

Screening Mammography Program 2017 Annual Report



Table of Contents

1.0	Message.....	5
2.0	Executive Summary	7
3.0	Screening Recommendations for Women in BC.....	8
4.0	About the Screening Mammography Program.....	9
	Figure 1: SMP Screening Process Overview	14
5.0	Program Initiatives and Activities.....	15
6.0	Professional Development and Academic Activities	18
7.0	Partnerships and Collaborations.....	20
8.0	Program Results	21
8.1	Recruitment and Re-screening	21
	Figure 1: SMP Annual Screening Volume Years: 2012–2016.....	21
	Figure 2: SMP Annual Screening Volume by Risk and Screen Years: 2001–2016	22
	Table 1: SMP Volume by Health Service Delivery Area (HSDA): 2016..	23
	Table 2: SMP Age and Volume Distribution for Higher Risk Women by Health Service Delivery Area (HSDA) 2016.....	24
	Table 3: Regional 30-Month Participation Rates by 10-Year Age Groups Ending December 31, 2016 Inclusive	25
	Figure 3: Biennial Screening Participation by Women Ages 50 to 69 over 30 Month Period Between July 1, 2014 and December 31, 2016..	26
	Figure 4: Bilateral Mammography Utilization by Women Ages 50 to 69 in BC Between July 1, 2014 and December 31, 2016 Inclusive....	27
	Table 4: Regional Participation Rates of Women Ages 50 to 69 by Selected Ethnic Groups Between July 1, 2014 and December 31, 2016 Inclusive	28
	Figure 5: SMP Participation Rates (%) for Women 50 to 69 by Calendar Year: 1988–2016.....	29
	Figure 6: Return Rates for Average Risk Women Age 40 to 74 by First/Subsequent Screens and Screen Result: 2013–2015	30
	Table 5: Return Rates for Average Risk Women Age 40 to 74: 2013–2015.....	30
	Figure 7: Return Rates for Higher Risk Women Age 40–74 by First/ Subsequent Screens and Screen Result: 2013–2015	31
	Table 6: Return Rates for Higher Risk Women Age 40 to 74: 2013–2015	31

8.2	2016 Screening Results	32
	Table 7: SMP Outcome Indicators by 10-Year Age Group: 2016	33
	Table 8: Diagnostic Procedures Received by SMP Participants with “Abnormal” Screening Mammograms: 2016	34
	Figure 8: Screening Outcome Summary (2016)	35
8.3	2016 Cancer Detection	36
	Table 9: Histologic Features of Breast Cancers Detected by SMP: 2016	36
8.4	Outcome Indicators by Calendar Year: 2012–2016	37
	Table 10: SMP Outcome Indicators by Calendar Year Between 2012 and 2016 Inclusive	38
8.5	Outcome Indicators by Age: 2012–2016 Cumulative	39
	Table 11: SMP Outcome Indicators by 10-Year Age Groups Between 2012 and 2016 Inclusive	40
8.6	Outcome Indicators by HSDA: 2012–2016 Cumulative	41
	Table 12: SMP Outcome Indicators by Health Service Delivery Area (HSDA) Between 2012 and 2016 Inclusive	41
8.7	Cancer Characteristics by Age: Cumulative Up To and Including 2016	42
	Table 13 Histologic Features of Breast Cancers Detected by SMP Cumulative Up To and Including 2016	42
8.8	Comparison with Canadian Standards	43
	Table 14: Comparison of SMP Performance with Canadian Breast Screening Standards for Ages 50 to 69 Years	44
8.9	Cost Analysis	45
	Table 15: Cost Comparison by Fiscal Year	45

Appendix

1.	Cancer Screening Program Overview	46
2.	2016 SMP Screening Services	48
3.	Map of Screening Centres	49
4.	Screening Centre Contact Information	50
5.	Educational Materials Order Form	53
6.	Glossary	54
7.	Acknowledgements	57
8.	Committees	58
9.	Radiologist Screeners	59
10.	Publications & Presentations	60
11.	SMP/BCCA Contact Information	62

1.0 Message



Message from the Medical Director

The first year of my term is quickly passing by and I am once again happy to share the annual report of the Screening Mammography Program. The number of screening mammograms performed in 2016 increased to 258,172, and 1,453 breast cancers were detected. The cancer detection rate continues to improve at 5.6 cancers per 1000 women screened, and reflects our efforts to reduce the disease burden on the women of British Columbia and their family and friends.

Teamwork abounds in healthcare, and such is the case in breast cancer screening. This begins with the staff of our program which includes client services to facilitate appointments, and our promotions department to share our key messages of breast health. Our ability to monitor and optimize quality is dependent on the work of our registry and information technology departments, and statisticians. New ideas and strategies for screening are shared amongst the leadership of both this program and other BC screening programs. The same practice also occurs across provincial and national borders allowing us to utilize a wealth of expertise around the world.

Local experience is also drawn upon including the shared comments of our participants and advocacy groups, and the diverse education of our breast imaging technologists and radiologists. I look forward to the upcoming opportunity for such collaboration at the biennial SMP Forum in the spring of 2018. In order to take advantage of the most appropriate screening technology and greatest understanding of breast cancer risk factors the program also conducts research while reviewing the evidence available from other sources.

We are certainly not alone then in our goal to improve breast health for the women of this province. Thank you in advance to all members of this team for your continued efforts in the upcoming year.

– Colin Mar, MD



Message from the Screening Operations Director

We are pleased to provide our annual report which includes both program results as well as initiatives the program undertook in order to improve and promote the services we provide.

In 2016 we were once again able to partner with the Canadian Breast Cancer Foundation and Global Media to provide the successful *Go Have 1* campaign. Other program promotion initiatives included engaging family physicians to send letters to their patients who were overdue for screening.

Seven centres across BC upgraded their mammography equipment to digital technology in 2016. Two planned digital mammography conversions in 2017 will complete the province's digital mammography equipment upgrade. Women in BC can be assured that their screening exams are being performed on state of art technology by knowledgeable professionals regardless of where they attend.

– *Janette Sam*

2.0 Executive Summary

The BC Cancer is proud of the achievements of the Screening Mammography Program. The population based breast cancer screening program was the first of its kind in Canada and is in its 29th year of operation. Since the inception of the program in 1988 to the end of 2016, the program has provided over 5,604,689 screening mammograms and detected 23,885 (breast) cancers.

The Screening Mammography Program has a participation target of 70% of eligible 50-69 year old women to have a screen every two years. The number of women 50-69 eligible for a screening mammogram grows each year as the population ages and this cohort increases in size. While the number of screens performed in this age group increased slightly in 2016 compared with 2015, the overall participation remained steady at 52.4%.

3.0 Screening Recommendations for Women in British Columbia

BC's provincial breast screening recommendations are consistent with current evidence-based research findings, effective February 4, 2014. Recommendations encompass the use of mammography, MRI, breast self-examination, and clinical breast examination to screen for breast cancer.

Provincial recommendations also include guidelines for women with a family history of breast cancer in a first degree relative (mother, sister, or daughter) which confers a higher-than-average risk. These guidelines are critical as these women are approximately two times more likely to develop breast cancer¹. More information about the BC breast screening recommendations may be found in appendix 2, 2017 SMP Screening Services, and online at www.screeningbc.ca.

The Program Results (section 8.0) have been updated to include outcome indicator analysis for women who have self-identified with this as higher than average risk. This is denoted as “higher risk,” in that section.

Risk / Age	Recommendation
Age 40 to 74 with a first degree relative (mother, daughter, sister) with breast cancer.	Screening is recommended every year. Women with a family history of breast cancer are almost two times more likely to develop breast cancer. A doctor's referral is not needed.
Age 40 to 49 without a family history of breast cancer	Women are encouraged to talk to their doctor about the benefits and limitations of mammography. If screening mammography is chosen, it is available every two years. A doctor's referral is not needed but is recommended.
Age 50 to 74 without a family history of breast cancer	Screening is recommended every two years. For women in this age group, the benefits of screening mammograms clearly outweigh the limitations. Book your appointment today. A doctor's referral is not needed.
Ages 75+	Women are encouraged to talk to their doctor about the benefits and limitations of mammography. If screening mammography is chosen, it is available every two to three years. A doctor's referral is not needed but is recommended.
Younger than age 40	Screening mammograms are not recommended unless you have a known BRCA1 or BRCA2 mutation, prior chest wall radiation or strong family history of breast cancer. A doctor's referral is needed for every screen.

¹ Pharoah PD, Day NE, Duffy S, Easton DF, Ponder BA. Family history and the risk of breast cancer: a systematic review and meta-analysis. *Int J Cancer*. 1997 May 29;71(5):800–809.

4.0 About the Screening Mammography Program

Regular breast cancer screening is an important part of a women's health routine. Here in BC, we have some of the best survival outcomes in Canada for those women who do get 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 is a better chance of treating the cancer successfully.
- It is less likely to spread.
- There may be more treatment options.

A woman's risk of breast cancer increases as she ages; over 80% of breast cancers in BC are found in women 50 years and older. The BC Cancer is committed to finding breast cancers early through breast cancer screening by its population based program – the Screening Mammography Program (SMP). SMP utilizes standard two-view bilateral mammography (x-ray of the breast) for breast cancer screening. Women ages 40 to 74 may self-refer to the program; however it is recommended that by age 50 average risk women have a screening mammogram every two years. Women 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 women must speak with their primary care provider and may be referred for a diagnostic mammogram.

Centres and Mobile Services

There are 36 fixed centres across the province, and three mobile vans that visit over 170 smaller BC communities, including many First Nations communities. Mobile schedules are posted on the SMP website (www.screeningbc.ca) and are sent to local health professionals.

The Screening Process

The Screening Process is illustrated in Figure 3.1 at the end of this section. The process consists of four stages:

1. Identify and invite the target population for screening.
2. Conduct the screening examination.
3. Investigate any abnormalities identified on screening.
4. Issue a screening reminder at the appropriate interval.

FAST TRACK – Facilitated Referral to Diagnostic Imaging

On average approximately 9% of women 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. The Fast Track system facilitates referral for women who require further testing.

Fast Track Overview

1. At the time of screening, women are informed that if further tests are required, they will be called directly by a diagnostic facility to book their appointment.
2. If further testing is required (i.e. additional mammographic views or breast ultrasound) the woman is booked at the Fast Track diagnostic clinic closest to the screening site, usually at the same location.
3. The SMP images and results are transferred to the diagnostic office prior to the appointment.
4. SMP notifies the woman's health care provider, where their patient has been referred for additional testing.
5. The diagnostic facility makes every effort to provide an appointment within one week of receiving the referral.

Standardization of the Fast Track referral system ensures that all women benefit from the shortened time between an initial abnormal screening result and the first appointment for diagnostic assessment.

Program Evaluation

Data is collected and analyzed on an ongoing basis to monitor the program's effectiveness and to identify areas for improvement. SMP 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 2013.²

Results of this analysis are presented in the "PROGRAM RESULTS" section of this report (Section 8). Age-specific breast cancer incidence and mortality rates are provided by the BC Cancer Registry.

² 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

Quality Assurance

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

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

- Certificate in Breast Imaging scholarship program, in partnership with the Canadian Breast Cancer Foundation;
- Educational Webinars throughout the year;
- A Quarterly Technologist Newsletter;
- An educational event at the bi-annual SMP 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;
- SMP Mammography Teaching Sets for Technologists for CME credits;
- Mammography and Patient Care In-Service presentations (CME credits) at the centres;
- A comprehensive SMP 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 SMP 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 BCCA Quality Assurance Support Group, and the scientific literature.

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

Image Quality Assurance: The SMP 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 and are also supported through site visits, training, and comprehensive manuals. The team also provides technical support for centres as they transition from analog to digital mammography.

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

Regular Promotion and Education Activities

Ongoing promotion activities include:

- Producing new promotional tools, such as brochures, posters, marketing giveaways, bookmarks and postcards that effectively communicate the benefits of mammography.
- Working with ethnic and First Nations groups to develop customized materials and culturally-sensitive approaches to increase understanding and interest in screening.
- Regular media advertisements to promote the mobile mammography service.
- A "@BCCancer_Agency" Twitter account that promotes relevant information about cancer screening including upcoming mobile visits in communities around the province.
- A website (www.screeningbc.ca) to support informed decision-making about screening.
- Regular presence at health fairs and events throughout the province by the BC Cancer's Prevention group.



Indigenous hummingbird logo
developed for mobile coaches

Client Satisfaction Surveys

Each year SMP performs a client satisfaction survey to ask women for their feedback about the program and their screening visit experience. The survey consists of 1000 surveys sent each month to women randomly selected from across the province that have attended the program.

In 2016, the survey was updated to include new overall satisfaction rate questions.

2016 Summary of SMP Client Satisfaction Survey Results

The total number of surveys sent: 11,997

Total number of surveys returned: 4,997 (42% return rate)

The results are compiled and both program wide and centre specific results are shared with the centres twice a year. Any centre specific comments provided by those surveyed are also forwarded to the centres for review.

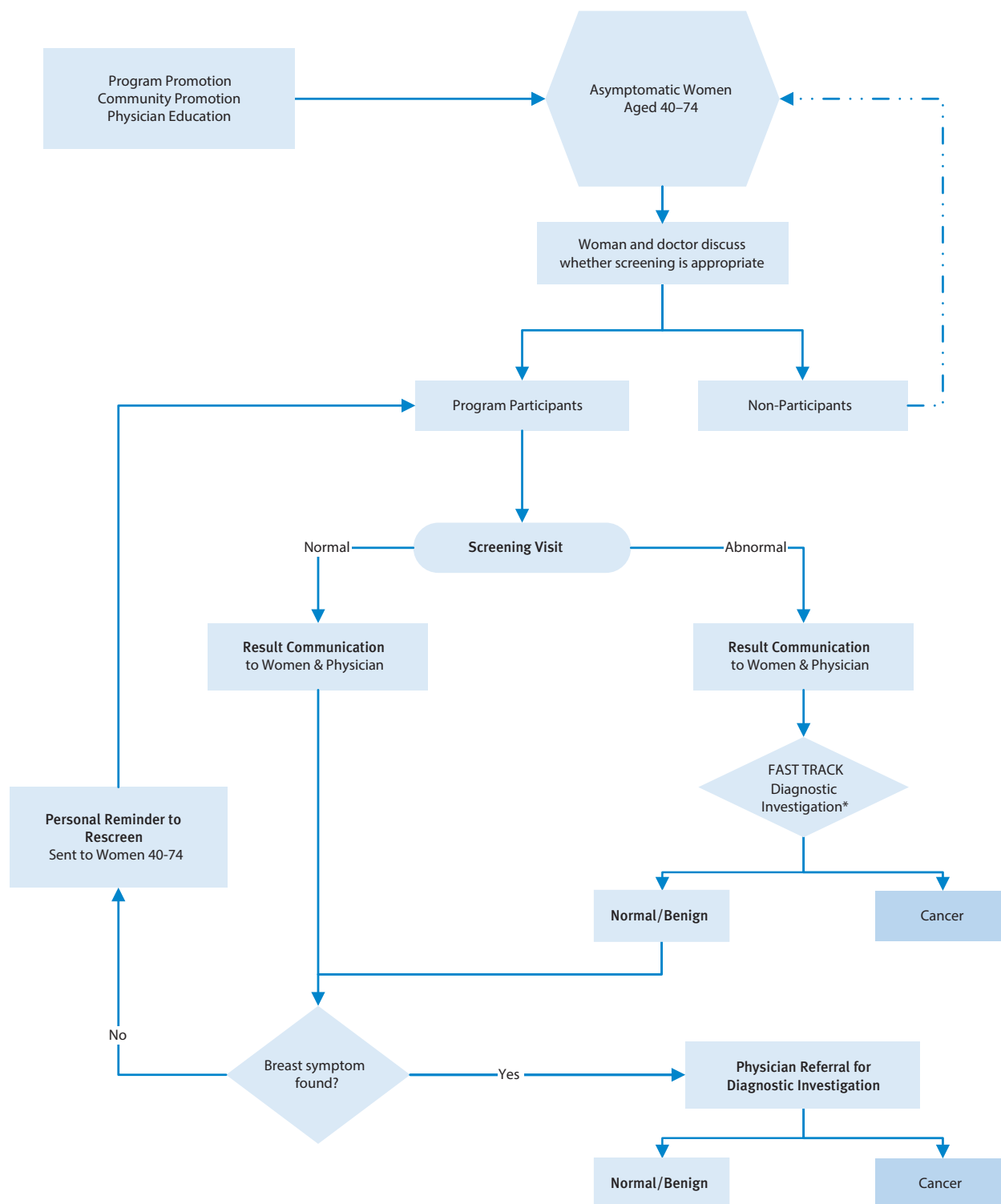
Through analysis of the 2016 responses, SMP identified five major factors that affect overall screening retention and whether a woman is more or less likely to return to screening. These are:

1. The pressure used during the procedure was tolerable
2. The technologist explained the procedure to my satisfaction
3. My privacy was respected during the procedure
4. The technologist was friendly and helpful
5. The receptionist was friendly and helpful

Centres are encouraged to review their individual results, which also include trends over a three year period, and to identify opportunities for improvement at each individual site.

Overall Satisfaction Rate	98% indicated "Overall Satisfaction" with Screening
Percentage indicating they would return to screening	98% said that they would return to Screening
Percentage indicating they would recommend screening to others	96% said that they would recommend the program to others
Appointment check in	95% rated the staff GOOD/EXCELLENT at being courteous, helpful and caring
Mammography Experience overall	99% rated the technologists GOOD/EXCELLENT at being courteous, helpful and caring
Mammography compression	94% felt the compression was either somewhat uncomfortable or tolerable

Figure 1: SMP Screening Process Overview



* SMPBC obtains diagnostic investigation information from sources such as Medical Services Plan, surgeons, hospitals and BC Cancer Registry on women who consent to follow up.

5.0 2016/17 Program Initiatives and Activities

Program Initiatives

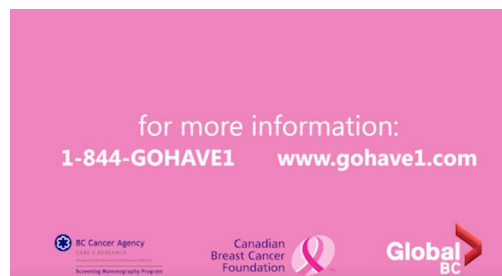
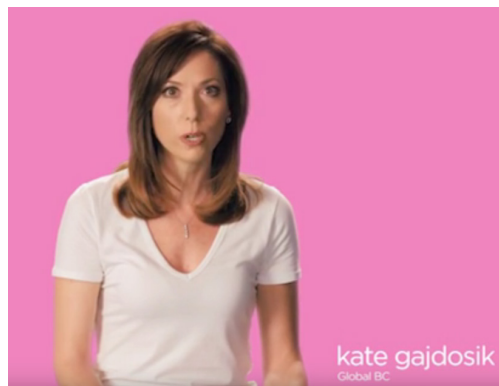
SMP regularly develops initiatives related to quality assurance, promotion and retention, and program expansion. This past year some of the initiatives and activities included:

GO HAVE1 Campaign

The Screening Mammography Program was pleased to partner once again with the Canadian Breast Cancer Foundation on the successful multi-media campaign — *GOHAVE1*. The goal of the campaign was to inform and encourage women to book a mammogram.

The campaign ran from September 26th to October 31st, 2016, coinciding with Breast Cancer Awareness month. The campaign included integrated PSA support by Global Television anchors and staff, video placement on YouTube, and digital display ads.

The 2016 *GOHAVE1* campaign had a positive effect on appointment bookings, with an increase of over 8,000 bookings during the campaign duration (October to December), compared to the same period in 2015.



Digital Mammography Vehicle Summer Tour in Northern BC

In the summer of 2016, the SMP's new digital mammography vehicle visited more than 37 Northern communities including Kitimat, Mackenzie and Tumbler Ridge. The new vehicles increase the accessibility of screening mammography for eligible women. They are equipped with a wheelchair lift, a spacious waiting area and an examination room to provide women with a comfortable and consistent screening experience. A wide selection of daytime and weekend appointments were offered to make scheduling convenient.

The visits were supported by a promotional campaign that included advertising on radio, Facebook and YouTube. The tour booked a total of more than 1,500 mammograms throughout the summer months of 2016.



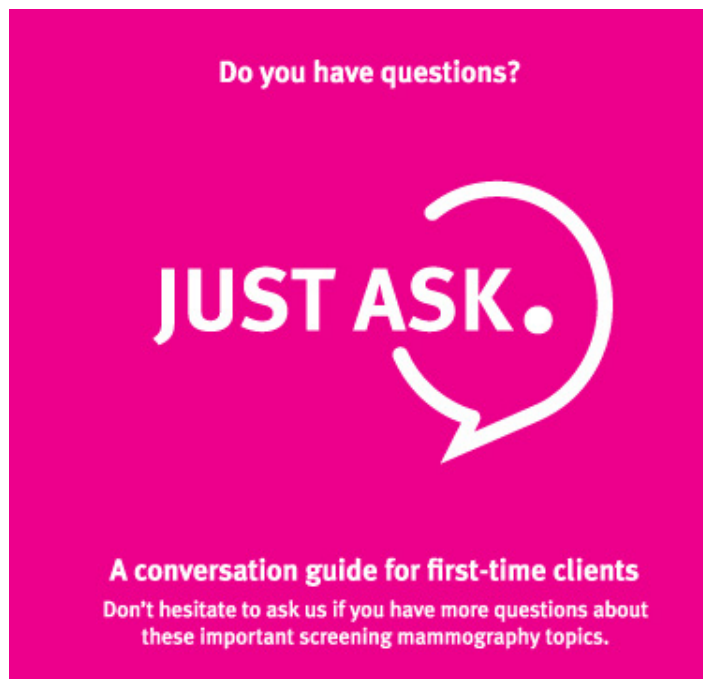
GP-to-Patient Letters

SMP engaged family physicians to help improve screening participation rates by initiating patient reminder letter projects across the province. The program prepared personalized reminder letters for overdue patients and distributed them to family physicians to sign. The project was well received and produced notable results. More than 50 per cent of family physicians that received letters participated, and the project was able to prove that women receiving a signed letter from their family physician were 50 per cent more likely to book a mammogram (compared with those that did not receive a letter).

Improved Patient Experience Project

In January 2016, the Screening Program conducted opinion research to assess and better understand the experience women have during their mammograms. Findings clearly showed that the patient's experience with the technologist appears to have the greatest impact on the overall appointment. The impact of the patient's satisfaction does affect the intention to return at the appropriate interval. To assist in the development of a technologist engagement strategy to address the findings and improve the experience for patients, a Mammography Experience working group of both technologists and eligible patients was assembled.

The Working Group identified that the first-time screenees were particularly affected as their initial experience with a screening mammogram visit could influence a lifetime of screening decisions. A project plan was devised to encompass the patient's journey from checking in for her appointment to completing the exam. Deployment of a pilot project in three screening centres using materials approved by the group will be in place from October 2017 to March 2018.



6.o Professional Development and Academic Activities

Screening program representatives and scientists authored five papers and posters for international conferences, and delivered nine lectures, interviews and presentations.

The SMP plans and participates in professional and academic activities throughout the year including a scientific forum hosted by the program.

Screening Mammography Program Scientific Forum

The SMP scientific forum was held on April 1–2, 2016 in Richmond, BC. The program included presentations on the correlation of high risk lesions between radiology and pathology, hereditary cancer screening, program update with policy transition and performance review, pan-Canadian study, breast reconstruction, controversies in mammography screening and challenging case reviews. The popular technologist breakout sessions focused on positioning and ergonomics while the Friday evening event covered breast pathology and a breast density study as well as technologist awards.

Out-of town faculty included:

- Dr. Edward Sickles, MD. Professor Emeritus, Department of Radiology, University of California at San Francisco School of Medicine; Former Chief, Breast Imaging Section, University of California at San Francisco Medical Centre, San Francisco, CA, USA
- Louise Miller, RTRM, Co-Director, Mammography Training Program, UCSD School of Medicine; Adjunct Radiology Instructor, S.D. Mesa College, San Diego, CA, USA

Local Presenters included:

- Dr. Andy Coldman, Emeritus Scientist, BC Cancer Research Centre
- Dr. Christine Wilson, MD, FRCPC, Clinical Associate Professor, BC Cancer, Vancouver Centre; Diagnostic Imaging UBC; Practice Leader Breast Imaging LMC, Vancouver BC
- Dr. Malcolm Hayes, Department of Pathology, BC Cancer, Clinical Professor, Department of Pathology and Laboratory Medicine, UBC Vancouver, BC
- Dr. Gillian Mitchell, Medical Director of BC Cancer Hereditary Cancer Program
- Janette Sam, Operations Director, BC Cancer Screening Mammography Program
- Dr. Esta Bovill, Clinical Instructor, Division of Plastic Surgery, UBC Faculty of Medicine, Vancouver, BC
- Dr. Rasika Rajapakshe, Chair, Research Committee & Senior Medical Physicist, BC Cancer, Vancouver, BC

- Ritinder Harry, Promotions Leader, Screening Programs, BC Cancer
- Tammy Clark, RTR, BAppSc, RDMS (BR) CBI, Supervisor Breast Imaging at Victoria General Hospital
- Meagan McGuinness, Technical Quality Management Coordinator, BC Cancer Screening Mammography Program
- Nancy Aldoff, Professional Practice Leader, BC Cancer Screening Mammography Program

SMP Educational Webinars and presentations have resulted in good participation from radiologists and technologists across the province. In 2016, SMP hosted the following educational webinars and presentations:

- “Digital Mobile Mammography” – Speaker: Nancy Aldoff RT(R)
- “Satisfaction Surveys – How Do You Rate?” – Speakers: Ritinder Harry, Carla Brown-John, Nancy Aldoff RT(R)
- Expert Case Reviews – Screener One on One sessions with Dr. Edward Sickles, MD. Professor Emeritus, Department of Radiology, University of California at San Francisco School of Medicine; Former Chief, Breast Imaging Section, University of California at San Francisco Medical Centre, San Francisco, CA, USA
- “Mobile Mammography – Lesson from the Road” – Speaker: Nancy Aldoff RT(R)
- “SMP Positioning and Image Critique” – Speaker: Meagan McGuinness RT(R)

7.0 Partnerships and Collaborations

Canadian Breast Cancer Foundation

The BC Cancer was proud to partner with Canadian Breast Cancer Foundation on multiple projects in 2016/17 including the **GOHAVE1** campaign.

Canadian Cancer Society

The BC Cancer is grateful to the Canadian Cancer Society for its ongoing support.

Canadian Partnership Against Cancer/Canadian Breast Cancer Screening Network

SMP participates as a member of the Canadian Partnership Against Cancer, Canadian Breast Cancer Screening Network. This national committee's purpose is to review, discuss and take action on inter-provincial matters of mutual interest or concern that are related to breast cancer screening.

National activities include representation by BCCA staff on the following committees and working groups:

Canadian Breast Cancer Screening Network

- Dr. Colin Mar, Medical Director, Screening Mammography Program
- Ms. Janette Sam, Operations Director, Screening Mammography Program

Monitoring and Evaluation Working Group

- Ms. Janette Sam, Operations Director, Screening Mammography Program

Canadian Partnership Against Cancer

- Organized Breast Cancer Screening Programs Report on Program Performance Working Group
 - Ms. Janette Sam, Operations Director, Screening Mammography Program

Mobile Health Clinics Association of the Pacific Northwest

- The Mobile Health Clinics Association fosters advocacy on behalf of Mobile healthcare and facilitates communications among healthcare providers across North America.
 - Ms. Nancy Aldoff, Professional Practice Leader, Screening Mammography Program

Shoppers Drug Mart

- The BC Cancer is grateful to Shoppers Drug Mart for their generous support of the digital mammography mobile coaches as they travel around the province.

8.0 2016 Program Results

The program results section provides 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.³

The program results include outcomes where applicable for women who have indicated they have a family history (higher than average risk women). In section 8.8, the SMP performance measures are presented against the national targets set for Canadian breast cancer screening programs.

8.1 Recruitment and Re-screening

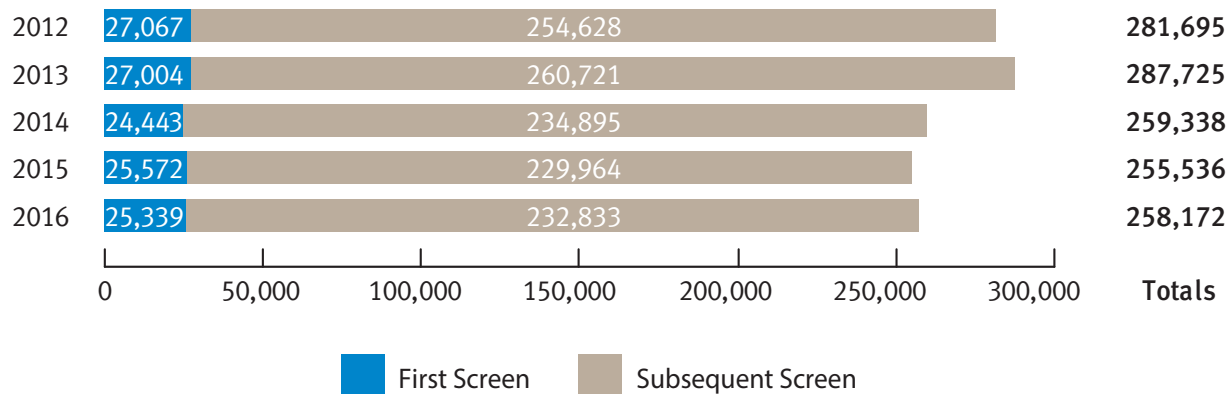
Screening Volume

The SMP provided 258,172 examinations in 2016. During this period 25,339 (9.8%) of those examinations were provided to first-time attendees.

Figure 1 shows that the total number of exams provided by SMP in 2016 increased by ~1.0% compared to 2015. The increase in first time screens was due in part to a successful television advertising campaign held during the fall of 2016.

The 2014 updated screening policy transition completed in 2016. The revised policy recommended that average risk women 40–49 years old return to screen every two years rather than annually and that women with higher risk, due to family history, screen annually. The decrease in the number of subsequent screens since 2014 is a result of the change in screening frequency for women 40–49 years old.

Figure 1: SMP Annual Screening Volume Years: 2012 – 2016

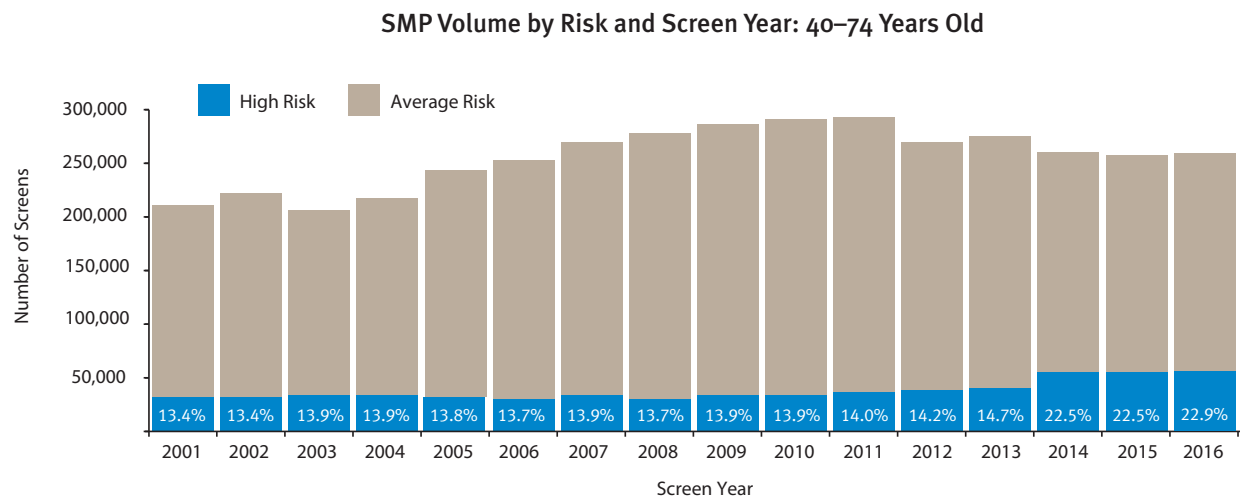


NOTE: SMP data extraction date: August 22, 2017

³ http://www.cancerview.ca/idc/groups/public/documents/webcontent/guideline_monitoring_breast.pdf

Figure 2 shows that the percentage of women who are at higher risk remains steady at 22.9% of the total number of women screened in 2016.

FIGURE 2: SMP ANNUAL SCREENING VOLUME BY RISK AND SCREEN YEARS: 2001-2016



NOTE: SMP data extraction date: August 22, 2017

SMP Volume by Health Service Delivery Area (HSDA) 2016

The age distribution of all exams and first exams performed in 2016 by Health Services Delivery Areas (HSDA) are displayed in Table 1.

- The majority of exams (67%) are performed for women between the ages of 50 and 69 in all HSDAs. This is the same as 2015.
- Majority of first-time attendees were under 50 years of age; however, there are regional variations ranging from 38% in East Kootenay to an average of ~ 65% of first-time attendees being under 50 years of age across most of the Lower Mainland.

Table 1: SMP Volume by Health Service Delivery Area (HSDA): 2016

HSDA	Total Exams	Age Distribution of All Exams			First Exams		Age Distribution of First Exams		
		<50	50-69	70+	n	% Total	<50	50-69	70+
East Kootenay	4,029	12%	71%	16%	404	10%	40%	57%	3%
Kootenay Boundary	3,990	12%	72%	16%	362	9%	38%	58%	3%
Okanagan	22,768	13%	70%	17%	2,185	10%	44%	52%	4%
Thompson Cariboo Shuswap	12,429	15%	68%	16%	987	8%	57%	40%	3%
Interior	43,216	14%	70%	17%	3,938	9%	46%	50%	3%
Fraser East	14,681	19%	67%	14%	1,493	10%	57%	41%	2%
Fraser North	36,448	24%	65%	11%	3,869	11%	67%	31%	2%
Fraser South	41,620	23%	65%	12%	4,577	11%	64%	34%	2%
Fraser	92,749	23%	66%	12%	9,939	11%	64%	34%	2%
Richmond	12,236	21%	68%	11%	1,156	9%	63%	34%	3%
Vancouver	32,779	23%	66%	11%	3,346	10%	67%	31%	2%
North Shore / Coast Garibaldi	17,064	19%	66%	14%	1,698	10%	61%	36%	3%
Vancouver Coastal	62,079	22%	66%	12%	6,200	10%	65%	33%	3%
South Vancouver Island	21,782	15%	69%	16%	1,827	8%	47%	48%	5%
Central Vancouver Island	17,426	11%	70%	19%	1,406	8%	40%	55%	4%
North Vancouver Island	7,547	11%	73%	16%	616	8%	42%	53%	5%
Vancouver Island	46,755	13%	70%	17%	3,849	8%	44%	51%	5%
Northwest	3,128	20%	67%	13%	336	11%	65%	34%	1%
Northern Interior	6,874	18%	69%	13%	593	9%	60%	37%	3%
Northeast	2,064	19%	70%	10%	259	13%	54%	45%	1%
Northern	12,066	19%	69%	12%	1,188	10%	60%	38%	2%
Program	258,172	19%	67%	14%	25,339	10%	58%	39%	3%

NOTE: SMP data extraction date: August 22, 2017

The age and volume distribution of all screens performed for women who self-identified as having a family history (higher risk) are displayed in Table 2.

- A higher percentage (26%) of the screens performed in the Interior, Vancouver Island and the North are for higher risk women.
- The majority of higher risk exams (82%) are performed for women between ages 50 and 74 in all HSDAs.

TABLE 2: SMP AGE AND VOLUME DISTRIBUTION FOR HIGHER RISK WOMEN BY HEALTH SERVICE DELIVERY AREA (HSDA): 2016

HSDA	Number of Higher Risk Exams	% Higher Risk Exams	Age Distribution of Higher Risk Exams		
			40-49	50-74	75+
East Kootenay	849	21%	10%	84%	4%
Kootenay Boundary	988	25%	11%	85%	5%
Okanagan	6,149	27%	10%	85%	5%
Thompson Cariboo	3,202	26%	12%	83%	4%
Interior	11,188	26%	11%	84%	5%
Fraser East	3,570	24%	14%	82%	4%
Fraser North	7,329	20%	18%	78%	4%
Fraser South	8,750	21%	17%	79%	4%
Fraser	19,649	21%	17%	79%	4%
Richmond	2,382	19%	15%	81%	3%
Vancouver	6,579	20%	19%	79%	2%
North Shore / Coast Garibaldi	4,039	24%	15%	82%	3%
Vancouver Coastal	13,000	21%	17%	80%	3%
South Vancouver Island	5,810	27%	13%	84%	3%
Central Vancouver Island	4,546	26%	9%	86%	4%
North Vancouver Island	2,029	27%	10%	87%	3%
Vancouver Island	12,385	26%	11%	85%	3%
Northwest	809	26%	18%	80%	3%
Northern Interior	1,756	26%	14%	82%	3%
Northeast	517	25%	16%	81%	2%
Northern	3,082	26%	15%	82%	3%
Program	59,577	23%	14%	82%	4%

NOTES:

HR is Higher Risk Women are women who self-identified at the time of screening as having a mother, sister, or daughter with breast cancer
SMP data extraction date: August 22, 2017

Screening Participation

Participation rate is the percentage of British Columbian screen-eligible women who completed at least one SMP screening mammogram in a 30-month period.

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

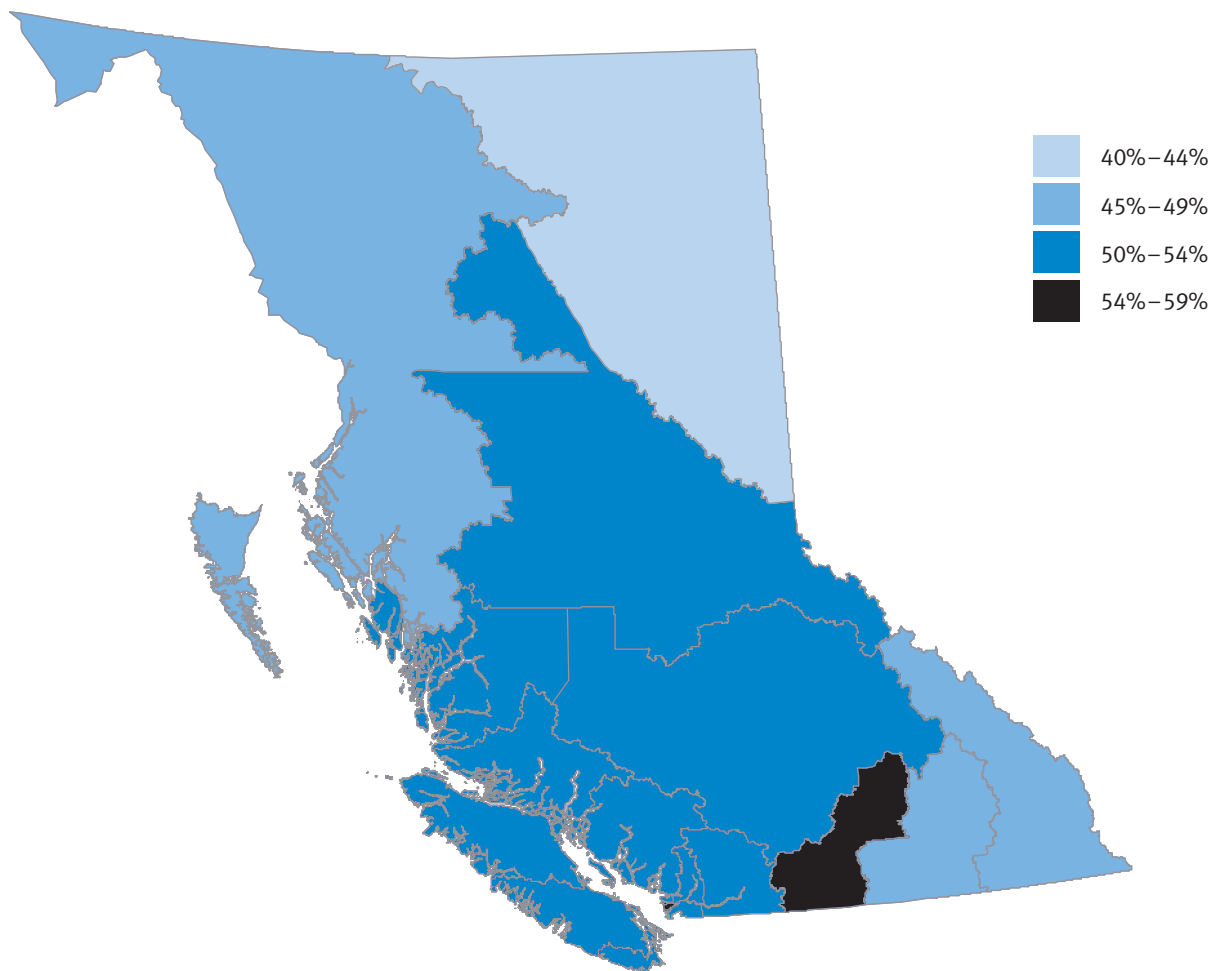
- In the 30-month period between July 1, 2014 and December 31, 2016, 512,731 women ages 40 and over participated in the SMP.
- The highest overall participation rates were seen in the 50–59, and 60–69 age groups, with a combined participation rate of 52.4%. Northeast had a slight increase in participation, increasing from 40 to 41%. Okanagan had the highest rate at 55%.
- Compared with 2015, the participation decreased by 3% in the 40–49 age group and 4% in the 70–79 age groups. Participation remained the same for 50–59 and 60–69 year olds.

TABLE 3: REGIONAL 30-MONTH PARTICIPATION RATES BY 10-YEAR AGE GROUPS ENDING DECEMBER 31, 2016 INCLUSIVE

HSDA	10-Year Age Groups					Ages 50-69
	40-49	50-59	60-69	70-79	80-89	
East Kootenay	24%	47%	52%	36%	3%	49%
Kootenay Boundary	21%	44%	47%	32%	4%	46%
Okanagan	30%	51%	58%	38%	4%	55%
Thompson Cariboo Shuswap	30%	46%	55%	36%	4%	50%
Interior	29%	49%	55%	37%	4%	52%
Fraser East	33%	49%	54%	35%	3%	51%
Fraser North	36%	52%	55%	33%	3%	53%
Fraser South	36%	52%	54%	34%	4%	53%
Fraser	35%	51%	54%	34%	3%	52%
Richmond	37%	53%	57%	33%	3%	54%
Vancouver	35%	49%	53%	31%	2%	51%
North Shore/Coast Garibaldi	35%	52%	57%	37%	3%	54%
Vancouver Coastal	35%	50%	55%	33%	3%	52%
South Vancouver Island	29%	52%	56%	38%	3%	54%
Central Vancouver Island	28%	50%	58%	39%	4%	54%
North Vancouver Island	25%	48%	56%	38%	2%	52%
Vancouver Island	28%	50%	57%	38%	4%	54%
Northwest	31%	45%	48%	32%	2%	46%
Northern Interior	32%	50%	53%	35%	3%	51%
Northeast	20%	39%	45%	26%	3%	41%
Northern	29%	46%	50%	32%	3%	48%
British Columbia	33%	50%	55%	35%	3%	52.4%

NOTES: 1. Based on the weighted average of 2014, 2015 and 2016 female population estimates 2. Population data source: P.E.O.P.L.E. 2016 population projection (Sept 2016), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia. 3. Postal code translation file: TMF201705 (May 2017). 4. Population and postal code data acquired through BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia 5. SMP data extraction date: August 22, 2017.

FIGURE 3: BIENNIAL SCREENING PARTICIPATION BY WOMEN AGES 50 TO 69 OVER 30-MONTH PERIOD BETWEEN JULY 1, 2014 AND DECEMBER 31, 2016



NOTES:

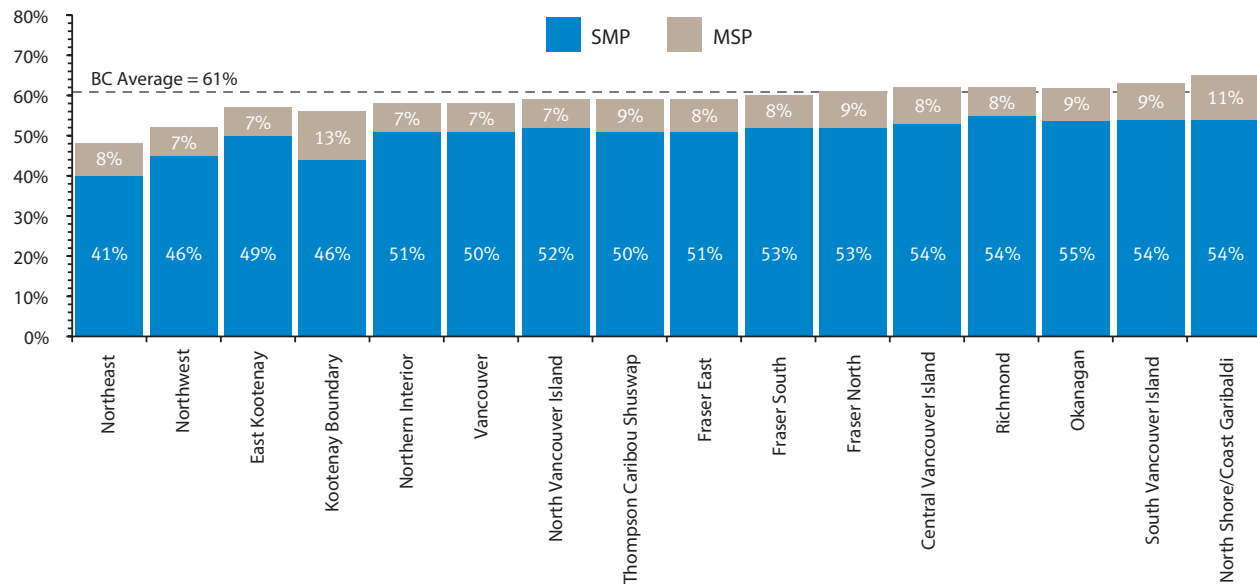
1. Based on the weighted average of 2014, 2015 and 2016 female population estimates
2. Population data source: P.E.O.P.L.E. 2016 population projection (Sept 2016), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
3. Postal code translation file: TMF201705 (May 2017).
4. Population and postal code data acquired through BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia
5. SMP data extraction date: August 22, 2017

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 the MSP.

Figure 4 shows the proportion of women receiving bilateral mammography services through the either SMP or MSP over a 30-month period. Some women may have had bilateral mammograms through both SMP and MSP. Thus, the proportions presented here may be slightly higher than the actual figures due to this possible duplication. In HSDA with long established SMP services, the proportion of women using the MSP funded bilateral mammography has stabilized to 8%–10%.

- During the 30-month reporting period, 61% of BC women ages 50 to 69 received bilateral mammography services through either the screening program or MSP. This rate has remained stable since 2014.
- The percentage of women ages 50 to 69 receiving bilateral mammography ranged from 48% to 65% across the province, with Northeast (49%) and Northwest (53%) having the lowest percentages.
- Overall, the SMP provided 86% of the bilateral mammography services for this age group.

Figure 4: Bilateral Mammography Utilization by Women Ages 50 to 69 in BC
Between July 1, 2014 and December 31, 2016 Inclusive



NOTES:

1. MSP data includes only MSP Fee-For-Service item 8611 on female patients only; all out of province claims are excluded.
2. MSP data contains payment date to June 30, 2016 for services provided between July 1, 2014 and December 31, 2016.
3. SMP data includes single and multiple screens per woman provided between July 1, 2014 and December 31, 2016.
4. 2014 to 2016 Projected Population Data Source: P.E.O.P.L.E. 2016 (Sept 2016), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
5. SMP data extraction date: August 22, 2017.

Participation rates of women ages 50 to 69 by selected ethnic groups are shown in Table 4. The percentage of each ethnic group in the population was computed based on National Household Survey Custom Profile, 2011 (original data source) data. The ethnic population size for each HSDA was estimated based on this ethnic population percentage and the P.E.O.P.L.E. 2016 population projections. The use of single ethnic response data may represent an under-estimation of the ethnic population size, especially the East/South East Asian population in the Fraser North, Richmond, and Vancouver HSDAs. The SMP data on ethnic origin was collected at the time of SMP registration on approximately 86% of attendee's ages 50 to 69 screened between July 1, 2014 and December 31, 2016. 13% of attendees did not specify their ethnicity and were excluded from this analysis.

- Participation in SMP by select ethnic groups has increased slightly compared with 2014 and 2015.
- Participation by Aboriginal women has remained the same.
- Participation by South Asians has increased by 1% overall (from 56% in 2015 to 57% in 2016).
- Participation by select ethnic groups has increased over the last six consecutive years, and is higher than the overall provincial rate of 52.4%.

Table 4 indicates that there are regional variations in participation. This information helps inform future promotional activities.

TABLE 4: REGIONAL PARTICIPATION RATES OF WOMEN AGES 50 TO 69 BY SELECTED ETHNIC GROUPS BETWEEN JULY 1, 2014 AND DECEMBER 31, 2016 INCLUSIVE

HSDA	Aboriginal Population %	Participation Rate	East/South-East Asians Population %	Participation Rate	South Asians Population %	Participation Rate
East Kootenay	1%	>99%	1%	>99%	1%	37%
Kootenay Boundary	<1%	>99%	1%	57%	<1%	>99%
Okanagan	1%	83%	1%	50%	1%	70%
Thompson Cariboo Shuswap	4%	54%	1%	78%	1%	42%
Interior	2%	68%	1%	62%	1%	62%
Fraser East	2%	52%	2%	84%	9%	51%
Fraser North	<1%	62%	25%	62%	4%	59%
Fraser South	<1%	79%	10%	70%	15%	50%
Fraser	1%	63%	14%	65%	10%	52%
Richmond	<1%	>99%	51%	58%	6%	56%
Vancouver	1%	48%	41%	50%	4%	63%
North Shore/Coast Garibaldi	2%	53%	7%	65%	2%	94%
Vancouver Coastal	1%	52%	33%	54%	4%	65%
South Vancouver Island	1%	60%	4%	54%	1%	79%
Central Vancouver Island	2%	37%	2%	60%	1%	44%
North Vancouver Island	2%	42%	1%	71%	<1%	>99%
Vancouver Island	1%	44%	3%	56%	1%	69%
Northwest	15%	56%	3%	26%	1%	91%
Northern Interior	4%	76%	2%	39%	1%	61%
Northeast	4%	75%	1%	12%	<1%	56%
Northern	7%	64%	2%	30%	1%	66%
British Columbia	1%	58%	13%	59%	4%	57%

PARTICIPATION RATE:

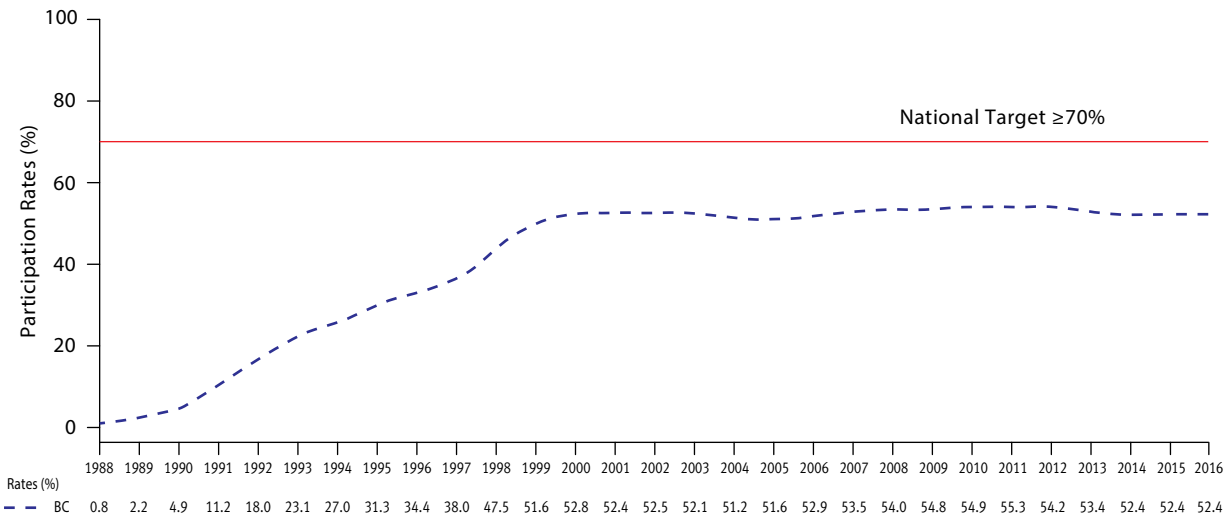
1. Population data sources: P.E.O.P.L.E. 2016 population projection (Sept 2016), BC STATS, Ministry of Technology, Innovation and Citizens' Services, Government of British Columbia, and Statistics Canada, National Household Survey Custom Profile, 2011 (original data source).
2. Postal code translation file: TMF201705 (May 2017).
3. Women attended the SMP at least once between July 1, 2014 and December 31, 2016 inclusive
4. East/South-East Asians include Chinese, Japanese, Korean, Filipino, Burmese, Cambodian, Laotian, Thai, Vietnamese, Indonesian, Malay, and other Asians.
5. South Asians include Bangladeshi, Bengali, East Indian, Gujarati, Pakistani, Punjabi, Sinhalese, Sri Lankan, Tamil.
6. SMP data extraction date: August 22, 2017.

POPULATION PERCENTAGE:

1. Original data source - Statistics Canada, National Household Survey Custom Profile, 2011
2. East/South-East Asians include Chinese, Filipino, Burmese, Cambodian, Hmong, Khmer, Laotian, Thai, Vietnamese, Indonesian, Japanese, Korean, Malaysian, Singaporean, Mongolian, Taiwanese, Tibetan, Asian n.o.s. and East/Southeast Asian n.i.e
3. South Asians include Bangladeshi, Bengali, East Indian, Goan, Gujarati, Kashmiri, Nepali, Pakistani, Punjabi, Sinhalese, Sri Lankan, Tamil, and South Asian n.i.e.

By 2000, there were 36 fixed and mobile mammography centres enabling all BC women to have reasonable access to screening services. There are now 39 fixed and mobile centres serving BC. The percentage of women participating each year in the target population increased until 2000 and has remained steady since then, ranging between 51–55%. This participation rate does not include women screened outside of the program.

FIGURE 5: SMP PARTICIPATION RATES (%) FOR WOMEN 50 TO 69 BY CALENDAR YEAR: 1988 – 2016



NOTE: SMP data extraction date August 22, 2017

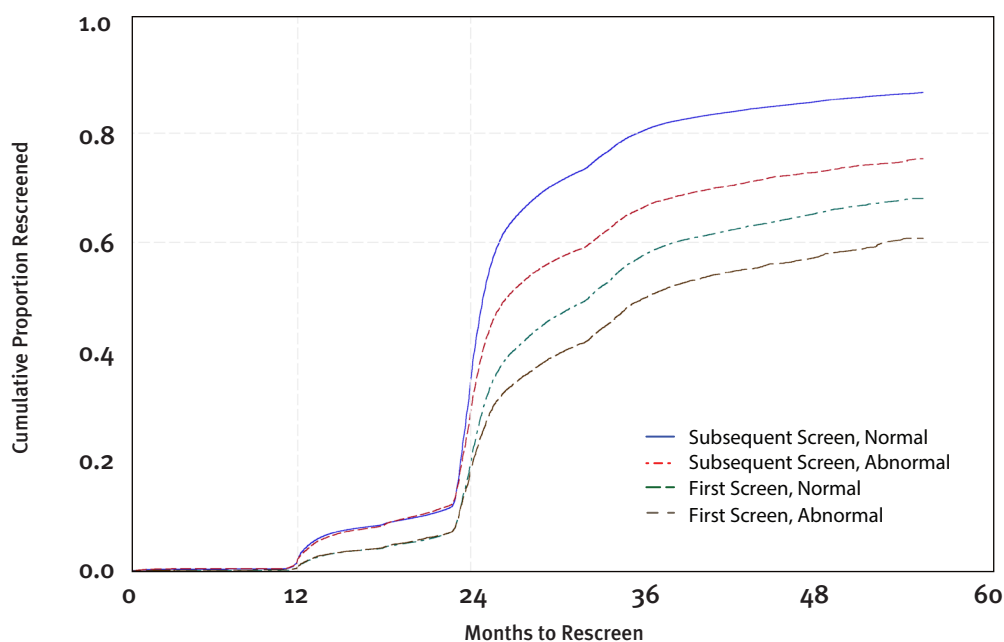
Screening Return Rates

Retention rate is the percentage of screen eligible women age that had a subsequent SMP screening 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 SMP sends recall reminders to women when they are due for their next screening interval. A second letter is sent if there is no appointment scheduled within four to six weeks of the first letter. This two-letter reminder system is repeated again the following year if there is no response.

Figure 6 and Table 5 show return rates for average risk women ages 40 to 74 who attended SMP between 2013 and 2015. By 24 months, when SMP recall mailing is active, women with normal results are more likely to respond to the recall letters than women who previously had an abnormal result. First time attendees have a lower rate of return than those who have had two or more visits already. By 30 months 68% of women with a previous normal result and 52% of women with a previous abnormal result had returned to screening. SMP has developed support material for the technologists to share with women at their first appointment to encourage them to return when they are recalled for future screening.

FIGURE 6: RETURN RATES FOR AVERAGE RISK WOMEN AGE 40 TO 74
BY FIRST/SUBSEQUENT SCREENS AND SCREEN RESULT: 2013 – 2015



NOTE: SMP data extraction date: August 22, 2017

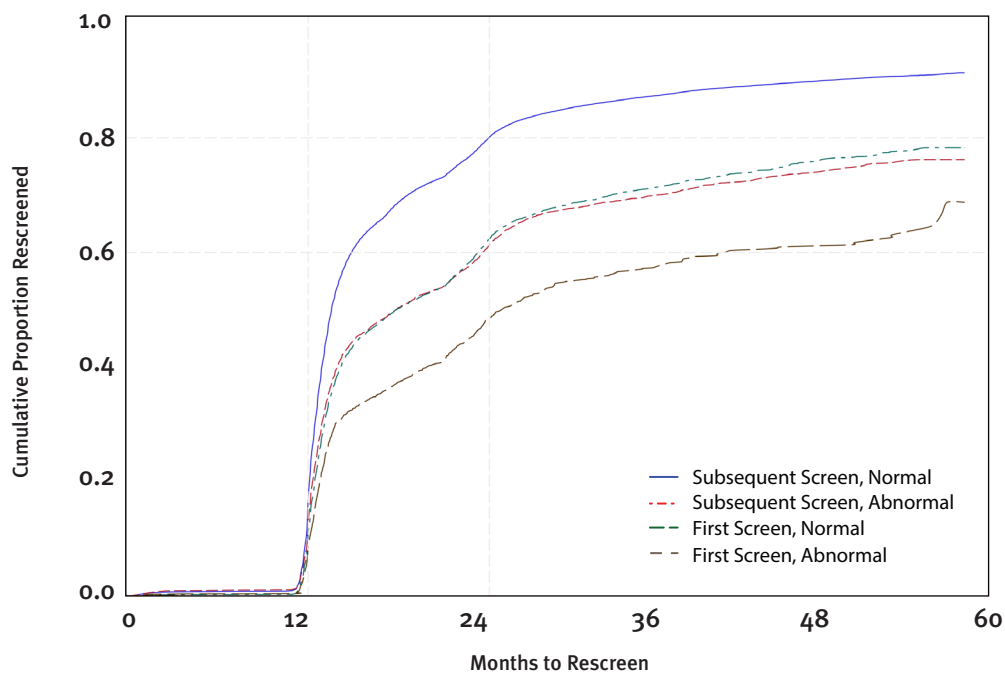
TABLE 5: RETURN RATES FOR AVERAGE RISK WOMEN AGE 40 TO 74: 2013 – 2015

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	55,386	12,036	360,317	27,963	415,703	39,999
Returned by 12 months	1%	1%	2%	2%	2%	2%
18 months	4%	4%	9%	8%	8%	7%
24 months	19%	18%	34%	29%	32%	26%
30 months	47%	40%	71%	57%	68%	52%
36 months	58%	50%	80%	66%	78%	62%

NOTE: SMP data extraction date: August 22, 2017.

Figure 7 shows a graph of return rates for women ages 40 to 74 who self-identified as having a family history of breast cancer (higher risk) and attended SMP between 2013 and 2015. Women in this cohort are recommended to screen annually rather than every two years. As a result of this 2014 policy change in screening frequency, there was a shift in higher risk women returning earlier to screen. By 18 months 67% of women with a previous normal result and 47% of women with a previous abnormal result had returned to screening.

FIGURE 7: RETURN RATES FOR HIGHER RISK WOMEN AGE 40 TO 74 BY FIRST/SUBSEQUENT SCREENS AND SCREEN RESULT: 2013 – 2015



NOTE: SMP data extraction date: August 22, 2017

TABLE 6: RETURN RATES FOR HIGHER RISK WOMEN AGE 40 TO 74: 2013 – 2015

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Total Number to be Re-screened	6,811	1,612	63,202	5,211	70,013	6,823
Returned by 12 months	11%	8%	17%	13%	16%	12%
18 months	50%	37%	69%	50%	67%	47%
24 months	62%	49%	80%	61%	78%	58%
30 months	69%	55%	86%	68%	84%	65%
36 months	72%	58%	88%	70%	86%	68%

NOTE: SMP data extraction date: August 22, 2017.

8.2 2016 Screening Results

Table 7 summarizes the outcome indicators for screening exams provided in 2016 by 10-year age groups:

- Of the 258,172 screening mammograms performed, 23,132 (9.0%) had an abnormal result.
- There were 1,453 breast cancers reported in 2016 as of August 22, 2017 (5.6 per 1,000 exams).
- The 2016 overall cancer detection rate increased compared with 2015, from 5.5 to 5.6 cancers detected per 1000 women screened.
- The cancer detection rate has increased over time, from an average of 4.2 per 1000 exams in 2010, to 5.6 per 1000 in 2016.
- The overall cancer detection rate is highest on both first and subsequent screens for women who reported a family history (mother, sister, daughter).
- The proportion of cancers detected per 1000 women screened increases as women age.

Abnormal Call Rate

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

- The overall screen abnormal call rate (40–79 first and subsequent screens) decreased in 2016 compared to 2015 (from 9.1% to 9.0%).
- The abnormal call rate is lower on subsequent screens than on first screens.
- The overall abnormal call rate decreases as women age, from 12.6% for ages 40 to 49 to 7.4% for ages 70 to 74.

Cancer Detection Rate

Cancer Detection Rate is the number of women with a screen detected cancer per 1,000 women 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 in 2016 compared to 2015 (from 5.5 per 1000 screens to 5.6 per 1000).
- The cancer detection rate for higher risk women was greater than that for average risk women for both first and subsequent screens.
- The overall DCIS detection rate decreased in 2016 compared to 2015 (from 1.2 to 1.1 per 1000).

Positive Predictive Value

Positive Predictive Value (PPV) is the percentage of women 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 compared with 2015 from 6.1% to 6.3% overall.

TABLE 7: SMP OUTCOME INDICATORS BY 10-YEAR AGE GROUP: 2016

Outcome Indicators		Age at Exam					All
		40-49	50-59	60-69	70-74	75+	
Number of Exams		48,831	87,492	86,626	27,040	7,970	258,172
% on first screens		29.7%	7.4%	3.9%	1.9%	2.7%	9.8%
% on higher risk screens		17.7%	21.6%	25.6%	28.3%	27.0%	23.1%
Number of Cancers		152	370	577	248	105	1,453
% on first screens		35.5%	14.6%	8.0%	4.8%	10.5%	12.3%
% on higher risk screens		21.7%	20.0%	25.5%	20.6%	35.2%	23.6%
Abnormal Call Rate		12.6%	8.7%	7.7%	7.4%	8.6%	9.0%
on first screens	Overall	18.9%	20.4%	19.5%	23.0%	24.8%	19.5%
	Higher Risk	18.6%	22.0%	18.8%	25.3%	19.4%	19.6%
	Average Risk	19.0%	20.2%	19.6%	22.6%	25.7%	19.5%
on subsequent screens	Overall	9.9%	7.7%	7.2%	7.1%	8.1%	7.8%
	Higher Risk	9.4%	6.9%	6.8%	6.4%	8.4%	7.2%
	Average Risk	10.1%	8.0%	7.4%	7.3%	8.0%	8.0%
Overall Cancer Detection Rate (per 1,000)		3.1	4.2	6.7	9.2	13.2	5.6
on first screens	Overall	3.7	8.3	13.7	22.9	51.2	7.0
	Higher Risk	4.3	10.5	19.5	11.5	64.5	9.2
	Average Risk	3.6	8.0	12.8	25.2	48.9	6.7
on subsequent screens	Overall	2.9	3.9	6.4	8.9	12.1	5.5
	Higher Risk	3.7	3.6	6.4	6.6	16.5	5.6
	Average Risk	2.6	4.0	6.4	9.8	10.5	5.4
DCIS Detection Rate (per 1,000)		0.8	0.9	1.2	1.4	1.8	1.1
on first screens	Overall	1.0	0.9	3.6	---	4.7	1.3
	Higher Risk	0.6	1.3	4.3	---	---	1.3
	Average Risk	1.1	0.9	3.5	---	5.4	1.3
on subsequent screens	Overall	0.7	0.9	1.1	1.5	1.7	1.1
	Higher Risk	0.9	0.9	1.0	1.2	1.4	1.0
	Average Risk	0.7	1.0	1.2	1.6	1.8	1.1
Positive Predictive Value of Screening Mammography		2.5%	4.9%	8.7%	12.5%	15.4%	6.3%
on first screens	Overall	2.0%	4.1%	7.1%	10.0%	21.6%	3.7%
	Higher Risk	2.3%	4.8%	10.5%	4.5%	33.3%	4.7%
	Average Risk	1.9%	4.0%	6.6%	11.2%	20.0%	3.5%
on subsequent screens	Overall	2.9%	5.1%	8.9%	12.7%	14.9%	7.0%
	Higher Risk	4.0%	5.3%	9.4%	10.3%	19.7%	7.8%
	Average Risk	2.6%	5.0%	8.7%	13.5%	13.1%	6.8%

TABLE 7: SMP OUTCOME INDICATORS BY 10-YEAR AGE GROUP: 2016 (CONT'D)

Outcome Indicators	Age at Exam					All
	40-49	50-59	60-69	70-74	75+	
Core Biopsy Yield Ratio	14.8%	28.2%	45.8%	53.1%	60.1%	34.8%
on first screens	10.1%	19.8%	31.3%	38.7%	58.8%	18.2%
on subsequent screens	19.5%	30.5%	47.7%	54.3%	60.3%	39.7%
Open Biopsy Yield Ratio	18.2%	18.4%	29.6%	50.0%	41.2%	24.6%
% on first screens	15.3%	13.2%	26.3%	---	100.0%	16.7%
% on higher risk screens	20.4%	19.5%	30.0%	52.0%	37.5%	26.7%

NOTES:

1. See glossary in the Appendix for definitions of terms.
2. Overall Cancer Rate includes ductal carcinoma in situ (DCIS).
3. An additional 153 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. 213 exams were performed for women <40 years old. No cancers were detected for this age group.
6. The "All" column includes women less than 40 years of age.
7. SMP data extraction date: August 22, 2017.

Diagnostic procedure information is available to date on 22,979 (99%) of the screening mammograms with abnormal findings. Table 8 shows the proportion of women receiving specific diagnostic procedures as part of the work-up on their screen-detected abnormalities.

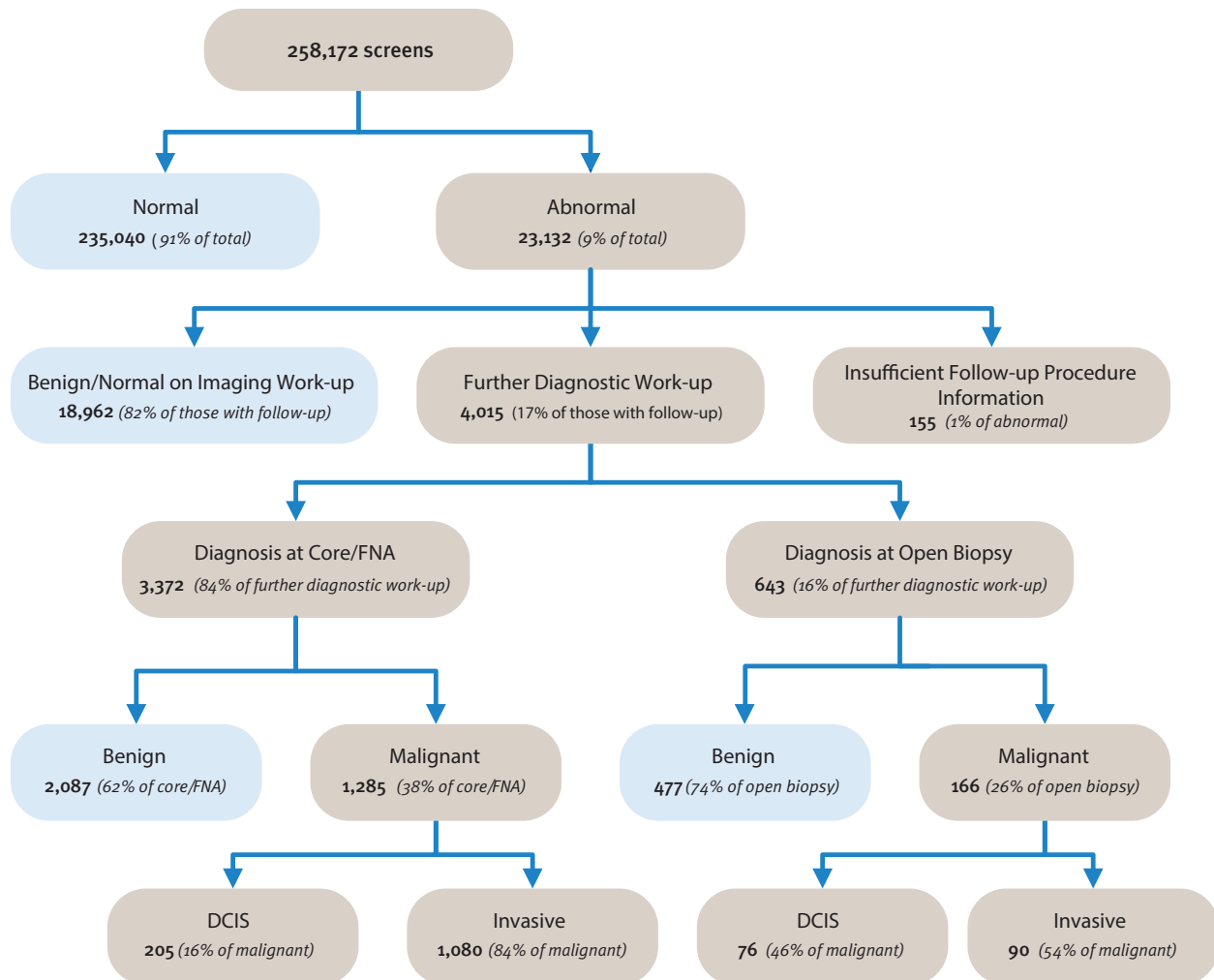
Overall, 16% and 3% of women with abnormal screening mammograms had core biopsy and open biopsy, respectively. The number of fine needle aspirates remained the same compared to the previous year.

TABLE 8: DIAGNOSTIC PROCEDURES RECEIVED BY SMP PARTICIPANTS WITH "ABNORMAL" SCREENING MAMMOGRAMS: 2016

Procedure	Age at Exam						All
	<40	40-49	50-59	60-69	70-79	80+	
Diagnostic Mammogram	100%	92%	94%	95%	94%	93%	94%
Ultrasound	67%	70%	66%	66%	66%	64%	67%
Fine Needle Aspiration	0%	1%	1%	1%	1%	2%	1%
Core Biopsy	10%	13%	15%	17%	21%	27%	16%
Surgical Biopsy	0%	3%	3%	2%	2%	4%	3%
with Localization	0%	2%	3%	2%	2%	4%	2%
Number of cases with diagnostic assessment information available	30	6,118	7,533	6,638	2,500	160	22,979

NOTE: SMP data extraction date: August 22, 2017.

FIGURE 8: SCREENING OUTCOME SUMMARY (2016)



8.3 2016 Cancer Detection

Histologic features of breast cancers detected by the SMP in 2016 are summarized by 10-year age groups in Table 9. 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, 19% of cancers detected were in situ.
- Of the invasive cancers detected, 58% were ≤ 15 mm, 75% did not have invasion of the regional lymph nodes, and 23% were grade 3 (i.e. poorly differentiated) tumours.
- Of the grade 3 tumours, 36% were smaller than 15 mm compared with 47% in 2015.

These overall outcome indicators met the international targets⁴ recommended for screening programs.

TABLE 9: HISTOLOGIC FEATURES OF BREAST CANCERS DETECTED BY SMP: 2016

Histological Features	Age at Exam								Age 40-79	
	40-49		50-59		60-69		70-79			
Number of Cancers	152		370		576		323		1,421	
in situ	39	26%	82	22%	107	19%	49	15%	277	19%
invasive	113	74%	288	78%	469	81%	274	85%	1,144	81%
Invasive Cancers Tumour Size										
≤5 mm	13	12%	29	10%	42	9%	15	6%	99	9%
6-10 mm	18	16%	52	18%	116	25%	72	27%	258	23%
11-15 mm	24	22%	79	28%	122	26%	67	25%	292	26%
16-20 mm	17	15%	49	17%	82	18%	47	17%	195	17%
>20 mm	39	35%	73	26%	103	22%	68	25%	283	25%
unknown size	(2)		(6)		(4)		(5)		(17)	
Invasive Cancers with tumour ≤ 15 mm										
	55	50%	160	57%	280	60%	154	57%	649	58%
Node Involvement in Invasive Cancers										
no	68	67%	180	67%	352	78%	206	81%	806	75%
yes	34	33%	87	33%	99	22%	49	19%	269	25%
no nodes sampled / unknown	(11)		(21)		(18)		(19)		(69)	
Histologic Grade of Invasive Cancers										
1 - well differentiated	32	30%	80	29%	149	32%	95	36%	356	32%
2 - moderately differentiated	48	44%	125	46%	210	46%	117	44%	500	45%
3 - poorly differentiated	28	26%	69	25%	100	22%	55	21%	252	23%
unknown grade	(5)		(14)		(10)		(7)		(36)	
Grade 3 tumour ≤ 15 mm	7	25%	28	41%	38	38%	17	31%	90	36%

NOTES:

- Targets¹: $>50\%$ invasive tumours ≤ 15 mm, $>70\%$ with negative nodes, $>30\%$ grade 3 tumours ≤ 15 mm.
- SMP data extraction date: August 22, 2017.

⁴ Tabår L, Fagerberg G, Duffy SW, Day NE, Gad A, Grøntoft O. Update of the Swedish two-country program of mammographic screening for breast cancer. Radiol Clin North Am. 1992 Jan;30(1):187-210

8.4 Outcome Indicators by Calendar Year: 2012–2016

Table 10 shows the outcome indicators for screening exams provided over five years.

- Abnormal call rates and cancer detection rates have increased in the five-year period.
- Core biopsy yield ratios have settled around 35% in the last five years.
- Open biopsy yield ratios, on the other hand, have been declining steadily. In 2016, 24.6% of the open biopsies performed found breast cancer.

Regular record linkage with the British Columbia Cancer Registry enables the SMP to determine the number of non-screen detected (interval) cancers in the SMP participants. Sensitivity (i.e. probability of finding women with breast cancer) and specificity (i.e. probability of a negative mammography in women without breast cancer) by calendar year are shown in Table 10. The SMP conducts formal reviews, both blinded and retrospective, of ~ 50% of interval cancers in SMP participants.

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 SMP, prevalent screens have been restricted to those women with no previous outside mammogram within 24 months of their first SMP encounter.

TABLE 10: SMP OUTCOME INDICATORS BY CALENDAR YEAR BETWEEN 2012 AND 2016 INCLUSIVE

Outcome Indicators	Calendar Year					5-Year Cumulative
	2012	2013	2014	2015	2016	
Number of Exams	281,695	287,725	259,338	255,536	258,172	1,342,466
% on first screens	9.6%	9.4%	9.4%	10.0%	9.8%	9.6%
Number of Cancers	1,273	1,401	1,418	1,418	1,453	6,963
% on first screens	11.1%	12.1%	12.5%	12.1%	12.3%	12.0%
Abnormal Call Rate	7.5%	7.4%	8.4%	9.1%	9.0%	8.2%
on first screens	16.0%	16.6%	18.3%	19.1%	19.5%	17.9%
on subsequent screens	6.5%	6.5%	7.4%	7.9%	7.8%	7.2%
Overall Cancer Detection Rate (per 1,000)	4.5	4.9	5.5	5.6	5.6	5.2
on first screens	5.2	6.3	7.3	6.7	7.0	6.5
on subsequent screens	4.4	4.7	5.3	5.4	5.5	5.1
DCIS Detection Rate (per 1,000)	0.9	1.0	1.1	1.2	1.1	1.1
on first screens	1.0	1.4	1.6	1.5	1.3	1.4
on subsequent screens	0.9	1.0	1.1	1.2	1.1	1.0
Positive Predictive Value of Screening Mammography	6.1%	6.6%	6.5%	6.2%	6.3%	6.3%
on first screens	3.3%	3.8%	4.0%	3.6%	3.7%	3.7%
on subsequent screens	6.8%	7.4%	7.2%	6.9%	7.0%	7.0%
Core Biopsy Yield Ratio	33.6%	35.5%	35.1%	34.0%	34.8%	34.6%
on first screens	16.0%	18.3%	19.9%	18.2%	18.2%	18.1%
on subsequent screens	38.7%	40.6%	39.1%	38.5%	39.7%	39.3%
Open Biopsy Yield Ratio	24.0%	24.0%	25.3%	21.6%	24.6%	23.9%
on first screens	15.9%	14.9%	21.6%	14.8%	16.7%	16.6%
on subsequent screens	26.2%	27.0%	26.2%	23.3%	26.7%	25.8%
Interval Cancer Rate (per 1,000)						
0-12 months	0.69	0.67	0.59	0.53	---	---
after first screens	0.78	0.82	0.45	0.51	---	---
after subsequent screens	0.68	0.65	0.60	0.53	---	---
13-24 months	0.74	0.72	0.56	---	---	---
Sensitivity (i.e. 1 - false negative rate)	86.7%	87.9%	90.3%	---	---	---
Specificity (i.e. 1 - false positive rate)	93.0%	93.1%	92.1%	91.5%	---	---
Prevalence to Expected Incidence Ratio for Age 50-79 (target: >3.0)	4.60	5.20	5.80	5.60	5.20	5.40

NOTES:

1. See glossary in the Appendix for definitions of terms.
2. Overall Cancer Rate includes ductal carcinoma in situ (DCIS).
3. The final number of cancers in 2016 is still to be determined.
4. Number of cancers and related rates do not include data for women whose follow-up is incomplete.
5. SMP data extraction date: August 22, 2017.

8.5 Outcome Indicators by 10-Year Age Groups: 2012 – 2016 Cumulative

Table 11 shows the outcome indicators for screening exams provided in a five-year period by 10-year age groups.

- From 2012 to 2016, the SMP provided 1,342,466 screening mammography examinations, and detected 6,963 breast cancers.
- Approximately 88% of the cancers detected during this five year period were in women 50 years of age or older.
- The screen-to-cancer ratio ranges from 111:1 for women in their 70's to 399:1 for women in their 40's.
- 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 7:1 for women in their 70's to 41:1 for women in their 40's.
- The cancer detection rate and positive predictive value increases for women as they get older.

Table 11: SMP Outcome Indicators by 10-Year Age Groups Between 2012 and 2016 Inclusive

Outcome Indicators	Age at Exam					All
	40-49	50-59	60-69	70-79	80+	
Number of Exams	328,579	438,681	398,433	169,663	6,066	1,342,466
% first screens	24.3%	7.0%	3.7%	1.9%	2.6%	9.6%
Number of Cancers	824	1,881	2,633	1,523	101	6,963
% on first screens	36.7%	13.7%	7.5%	4.7%	6.9%	12.0%
Abnormal Call Rate	10.3%	8.1%	7.2%	6.8%	8.4%	8.2%
on first screens	17.1%	19.4%	18.5%	19.2%	21.2%	17.9%
on subsequent screens	8.1%	7.3%	6.8%	6.6%	8.1%	7.2%
Overall Cancer Detection Rate (per 1,000)	2.5	4.3	6.6	9.0	16.7	5.2
on first screens	3.8	8.4	13.6	22.2	45.2	6.5
on subsequent screens	2.1	4.0	6.3	8.7	15.9	5.1
DCIS Detection Rate (per 1,000)	0.7	1.0	1.3	1.6	2.1	1.1
on first screens	1.1	1.5	2.7	2.2	0.0	1.4
on subsequent screens	0.6	0.9	1.2	1.5	2.2	1.0
Positive Predictive Value of Screening Mammography	2.5%	5.3%	9.2%	13.2%	19.8%	6.3%
on first screens	2.2%	4.4%	7.4%	11.8%	21.9%	3.7%
on subsequent screens	2.6%	5.5%	9.4%	13.3%	19.7%	7.0%
Core Biopsy Yield Ratio	16.1%	29.4%	45.2%	55.2%	65.7%	34.6%
on first screens	11.9%	20.4%	30.1%	41.3%	63.6%	18.1%
on subsequent screens	20.1%	31.6%	47.0%	56.2%	65.9%	39.3%
Open Biopsy Yield Ratio	13.5%	21.5%	30.4%	38.9%	35.0%	23.9%
on first screens	12.9%	18.0%	26.7%	35.0%	0.0%	16.6%
on subsequent screens	14.0%	22.3%	30.9%	39.1%	35.0%	25.8%
Interval Cancer Rate (per 1,000)						
0-12 months	0.56	0.50	0.53	0.51	<0.01	0.52
after first screens	0.53	0.52	0.76	<0.01	<0.01	0.54
after subsequent screens	0.57	0.50	0.52	0.52	<0.01	0.52
13-24 months	0.02	0.51	0.60	0.82	1.98	0.46
Sensitivity (i.e. 1 - false negative rate)	81.8%	89.5%	92.5%	94.7%	100.0%	90.8%
Specificity (i.e. 1 - false positive rate)	90.0%	92.3%	93.5%	94.1%	93.1%	92.3%

NOTES:

1. See glossary in the Appendix for definitions of terms.
2. Overall Cancer Rate includes ductal carcinoma in situ (DCIS).
3. The final number of cancers in 2016 is still to be determined.
4. Number of cancers and related rates do not include data for women whose follow-up is incomplete.
5. The "All" column includes women less than 40 years of age.
6. SMP data extraction date: August 22, 2017.

8.6 Outcome Indicators by HSDA: 2012 – 2016 Cumulative

Outcome indicators for 2012 to 2016 are summarized by HSDA in Table 12.

- South Vancouver Island region has the lowest abnormal call rate (5%), while Fraser East has the highest (10%).
- Northeast has the lowest cancer detection rate (3.2 per 1,000), and Central Vancouver Island has the highest (6.1 per 1,000).
- Northeast has the lowest positive predictive value (3%) and South, North and Central Vancouver Island regions have the highest (9%).
- All of the HSDAs meet the international targets⁵ recommended for screening programs for invasive tumour detection size (target > 50%); ten out of the sixteen HSDAs meet the international target recommended for percentage of cases with negative nodes (target > 70%).

Table 12: SMP Outcome Indicators by Health Service Delivery Area (HSDA) Between 2012 and 2016 Inclusive

HSDA	% Called Abnormal	Cancer Detection Rate (per 1000)	PPV	In-Situ : Invasive (number)	% Invasive ≤15 mm	% Invasive with -ve nodes
East Kootenay	9%	4.1	5%	14 : 73	63%	81%
Kootenay Boundary	7%	4.8	7%	21 : 78	64%	76%
Okanagan	7%	5.5	8%	116 : 530	62%	75%
Thompson Cariboo	8%	6.0	7%	75 : 325	59%	71%
Interior	7%	5.4	7%	226 : 1006	62%	74%
Fraser East	10%	5.3	5%	75 : 337	57%	66%
Fraser North	9%	5.2	6%	248 : 704	64%	69%
Fraser South	10%	5.3	5%	247 : 882	57%	69%
Fraser	10%	5.3	6%	570 : 1923	60%	69%
Richmond	9%	5.2	6%	84 : 252	57%	73%
Vancouver	9%	5.3	6%	230 : 679	61%	67%
North Shore / Coast Garibaldi	8%	4.8	6%	89 : 344	62%	71%
Vancouver Coastal	9%	5.1	6%	403 : 1275	61%	69%
South Vancouver Island	5%	4.6	9%	58 : 465	53%	69%
Central Vancouver Island	7%	6.1	9%	112 : 435	63%	75%
North Vancouver Island	6%	5.3	9%	29 : 174	66%	76%
Vancouver Island	6%	5.2	9%	199 : 1074	59%	73%
Northwest	6%	4.3	7%	11 : 61	61%	62%
Northern Interior	7%	4.2	6%	25 : 136	62%	71%
Northeast	10%	3.2	3%	3 : 30	63%	70%
North	7%	4.1	5%	39 : 227	62%	69%
Program	8%	5.2	6%	1441 : 5522	60%	71%

NOTES: 1. See glossary in the Appendix for definitions of terms. 2. Targets: >50% invasive tumours ≤15mm, >70% with negative nodes
3. SMP data extraction date: August 22, 2017.

5. Tabàr L, Fagerberg G, Duffy, SW, Day NE, Gad A, Grøntoft O. Update of the Swedish Two-country Program of Mammographic Screening for Breast Cancer. Radiol Clin North Am 1992; 30(1): 187-210

8.7 Cancer Characteristics by Age: Cumulative Up To and Including 2016

From the start of the program in July 1988 to December 2016, 25,304 women were found to have breast cancer through screening-initiated work-up. Histologic features of breast cancers detected by the SMP cumulative up to and including 2016 are summarized by 10-year age groups in Table 13. Internationally recommended targets have been achieved.

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

Table 13: Histologic Features of Breast Cancers Detected by SMP Cumulative Up To and Including 2016

Histological Features	Age at Exam										Age 40+	
	40-49		50-59		60-69		70-79		80+			
Number of Cancers	3,903		7,105		8,329		5,572		395		25,304	
in situ	1,213	31%	1,742	25%	1,683	20%	976	18%	45	11%	5,659	22%
invasive	2,690	69%	5,363	75%	6,646	80%	4,596	82%	350	89%	19,645	78%
Invasive Cancers Tumour Size												
≤5 mm	268	10%	495	9%	609	9%	343	8%	32	9%	1,747	9%
6-10 mm	507	19%	1,237	23%	1,775	27%	1,375	30%	85	25%	4,979	26%
11-15 mm	701	27%	1,483	28%	1,939	30%	1,359	30%	99	29%	5,581	29%
16-20 mm	408	16%	875	17%	989	15%	684	15%	62	18%	3,018	16%
>20 mm	739	28%	1,189	23%	1,260	19%	779	17%	67	19%	4,034	21%
unknown size	(67)		(84)		(74)		(56)		(5)		(286)	
Invasive Cancers with tumour ≤ 15 mm	1,476	56%	3,215	61%	4,323	66%	3,077	68%	216	63%	12,307	64%
Node Involvement in Invasive Cancers												
no	1,685	69%	3,637	73%	4,776	78%	3,291	81%	207	81%	13,596	76%
yes	751	31%	1,346	27%	1,385	22%	795	19%	49	19%	4,326	24%
no nodes sampled / unknown	(254)		(380)		(485)		(510)		(94)		(1,723)	
Histologic Grade of Invasive Cancers												
1 - well differentiated	640	26%	1,560	31%	2,068	33%	1,528	36%	126	39%	5,922	32%
2 - moderately differentiated	1,097	44%	2,109	42%	2,780	45%	1,934	45%	138	43%	8,058	44%
3 - poorly differentiated	756	30%	1,326	27%	1,381	22%	804	19%	59	18%	4,326	24%
unknown grade	(197)		(368)		(417)		(330)		(27)		(1,339)	
Grade 3 tumour ≤ 15 mm	307	41%	595	45%	693	50%	391	49%	25	42%	2,011	46%

NOTES:

1. Targets¹: > 50% invasive tumours ≤15mm, >70% with negative nodes, >30% grade 3 tumours ≤15mm.
2. SMP data extraction date: August 22, 2017.

8.8 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 SMP performance measures are presented against the targets set for Canadian breast cancer screening programs.⁶ 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.

SMP 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 to reduce abnormal call rates, diagnostic intervals, and benign to malignant open biopsy ratio.

- The participation rate remained the same compared to 2015 (52.4% plus 8% MSP).
- The retention rate remained the same compared with 2015.

Comparison of SMP Performance with Canadian Breast Screening Standards for Ages 50 to 69 is summarized in Table 14.

⁶ Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Screening Program Performance third Edition. Health Canada 2013

Table 14: Comparison of SMP Performance with Canadian Breast Screening Standards for
Ages 50 to 69 Years

Performance Measure	National Target ¹	SMP
Participation Rate (1)	≥70% of the eligible population	52.4% (plus 8% MSP)
Retention Rate (2)		
Initial Rescreen	≥75% initial re-screen within 30 months	45%
Subsequent Rescreen	≥90% subsequent re-screen within 30 months	77%
Abnormal Call Rate (3)		
First Screens	<10% first screens	20.1%
Subsequent Screens	<5% re-screens	7.5%
Invasive Cancer Detection Rate (per 1000) (3)		
First Screens	>5.0 per 1,000 first screens	8.3 per 1000
Subsequent Screens	>3.0 per 1,000 re-screens	4.1 per 1000
In Situ Cancer Detection Rate (3)		
First Screens	Surveillance and Monitoring only	1.8 per 1000
Subsequent Screens	Surveillance and Monitoring only	1.0 per 1000
Diagnostic Interval (3)		
no tissue biopsy performed	≥90% within 5 weeks if no tissue biopsy performed	76.2%
tissue biopsy performed	≥90% within 7 weeks if tissue biopsy performed	59.4%
Positive Predictive Value (3)		
First Screens	≥5% first screen	5.1%
Subsequent Screens	≥6% re-screens	6.9%
Benign Core Biopsy Rate (per 1000) (3)		
First Screens	Surveillance and Monitoring only	28.8 per 1000
Subsequent Screens	Surveillance and Monitoring only	7.0 per 1000
Benign to Malignant Core Biopsy Ratio (3)		
First Screens	Surveillance and Monitoring only	3.2 : 1
Subsequent Screens	Surveillance and Monitoring only	1.5 : 1
Benign Open Biopsy Rate (per 1000) (3)		
First Screens	Surveillance and Monitoring only	4.8 per 1000
Subsequent Screens	Surveillance and Monitoring only	1.6 per 1000
Benign to Malignant Open Biopsy Ratio (3)		
First Screens	≤1:1	4.7 : 1
Subsequent Screens	≤1:1	3.1 : 1
Invasive Tumour size ≤10 mm (4)	>25%	32%
Invasive Tumour size ≤15 mm (4)	>50%	59%
Node Negative Rate in Cases of Invasive Cancer (4)	>70%	74%

NOTES:

1. Screen years: (1) = July 1, 2014 - December 31, 2016, (2) = 2013-2015, (3) = 2016, (4) = 2015
2. Population data source: P.E.O.P.L.E. 2016 population projection (May 2016), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
3. SMP data extraction date: August 22, 2017.

8.9 Cost Analysis

The BC Cancer Agency Screening Mammography Program is funded by the provincial Ministry of Health through the Provincial Health Services Authority (PHSA). The SMP 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 SMP Central Office, including: promotion, a provincial toll-free call centre, mobile service coordination and staff travel, result mail-out to women 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 15

Financial reports for PHSA and BCCA are available at the PHSA website:
www.phsa.ca/AboutPHSA/PHSA_Budget_Financials/default.htm

Table 15: Cost Comparison by Fiscal Year

Indicator	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017
Total Cost	\$21,633,483	\$21,936,860	\$20,364,256	\$19,976,921	\$21,030,530
Total cost per screen	\$75.63	\$79.51	\$78.32	\$79.35	\$79.38
Central Services	\$17.05	\$19.62	\$18.98	\$17.52	\$16.58
Screen Provision Costs	\$43.87	\$45.11	\$44.56	\$46.98	\$47.88
Professional Reading Fees	\$14.71	\$14.78	\$14.78	\$14.85	\$14.92
Cost per cancer detected	\$16,294.50	\$15,702.83	\$14,661.09	\$13,921.18	Not Available

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 \$14.92 per screen effective April 1, 2016.
4. Number of cancers detected in 2016-17 is not available yet, and thus the cost per cancer detected is not computed.
5. Cost per cancer detected is based upon screens with complete follow-up.
6. The cost per screen is exclusive of salary and benefit increases to public screening centres which, commencing in fiscal 2006, have gone directly to the Health Authority.
7. SMP data extraction date: August 22, 2017.

Appendix 1 — Cancer Screening Program Overview

Definition of Screening

Screening is a prevention strategy. 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 process⁷. 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.”⁸

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 we may use to identify individuals who may have occult disease.^{9,10,11}

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).

⁷ US Preventive Services Task Force: Guide to Clinical Preventive Services, Ed 2. Baltimore, Williams & Wilkins, 1996

⁸ Morrison A: Screening in Chronic Disease. New York, Oxford Press, 1992

⁹ Cole P, Morrison AS: Basic issues in cancer screening. In Miller AB (ed); Screening in Cancer. Geneva, International Union Against Cancer, 1978, P7

¹⁰ Miller AB; Fundamentals of Screening. In Screening for Cancer. Orlando, Academic Press, 1985, P3

¹¹ Wilson JMG, Junger G; Principles and Practice of Screening for Disease. Geneva, World Health Organization, 196

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.

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 women, 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
6. Evaluation/Research Partnerships

Appendix 2 — 2016 Screening Services

In 2016, SMP provided screening mammography to women ages 40 and over. The recall frequency shown below was used to calculate the program results for the period of January 1, 2016 – December 31, 2016.

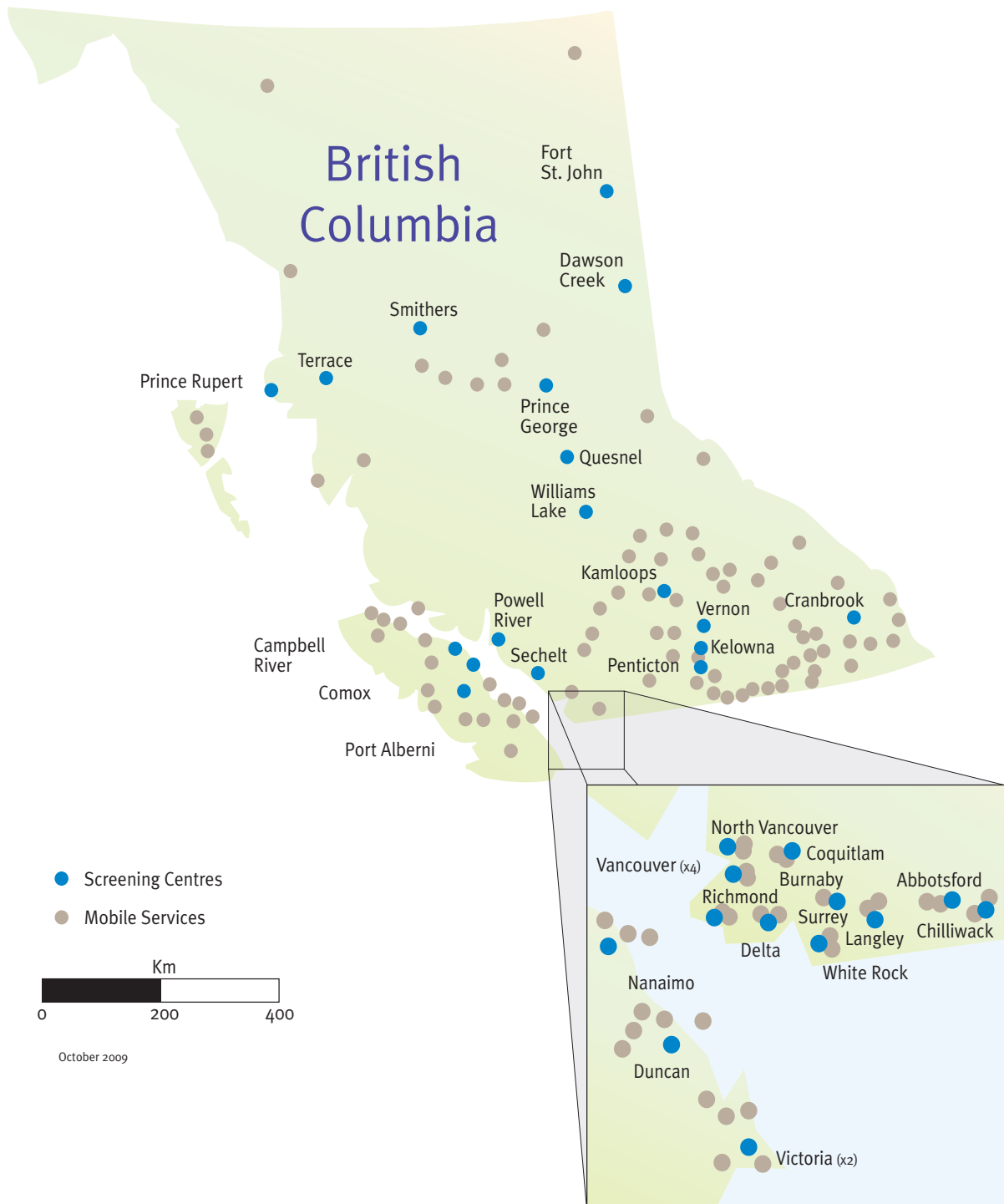
Age	Recall Frequency
<40	Will accept with primary health care provider referral, no recall provided
40-74 Average Risk	Reminders* for 24-month and 36-month anniversary to age 74
40-74 High Risk	Reminders* for 12-month and 24-month anniversary to age 74
75+	Will accept, no recall provided

Eligibility Criteria

- Have no breast changes*.
- Have not had a mammogram within 12 months.
- Have not had breast cancer.
- Do not have breast implants.
- Are not pregnant or breast feeding.
- Can provide the name of a primary care provider to receive the results.

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

Appendix 3 — Map of Screening Centres



Appendix 4 — Screening Centre Contact Information

Abbotsford	604-851-4750	Prince Rupert	1-800-663-9203
Burnaby	604-436-0691	Quesnel	1-800-663-9203
Campbell River	1-800-663-9203	Smithers	1-800-663-9203
Chilliwack	1-800-663-9203	Sechelt	1-800-663-9203
Comox	250-331-5949	Richmond	604-244-5505
Coquitlam	604-927-2130	Surrey – JPOCSC	604-582-4592
Cranbrook	250-417-3585	Terrace	1-800-663-9203
Dawson Creek	1-800-663-9203	Vernon	250-549-5451
Delta	604-946-1121	White Rock	604-535-4512
Duncan	1-800-663-9203	Williams Lake	1-800-663-9203
Fort St. John	1-800-663-9203		
Kamloops	250-828-4916	Vancouver	
Kelowna	250-861-7560	BC Women's Health Centre	604-775-0022
Langley	604-514-6044	Mount St. Joseph Hospital	604-877-8388
Nanaimo	250-716-5904	5752 Victoria Drive	604-321-6770
IK and NLM Mobile	1-800-663-9203	#505-750 West Broadway	604-879-8700
North Vancouver	604-903-3860		
Penticton	250-770-7573	Victoria	
Port Alberni	1-800-663-9203	305 – 1990 Fort Street	250-952-4232
Powell River	1-800-663-9203	Victoria General Hospital	250-727-4338
Prince George	250-645-6654		

Mobile Screening Service Delivery Areas

Agassiz	Elkford	Ladysmith	Pitt Meadows	Sointula
Alert Bay	Enderby	Lake Cowichan	Port Alice	Sooke
Alexis Creek	Fernie	Lillooet	Port Clements	Sorrento
Anahim Lake	Fort Nelson	Logan Lake	Port Coquitlam	Southside
Armstrong	Fort Rupert	Lumby	Port Hardy	Sparwood
Ashcroft	Fort St. James	Lytton	Port McNeill	Squamish
Balfour	Fountain	Mackenzie	Port Moody	Stewart
Barriere	Fraser Lake	Maple Ridge	Princeton	Summerland
Beaver Valley	Gabriola	Masset	Qualicum Beach	Surrey
Bella Bella	Galiano Island	McBride	Queen Charlotte	Tatla lake
Bella Coola	Golden	Merritt	Queensborough	Tofino
Blind Bay	Gold River	Midway	Radium	Trail
Bowen Island	Grand Forks	Mill Bay	Revelstoke	Tumbler Ridge
Burnaby	Granisle	Mission	Richmond	Ucluelet
Burns Lake	Greenwood	Mount Currie	Rock Creek	Valemount
Castlegar	Hagwilget	Nakusp	Rossland	Vancouver
Chase	Hazelton	Nelson	Saanichton	Vanderhoof
Chemainus	Hope	New Denver	Sandspit	Westbank
Chetwynd	Houston	New Westminster	Salmo	Whistler
Christina Lake	Hudson's Hope	North Vancouver	Salmon Arm	Williams Lake
Clearwater	Invermere	Old Massett	Salt Spring Island	Windermere
Clinton	Kaslo	Oliver	Savona	Winfield
Coquitlam	Keremeos	Osoyoos	Sayward	100 Mile House
Crawford Bay	Kimberley	Parksville	Scotch Creek	
Creston	Kitimat	Peachland	Sicamous	
Dease Lake	Kitsumkalum	Pemberton	Skidegate	
Delta	Kitwanga	Pender Island	Slocan	

Lower Mainland locations change from time to time. Latest visits include: Alouette Correctional Centre, BCIT Campus, Ballard Auto, Burnaby City Hall, Creation Technologies, Downtown Eastside Women's Health Centre, ICBC North Vancouver, Indo-Canadian Senior Centre, Maple Ridge City Hall, New Vista Society, Overwaitea Head Office, Pacific Blue Cross, Richmond City Hall, Salvation Army Caring Place, Surrey Primary Care Centre, SFU Campus, Teck Metals, Translink, UBC, Vancouver Primary Care Centre/Native Health, Vancouver Police Department, West Vancouver City Hall, Work Safe BC (Richmond).

First Nations Communities

Akisqnuk First Nation	Windermere	Okanagan Indian Band	Vernon
Aq'am First Nation	Cranbrook	Pauquachin First Nation	Saanich
Blueberry River First Nation	Buick	Penticton Indian Band	Penticton
Bonaparte Indian Band	Cache Creek	Prophet River First Nation	Fort Nelson
Boston Bar Indian Band	Boston Bar	Saik'uz First Nation	Vanderhoof
Canim Lake Indian Band	Canim Lake	Seabird Island Band	Agassiz
Doig River First Nation	Rose Prairie	Shuswap Band	Invermere
Esketemc First Nation	Alkali Lake	Simpcw First Nation	Barriere
Fort Nelson First Nation	Fort Nelson	Skeetchestn First Nation	Savona
Ginglox Indian Band	Kincolith	Soda Creek Indian Band	Williams Lake
Gitanyow First Nation	Kitwanga	Splatsin First Nation	Enderby
Gitlakdamix First Nation	New Aiyansh	Squamish First Nation	North Vancouver
Halfway River First Nation	Wonowon	Squamish First Nation	Squamish
Katzie First Nation	Pitt Meadows	Stella'ten First Nation	Fraser Lake
Kwantlen First Nation	Langley	Sto:lo First Nation	Chilliwack
Laxgalts First Nation	Greenville	Sts'ailes First Nation	Agassiz
Leq'amel First Nation	Deroche	Sumas First Nation	Abbotsford
Little Shuswap Lake Indian Band	Chase	Tlaz'ten First Nation	Fort St. James
Lower Nicola Indian Band	Merritt	Tsawwassen First Nation	Tsawwassen
Lower Similkameen Indian Band	Keremeos	Tsleil-Waututh Nation	North Vancouver
McLeod Lake Indian Band	McLeod Lake	Upper Nicola Indian Band	Merritt
Musqueam Indian Band	Vancouver	Yale First Nation	Hope
Nadleh Whut'en First Nation	Fraser Lake	Westbank First Nation	Kelowna
Nak'azdli First Nation	Fort St. James		
Nazko First Nation	Quesnel		

Appendix 5 — Educational Materials Order Form

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



BC Cancer Agency

CARE + RESEARCH

An agency of the Provincial Health Services Authority

Order Form

Cancer Screening Promotion and Resource Materials

Cancer screening promotion and resource materials are available free of charge for use in your office/clinic.

To order materials, please complete this form and email to screening@bccancer.bc.ca or fax to 604-877-6113.

ITEM	QUANTITY
Screening Mammography Program	
SMP Tear-Off Referral Pad (50 sheets)	# of pads:
SMP Program Brochure – “Is Screening Mammography Right for You?”	English: Punjabi:
	Simplified Chinese: Traditional Chinese:
SMP Physician Protocol Fact Sheet	English:
Poster - “Why Mammograms Work” (8.5” by 11”)	English:
Cervical Cancer Screening Program	
CCSP Program Brochure – “Is Cervical Cancer Screening Right for You?”	English: Punjabi:
	Simplified Chinese: Traditional Chinese:
CCSP Program Brochure – “Abnormal Cervical Cancer Screening Result”	English: Punjabi:
	Simplified Chinese: Traditional Chinese:
CCSP Tear-Off Pad (50 sheets) – “After Your Pap Test”	# of pads:
Poster - “Cervical Cancer Screening: What You Should Know” (8.5” by 11”)	English: Punjabi:
	Simplified Chinese: Traditional Chinese:
Poster – “In the time it takes to...You can get a Pap test”	# of posters:
Bookmark – “In the time it takes to...You can get a Pap test”	# of bookmarks:
CCSP Health Care Provider FAQ Booklet (8.5” by 11”)	English:
Fact Sheet – Cervical Cancer Screening Policy Change	English:
Colon Screening Program	
CSP Program Brochure – “Is Colon Screening Right for You?”	English: Punjabi:
	Simplified Chinese: Traditional Chinese:
CSP Program Brochure – “Abnormal FIT”	English: Punjabi:
	Simplified Chinese: Traditional Chinese:
CSP Program Brochure – “What is a Colonoscopy?”	English: Punjabi:
	Simplified Chinese: Traditional Chinese:
CSP Program Brochure – “Preparing for Your Colonoscopy”	English: Punjabi:
	Simplified Chinese: Traditional Chinese:
FIT Decision Table Fact Sheet	English:
Colon Screening Program Fact Sheet	English:
Polyp Info Sheet	English:
Colonoscopy Referral Pad (50 sheets)	# of pads:
<i>For colonoscopists and patient coordinators:</i>	
Colonoscopy Reporting Form (100 per pack)	# of packs:
Colonoscopy Reporting Form Page 2 (25 per pack)	# of packs:
Colonoscopist Reference Sheet	English:
Specimen Table Example	English:
Patient Assessment Process	English:
Bowel Preparation Decision Algorithm	English:
CONTACT INFORMATION	
Name:	Organization:
Phone Number:	Email:
Delivery Address:	

Email to screening@bccancer.bc.ca or Fax to **604-877-6113**.

July 2017

Appendix 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.
- Invasive Cancer Detection Rate: Number of invasive cancer cases detected per 1,000 screens with complete follow-up.
- Interval Cancer Rate: Number of women 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 women who have a screening mammogram within 30 months as a proportion of the eligible population. The eligible population is estimated by the weighted average of the three-year population from forecast.
- 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 women 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.

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

Where N_i is the number of prevalent screens for age group i , $C a_i$ is the number of cancers detected in prevalent screens for age group i and R_i 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:** The estimated percentage of women returned for rescreen within 30 months of their previous screen. This rate is estimated using Kaplan-Meier method.
- **Return (Compliance) Rate:** The estimated percentage of women without history of breast cancer diagnosis returned for rescreen within a certain period of time. This rate is estimated using Fine-Gray competing risk 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.

- **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”.

Appendix 7 — Acknowledgements

The SMP 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.
- Primary 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
- BC Women's Health Centre
- BC/Yukon Women's Cancer Alliance
- Canadian Breast Cancer Foundation
- Canadian Cancer Society
- College of Physicians and Surgeons
- Doctors of BC
- Divisions of Family Practice
- University of British Columbia
- Women's Health Bureau

Appendix 8 — Committees

Quality Management Committee

Ms. Nancy Aldoff
 Dr. Stephen Chia
 Ms. Ritinder Harry
 Dr. Malcolm Hayes
 Ms. Lisa Kan
 Ms. Sheila MacMahon
 Ms. Mary Nagy
 Ms. Janette Sam
 Dr. Linda Warren
 Dr. Colin Mar – Chair

Screener's Advisory Committee

Dr. Ken Bentley
 Dr. Ron Campbell
 Dr. Michael Clare
 Dr. Eleanor Clark
 Dr. Jennifer Dolden
 Dr. Brenda Farnquist
 Dr. Nancy Graham
 Dr. Dennis Janzen
 Dr. Rob Johnson
 Ms. Lisa Kan
 Dr. Tahir Khalid
 Dr. Nicola Lapinsky
 Dr. Grant Larsen
 Dr. Brent Lee
 Dr. Colin Mar – Chair
 Dr. Peter McNicholas
 Dr. Julie Nichol
 Dr. David O'Keeffe
 Dr. Amie Padilla-Thornton
 Dr. Catherine Phillips
 Dr. Rasika Rajapakshe
 Ms. Janette Sam
 Dr. Greg Shand
 Dr. Stuart Silver
 Dr. Catherine Staples
 Dr. Phil Switzer
 Dr. Beth Tanton
 Dr. Linda Warren

Quality Assurance Support Group

Ms. Nancy Aldoff
 Ms. Sheila MacMahon
 Ms. Meagan McGuinness
 Ms. Moira Pearson
 Dr. Rasika Rajapakshe
 Dr. Derek Wells
 Dr. Joseph Yang

Alphabetical Listing

Appendix 9 — Radiologist Screeners

Abbotsford & Chilliwack

Dr. Amarjit Bajwa
Dr. Tahir Khalid*
Dr. Marion J. Kreml
Dr. Caroline Pon

Burnaby & Richmond

Dr. Theodore Blake
Dr. Bill Collins
Dr. Henry Huey
Dr. Marty Jenkins
Dr. Vanindar (Vee) Lail
Dr. Beth Tanton*
Dr. Lynette Thurber
Dr. Betty Tuong

Comox

Dr. Kevin Irish
Dr. Grant Larsen*
Dr. David McKeown*

Coquitlam

Dr. Debra Chang
Dr. Jennifer Dolden*
Dr. Brad Halkier
Dr. Anita McEachern
Dr. Robert Van Wiltenburg

Cranbrook

Dr. Daryn Maisonneuve
Dr. Julie Nicol*

Interior & Kootenay / Northern & Lower Mainland

Dr. Marie-Josée Cloutier
Dr. Colin Mar
Dr. Charlotte Yong-Hing
Dr. Kevin Ibach

Kamloops

Dr. Michael Clare*
Dr. Donal Downey
Dr. Dellano Fernandez

Kelowna

Dr. Brenda Farnquist*
Dr. Michael Partrick
Dr. Catherine Staples
Dr. Timothy Wall

Langley

Dr. Ron Campbell*
Dr. Tahir Khalid*
Dr. Marion J. Kreml
Dr. John Lai
Dr. John Matheson
Dr. Caroline Pon
Dr. Xing Wong

Nanaimo/Islands & Coastal Mobile

Dr. David Coupland
Dr. Rob Johnson*
Dr. Zenobia Kotwall
Dr. David O’Keeffe*
Dr. Paul Trepanier

North Vancouver

Dr. Sven Aippersbach
Dr. Simon Bicknell
Dr. Patrick Llewellyn*
Dr. David Spouge

Penticton

Dr. Peter McNicolas*
Dr. Stacey Piche

Prince George

Dr. Alasdair Leighton
Dr. Greg Shand*

Sechelt

Dr. Sven Aippersbach
Dr. Simon Bicknell
Dr. Patrick Llewellyn
Dr. Catherine Phillips*
Dr. David Spouge

Surrey & JPOSC

Dr. Sanjiv Bhalla
Dr. Don Coish
Dr. Guy Eriksen
Dr. Fin Hodge
Dr. Dennis Janzen*
Dr. Dennis Lee
Dr. Amir Neyestani
Dr. John Sisler
Dr. L. Earl Tregobov

Vancouver –

BC Women’s Health Centre

Dr. Marie-Josée Cloutier
Dr. Paula Gordon
Dr. Linda Warren*

Vancouver –

Mount St. Joseph Hospital

Dr. Jessica Farrell
Dr. Jennifer Jessup
Dr. Amie Padilla-Thornton*

Vancouver – Victoria Drive

Dr. Connie Siu
Dr. Phil Switzer*

Vancouver –

#505 – 750 West Broadway

Dr. Theodore Blake
Dr. Paula Gordon
Dr. Nicola Lapinsky*
Dr. Linda Warren

Vernon

Dr. Ken Bentley*
Dr. Ian Marsh
Dr. Glenn Scheske

Victoria General Hospital/

Victoria Richmond Ave

Dr. Richard Eddy
Dr. Chris King
Dr. Robert Koopmans
Dr. Brent Lee*
Dr. Nicola Proctor
Dr. Stuart Silver*
Dr. Rick Smith
Dr. Paul Sobkin

White Rock

Dr. Eleanor Clark*
Dr. Joanne Coppola
Dr. Jeffrey Hagel
Dr. Maria Kidney

Alphabetical Listing

* Indicates Chief Screener

Appendix 10 — Publications & Presentations

Publications

Paula Gordon

Gordon, P. Chen THH, Yen AMF, Fann JCY, Gordon P, Chen SLS, Chiu SYH, Hsu CY, Chang KJ, Lee WC, Yeoh KG, Saito H, Promthet S, Hamashima C, Maidin A, Robinson F, Zhao LZ. Clarifying the debate on population-based screening for breast cancer with mammography. A systematic review of randomized controlled trials on mammography with Bayesian meta-analysis and causal model. *Medicine* (2017) 96:3(e5684).

Gordon, P. Seely, JM, Lee J, Whitman GJ, Gordon PB. Canadian Radiologists Do Not Support Screening Mammography Guidelines of the Canadian Task Force on Preventive Health Care, *Can Assoc Radiol J* 2017 Mar 25. pii: S0846-5371(16)30110-3. doi: 10.1016/j.carj.2016.08.004.

Rasika Rajapakshe

Rajapakshe, R. (2016) Mlikotic R, Parker B, Rajapakshe R, “Assessing the Effects of Participant Preference and Demographics in the Usage of Online Survey Questionnaires by Women Attending Screening Mammography in British Columbia” *J Med Internet Res* 2016;18(3):e70 DOI: 10.2196/jmir.5068.

Presentations and Lectures

Nancy Aldoff

Aldoff, N. (2016, Feb). Satisfaction Surveys – How Do You Rate? Webinar to SMP Centres Technologists and Clerks from Vancouver, BC.

Aldoff, N. (2016, April). Mobile Mammography – Lessons Learned on the Road, Mobile Health Clinics Association of the Pacific Northwest. Lecture presented at the Mobile Medical Unit-PHSA, Delta, B.C.

Paula Gordon

Gordon, P. (2017 Jan) Tomosynthesis: Why 3D is the Future of Screening Mammography. BC Women's Research Rounds.

Colin Mar

Mar, C. (2016, Oct.) Fair Child TV, News Broadcast Interview, Vancouver, BC.

Mar, C. (2016, Oct.) Global News, Breast Cancer Awareness Month News Broadcast Interview, Vancouver, BC.

Meagan McGuinness

McGuinness, M. (2016, November). SMPBC – Is Mammography Right for You? Tong Louie Family YMCA, Surrey, BC.

Janette Sam

Sam, J. (2016, Feb) Interview Osoyoos Times, new mobile units ensure thousands of women in small towns get quality breast screening services, Osoyoos, BC.

Sam, J. (2016, April) Screening Mammography Program Update – Policy, Practice and Performance Review. Janette Sam, Screening Mammography Forum 2016, Richmond, BC.

Janette Sam and Valerie Lukac (2016, June) Abstract - Digitization of the Provincial Mobile Mammography Screening Program at the BC Cancer. e-Health Conference 2016, Vancouver, BC.

Sam, J. (2016, Sept) General Practice Oncology Training Program – Presentation on SMP screening Principles. Vancouver, BC.

Rasika Rajapakshe, Stephen Smithbower, Nancy Aldoff, and Janette Sam (2016, Dec) Abstract “A Cloud Based Platform for Automated Digital Mammography Quality Control: mammoQC”, International Conference on Medical Physics, Bangkok, Thailand.

Appendix 11 — SMP / BCCA Contact Information

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SMP Technologists
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Fax: 604.660.3645
Website: www.smpbc.ca
E-mail: Screeningadmin@bccancer.bc.ca

Alphabetical Listing

[illegible]



Provincial Health Services Authority

BC Cancer Agency Centres:

Abbotsford Centre

32900 Marshall Road
Abbotsford, BC V2S 1K2
604.851.4710 or toll-free 1.877.547.3777

Centre for the North

1215 Lethbridge Street
Prince George, BC V2N 7E9
250.645. 7300 or toll-free 1.855.775.7300

Fraser Valley Centre

13750 96th Avenue
Surrey, BC V3V 1Z2
604.930.2098 or toll-free 1.800.523.2885

Sindi Ahluwalia Hawkins Centre for the Southern Interior

399 Royal Avenue
Kelowna, BC V1Y 5L3
250.712.3900 or toll-free 1.888.563.7773

Vancouver Centre

600 West 10th Avenue
Vancouver, BC V5Z 4E6
604.877.6000 or toll-free 1.800.663.3333

Vancouver Island Centre

2410 Lee Avenue
Victoria, BC V8R 6V5
250.519.5500 or toll-free 1.800.670.3322

BC Cancer Agency Research Centre

675 West 10th Avenue
Vancouver, BC V5Z 1L3
604.675.8000 or toll-free 1.888.675.8001

BC Cancer Foundation

150 - 686 W. Broadway
Vancouver, BC V5Z 1G1
604.877.6040 or toll-free 1.888.906.CURE/2873

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