

Nova Scotia Breast Screening Program 2005 Annual Report

Operations

NSBSP Administration Site and Central Mammography Booking

7001 Mumford Rd

Unit 603L

Halifax, Nova Scotia

B3L 2H8

Toll Free: 1-800-565-0548 (Mobile van, fixed site and diagnostic mammography bookings)

Halifax: 902-473-3960 (District 9 fixed sites and diagnostic mammography bookings)

Fax: 902-473-3959

www.breastscreening.ns.ca

NSBSP Navigation

Toll Free: 1-877-738-9898

Halifax: 902-473-3680

Central Mammography Booking Affiliates

District 9

QEII Health Sciences Center

1288 Tower Rd

Halifax, NS

B3H 2Y9

Tel: 902-473-3960

Fax: 902-473-3959

District 8

Cape Breton Regional Hospital

1482 George St

Sydney, NS

B1P 1P3

Tel: 902-567-7788

Fax: 902-567-7812

and

Dartmouth General Hospital

325 Pleasant St

Dartmouth, NS

B2Y 4G8

Tel: 902-465-8440

Fax: 902-465-8360

District 2

Yarmouth Regional Hospital

60 Vancouver St

Yarmouth, NS

B5A 2P3

Tel: 902-742-3541

Fax: 902-742-5320

District 4

Colchester Regional Hospital

207 Willow St

Truro, NS

B2N 5A1

Tel: 902-893-5554

Fax: 902-893-553

District 5

Cumberland Regional Health Care Complex

110 East Pleasant St

Amherst, NS

B4H 1N6

Tel: 902-667-5400 (6155)

Fax: 902-667-6307

District 1

South Shore Regional Hospital

90 Glen Allen Dr

Bridgewater, NS

B4V 3S2

Tel: 902-527-5246

Fax: 902-543-9793

District 3

Valley Regional Hospital

150 Exhibition St

Kentville, NS

B4N 5E3

Tel: 902-678-7381 (2720)

Fax: 902-678-0098

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Abe Almeda
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Lorie Currie
Dr. Jennifer Payne

Consultant Epidemiologist Dept of Radiology,
Dalhousie University

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Promotion and Navigation

Dianna Schreuer
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Data Management

Theresa Foley

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Dr. A.J. Johnson
Dr. Gerald Schaller
Dr. Gordon Jones
Dr. Joy Borgaonkar
Dr. Judy Rowe

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(Sydney)

Dr. Sian Iles
Dr. John Chadwick
Dr. Anne Latour

YRH
(Yarmouth)

Dr. Eric Woods

CRH
(Truro and
Amherst)

Dr. Nancy MacNeil
Dr. John MacNeil
Dr. Dave Gordon

DGH
(Dartmouth)

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Dr. Kim Colter

SSR

Dr. Peter Jeffrey
Dr. Arthur Marshall
Dr. C.L. Church

VRH

Dr. Michael Dunn
Dr. David Acton
Dr. John Bilo
Dr. Maureen Madigan

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Linda Bower
Debbie Bezanson

Executive Summary

On June 15th 2005 the Nova Scotia Breast Screening Program (NSBSP) celebrated the 15th year of providing an outcome driven, client oriented program to women in Nova Scotia. In August 2006, at no cost to the program, the Program Administration offices, Central Mammography Booking (CMB) offices and Halifax Breast Screening Clinic relocated to larger quarters in the Halifax Shopping Center, reflective of the continual growth of this program over the past 15 years. The new address can be found on Pg 1 of this report.

In 2005, the program expanded to include The South Shore Regional Hospital which became the seventh fixed breast screening site to join with NSBSP. In addition, there were three diagnostic sites which approved all their mammography bookings, both diagnostic and screening to be booked through the provinces Central Mammography Booking office. Consultations for further expansion continue and in November 2006, it is anticipated that the Aberdeen Hospital in New Glasgow will join NSBSP and CMB.

Database enhancements to permit better evaluation of wait times, and automatic screening appointment reminders via an improved phone system are being implemented.

In November, 2005, Dr. Jennifer Payne joined the NSBSP team to further work on Program Evaluation and Scientific/Peer Reviewed Presentations and Publications, through her appointment as Assistant Professor, Department of Diagnostic Radiology, Dalhousie University. Works to date are listed on Pages 47 and 48. Her duties also include providing guidance for Residents projects and Master's theses.

With support from the Department of Health, NSBSP will move forward with a planned approach toward a complete Full Field Digital Mammography (FFDM) Breast Screening Program by 2012. It is anticipated that the first fixed FFDM site, will be located at the Cobequid Community Health Center and could be operational in late 2006. Mobile FFDM capabilities in Cape Breton will be operational in late 2006.

There are still many challenges for the Nova Scotia Breast Screening Program which include:

- Insufficient capacity
- Inequitable distribution of mobile screening vans
- Inadequate surgical capacity
- Maintenance of high radiologist performance
- Review and standardization of technologist workload

It will be a priority for Program Management to address these challenges as program development continues toward the concept to provide one comprehensive mammography program for women in this province, and one provincial standard for all women.

Introduction

The Nova Scotia Department of Health (DoH) established and funded the Nova Scotia Breast Screening Program (NSBSP) as a provincial program in 1991. All ten provinces and two territories now have breast screening programs. Evidence from randomized controlled projects has demonstrated that organized breast screening mammography maximizes the early detection of breast cancer.

NSBSP offers modified clinical breast examinations and breast health information at all sites. In October 2006, eleven screening sites and eight diagnostic sites were booking procedures and contributing real-time data through the provincial Central Mammography Booking Database (CMB). Discussions with management at the Aberdeen Hospital in New Glasgow and St. Martha’s Hospital in Antigonish for future involvement with NSBSP are underway. CMB inclusion of these two sites would complete the organizational phase of NSBSP.

“Lack of full organization may result in sub-optimal program operation, performance and resource efficiency.” *Progress in Cancer Control: Screening: Canadian Cancer Society/National Cancer Institute of Canada: Canadian Cancer Statistics 2006.*

Database development with ongoing improvements has been a priority of program set-up, and remains the key to program evaluation. From June 1991 until December 2005 there have been 375,642 screening examinations on 119,185 women registered in the NSBSP database. There have been 1,670 cancers detected. Cancer detection rates for this period are seen in **Table 1**.

Of the mammography screening examinations performed in 2005, 33% were between 40 and 49, 34% between 50 and 59, 22% between 60 and 69 and 11% over age 70. In 2005 the number of NSBSP screens increased by 4%, from 48,672 in 2004 to 50,895 women ages 40 and over.

Table 1 Cancer Detection Rates

	Cancer Detection Rate per 1,000 Screens			Cancer Detection Rate Per 1,000 Women		
	1991- 2003	1991- 2004	1991- 2005	1991- 2003	1991- 2004	1991- 2005
	276,072	324,745	375,642	95,116	107,399	119,185
Age						
40- 50	2.4	2.4	2.4	5.5	5.6	5.7
50- 59	4.5	4.3	4.3	14.5	14.6	15.0
60- 69	5.8	5.9	6.0	21.3	22.9	24.7
70+	9.3	9.3	9.7	33.7	35.8	38.7

Mission Statement

The Nova Scotia Breast Screening Program’s goal is to reduce the mortality from breast cancer in Nova Scotia women aged 50-69 years of age by 30% within ten years following development of a province wide screening program.

Vision

The Nova Scotia Breast Screening Program’s vision is to provide quality standardized mammography access with timely assessment, informed patient navigation and appropriate follow-up of women who have abnormal mammograms on screening, through diagnostic work-ups in accredited work-up centers, before consideration of surgical alternatives.

Nova Scotia Breast Screening Program (NSBSP) Organizational Chart – Oct 2006

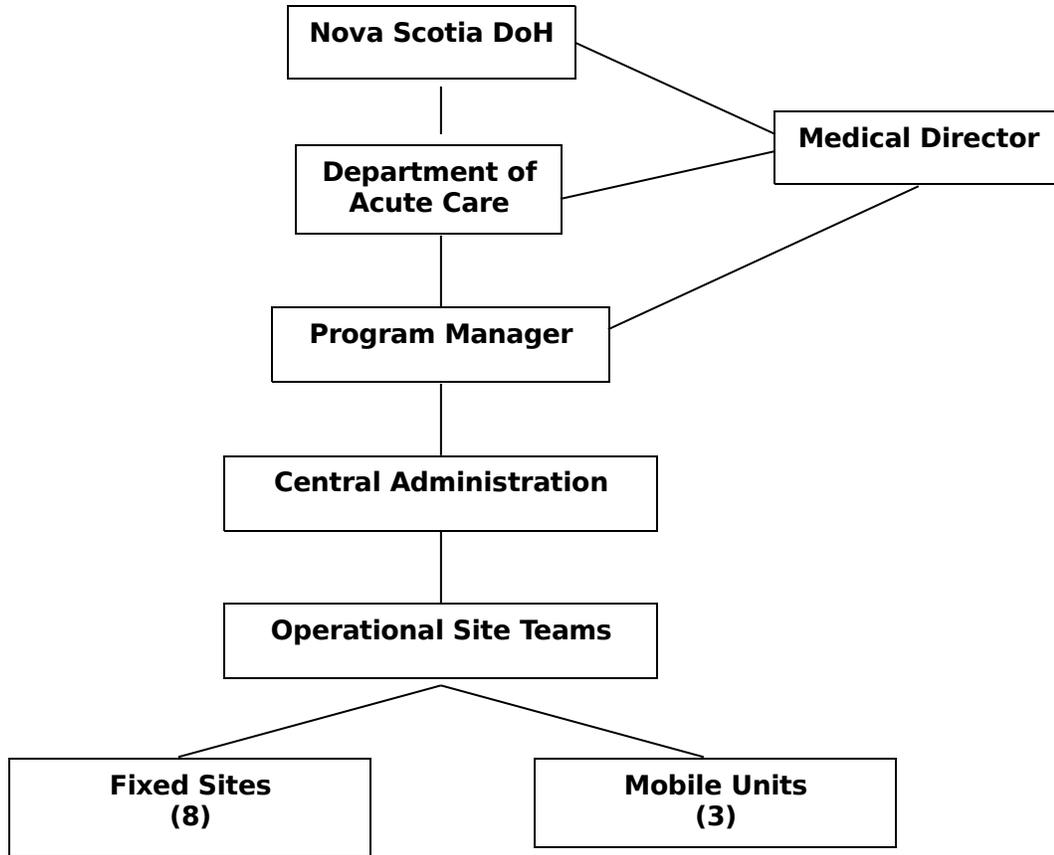


Table 2

Central Mammography Booking (CMB) Participants

		<i>Sites</i>	<i>Participation date</i>	
<i>Screening</i>				
<i>Mobiles</i>	3	<i>Mobile 1 (Cape Breton)</i>	<i>Sept</i>	<i>1994</i>
		<i>Mobile 2 (Western)</i>	<i>July</i>	<i>1997</i>
		<i>Mobile 3 (Northern)</i>	<i>Jun</i>	<i>2003</i>
<i>Fixed</i>	8	<i>Halifax Shopping Center</i>	<i>Jun</i>	<i>1991</i>
		<i>Sydney - hospital</i>	<i>May</i>	<i>2000</i>
		<i>Yarmouth - hospital</i>	<i>Apr</i>	<i>2001</i>
		<i>Truro - hospital</i>	<i>Jun</i>	<i>2002</i>
		<i>Dartmouth - hospital</i>	<i>Jan</i>	<i>2003</i>
		<i>Amherst - hospital</i>	<i>June</i>	<i>2004</i>
		<i>Bridgewater - hospital</i>	<i>July</i>	<i>2005</i>
		<i>Kentville - hospital</i>	<i>Jan</i>	<i>2006</i>
<i>Diagnostic sites</i>	8	<i>Halifax</i>	<i>Dec</i>	<i>2000</i>
		<i>Sydney</i>	<i>May</i>	<i>2001</i>
		<i>Dartmouth</i>	<i>Apr</i>	<i>2003</i>
		<i>Truro</i>	<i>Apr</i>	<i>2004</i>
		<i>Yarmouth</i>	<i>Apr</i>	<i>2005</i>
		<i>Bridgewater</i>	<i>July</i>	<i>2005</i>
		<i>Ahmerst</i>	<i>Jan</i>	<i>2006</i>
		<i>Kentville</i>	<i>Jan</i>	<i>2006</i>

Strategic Planning

Provincial Program Model Approach

Within the Acute and Tertiary Care Branch the following provincial programs are currently funded by the Department of Health: Cancer Care Nova Scotia, Nova Scotia Diabetes Care Program, Reproductive Care Program, Nova Scotia Breast Screening Program, Cardiac Advisory Council, Nova Scotia Provincial Blood Coordinating Program and the Nova Scotia Hearing and Speech Program.

The Acute and Tertiary Care Branch has developed an Accountability Framework for Provincial Programs to assist in determining whether a provincial program approach is the appropriate solution to address particular health care issues related to acute and tertiary care. In addition, this accountability framework will provide support for existing Provincial Programs where reporting relationships, roles and responsibilities are not clear. *Provincial Program Model, Acute and Tertiary Care Branch Proposal, April 2, 2004*

Requirements for a Breast Screening Program

Breast Cancer is an important health problem which has a recognizable latent or early non-symptomatic stage. The screening test must be efficacious (sensitivity and specificity) and acceptable, and diagnosis and treatment must be acceptable with facilities available. The cost must be balanced against medical care funding as a whole and should be ongoing. *WHO 1968, Criteria for Screening Program.*

Provincial Review of Mammography Units

In the interest of promoting an integrated approach to breast screening, all but two District Health Authorities have implemented NSBSP's screening and provincial diagnostic computer booking program. Discussions are currently underway with DHA 6 and 7 to include a fixed mammography unit with the program. NSBSP would then be able to provide a comprehensive picture of screening mammography recruitment, participation and outcomes for women in Nova Scotia.

Similar to advances for other diagnostic equipment, there is new and updated technology available for mammography. Considering new technology and the process of integrating all units plus the integration of Picture Archiving Communications Systems (PACS), in 2005 it was considered timely to conduct a provincial review of all mammography units with a goal of developing a provincial plan for the future. The Committee Members and Terms of Reference for this Provincial Review of Mammography Units is included in this document as **Appendix A**.

Provincial Mammography Review goals:

- review current mammography units in the province and identify a replacement plan and associated costs
- review the evidence supporting current and future technology and develop a plan for the province
- outline a process for the District Health Authorities and the Department of Health to receive and review the plan developed
- consider the provincial approach to information management and improved technology

The review process and plan decided in June 2005, was to upgrade all fixed and mobile mammography facilities to digital mammography with wideband networking to regional and central diagnostic centers. A provincial RFP was submitted for immediate purchase of equipment for Cape Breton and Yarmouth, some of which will be full field digital. This was the beginning of an organized long term approach (5-7 years) to introduce digital mammography to the province. This review process is now in the implementation stage. For purposes of uniformity and quality performance execution, one successful bid for all equipment was identified, and equipment purchases have begun. A provincial mammography committee for implementation of FFDM has been established.

Although a number of new technologies are on the horizon, they are unlikely to replace mammography in the near future for screening the general population. Mammography remains the only breast cancer screening tool proven to reduce mortality from breast cancer in the population. *Public Health Agency of Canada, 2006.*

Core Business Functions

Population Health

Increasing the number of mammography facilities (capacity) and standardizing a mammography service province-wide to provide relevant research material for responsible health care reform

Database Surveillance and Evaluation

Providing quality assessment and provincial outcomes

Education

Promoting awareness of service availability, breast screening guidelines and the Clinical Practice Guidelines for the Care and Treatment of Breast Cancer

Mortality Rates

The most recent actual data for 2002 showed the breast cancer mortality rate in countries with “organized” breast screening programs to be at its lowest since 1950. Since 1993, incident rates for breast cancer have stabilized and death rates have declined at a rate of 2.7% annually. There is evidence for improved survival due to the **organized mammography screening programs detecting cancer earlier** and advances in adjuvant therapies following breast cancer surgery. *National Cancer Institute of Canada: Canadian Cancer Statistics 2006.*

Decreased mortality of breast cancer requires early detection of the disease as well as prompt and appropriate treatment. For 2006, it is reported that there will be an estimated 22,200 new cases of female breast cancer and 5,300 deaths in Canada. In Nova Scotia for 2006, it is estimated that there will be 700 new cases of breast cancer and 190 deaths. Breast cancer is the most common cancer and most common cause of death among females aged 20-49, accounting for 40% of cancer diagnoses and 25% of cancer deaths. *Cancer Institute of Canada: Canadian Cancer Statistics, 2006.*

During their lifetimes, 1 in 8.9 women (11.2%) are expected to develop breast cancer, and 1 in 27 (3.7%) are expected to die from it. Only 29% of breast cancers are diagnosed at age 70 or older, 51% between ages 50 and 69 and 20% under age 50. Presently 1.0% of females are survivors of breast cancer diagnosed within the previous 15 years. *Canadian Cancer Society/National Cancer Institute of Canada: Canadian Cancer Statistics, 2006.*

For 2006 estimated age standardized **incidence** rates for breast cancer in Nova Scotia are **106/100,000** with an estimated **700** new cases. In 2003, actual data reported **590** new cases for an actual age-standardized **incident** rate of **92/100,000** third lowest among all Canadian provinces. Incidence is increasing due to the implementation of breast screening programs and greatly improved methods of data collection both of which NSBSP has as been active in developing and promoting.

The *estimated* age standardized **mortality** rate for Nova Scotia for 2006 is now the third highest in Canada at **26/100,000** based on **190** estimated deaths. It is steadily decreasing. Two years ago it was the highest and one year ago, second highest. *Actual* data for the age standardized **mortality** rate for breast cancer in Nova Scotia for the year 2002 was **25/100,000**, a decrease from the *actual* rate of 26/100,000 in 2001. There were **170** deaths recorded in Nova Scotia in both 2001 and 2002.

In Canada in 2002 there were **94,200** Potential Years of Life Lost (PYLL) due to breast cancer (18.3% of all causes of PYLL) compared to 95,000 in 2001. With regard for the most common cancers in women and men, the PYLL from breast cancer far exceeded the PYLL from prostate cancer (34,000) reflecting the relatively young age that women die from breast cancer. *Canadian Cancer Statistics 2005*.

The five year relative survival ratio for breast cancer cases diagnosed 1995 to 1997 in Canada was **86%** (85% in Nova Scotia). *Cancer Institute of Canada: Canadian Cancer Statistics 2006*. On average, fourteen Nova Scotia women will be diagnosed with breast cancer every week. On average, four Nova Scotia women will die of breast cancer every week. *Canadian Cancer Statistics 2005*.

CAR Accreditation

The Nova Scotia Breast Screening Program has been instrumental in encouraging high quality mammography through accreditation of staff and equipment by the Canadian Association of Radiologists (CAR). NSBSP has taken a lead to promote this process. It is one of many organized steps towards achieving and maintaining favorable program indicators. The Cumberland County Health Care Center in Amherst and St. Martha's Hospital in Antigonish are the latest sites to successfully obtain accreditation by the CAR and **complete the province-wide accreditation process**. The challenge now is to ensure the process is ongoing. Re-accreditation is required every three years.

One aspect of the accreditation process is to constantly strive to upgrade performance. A recently published paper funded by The Canadian Breast Screening Initiative concluded: "The requirement of some Canadian Breast Screening Programs of minimum annual volumes that are higher than the 480 mammograms specified by the Canadian Association of Radiologists, is supported." *Organized Breast Screening Programs in Canada: Effect of Radiologist Reading Volumes on Outcomes: Radiology: Volume 238: Number 3, March 2006*. Nova Scotia contributed data to this study and is one of the provinces which had provincial policy supported. NSBSP recommends that all radiologists interpreting provincial screening program mammograms, have an annual reading volume of 2,500.

In 2005, it became policy in Nova Scotia that fees for mammography services would not be paid by the province unless CAR accreditation and a process for accreditation maintenance is in place. This policy was supported by the Nova Scotia Association of Radiologists, the Medical Society of Nova Scotia (Doctors, Nova Scotia), and the Department of Health.

Scotia Mammography Database

Central Mammography Booking Database (CMB):

Includes (1) screening and (2) diagnostic booking and follow-up modules

1. NSBSP Database: Includes self referred bookings for asymptomatic women ages 40 to 69 and over age 70 (if otherwise in good health). *The Canadian Association of Radiologist's Guidelines for Screening Mammography.*

2. Diagnostic Mammography Database (DMB): An improved diagnostic database which has been designed to complement the NSBSP database and to provide one provincially standardized diagnostic mammography reporting module with upgraded services. Presently it is in use at the Queen Elizabeth II Health Sciences Center (QEII HSC) in Halifax and Cape Breton Regional Hospital (CBRH) in Sydney. Plans to expand the diagnostic database for diagnostic mammography reporting are anticipated within the next year as provincial information technology support becomes available.

The NSBSP Guidelines for booking both screening and diagnostic mammography are included as **Appendix B**. A draft copy of the new diagnostic mammography requisition which must be correctly filled out and faxed to CMB by the referring physician (office), is included as **Appendix C**.

If resources are allocated for data collection and outcome analysis, it will promote the best possible quality initiatives, staff performance and results at all levels. Timely annual report production has been a significant NSBSP accomplishment, made possible by aggressive NSBSP database development. This has resulted in a yearly effort to close the books on cases, and has also provided organized safe-guards for women to prevent cases from falling through cracks in the healthcare system.

Cumulative, annual and biennial figures and charts are contained in this report. Target age group (50-69) numbers are used when calculating Program Indicators, but other charts and figures include women outside the NSBSP targeted age group. The NSBSP database also ensures that every tenth mammogram has been blind read by a second radiologist. Participation, retention rates and abnormal call rates for this report were calculated from NSBSP database results collected in May, 2006. Case follow-up and cancer detection data in this report were based on database information available in August, 2006. At that time three cases reported as abnormal were not complete. Of these, two had more serious problems and one surgical consult report had not been received following several inconclusive short term follow-up mammograms. In 2005, four women were classified as "Lost to follow-up", and two women with abnormal screening reports refused one or more recommended follow-up procedures, resulting in a status of "Refused".

From the beginning of the program in 1991, there have been 47 women "Lost to Follow-up" and 22 have "Refused" recommended work-up procedures. These women are therefore classified as non-compliant and are categorized appropriately for the particular screening episode. These cases have been reviewed at NSBSP team approach rounds and many have since undergone subsequent re-screening or diagnostic mammography.

Quality is the key word for successful breast cancer screening. Without a reliable database, the organization is extremely difficult. Providers of screening have a responsibility to insist that the program be well organized. If done properly, the cost-benefit analysis will reveal a reasonable cost per screen and cost per cancer detected.

Performance Indicators

In order to achieve reductions in breast cancer mortality and morbidity and to minimize undesirable effects of breast screening, the delivery of organized screening must be of high quality. Performance Measures and Targets were selected on the basis of assessing program progress toward desired goals. The eleven performance indicators met the following criteria:

- data for the measure was regularly available
- data available for the measure was of high quality
- meaningful targets could be defined on an evidentiary basis
- measures and targets would be useful for national comparison
- monitoring on an annual basis would be valuable
- each measure was widely accepted for use in program evaluation

A routine biennial report is produced at the national level using data from the Canadian Breast Cancer Screening Database (CBCSD). Although there are many differences in the manner in which the provinces have set up their individual programs, this monitoring role provides useful feedback and comparisons, as well as a mechanism to share processes and provide definitions. The targets set have provided goals and formats for the ten differently structured provincial breast screening programs in the interest of producing more standardized provincial data reports. In 2006, the Evaluation Indicators Working Group, a sub-committee of the Canadian Breast Cancer Screening Initiative) published the document "Guidelines for Monitoring Breast Screening Program Performance", second edition. A list of eleven performance indicators and definitions can be seen on **Page II**.

The NSBSP Performance Indicators for 2002, 2003, 2004 and 2005 plus the Canadian Breast Screening Database Indicators, most recently available for the combined years of 2001 and 2002 can be seen in **Table 3a** on **Page 12**. All Program Indicators are for the target age group (50-69). More information on each indicator can be found on the specified pages.

Additional imaging and interventional indicators are being looked at by some provinces as an overall client-based service delivery measure and program quality exercise. "Future methods should be directed toward developing new screening methods as well as methods of improving the sensitivity and specificity of mammography. Methods of reducing surgical biopsy rates and complications of treatment should also be studied, as should communication of the risks and benefits associated with screening." *Ann Intern Med, 2002; 137:347-360.*

Performance Indicators (Definitions)

Participation Rate: Percentage of women who have a screening mammogram (calculated biennially) as a proportion of the eligible population (Page 13)

Retention Rate: Estimated percentage of women who are re-screened within 30 months of their previous screen (Page 18)

Abnormal Call Rate: Percentage of women screened referred for further testing because of abnormalities found with a program screen (Page 20)

Invasive Cancer Detection Rate: Number of invasive cancers detected per 1,000 women screened (Page 23)

In Situ Cancer Detection Rate: Number of ductal carcinoma in situ (DCIS) cancers (rather than invasive cancer) during a screening episode per 1,000 women screened (Page 23)

Diagnostic Interval: Total duration from abnormal screen to resolution of abnormal screen (Page 24)

Positive Predictive Value: Proportion of abnormal cases with completed follow-up found to have breast cancer (invasive or in situ) after diagnostic work-up (Page 25)

Benign to Malignant Open Biopsy Ratio: Among open biopsies, the ratio of number of benign cases to the number of malignant cancer cases (Page 26)

Invasive Cancer Tumor Size: Percentage of invasive cancers with tumor size of $\leq 10\text{mm}$ and $\leq 15\text{mm}$ in greatest diameter as determined by the best available evidence: 1) pathological *, 2) radiological, 3) clinical (Page 28)

* (> 99.9% of tumor sizes input into NSBSP database are pathological)

Node Negative Rate in Cases of Invasive Cancer: Proportion of invasive cancers in which the cancer has not invaded the lymph nodes (Page 29) **

** For Nova Scotia this figure also includes node negative cases of DCIS. Although rare, surgical pathology reports of DCIS can have positive node pathology.

Post Screen Detected Invasive Cancer Rate: Number of women with a diagnoses of invasive breast cancer after a normal screening within 12 and 24 months of the screen date for women screened on an annual or biannual basis respectively (Page 30)

Table 3a Performance Indicators (ages 50-69)

Indicator	Canadian Recommendations	Canada		Nova Scotia		
		2001+0 2	2002	2003	2004	2005
• Number of screens	N/A	1,159,459	21,780	25,501	27,480	28,467
• Number of 1 st screens	N/A	342,847	4,314	6,475	5,480	4,995
• Number of cancers	N/A	6,125	122	108	123	146
• Participation rate	≥ 70% of the eligible population	34	35	38	43	46
• Retention rate						
1 st screen	≥ 75% re-screened within 30 months	69	>80	>80	>80	>85
Re-screen	≥ 90% re-screened within 30 months	88	>80	>80	>80	>93
• Abnormal screen rate						
1 st screen	< 10% of screens are reported as abn	13.1	8.6	7.1	8.0	7.8
Re-screen	< 5 % of screens are reported as abn	7.4	4.5	4.3	4.1	4.3
• Invasive cancer rate						
1 st screen	> 5 per 1,000	5.0	6.7	3.9	5.3	3.8
Re-screen	> 3 per 1,000	3.9	3.7	2.8	3.1	4.1
• In Situ cancer rate	Surveillance and Monitoring only					
1 st screen	per 1,000 screens	1.2	1	1	1	< 1
Re-screen	per 1,000 screens	1.0	1	1	1	< 1
• Diagnostic Interval						
No open biopsy	≥ 90% within 5 weeks (no tissue bx)	72	83	80	75	62
With open biopsy	≥ 90% within 7 weeks (with tissue bx)	49	33	28	23	31
• Positive Predictive Value						
1 st screen	≥ 5% of abnormal screens (are cancer)	4.8	9.7	7.4	7.9	6.1
Re-screen	≥ 6% of abnormal screens (are cancer)	6.6	10.6	8.8	9.6	12.1
• B : M open biopsy ratio						
≤ 1: 1 ratio initial screen open biopsies		1.0 : 1	0.1 : 1	0.2 : 1	0.4 : 1	0.2 : 1
≤ 1: 1 ratio re-screen open biopsies		0.9 : 1	0.2 : 1	0.2 : 1	0.2 : 1	0.15 : 1
• Invasive ca tumor size						
> 25 % ≤ 10mm		36.4	42	34	39	33
> 50% ≤ 15mm		64.6	69	65	68	54
• Node negative cancers	> 70% node negative	75	75	76	78	70
		Canada	N.S.	N.S.	N.S.	
		98/99	2000/2001	2002/2003	2004/2005	
• Post Screen Detected Invasive Cancer Rate	Rate per 10,000 person years					
within 12 months	< 6	7.7	-	-		
within 24 months	< 12	10.2	-	-		

- Funding by The Canadian Breast Cancer Foundation - Atlantic Chapter has enabled a retrospective study of Post Screen Cancer rates. These will be available for 2000/2001 and 2002/2003 for the 2006 Annual Report (Page 41).

Table 3b Performance Indicators under review (ages 50-69)

		Canada		Nova Scotia		
		2000 +01	2002	2003	2004	2005
• Benign open biopsy rate	Surveillance and monitoring					
	1 st screen	4.3	0.9	1.2	2.4	1.0
	Re-screen	2.7	0.9	0.8	0.6	0.8
• B : M ratio - direct to open bx *	≤ 2 : 1	0.9 : 1	1 : 1	0.7 : 1	2.2 : 1	2.2 : 1
• Benign core biopsy rate	Surveillance and monitoring					
	1 st screen	10.8	19.7	18.4	21.2	22.2
	Re-screen	4.1	7.6	9.3	8.3	8.8
• B : M core bx ratio	Surveillance and monitoring					
	1 st screen	2.9 : 1	3.0 : 1	4.3 : 1	4.0 : 1	5.3 : 1
	Re-screen	1.5 : 1	1.8 : 1	2.6 : 1	2.1 : 1	1.9 : 1

* Captured by the province of Nova Scotia only, to obtain a quality performance indicator for facilities in this province where breast surgery is performed

• Participation Rate

Percentage of women who have a screening mammogram (calculated biennially) as a proportion of the eligible population

Target: $\geq 70\%$ of the target population

Table 4 NSBSP Biennial Participation Rate and Trend by District Health Authority ages 50-69

District Health Authority (DHA)	Target Population	Participation Rates 2001+2002	Participation Rates 2002+2003	Participation Rates 2003+2004	Participation Rates 2004+2005	Annual DHA Participation Trend Per DHA	Biennial Screens 2004+2005
Unknown	-	3%	2%	6%	7%		
1 South Shore	7,555	20%	24.4%	26.6%	33.8%	+ 7.2%	3,226
2 SW Nova	7,241	34%	36.3%	44.7%	54.3%	+ 9.6%	2,551
3 Annapolis Valley	9,312	31%	29.3%	28.7%	29.6%	+ 0.9%	3,930
4 Colchester E Hants	7,439	25%	47.9%	51.9%	52.2%	+ 0.3%	2,756
5 Cumberland	4,043	6%	12.4%	25.5%	40.3%	+ 14.8%	3,882
6 Pictou	5,406	4.6%	9.3%	11.6%	10.9%	- 0.7%	1,629
7 Guys/Ant	5,434	36%	36.1%	36.1%	37.2%	+ 1.1%	590
8 CB	15,762	37%	36.9%	39.0%	42.8%	+ 3.8%	2,019
9 Cap	38,114	42%	46.4%	50.9%	50.4%	+ 0.5%	6,761
Invalid Code	-	-	-	-	-		19,208
Total	100,306	34%	38% (+ 4%)	43.3% (+ 5%)	46.4%	+ 3.1%	46,560 (+ 6%)

The NSBSP participation rate for the **biennial** timeframe of 2004 and 2005 was **46.4%** of the targeted age population in Nova Scotia.

Over one year there was a biennial participation rate increase of **3.1%**. For the same time-frame the number of screens increased by **6%**, compared to a 12% increase one year ago. The lowest participation rate of **10.9%**, seen in District Health Authority (DHA)6 (New Glasgow), reflects the lack of database information from this site not presently booking mammography through Central Booking or submitting data to the province. This is not an accurate representation of the breast screening participation rate in this district due to ad hoc screening in the diagnostic sector. NSBSP is now in consultation with this district. DHA 1 (Bridgewater) shows **7%** increase from last year following start-up and partial year data. Increased participation rates from DHA 3 (Kentville), will reflect in next year's annual report. In DHA 2 (Yarmouth), participation rates have risen by **9.6%** due to a significant increase of organized screening program examinations from that fixed site. This has resulted in DHA 2 having the highest organized breast screening participation rate in the province. DHA 5 (Amherst) shows a **14.8%** increase in participation rates following the first full year of NSBSP participation.

Rates in DHA 4 (Truro) have not changed but remain among the highest (**52%**), following significant increases last year, their first full year with CMB. Minimal changes can be seen in the Capital Health District (DHA 9) and Cape Breton (DHA 8), both requiring much needed additional capacity in mammography services.

The most frequent "self-reported" reason for participation in NSBSP continues to come from recommendations for regular mammography screening by family physicians. This strongly supports the Program's decision to focus promotional funding on increasing physician awareness of early detection by mammography screening and the associated cost benefit. Of interest as well, is the fact that the most common reason for Gynecological Screening is due to reminders by NSBSP, at the time of breast screening examinations.

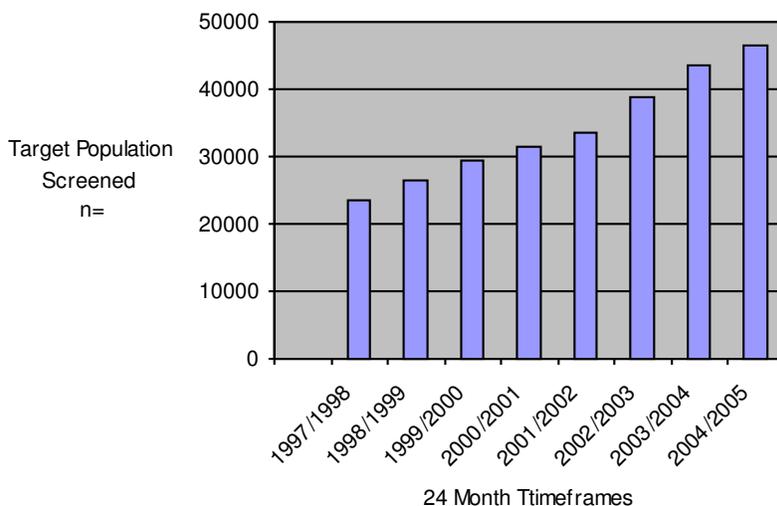
In 2004, 10.1% of women screened were over age 69. This increased to 10.6% in 2005. In 1997, 4% of NSBSP's clientele were over the age of 69. Following policy change in 1998 to accept these women into the program (but not send them reminder letters) these figures have been watched carefully for the resulting affect on program capacity, as it increasingly affects available bookings for the target age group of 50-69. However, many in this group had started with the program when in the target age group and if still asymptomatic, should not need to have examinations in

and tie up the diagnostic system. **After age 70, screening mammography is recommended if a women’s life expectancy is anticipated to be ten years.**

In the initial six months of the program the policy to not accept the 40-49s was clearly not enforced and 20% of women attending were in this age group. However, physicians and women in their 40s lobbied strongly in an effort for them to officially become part of the program. Following a relatively high cancer detection rate and a high number of node positive cases seen in this group in 1992, it was decided to change policy and accept these women in order to provide organized outcomes for this younger group for whom surveillance and monitoring should also occur. If this had not been done, they also would have continued to have screening mammography in the diagnostic mode, resulting in unnecessary appointments in the diagnostic sector and no tracking of outcomes. In 1995, it officially became policy to send recall letters to these younger women using the annual screen protocol.

In 2005, 33% of NSBSP participants were aged 40-49.

Figure 1 NSBSP Biennial Participation (ages 50-69)



The commitment of the Nova Scotia Department of Health (DoH) to the Nova Scotia Breast Screening Program has resulted in linear increases in participation rates. Screens integrated from Mobile 3, Truro and Dartmouth in 2002/2003 resulted in the slightly higher participation rate for that year. This is also evident for 2003 and 2004, when complete year data from these sites and additional data from screens at the Amherst Hospital became available. Support given by the DoH toward provision of a truly comprehensive, provincial mammography program continues to be apparent. Increases in 2004/2005 mainly represent the addition of the screening program from Bridgewater and additional NSBSP screening appointments from the fixed site at the Yarmouth Regional Hospital. For the **two** year period of 2004 and 2005, there were 46,560 (**Table 4**) screening mammograms performed by NSBSP on women in the target age group.

In May and June 2005, the NSBSP administration office staff incorporated information from 5,000 mammogram requisitions from The South Shore Regional Hospital in Bridgewater (DHA 1) into the Central Mammography Database, enabling booking for both screening and diagnostics at that site to come on line on July 4th. The same process, in consultation with The Valley Regional Hospital in Kentville (DHA 3) resulted in a CMB start date at that hospital, in January 2006.

On the national scene, the spring 2006 population census has been completed and will eventually result in changing needs in the health care system. It is anticipated that the target-aged population in the Capital Health District (DHA 9) will show continued growth, resulting in

longer wait times and increased appointment needs for both screening and diagnostic mammography in this district. Planning for a third mammography facility has commenced for DHA 9 from the Cobequid Community Health Center. This additional unit, plus implementation of standardized booking schedules for mobile facilities should greatly facilitate an increase in provincial participation rates.

Table 5a Diagnostic and Screen Biennial Participation Rates ages 50-69

Diagnostic Mammography Facilities by DHA	Target Population	<i>Biennial Diagnostic Mammograms 2004+2005</i>	Biennial Screens Plus Biennial Diagnostics 2004+2005	Combined Participation Rates 2002+2003 Per DHA	Combined Participation Rates 2003+2004 Per DHA	Combined Participation Rates 2004+2005 Per DHA
Unknown	-	1,832	5,058	4%	4%	5%
1 South Shore Regional	7,555	61	2,612	>25%	>27%	>35%
2 Yarmouth Regional	7,241	18	3,948	>36%	>44%	>54%
3 Valley Regional	9,312	46	2,802	>30%	>29%	>31%
4 Colchester Regional *	7,439	147	4,029	>49%	>54%	>54%
5 Cumberland Regional	4,043	26	1,655	>13%	>26%	>41%
6 Aberdeen	5,406	16	606	>9%	>12%	>11%
7 St. Martha's	5,434	45	2,064	>37%	>36%	>38%
8 Cape Breton Health Care *	15,762	984	7,745	41%	>44%	>49%
9 QEII HSC and DGH	38,114	2,523	21,731	>51%	>57%	>57%
Invalid Postal Code	-	2	10			
Total	100,306	5,700	52,260	>44%	>48%	53%

Table 5a contains in addition to data in **Table 4**, diagnostic data from facilities now booking diagnostic mammography using the Central Mammography Booking Database. The data presented in **Table 5a** shows **52,260** women having at least one bilateral mammogram in a two year period at either a screening or diagnostic site. The resulting mammography participation rate is **53%** an increase of 5% over 2004.

Italicized numbers in column three, indicate numbers of women by DHA having had a bilateral diagnostic examination outside their home district but at a facility booking and reporting through CMB, and who have not already had a screening mammogram in the same year. The majority of Nova Scotia hospitals are effectively channeling appropriate screening cases to the program mode and two (*) have implemented the provincial diagnostic reporting system. Mammography performed in diagnostic centers must be ordered by faxed requisition. "Diagnostic" bookings comprise symptomatic cases, abnormal screen work-ups, women with previous breast cancer, and short term follow-up cases following core biopsy, surgery or previous mammography. See **Appendices B and C**. In September 2006, it is estimated that more than 5,000 mammograms are performed annually in sites where CMB booking is not in place.

Figure 2 2004/2005 Combined Provincial Mammography Participation Rates per DHA (ages 50-69)

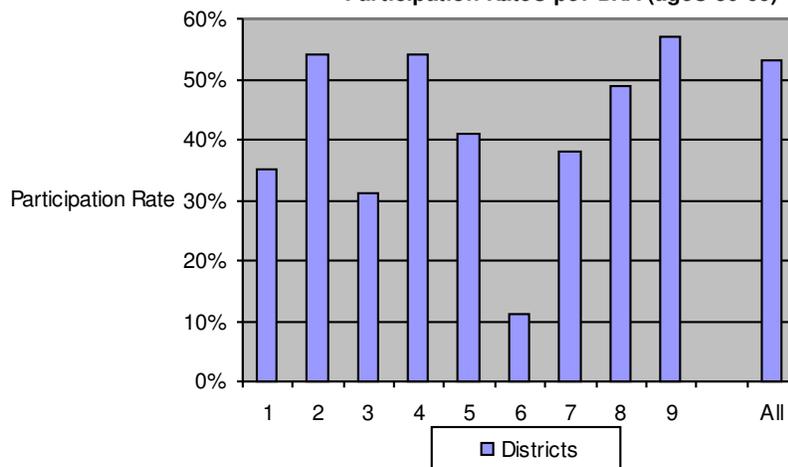


Table 5b NSBSP Biennial Participation and Cancer Detection Rate by District ages 50-69

District Health Authority (DHA)	Target Population	Women screened biennially 2004+2005	Participation Rate 2004+2005	Invasive Cancers	In situ Cancers	All Cancers	Cancer Rate per woman screened per district
Unknown District	-	3,226	7%	9	2	11	
1 South Shore	7,555	2,551	33.8%	7	1	8	3.1
2 South West Nova	7,241	3,930	54.3%	10	2	12	2.8
3 Annapolis Valley	9,312	2,756	29.6%	2	0	2	0.7
4 Colchester E. Hants	7,439	3,882	52.2%	8	3	11	2.8
5 Cumberland	4,043	1,629	40.3%	5	1	6	3.7
6 Pictou County	5,406	590	10.9%	1	0	1	1.7
7 Guysborough /Antig	5,434	2,019	37.2%	6	0	6	3.0
8 Cape Breton	15,762	6,761	42.8%	22	7	29	4.3
9 Capital	38,114	19,208	50.4%	47	10	57	3.0
Invalid Postal Codes	-	8	-				
Total	100,306	46,560	46.4%	117	26	143	3.0

Table 5b has in addition to data in **Table 4** the cancer detection rate of surgically removed cancers by district.

It is important to remember that the cancer rates in **Table 5b** do not reflect the overall provincial cancer detection rates. These figures include only findings from the Nova Scotia Breast Screening Program database and represent approximately one third of the annual cancer detections in this province.

Table 6 Diagnostic and Screen Biennial Participation Rates ages 40-69

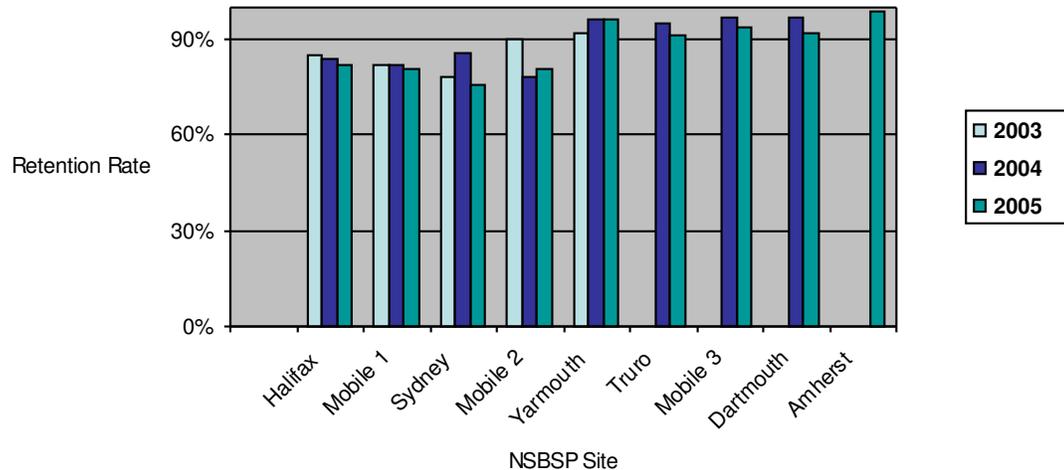
Diagnostic Mammography Facilities by DHA	Population (40-69)	Biennial Diagnostic Mammograms 2004+2005	Biennial Screens Plus Biennial Diagnostics 2004+2005	Combined Participation Rates 2002+2003 per DHA	Combined Participation Rates 2003+2004 per DHA	Combined Participation Rates 2004+2005 per DHA
Unknown		5,180	10,843	(5%)	(4%)	5%
1 South Shore Regional	12,634	116	4,179	>23%	> 22%	>33%
2 Yarmouth Regional	12,182	43	6,644	>36%	>39%	> 55%
3 Valley Regional	16,007	87	4,512	>27%	> 23%	>28%
4 Colchester Regional *	13,532	306	7,192	>49%	>48%	>53%
5 Cumberland Regional	6,583	36	2,901	>13%	>23%	>44%
6 Aberdeen	9,246	31	1,058	>10%	>11%	>11%
7 St. Martha's	9,200	73	3,248	>34%	>31%	>35%
8 Cape Breton Health*	26,722	1,745	12,910	>39%	>36%	>48%
9 QEII HSC and DGH *	71,365	6,326	40,505	>50%	>50%	>57%
Invalid Postal Code		3	12			
Total	177,471	13,946	94,004	44%	>43%	>53%

Table 6 is similar to **Table 5a** except for the addition of the ages 40 to 49. This age group (recalled on an annual basis, although not actively recruited) is accepted by NSBSP for purposes of data collection and other benefits available only through the organized program. In **Table 6** it can be seen the provincial **screening plus diagnostic** participation rate when including the 40-49 age group for 2005 is **53%** (**43%** one year ago), and is the same (**53%**) as the 2005 target age group of NSBSP in **Table 5a**. The increase is primarily due to greater numbers of diagnostic examinations (ages 40-49) from Halifax and Sydney, following a complete year of diagnostic data from these two sites. It is expected that there are significant numbers of this age group in other sites having mammograms and not providing outcomes. Analysis of data on women under age 50 is now possible when reporting is done through the provincial diagnostic database.

• Retention Rate

Estimated percentage of women who are re-screened within 30 months of their previous screen
 Target: $\geq 75\%$ re-screened within 30 months

Figure 3 2003, 2004 and 2005 Retention Rates by site and ages 50-69



NSBSP retention rates for this report are based on the number of eligible clients who are due for their next appointment and have been sent a reminder notice, but have failed to book as of May 13, 2006. Due to fluctuating wait times, clients who have not booked but are still within three months (as opposed to the six month leeway specified in the official definition above) of their recall dates are not included, nor are previously diagnosed cases of breast cancer. Clients deciding never to return are included until they reach age 69. The program does accept women over age 70 for screening every two to three years, but does not send them reminder letters unless recommended by the radiologist to return for screening.

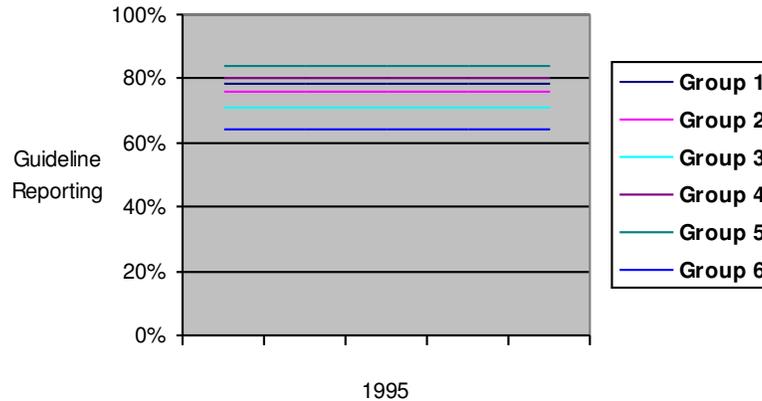
The overall retention rate for NSBSP remains well above 85% for 2005. Due to more recent involvement in the program, some NSBSP sites (Truro, Mobile 3, Dartmouth and Amherst) reflect higher retention rates. The highest retention rate seen at the Yarmouth site is due to a greater number of screens formerly having been recalled at yearly intervals (**Figure 4**). By increasing organized screening outputs from the hospital site in 2005, Yarmouth (DHA 2) was able to increase not only participation but also retention. The lowest rate from the five initial sites is at the fixed site in Sydney, **indicative of insufficient capacity**. The Cape Breton mobile van (Mobile 1) however, has maintained a steady retention rate of 81% over the past three years. For both fixed and mobile screening unit managed by DHA 4, very high retention rates can be seen at the fixed site in Truro (91%) and Mobile 3 (94%). One year ago these rates were 95% and 97% respectively.

In previous years, prior to the start-up of Mobile 3, Mobile 1 spent several months servicing mainland sites in addition to sites in Cape Breton. Due to extra services recently provided by the third mobile and taking into consideration the declining age of Mobile 1, 2004 became the first year it was possible to restrict Mobile 1 for use exclusively on the island. In 2005 Mobile 1 was further restricted for use as a fixed screening site at the Cape Breton Regional Hospital. A newly constructed replacement for Mobile 1 should be available for travel by the end of 2006. With a significantly higher target population in DHA 8 compared to that combined in DHA 4 and 5, mobile services have been somewhat redistributed. Several sites on Cape Breton Island are now being served by Mobile 3, with films sent to Sydney for reporting at that site. Further changes are expected to result based on geographic mapping recommendations (The GIS Study, **Page 38**). Following the Provincia Review of Mammography Units (**Pg 6**) a new fixed mammography unit

was purchased for Sydney. It has long been known that NSBSP facilities and screening appointments

are not as readily available for DHA 8 as they are on the mainland. This affects not only recruitment but also retention, and has been an escalating problem for women living in Cape Breton. With the new fixed diagnostic unit and improved mobile van service, increased booking availability and lower wait times should be realized in eastern Nova Scotia.

Figure 4 "Biennial Guideline Reporting" (ages 50-69)



“At some point there is insufficient incremental value to justify decreasing the time between screening examinations (few if any additional lives are saved beyond those saved with the longer interval)..... If screening is repeated, and the time between screening examinations is appropriate, then most of the next group of cancers will have just entered the detectable phase.” *Screening for Cancer: When is it valid? – Lessons from the Mammography Experience: Radiology, 2003; 229: 319-327.*

Figure 4 demonstrates that for the target age group in 2005, one imaging interpretation group recalls **64%** of screening cases on a biennial basis. The cancer detection rate for this group was 4.4. Of note is a positive trend seen in group 3 where two year call backs in 2003, 2004 and 2005 were 33%, 57% and are now at 71% due in part to the reduction in numbers of screeners at this one site, and attempts to follow NSBSP guidelines more closely. There is evidence that despite more annual recalls, lower cancer detection rates can result. It is possible in fact that with a higher rate of “annual recall-screening” for the age 50-69 group, fewer early cancers are being detected. The four interpretation groups following guideline reporting have biennial recalls rates of **78%, 76%, 80% and 83%**, similar to 2004. The cancer detection rates by the same reporting groups are respectively 4.9, 5.6, 4.9 and 5.8. In an American study comprising eight screening studies, the interval at which mammography was performed was between 12 and 33 months and annual screening mammography was found no more effective than biennial screening mammography. *Breast Cancer Screening: A Summary of the Evidence for the U.S. Preventive Services Task Force; Annals of Internal Medicine, 2002, 137: 347-360.* In this publication it is suggested that one needs an appropriate “time” interval to see changes reflective of breast cancer.

Promoting the concept of “One Provincial Standard”, Nova Scotia’s Department of Health recommends that breast screening recalls follow evidence based guidelines encouraged by NSBSP (**Appendix B**).

• **Abnormal Call Rate (%)**

Percentage of women screened referred for further testing because of abnormalities found within a program screen
 Targets : < 10% of 1st screens and < 5% of re-screens

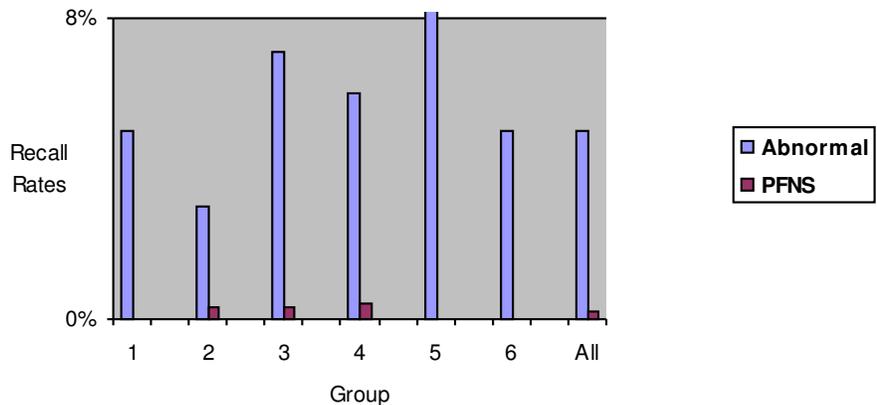
Table 7a 2005 Abnormal call rates and cancer detection rates (50-69)

	Screens	Abnormal Reports	Abnormal Call Rate (%)	Cancers	Cancer detection Rate/1000 Screens
1 st	4,995	392	7.8	24	4.8
Re-screen	23,472	999	4.3	122	5.2
All	28,467	1,391	4.9	146	5.1

Table 7b 2005 Physical Finding Not Seen (PFNS) call rates and cancer detection rates (50-69)

	Screens	PFNS Reports	PFNS Call Rate (%)	Cancers	Cancer detection Rate/1000 Screens
1 st	4,995	9	0.18	0	0
Re-screen	23,472	40	0.17	1	0.042
All	28,467	49	0.17	1	0.035

Figure 5 Abnormal and PFNS Recall Rates by Reporting Group 2005 (50-69)



In 2005, **1,391** screens in the target age group were reported as abnormal (**Table 7a**). Abnormal reporting rates of **4.9%** overall (**7.8%** for 1st screens and **4.3%** for re-screens), were the same as in 2004. These are lower than reported nationally and have improved greatly from the start of the program. An additional 49 cases (**Table 7b**) were reported based on clinical findings categorized as Physical Findings Not Seen or “PFNS”. This increased from 28 a year ago and 40 in 2003. Groups 5 and 6 chose not to use the PFNS option as an interpretation result. Generally however, the “PFNS” reporting selection is being used, but the number of reports is minimal and not always significant enough to reflect as a percentage in **Figure 5**. For 2005, in the target age group, one cancer was detected by clinical findings alone which was not visible on mammography. There was in addition, one clinical finding resulting in one cancer detection in the 40-49 age group which is not represented in the above chart.

Table 8 2005 Work-up Assessment (all ages)

Assessment Tests	All	Assessment testing per all abnormal screens	Assessment testing per all screens	1st	Assessment testing per abnormal (1 st screens)	Assessment testing per (1 st screens)
Work-up ultrasounds	1115	39%	2%	479	45%	4%
Work-up mammograms	2696	95%	5%	1000	94%	8%
Core Biopsies	878	31%	2%	344	32%	3%
MRI	27	0.9%	0.05%	9	0.8%	0.07%
Women to surgery	287	10.1%	0.6%	74	7%	0.6%

Table 9a 2005 and Cumulative Core Biopsy Outcomes (all ages)

Outcome	1991-2005			2005		
	Stereo	U/S Guided	All	Stereo	U/S Guided	All
Benign	3,947	139	4,086	593	54	647
Atypical/Suspicious	312	5	317	26	0	26
Cancer	1,409	77	1,486	205	19	224
Invasive	1,026	76	1,102	156	19	175
DCIS	381	0	381	49	0	49
Lymphoma	2	1	3	0	0	0
LCIS	10	0	10	3	0	3
Unsatisfactory	65	0	65	1	0	1
Others*	282	9	291	50	6	56
Total	6,025	230	6,255	878	79	957
Benign : Malignant**	2.8 : 1	1.8 : 1	2.7 : 1	2.9 : 1	2.8 : 1	2.9 : 1

*Includes unsuccessful and equivocal cases

**Results of atypia and LCIS are not included to determine B : M ratios

There were 5,818 women having **6,255** core biopsies (by screen exam date) through NSBSP from 1991 until 2005 (486 women had more than one core biopsy at different times or bilaterally). Of the **957** core biopsies performed in 2005, **79** were indicated as being done using ultrasound guidance for positioning of the needle. In 2005, all positive core biopsy cases aged 50-69 proceeded to surgery. Outside the target age group, one case could not proceed to surgery after positive core biopsy, and one definitive surgical result had not been received. The core biopsy program also collects core biopsy data by core biopsy date for separate studies unrelated to NSBSP annual outcomes. Additional core biopsy outcome data is shown in **Table 9b**.

Table 9b 1991-2005 Core Biopsy and Definitive Surgery Outcomes

	1991-2005	2005
Malignant cores benign at surgery	13	2
Malignant cores atypical or benign at surgery	7	0
Malignant cores malignant at surgery	1,438	218
Malignant cores - no definitive surgery	38	7
Benign cores benign at surgery	231	25
Benign cores atypical or suspicious at surgery	28	5
Benign cores malignant at surgery	70	12
Benign cores - no definitive surgery	3,757	605
Atypical or suspicious cores benign at surgery	64	2
Atypical or suspicious cores atypical or suspicious at surgery	100	10
Atypical or suspicious cores malignant at surgery	118	10
Atypical or suspicious cores - no definitive surgery	35	4
Unsatisfactory or others	356	57

Table 10 2005 NSBSP Surgical Outcomes by District Health Authority (all ages)

DHA	1	2	3	4	5	6	7	8	9	Unkn	All
Screening Exams	3,175	4,634	2,802	4,480	2,044	649	1,977	7,314	20,091	3,729	50,895
Surgical Procedures	22	33	10	21	18	1	9	51	134	21	320
Women to Surgery	20	31	10	19	15	1	9	48	115	19	287
B : M Ratio	1 : 5.0	1 : 1.6	1 : 1.5	1 : 17	1 : 3.7	0 : 1	0 : 9	1 : 10.8	1 : 25.5	1 : 3.8	1 : 6.8
Cancer Det Rate	4.7	4.1	2.1	3.8	5.4	1.5	4.6	5.9	5.1	4.0	4.7

Table 11 2005 NSBSP: Days to Diagnosis and Surgery Wait Times by District Health Authority (all ages)

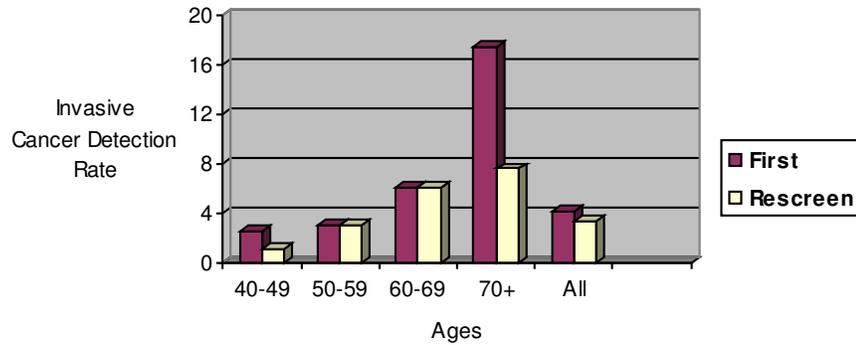
DHA	1	2	3	4	5	6	7	8	9	Unknown	All
Screen to 1 st core biopsy (any result)	66	81	62	42	69	33	37	31	32	43	44
Screen to 1 st core biopsy (cancer)	54	73	50	36	57	13	29	26	27	43	35
Cancer core to 1 st surgery	97	118	87	70	101	26	66	49	65	80	72
Benign core to 1 st surgery	123	170	109	0	204	0	0	95	97	0	114
1 st core to 1st surgery (if multiple cores)	37	44	42	34	50	13	37	32	42	46	40
No core to 1 st surgery	145	108	135	111	77	0	0	0	0	88	104

Tables 10 and 11 are included for use at the **district** level to provide a baseline for each District Health Authority and perhaps assist in reform at the district level. They include Nova Scotia Breast Screening database results only. Of importance are trends that possibly could become indicators for each district and assist in utilizing resources. NSBSP considers numbers and types of assessment tests to be helpful and relevant information for both provincial and district feedback. It is particularly useful for analyzing how health service providers apply the Clinical Practice Guidelines. These outcomes may be important at the **provincial** level to assist in providing continuous quality improvements to all services in place in both screening and diagnostic sites. It is hoped that this data may eventually be utilized to benefit women undergoing these procedures.

• Invasive Cancer Detection Rate

Number of women detected with invasive cancer during a screen episode per 1,000 women screened
 Target: 1st screen > 5 per 1000 screens Re-screen > 3 per 1000 screens

Figure 6a 2005 Invasive Cancer Detection Rates per 1,000 Screens by age

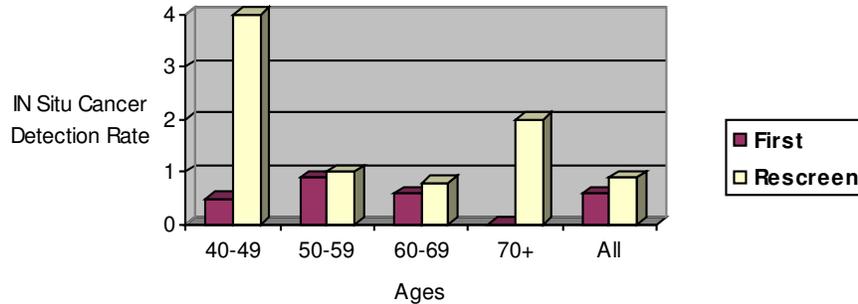


There were 191 cases of invasive breast cancer detected in 2005. Shown in ten year age groups above, 116 (61%) of these were in the 50-69 age group for a cancer detection rate overall of **4.1 per 1,000 screens**. Nova Scotia is lower than national targets of more than 5 per 1,000 (**3.8**) for first screens and higher than the 3 per 1,000 for re-screens (**4.1**). It may well be that with the screening program now in place, the invasive cancer rates will continue to fall as more high risk lesions are picked up in the screened population at a pre-cancerous or early stage (DCIS and atypical). The rate of invasive breast cancer increases by age group for both initial screens and re-screens. Also, many of the first time program screens have had previous mammograms in the diagnostic sector.

• In Situ Cancer Detection Rate

Number of women detected with ductal carcinoma in situ (DCIS) cancer, rather than invasive cancer, during a screening episode per 1,000 women screened Target: At present collected for surveillance and monitoring purposes only

Figure 6b In Situ Cancer Detection Rate per 1,000 Screens by age



There were 43 cases of In Situ cancer detected in 2005. Of these, 26 (60%) were aged 50-69. The overall in situ cancer detection rate for this age group was **0.9 per 1,000 screens** similar to the 1% rate at the national level. The Performance Indicator's Working Group felt it inappropriate to set targets for DCIS due to lack of evidence of the transition of DCIS to invasive cancer and increasing sensitivities of screening techniques. In 2005, there were 5 cases of LCIS, 3 of which were between 50 and 69.

• Diagnostic Interval

Total duration from abnormal screen to resolution of abnormal screen

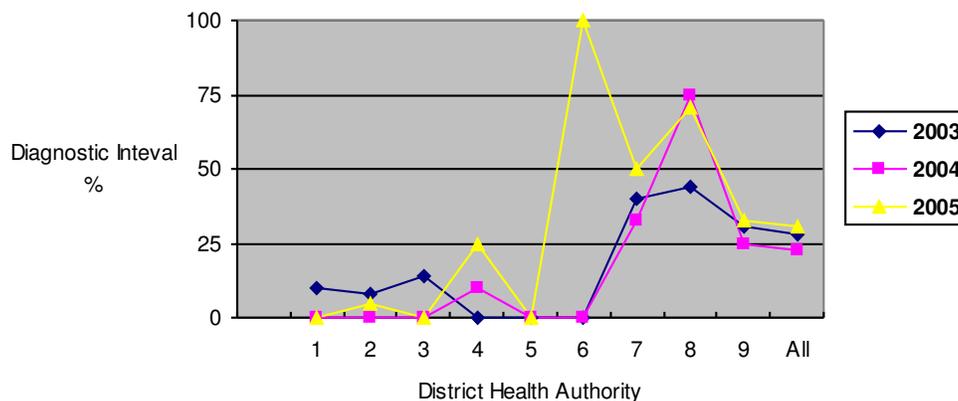
Target: (1) $\geq 90\%$ within 5 weeks if no tissue biopsy (2) $\geq 90\%$ within 7 weeks if tissue biopsy

Figure 7a Abnormal screen to diagnosis - no biopsy (%)



In 2005, the NSBSP overall “**Diagnostic Interval**” shows only **62%** of abnormal screens having had **no** tissue biopsy, are at case completion after five weeks from screening. This is lower than the 72% overall nationally in 2001 and 2002. (**Table 3a, Page 12**). It can be seen that for the target age group (50-69) the overall diagnostic interval has not improved in recent years.

Figure 7b Abnormal screen to diagnosis - with biopsy (%)



In NSBSP in 2005 the overall **Diagnostic Interval** for women having had a tissue biopsy was **32%**. This indicates that these intervals have decreased marginally overall from last year but are still far short of the 2001/2002 national average of 49% of women who attain a diagnosis within 7 weeks. Diagnostic Intervals have improved in DHA 4, 6, 7, and 9. The shortest diagnostic interval seen in DHA 6 is based on only one case. Numbers of surgeries for which results were based are seen in **Table 10, Page 22** and are for screening cases only.

• Positive Predictive Value

Proportion of abnormal cases with completed follow-up found to have breast cancer (invasive or in situ) after diagnostic work-up

Target: 1st screens $\geq 5\%$ of abnormal screens are cancer

Re-screen $\geq 6\%$ of abnormal screens are cancer

Figure 8a High-Low Positive Predictive Values (%) 50-69

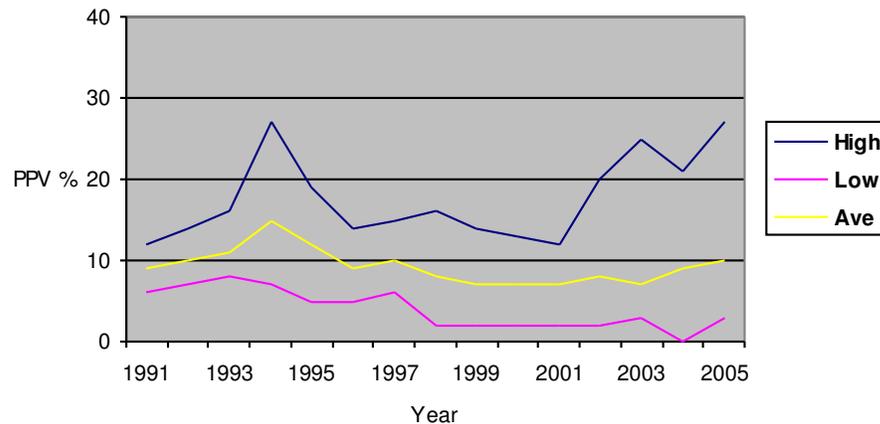
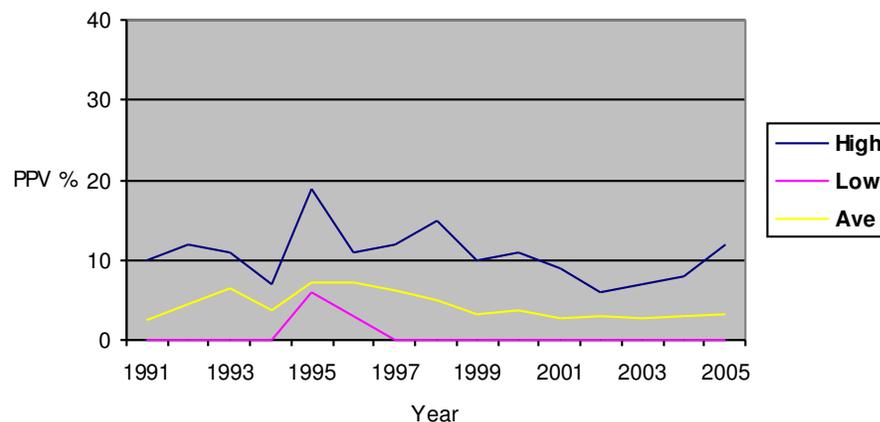


Figure 8a demonstrates for the target age group, the individual highest and lowest as well as the average PPV for the indicated years. A downward trend of performance can be seen especially after 1994 and 2003 as new sites joined the program. The highest number of target age, first read mammograms interpreted in 2005 by a NSBSP radiologist was 3,277 with a corresponding PPV of **25%**. The highest PPV of the year was 27%.

Figure 8b High-Low Positive Predictive Values (%) 40-49



As expected, PPV's are lower for the age 40-49 group where breast density is at times greater and can decrease the sensitivity of early detection (**Figure 8b**).

One international publication has stated that Positive Predictive Values (PPVs) for initial mammograms were as high as 37.5% in the Netherlands where corresponding recall was 1.4%, and as low as 5% in the United States where the corresponding recall was 15%. Cancer detection

rates did not closely follow the pattern of recall rates. These differences may be influenced by factors including prevalence of cancer in the screening population, radiologist training, quality of the mammograms and fear of malpractice and legal outcomes. *Report from the International Breast Cancer Screening Network (IBSN), Draft Paper 24 September 2003.*

Several radiologists in NSBSP maintain consistently high PPVs. Determinants of this trend seem to be dependent on the length of involvement in the program, level of commitment, interaction of the imaging team and frequency of multi-disciplinary team rounds reviews. PPVs for three NSBSP radiologists in 2005 were 27%, 24% and 18% with corresponding abnormal reporting rates for first reads of 2.7%, 3.6% and 3.2% respectively. All three radiologists are in groups practicing guideline reporting (**Figure 4, Page 19**). Positive Predictive Values, especially in relation to abnormal reporting rates will be more meaningful when correlated with the associated interval cancer rates, which will be available for Nova Scotia by 2007.

Since the beginning of the program, all participating radiologists have received a letter detailing their individual PPV, abnormal rate and cancer detection rate for both first and subsequent screens.

Specialist radiologists detect more cancers, more early stage cancers, recommend more biopsies, and have lower recall rates than general radiologists. *Performance Parameters for Screening and Diagnostic Mammography: Specialists and General Radiologists; Edward A Sickles MD, Dulcy E. Wolverton MD, and Katherine E Dee MD; RSNA, 2002.*

• Benign to Malignant Open Biopsy Ratio

Among open biopsies, the ratio of the number of benign cases to the number of malignant cancer cases
Target: $\leq 2 : 1$ for all open biopsies

Figure 9 2005 Benign to Malignant Open Biopsy Ratio by District 50-69

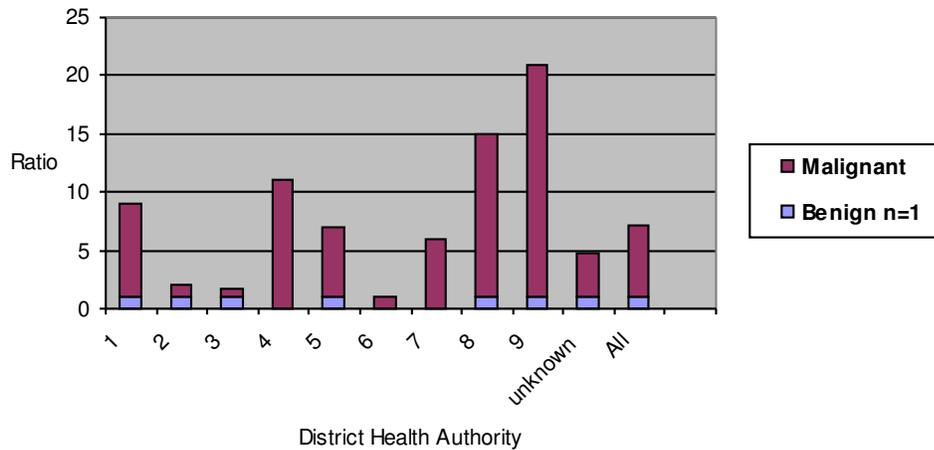
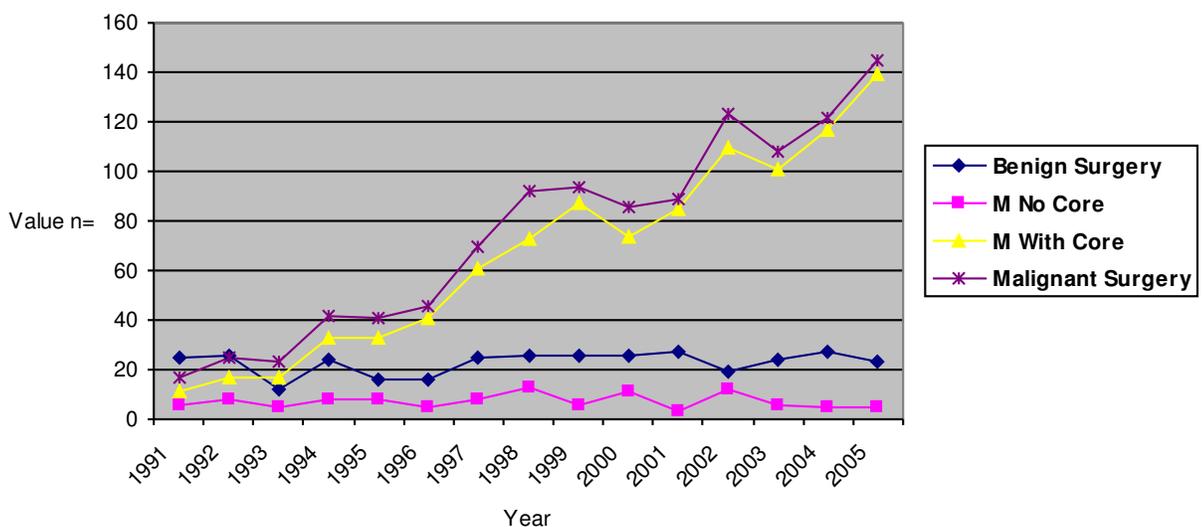


Figure 9 demonstrates the 2005 benign to malignant surgical ratios **1 : 6.3** (or 0.16 : 1) for women aged 50-69, indicating that overall for every one benign surgical outcome, there were 6.3 malignant outcomes. In 2005, no benign surgery cases were performed on NSBSP clients in Districts 4, 6 and 7. Greatly improved ratios are seen from last year in districts 1 and 4. Of note is the ratio in DHA 8 and DHA 9 where these Benign to Malignant open biopsy ratios were **1 : 14** (or 0.07 : 1) and **1 : 20** (or 0.05 : 1) respectively. This indicator has the potential to be more significant in the future as all diagnostic facilities join with Central Mammography Booking. The important outcome is to find the greatest number of small cancers with minimum work-up, decreased wait times and decreased number of surgeries.

Figure 10 Malignant (M) : Benign (B) Surgical Outcomes by Year (50-69)



The relationship between the number of benign surgical outcomes and number of malignant surgical outcomes not having had a core biopsy as part of their work-up remains similar from the beginning of the program. It is also apparent in **Figure 10** that the number of malignant surgical

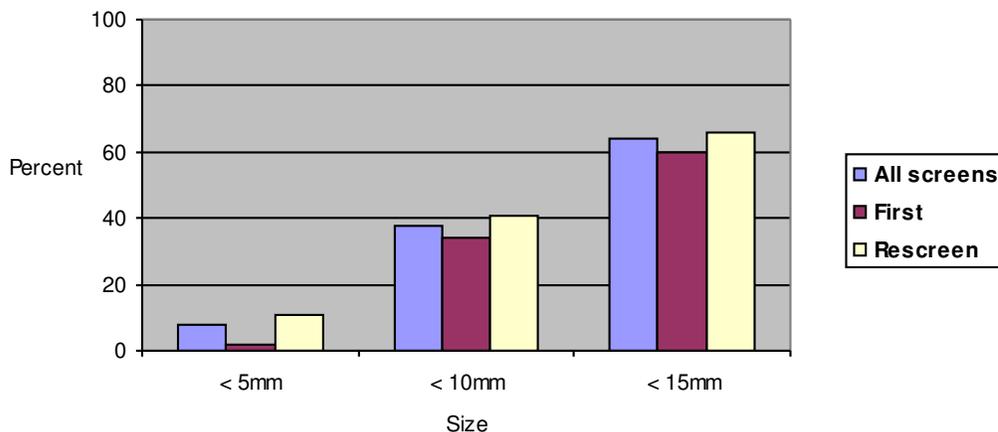
outcomes has increased substantially over the years as the program has grown. It can be seen that the number of cancers subsequently detected after having a core biopsy, remains in proportion to total number of cancers detected from open surgical outcomes. One benign or malignant surgical outcome per woman is used in **Figure 10** indicating that benign : malignant outcome ratios of surgery have improved greatly since the start of the program. The number of core biopsies has increased, particularly as new sites joined the organized screening program in 1994, 1997, 2002 and 2005.

Table 12	2005 Biopsy Results per woman	ages 50-69		Ratio	Rate
		B n=	M n=		
	Benign : Malignant open biopsy ratios	24	145	0.17 : 1	
	Benign : Malignant core biopsy ratio (atypical not included)	337	135	2.5 : 1	
	Benign : Malignant core biopsy ratio (atypical included)	354	135	2.6 : 1	
	Benign : Malignant core biopsy ratio (atypical and others included)	381	135	2.8 : 1	
	Benign : Malignant open biopsy ratio – direct to open biopsy (no core)	10	5	2 : 1	
	Benign : Malignant open biopsy ratio – after core biopsy	13	139	0.09 : 1	
	Benign open biopsy rate per 1000 screens	23			0.8
	Benign core biopsy rate per 1000 screens	337			11.8

• Invasive Cancer Tumor Size

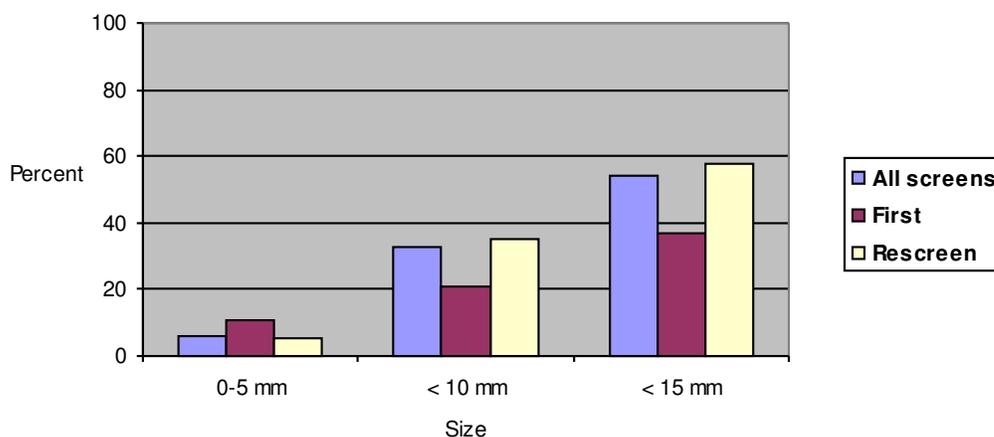
Percentage of invasive cancers with tumor size of <10mm and <15mm and in greatest diameter as determined by the best available evidence
 Targets: > 25% ≤ 10mm and >50% ≤ 15mm

Figure 11a Invasive Cancer Tumor Size 1991-2005 (all ages)



Of 1,670 cancers of all ages detected from the start of the program, 77% (1,289) were invasive and of these, **8%** were less than or equal to 5mm, **37%** were 10mm or less and 64 % were 15 mm or less. Of all invasive cancers in the target age group, 70% were stage 1 or better. During this time 371 cases of DCIS and 10 cases of LCIS were also detected. Over 99.5% of tumor sizes were obtained from pathology reports, with film measurements needed only in cases where it was not specified in the pathology reports.

Figure 11b Invasive Cancer Tumor Size 2005 (ages 50-69)

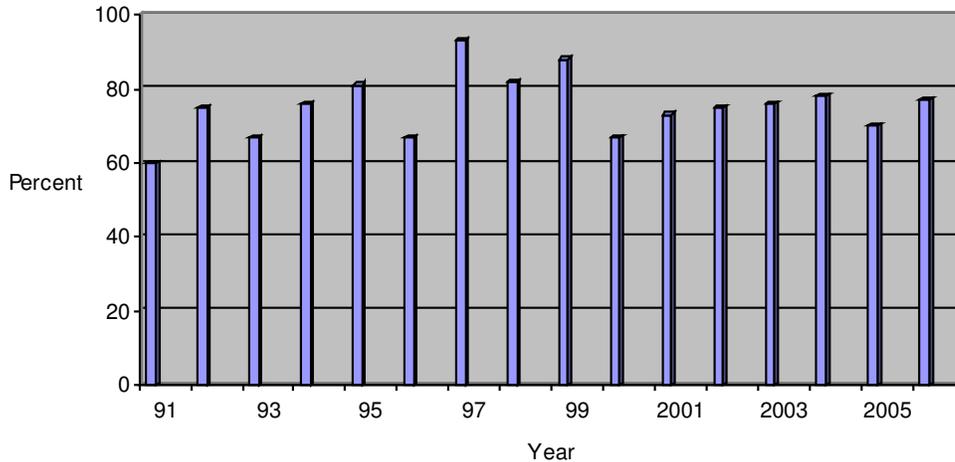


In 2005, in the target age group, 146 cancers were detected. Of these, 116 (80%) were invasive and of these, 11 (**6%**) were 5mm or less, **33%** were 10mm or less and **54%** were 15mm or less. Sixty-two percent were stage 1 or better. During this time, 26 cases of DCIS were detected and there were three cases diagnosed as LCIS.

• Node Negative Cancers

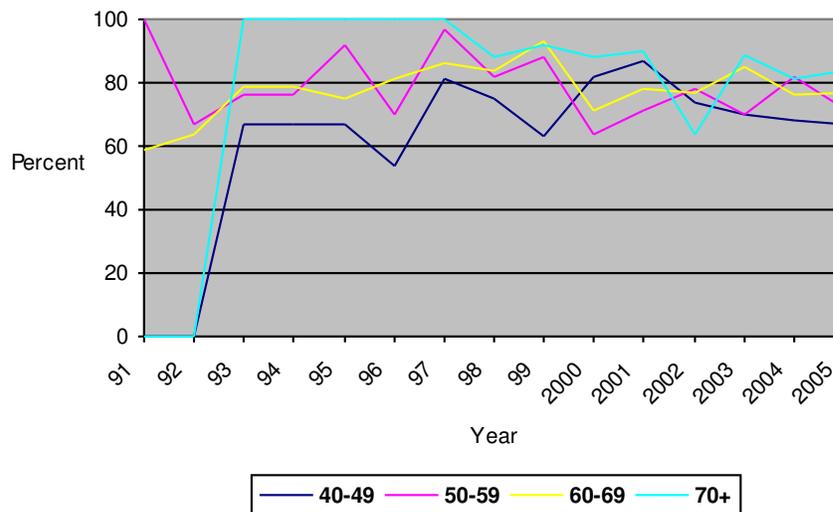
Proportion of invasive cancers in which the cancer has not invaded the lymph nodes
 Target: > 70% node negative

Figure 12a Node Negative Cases by Year 50-69



Since the beginning of the program **77%** of all invasive cancers in the target age group were node negative. In addition there have been 55 cases of DCIS with nodal excisions (52 with negative nodes and 3 with positive nodes). In 2005, there were 116 invasive cancers in the **target age** group of which 105 (90%) had lymph nodes excised. Of these **70%** were node negative. In all age groups there were 186 lymph node dissections and of these, 15%, 27%, 35% and 23% were in the 40-49, 50-59, 60-69 and 70+ age groups respectively.

Figure 12b Node Negative Cases by Age and Year



• **Post-Screen Detected Invasive Cancer Rate**

Number of women with a diagnosis of invasive breast cancer after a negative screening episode per 10,000 person-years at risk, within 12 and 24 months of the screen date

Target: Canada : < 6 per 10,000 person years (within 12 months, age 50- 69)
< 12 per 10,000 person years (within 24 months, age 50-69)
United Kingdom : 12 per 10,000 screens (within 24 months)
Australia : < 6.5 per 10,000 (within 12 months)

NSBSP has identified post screen detected cancers from the start of the program, but it is known that reporting of these is of little or no use unless accurate data is available. Post screen cancers are routinely reviewed at four provincial site team rounds reviews as an ongoing quality assurance measure. Of importance is the identification of programmatic sensitivity and specificity, which may not be calculated without proper identification of these cancers. In September 2002, NSBSP had identified **141 (6/10,000)** non-compliant cancers and **131 (6/10,000)** interval cancers.

A provincial study funded by the Canadian Breast Cancer Foundation Atlantic Chapter, will enable the NSBSP post-screen invasive cancer rates for 2000/2001 and 2002/2003 to be included in the 2006 NSBSP Annual Report.

Former Initiatives

Database Development

From a simple flat file database available in 1991, a complete rewrite upgraded the NSBSP system to a user friendly and user developed relational database completed in 1997. A second rewrite began in 2002 and when completed in June 2004 resulted in standardized data entry procedures and outcomes for both screening and diagnostic mammography from one database. Meetings with the provincial Meditech Hospital Information System administration in the past have discussed a pilot linkage project. In 2004, provincial funding was put in place to cover costs for one additional NSBSP system support person. More information on database upgrades over the years may be seen on **Page 9**.

Central Mammography Booking (CMB) and Diagnostic Wait Times

A project designed to book all mammography appointments, both screening and diagnostic through one call center was completed and implemented in December 2000. Prior to this, it was only the first two mobile vans that utilized the booking center. Funding for computer interfaces and programming for this project was obtained through the federal government's Infostructure Support Program and the Canadian Breast Cancer Foundation - Atlantic Chapter. Initially the project enforced standard booking guidelines and booked appointments for two NSBSP vans, one NSBSP fixed site and one diagnostic center. Starting dates for diagnostic centers joining with CMB are seen in **Table 2** on **Page 5**. **Table 13** shows these sites and the resulting effect Central Mammography Booking has had on their diagnostic wait time. Core biopsies are now also booked through CMB.

Table 13 Impact of CMB on Diagnostic Waiting Lists

Hospital	Wait Sept 2000	Wait May 2001	Wait May 2002	Wait May 2003	Wait May 2004	Wait May 2005	Wait May 2006
QEII HSC (Hfx)	6 mos	2 mos	3 wks	1 wk	2-4 days	4 days	3days
CBHCC (Sydney)			3 months	2 wks	1 wk	11 days	3 weeks
DGH (Dartmouth)			4 months	2 wks	1 wk	10 wks	3 weeks
CRHCC (Truro)			3 months	1 wk	1 wk	3 days	1 week
YRH (Yarmouth)			4 months	3 months	3 months	2 days	2 days
SSRH (Bridgewater) *					4 months	4 months	2 days
CCHHC (Amherst) #						1 month	1 week
VRH (Kentville)!						1 month	1 week

* Joined CMB in July 2005

Joined CMB in January 2006

! Joined CMB in January 2006

There is a considerable body of evidence that an abnormal breast cancer screening precipitates acute anxiety especially upon receipt of notification of the abnormal screen. Anxiety may persist for several months after resolution of the screening episode, even after the woman has been informed that she does not have cancer. *Waiting for a Diagnosis after an Abnormal Screen in Canada: Minister of Public Works and Government Services Canada, 2000*. With a goal of enabling NSBSP to process the bookings for provincial diagnostic mammography departments and to assist in channeling the flow of asymptomatic women to the screening program, CMB has successfully decreased waiting times at the diagnostic sites.

With appropriate integration of diagnostic and screening mammography programs through one Centralized Mammography Booking system, short wait times for diagnostics can be maintained.

Urgent situations can be addressed within a few days at all sites. In the Capital Health District, women have an option to choose an earlier appointment at another facility, and with planned implementation for breast screening from the Cobequid site in Sackville, despite population growth in the Halifax/Dartmouth area, it is anticipated that screening wait times at both the Halifax Shopping Center and DGH should decrease over the next year.

Double-Read System

Since the beginning of the program every tenth screening mammogram has been selected for a second interpretation by a different radiologist. These cases are computer selected and this process requires that these films be re-loaded following reporting sessions. Radiologist scheduling must be taken into consideration to avoid delays. Future reports will look at results. In addition to this formal approach, an unofficial double read system has been encouraged and may include peer review at a different hospital. Although this is work intensive for the entire NSBSP team, it has decreased work-up rates and is in the best interest of the clients.

Previous Publications

Published works of the Nova Scotia Breast Screening Program include:

- Stereotaxis Needle Core Biopsy of Breast Lesions Using a Regular Mammographic Table with an Adaptable Stereotaxic Device (AJR 1994; 163: 317-321)
- Nova Scotia Breast Screening Program Experience: Use of Needle Core Biopsy in the Diagnosis of Screening-Detected Abnormalities (Radiology 1996; 198: 125-130)
- Patient Navigation: Improving Timeliness in the Diagnosis of Breast Abnormalities (CARJ Vol 55, No. 3, June 2004)
- Ten Years of Breast Screening in the Nova Scotia Breast Screening Program, 1991-2001. Experience: Use of an Adaptable Stereotactic Device in the Diagnosis of Screening-Detected Abnormalities (CARJ vol 56, No. 2, April 2005)

Community Based Computerized Mobile Approach

A community operated and co-ordinated approach has resulted in buy-in of the provincial program at the community level while also taking advantages of the administrative services offered by the centrally located NSBSP office. Although mobile services result in increased effort and higher cost per screen, the multi van approach has served significantly to increase accessibility and participation in this province where originally there were twelve mammography units doing opportunistic breast screening. All three mobiles are computerized with real-time computer linkage to both the corresponding Interpretation Centers and the Central Administration Office. As a province where socio-economic influences often preclude attention to health programs, particularly those dealing with prevention, all three mobile units have been operating at close to maximum capacity. Extra funding for staff was approved in 2004 to enable Mobile 1 to maximize hours of operation, i.e. open evenings and Saturdays and a replacement mobile will be available for rural Cape Breton in late 2006.

Fee for Service Increase and Provincial Breast Screening Quality Initiative

The Nova Scotia procedure fee for screening mammography increased following a proposal put forward to the Medical Society of Nova Scotia. In April, 2004 the fee was raised from \$7.34 to \$10.47. The previously lower reimbursement rate contributed somewhat to the slow development of NSBSP. It was felt that a new screening fee would encourage participation from imaging departments presently not part of this program's Central Mammography Booking service. Also effective in April 2004, screening mammograms were to be performed only at screening centers accredited by the Canadian Association of Radiologists. To be eligible for reimbursement, mammography now must be done at accredited sites.

Self reported Canadian mammography data from 2003 which includes **screening mammograms occurring external to the Canadian organized programs**, estimates participation rates of 64.7% with a considerable portion of this screening taking place in the higher fee for service sector. This mammography is performed in an ad hoc fashion without organized recall, monitoring and surveillance measures (*Health Canada. Organized Breast Cancer Screening Programs in Canada - 1999 and 2000 Report. Ottawa: Minister of Public Works and Government Services Canada, 2003, 13-15*).

"In some provinces, many more women report having had a screening test than are reported by the corresponding provincial programs in the same year (e.g. in 2000 and 2001, 54% of Ontario women aged 50-69 reported having had a recent mammogram while the organized screening

program included only 22% of women in the target age range." *Progress in Cancer Control: Screening: Canadian Cancer Society/National Cancer Institute of Canada: Canadian Cancer Statistics 2006.*

The Core Biopsy Program

Under auspices of NSBSP a core biopsy program was started to coincide with the program start in June 1991. Database development has permitted tracking these examinations. Since the beginning of the program in June 1991 until December 2005, a total of 6,025 stereotactic core biopsies and a reported 230 ultrasound guided core biopsies have been performed on 5,818 women. Results may be seen in **Tables 9a and 9b** on **Page 21**.

Promotion of stereotactic needle core biopsy as opposed to clinical or ultrasound guided core biopsy is preferred for the following reasons:

- in a screening population, lesions are nearly always identified by mammography, and if the core biopsy is benign they are followed by mammography. If lesions are malignant, they are localized by mammographic guidance and mammographic specimens to confirm excision
- stereotactic localization following stereotactic core biopsy, by design, also localizes the core biopsy track so that this can be removed at the time of surgery
- stereotactic films are very reproducible unlike ultrasound which is operator dependant
- many lesions identified by mammography (especially calcifications) are not seen during ultrasound guided core biopsy, even by experienced ultrasonographers
- documentation of a missed lesion by ultrasound is difficult but clearly present with the NSBSP stereotactic needle core biopsy approach *Nova Scotia Breast Screening Program Experience: Use of Needle Core Biopsy in the Diagnosis of Screening Detected Abnormalities, Radiology 1996*. For this reason, a negative ultrasound guided core biopsy is not as acceptable to many clinicians and the patient usually must go on to have surgery regardless of negative results.

"Core biopsy is a superior method for the evaluation of non-palpable lesions due to increased diagnostic specificity and reduced rate of inadequate samples." *Brenner RJ, Bassett LW, Fajardo LL, Dershaw DD, Evans WP III, Hunt R, et al. Stereotactic core needle biopsy: a multi-institutional prospective trial. Radiology 2001; 218: 866-72*. In reports comparing stereotactic core biopsy to surgical biopsy, the sensitivity of core biopsy for diagnosis of malignant lesions varies from 85% to 98%. However in a multi-institutional study in which the results of 1,363 image directed core biopsies were compared with the results of subsequent surgical biopsies there was 98% agreement and only 1.1% false-negative core biopsy outcome (level III evidence). *Parker SH, Burbank F, Jackman RJ, Aucreman CJ, Cardenosa G, Cink TM, et al. Percutaneous large-core breast biopsy: a multi-institutional study. Radiology 1994; 193: 359-64*. **False negative core biopsy outcome from the Nova Scotia Breast Screening Program from 1991 to 2005 is also 1.1%.**

Over the first fifteen years of the program there have been 20 malignant core biopsies for which the corresponding surgical outcomes were benign, resulting in a false positive rate of 0.5%. The false-positive core biopsy outcome per woman is 0.3%. Atypical/suspicious and benign open surgical results are included when calculating the false positive rate.

For both stereotactic and ultrasound core biopsy to be successful there needs to be a validation process and team management.

Cancer has a significant economic impact in Canada as measured by direct and indirect costs. Direct costs refer to the value of goods and services for which payment was made and resources used in treatment, care and rehabilitation directly related to illness or injury. Indirect costs are defined as the value of economic output lost because of illness, injury-related work disability or premature death (*National Cancer Institute of Canada: Canadian Cancer Statistics 2004*). In 1998, in Canada, \$2.5 billion were direct costs with hospital care costing \$1.8 billion and representing 74% of this amount. Physician services to treat cancer cost \$333 million, or 14% of direct costs. Approximately \$210 million or 9% of direct cancer costs were spent on drugs for

cancer treatment. The indirect cost was \$11.8 billion. *Economic Burden of Illness in Canada, Health Canada 2002*. Although the figures above represent costs for all cancers and for all Canadian provinces, the core biopsy program in Nova Scotia has made positive impacts on reducing wait times, hospital stays and physician services. It has made a huge impact in greatly decreasing benign breast surgeries.

The Pink Rose Project and Physician Assisted Navigation

The Pink Rose Project instituted the provision of "Information Packages" to newly diagnosed women at the time of imparting the diagnosis. Started and managed by a volunteer breast cancer survivor under the umbrella of NSBSP, this initiative has been adapted and introduced into most other provincial programs. Begun as a service provided by one hospital, the packages are now funded by the Canadian Breast Cancer Foundation - Atlantic Chapter, and distributed by pathology departments, NSBSP coordinators, Cancer Care personal as well as active survivors throughout the province.

With the development of NSBSP in 1991, physician assisted referral for all abnormal **screens** to the diagnostic work-up sites was instituted. The physician was always the first point of contact by phone, and with their approval the program would (also by phone) contact the patient with the date, time, place and nature of the work-up test or core biopsy. For even greater efficiency, the phone contact has been replaced with a faxed appointment process. As in all screening programs, results were also mailed to both the women and the physician. This fast tracking resulted in decreased times to diagnoses and overwhelming acceptance of the process. In 1997, requests from the medical community to also navigate women with abnormal reports in the **diagnostic** sector resulted in a full time navigation position. In addition, through personal contact with physicians and women, the navigator has promoted a heightened awareness of the clinical practice guidelines for mammography. This single NSBSP diagnostic-based navigator position has been closely tied to the largest diagnostic work-up site and is supported by the Pink Rose Project.

The NSBSP Navigator is a resource for women using diagnostic and screening facilities in the entire province, whether affiliated with NSBSP or not. *Patient Navigation: Improving Timeliness in the Diagnosis of Breast Abnormalities* was published in June 2004 in the *Canadian Association of Radiologists Journal (CARJ Vol.55, No. 3, June 2004)*. This publication documents the potential to decrease waiting times related to the facilitated investigation of breast abnormalities. Other provincial breast screening programs have incorporated a similar approach for fast-tracking women to diagnosis. *Influence of direct referrals on time to diagnosis after an abnormal breast screening result. Kathleen M. Decker MHA et al: Cancer Detection and Prevention 28 (2004) 361-367. Manitoba Breast Screening Program, Winnipeg, Manitoba*

All results from the smaller diagnostic work-up sites are monitored by the NSBSP Image and Data Manager pending a status of case "completion".

Programmatic Screening of Ages 40-49

In 1993 it was recognized that women themselves were demanding mammography at age 40 and appropriate tracking mechanisms did not exist for these examinations. Until further meta-analyses are published on the subject, NSBSP (after consultation with the Department of Health) determined these women should be able to self-refer for screening mammography. Automatic recall on an annual basis for women 40-49 was instituted in 1995. Current evidence suggests there is good evidence to screen the 40-49 age group providing quality assurance aspects of the program are in place and outcomes can be monitored. One trial presently being conducted under the auspices of the United Kingdom Coordinating Committee for Cancer Research (UKCCCR) was planned for first analysis in 2003. Similar feasibility studies are also in progress in four other European countries. These trials recognize that if early detection of breast cancer is to be effective in younger women, the intervals between screen episodes must be shorter. Like many other provincially organized breast screening programs, NSBSP awaits final outcome analysis of these studies.

The Nova Scotia Breast Screening Program Web-site

From the web site originally designed in 2002 by a high school student as a summer project, the updated site now includes current mobile van schedules as well as program guidelines. The NSBSP site may be visited at www.breastscreening.ns.ca. It is updated yearly to coincide with annual releases of the three mobile van schedules and following policy changes. The annual report may also be accessed on the web-site.

Annual Radiologist Mailing

Each year radiologists associated with the program receive feedback containing their individual cancer detection rates and positive predictive values from the previous year. In this way the learning curve trends inherent to the interpretation of screening mammography are directly shared, and can be monitored by each screener for enhancement of results.

Post Card Reminders

To eliminate many hours of manual work, in 2003, weekly reminder letters started printing as postcards.

Organizational Procedures for Outcome Data Entry

With changes to database systems, a data entry procedures document appropriate for the NSBSP database was updated in 2005.

1 in 9 Workshop

As part of continuing medical education collaboration, Dalhousie University in Halifax, the Canadian Cancer Society and NSBSP organized "The 1 in 9 Workshop" for medical students and residents. This was put in place in 1997 using resources from the breast screening program and Department of Family Medicine at the university. This is a four hour intensive information session focusing on breast screening processes, clinical breast examination, breast cancer and the emotional impact of breast cancer following detection. The lectures and small group workshops present a powerful overview of this disease and it has continued as an annual event. It is a most useful tool for community education and promotion of NSBSP to health care professionals.

Cartoon Information Sheet and Client Version of CPGs "Survey"

In 1998, NSBSP began enclosing with the client abnormal letter and work-up appointment, a modified client version of the Clinical Practice Guideline for Mammography (CPG 2). The original versions had as an objective, to provide information and recommendations to facilitate decision-making when a mammographic abnormality is detected by screening. The Medical Imaging and Pathology team of NSBSP was instrumental in this publication. Although modified by NSBSP to reflect a more client-friendly handout, the feedback resulting from the survey indicated a need for a still greater degree of sensitivity. In addition, a cartoon sheet enclosure introduced in 2003 was redesigned along with the CPG brochure following survey results in 2004. **Action: Continue the cartoon and CPG enclosures and share comments with physicians, staff and management of the NSBSP.**

2004 Policy for Clinical Breast Examination

A standardized NSBSP policy for modified Clinical Breast Examination teaching was implemented for program use in all sites. This was put in place after it became apparent that sites were applying the policy differently. **The policy states that all women will receive a modified clinical breast exam by the technologist prior to their screening mammogram.** This is not a thorough examination but enables computer entry of significant palpable abnormalities be made of obvious findings for the radiologist reporting the films.

Well Woman Approach

As 98% of all women screened will not be diagnosed with breast cancer, NSBSP has maintained a focus on "Well Woman" and "Population Health" concerns. Earliest detection coupled with vigilant measures to ensure high quality, organized, imaging measures are in place, will result in more "well women" plus achievement of the NSBSP goal to lower mortality from breast cancer in women. Within one year it is envisioned that NSBSP facilities will be "province-wide". Providing

that 70% of the target population is screened and diagnosis is early, both the prognosis for this disease and program goal expectations are excellent.

1998 and 2004 Office Re-organizations

Due to expansion in all aspects of the program over the years and with extra space becoming available in the adjoining suite housing the Halifax site of the Breast Screening Clinic, in 1998 the program offices moved from the clinic to a separate suite. In 2004, following approval of a casual staffing complement, additional work stations were installed for booking clerks. To more effectively handle the booking of diagnostic procedures, a separate office and dedicated staff member was allocated for diagnostic booking procedures.

Workload Measures

Although the program philosophy for “high volume” screening is important, quality results are always the ultimate goal. Information sharing is critical for all program staff. Much has been reported about radiologist performances for the purpose of increasing cancer detection rates while keeping recalls at a reasonable level. Equally important has been to analyze booking growth for clerical and technical staff workloads over years of program expansion.

Canadian Breast Cancer Foundation (CBCF) Funding

Since inception of the Atlantic Chapter of the Canadian Breast Cancer Foundation, this organization has received and favorably reviewed many proposals submitted by NSBSP. The proactive approach by the Atlantic Chapter and many volunteers, has played a large part in the expansion of the breast screening program, database development and other program enhancements. Listed below are grants awarded NSBSP administration. The Run for the Cure (both in Sydney and Halifax) along with the many other volunteer services sponsored by CBCF - Atlantic Chapter, diligently raise and administer funds.

Past NSBSP Funding:

1997	\$36,000	toward purchase of Mobile 2
1997	1,500	film encoder
	15,000	mammoviewer for NSBSP-Halifax
1998/99	40,000	breast ultrasound equipment-Halifax
1999	30,000	computer hardware for Infostructure Project
2000	20,000	completion of Infostructure Project
	50,000	x-ray equipment replacement Machine 1-Halifax
2001	50,000	diagnostic database hook-up to other hospitals *
2002	150,000	Mobile 3 purchase and operating costs
2003	35,000	x-ray equipment replacement Machine 2-Halifax
2004	42,000	purchase of two mammoviewers
2005	25,000	Radiologist Learning Tool and Reports
2006	60,000	purchase of three mammoviewers

For Submission:

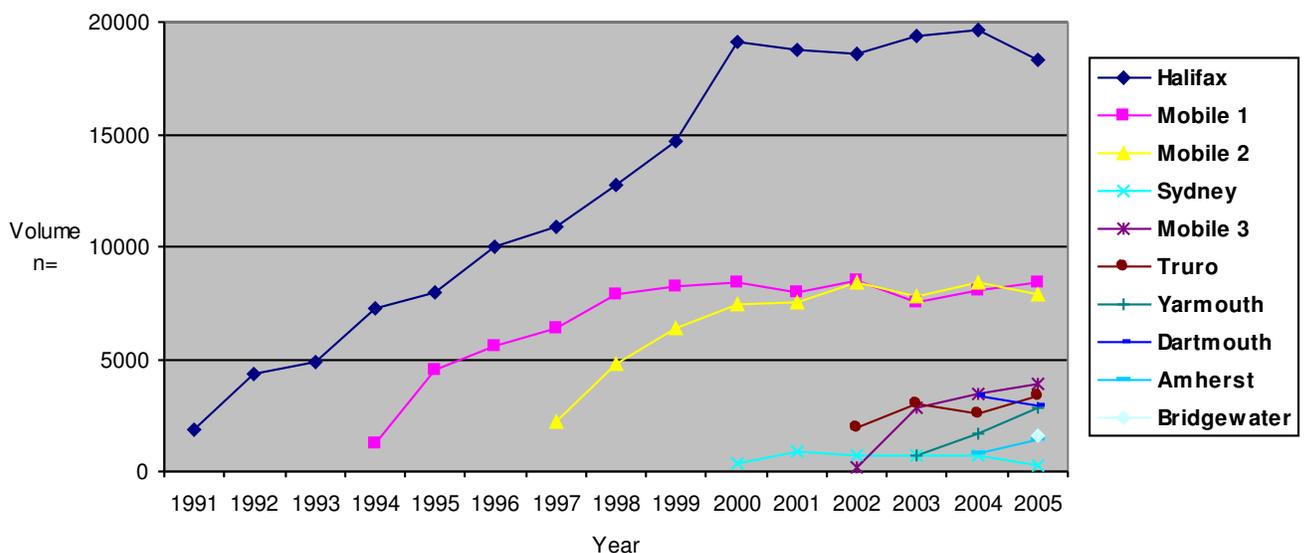
1. “Access to Breast Cancer Screening in Nova Scotia”- to the Community Health Grants Program Nov 06
2. “The Nova Scotia Breast Screening Program and Core Biopsy: 15 Years of follow-up”- to the Research Grants Program Dec 06

Current Initiatives

(GIS) Study as a Tool to Access Breast Screening

The Nova Scotia Breast Screening Program now consists of eight fixed screening sites and three mobile screening units and is poised to add two more sites which would make it the first province in Canada to screen all women for breast cancer within an organized program. At the same time there is also a growing concern about the wait times developing in some of the fixed sites, as alluded to by the leveling off of screening volumes in several sites as shown in **Figure 13**. As capacity has hit a maximum, wait times have become a growing concern. The program has focused much of its efforts on keeping women in the program, for example through the use of reminder phone calls, which is evident in the program's retention rates far exceeding the national target. However, this has come at the expense of increasing recruitment and participation rates in the program.

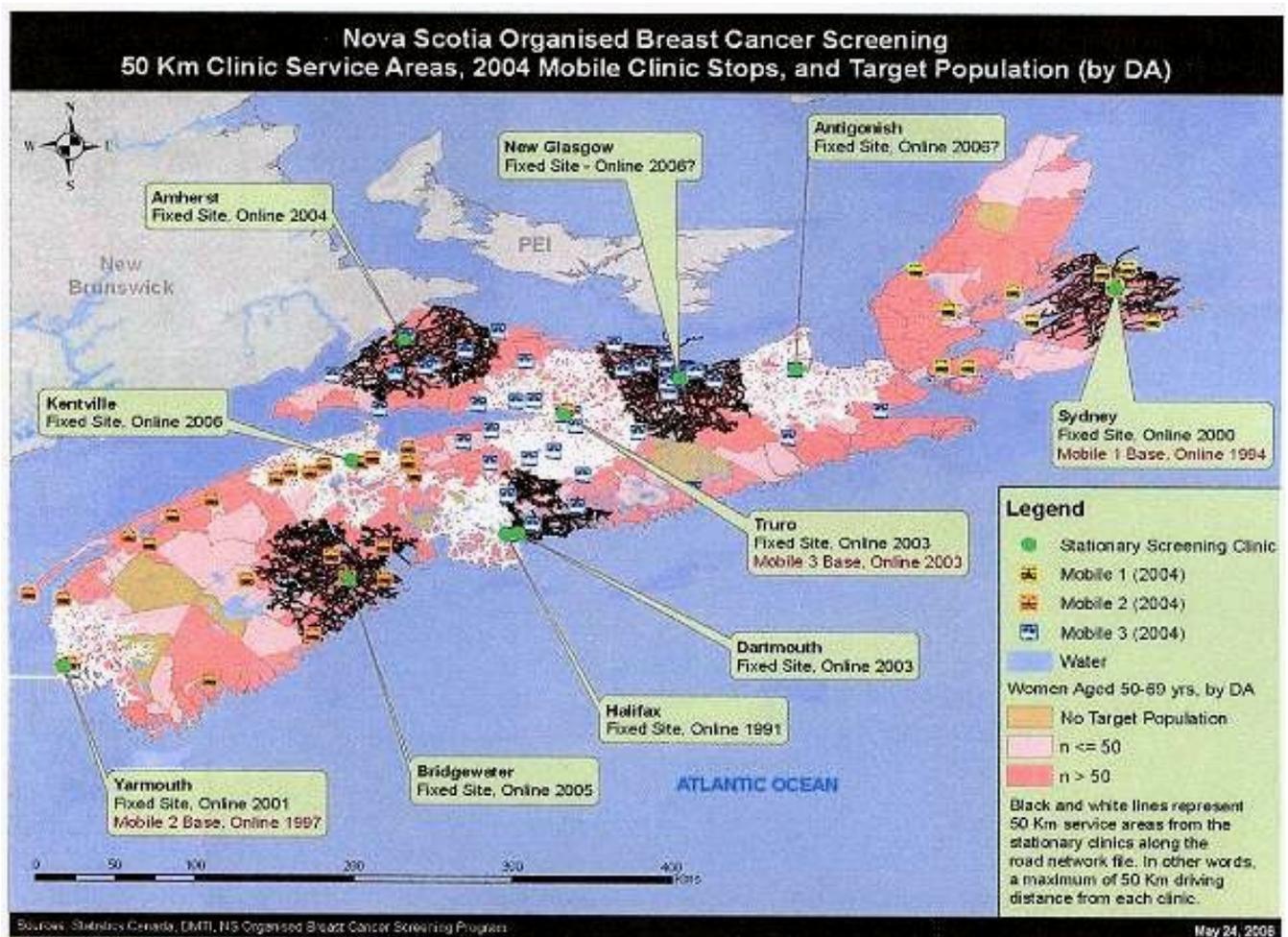
Figure 13 NSBSP Volume by Site and Year



Given that all screening mammography will be overseen by the NSBSP, it is now timely to evaluate the role of the mobile units in relation to the fixed sites in providing equitable screening services to women throughout Nova Scotia. Geographical Information Systems (GIS) is a computer tool that links information to location, and then allows the layering of different types of information, to understand how various factors work together. To this end, NSBSP has partnered with the office of Public Health Practice of the Public Health Agency of Canada to explore mapping of data for the years 2002 to 2004. Together with 1991 Census data, the map shown on the **front cover** of this report provides some insight into the inequities in screening participation across the province. As additional fixed sites have joined the program since 2004, participation figures will hopefully change.

Again, given the potential for eleven fixed sites in the province, it is now timely to review the manner in which the mobile vans can complement the fixed sites. As the map below shows, a scenario of a 30 minute driving distance to each of these fixed sites was combined with both the size of the target population and information on mobile van visits (that preceded some more fixed sites joining the program) in an effort to understand how the mobile schedules can be used to complement the fixed sites in a responsive manner. It becomes clear that the mobile van

schedules will have to be re-evaluated in an effort to provide more equitable screening services across Nova Scotia.



Preliminary results on the potential of GIS to evaluate regional differences in participation and to reform mobile scheduling were presented to the Annual General meeting of the Canadian breast Cancer Foundation-Atlantic Chapter and will hopefully form the thesis of a master's student at Dalhousie University.

NSBSP is also exploring the potential to collaborate with the College of Geographical Sciences in Lawrencetown Nova Scotia to analyze patterns in women's driving to screening sites and how this has changed over time. This is particularly of interest given the increasing wait times at the Halifax Shopping Center site and women's requests for screens to be booked at other locations, indicating their willingness to drive further in order to wait less for their screening visit.

Wait Times Reports

NSBSP has been working with the Department of Health as part of their Wait Times Initiative to develop standardized reports of wait times for both screening and diagnostic mammography as well as needle core biopsy and open surgical procedures. These reports, which will be produced for each of the NSBSP sites, should be available in the summer 2007. Diagnostic mammography wait times can be seen on **Page 31**, and the following table demonstrates the current provincial screening mammography wait-times.

Table 14 **NSBSP Wait Times September 2006**

DHA	1	2	3	4	5	6	7	8	9a	9b
Wait	18 weeks	7 weeks	11 weeks	18 weeks	6 weeks	N/A	N/A	6 weeks	37 weeks	40 weeks

Provincially Supported Screening Mammography Policies

The expectation of the DoH of the province of Nova Scotia is for all mammography facilities in N.S. to be participating in NSBSP by 2007. With 100% participation of provincial mammography sites soon to become a reality, further standardization of policies and procedures has become a priority. In past years, measures implemented with provincial approval include:

- involvement of the 40-49 and over 69 age groups
- mandatory site accreditation for all participating NSBSP sites
- evidence-based reporting intervals
- mandatory program evaluation
- elimination of BSE teaching as a complement for mammography

In 2005, other measures strongly supported were:

- mandatory modified CBE at all sites
- planned compatible expansion with **one** provincially approved equipment vendor
- provincial mammography film purging policy

Updated Diagnostic and Screening Binders

Due to increasing use of Central Mammography Booking (CMB) and site specific Imaging Department procedures, procedure binders for all diagnostic and screening mammography sites were compiled by NSBSP administration in consultation with site personnel. Documentation for individual diagnostic booking schedules and staffing situations along with NSBSP policies and procedures have been assembled for all eight sites now booking diagnostic examinations through CMB. These will be of great use in facilitating future plans, particularly for issues that apply to increasing capacity. Capacity building now becomes the biggest challenge faced by NSBSP. It is anticipated that this challenge will be partially met with a provincially planned introduction of Full Field Digital Mammography to the province which will result in greater efficiencies in both the fixed sites and mobile vans.

Health Services Programs Operational Review

NSBSP, along with other provincial programs, participated in a review process conducted by Corpus Sanchez Inc. commissioned by the Department of Health. This "Provincial Health Services Operational Review (PHSOR) was to conduct a value for money audit across all aspects of health services delivery in Nova Scotia. The NSBSP session with the consultant focused on the growth and development of the program, its current quality improvement initiatives, and the challenges it faces in further expanding and improving upon the care provided to the women of Nova Scotia.

NSBSP Post Screen Cancers: Report and Learning Tool

In November 2005 a proposal to the Canadian Breast Cancer Foundation (CBCF), Atlantic Chapter was submitted and subsequently awarded funding. Work on part 1 of this two year project started in May 2006 and there are three distinct goals:

- to obtain, review and classify Interval Cancers identified by the program
- to compile a Radiologist Learning Tool File for review by all NSBSP radiologists
- to produce two reports - one for CBCF and one scientific report for peer review

Although these cases are not routinely shared between imaging departments as part of the NSBSP mandate, they are reviewed internally during breast screening team approach rounds by four participating facilities. Funding restraints have thus far prevented an in depth review of these post screen cancers, without knowledge of, it is not possible to calculate the sensitivity and specificity of a breast screening program. The project will look at interval cancers detected up to and including 2005. In addition, it is desirable to undertake a one time blitz to compile, review, classify and study these cases. It is also intended as an opportunity to train staff to ensure future interval cancer collection is a simple, routine ongoing part of NSBSP procedure. Compilation of The Radiologist Learning Tool File (LTF) is underway with discussions to determine the best approach to maximize efforts and provide radiologists with an exercise they will look forward to on an annual basis. It is the intent to provide CME credits for radiologists and technologists and to utilize this LTF as a teaching experience for radiology residents and technologists.

Promotion

In 2005, Health Canada's Primary Health Care Transition Fund sponsored The Diversity and Social Inclusion Initiative Project to assist NSBSP in promotional efforts. An ethnically diverse 11x17 laminated poster was developed featuring Nova Scotia women. The message on the importance of breast screening was: "We are all women, we are all at risk". This message has been translated into French and Mi'kmaq as well as the English version. Project completion date was early in 2006, to coincide with the 15th anniversary of NSBSP. For distribution, these posters were sent to all program co-ordinators and in addition, a smaller, 8 ½ x 11 version was mailed to all primary care physicians in the province (**Appendix D**). Associated funding also permitted the existing NSBSP brochure "An Important Message to Women aged 50-69" to be translated and printed in French. Both the French and English brochures may be viewed on the NSBSP website, www.breastscreening.ns.ca.

Viewer Purchases

Following acceptance of a proposal to the Canadian Breast Cancer Foundation for funding for mammography viewers, in 2004, three viewers were purchased by the program for use in imaging departments in Bridgewater, Kentville and Truro. A proposal for additional viewers was submitted to the Canadian Breast Cancer Foundation in the spring of 2006. This proposal was to supply viewers to the two final sites anticipated to join with the program, a viewer for Bridgewater where DHA 1 films from mobile 2 will begin to be read and one more for the QEII HSC to assist with extra workload referrals requested from other health district authorities.

Radiology Reading Volumes Study

Nova Scotia was one of the provinces contributing data to the Pan Canadian Study by a working group of the Canadian Breast Cancer Screening Initiative. This study was to look at cancer detection rates and radiologist performance, in relation to volumes of mammograms interpreted. The results from this study, *Organized Breast Screening Programs in Canada: Effect of Radiologist Reading Volumes on Outcomes*, were published in *Radiology: Volume 238: Number 3, (809- 815) – March, 2006*.

The working group concluded that cancer detection did not vary with reading volume. The average Positive Predictive Value (PPV) for individual radiologists improved as reading volume rose up to 2,000 mammograms per year; it stabilized at higher volumes. In North America required volumes are comparatively low, at 480 mammograms per year, compared with the 2,000 mammograms required in Australian screening programs and 5,000 mammograms required in United Kingdom Screening Programs *Radiology: Volume 238: Number 3, (810) – March, 2006*.

The Nova Scotia Breast Screening Program utilized the 3,000 case reading volume as its guideline from the beginning of the program in 1991. Based on NSBSP outcome results and a British Columbia study *Standardized Abnormal Interpretation and Cancer Detection Ratios to Assess Reading Volume and Reader Performance in a Breast Screening Program; Radiology 2000; 215: 563-567*, NSBSP lowered the reading volume recommendation to 2,500 per year in the year 2000. Future recommendations for NSBSP policy change in this area will be based on further NSBSP analysis.

The Diagnostic Mammography Reporting Database

Development of the diagnostic database has been in progress for three years (**Page 9**) and has been installed at the QEII Health Sciences Center in Halifax and the Cape Breton Health Care Complex in Sydney where user feedback continues to result in enhancements. Official sign off on this project is anticipated in 2006 at which time plans are to introduce it to other provincial diagnostic mammography providers. One improvement made possible by the new diagnostic re-write has been the development and implementation of the film tracking program enabling a simple list generation of films signed out but not returned in a timely manner.

Another advantage is that Central Mammography Booking is now proactively booking all diagnostic mammography as recommended by the reporting radiologist. Follow-up appointments are scheduled and faxed to the referring physician's office enabling them to notify the woman. This is currently being done in sites that are reporting using the new diagnostic reporting system (the QEII HSC and Cape Breton Health Care Complex).

Also this year a line was added to both the client and physician mailed "normal" reports. This line states: "the radiologist reporting your screening mammogram recommends that you return in either 1 year or 2 years as appropriate for your next mammogram".

In 2005, following apparent variations between site operations due to management and site differences, monthly progress reports were requested by the Department of Health as a means to demonstrate to each site, specific areas possibly needing improvement. This feedback provides all sites with information from other sites and also provides useful feedback of the service provided to clients by the Central Booking staff. Areas needing improvement at the Central Booking site are also readily apparent and can quickly be remedied. Of significance for the sites are quality assurance measures identifying "In Progress Reports" where the follow-up status of a case is still in progress 4 months after a screen was performed and "No Work-up Reports" which lists all abnormal screens which have no follow-up listed 6 or more weeks after the screen has been done. Exams for which "No Reports" exist are also identified monthly.

Film Purging Policy

All documents will be kept for 10 years, including mammography films, computer generated mammography reports and background information questionnaires. All documents with personal identifiers of no further value must be disposed of by shredding, pulping, incineration or maceration with the objective of obliteration beyond any possible reconstitution.

A survey was distributed to other provincial breast screening programs regarding their policy on purging of mammography films. The results were as follows:

- New Brunswick: do not purge
- Alberta: Purged films older than 10 years
- British Columbia: purged after 7 years
- Quebec: purged after 5 years

2005 Office Re-Organization

Flat screen monitors and an upgraded laser printer were purchased in 2005. In addition, an upgraded postal machine which envelopes and seals the client and physician reports for mailing, was put in place.

Following continued growth of the program and in consultation with the Halifax Shopping Center for more office space, both the NSBSP Administrative office and the Halifax Clinic site of the NSBSP moved to a suite on the ground level of the back of the building in August, 2006. Each suite will have a separate outside entrance, although the inner suites will share common space. Clinic clients will now be able to park closer to the clinic entrance and also have an option to use an inside entrance to access mall facilities. The move and associated renovations were completely paid for by the Halifax Shopping Center Administration. The new address can be found on Page 1 of this 2005 Annual Report.

Canadian Cancer Society Promotion

This year, the Canadian Cancer Society (CCS) provided large quantities of promotional brochures to NSBSP for distribution on the mobile screening vans and fixed screening sites throughout the province. These resources are also distributed by program staff during promotional activities. The brochures were titled: Cancer Facts: what women can do

Breast Health: what you can do

Breast Self-examination: what you can do

In addition the CCS provide Breast Self-examination shower cards which are often a much needed reminder for women of the importance of timely breast health examinations and to take a proactive approach to breast health.

2006 Cervical Cancer Prevention Program Update and Guideline Changes

To address site concerns about the possible deletion of the NSBSP system generated question re: pap tests, and following collaboration with Cervical Cancer Prevention Program management, the question will remain. It serves as an important reminder to women, and is one of the top reasons women give when asked "why" they are booking their pap tests. Since 1992, a reminder notice to remember to book a pap test has also been included on the screening reminder notifications. It is included as well on the "wallet sized" NSBSP promotional cards.

Effective in October 2006, guidelines for pap testing in Nova Scotia will change. The new brochures reflecting these changes will be distributed to all NSBSP site co-ordinators to update NSBSP staff and for distribution. These brochures are available from The Cervical Cancer Prevention Program at 902-473-7438. Following are the guidelines as stated in the brochure: When should you have a Pap Test?

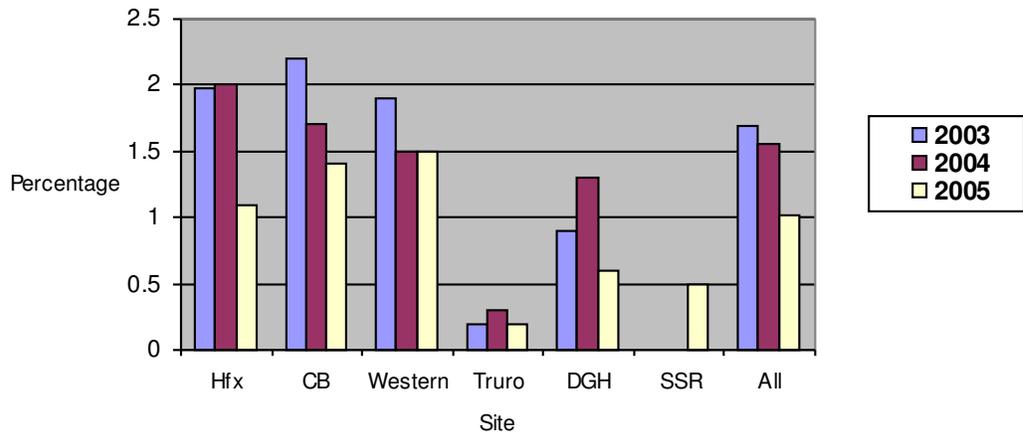
- Within three years of becoming sexually active or when you reach the age of 21.
- If your Pap test results are normal (negative or clear), continue to have Pap tests every two years until age 75. You should continue to have Pap tests even if you are no longer sexually active, or if you no longer have periods (menopause). If you are over 75, talk with your doctor about your need for further testing.
- If you have had a hysterectomy (removal of your uterus) you may still need a regular Pap test. A woman whose cervix is not completely removed, or a woman who has had treatment for pre-cancer or cancer of the cervix, should continue to have yearly Pap tests after a hysterectomy. If you have questions about your need for a Pap test, talk to your doctor.

2005 Staff Performances

- **Radiologist:**

In 2005, the highest number of first reads by a single radiologist was 6,143. There were in total, 120 cases reported as high suspicion and as might be expected, unofficial double reads decreased in 2005 to 585.

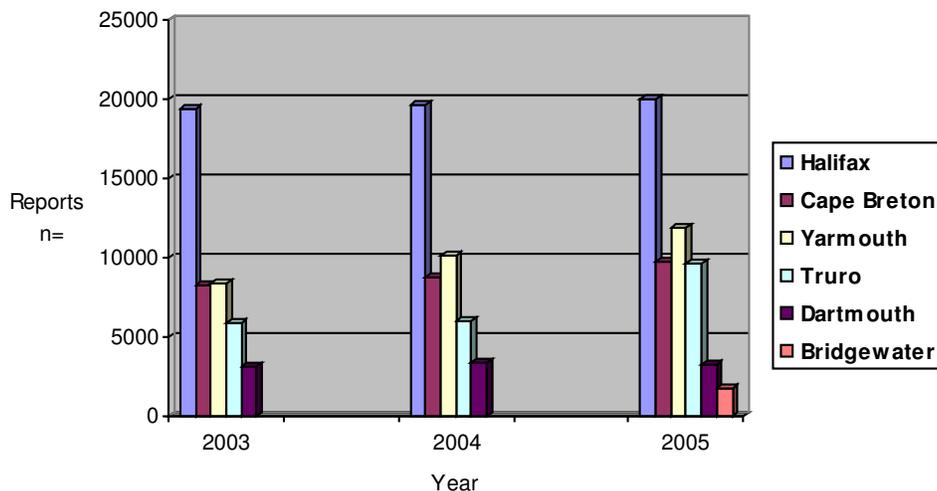
Figure 13 Unofficial Double Reads by Interpretation Site - all ages



The percentage of unofficial double reads from all reporting sites is within the acceptable limit of 3 per 100 screens as defined by NSBSP. Provided this additional mechanism, used to increase reporting effectiveness is monitored, the practice is encouraged as an additional quality assurance initiative.

- **Technologist and Radiologist**

Figure 14a Volumes by Reporting Site (all ages)

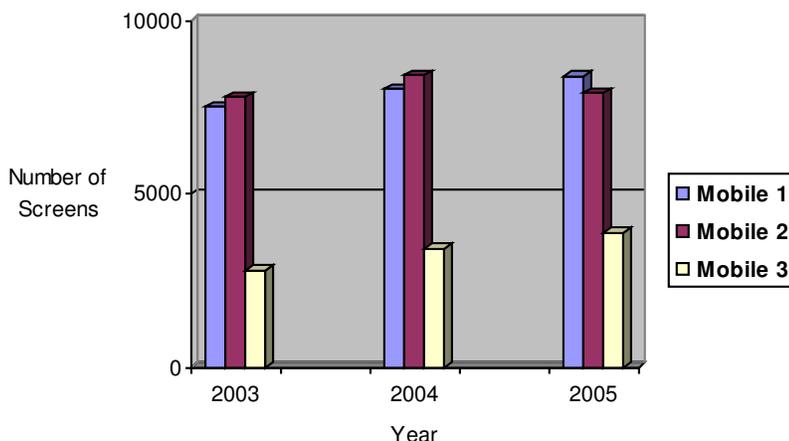


Screen volume increases can be seen for four out of five reporting sites in 2005. Halifax, Cape Breton, Yarmouth, Truro reporting sites have increased capacity by 2.1%, 10.2%, 15.4%, and

37.3% respectively. The increase for the Truro group reflects a full year of additional reporting from the Amherst site while additional capacity in the Western site is from increased numbers of NSBSP appointments at both in the fixed sites at both Yarmouth and Bridgewater. Numbers at the Dartmouth site have decreased due to insufficient technologist staffing.

- **Technologist**

Figure 14b Volume by Mobile Van (all ages)



From 2004 to 2005 while the workload on Mobiles 1 and 3 increased by **4.3%** and **11.9%** respectively, Mobile 2 has decreased production by **6.3%**. This is due in part from an increase in the numbers of screening mammograms performed on site in the hospital in Yarmouth plus the first year of screening mammography from the Bridgewater site. This has however resulted in an **overall increase** in volume in the western region. The long-range goal of the NSBSP is to have all three mobiles performing similar numbers of examinations annually. Start-up mode, portability (a drive on portable mammography unit, unlike the two self-contained mobiles), limited staffing of three days per week and possibly an excess of scheduled sites (consequently more travel time), have accounted for the lower number of screens done on Mobile 3. With vigilant scheduling following the Geographic Information Systems (GIS) Study outcomes, the gap should close. With the first NSBSP outcomes from Kentville next year, a further reduction of screens could be seen by Mobile 2.

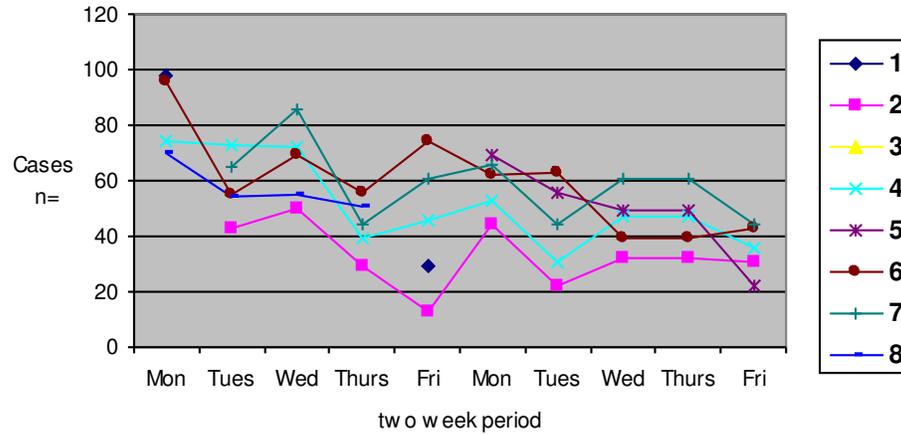
- **Clerical**

There were 123,089, 100,562 and 89,689 procedures booked through Central Mammography Booking for the years 2005, 2004 and 2003. Of these 82,392, 70,076 and 60,452 respectively were program **screens**. The maximum number of appointments booked by any one clerk was 17,005, 14,188 and 17,238 for the same years, indicating effects of new staff and resulting in greater client satisfaction. The comparable numbers of **diagnostic** mammograms booked were 16,249, 11,012 and 11,880. Also booked for the indicated years were 5,531, 4,025 and 2,493 ultrasound examinations.

In addition for the **diagnostic** module there were 871, 577 and 739 “Ineligible Screens” booked in 2005, 2004 and 2003. An “IS” is defined at CMB as a screening exam that for some reason cannot be done through NSBSP and includes cases with special needs and requests for under age mammography screening. In addition there were 1,271, 961 and 11,189 “Physician or Patient Demanded Screens in Diagnostic” (PDSDs) performed over the same time periods. As expected, with an increased acceptance of Centralized Mammography Booking, there was less use of these two particular categories between 2003 and 2004 as both women and health care givers became better educated about the difference between screening and diagnostic mammography in sites where NSBSP has been in place for some time. It can be seen however that these have increased

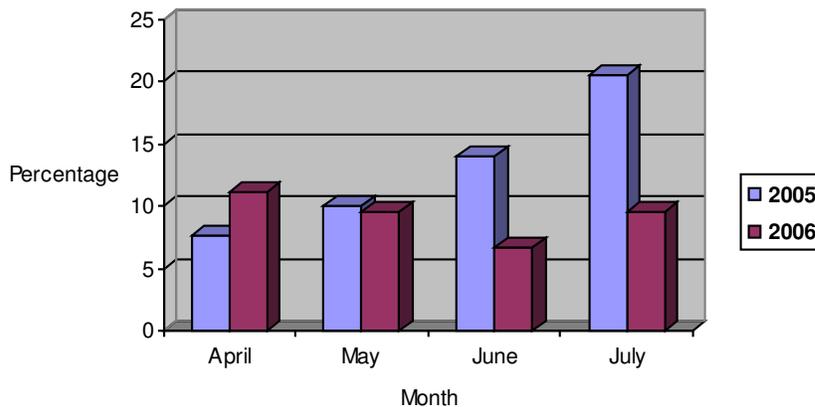
in 2005, perhaps due to an increased number of new staff or a natural reluctance by women and physicians to comply as more sites new to NSBSP, come on line. Follow-up mammograms, 6 month Post Core Biopsy examinations and Screen Work-Up examinations are also booked by the clerical staff at CMB.

Figure 15 Weekly Clerical Productivity Results



Currently, a restructuring of clerical workloads is being done. Presently the highest number of abandoned phone calls is between 9:00 am and 9:30 am. The 10:00 am – 6:00 pm shift is subsequently under review and will soon be evaluated to see if it will continue. Much of the work it was intended for is now obsolete and the objective is to lower the number of abandoned calls, particularly as province-wide booking is soon anticipated. To assist in maintaining a high degree of client satisfaction despite continued program growth, graph-sharing (**Figure 15**) permits the program’s booking clerks to assess their own performance activity by accessing private biweekly results. This graph is routinely posted and it is clearly seen that the busiest booking days are at the beginning of each week. Although not a new concept, these bi-weekly charts greatly assist in determining appropriate staffing complements.

Figure 16 CMB - Abandoned Calls



It can be seen in **Figure 16** that the number of abandoned booking calls made to Central Mammography Booking (CMB) has improved following a steady increase in 2005 from which time these calls have been monitored. The effect of additional staffing for summer vacation relief is also noted.

Publications, Presentations and Posters

Conferences/Peer Reviewed

The International Breast Screening Network Biennial Meeting Ottawa, May 11-12, 2006

- Oral Presentation: GIS as a Tool to Evaluate Breast Screening: Judy S Caines, MD FRCP; Gerald H Schaller, MD FRPC; Jennifer I Payne, PhD; Dolon Chakravartty, MHSc
- Poster Presentation: The Nova Scotia Breast Screening Program and Core Biopsy: 15 Years of Follow-up: Caines JS, MD FRCP; Payne JI, PhD; Iles SE, MD FRCP; Schaller GH, MD FRCP; Woods ER, MD FRCP; Barnes PJ, MD FRCP; MacIntosh RF, BSc MD FRCP
- Poster Presentation: Managing and Taming Wait Times and Participation Rates in a Small Population and Large Geographical Environment: A Proactive Approach: Schaller GH, MD FRCP; Payne JI, PhD; Caines JS, MD FRCP

Geomatics Atlantic Conference, Wolfville, Nova Scotia, June 5-8, 2006

- Oral presentation: GIS as a tool for Nova Scotia Health Program Planning and Evaluation: Breast Screening and Diabetes Care. Payne JI, PhD
- Poster Presentation: GIS and Health Program Evaluation: The Nova Scotia Breast Screening Program. Payne JI, PhD
- Panelist Presentation: What can GIS do to help improve the health of populations? Payne JI, PhD

Annual General Meeting of the Canadian Association of Radiologists, Montreal, October 22-25, 2006

- Poster Presentation: The Nova Scotia Breast Screening Program and Core Biopsy: 15 Years of Follow-up: Caines, JS, Payne, JI, Iles SE, Schaller GH, Woods ER, Barnes, PJ, MacIntosh RF (accepted).
- Poster Presentation: Managing and Taming Wait Times and Participation Rates in a Small Population and Large Geographical Environment. Schaller GH, Payne, JI, Caines, JS (accepted).
- Poster Presentations: GIS as a Tool to Evaluate Breast Screening: Judy S Caines, MD FRCP; Gerald H Schaller, MD FRPC; Jennifer I Payne, PhD; Dolon Chakravartty, MHSc (accepted)

Letter to the Editor: December, re the 2005 Issue of the Canadian Association Radiology Journal on Breast Imaging. Canadian Association of Radiology Journal 2006; 57(3): 192-193

- Stereotactic Needle Core Biopsy in Nova Scotia: Judy S Caines, MD FRCP; Gerald H Schaller, MD FRCP; Sian E Iles, MD FRCP; Jennifer I Payne, PhD

Presentations (Invited)

- Presentation to the Lunch and Learn Series of the Nova Scotia Breast Screening Program. Halifax, June 27, 2006 Overview of the NSBSP and the Potential of GIS as an Evaluation Tool
- Presentation to the Nova Scotia Hospital Chief Executive Officers. Halifax, June 23, 2006 Overview of the NSBSP and the Potential of GIS as an Evaluation Tool
- Presentation to the NS Department of Health Provincial Health Services Operations Review (PHSOR). Halifax, June 23, 2006 Nova Scotia Breast Screening Program: Impact and Potential Growth
- Presentation to the Senior Leadership Team, Nova Scotia Department of Health. Halifax, June 12, 2006 Overview of the NSBSP and the Potential of GIS as an Evaluation Tool
- Presentation to the Canadian Breast Cancer Foundation (Atlantic Chapter) Board of Directors and Annual General Meeting. Halifax, June 02, 2006. Overview of the NSBSP and the Potential of GIS as an Evaluation Tool

- Presentation to Radiology Research Rounds, Dalhousie University. Halifax, April 25, 2006
GIS as a Tool to Evaluate Access to Breast Screening

Program Cost Trends

	95/96	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06
D. S. cost per Screen	55.24	53.62	42.38	42.38	34.82	34.72	40.74	39.57	40.08	40.85
T. O. cost per Screen	86.03	72.23	58.90	58.15	51.03	51.04	54.71	55.05	54.89	57.28
D. S. cost per Cancer	12,673	10,743	8,363	9,261	8,957	9,001	9,200	9,731	9,516	8,699
T.O. cost per Cancer	19,367	14,263	11,624	12,710	13,123	13,234	12,356	13,583	13,032	12,198

D.S. = Direct Service

T.O. = Total Operating

Screening site capital expenditures and Fees for Service are not included

Administration site capital expenditures, Consultant Fees and Medical Director Fees are included

Recommendations for 2007

- Increase capacity
- Decrease duplication by interface with Meditech
- Review and standardize site budget submissions