H, Walsh C, Modares M, Yap WW, Gorelik N, Brown M, Yong-Hing CJ, Hanneman K. Disparities in Radiologist Fee-For-Service Payments by Gender in Canada. Can Assoc Radiol J. 2023 Nov;74(4):650-656. doi: 10.1177/08465371231170630. Epub 2023 Apr 17. PMID: 37066858.
7. Sharma S, Patlas M, Khosa F, Yong-Hing CJ. Equity, Diversity and Inclusion in Radiology: Prioritizing Trainee Involvement. Can Assoc Radiol J. 2023 Nov;74(4):610-611. doi: 10.1177/08465371231170230. Epub 2023 Apr 9. PMID: 37032308.
8. Tomblinson CM, Stowell JT, Zavaletta V, Freeman N, Yong-Hing CJ, Carroll EF, Willis MH, Flores EJ, Spalluto LB. Beyond the Binary: Moving the Radiology Workforce Toward Gender Inclusion, From the *AJR* Special Series on DEI. AJR Am J Roentgenol. 2023 Oct;221(4):425-432. doi: 10.2214/AJR.22.28967. Epub 2023 Mar 15. PMID: 36919881.
9. Hamel C, Margau R, Pageau P, Venturi M, Esmaeilisaraji L, Avard B, Campbell S, Corser N, Dea N, Kwok E, MacLean C, Sarrazin E, Yong-Hing CJ, Zaki-Metias K. Canadian Association of Radiologists Diagnostic Imaging Referral Guidelines: a guideline development protocol. CMAJ Open. 2023 Mar 14;11(2):E248-E254. doi: 10.9778/cmajo.20220098. PMID: 36918208; PMCID: PMC10019324.
10. Yong-Hing CJ, Khosa F. Provision of Culturally Competent Healthcare to Address Healthcare Disparities. Can Assoc Radiol J. 2023 Aug;74(3):483-484. doi: 10.1177/08465371231154231. Epub 2023 Jan 30. PMID: 36715236.
11. Bentley H, Wu T, Russell M, Fitzgerald S, Chapman N, Kolof H, Yong-Hing CJ. Assessment of Musculoskeletal Discomfort and Evaluation of Radiology Workstation Ergonomics in a National Radiology Workforce. Acad Radiol. 2023 Oct;30(10):2101-2107. doi: 10.1016/j.acra.2022.12.007. PMID: 36586761.
12. Heaney RM, Zaki-Metias KM, McKee H, Wang H, Ogunde B, Yong-Hing CJ, Freitas V, Ghai S, Seely JM, Nguyen ET. Correlation Between Breast Arterial Calcifications and Higher Cardiovascular Risk: Awareness and Attitudes Amongst Canadian Radiologists Who Report Mammography. Can Assoc Radiol J. 2023 Aug;74(3):582-591. doi: 10.1177/08465371221140347. PMID: 36541871.
13. Yap WW, Hodgson CS, Spalluto L, Lebel K, Trop I, Hillier E, Darras K, Hillier T, Yong-Hing CJ. Canadian Radiology Gender Pay Gap-Reality or Myth? Can Assoc Radiol J. 2023 May;74(2):288-297. doi: 10.1177/08465371221132465. Erratum in: Can Assoc Radiol J. 2023 Aug;74(3):600. doi: 10.1177/07334648221148561. PMID: 36223428.
14. Yong-Hing CJ, Vaqar M, Sahi Q, Khosa F. Burnout: Turning a Crisis Into an Opportunity. Can Assoc Radiol J. 2023 Feb;74(1):16-17. doi: 10.1177/08465371221130683.. PMID: 36164815.
15. Yan TD, Yuan PHS, Saha T, Lebel K, Spalluto L, Yong-Hing CJ. Female Authorship Trends Among Articles About Artificial Intelligence in North American Radiology Journals. Can Assoc Radiol J. 2023 May;74(2):264-271. doi: 10.1177/08465371221122637. PMID: 36062579.

Presentations, Interviews and Lectures, Research Grants

Charlotte Yong-Hing

1. Women in Radiology, RSNA, Chicago IL, Nov 2023
2. Mentorship and Sponsorship, not only for Early Career, RSNA, Chicago IL, Nov 2023
3. The Mid Career Leaky Pathway in Radiology, RSNA, Chicago IL, Nov 2023
4. Breast Arterial Calcification Reporting on Mammography, Alberta Society of Radiologists, Hybrid, Oct 14, 2023
5. Breast Cancer Screening, Family Practice Oncology Network, Virtual October 10, 2023
6. CARJ Podcast Episode 2 – Misinformation and Breast Screening, podcast, October 10, 2023
7. Mid Career Challenge in Radiology, Vancouver Imaging Review, Hybrid, Sept 15, 2023
8. Equity, Diversity and Inclusion, Vancouver Imaging Review, Hybrid, Sept 15, 2023
9. Tackling Bias, Royal Columbian Hospital Facility Engagement (a Specialist Services Committee initiative), Coquitlam BC, April 19, 2023
10. 2022 UBC Radiology Equity, Diversity and Inclusion Survey Results, University of British Columbia Radiology Grand Rounds, May 17, 2023.
11. Quality and Guidelines, Canadian Society of Breast Imaging 2023 Annual Meeting, virtual, April 1, 2023.
12. Contrast Enhanced Mammography: the BC Cancer Vancouver Experience – so far!, Canadian Association of Radiologists, 2023 Annual Scientific Meeting, Montreal, QC, April 2023.
13. Equity, Diversity and Inclusion: From an illusive dream to an achievable reality, Vancouver Imaging in Recognition of International Women's Day 2023, virtual, March 8 2023.
14. Leadership's responsibilities for diversity and inclusion, Physician Leadership Workshop for Women in Radiology, Virtual January 21, 2023.
15. Leadership's responsibilities for diversity and inclusion, Physician Leadership Workshop for Women in Radiology, Virtual January 21, 2023.
16. Equity, Diversity and Inclusion in Quality Improvement, Provincial Health Services Authority Physician Quality Improvement Cohort 6 LS4, Webinar, Jan 20, 2023.
17. JFR365, la Tribune internationale: Equity and diversity in radiology in Canada and France, équité et diversité en radiologie au Canada et en France: https://jfr365.jfr.plus/session/media/equity-and-diversity-radiology-canada-and-france, online, Jan 12, 2023.

Rasika Rajapakshe

1. "Artificial Intelligence in Breast Screening", 2023 COMP Annual Canadian Winter School, (Virtual) 2 February, 2023.

Amanda Hunter

1. Before and After Positioning Makeovers for CAMRT Breast Imaging Education Day 2023 (webinar). Amanda Hunter & Shelley Pietraroia; Vancouver, BC. October 28, 2023
2. New Salmon Arm Breast Screening Centre Program Orientation. Amanda Hunter & Shelley Pietraroia; Vancouver, BC. October 31, 2023
3. Facilitated Referral Process (Fast Tracks & Higher Risk Surveillance) Webinar. Lherena Cabrera, Mary Nagy, & Amanda Hunter. July 12, 2023.
4. Work In Progress (WIP) Case Handling and Investigation Webinar. Amanda Hunter, Emily Charles, & Lherena Cabrera. Vancouver, BC. January 2023.

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