# Retention of Screened Women in the Manitoba Breast Screening Program

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## ABSTRACT

**Background:** The retention rate or the percentage of women who return to screening within 30 months of a previous screening is an important measure of screening success and the acceptability of the screening program to women. The objective of this study was to investigate variables associated with the retention of women 50 to 68 years of age who were screened by the Manitoba Breast Screening Program (MBSP) during 2002 and 2003.

**Methods:** All women screened by the MBSP in 2002 and 2003 who were eligible for re-screening in 2 years were included in the study. Data were extracted from the MBSP database which contains demographic, screening, diagnostic follow-up, and diagnosis information for all women screened by the program. Contingency tables, $\chi^2$ tests, and logistic regression were used to investigate variables that were associated with retention.

**Results:** Retention was related to screen type (first or return), screen result (normal or abnormal), family history of breast cancer (risk or no risk), education (less than grade 9 or some high school or more), and ethnicity (Asian, First Nations, other). Retention was not related to residence (rural or urban).

**Conclusions:** Overall screening retention at the MBSP was 80% which meets national standards. However, additional efforts may be required to improve the retention rate of Asian and First Nations women as well as women who had an abnormal screening result or less than a grade 9 level of education.


**Key words:** Screening; breast cancer; retention

*La traduction du résumé se trouve à la fin de l'article.*

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The primary goal of breast cancer screening is to reduce breast cancer mortality and morbidity. Regular breast screening for women 50 to 69 years of age is expected to prevent approximately 30% of breast cancer deaths 7 to 12 years after sufficient participation has been achieved.[1] Sufficient participation is defined as 70% of the target population and is based on the participation rate achieved in trials that reported substantial mortality reductions.

However, participation must also be ongoing and timely. Therefore, the retention rate or the percentage of women who come back to screening is also a key measure. The retention of women in a breast screening program is not only important for success at the population level but is also an indicator of the acceptability of screening to women.[2]

In 2002, a Health Canada working group developed a set of guidelines for monitoring breast screening program performance.[3] According to these guidelines, at least 75% of women should come back to screening within 30 months. Thirty months was chosen to provide 6 additional months after the recommended 2-year interval in which to be screened. The objective of this study was to investigate variables associated with the retention of women 50 to 68 years of age who were screened by the Manitoba Breast Screening Program (MBSP) during 2002 and 2003.

## METHODS

### Setting

The MBSP is a population-based provincial breast screening program that provides a bilateral mammogram to Manitoba women 50 to 69 years of age.[4] The program operates 4 fixed sites and 2 mobile screening vans. Approximately 80% of women 50 to 69 years of age who receive a bilateral mammogram in Manitoba are screened through the program. Between 6 to 10% of women, depending on age and screening history, are referred for further testing because of an abnormality found on the mammogram. Informed consent is obtained from participants so that their data can be used for program evaluation.

Most women are screened every 2 years, although a small proportion of women are screened annually due to a strong family history of breast cancer (greater than 25%

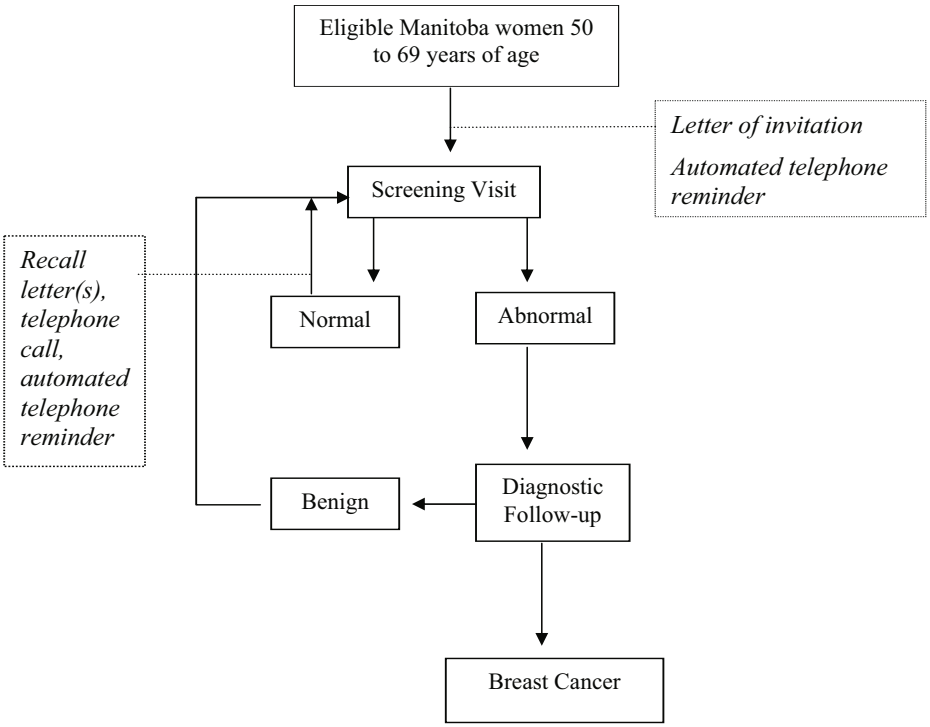


**Figure 1.** Breast screening process

risk) or a previous diagnosis of atypical ductal hyperplasia. Women are sent a recall letter approximately six weeks before they are due to come back to screening. For women who have previously attended a mobile site, the recall letter is timed to coincide with the arrival of the mobile in their community. A second recall letter is sent 3 weeks later if the woman has not made an appointment. Rural women are telephoned directly when extra appointments are available on the mobile. Finally, all women receive an automated telephone reminder 2 days before their scheduled appointment. The breast screening process is the same for first visits (women who attend the program for their first mammogram) as for return visits (women who attend the program for subsequent mammograms) (Figure 1).

## Data source

Data were extracted from the MBSP database, which contains demographic, screening, diagnostic follow-up, and diagnosis information on all women screened at the program since 1995. The MBSP continuously monitors data quality and follows a detailed data quality plan. Most data fields have built-in quality edit checks and utilize pull-down menus that limit data selection. Additional fields are examined using a programmed consistency check to monitor incomplete data and ensure that the data entered meet acceptable ranges. The MBSP database regularly links with the Manitoba Cancer Registry to monitor follow-up data for women with abnormal results. Finally, MBSP data are submitted to the National Breast Cancer Screening Database biennially.

## Study design and population

This study used a retrospective cohort design. All women 50 to 68 years of age screened in 2002 and 2003 and eligible to return for a subsequent screen were included in the study. Women who had a 2-year normal screening result or an abnormal screening result followed by a benign outcome with a recommendation to be screened in 2 years were eligible to return. Women with an annual screening recommendation, who were diagnosed with invasive or *in situ* breast cancer, who turned 70 years of age before the next time they were supposed to be screened, or who died during the 30 months after their screening appointment in 2002 or 2003 were not eligible to return. Participant characteristics that might influence retention were examined and included screen type, visit number, result, family history of breast cancer, education, ethnicity, residence and age group.

Women who had their first MBSP appointment in 2002 or 2003 had a screen type of first and a screen number of 1. Women who had a second or subsequent appointment in 2002 or 2003 had a screen type of return and a screen number of 2, 3 4, 5 or 6 or more. Result refers to the result of the screen that occurred during 2002 or 2003 and was either normal or abnormal. Family history is determined by the technologist at the time of screening using the number of first- and second-degree blood relatives diagnosed with breast or ovarian cancer and the age at which they were diagnosed. Women who had a 25% or greater lifetime risk of breast cancer are screened annually and were excluded from this analysis. Women who had a 12-25% lifetime risk of breast cancer are screened every two years. These women were considered 'at risk' for this analysis. Women who had an 11% risk or less were considered not at high risk.[5]

Ethnicity and education were compiled from data collected from the questionnaire that women complete at the time of screening. Ethnicity was grouped into three categories: Asian, First Nations, and other. Preliminary analyses found that all ethnicities other than Asian and First Nations had similar retention rates so they were combined for the final analysis. First Nations includes women who stated that their ethnicity was Aboriginal, Inuit, or Métis. Education was grouped into two categories: grade 9 or less and some high school or more.

Residence was determined using the participant's postal code at the time of screening. An urban residence included the two largest cities in the province: Winnipeg (population 658,579) and Brandon (43,020). Over 60% of the provincial population resides in these two cities. Finally, women were grouped into one of four age categories based on their age at the time of screening: 50-54, 55-59, 60-64, or 65-68.

## Data analysis

The relationship between retention and the above-listed variables was initially examined using contingency tables and $\chi^2$ tests. These analyses were followed by logistic regression models with retention at 30 months as the outcome. All statistical analyses were performed using SAS Version 9.1.[6]

## RESULTS

### Study population

A total of 47,637 women screened between January 1, 2002 and December 31, 2003 and eligible to come back to screening were included in the study. The characteristics of the study participants are presented in Table I. Education was missing for 427 women (1.0%) and ethnicity was missing for 4,933 women (10.3%). The average age at screening was 57.0 years (52.8 years for first screens and 58.2 years for return screens). The mean number of months to the next screen was 24.9 (26.2 months for first screens and 24.6 months for return screens).

### Retention

Retention was defined as the proportion of women coming back to the MBSP within 30 months of their previous screen. Overall, 80% of women in the study came back for a subsequent screen. The cumulative proportion of women screened within 30 months of their previous screen was 69% for first screens and 84% for return screens (Figure 2).

### Contingency tables

Table II shows the relationship between retention and participant characteristics. Fewer women having a first screen in 2002 or 2003 came back to the MBSP compared to women who had a return screen. Retention also increased with increasing visit number.

Women who had an abnormal result had lower rates of retention than women who had a normal result, regardless of whether it was a first or return screen. Women who were at high risk of breast cancer based on family history had higher rates of retention than women with no family history of breast cancer. Urban women had slightly higher retention than rural women for first screens; the difference was small but significant, which is most likely related to the large sample size. There was no difference in retention by residence for return screens or all screens.

Women with a grade 9 or less education had lower rates of retention than women with some high school or more. Retention was also significantly associated with ethnicity. First Nations women and Asian women had lower retention rates than other women. Retention decreased with increasing age for first screens but increased for return and all screens.

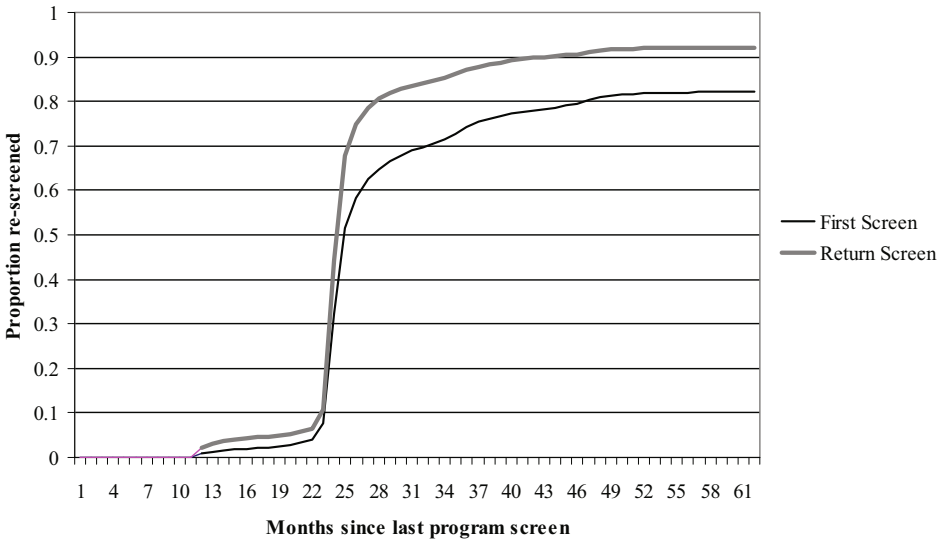


**Figure 2.** Cumulative probability of returning for breast screening for women 50 to 68 years of age screened during 2002 and 2003

**TABLE I**

**Characteristics of Study Participants (N=47,637)**

| Variables | | Visit Type, N (%) | | |
|---|---|---|---|---|
| | | First | Return | All Screens |
| Result | Abnormal | 1097 (2.3) | 1971 (4.1) | 3068 (6.4) |
| | Normal | 9445 (19.8) | 35,124 (73.7) | 44,569 (93.5) |
| Visit number | 1 | 10,542 (22.1) | 0 | 10,542 (22.1) |
| | 2 | 0 | 11,590 (24.3) | 11,590 (24.3) |
| | 3 | 0 | 13,311 (27.9) | 13,311 (27.9) |
| | 4 | 0 | 9861 (20.7) | 9861 (20.7) |
| | 5 | 0 | 1837 (3.9) | 1837 (3.9) |
| | ≥6 | 0 | 496 (1.0) | 496 (1.0) |
| Residence | Rural | 3871 (8.1) | 15,726 (33.0) | 19,597 (41.1) |
| | Urban | 6671 (14.0) | 21,369 (44.9) | 28,040 (58.9) |
| Family history | Risk | 2494 (5.2) | 9634 (20.2) | 12,128 (25.5) |
| | No risk | 8048 (16.9) | 27,461 (57.6) | 35,509 (57.5) |
| Education* | Some high school or more | 9630 (20.4) | 31,956 (67.7) | 41,586 (88.1) |
| | ≤Grade 9 | 776 (1.6) | 4848 (10.3) | 5624 (11.9) |
| Ethnicity† | Asian | 635 (1.5) | 1448 (3.4) | 2083 (4.9) |
| | First Nations | 763 (1.8) | 1153 (2.7) | 1916 (4.5) |
| | Other | 8392 (19.6) | 30,313 (71.0) | 38,705 (90.6) |
| Age group | 50-54 | 8227 (17.3) | 8983 (18.9) | 17,210 (36.1) |
| | 55-59 | 1300 (2.7) | 13,821 (29.0) | 15,121 (31.7) |
| | 60-64 | 790 (1.7) | 10,948 (23.0) | 11,738 (24.6) |
| | 65-68 | 225 (0.5) | 3343 (7.0) | 3568 (7.5) |

* Missing education for 427 women (1.0%), N=47,210
† Missing ethnicity for 4,933 women (10.3%), N=42,704

### Logistic regression

In order to examine in more detail characteristics associated with retention, each variable was entered in a logistic regression analysis adjusted for age at screening and then into a multivariable model with retention at 30 months as the outcome. Screen type, result, family history of breast cancer, and education were all significant predictors of retention (Table III). Women who had a first screen, an abnormal screening result, and were either Asian or First Nations were less likely to return for screening by 30 months. Women who had a higher risk of breast cancer based on family history and had some high school education were more likely to return for screening. Residence did not influence retention. In the multivariable model, the same variables were predictive of retention as in the age-adjusted analyses.

## DISCUSSION

Overall screening retention at the MBSP was 80%, which meets national standards; however, some women were less likely to return to screening. Women who had a first screen, an abnormal result, no family

**TABLE II**

**Analysis of the Association Between Participant Variables and Retention**

| Variables | | Percent Re-screened (95% CI) | | |
|---|---|---|---|---|
| | | First | Return | All Screens |
| Screen type | First | 68.9 (68.0-69.8) | – | 68.9 (68.0-69.8)* |
| | Return | – | 83.6 (83.2-84.0) | 83.6 (83.2-84.0)* |
| Visit number | 1 | 68.9 (68.0-69.8) | – | 68.9 (68.0-69.8)* |
| | 2 | – | 76.4 (75.6-77.1) | 76.4 (75.6-77.1)* |
| | 3 | – | 84.1 (83.5-84.7) | 84.1 (83.5-84.7)* |
| | 4 | – | 89.1 (88.5-89.7) | 89.1 (88.5-89.7)* |
| | 5 | – | 92.2 (91.0-93.5) | 92.2 (91.0-93.5)* |
| | ≥6 | – | 96.2 (94.5-97.9) | 96.2 (94.5-97.9)* |
| Result | Abnormal | 51.1 (48.2-54.1)* | 65.1 (63.0-67.2)* | 60.1 (58.4-61.8)* |
| | Normal | 71.0 (70.0-71.9)* | 84.6 (84.2-85.0)* | 81.7 (81.4-82.1)* |
| Family history | Risk | 74.6 (72.9-76.4)* | 85.4 (84.7-86.1)* | 83.2 (82.5-83.9)* |
| | No risk | 67.1 (66.1-68.1)* | 82.9 (82.5-83.4)* | 79.4 (78.9-79.8)* |
| Residence | Rural | 67.2 (65.7-68.6)† | 83.4 (82.8-84.0) | 80.2 (79.6-80.7) |
| | Urban | 69.9 (68.8-71.0)† | 83.7 (83.2-84.2) | 80.4 (80.0-80.9) |
| Education | Some high school or more | 70.3 (69.4-71.2)* | 84.4 (84.0-84.8)* | 81.1 (80.7-81.5)* |
| | ≤Grade 9 | 52.8 (49.3-56.3)* | 78.7 (77.6-79.9)* | 75.1 (74.0-76.3)* |
| Ethnicity | Asian | 58.4 (54.6-62.3)* | 76.9 (74.8-79.1)* | 71.3 (69.3-73.2)* |
| | First Nations | 51.8 (48.2-55.3)* | 68.5 (65.8-71.2)* | 61.8 (59.7-64.0)* |
| | Other | 71.4 (70.5-72.4)* | 84.7 (84.3-85.1)* | 81.8 (81.5-82.2)* |
| Age group | 50-54 | 72.1 (71.1-73.0)* | 83.5 (82.7-84.2)‡ | 78.0 (77.4-78.6)* |
| | 55-59 | 58.4 (55.7-61.1)* | 82.9 (82.3-83.5)‡ | 80.8 (80.2-81.4)* |
| | 60-64 | 56.8 (53.4-60.3)* | 84.3 (83.6-85.0)‡ | 82.4 (81.7-83.1)* |
| | 65-68 | 56.9 (50.4-63.4)* | 84.4 (83.1-85.6)‡ | 82.6 (81.4-83.9)* |

* p<0.0001
† p=0.0033
‡ p=0.0207

**TABLE III**

**Variables Associated with Retention at 30 Months**

| Variables | | Logistic Regression Models, OR (95% CI) | |
|---|---|---|---|
| | | Adjusted for Age | Multivariable Model |
| Screen type | First | 0.40* (0.38-0.42) | 0.43* (0.41-0.46) |
| | Return | 1.0 | 1.0 |
| Result | Abnormal | 0.34* (0.32-0.37) | 0.35* (0.33-0.38) |
| | Normal | 1.0 | 1.0 |
| Family history | Risk | 1.29* (1.22-1.36) | 1.22* (1.15-1.29) |
| | No risk | 1.0 | 1.0 |
| Residence | Rural | 0.97 (0.93-1.02) | 0.98 (0.93-1.04) |
| | Urban | 1.0 | 1.0 |
| Education | Some high school or more | 1.54* (1.45-1.65) | 1.38* (1.28-1.49) |
| | ≤Grade 9 | 1.0 | 1.0 |
| Ethnicity | Asian | 0.56* (0.51-0.62) | 0.61* (0.55-0.68) |
| | First Nations | 0.37* (0.33-0.40) | 0.44* (0.40-0.49) |
| | Other | 1.0 | 1.0 |

* p<0.0001

history of breast cancer, lower levels of education, an Asian or First Nations ethnicity, or who were 50-54 years of age had lower rates of retention.

The difference in retention between first and return screeners was almost 15%. Clearly, the most likely point for women to discontinue screening is after their first screen. Data from other Canadian programs show the same trend.[2] This suggests that the program may wish to invest more efforts in encouraging women to return to screening after their first visit.

Other investigators have found conflicting results on the influence of an abnormal screening result; some studies showed a false-positive result to be a deterrent to future screening, while in other studies it actually increased retention.[7-11] The lower retention among women with a previous abnormal mammogram in this study could reflect the anxiety that follows an abnormal result. This may outweigh the perceived benefits of future screening. A previous analysis found that Manitoba women who had abnormal results were less satisfied with the screening program and may therefore be less likely to reattend.[12] It is also possible that some women who had an abnormal mammogram may have had subsequent bilateral mammograms outside the screening program at a diagnostic facility. Approximately 11% of Manitoba women between 2001 and 2003 had a bilateral mammogram at a diagnostic facility.[13] In this study, they would be classified as not being screened within 30 months. Therefore, the difference in retention between women who had a normal result and those who had an abnormal result may be less than it appears.

A family history of breast cancer has previously been associated with adherence to mammography.[14] This study found that women at higher risk were more likely to come back to screening compared to women with no family history of breast cancer. This may be due to the increased vulnerability that women feel who have relatives that have been diagnosed with breast cancer. Other investigators have also found level of education and socio-economic status to influence preventive health behaviours including breast cancer screening.[14,15]

As in Manitoba, indigenous women in Australia and Asian women are also less likely than other women to return for screening.[16] To encourage participation, the MBSP routinely takes a mobile screening van to Aboriginal communities and to inner-city areas with high Aboriginal and immigrant populations. MBSP staff also speak to the nurse or community health representative in every Aboriginal community at least once every 2 years, organize group trips to the closest fixed or mobile site, send tailored letters to eligible women, translate screening videos into Cree and Oji-Cree, advertise on the Native Communications Incorporated radio station, and obtain project funding to fly women from remote areas to screening sites. Despite these efforts, First Nations and Asian women in Manitoba are still less likely to return. This lower retention may be related to socio-economic factors not included in this analysis that the screening program will not be able to address. However, some communities are starting to initiate contact with the program; the mobile screening vans have recently visited specific sites such as the Indian and Métis Friendship Centre and the Philippine Canadian Cultural Centre, so perhaps increases in retention will be seen in the future.

A major strength of this study was the use of previously collected information that has undergone many data quality checks. Three variables used in this study (family history of breast cancer, education, and ethnicity) were recorded by women

prior to their screening appointment and therefore are subject to the limitations associated with self-reported data. However, information on screening dates and outcomes was not self-reported, so actual retention was not influenced by recall, non-response, or acquiescence bias.

Some studies have also indicated that women who do not come back to screening experienced more pain than usual during their previous mammogram.[8,17] Since the program does not routinely collect information on pain, it could not be included in this analysis. However, an analysis of the satisfaction of women who attended the MBSP in 2003 found that 72% of women reported that the pain they experienced was 5 or less on a scale of 1 to 10 (5 representing a mild headache).

In summary, overall screening retention at the MBSP meets national standards. However, additional efforts may be required to improve the retention rate of Asian and First Nations women as well as women who had an abnormal screening result or less than a grade 9 level of education.

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## RÉSUMÉ


**Contexte :** Le taux de persévérance (le pourcentage des femmes qui se soumettent de nouveau à un examen de dépistage dans les 30 mois qui suivent un examen antérieur) est un indicateur important du succès d'un programme de dépistage et de son acceptabilité auprès des femmes. Cette étude avait pour objectif d'examiner les variables associées à la persévérance chez les femmes de 50 à 68 ans ayant subi un examen de dépistage du Programme manitobain de dépistage du cancer du sein (PMDCS) en 2002 et 2003.

**Méthode :** L'étude a tenu compte de toutes les femmes qui ont subi un examen de dépistage du PMDCS en 2002 et 2003 et qui étaient admissibles à un redépistage après 2 ans. Les données ont été extraites de la base du PMDCS, qui contient des données démographiques, de dépistage, de suivi diagnostique et de diagnostic sur toutes les femmes ayant subi un examen de dépistage dans le cadre du programme. Pour examiner les variables associées à la persévérance, on a utilisé les tableaux de contingence, le test du khi-carré et la régression logistique.

**Résultats :** La persévérance a été associée au type d'examen de dépistage (premier ou subséquent), au résultat de l'examen (normal ou anormal), aux antécédents familiaux de cancer du sein (à risque ou non), à la scolarité (8e année ou moins, certaines études secondaires, études supérieures) ainsi qu'à l'origine ethnique (asiatique, Premières nations, autre). La persévérance n'a pas été associée au lieu de résidence (milieu rural ou urbain).

**Conclusions :** Dans l'ensemble, le taux de persévérance en ce qui concerne les examens de dépistage du PMDCS était de 80 %, ce qui satisfait aux normes nationales. Toutefois, il faudrait peut-être déployer davantage d'efforts pour améliorer le taux de persévérance chez les femmes asiatiques et des Premières nations ainsi que chez les femmes dont l'examen de dépistage s'est traduit par un résultat anormal ou qui ont moins de 9 ans de scolarité.


**Mots clés :** dépistage; cancer du sein; persévérance