

# A Randomized Trial of the Use of Print Material and Personal Contact to Improve Mammography Uptake Among Screening Non-attenders in Singapore

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## Abstract

*The Singapore Breast Screening Project was a nationwide study inviting a random sample of women between the ages of 50 and 64 years for mammography at one of two hospital-based screening centres over two years. The current study was undertaken to determine if (1) mailed health educational material alone, or (2) the same material delivered during a home visit made to the subject and her family would increase the uptake among Singapore women who had not responded to two previous invitations for mammographic screening as part of the Project.*

*This randomized trial employed a standard second reminder letter (R), the same letter packaged with health education material designed for the project (RP) and the addition of a home visit to make contact with the woman and her family (RV). The outcome measure of interest was the proportion of women in each group subsequently attending for screening. The study population comprised 1500 non-attenders whose names appeared consecutively in the database of the larger screening centre in this Project. These were randomized into three groups of 500 each. In total, they broadly resembled the national population in ethnic composition (72.3% Chinese, 17.8% Malays, 9.0% Indians and 0.8% Others).*

*By the end of the project, 7.0% of women in group R and 7.6% in group RP responded to the invitation. In group RV, 428 homes were visited at least once and contact was made with the subject and her family member in 306 (71.5%) cases. Subsequently, 13.3% of the women visited attended for screening. The rate ratio for attendance in group RP compared with group R was 1.09 (95% CI 0.70 to 1.70) and for group RV compared with R, 1.90 (1.27 to 2.84). When analyzed by groups originally assigned to, women in group RV remained significantly more likely to attend than those in groups R or RP. The marginal cost of a home visit, based on this study, was \$25.04 per additional woman screened.*

*Our results suggest that the response to a second reminder is generally low and that additional print material does not improve screening attendance in this group of initial non-attenders. Personal contact with the family through a home visit appears to increase uptake, and may be helpful particularly among women who have less frequent contact with the health care system.*

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**Key words:** *Acceptance, Breast cancer, Intervention trial, Mammographic screening*

## Introduction

Breast cancer is the most common cancer among females in Singapore.<sup>1</sup> Although lower than incidence rates in North America and the United Kingdom the incidence of breast cancer here has doubled from 20 to 38.8 per 100,000 women per year over the past 2 decades,<sup>2</sup> and the disease is currently of major public health concern.

The introduction of population-based mammographic screening in countries such as Sweden, other parts of

Europe, and Canada has followed studies demonstrating its effectiveness in many parts of the world.<sup>3-5</sup> This, in turn, has led to interest in employing mammography as a screening tool in Singapore. The Ministry of Health initiated the Singapore Breast Screening Project in 1994 to evaluate the responsiveness of the target population and the ability of the test to detect early disease and reduce mortality from breast cancer in an Asian population.

Under this project, 69,500 women between the ages of

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50 and 64 years were randomly selected to receive an invitation for a free mammogram at one of the two specially designated screening centres situated in a major hospital. Each woman received an invitation letter in English as well as in her mother tongue (Chinese, Malay or Tamil), which explained the purpose of the test and gave details of the date and time of her appointment. The recipient was asked to call the screening centre to confirm or to change the appointment date, or if she had any enquiries. The screening centre followed up non-respondents by sending two reminder letters over the ensuing two months.

Over the study period of two and a half years, a total of 28,231 women responded to the screening invitation. While the early measures of screening effectiveness have been promising,<sup>6</sup> the overall attendance rate of 41% falls below the acceptance achieved by most population-based studies, in which rates of between 60% and 93% have generally been reported,<sup>7</sup> and is also below the 70% recommended as being the level necessary for a reduction in mortality of 25%.<sup>3,8</sup>

Previous work on the acceptability of the mammography among women in Singapore suggest that the decision to attend may be affected by several factors unique to local women, such as family support.<sup>9</sup> We showed that the single most important factor influencing attendance was encouragement from a family member, usually an adult son or daughter, or a spouse. Focus groups and face-to-face interview surveys also revealed that, of the domains specified in the Health Belief Model, a sense of personal susceptibility and a belief in the benefits of early detection were the more important motivators for attendance at mammography.<sup>9,10</sup>

The objectives of the current study were to determine if (1) a mailed educational message designed to address the needs of local women and (2) a home visit establishing contact with the woman and a family member would improve the uptake of the test among women who had not responded to the mailed invitation and one reminder letter.

### Subjects and Methods

Using results from focus group discussions and previous studies conducted among the target population, we developed a family information pack which was intended to address the most significant barriers to mammography we had identified among local women, namely a lack of sense of personal susceptibility and the belief that early detection did not improve chances of a cure. The pack was labelled "Why should I have a mammogram? A message for you and your family". The text of the message is given in Figure 1. The material was pre-tested for readability and appropriateness in a convenience sample of women from the target population. It was translated into Chinese and Malay so that each

woman received the text in English and her mother tongue.

Please read this carefully. It will answer many of your questions about breast screening.

Show it to your family members so that they can also understand the importance of the test.

Why the fuss about breast cancer?

*Breast cancer is the most common cancer among women in Singapore. Anyone can get breast cancer, and the chances are greater after the age of 45.*

Isn't it true that cancer is incurable?

*Nowadays, breast cancer can be cured if detected early. The mammogram is the only way to pick up these very small cancers.*

Why have I been invited?

*Your name has been selected at random from all women of your age group living in Singapore.*

But there is nothing wrong with me now.

*This is the best time to go for the test. Mammograms can detect problems before lumps, pain or discharge appear. Do NOT wait until you feel something is wrong. Go for a mammogram now.*

Fig. 1. Text of the pamphlet: Why should I have a mammogram?

The current study involves women invited to the larger of the two screening centres, which accounted for 80% of all women selected for the Singapore Breast Screening Project. A list of 1500 women who had not responded to the invitation and first reminder, and were due to receive their second reminders in December of 1996 were selected as the study population. They were randomly assigned using a simple computer program in DBASE IV into three groups of 500 each. The first group (R) received a routine one-page second reminder letter through the mail, in which she was given a screening date and invited to call up to confirm her appointment or change her date. The letter also stated that this would be the last invitation she would receive from the project. This was accompanied by a pamphlet which explained the reason for the test and what could be expected at the screening centre. A second group (RP) received the same material, but in addition the educational folder developed specifically for this study. A female field worker aged between 19 and 22 visited the homes of women in a third group (RV) to personally deliver the same invitation letter and educational folder to the woman and at least one adult family member. Field workers were trained by the investigators; their primary task was to convey the message contained in the pamphlet to the woman and her family. Although they were familiar with the Breast Screening Project, they were instructed to refer women to the enquiry desk of the screening

centre if further clarification was necessary. As far as possible, field workers were assigned to subjects of the same ethnicity to facilitate communication.

#### Sample Size Calculations

From routine data collected by the mammography project, we estimated that 5% of women in the control group (R: reminder letter only) would respond to the second reminder letter. To detect a two-fold increase in attendance to 10% in the intervention groups, a sample size of 500 for each group would be required to achieve 85% power at a 5% level of significance (2-sided).

#### Data Analysis

Relative risks and their 95% confidence intervals were used to compare the proportion of women attending by intervention group. We report analyses performed both by intervention received and by “intention-to-treat”. The proportional hazards model was used to obtain rate ratio estimates adjusted for age and ethnicity.<sup>11</sup> We were interested primarily in the difference in subsequent attendance between the two intervention groups (RP and RV) and the control population (R).

#### Results

Table I describes the three groups by age and ethnicity, which were the two demographic variables available to the Singapore Breast Screening Project. There was no difference in the mean age between the three groups, and the ethnic distribution was also similar.

Women randomized to Groups R and RP received the corresponding material through the postal service. The outcome of visits made by 18 field workers to the home addresses of 428 subjects randomized to Group RV is shown in Table II. The Breast Screening Project routinely allows approximately four weeks between generating a second reminder and the designated appointment date. Due to time constraints, it was only possible to attempt a personal visit to 428 of the 500 subjects assigned to this Group, such that an appropriate interval remained between the visit and the appointment date. The remain-

ing subjects were notified by post.

Out of the 428 homes visited, successful contact with the woman and at least one family member was made in 71.5% of cases. In 13 cases, the field worker was unable to locate the woman at home on two separate attempts, although the address was correct. Sixty-one women (14.2%) had either shifted or passed on without the information having been captured in the database used for the study. The remaining 11.2% were uncontactable for other reasons, such as being out of the country at the time of the study.

The key outcome measure in this study was attendance for screening after randomization. As women were permitted to change or postpone their screening appointment, attendance was only calculated at the close of the Breast Screening Project, about 5 weeks after the designated appointment dates. At this time, a total of 139 (9.3%) out of the 1500 women had presented themselves for screening. The distribution by intervention group is given in Table III.

The number of women attending from Groups R and RP were similar; 35 (7.0%) and 38 (7.6%) respectively, with no increase in the group receiving the educational folder by post (risk ratio = 1.09, 95% CI 0.70 to 1.70). However, the proportion attending in the group visited at home (RV) was higher (13.3%) and the difference was statistically significant. The corresponding rate ratio was 1.90 (1.27 to 2.84) compared with Group R and 1.75 (1.19 to 2.59) compared with Group RP.

We also analysed the data according to the intervention group women were originally assigned to. The number of women in Group RV who responded after receiving their letters through the mail instead was 9 (12.5%). The total number of screening attenders from Group RV was thus 64 (12.8%). We again compared this with the proportion attending from Groups R and RP and obtained rate ratios of 1.78 (95% CI 1.20 to 2.66) and 1.69 (1.14 to 2.50) respectively.

Adjustment for age and ethnicity did not materially affect the estimates obtained. The corresponding ad-

TABLE I: COMPARISON OF INTERVENTION GROUPS BY AGE AND ETHNICITY

	Group 1 (n = 500)	Group 2 (n = 500)	Group 3 (n = 500)
Mean age* (SD) in years	59.0 (4.22)	58.4 (4.01)	59.1 (4.23)
Range	52 to 67	52 to 67	52 to 67
Ethnic distribution			
Chinese	371 (74.2)	349 (69.8)	365 (73.0)
Malay	82 (16.4)	97 (19.4)	88 (17.6)
Indian	42 (8.4)	50 (10.0)	43 (8.6)
Others	5 (1.0)	4 (0.8)	4 (0.8)

\* at randomization; SD: standard deviation

TABLE II: OUTCOME OF VISITS TO THE HOME ADDRESS OF 428 WOMEN WHO DID NOT RESPOND TO TWO INVITATIONS FOR MAMMOGRAPHIC SCREENING IN THE SINGAPORE BREAST SCREENING PROJECT

Outcome	Number (%)
Contact made with subject and a family member, letter accepted	306 (71.5%)
Not at home on three separate attempts	13 (3.0%)
Subject no longer residing at the given address	43 (10.0%)
Subject passed on	18 (4.2%)
Unable to contact for other reason	48 (11.2%)
Total	428 (100.0%)

TABLE III: PROPORTION OF WOMEN RESPONDING TO THE SCREENING INVITATION BY INTERVENTION RECEIVED

Group	Number attended/ number invited	% uptake	Rate ratio (95% CI)	
R	Normal screening reminder sent by post	35 / 500	7.0%	(reference group)
RP	Screening reminder and additional educational information sent by post	38 / 500	7.6%	1.09 (0.70 to 1.70) (reference group)
RV	Screening reminder and additional educational information delivered to the home	57 / 428	13.3%	1.90 (1.27 to 2.84) 1.75 (1.19 to 2.59)

justed rate ratios were 1.90 (95% CI 1.24 to 2.86) and 1.80 (1.20 to 2.72) respectively.

### Discussion

This study was prompted by the low uptake of screening mammography among local women invited for the Singapore Breast Screening Project. It targeted the reluctant participant, that is, the woman who did not respond to two invitations. Our results suggest that among these initial non-attenders, additional print material does not increase uptake above that achieved by a standard one-page reminder letter. In contrast, a home visit in which contact is made with the woman and a family member resulted in an 80% to 90% increase in uptake.

The effectiveness of mailed invitations to eligible women by name compared with community-based intervention programmes in promoting mammography uptake has been well-established.<sup>12-14</sup> In the context of the current study, additional educational material by post did not improve attendance rates compared with the standard invitation. This could be due to one or more factors: it is possible that in some cases the pamphlets and letters were regarded as “junk mail” and not even read. In a previous study of 260 non-attenders, 19.2% of those who recalled receiving their invitation had put the letter aside without reading it (Seow A and Straughan P T, unpublished data). It is worth noting that literacy rates in this age group (52.8%) are lower compared to the general population (84% in all females above 10 years of age).<sup>15</sup> In addition, among those who read the material, the content of the pamphlet could have failed to address the chief barriers to her decision to attend. A third possible explanation is that these barriers were not amenable to change by printed messages. This is not unlikely considering this study was aimed at women who had previously not responded to two mailed invitations. One or more of these possible explanations may apply in each case, but overall, our results indicate that additional mailed print material is unlikely to influence screening attendance among these women.

In contrast, in-person contact with the woman and at least one family member significantly improved screening uptake in this study. This finding concurs with previous results suggesting that in an Asian society, the

influence of family members, even in matters relating to health, is strongest.<sup>9</sup> Apart from providing encouragement, adult sons and daughters also enable screening behaviour by playing a supportive role, such as accompanying their parent to the screening centre. Bringing the family member's influence to bear on the woman's decision to participate in screening is one of the likely means by which face-to-face contact led to improved attendance among the women receiving home visits in this study. Another factor in this intervention was that a personal visit demonstrated to the woman the importance of her attendance. Staff at the screening centre reported several women remarking, “I didn't want to come, but someone bothered to come to my house....”.

The finding that personal contact significantly improves attendance is in agreement with other studies. In the United States, a physician's recommendation has been shown to be consistently more important in predicting screening attendance than barriers such as cost and fear of radiation.<sup>16-18</sup> Some interventional studies designed to improve screening uptake have successfully utilized the primary care team. Sharp et al<sup>19</sup> reported that a personal letter signed by the woman's own general practitioner (GP) was at least as effective as a nurse visit in promoting mammography attendance in the United Kingdom. In Singapore, however, as in the United States, persons are not required to register with a specific primary care physician, and may choose to consult any doctor during an episode of illness, or for a check-up. Previous studies among screening non-attenders in Singapore suggest that contact with the health care system is generally infrequent. Out of 260 screening non-attenders, 54.3% reported visiting a doctor less often than twice a year for an illness, and 65% reported visiting less often than annually for a check-up (Seow A and Straughan P T, unpublished data). Several studies in the United States have emphasized the need for creative breast cancer screening activities among minority women, especially in the older age groups, which are also often characterized by less frequent contact with the health care system. For such populations, our results suggest that the use of other forms of personal contact, possibly with involvement of family members, may be an effective means of improving screening behaviour.

We calculated the marginal costs of introducing a home visit to persuade initial non-attenders based on the results of this study. The success rate (in terms of contacting the subject and her family member) was, on average, once in every 2.8 visits. Using the average hourly wage of \$9 assuming an undergraduate or young nurse would make the visits and based on 6 visits made in one hour, the marginal cost of using this intervention is estimated to be \$25.04 per additional screening attendance.

We conclude that educational material sent by mail did not increase screening uptake among initial non-attenders in our local population, whereas a screening invitation delivered personally to the women and their family members achieved a significant increase. Such an intervention if combined with additional efforts to improve cost-efficiency, may be feasible among selected groups who are unlikely to respond to more traditional print material, or whose contact with the health care system is infrequent.

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