

## Screening Mammography Program

# Screening Mammography Program 2015 Annual Report





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## 1.0 Message



### Message from the Medical Director

“May you live in interesting times” is a saying we are all familiar with and could well be used to describe the Screening Mammography world, over the past few years. However, this year we have moved forward following the recent guideline changes and we are now seeing the results of these as they are embraced by the women of BC and their primary care providers. A number of presentations were made throughout the year at various Primary Health Care provider conferences and other educational venues. In addition, we had webinars with selected Family Practice divisions to explore various possible solutions to the unattached patient problem, which we continue to work at from many different angles.

We have successfully completed revising our new Screener test set to a digital format. I would like to thank our volunteers on the Test Set committee for their valuable time and their ongoing support and commitment to the program. It is much appreciated. Also, I must include our staff members Nancy Aldoff and Teresa Wight for all of their hard work on this project.

We had seven successful new screener candidates come on board this year. Congratulations to all of them!

We also had a Structured Reporting for Breast Imaging Working Group which had a provincial scope and made recommendations for how we should proceed once we make the transition to digital or electronic reporting. The recommendation, not surprisingly, was made for a BIRADS format for both screening and diagnostic work.

I would like to thank all of the Screeners, technologists, clerical and other “behind the scenes” staff that make up this Program for your dedication. We need to remember, in the tough times, that what we are doing does make a difference. Together, we detect approximately 1,400 new cancers every year in asymptomatic women. The majority of these are small and more easily treated. Observational studies like the Pan Canadian Study show that we are making a difference by decreasing the breast cancer mortality by 40%. That is worth remembering.

Thank you.

– Christine Wilson MD





### Message from the Screening Operations Director

As we reflect back upon 2014, we can be proud of our achievements. We successfully transitioned through the policy update, and I am pleased to share the updated results in this report. In this report you will find a breakdown of outcome indicators where possible for women of both average and higher risk.

We also completed a lengthy tender process for three new digital mammography coaches and are proud to share this and other program initiatives in section 5.

We also share the results of the recently published Pan-Canadian study of breast screening and mortality rates. The study compared breast cancer deaths in screening program participants versus non-participants, and found a 40% reduction in breast cancer deaths among those who participated in screening. These results demonstrate the value of participating in screening and how important the work is that we do. We couldn't do this work without the generous support from our community partners, program volunteers and most importantly the women we serve. Together we continue to make a difference.

– Janette Sam

## 2.0 Executive Summary

The BC Cancer Agency 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 27th year of operation. Since the inception of the program in 1988 to the end of 2014, the program has provided over 5,090,981 screening mammograms and detected 22,372 (breast) cancers.

We are happy to provide this 27th annual report. While the technology has changed significantly over the last 27 years our commitment has remained the same – to provide a quality service for the women of BC.

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 in 2014 compared with 2013, the overall participation remained steady at 53%. Participation rates continue to rise however for select ethnic groups (First Nations, South Asian and East/South-East Asian), and significantly exceed overall participation rates across the province at 56% on average compared with 53% provincially overall.

The node negative rate for those women who had breast cancer detected remains high at 76%, which exceeds the national target of 70% (Table 12). Screening helps find cancers when they are smaller, leading to more treatment options for women.

### 3.0 Screening Recommendations for Women in British Columbia

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

BC recommendations include guidelines for women with a family history of breast cancer in a first degree relative (mother, sister, or daughter). These guidelines are critical as these women are approximately two times more likely to develop breast cancer . More information about the BC breast screening recommendations may be found online at [www.screeningbc.ca](http://www.screeningbc.ca).



## 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.

Going for 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; 86% of breast cancers in BC are found in women 50 years and older. The BC Cancer Agency 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 40-74 may self-refer to the program; however it is recommended that by age 50 women have a screening mammogram every two years. Women are not eligible for a screening mammogram in BC if they have/had breast cancer, breast implants, or if they currently have breast symptoms requiring a diagnostic investigation. These women must speak with their primary care provider and be referred for a diagnostic mammogram.

### Centres and Mobile Services

There are 37 fixed centres across the province, and three mobile vans that visit over 120 smaller BC communities, including many First Nations communities. Mobile schedules are posted on the SMP website ([www.screeningbc.ca](http://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 8% 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, modeled after a process developed in Nanaimo, facilitates referral for women who require further testing.

#### Fast Track Overview

- 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.
- 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.
- The SMP images and results are transferred to the diagnostic office prior to the appointment.
- SMP notifies the woman's health care provider where their patient has been referred for additional testing.
- 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 .

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.

## 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 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 centers as they pursue accreditation. Accredited sites display a certificate for all women attending the service to see.

**Image Quality Assurance:** The SMP Quality Assurance Support Group provides leadership and technical support to centres for their quality control practices. All centres undergo regular annual equipment testing. SMP quality control practices are standardized and monitored regularly with support to the centres through site visits, manuals, and training. 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:

Production of 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 "@screeningbc" Twitter account that promotes relevant information about cancer screening including upcoming mobile visits in communities around the province.
- A website ([www.screeningbc.ca](http://www.screeningbc.ca)) to support informed decision making about screening.
- Regular presence at health fairs and events throughout the province by the BC Cancer Agency's Prevention group.

### Client Satisfaction Surveys

Each year SMP performs a client satisfaction survey to ask women 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 2014 the survey was updated to include new overall satisfaction rate questions.

2014 Summary of SMP Client Satisfaction Survey Results:

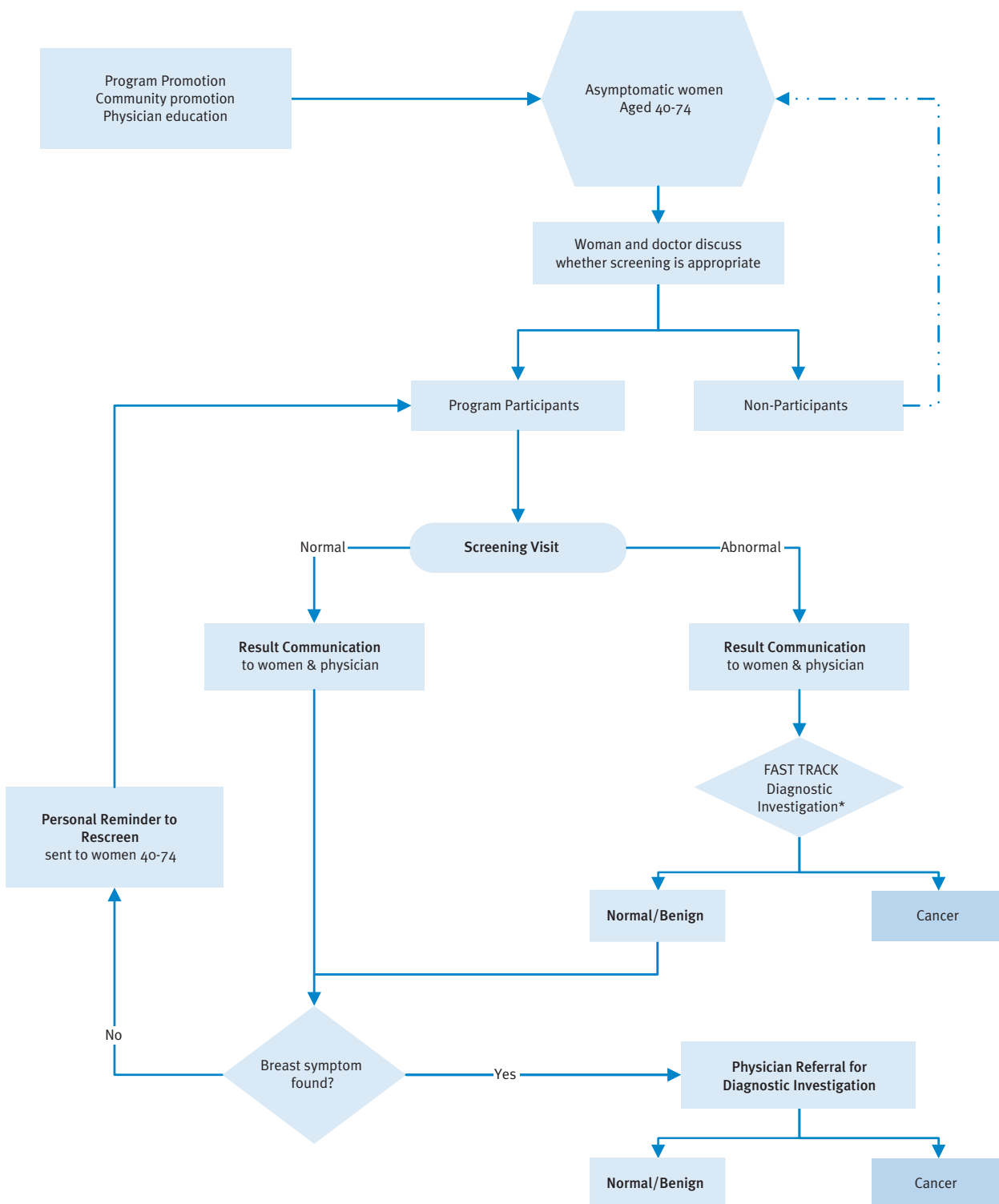
The total number of surveys sent – 12,178

Total number of surveys returned – 4,251 (35% return rate)

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

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 2013/14 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:

#### Five Plus



As part of the Provincial Breast Health Strategy, BC's leading cancer organizations joined forces to create Five Plus ([www.fiveplusbc.ca](http://www.fiveplusbc.ca)), a new website that encourages women to take five steps that may help to prevent breast cancer, plus two actions for possible early detection:

1. Maintain a healthy body weight.
2. Maintain an active lifestyle.
3. Limit alcohol consumption.
4. Breastfeed if possible.
5. Weigh the risks and benefits of hormone therapy.

Plus:

1. Be aware of the look and feel of your breasts so you notice any changes.
2. Book a mammogram every two years if you are between the ages of 50 to 74. Mammograms for women age 40-49 or over 74 can also be considered. Talk to your doctor.

The Five Plus actions are based on current research and were developed by a team of BC's foremost experts in breast health. The website, [www.fiveplusbc.ca](http://www.fiveplusbc.ca), contains detailed information about how these five risk factors affect breast health and how best to detect breast cancer early.

Project Partners include Ministry of Health, the Provincial Health Services Authority (and its agencies the BC Cancer Agency and BC Women's Hospital & Health Centre), the regional health authorities, the Canadian Breast Cancer Foundation, the Canadian Cancer Society, and the University of British Columbia.

### **Pan-Canadian Study of Mammography Screening and Mortality from Breast Cancer**

BC Screening Mammography Program results were included in a study by the Canadian Breast Cancer Screening Initiative (CBCSI) of breast screening programs in Canada. The study demonstrated that regular screening mammograms can significantly reduce a woman's risk of dying from breast cancer.

This observational study compared breast cancer deaths in screening program participants versus non-participants, and found a 40% reduction in breast cancer deaths among those who participated in screening. This result was found to be similar across all age groups.

The results indicate that provincial breast screening programs in Canada have had a very positive impact on the number of deaths from breast cancer and that the mortality reduction is greater than suggested in some recent guideline estimates.

Breast cancer mortality was reduced within 10 years of women starting screening. Since breast cancer is more common in older women, the number of older women needing to be screened in order to prevent one death is lower. Therefore, the degree of the mortality reduction was enhanced with increasing age: one death was prevented within 10 years for every 1,250 women participating aged 40-49; 750 women aged 50-59; 550 women aged 60-69; and 500 women 70-79 respectively.

The study was undertaken by the CBCSI and funded by the Public Health Agency of Canada (PHAC). It studied nearly 2.8 million women aged 40-79 years who participated in screening programs in British Columbia, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia and Newfoundland and Labrador between 1990 and 2009. This is the first study that has used data from women in several Canadian screening programs to look at whether participation in breast cancer screening reduced the risk of dying from breast cancer. The study's findings are in line with similar studies conducted in Europe. It was published in the Journal of the National Cancer Institute in October 1, 2104.

A link to the full study report can be found here:  
<http://jnci.oxfordjournals.org/content/106/11>

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Study reference: Pan-Canadian Study of Mammography Screening and Mortality from Breast Cancer Andrew Coldman; Norm Phillips; Christine Wilson; Kathleen Decker; Anna M. Chiarelli; Jacques Brisson; Bin Zhang; Jennifer Payne; Gregory Doyle; Rukshanda Ahmad JNCI Journal of the National Cancer Institute 2014 106 (8)

### **Breast cancer screening for women who received mantle radiation for Hodgkin lymphoma**

Mantle radiation (also known as mantle field radiotherapy) is a radiation technique that involves radiation to the neck, chest and armpit area (also known as the 'mantle' area). Mantle radiation was primarily used as a treatment technique for Hodgkin lymphoma from the 1970s until the late 1990s, when it was replaced by newer treatments, although it is still used today in rare situations.

Evidence indicates that women who have received mantle radiotherapy treatment for Hodgkin lymphoma have a significant increased risk of breast cancer compared to other women of the same age. This increased risk begins about 10 years after treatment and increases over time.

Recent research recommends that the optimal screening for women who received mantle radiation for Hodgkin Lymphoma is an annual digital mammogram and a breast MRI (magnetic resonance imaging).

Therefore, the BC Cancer Agency recommends that women who have received mantle radiation for Hodgkin lymphoma follow this screening routine:

- A breast magnetic resonance imaging (MRI) exam every year starting at age 30 or 10 years after radiation treatment until the age of 65.
- A screening mammogram (breast x-ray) every year starting at age 30 or 10 years after radiation treatment until the age of 74.

In the fall of 2014, the BC Cancer Agency informed health care providers and former Hodgkin lymphoma patients of these recommendations.

### **Improving Screening Mammography Return Rates in Overdue Women: A Randomized Study of Signed Reminder Letters from Family Physicians**

This work was presented at the ASCO Breast Cancer Symposium, Sept. 4-6, 2014, San Francisco, CA.

For a screening program to be effective, women not only need to initially participate in screening, but also need to return for ongoing screening at the appropriate interval. With the current reminder system, the return rate for screening mammography among women aged 50-69 in BC at 30 months is 80.1% (Annual Report with 2007-2009 data).

In 2013, Dr. Alan Nichol and Dr. Elisa Chan of the BC Cancer Agency led a study to determine if a signed letter from a family physician with the postcard would improve screening mammography attendance compared to the postcard alone, in the context of an organized

population-based program where routine postal reminders are already in place.

2,696 women received both the signed family physician letter and postcard and 2,689 women received the postcard alone. The study results demonstrated that all women except for those whose last screen was abnormal were significantly more likely to attend a screening mammogram if they received a signed family physician letter along with a postcard compared to receiving a postcard alone.

Funding was provided by the Canadian Breast Cancer Foundation, BC/Yukon Division.



#### BC Cancer Agency's first digital mammography coach

Health Minister Terry Lake unveiled BC's first state of the art digital mammography coach in front of the legislature in Victoria on February 24, 2015. The BC Cancer Agency's new mobile coach will benefit women across Vancouver Island, the Gulf Islands and the Squamish Corridor. The new digital mammography coach will allow for greater efficiency in sharing of images, and enable the technologists to view the images right away to ensure image quality, rather than waiting for the films to be developed when they return to their reporting centre.

Speaking at the event, Dr. Christine Wilson Medical Director, Screening Mammography Program said "Converting the mobile coaches to digital mammography offers greater efficiency in reporting, allowing radiologists to access both screening mammography and diagnostic images and reports on the same local system."

The Vancouver Island Coastal mobile coach is the first of three Screening Mammography Program mobiles in the province to transition to digital mammography, with the other two coaches planned for

replacement in early 2016. Women will now be able to have their screening mammogram performed with state of art equipment within the comfort of these coaches. The new coaches are equipped with a wheelchair lift, a spacious waiting area, an examination room and are designed to fit on all BC Ferries, providing women with a consistent mammography experience at all locations. The funding for the purchase of the mobile mammography coach was provided through Ministry of Health capital funding and generous support by the Canadian Breast Cancer Foundation (CBCF) and Shoppers Drug Mart.

#### **Ask an Expert Campaign - October 2014**

The program partnered with the Canadian Breast Cancer Foundation (CBCF) on CBCF's annual, nation-wide "Ask an Expert" campaign. The campaign connected Canadian women to breast cancer experts coast to coast on October 15, 2014 during breast cancer awareness month.

This year, "Ask an Expert" took a two-fold approach to connecting those with questions to experts; using television and online chat to provide participants with insights across the spectrum of breast health and breast cancer and encourage interactive discussion.

During the morning of the event, live interviews with local CBCF-funded researchers were broadcast on two CTV programs; CTV Morning Live and Canada AM. In the BC/Yukon region, CTV Morning Live Vancouver featured an interview with Dr. Kristin Campbell (University of British Columbia/BC Cancer Agency).

The television interviews were followed by a live, online chat. The online chat, hosted and now archived on the CTV website at [www.ctvnews.ca/askanexpert](http://www.ctvnews.ca/askanexpert), was moderated by the CBCF and featured a panel of four breast cancer experts. Dr. Stephen Chia served as the BC Cancer Agency representative for this portion of the event.

#### **South Island HSDA Promotion**

In light of a declining participation rate in the South Island HSDA, a promotion plan was developed and implemented to increase program awareness and participation for women 50-69 in this health service delivery area (HSDA).

To accomplish this, a number of tactics were employed to relay the importance of regular screening to help motivate eligible women to schedule a mammogram:

- Reminder postcards sent to overdue women;
- Reminder letters sent to GPs notifying them that their patients were overdue;
- Workplace promotion campaigns and mobile stops;
- Community organization outreach;
- Walk-in clinic outreach, and;
- Radio advertising using the "Take Care of the Girls" ads that were developed the previous year

The effect on SMP participation was positive. Mobile mammography service visits to Camosun College and the University of Victoria accounted for 70 screens and 918 women who received a reminder booked a mammogram after the mail-out; this represents 6.9% of all reminder recipients. From September 1, 2014 to January 31, 2015, the number of women 50-69 attending increased by 37.6%, and for all ages by 9.8% when compared to the same time period twelve months earlier.

From an awareness perspective, the promotion plan also had a positive effect. SMP materials were placed in and distributed through 39 community organizations and 14 workplaces, adding 1200 brochures and 42 posters into circulation within the South Island HSDA.



## 6.0 Professional Development and Academic Activities

Screening program representatives and scientists authored 8 publications in radiologic literature, and delivered 23 lectures and presentations to mammography screening peers.

The SMP plans and participates in professional and academic activities throughout the year. SMP Educational Webinars have resulted in good participation from radiologists and technologists across the province.

In 2014, SMP hosted the following province-wide webinars:

- SMPBC Policy Changes – Carla Brown-John and Nancy Aldoff
- Practical Strategies for Challenging Situations for Technologists – Nancy Aldoff with Laura Roberts RT(R) and Barb Nugent RT(R)

## 7.0 Partnerships and Collaborations

### Canadian Breast Cancer Foundation

The BC Cancer Agency was proud to partner with Canadian Breast Cancer Foundation on multiple projects in 2014/15 including the Take Care of the Girls campaign and the Ask an Expert campaign.

In section 8.8, the SMP performance measures are presented against the national targets set for Canadian breast cancer screening programs.

### Canadian Cancer Society

The BC Cancer Agency was proud to partner with the Canadian Cancer Society on multiple projects in 2014/15 including the Sirf Dus initiative to promote screening mammography in the South Asian community.

### Canadian Partnership Against Cancer /Canadian Breast Cancer Screening Network

#### Canadian Breast Cancer Screening Network

- Dr. Christine Wilson, 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

## 8.0 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 .

In 2014 the BC breast screening policy was updated. New guidelines were developed for women with a family history of breast cancer in a first degree relative (mother, sister, daughter). As part of the new policy implementation, all women who had previously self-identified themselves as having a family history were contacted by letter to inform them of the recommendation to return for screening annually. Women 40 years of age and older, of average risk, without a family history, are eligible to return to screen every two years and were informed of the guidelines by letter at the time of their planned recall interval.

The program results have been updated to 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.

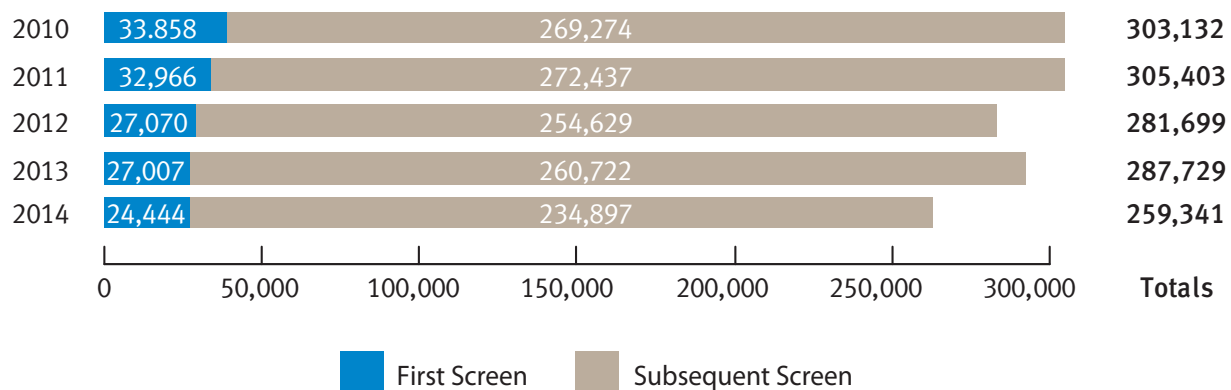
## 8.1 Recruitment and Re-screening

### Screening Volume

The SMP provided 259,341 examinations in 2014. During this period 24,444 (9.4%) of those examinations were provided to first time attendees.

Figure 2 shows that the total number of exams provided by SMP in 2014 decreased by ~10% compared to 2013. There was a 9.5% decrease in first time screen attendees, while the number of returning participants decreased by 10% over the previous year. The decrease in attendance was primarily due to the screening policy update, which recommended that average risk women 40-49 years old return to screen every two years rather than annually.

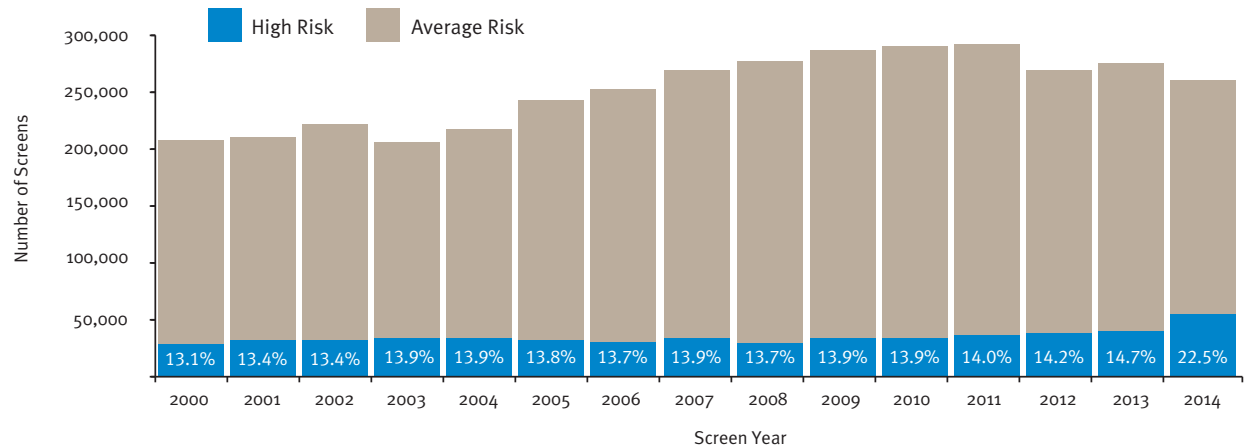
FIGURE 2: SMP ANNUAL SCREENING VOLUME YEARS: 2010 – 2014



NOTE: SMP data extraction date: August 25, 2015

In 2014 there was an increase in the number of higher than average risk women attending for screening, due in part to direct notification of the program to all women who had previously attended for screening and had indicated a family history.

FIGURE 3: SMP ANNUAL SCREENING VOLUME BY RISK AND SCREEN YEARS: 2000-2014



NOTE: SMP data extraction date: August 25, 2015

### SMP Volume by Health Service Delivery Area (HSDA) 2014

The age distribution of all exams and first exams performed in 2014 by Health Services Delivery Areas (HSDA) are displayed in Table 1.

- The majority of exams (66%) are performed for women between ages 50 to 69 in all HSDAs. This is a 9% increase over 2013.
- Majority of first time attendees were under 50 years of age; however, there are regional variations ranging from 41% in East Kootenay to an average of ~ 70% 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): 2014**

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	4,342	14%	71%	16%	428	10%	41%	53%	6%
Kootenay Boundary	3,969	13%	70%	16%	294	7%	51%	46%	3%
Okanagan	21,389	15%	68%	18%	1,648	8%	48%	48%	4%
Thompson Cariboo	12,818	16%	68%	16%	881	7%	59%	39%	2%
<b>Interior</b>	<b>42,518</b>	<b>15%</b>	<b>68%</b>	<b>17%</b>	<b>3,251</b>	<b>8%</b>	<b>50%</b>	<b>46%</b>	<b>4%</b>
Fraser East	14,337	22%	64%	14%	1,420	10%	61%	36%	3%
Fraser North	37,564	26%	63%	11%	3,890	10%	70%	27%	2%
Fraser South	40,061	25%	64%	11%	4,526	11%	63%	35%	2%
<b>Fraser</b>	<b>91,962</b>	<b>25%</b>	<b>63%</b>	<b>12%</b>	<b>9,836</b>	<b>11%</b>	<b>66%</b>	<b>32%</b>	<b>2%</b>
Richmond	11,947	23%	66%	10%	1,033	9%	67%	31%	2%
Vancouver	33,296	26%	63%	11%	3,654	11%	69%	29%	2%
North Shore / Coast Garibaldi	17,464	21%	65%	14%	1,658	9%	61%	37%	2%
<b>Vancouver Coastal</b>	<b>62,707</b>	<b>24%</b>	<b>64%</b>	<b>12%</b>	<b>6,345</b>	<b>10%</b>	<b>67%</b>	<b>31%</b>	<b>2%</b>
South Vancouver Island	22,130	15%	70%	15%	1,639	7%	54%	43%	3%
Central Vancouver Island	18,220	13%	69%	18%	1,388	8%	43%	52%	5%
North Vancouver Island	7,506	14%	72%	15%	594	8%	46%	49%	4%
<b>Vancouver Island</b>	<b>47,856</b>	<b>14%</b>	<b>70%</b>	<b>16%</b>	<b>3,621</b>	<b>8%</b>	<b>49%</b>	<b>48%</b>	<b>4%</b>
Northwest	3,447	21%	68%	11%	343	10%	63%	34%	3%
Northern Interior	7,430	20%	69%	11%	555	7%	66%	33%	1%
Northeast	2,169	22%	69%	10%	276	13%	53%	45%	3%
<b>Northern</b>	<b>13,046</b>	<b>21%</b>	<b>69%</b>	<b>11%</b>	<b>1,174</b>	<b>9%</b>	<b>62%</b>	<b>36%</b>	<b>2%</b>
<b>Program</b>	<b>259,341</b>	<b>21%</b>	<b>66%</b>	<b>13%</b>	<b>24,444</b>	<b>9%</b>	<b>61%</b>	<b>36%</b>	<b>3%</b>

NOTE: SMP data extraction date: August 24, 2015

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 1.2.

- 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 (81%) are performed for women between ages 50 to 69 in all HSDAs

**TABLE 2 – SMP AGE AND VOLUME DISTRIBUTION FOR HIGHER RISK WOMEN BY HEALTH SERVICE DELIVERY AREA (HSDA) 2014**

HSDA	Number of Higher Risk Exams	% Higher Risk Exams	Age Distribution of Higher Risk Exams		
			40-49	50-74	75+
East Kootenay	969	22%	10%	86%	3%
Kootenay Boundary	1,010	25%	10%	85%	5%
Okanagan	5,657	26%	11%	83%	5%
Thompson Cariboo	3,283	26%	13%	83%	4%
<b>Interior</b>	<b>10,919</b>	<b>26%</b>	<b>12%</b>	<b>84%</b>	<b>5%</b>
Fraser East	3,398	24%	15%	80%	4%
Fraser North	7,423	20%	20%	77%	4%
Fraser South	8,282	21%	19%	78%	3%
<b>Fraser</b>	<b>19,103</b>	<b>21%</b>	<b>18%</b>	<b>78%</b>	<b>4%</b>
Richmond	2,288	19%	15%	81%	3%
Vancouver	6,212	19%	21%	76%	3%
North Shore / Coast Garibaldi	4,108	24%	17%	80%	3%
<b>Vancouver Coastal</b>	<b>12,608</b>	<b>20%</b>	<b>18%</b>	<b>78%</b>	<b>3%</b>
South Vancouver Island	5,647	26%	13%	83%	4%
Central Vancouver Island	4,672	26%	10%	85%	5%
North Vancouver Island	2,009	27%	12%	85%	3%
<b>Vancouver Island</b>	<b>12,328</b>	<b>26%</b>	<b>12%</b>	<b>84%</b>	<b>4%</b>
Northwest	904	26%	16%	82%	2%
Northern Interior	1,892	25%	16%	81%	3%
Northeast	546	25%	17%	80%	3%
<b>Northern</b>	<b>3,342</b>	<b>26%</b>	<b>16%</b>	<b>81%</b>	<b>2%</b>
<b>Program</b>	<b>58,554</b>	<b>23%</b>	<b>16%</b>	<b>81%</b>	<b>4%</b>

NOTE: SMP data extraction date: August 24, 2015



## 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, 2012 and December 31, 2014, 529,695 women ages 40 and over participated in the SMP.
- The highest overall participation rates were seen in the 50 to 59, and 60 to 69 age groups, with a combined participation rate of 53%. Northeast had the lowest participation rate at 40%, while Richmond had the highest at 56%.
- Compared with 2013, the participation decreased slightly in the 40-49 and 70-79 age groups. Participation remained the same for 60-69 year olds at 55%. North Shore/Coast Garibaldi and Northeast showed the highest increase in participation compared with 2013 (by 3% respectively)

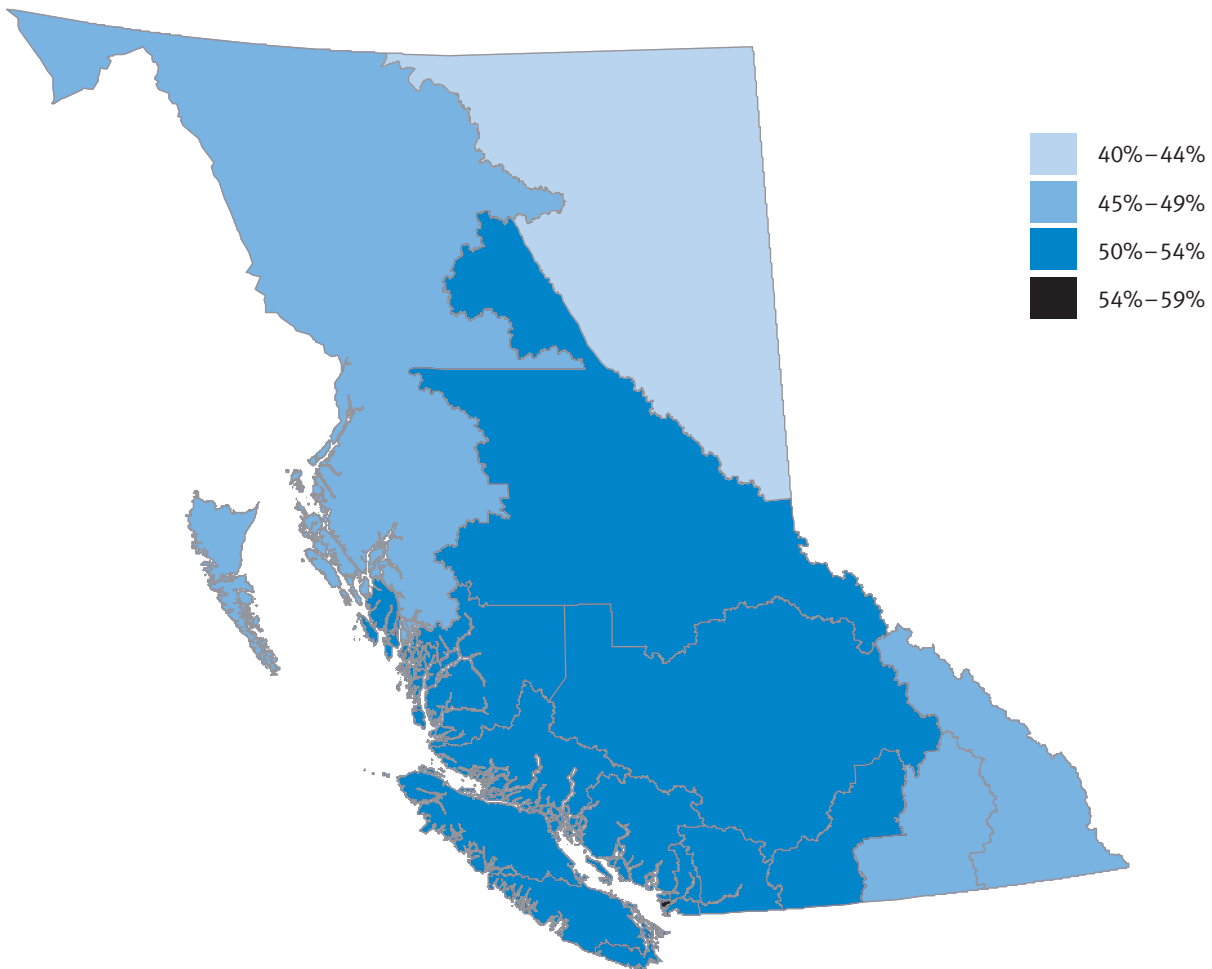
**TABLE 3: REGIONAL 30-MONTH PARTICIPATION RATES BY 10-YEAR AGE GROUPS ENDING DECEMBER 31, 2014 INCLUSIVE**

HSDA	10-Year Age Groups					Ages 50-69
	40-49	50-59	60-69	70-79	80-89	
East Kootenay	32%	46%	53%	42%	3%	49%
Kootenay Boundary	27%	44%	48%	40%	3%	46%
Okanagan	37%	51%	59%	47%	3%	54%
Thompson Cariboo Shuswap	37%	49%	55%	44%	3%	52%
Fraser East	39%	48%	54%	43%	2%	51%
Fraser North	43%	51%	55%	41%	3%	53%
Fraser South	43%	50%	53%	41%	2%	52%
Richmond	44%	54%	59%	42%	2%	56%
Vancouver	41%	50%	54%	39%	2%	51%
North Shore/Coast Garibaldi	41%	52%	56%	45%	2%	54%
South Vancouver Island	37%	50%	57%	46%	2%	53%
Central Vancouver Island	35%	49%	59%	47%	3%	54%
North Vancouver Island	33%	49%	58%	45%	1%	53%
Northwest	34%	45%	49%	39%	1%	47%
Northern Interior	38%	50%	54%	42%	2%	52%
Northeast	23%	38%	42%	34%	2%	40%
<b>British Columbia</b>	<b>40%</b>	<b>50%</b>	<b>55%</b>	<b>43%</b>	<b>2%</b>	<b>53%</b>

### NOTES:

1. Based on the weighted average of 2012, 2013 and 2014 female population estimates
2. Population data source: P.E.O.P.L.E. 2014 population projection (Sept 2014), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
3. Postal code translation file: TMF201505 (May 2015).
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: July 13, 2015.

**FIGURE 4: BIENNIAL SCREENING PARTICIPATION BY WOMEN AGES 50 TO 69 OVER 30 MONTH PERIOD BETWEEN JULY 1, 2012 AND DECEMBER 31, 2014**



**NOTES:**

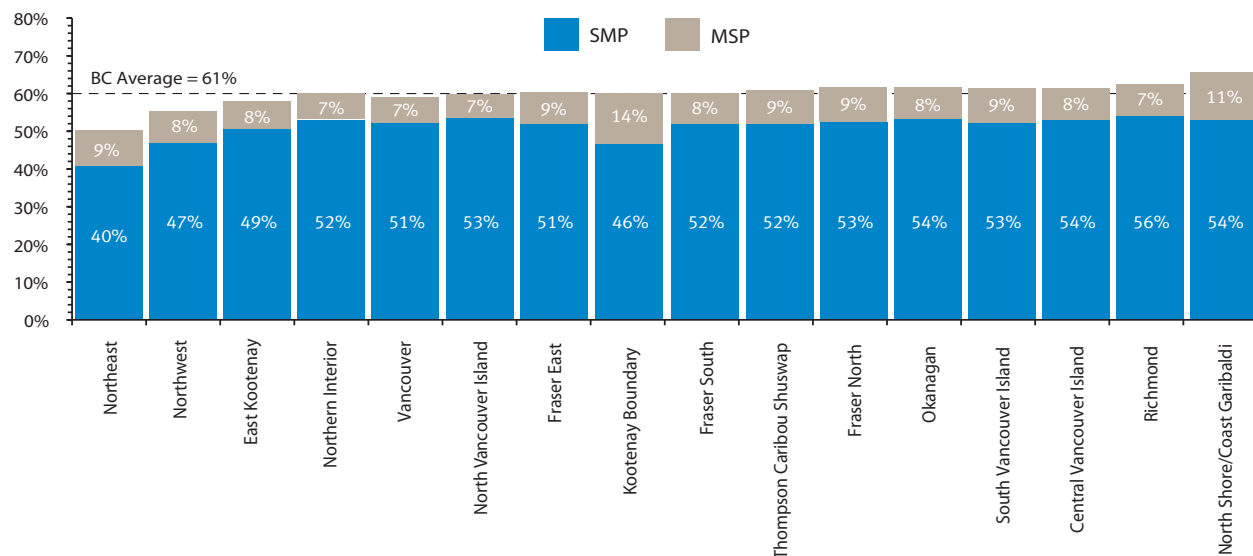
1. Based on the weighted average of 2012, 2013 and 2014 female population estimates
2. Population data source: P.E.O.P.L.E. 2014 population projection (Sept 2014), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
3. Postal code translation file: TMF201505 (May 2015).
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: July 13, 2015.

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 5 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, which is a 1% increase from 60% reported in 2013.
- The percentage of women ages 50 to 69 receiving bilateral mammography ranged from 49% to 66% across the province, with Northeast (49%) and Northwest (55%) having the lowest percentages.
- Overall, the SMP provided 86% of the bilateral mammography services for this age group.

**FIGURE 5: BILATERAL MAMMOGRAPHY UTILIZATION BY WOMEN AGES 50 TO 69 IN BC  
BETWEEN JULY 1, 2012 AND DECEMBER 31, 2014 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, 2015 for services provided between July 1, 2012 and December 31, 2014.
3. SMP data includes single and multiple screens per woman provided between July 1, 2012 and December 31, 2014.
4. 2012 to 2014 Projected Population Data Source: P.E.O.P.L.E. 2013 (Sept 2013), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
5. SMP data extraction date: August 24, 2015

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. 2014 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 85% of attendee's ages 50 to 69 screened between July 1, 2012 and December 31, 2014. 15.5% of attendees did not specify their ethnicity and were excluded from this analysis.

- Participation in SMP by select ethnic groups has increased over the last four consecutive years, and is now higher than the overall provincial rate.
- Participation by First Nations women has increased by 9% overall (from 47.7% to 56.5%),
- Participation by East/South East Asians has increased by 3% overall (from 53.4% to 56.3%)
- Participation by South Asians has increased by 5% overall (from 50.2% to 55.3%).

These increases are as a result of outreach and mobile visits to select ethnic communities and targeted promotion activities by community partners such as the successful Canadian Cancer Society Sirf Dus campaign. Table 4 indicates that there are regional variations. 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, 2012 AND DECEMBER 31, 2014 INCLUSIVE**

HSDA	First Nations		East/South-East Asians		South Asians	
	Population %	Participation Rate	Population %	Participation Rate	Population %	Participation Rate
East Kootenay	1%	100%	1%	100%	1%	44%
Kootenay Boundary	<1%	100%	1%	60%	<1%	100%
Okanagan	1%	70%	1%	50%	1%	64%
Thompson Cariboo Shuswap	4%	54%	1%	83%	1%	47%
Fraser East	2%	51%	2%	76%	9%	52%
Fraser North	<1%	58%	25%	57%	4%	60%
Fraser South	<1%	75%	10%	62%	15%	48%
Richmond	<1%	100%	51%	58%	6%	57%
Vancouver	1%	42%	41%	50%	4%	62%
North Shore/Coast Garibaldi	2%	47%	7%	59%	2%	90%
South Vancouver Island	1%	57%	4%	50%	1%	73%
Central Vancouver Island	2%	47%	2%	56%	1%	50%
North Vancouver Island	2%	57%	1%	70%	<1%	100%
Northwest	15%	54%	3%	25%	1%	100%
Northern Interior	4%	67%	2%	38%	1%	67%
Northeast	4%	66%	1%	8%	<1%	56%
<b>British Columbia</b>	<b>1%</b>	<b>57%</b>	<b>13%</b>	<b>56%</b>	<b>4%</b>	<b>55%</b>

#### PARTICIPATION RATE:

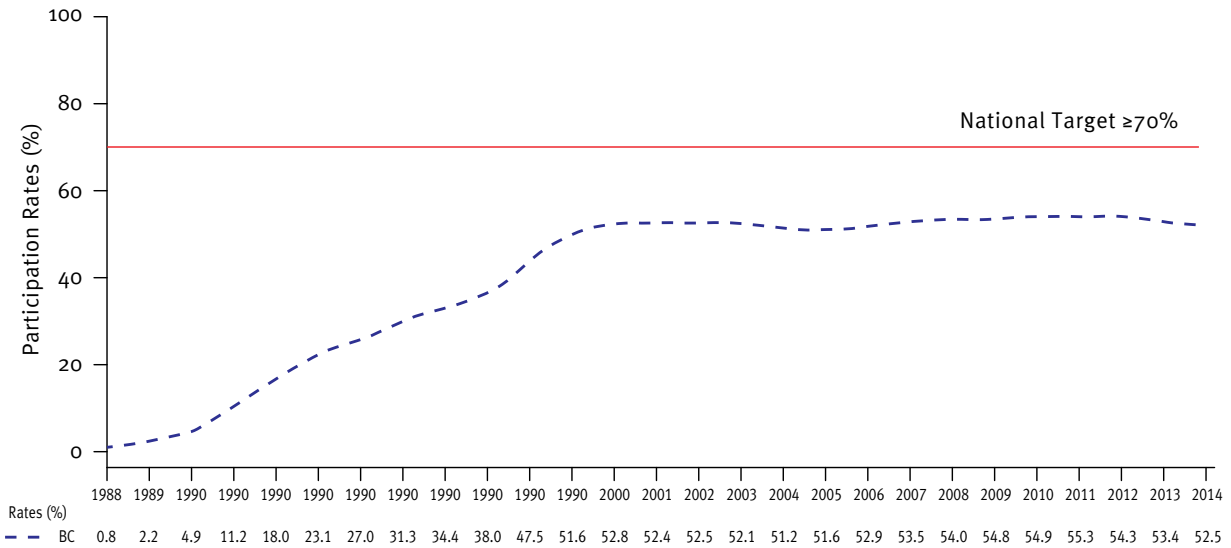
1. Population data sources: P.E.O.P.L.E. 2013 population projection (Sept 2013), BC STATS, Ministry of Technology, Innovation and Citizens' Services, Government of British Columbia, and Statistics Canada, National Household Survey Custom Profile, 2011 (original data source).
2. Postal code translation file: TMF201406 (June 2014).
3. Women attended the SMP at least once between July 1, 2011 and December 31, 2013 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 13, 2014.

#### 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 centers enabling all BC women to have reasonable access to screening services. There are now 40 fixed and mobile centers serving BC. The percentage of women in the target population increased each year until 2000 and has remained steady since then, ranging between 51-54%. This participation rate does not include women screened outside of the program.

**FIGURE 6 – SMP PARTICIPATION RATES (%) FOR WOMEN 50 TO 69 BY CALENDAR YEAR: 1988–2014**



NOTE: SMP data extraction date: August 24, 2015

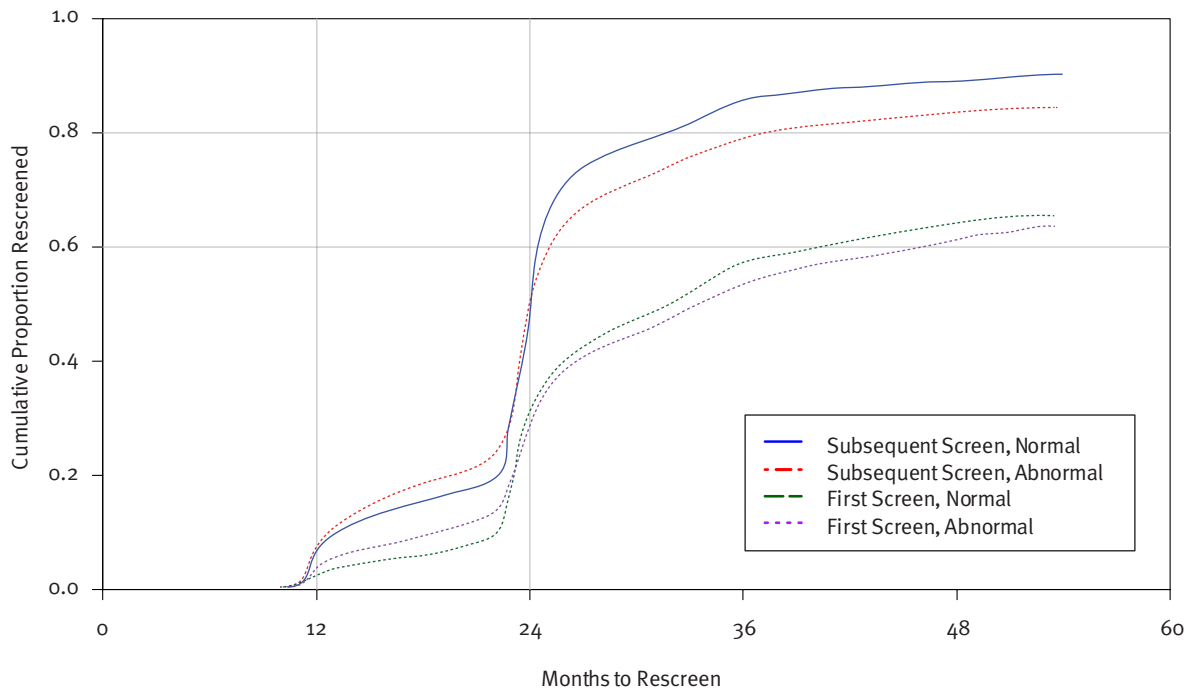
## Screening Return Rates

**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 7 and Table 5 show return rates for women ages 50 to 69 who attended SMP between 2011 and 2013. About 3% more women with a previous abnormal result at their last visit self-select to return early (by 18 months) than those with normal results. But by 24 months, when SMP recall mailing is active, women with normal results are more likely to respond to the recall letters. First time women attendees have a much lower rate of return than those who have had two or more visits already. Compared to 2010-2012 the 30 month retention rate dropped slightly by 1% for women with both either normal or abnormal results. 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 7: RETURN RATES FOR WOMEN AGE 50-69 BY FIRST/SUBSEQUENT SCREENS AND SCREEN RESULT: 2011–2013**



NOTE: SMP data extraction date: August 24, 2015



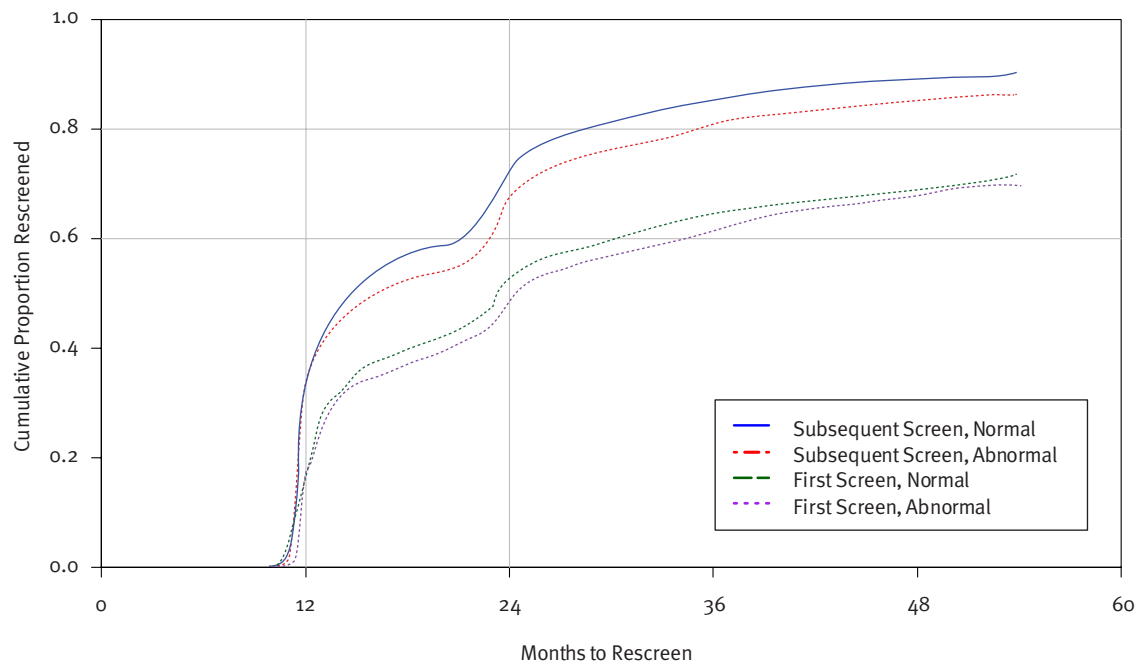
TABLE 5: RETURN RATES FOR WOMEN AGE 50 TO 69: 2011 – 2013

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
<b>Total Number to be Re-screened</b>	21,901	4,413	428,294	26,704	450,195	31,117
<b>Returned by 12 months</b>	1%	1%	3%	3%	3%	3%
18 months	5%	8%	15%	17%	14%	16%
24 months	21%	23%	43%	42%	42%	39%
30 months	46%	44%	78%	70%	76%	67%
36 months	56%	52%	85%	78%	84%	75%

NOTE: SMP data extraction date: August 24, 2015

Figure 8 shows a graph of return rates for women ages 40 to 49 who attended SMP previously between 2011 and 2013. Women in this cohort were contacted and notified of the change in screening frequency for their age group (every two years rather than annually). As a result of the policy change there was a significant shift in women delaying their return to screening compared with 2013. By 24 months 65% of women with a previous normal result and 57% of women with an abnormal result had returned to screening. Just as observed for women ages 50-69, first time women ages 40-49 also have a much lower rate of return than those who had two or more visits already.

FIGURE 8: RETURN RATES FOR WOMEN AGE 40-49 BY FIRST/SUBSEQUENT SCREENS AND SCREEN RESULT: 2011-2013



NOTE: SMP data extraction date: August 24, 2015

TABLE 6: RETURN RATES FOR WOMEN AGE 40-49: 2011-2013

	First Screen		Subsequent Screen		Overall	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
<b>Total Number to be Re-screened</b>	48,344	8,895	201,663	15,229	250,007	24,124
<b>Returned by 12 months</b>	7%	7%	13%	12%	12%	11%
18 months	39%	36%	55%	51%	52%	45%
24 months	50%	47%	69%	64%	65%	57%
30 months	59%	56%	80%	75%	76%	68%
36 months	63%	61%	85%	80%	80%	73%

NOTE: SMP data extraction date: August 24, 2015

## 8.2 2014 Screening Results

Table 7 summarizes the outcome indicators for screening exams provided in 2014 by 10-year age groups:

- Of the 259,342 screening mammograms performed, 21,873 (8.4%) had an abnormal result.
- There were 1,402 breast cancers reported in 2014 as of July 15, 2015 (5.4 per 1,000 exams).
- The 2014 overall cancer detection rate increased compared with 2013, from 4.8 to 5.4 cancers detected per 1000 women screened.
- 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 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, first and subsequent screen abnormal call rates increased in 2014 compared to 2013 (from 7.4 to 8.4%).
- The abnormal call rate is lower on subsequent screens than on first screens.
- The overall abnormal call rate decreases as women age, from 10.9% for ages 40 to 49 to 6.8% 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 2014 compared to 2013 (from 4.8 per 100 screens to 5.4 per 100).
- The cancer detection rate increased across all age groups.
- The higher risk cancer detection rate was higher than the average risk cancer detection rate for both first and subsequent screens.

### 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 was similar to 2013.
- Cancer detection rates, ductal carcinoma in-situ (DCIS) detection rates, positive predictive values, core biopsy yield ratios, and open biopsy yield ratios increase with age. Compared to 2013, the overall and DCIS cancer detection rates, and core biopsy ratio increased for overall, first, and subsequent screens.
- The overall core biopsy yield rate increased by 4% compared with the rate in 2013 (39.2% in 2014 compared with 35.4% in 2013)

TABLE 7: SMP OUTCOME INDICATORS BY 10-YEAR AGE GROUP: 2014

Outcome Indicators		Age at Exam					All
		40-49	50-59	60-69	70-74	75+	
<b>Number of Exams</b>		54,191	88,724	81,859	25,401	8,974	259,341
% on first screens		27.2%	6.8%	3.5%	1.8%	2.1%	9.4%
% on higher risk screens		16.9%	22.0%	25.3%	27.4%	24.0%	22.6%
<b>Number of Cancers</b>		147	397	537	234	89	1,404
% on first screens		43.5%	12.6%	8.8%	3.0%	2.2%	12.1%
% on higher risk screens		21.8%	27.0%	25.5%	29.9%	32.6%	26.7%
<b>Abnormal Call Rate</b>		10.9%	8.5%	7.3%	6.8%	6.9%	8.4%
on first screens	Overall	17.5%	20.4%	18.4%	18.4%	15.1%	18.3%
	Higher Risk	19.5%	20.2%	17.9%	16.9%	6.8%	19.1%
	Average Risk	17.2%	20.4%	18.5%	18.7%	17.6%	18.2%
on subsequent screens	Overall	8.5%	7.7%	6.9%	6.6%	6.7%	7.4%
	Higher Risk	8.8%	7.8%	6.9%	7.0%	6.8%	7.5%
	Average Risk	8.4%	7.6%	6.9%	6.4%	6.7%	7.4%
<b>Overall Cancer Detection Rate (per 1,000)</b>		2.7	4.5	6.6	9.2	9.9	5.4
on first screens	Overall	4.3	8.3	16.6	15.4	10.8	7.0
	Higher Risk	5.1	5.8	19.4	12.0	22.7	7.7
	Average Risk	4.3	8.6	16.2	16.1	7.1	6.9
on subsequent screens	Overall	2.1	4.2	6.2	9.1	9.9	5.3
	Higher Risk	3.2	5.5	6.4	10.0	13.3	6.3
	Average Risk	1.9	3.8	6.1	8.8	8.8	4.9
<b>DCIS Detection Rate (per 1,000)</b>		0.8	0.9	1.2	1.8	1.8	1.1
on first screens	Overall	1.5	1.3	1.8	2.2	---	1.5
	Higher Risk	3.2	1.4	4.9	---	---	2.8
	Average Risk	1.3	1.3	1.2	2.7	---	1.3
on subsequent screens	Overall	0.6	0.9	1.2	1.8	1.8	1.1
	Higher Risk	0.8	1.1	1.3	2.2	3.3	1.3
	Average Risk	0.6	0.8	1.1	1.7	1.3	1.0
<b>Positive Predictive Value of Screening Mammography</b>		2.5%	5.3%	9.0%	13.7%	14.4%	6.5%
on first screens	Overall	2.5%	4.1%	9.1%	8.5%	7.4%	3.8%
	Higher Risk	2.6%	2.9%	11.0%	7.1%	33.3%	4.0%
	Average Risk	2.5%	4.3%	8.8%	8.8%	4.2%	3.8%
on subsequent screens	Overall	2.5%	5.5%	9.0%	14.0%	14.8%	7.1%
	Higher Risk	3.6%	7.0%	9.2%	14.3%	19.4%	8.5%
	Average Risk	2.2%	5.0%	8.9%	13.8%	13.3%	6.7%

TABLE 7: SMP OUTCOME INDICATORS BY 10-YEAR AGE GROUP: 2014 (CONT'D)

Outcome Indicators	Age at Exam					All
	40-49	50-59	60-69	70-74	75+	
<b>Core Biopsy Yield Ratio</b>	16.1%	29.8%	45.1%	53.0%	60.0%	35.0%
on first screens	14.1%	20.0%	34.4%	29.2%	50.0%	19.7%
on subsequent screens	18.1%	31.9%	46.5%	54.6%	60.3%	39.1%
<b>Open Biopsy Yield Ratio</b>	10.3%	25.8%	27.8%	45.5%	27.3%	24.3%
% on first screens	11.8%	28.6%	31.3%	---	---	18.6%
% on higher risk screens	9.2%	25.3%	27.4%	45.5%	28.6%	25.6%

## NOTES:

1. See glossary in the Appendix for definitions of terms.
2. Overall Cancer Rate includes ductal carcinoma in situ (DCIS)
3. An additional 141 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. 192 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 24, 2015.

Diagnostic procedure information is available to date on 21,193 (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.

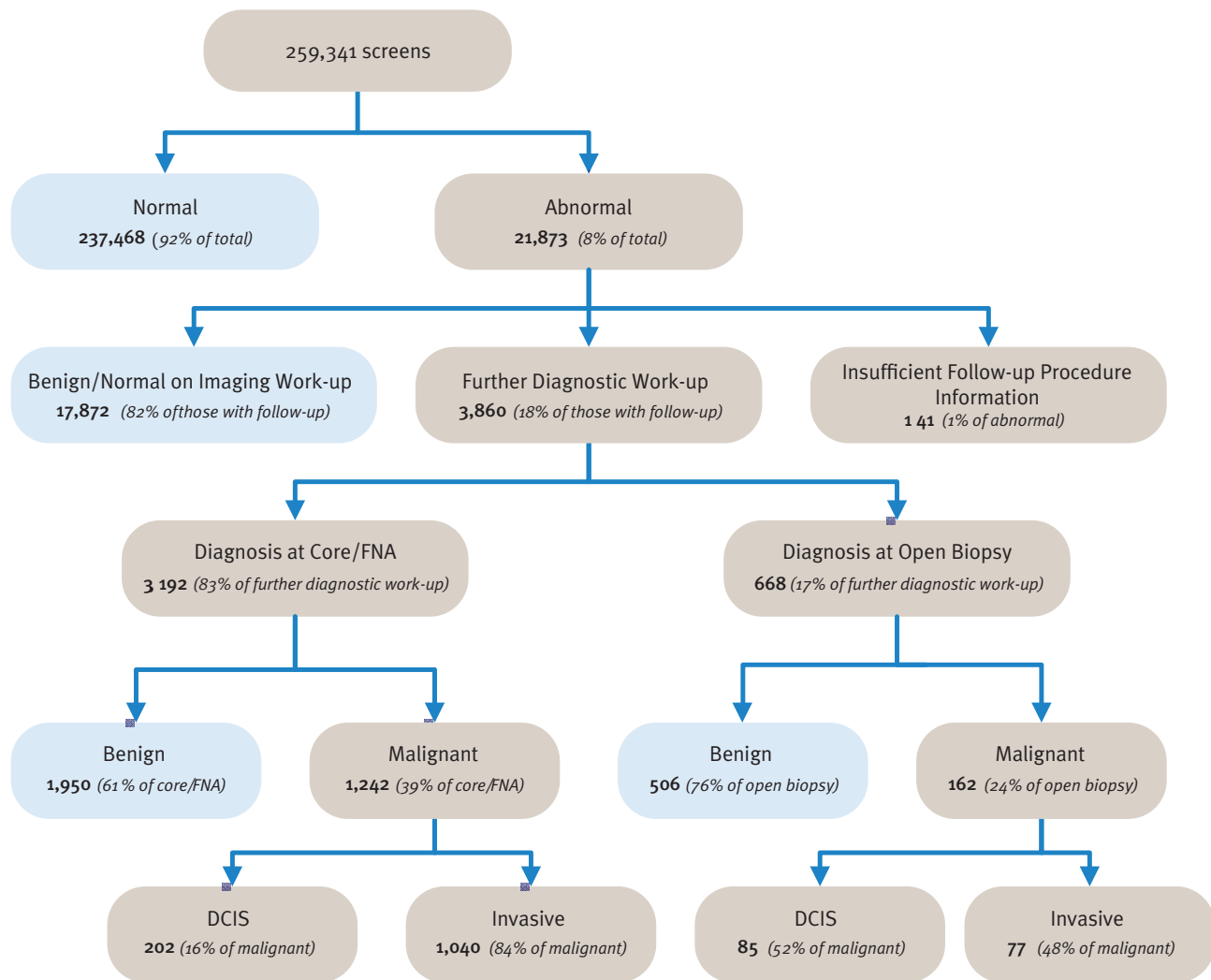
Overall, 16% and 3% of women with abnormal screening mammograms had core biopsy and open biopsy, respectively. The number of core biopsies performed increased by 1% (from 15% to 16%) compared to the previous year.

TABLE 8: DIAGNOSTIC PROCEDURES RECEIVED BY SMP PARTICIPANTS WITH "ABNORMAL" SCREENING MAMMOGRAMS: 2014

Procedure	Age at Exam						All
	<40	40-49	50-59	60-69	70-79	80+	
Diagnostic Mammogram	90%	93%	94%	95%	95%	92%	94%
Ultrasound	77%	67%	65%	65%	66%	66%	66%
Fine Needle Aspiration	0%	1%	1%	1%	2%	1%	1%
Core Biopsy	0%	13%	15%	18%	22%	30%	16%
Surgical Biopsy	3%	3%	3%	3%	4%	1%	3%
with Localization	3%	3%	3%	3%	3%	1%	3%
Number of cases with diagnostic assessment information available	30	5,877	7,525	5,975	2,229	96	21,732

NOTE: SMP data extraction date: August 24, 2015.

FIGURE 9: SCREENING OUTCOME SUMMARY (2014)



### 8.3 2013 Cancer Detection

Histologic features of breast cancers detected by the SMP in 2013 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, 21% of cancers detected were in situ.
- Of the invasive cancers detected, 62% were  $\leq 15$  mm, 76% did not have invasion of the regional lymph nodes (a 2% decrease compared with 78% in 2012), and 24% were grade 3 (i.e. poorly differentiated) tumours, compared with 26% in 2012.
- Of the grade 3 tumours, 33% were smaller than 15 mm.

These overall outcome indicators met the international targets<sup>4</sup> recommended for screening programs.

**TABLE 9: HISTOLOGIC FEATURES OF BREAST CANCERS DETECTED BY SMP: 2013**

Histological Features	Age at Exam								Age 40-79	
	40-49		50-59		60-69		70-79			
Number of Cancers	189		373		499		320		1,381	
in situ	53	28%	87	23%	95	19%	58	18%	293	21%
invasive	136	72%	286	77%	404	81%	262	82%	1,088	79%
Invasive Cancers Tumour Size										
≤5 mm	13	10%	23	8%	42	11%	31	12%	109	10%
6-10 mm	20	16%	54	19%	104	26%	73	28%	251	24%
11-15 mm	27	21%	89	32%	111	28%	71	27%	298	28%
16-20 mm	24	19%	49	18%	57	15%	42	16%	172	16%
>20 mm	45	35%	63	23%	79	20%	43	17%	230	22%
unknown size	(7)		(8)		(11)		(2)		(28)	
Invasive Cancers with tumour ≤ 15 mm										
	60	47%	166	60%	257	65%	175	67%	658	62%
Node Involvement in Invasive Cancers										
no	80	68%	193	73%	286	77%	201	83%	760	76%
yes	38	32%	72	27%	84	23%	42	17%	236	24%
no nodes sampled / unknown	(18)		(21)		(34)		(19)		(92)	
Histologic Grade of Invasive Cancers										
1 - well differentiated	28	23%	74	27%	124	32%	90	36%	316	30%
2 - moderately differentiated	59	48%	123	45%	171	44%	123	49%	476	46%
3 - poorly differentiated	36	29%	78	28%	92	24%	39	15%	245	24%
unknown grade	(13)		(11)		(17)		(10)		(51)	
Grade 3 tumour ≤ 15 mm	6	17%	29	37%	32	35%	15	38%	82	33%

**NOTES:**

1. Targets<sup>1</sup>:  $>50\%$  invasive tumours  $\leq 15$ mm,  $>70\%$  with negative nodes,  $>30\%$  grade 3 tumours  $\leq 15$ mm.
2. SMP data extraction date: August 24, 2015.

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: 2010–2014

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

- Abnormal call rates, cancer detection rates, and positive predictive values have increased slightly over 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 2014, 24.3% 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 8. 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 2010 AND 2014 INCLUSIVE

Outcome Indicators	Calendar Year					5-Year Cumulative
	2010	2011	2012	2013	2014	
<b>Number of Exams</b>	303,132	305,403	281,699	287,729	259,341	1,437,304
% on first screens	11.2%	10.8%	9.6%	9.4%	9.4%	10.1%
<b>Number of Cancers</b>	1,289	1,479	1,273	1,397	1,404	6,842
% on first screens	13.6%	13.7%	11.1%	12.1%	12.1%	12.5%
<b>Abnormal Call Rate</b>	7.3%	7.8%	7.5%	7.4%	8.4%	7.7%
on first screens	15.6%	16.8%	16.0%	16.6%	18.3%	16.6%
on subsequent screens	6.2%	6.7%	6.5%	6.5%	7.4%	6.7%
<b>Overall Cancer Detection Rate (per 1,000)</b>	4.3	4.8	4.5	4.9	5.4	4.8
on first screens	5.2	6.2	5.2	6.3	7.0	5.9
on subsequent screens	4.1	4.7	4.4	4.7	5.3	4.6
<b>DCIS Detection Rate (per 1,000)</b>	0.9	1.0	0.9	1.0	1.1	1.0
on first screens	1.3	1.6	1.0	1.4	1.5	1.4
on subsequent screens	0.8	0.9	0.9	1.0	1.1	0.9
<b>Positive Predictive Value of Screening Mammography</b>	5.9%	6.2%	6.1%	6.6%	6.5%	6.3%
on first screens	3.4%	3.7%	3.3%	3.8%	3.8%	3.6%
on subsequent screens	6.7%	7.0%	6.8%	7.3%	7.1%	7.0%
<b>Core Biopsy Yield Ratio</b>	35.1%	35.0%	33.6%	35.5%	35.0%	34.8%
on first screens	18.3%	17.9%	16.0%	18.3%	19.7%	18.0%
on subsequent screens	40.9%	40.8%	38.7%	40.6%	39.1%	40.0%
<b>Open Biopsy Yield Ratio</b>	29.2%	26.3%	24.0%	23.8%	24.3%	25.7%
on first screens	19.6%	18.0%	15.9%	14.9%	18.6%	17.5%
on subsequent screens	32.0%	29.0%	26.2%	26.7%	25.6%	28.1%
<b>Interval Cancer Rate (per 1,000)</b>						
0-12 months	0.71	0.55	0.70	0.62	---	---
after first screens	0.56	0.21	0.78	0.78	---	---
after subsequent screens	0.73	0.59	0.69	0.60	---	---
13-24 months	0.77	0.76	0.68	---	---	---
<b>Sensitivity (i.e. 1 - false negative rate)</b>	85.6%	89.7%	86.6%	---	---	---
<b>Specificity (i.e. 1 - false positive rate)</b>	93.2%	92.7%	93.0%	93.1%	---	---
<b>Prevalence to Expected Incidence Ratio for Age 50-79 (target<sup>1</sup>: &gt;3.0)</b>	4.40	6.20	4.60	5.20	5.40	5.20

## 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 2014 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 24, 2015.

1 Day NE, Williams DRR, Khaw KT. Breast Cancer Screening Programmes: The Development of a Monitoring and Evaluation System. Br J Cancer 1989; 59:954-958

## 8.5 Outcome Indicators by 10-Year Age Groups: 2010 – 2014 Cumulative

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

- From 2009 to 2013, the SMP provided 1,437,304 screening mammography examinations, and detected 6,842 breast cancers.
- About 86% 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 120:1 for women in their 70's to 460:1 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 2010 AND 2014 INCLUSIVE

Outcome Indicators	Age at Exam					All
	40-49	50-59	60-69	70-79	80+	
<b>Number of Exams</b>	<b>430,063</b>	<b>449,627</b>	<b>375,915</b>	<b>174,764</b>	<b>5,715</b>	<b>1,437,304</b>
% first screens	22.0%	7.1%	3.7%	1.9%	3.3%	10.1%
<b>Number of Cancers</b>	<b>968</b>	<b>1,853</b>	<b>2,426</b>	<b>1,512</b>	<b>83</b>	<b>6,842</b>
% on first screens	34.5%	14.2%	7.7%	4.4%	9.6%	12.5%
<b>Abnormal Call Rate</b>	<b>9.2%</b>	<b>7.5%</b>	<b>6.7%</b>	<b>6.3%</b>	<b>7.1%</b>	<b>7.7%</b>
on first screens	16.0%	18.0%	17.3%	17.3%	14.0%	16.6%
on subsequent screens	7.3%	6.7%	6.3%	6.1%	6.9%	6.7%
<b>Overall Cancer Detection Rate (per 1,000)</b>	<b>2.3</b>	<b>4.1</b>	<b>6.5</b>	<b>8.7</b>	<b>14.5</b>	<b>4.8</b>
on first screens	3.5	8.2	13.2	20.4	43.2	5.9
on subsequent screens	1.9	3.8	6.2	8.4	13.6	4.6
<b>DCIS Detection Rate (per 1,000)</b>	<b>0.7</b>	<b>0.9</b>	<b>1.2</b>	<b>1.5</b>	<b>1.8</b>	<b>1.0</b>
on first screens	1.1	1.6	2.1	3.3	0.0	1.4
on subsequent screens	0.6	0.8	1.2	1.5	1.8	0.9
<b>Positive Predictive Value of Screening Mammography</b>	<b>2.5%</b>	<b>5.5%</b>	<b>9.7%</b>	<b>13.9%</b>	<b>20.5%</b>	<b>6.3%</b>
on first screens	2.2%	4.6%	7.7%	12.0%	32.0%	3.6%
on subsequent screens	2.6%	5.7%	9.9%	14.0%	19.7%	7.0%
<b>Core Biopsy Yield Ratio</b>	<b>17.0%</b>	<b>31.0%</b>	<b>46.6%</b>	<b>55.8%</b>	<b>75.5%</b>	<b>34.8%</b>
on first screens	12.0%	20.9%	32.7%	40.3%	85.7%	18.0%
on subsequent screens	21.4%	33.6%	48.3%	56.8%	74.7%	40.0%
<b>Open Biopsy Yield Ratio</b>	<b>13.8%</b>	<b>24.1%</b>	<b>32.5%</b>	<b>43.5%</b>	<b>60.0%</b>	<b>25.7%</b>
on first screens	13.2%	20.3%	27.0%	37.9%	100.0%	17.5%
on subsequent screens	14.2%	25.0%	33.0%	43.9%	53.8%	28.1%
<b>Interval Cancer Rate (per 1,000)</b>						
0-12 months	0.57	0.52	0.64	0.53	0.35	0.57
after first screens	0.47	0.62	0.71	0.30	<0.01	0.52
after subsequent screens	0.60	0.52	0.63	0.54	0.36	0.57
13-24 months	0.02	0.63	0.82	0.90	1.40	0.53
<b>Sensitivity (i.e. 1 - false negative rate)</b>	<b>79.8%</b>	<b>88.7%</b>	<b>91.0%</b>	<b>94.2%</b>	<b>97.6%</b>	<b>89.4%</b>
<b>Specificity (i.e. 1 - false positive rate)</b>	<b>91.0%</b>	<b>92.9%</b>	<b>94.0%</b>	<b>94.6%</b>	<b>94.3%</b>	<b>92.8%</b>

## 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 2014 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 24, 2015.

## 8.6 Outcome Indicators by HSDA: 2010–2014 Cumulative

Outcome indicators for 2010 to 2014 are summarized by HSDA in Table 12.

- South Vancouver Island region has the lowest abnormal call rate (5%), while Fraser East has the highest (11%).
- Northeast has the lowest cancer detection rate (3.0 per 1,000), and Central Vancouver Island has the highest (5.7 per 1,000).
- Northeast and East Kootenay have the lowest positive predictive value (4%) and all Vancouver Island regions have the highest (9%).
- All of the HSDAs meet the international targets recommended for screening programs for invasive tumour detection size (target > 50%); nine 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 2010 AND 2014 INCLUSIVE**

HSDA	% Called Abnormal	Cancer Detection Rate (per 1000)	PPV	In-Situ : Invasive (number)	% Invasive ≤15 mm	% Invasive with -ve nodes
East Kootenay	9%	4.2	4%	14 : 81	68%	79%
Kootenay Boundary	6%	4.5	8%	21 : 75	59%	75%
Okanagan	6%	4.9	8%	98 : 512	61%	77%
Thompson Cariboo	7%	5.6	8%	78 : 331	59%	73%
Fraser East	11%	5.5	5%	83 : 355	56%	68%
Fraser North	8%	4.5	6%	220 : 674	63%	69%
Fraser South	9%	4.7	5%	229 : 811	60%	70%
Richmond	7%	4.2	6%	79 : 218	62%	68%
Vancouver	8%	4.7	6%	238 : 646	63%	68%
North Shore / Coast Garibaldi	7%	4.8	7%	105 : 365	65%	70%
South Vancouver Island	5%	4.5	9%	72 : 478	54%	68%
Central Vancouver Island	6%	5.7	9%	92 : 451	65%	76%
North Vancouver Island	6%	5.0	9%	34 : 171	69%	77%
Northwest	7%	4.5	7%	21 : 62	56%	69%
Northern Interior	7%	4.1	6%	29 : 142	61%	65%
Northeast	9%	3.0	4%	5 : 30	63%	70%
<b>Program</b>	<b>8%</b>	<b>4.8</b>	<b>6%</b>	<b>1424 : 5418</b>	<b>61%</b>	<b>71%</b>

**NOTES:**

1. See glossary in the Appendix for definitions of terms.
2. Targets<sup>1</sup>: >50% invasive tumours ≤15mm, >70% with negative nodes
3. SMP data extraction date: August 24, 2015.

<sup>5</sup> Tabär 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 2013

From the start of the program in July 1988 to December 2013, 21,018 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 2013 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 2013**

Histological Features	Age at Exam										Age 40+	
	40-49		50-59		60-69		70-79		80+			
Number of Cancers	3,459		5,928		6,642		4,662		328		21,019	
in situ	1,092	32%	1,471	25%	1,355	20%	823	18%	35	11%	4,776	23%
invasive	2,367	68%	4,457	75%	5,287	80%	3,839	82%	293	89%	16,243	77%
Invasive Cancers Tumour Size												
≤5 mm	231	10%	411	9%	465	9%	290	8%	27	9%	1,424	9%
6-10 mm	453	20%	1,054	24%	1,427	27%	1,171	31%	76	26%	4,181	26%
11-15 mm	635	27%	1,236	28%	1,575	30%	1,136	30%	86	30%	4,668	29%
16-20 mm	359	16%	737	17%	780	15%	573	15%	50	17%	2,499	16%
>20 mm	636	27%	959	22%	988	19%	625	16%	51	18%	3,259	20%
unknown size	(53)		(60)		(52)		(44)		(3)		(212)	
Invasive Cancers with tumour ≤ 15 mm												
	1,319	57%	2,701	61%	3,467	66%	2,597	68%	189	65%	10,273	64%
Node Involvement in Invasive Cancers												
no	1,489	70%	3,034	73%	3,791	78%	2,718	81%	167	81%	11,199	76%
yes	652	30%	1,103	27%	1,094	22%	653	19%	40	19%	3,542	24%
no nodes sampled / unknown	(226)		(320)		(402)		(468)		(86)		(1502)	
Histologic Grade of Invasive Cancers												
1 - well differentiated	572	26%	1,310	32%	1,610	33%	1,294	37%	102	38%	4,888	32%
2 - moderately differentiated	946	43%	1,729	42%	2,202	45%	1,579	45%	114	43%	6,570	44%
3 - poorly differentiated	669	31%	1,093	26%	1,114	23%	658	19%	50	19%	3,584	24%
unknown grade	(180)		(325)		(361)		(308)		(27)		(1201)	
Grade 3 tumour ≤ 15 mm	273	41%	495	45%	568	51%	326	50%	22	44%	1,684	47%

**NOTES:**

1. Targets1: >50% invasive tumours ≤15mm, >70% with negative nodes, >30% grade 3 tumours ≤15mm.
2. SMP data extraction date: August 24, 2015.

## 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. 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 increased 1% compared to 2013 (52% plus 8% MSP to 53% plus 8% MSP).
- Compared with 2013 the retention rate decreased by 1% for first screens and 1% for subsequent screens.

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

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1 Tabár 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: 187-209

2 Day NE, Williams DRR, Khaw KT. Breast Cancer Screening Programmes: The Development of a Monitoring and Evaluation System. *Br J Cancer* 1989; 59:954-958

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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 <sup>7</sup>	SMP
<b>Participation Rate (1)</b>	≥70% of the eligible population	53% (plus 8% MSP)
<b>Retention Rate (2)</b>		
Initial Rescreen	≥75% initial re-screen within 30 months	46%
Subsequent Rescreen	≥90% subsequent re-screen within 30 months	77%
<b>Abnormal Call Rate (3)</b>		
First Screens	<10% first screens	19.7%
Subsequent Screens	<5% re-screens	7.3%
<b>Invasive Cancer Detection Rate (per 1000) (3)</b>		
First Screens	>5.0 per 1,000 first screens	9.5 per 1000
Subsequent Screens	>3.0 per 1,000 re-screens	4.2 per 1000
<b>In Situ Cancer Detection Rate (3)</b>		
First Screens	Surveillance and Monitoring only	1.5 per 1000
Subsequent Screens	Surveillance and Monitoring only	1.0 per 1000
<b>Diagnostic Interval (3)</b>		
no tissue biopsy performed	≥90% within 5 weeks if no tissue biopsy performed	80.3%
tissue biopsy performed	≥90% within 7 weeks if tissue biopsy performed	61.1%
<b>Positive Predictive Value (3)</b>		
First Screens	≥5% first screen	5.6%
Subsequent Screens	≥6% re-screens	7.1%
<b>Benign Core Biopsy Rate (per 1000) (3)</b>		
First Screens	Surveillance and Monitoring only	27.1 per 1000
Subsequent Screens	Surveillance and Monitoring only	7.2 per 1000
<b>Benign to Malignant Core Biopsy Ratio (3)</b>		
First Screens	Surveillance and Monitoring only	2.9 : 1
Subsequent Screens	Surveillance and Monitoring only	1.6 : 1
<b>Benign Open Biopsy Rate (per 1000) (3)</b>		
First Screens	Surveillance and Monitoring only	4.1 per 1000
Subsequent Screens	Surveillance and Monitoring only	1.6 per 1000
<b>Benign to Malignant Open Biopsy Ratio (3)</b>		
First Screens	≤1:1	2.4 : 1
Subsequent Screens	≤1:1	2.8 : 1
<b>Invasive Tumour size ≤10 mm (4)</b>	>25%	33%
<b>Invasive Tumour size ≤15 mm (4)</b>	>50%	63%
<b>Node Negative Rate in Cases of Invasive Cancer (4)</b>	>70%	75%

NOTES:

1. Screen years: (1) = July 1, 2012 - December 31, 2014, (2) = 2011-2013, (3) = 2014, (4) = 2013
2. Population data source: P.E.O.P.L.E. 2014 population projection (Sept 2014), BC Stats, Ministry of Technology, Innovation and Citizens' Services, Government of the Province of British Columbia.
3. SMP data extraction date: August 24, 2015.

<sup>7</sup> Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Screening Program Performance third Edition. Health Canada 2013



## 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](http://www.phsa.ca/AboutPHSA/PHSA_Budget_Financials/default.htm)

**TABLE 15: COST COMPARISON BY FISCAL YEAR**

Indicator	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015
<b>Total Cost</b>	<b>\$21,450,188</b>	<b>\$21,716,688</b>	<b>\$21,633,483</b>	<b>\$21,936,860</b>	<b>\$20,364,256</b>
<b>Total cost per screen</b>	<b>\$72.34</b>	<b>\$74.76</b>	<b>\$75.63</b>	<b>\$79.51</b>	<b>\$78.32</b>
Central Services	\$13.89	\$16.83	\$17.05	\$19.62	\$18.98
Screen Provision Costs	\$43.88	\$43.29	\$43.87	\$45.11	\$44.56
Professional Reading Fees	\$14.57	\$14.64	\$14.71	\$14.78	\$14.78
<b>Cost per cancer detected</b>	<b>\$16,608.48</b>	<b>\$15,074.27</b>	<b>\$16,294.50</b>	<b>\$15,707.82</b>	<b>Not Available</b>

**NOTES:**

1. Program Expenses are audited through PHSA Finance annually.
2. Screen Provision Costs includes, but are not limited to, staffing costs, equipment maintenance related costs, and mobile operation costs.
3. The professional reading fee was \$14.78 per screen effective April 1, 2014.
4. Number of cancers detected in 2014-15 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 24, 2015.



## 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 process<sup>8</sup>. 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.”<sup>9</sup>

### 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 used to identify individuals who may have occult disease.<sup>10,11,12</sup>

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).

<sup>8</sup> US Preventive Services Task Force: Guide to Clinical Preventive Services, Ed 2. Baltimore, Williams & Wilkins, 1996

<sup>9</sup> Morrison A: Screening in Chronic Disease. New York, Oxford Press, 1992

<sup>10</sup> Cole P, Morrison AS: Basic issues in cancer screening. In Miller AB (ed); Screening in Cancer. Geneva, International Union Against Cancer, 1978, P7

<sup>11</sup> Miller AB; Fundamentals of Screening. In Screening for Cancer. Orlando, Academic Press, 1985, P3

<sup>12</sup> 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

## Appendix 2 — 2014

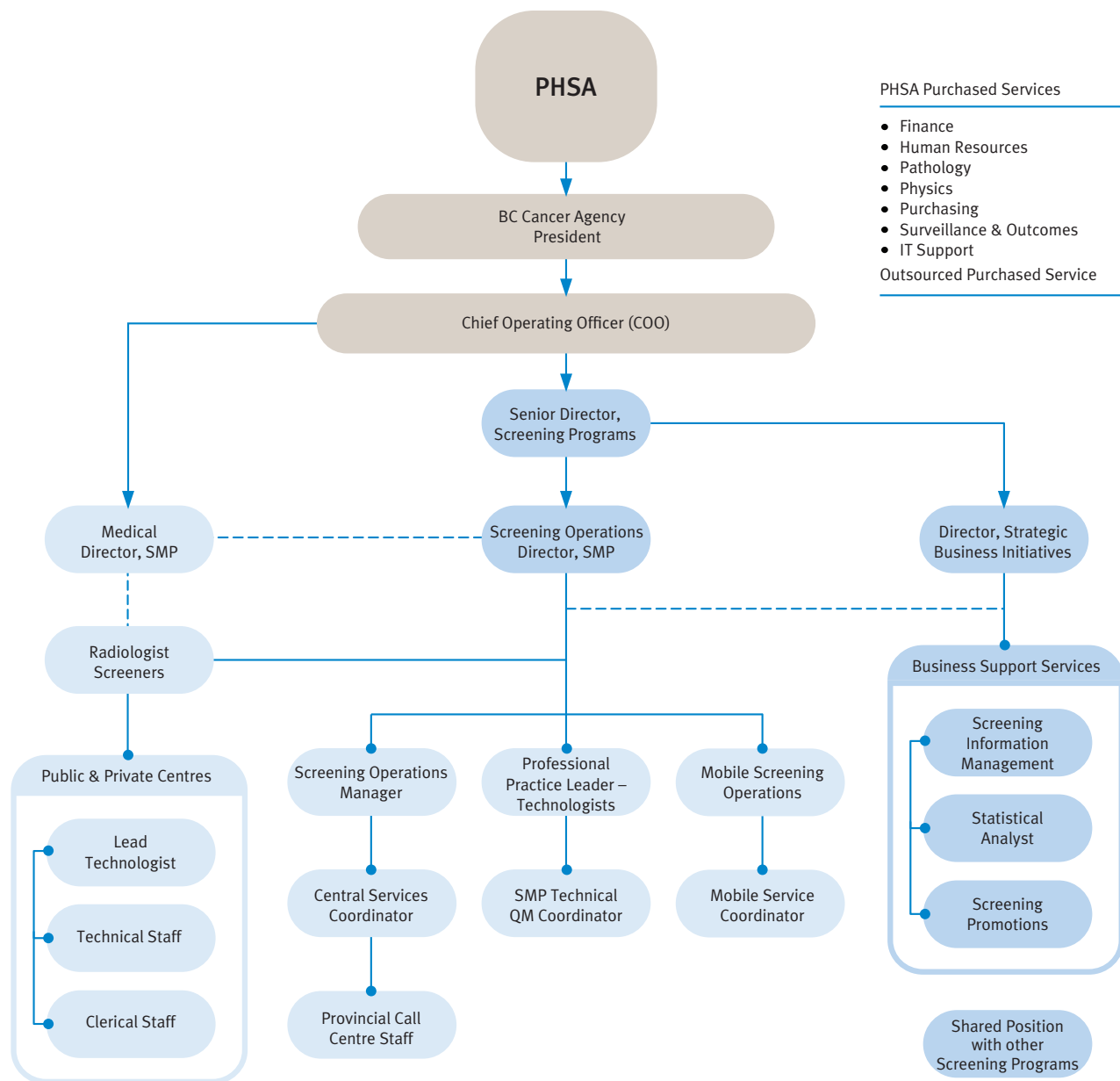
In 2014 SMP provided screening mammography to women ages 40 and over. The recall frequency shown below was used to calculate the program results for the period of January 1, 2014 – December 31, 2014.

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

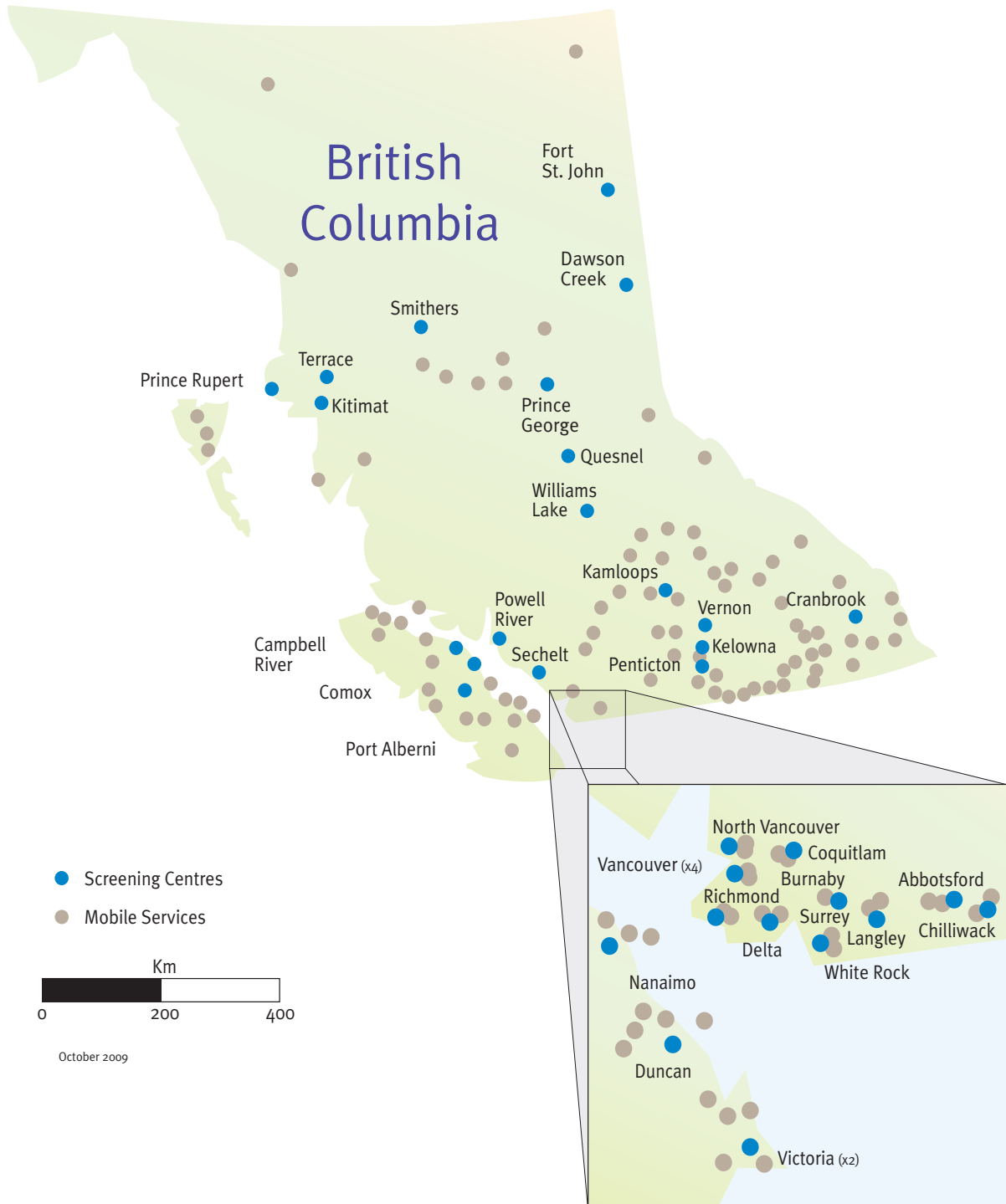
### Eligibility Criteria

- 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.

## Appendix 3 – SMP/BCCA Organization Chart



## Appendix 4 — Map of Screening Centres



## Appendix 5 — Screening Centre Contact Information

Abbotsford	604-851-4750	Prince George	250-565-6816
Burnaby	604-436-0691	Prince Rupert	1-800-663-9203
Campbell River	1-800-663-9203	Quesnel	1-800-663-9203
Chilliwack	1-800-663-9203	Smithers	1-800-663-9203
Comox	250-890-3020	Sechelt	1-800-663-9203
Coquitlam	604-927-2130	Richmond	604-244-5505
Cranbrook	250-417-3585	Surrey – JPOCSC	604-582-4592
Dawson Creek	1-800-663-9203	Terrace	1-800-663-9203
Delta	604-946-1121	Vernon	250-549-5451
Duncan	1-800-663-9203	White Rock	604-535-4512
Fort St. John	1-800-663-9203	Williams Lake	1-800-663-9203
Kamloops	250-828-4916		
Kelowna	250-861-7560	Vancouver	
Kitimat	1-800-663-9203	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
Provincial Screening Call Centre: 1-800-663-9203			

### Mobile Screening Service Delivery Areas

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

Lower Mainland locations change from time to time.

Latest visits include: Alouette Correctional Centre, BC Biomedical Lab, BCIT Campus, Ballard Auto, Buchanan Lodge, Chilliwack City Hall, Coast Mountain Bus Company, Creation Technologies, Downtown Eastside Women's Health Centre, ICBC North Vancouver, ICBC Surrey, Indo-Canadian Senior Centre, Maple Ridge City Hall, New Vista Society, North Vancouver City Hall, Overwaitea Head Office, Pacific Blue Cross, Richmond City Hall, Surrey Primary Care Centre, SFU Campus, Surrey Tax Centre, Telus, Translink, Vancouver Primary Care Centre/Native Health, Vancouver Tax Centre, West Vancouver City Hall, Work Safe BC (Richmond)

## First Nations Communities

Chehalis First Nation	Agassiz	Nadleh Whut'en First Nation	Fraser Lake
Seabird First Nation	Agassiz	Stella'ten First Nation	Fraser Lake
Esketemc First Nations	Alakli Lake	Laxgalts First Nation	Greenville
Boston Bar First Nation	Boston Bar	Kispiox First Nation	Hazelton
tsartlip First Nation	Brentwood Bay	Gingolx Indian Band	Kincolith
Lake Babine Nation	Burns Lake	Gitanyow First Nation	Kitwanga
Bonaparte Indian Band	Cache Creek	Lower Nicola Indian Band	Merritt
Canim Lake Indian Band	Camin Lake	Upper Nicola Indian Band	Merritt
Cambell River First Nation	Campbell River	Nanoose First Nation	Nanoose Bay
Penelakut Tribe	Chemainus	Gitlakdamix First Nation	New Aiyansh
Stz'uminus First Nation	Chemainus	Esketemc First Nations	North Vancouver
Sto:lo First Nation	Chilliwack	Squamish First Nation	North Vancouver
Quatsion First Nation	Coal Harbour	Tseshaht First Nation	Port Alberni
Soowhalie First Nation	Cultus Lake	Gwa'Sala-Nakwaxda'xw	Port Hardy
Lyackson First Nation	Duncan	T'sou-ke Nation	Sooke
Splatsin First Nation	Enderby	Kitselas First Nation	Terrace
Prophet River First Nation	Fort Nelson	Ahousaht First Nation	Tofino
Nak'azdli First Nation	Fort St. James	Tla-o-qui-aht First Nation	Tofino
Tlaz'ten First Nation	Fort St. James	Saik'uz First Nation	Vanderhoof



## Appendix 6 — Educational Materials Order Form



### 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](mailto:screening@bccancer.bc.ca) or fax to 604-660-3645.

#### Screening Mammography Program of BC

Item	Quantity Requested
SMP Tear-Off Pad (50 sheets)	(max. 20)
SMP Program Brochure – “Is Screening Mammography Right for You?”	(max. 50)
SMP Physician Protocol Fact Sheet	(max. 5)
Fridge Magnet - “Pass it On”	(max. 50)
Poster - “Why Mammograms Work” (8.5” by 11”)	(max. 10)

#### Cervical Cancer Screening Program

Item	Quantity Requested
CCSP Program Brochure – “Is Cervical Screening Right for You?” (English)	(max. 50)
CCSP Program Brochure – “Is Cervical Screening Right for You?” (Punjabi)	(max. 50)
CCSP Program Brochure – “Is Cervical Screening Right for You?” (Traditional Chinese)	(max. 50)
CCSP Program Brochure – “Is Cervical Screening Right for You?” (Simplified Chinese)	(max. 50)
CCSP Program Brochure – “Abnormal Pap Test” (English)	(max. 50)
CCSP Program Brochure – “Abnormal Pap Test” (Punjabi)	(max. 50)
CCSP Program Brochure – “Abnormal Pap Test” (Traditional Chinese)	(max. 50)
CCSP Program Brochure – “Abnormal Pap Test” (Simplified Chinese)	(max. 50)
CCSP Tear-Off Pad (50 sheets) – “After Your Pap Test”	(max. 3)
Poster – “You Can Get A Pap Test in the Time it Takes to...” (8.5” by 11”)	(max. 10)
Postcard – “You Can Get A Pap Test in the Time it Takes to...” (8.5” by 11”)	(max. 50)

#### Colon Screening Program

Item	Quantity Requested
CSP Program Brochure – “Is Colon Screening Right for You?” (English)	(max. 50)
CSP Program Brochure – “Is Colon Screening Right for You?” (Punjabi)	(max. 50)
CSP Program Brochure – “Is Colon Screening Right for You?” (Traditional Chinese)	(max. 50)
CSP Program Brochure – “Is Colon Screening Right for You?” (Simplified Chinese)	(max. 50)
CSP Program Brochure – “What is a Colonoscopy?” (English)	(max. 50)
CSP Program Brochure – “What is a Colonoscopy?” (Punjabi)	(max. 50)
CSP Program Brochure – “What is a Colonoscopy?” (Traditional Chinese)	(max. 50)
CSP Program Brochure – “What is a Colonoscopy?” (Simplified Chinese)	(max. 50)
Colonoscopist Reference	(max. 5)
Colonoscopy Referral Pad (50 sheets)	(max. 5)
Colonoscopy Reporting Form	(max. 200)
Colonoscopy Specimen Table Example	(max. 5)
CSP Program Fact Sheet	(max. 5)
Patient Assessment Process	(max. 5)
Patient Coordinator Bowel Preparation Decision Algorithm	(max. 5)
Polyp Info Sheet	(max. 5)

#### Contact Information

Name		Organization	
Phone Number		Email	
Delivery Address			

Email to [screening@bccancer.bc.ca](mailto:screening@bccancer.bc.ca) or Fax to 604-660-3645

## Appendix 7 — 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 Kaplan-Meier 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 8 — 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 9 — Committees

### *Alphabetical Listing*

#### **Academic Committee**

Christine Wilson (Co-Chair)  
 Scott Tyldesley (Co-Chair)  
 Janette Sam (Recorder)  
 Nancy Aldoff  
 Chris Baliski  
 Nadine Caron  
 Kathy Ceballos  
 Stephen Chia  
 Andy Coldman  
 Jaco Fourie  
 Paula Gordon  
 Malcolm Hayes  
 Lisa Kan  
 Anky Lai  
 Heather MacNaughton  
 Alan Nichol  
 Rob Olson  
 Rasika Rajapakshe  
 Larry St. Germain  
 Elaine Wai  
 Linda Warren  
 Ryan Woods

#### **Quality Management Committee**

Ms. Nancy Aldoff  
 Ms. Carla Brown-John  
 Dr. Stephen Chia  
 Dr. Nick Foster  
 Ms. Ritinder Harry  
 Dr. Malcolm Hayes  
 Ms. Lisa Kan  
 Ms. Sheila MacMahon  
 Ms. Janette Sam  
 Mr. Larry St. Germain  
 Dr. Linda Warren  
 Dr. Christine Wilson – Chair

#### **Screener's Advisory Committee**

Dr. Ken Bentley  
 Dr. Michael Clare  
 Dr. Eleanor Clark  
 Dr. Nancy Graham  
 Dr. Dennis Janzen  
 Dr. Rob Johnson  
 Ms. Lisa Kan  
 Dr. Tahir Khalid  
 Dr. Nicola Lapinsky  
 Dr. Brent Lee  
 Dr. Richard Lee

Dr. Patrick Llewellyn  
 Dr. Heather MacNaughton  
 Dr. John Matheson  
 Dr. Peter McNicholas  
 Dr. David McKeown  
 Dr. Julie Nichol  
 Dr. David O'Keeffe  
 Dr. Rasika Rajapakshe  
 Ms. Janette Sam  
 Dr. Greg Shand  
 Dr. Stuart Silver  
 Dr. Catherine Staples  
 Dr. Phil Switzer  
 Dr. Lynette Thurber  
 Dr. Tim Wall  
 Dr. Linda Warren  
 Dr. Christine Wilson – Chair

#### **Quality Assurance Support Group**

Ms. Nancy Aldoff  
 Ms. Sheila MacMahon  
 Ms. Moira Pearson  
 Dr. Rasika Rajapakshe  
 Mr. Derek Wells  
 Ms. Teresa Wight  
 Dr. Joseph Yang

#### **Screening Guidelines Review Committee**

Stephen Chia, Medical Oncologist & Chair Breast Cancer Tumour Group – BC Cancer Agency, Review Committee Co-Chair  
 Brian Schmidt, retired Senior VP - PHSA & past Interim President – BC Cancer Agency, Review Committee Co-Chair  
 Christine Wilson, Medical Director – SMPBC, Chair, Clinical Pathway Team – Provincial Breast Health Strategy  
 Andy Coldman, Vice President, Population Oncology – BC Cancer Agency  
 Jan Christilaw, President, BC Women's, Project Sponsor & Co-Chair – Steering Committee Provincial Breast Health Strategy  
 Paula Gordon, Medical Director – BCW, Co-Chair, Workforce Team – Provincial Breast Health Strategy  
 Lawrence Turner, Surgeon – FHA  
 Elaine Wai, Radiation Oncologist – BC Cancer Agency, Victoria  
 Sylvia Robinson, Public Health – Ministry of Health  
 Kelly Barnard, Deputy Medical Health Officer – Ministry of Health

## Appendix 10 — Radiologist Screeners

### Abbotsford

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

### Burnaby & Richmond

Dr. Bill Collins  
Dr. Nancy Graham  
Dr. Henry Huey  
Dr. Marty Jenkins  
Dr. Vee Lail  
Dr. Elizabeth Tanton\*  
Dr. Betty Tuong

### Comox

Dr. Grant Larsen  
Dr. David McKeown\*

### Coquitlam

Dr. Debra Chang  
Dr. Jennifer Dolden  
Dr. Brad Halkier  
Dr. Maria Kidney  
Dr. Heather MacNaughton\*  
Dr. Anita McEachern  
Dr. Robert Van Wiltenburg

### Cranbrook

Dr. Daryn Maisonneuve  
Dr. Julie Nicol\*

### Interior/Kootenay

Dr. Marie-Josée Cloutier  
Dr. Dorothy Harrison  
Dr. Colin Mar  
Dr. Christine Wilson\*  
Dr. Charlotte Yong-Hing

### Kamloops

Dr. Michael Clare\*  
Dr. Donal Downey  
Dr. Dellano Fernandes

### Kelowna

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

### Langley

Dr. Ron Campbell\*  
Dr. John Matheson

### Nanaimo/Islands & Coastal Mobile

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

### North Vancouver

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

### Penticton

Dr. Peter McNicolas\*  
Dr. Stacey Piche

### Prince George

Dr. Alasdair Leighton  
Dr. Greg Shand\*

### Sechelt

Dr. Simon Bicknell  
Dr. Daniel Dolden  
Dr. Patrick Llewellyn\*  
Dr. David Spouge

### Surrey & JPOSC

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

### Vancouver –

#### BC Women's Health Centre

Dr. Marie-Josée Cloutier  
Dr. Paula Gordon  
Dr. Patricia Hassell  
Dr. Linda Warren\*

### Vancouver –

#### Mount St. Joseph Hospital

Dr. Jessica Farrell  
Dr. Richard Lee\*  
Dr. Amie Padilla-Thornton

### Vancouver – Victoria Drive

Dr. Connie Siu  
Dr. Phil Switzer\*

### Vancouver –

#### #505–750 West Broadway

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. George Hodgins  
Dr. Robert Koopmans  
Dr. Brent Lee\*  
Dr. Delmer Pengelly  
Dr. Nicola Proctor  
Dr. Stuart Silver\*  
Dr. Rick Smith  
Dr. Paul Sobkin  
Dr. John Wrinch

### White Rock

Dr. Eleanor Clark\*  
Dr. Joanne Coppola  
Dr. Jeffrey Hagel

*Alphabetical Listing*

\* Indicates Chief Screener

## Appendix 11 — Publications & Presentations

### Publications

#### *Nancy Aldoff*

Parker, B., Rajapakshe, R., Yip, A., Wight, T., Aldoff, N., Sam, J., & Wilson, C. (2014). Trends in Mammogram Image Quality, Dose & Screen-Detected Cancer Rates in an Organized Screening Mammography Program. Lecture Notes in Computer Science Volume. 8539, pp 415-422.

#### *Andy Coldman*

Coldman, A., Phillips, N. (2014). Breast Cancer Survival and Prognosis by Screening History. British Journal of Cancer. 110, 556-559. doi: 10.1038/bjc.2013.732.

Coldman, A., Phillips, N., Wilson, C., Decker, K., Chiarelli, M. A., Brisson, J., Zhang, B., Payne, J., Doyle, G., & Rukshanda, A. (2014). Pan-Canadian Study of Mammography Screening and Mortality from Breast Cancer. Journal of the National Cancer Institute. 106 (11). doi: 10.1093/jnci/dju261

#### *Rasika Rajapakshe*

Rajapakshe, R., Araujo, C., Vandenberg, C., Parker, B., Smithbower, S., Baliski, C., Ellard, S., Kovacic, L., Reed, M., Tyldesley, S., Fyles, G., & Mlikotic, R. (2014). Development of a Micro-simulation Model for Breast Cancer to Evaluate the Impacts of Personalized Early Detection Strategies. Lecture Notes in Computer Science Volume. 8539, pp 372-379.

Parker, B., Rajapakshe, R., Yip, A., Wight, T., Aldoff, N., Sam, J., & Wilson, C. (2014). Trends in Mammogram Image Quality, Dose & Screen-Detected Cancer Rates in an Organized Screening Mammography Program. Lecture Notes in Computer Science Volume. 8539, pp 415-422.

Smithbower, S., Rajapakshe, R., Sam, J., Aldoff, N., & Wight, T. (2014). A Regional Web-Based Automated Quality Control Platform. Lecture Notes in Computer Science Volume. 8539, pp 444-451.

#### *Janette Sam*

Parker, B., Rajapakshe, R., Yip, A., Wight, T., Aldoff, N., Sam, J., & Wilson, C. (2014). Trends in Mammogram Image Quality, Dose & Screen-Detected Cancer Rates in an Organized Screening Mammography Program. Lecture Notes in Computer Science Volume. 8539, pp 415-422.



Smithbower, S., Rajapakshe, R., Sam, J., Aldoff, N., & Wight, T. (2014). A Regional Web-Based Automated Quality Control Platform. Lecture Notes in Computer Science Volume. 8539, pp 444-451.

#### ***Linda Warren***

Borugian MJ., Spinelli JJ., Gordon PB., Abanto Z., Brooks-Wilson A., Pollak MN., Warren LJ., Hislop TG., & Gallagher RP. (2014). Fasting insulin and endogenous hormones in relation to premenopausal breast density (Canada). *Cancer Causes Control*. 2014 Mar; 25(3):385-94. doi: 10.1007/s10552-014-0339-9. Epub 2014 Jan 17.

#### ***Christine Wilson***

Coldman, A., Phillips, N., Wilson, C., Decker, K., Chiarelli, M. A., Brisson, J., Zhang, B., Payne, J., Doyle, G., & Rukshanda, A. (2014). Pan-Canadian Study of Mammography Screening and Mortality from Breast Cancer. *Journal of the National Cancer Institute*. 106 (11). doi: 10.1093/jnci/dju261

Cho, K., Tyldesley, S., Speers, C., Poole Lane, B., Gelmon, K., & Wilson, C. (2014). The Utilization and Impact of Core Needle Biopsy Diagnosis on Breast Cancer Outcomes in British Columbia. *BC Medical Journal*. 56(4): 183-190.

Parker, B., Rajapakshe, R., Yip, A., Wight, T., Aldoff, N., Sam, J., & Wilson, C. (2014). Trends in Mammogram Image Quality, Dose & Screen-Detected Cancer Rates in an Organized Screening Mammography Program. Lecture Notes in Computer Science Volume. 8539, pp 415-422.

Hayes, M.M., Nguyen, G.K. (2014). Breast Imaging and Intervention. "Cytodiagnosis of Breast Lesions, an Atlas and Text". Library and Archives Canada. SBN: 978-0-9881205-2-5

### **Presentations and Lectures**

#### ***Nancy Aldoff***

Aldoff, N. (2014, January). SMPBC Screening Policy Changes, Province-wide Webinar to Centres for technologist and clerical staff. Lecture conducted from Vancouver, BC.

Aldoff, N. (2014, December). Screening Mammography Program for the Women of British Columbia, Women's Health Seminar. Lecture conducted from North Shore Multicultural Centre, North Vancouver, BC.

#### ***Paula Gordon***

Gordon, P. (2014, March). The Screening Guidelines Debate: Statistics & Politics 101. Lecture conducted from Practical Radiology, Whistler, BC.

Gordon, P. (2014, April). Tomosynthesis Update. Lecture conducted from Screening mammography Forum 2014, Vancouver, BC.

Gordon, P. (2014, November). Screening Mammography. Lecture conducted from UBC School of Population and Public Health, Vancouver, BC.

Gordon, P. (2014, October). The Screening Guidelines Debate: Statistics and Politics 101. Lecture conducted from University of Ottawa Breast Imaging Update, Ottawa, ON.

### ***Rasika Rajapakshe***

Parker, B., Rajapakshe, R., Araujo, C., Vandenberg, C., Smithbower, S. (2014, April). The Development of a Visualization Platform for a Breast Cancer Treatment Microsimulation Model Using the British Columbian Cancer Treatment Data. Lecture conducted from 2014 International Health Data Linkage Conference, Vancouver, BC.

### ***Janette Sam***

Sam, J. (2014, April). Screening Mammography Program Update – Policy, Practice and Performance Review. Lecture conducted from Screening Mammography Program Educational Forum, Richmond, BC

Sam, J. (2014, April). BCCA SMP Mobile Mammography Program - We've come a long ways! Lecture conducted from Screening Mammography Program Educational Forum, Richmond, BC

### ***Linda Warren***

Warren, L. (2014, April). SMP Screener's Advisory Committee – BI-RADS Informational Session. Lecture conducted from Vancouver, BC.

Warren, L. (2014, June). SMPBC Webinar BI-RADS Informational Session. Lecture conducted from Vancouver, BC.

Warren, L. (2014, November). Talk on Mammograms. Lecture conducted from RSNA-On-The-Air, Oak Brook, IL.

### ***Christine Wilson***

Wilson, C. M. (2014, January 29). Interview with Pamela Fayerman. Vancouver Sun.

Wilson, C. M. (2014, February 3). Interview with Helen Branswell. Canadian Press.

Wilson, C. M. (2014, February 4). Interview with Globe and Mail

Wilson, C. M. (2014, February 4). Interview with CBC Radio. Victoria

Wilson, C. M. (2014, February 12). Interview with Fairchild TV

Wilson, C. M. (2014, February 12). Interview with CFX radio

Wilson, C. M. (2014, February 12). Interview with Global BC1 TV

Wilson, C. M. (2014, February 26). Interview with CTV TV

Wilson, C. M. (2014, April 17). Interview with PostMedia/OMINI TV

Wilson, C. M. (2014, July 4). Interview Jackie, Middleton. Canadian Living.

Wilson, C. M. (2014, October 15). Interview with KOOL FM

Wilson, C. M. (2014, November 25). Interview with Mi-Jung Lee CTV.  
Breast Density Update

Wilson, C. M. (2014, March). Guest Blogger with BC Cancer Foundation

Wilson, C. M. (2014, February). FPON GPO Training Program Spring 2014, Lecture conducted from BCCA – Vancouver Centre, Vancouver, BC.

Wilson, C. M. (2014, February). Postgraduate Review course for Family Physicians. UBC CPD. Breast Screening Guidelines and Controversies. Lecture conducted from Vancouver Downtown Pinnacle Marriott, Vancouver, BC.

Wilson, C. M. (2014, April). Grand Rounds Abbotsford Hospital video conference. Lecture conducted from Vancouver, BC.

Wilson, C. M. (2014, May). Department of FP CME rounds. Lecture conducted from Vancouver General Hospital, Vancouver, BC.

Wilson, C. M. (2014, June). Breast Screening – Still Controversial? University of Saskatchewan Alumni Conference. Lecture conducted from Saskatoon, SK.

Wilson, C. M. (2014, September). Partners for Better Health – Declining south Vancouver Island Screening Participation Rates video conference. Lecture conducted from Vancouver, BC.

Wilson, C. M. (2014, October). Surgical Oncology Network - Controversies in Breast Screening. Lecture conducted from Four Seasons Hotel, Vancouver, BC.

Wilson, C. M. (2014, November). FPON CME Day, Practice Changing Breast Screening Guidelines. Lecture conducted from Vancouver, BC.

Wilson, C. M. (2014, November). St Paul's CME - New Breast Screening Guidelines. Lecture conducted from Vancouver Convention Centre, Vancouver, BC.

Wilson, C. M. (2014, November). Radiation Oncology Grand Rounds - Female Hodgkin's survivors – Drs Karen Goddard and Christine Wilson. Lecture conducted from BCCA – Vancouver Centre, Vancouver, BC.

Wilson, C. M. (2014, November). Women's Health Primary Care Update - BC's Breast Screening Policy: Encouraging Women to Make an Informed Decision. Lecture conducted from UBC Robson Square, Vancouver, BC. Sonography and Thermal Ablation. *99th Scientific Assembly and Annual Meeting*. Chicago, IL

## Appendix 12 — SMP / BCCA Contact Information

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## Notes

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**BC Cancer Agency**

CARE + RESEARCH

*An agency of the 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