

Barriers to breast cancer screening in Singapore: A literature review

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ABSTRACT

Introduction: Breast cancer is a leading cause of cancer death among women, and its age-standardised incidence rate is one of the highest in Asia. We aimed to review studies on barriers to breast cancer screening to inform future policies in Singapore.

Method: This was a literature review of both quantitative and qualitative studies published between 2012 and 2020 using PubMed, Google Scholar and Cochrane databases, which analysed the perceptions and behaviours of women towards breast cancer screening in Singapore.

Results: Through a thematic analysis based on the Health Belief Model, significant themes associated with low breast cancer screening uptake in Singapore were identified. The themes are: (1) high perceived barriers versus benefits, including fear of the breast cancer screening procedure and its possible outcomes, (2) personal challenges that impede screening attendance and paying for screening and treatment, and (3) low perceived susceptibility to breast cancer.

Conclusion: Perceived costs/barriers vs benefits of screening appear to be the most common barriers to breast cancer screening in Singapore. Based on the barriers identified, increasing convenience to get screened, reducing mammogram and treatment costs, and improving engagement with support groups are recommended to improve the screening uptake rate in Singapore.

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Keywords: Barriers, breast cancer, mammography, screening programme

INTRODUCTION

Breast cancer is a major public health concern and a leading cause of cancer death among women worldwide, including Singapore.¹ According to the 2018 Singapore Cancer Registry report, breast cancer has been consistently ranked as a leading cancer (29.3% of all cancers in Singapore) among women in Singapore women for the past 50 years.² Additionally, the age-standardised incidence rate of invasive breast cancer in Singapore has increased 3.5-fold to 70.7 per 100,000 population in 2014 to 2018.² Despite these alarming figures, breast cancer screening rates in Singapore have remained relatively low.

Early detection significantly reduces mortality since breast cancer detected at earlier stages has a better prognosis. Mammography screening is the only breast cancer screening method that has proven to be

effective, with more than 40% reduction in the risk of breast cancer deaths in high-income countries.^{3,4} While it is costly, it is also cost-effective and feasible in countries with good healthcare infrastructure that can afford long-term organised population-based screening programmes.⁵

Singapore's approach to breast cancer screening

Singapore's approach to promoting breast cancer screening follows a multipronged strategy comprising a national breast cancer screening programme, together with targeted health education through family, healthcare providers (HCPs), cultural leaders, and community engagement groups (e.g. Breast Cancer Foundation, Singapore).

The National Breast Cancer Screening Programme, BreastScreen Singapore (BSS), managed by the Health

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CLINICAL IMPACT

What is New

- High perceived barriers versus benefits, personal challenges that impede screening attendance, payment for screening and low perceived susceptibility to breast cancer were identified as major barriers to breast cancer screening.

Clinical Implications

- Sensitivity, cultural and communication training of healthcare providers (HCPs) may help overcome embarrassment and distrust of HCPs felt by some women as deterrents to screening.
- Based on identified barriers to screening, this study provides suggestions and informs healthcare policymakers on how to improve breast cancer screening uptake in Singapore.

Promotion Board, Singapore, has been providing subsidised breast cancer screening to the population since 2002.⁶ However, BSS is not a fully organised programme, and improvements have been made to determine screening eligibility using different parameters since 2019.⁷

There is also a national campaign to raise awareness of breast cancer and screening. It takes place every October as part of Breast Cancer Awareness Month. During the campaign, partnering voluntary welfare organisations make additional subsidies available to eligible women, which in turn encourages higher take-up rates of screening mammogram.

Information on screening are readily accessible via websites such as HealthHub, the national population enablement platform for digital health.⁷ Seetoh et al. found that a similar multipronged approach, including physician reminders, tailored education and cost reduction, is an effective solution in overcoming attitudinal barriers to increase screening uptake.⁸

However, despite publicity and encouragement from the Singapore health authorities, the screening uptake rate in Singapore has remained low at about 40% (Fig. 1A).⁷ This is lower compared to other countries (Fig. 1B).¹⁰⁻¹² Both Singapore and international studies have shown that possible reasons for the relatively low screening rates include cultural, economic, and technological factors that often minimise participation in screening procedures by those at high risk for breast cancer.⁸⁻¹¹

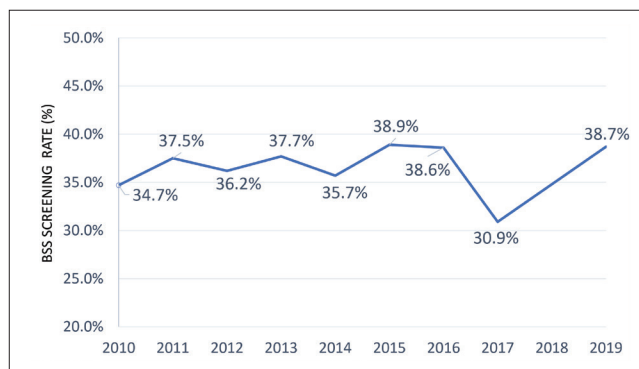


Fig. 1. (A) Women aged 50–69 years who underwent mammography in the last 2 years.

BSS: BreastScreen Singapore

Data source: Ministry of Health, Singapore. National Population Health Survey 2019. Available at: <https://www.hpb.gov.sg/docs/default-source/default-document-library/national-population-health-survey-2019.pdf>. Accessed on 5 August 2022.

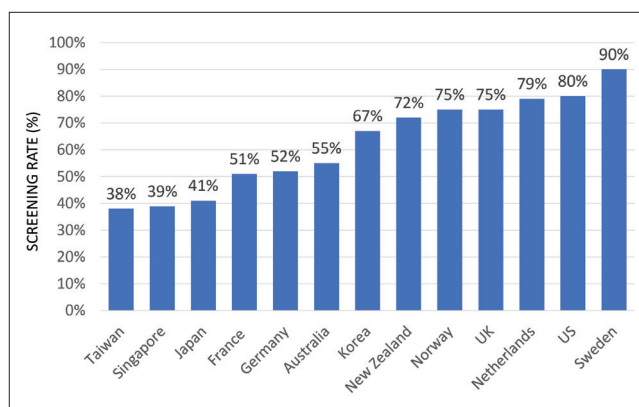


Fig. 1. (B) Breast cancer screening rates in countries with national screening programme, 2015 (or nearest years).¹⁰⁻¹²

Superscript numbers: Refer to REFERENCES

While there have been numerous studies performed in Singapore to explore these barriers contributing to poor breast cancer screening uptake, none to our knowledge have attempted to provide a consolidated view of these barriers relative to one another. Thus, our study aimed to consolidate identified barriers leading to low screening uptake in Singapore, and propose for programme development and policymaking.

METHOD

We performed a literature review of studies on breast cancer screening in Singapore between 2012 and 2020 using PubMed, Google Scholar and Cochrane databases. Studies were identified using the key terms: “breast cancer screening”, “motivators”, “barriers”, and “Singapore screening”. To expand the scope and breadth of studies reviewed, studies screened from the bibliographies of articles identified based on the key terms were also reviewed.

We also only included studies where women have either undergone screening or have never been screened before. Studies on breast self-examination or presentation of breast cancer upon breast self-examination were excluded. Editorial, letters, conference abstracts and personal views were excluded. One coder was used to identify themes using the constructs described in the Health Belief Model (HBM) for easier understanding.¹⁷

HBM is based on the understanding that individuals will adopt health-related actions if they believe they are faced with risk and have the potential to reduce that risk. The model postulates that behaviour change occurs according to constructs of perceived susceptibility to a condition, perceived severity of the condition, perceived benefits outweighing the risks, and perceived self-efficacy and cues to perform an available course of action.¹⁷

Recurrent themes that emerged as barriers to breast cancer screening were mapped and ranked according to these HBM constructs.

RESULTS

A total of 10 studies were included for the thematic analysis (Fig. 2). The ranked themes are described in Table 1 and online Supplementary Table S1.¹⁷

Perceived costs/barriers versus the benefits of breast cancer screening

High perceived costs/barriers vs the benefits of breast cancer screening among women in Singapore was identified as the most common obstacle to breast cancer screening in Singapore.

1. Fear

Fear was the most common subtheme elicited. Perceived fear of the screening components (fear of procedural pain and fear of radiation from mammograms),^{18,19} and perceived fear of screening outcomes (fear of cancer diagnosis leading to high out-of-pocket cost of treatment, fear of poor quality of life, fear of treatment side effects, fear of lifetime medication and fear of social stigma) are the most widely reported barriers to breast cancer screening among women in Singapore.^{8,18,20}

2. Personal challenges

Women with perceived inability to attend screening due to personal challenges were also less likely to attend breast cancer screening. Such challenges included having “no time” due to personal or professional responsibilities and “inconvenience” in

having to personally attend the screening that may or may not be nearby.^{18,20-22}

3. Cost

The financial cost of screening and being a financial burden to their families due to the high cost of treatment were also identified as deterrents to screening attendance. Bilger et al. found that among various factors, women were more concerned about outcomes of screening and treatment cost if tested positive than by screening attributes, which include the cost of screening or monetary incentives to screen.²³

While previous studies have emphasised that the cost of screening had a minor effect on the decision to go for breast cancer screening, one study highlighted that women in Singapore who do not undergo regular mammograms were in fact only willing to pay an average amount of only SGD29 for screening vs the subsidised price of S\$50 (for Singapore citizens aged ≥ 50 years).^{7,24} Even those who underwent regular mammograms were willing to pay an average of only SGD33.²⁴ Furthermore, Lim et al. showed that a large proportion (71.4%) of women in their study population were worried about cost and also not aware that MediSave, a compulsory national medical savings scheme, could be used to pay for screening mammograms. This was apparent in low-income families and among women who did not have any personal experience with breast cancer.¹⁸

4. Modesty/embarrassment and distrust

In several studies, cultural beliefs on modesty and embarrassment during the procedure emerged as strong reasons for not undergoing screening. The involvement of male staff, previous negative personal experiences and negative experiences by others were specifically mentioned as barriers to screening.^{18,22} These experiences could have contributed to distrust felt towards HCPs and screening methods.^{22,25}

Perceived susceptibility to breast cancer

“I’m healthy” was commonly cited as a reason for avoiding breast cancer screening among women who have and have not undergone for a mammogram before. Malay women were found to indicate this more often as a reason to avoid screening compared with their Chinese and Indian counterparts.²⁴⁻²⁶

“I’m not at risk” was also commonly cited, as women perceived a lack of family history, feeling well and having undergone a prior mammogram with normal results, meant that they were exempted from regular

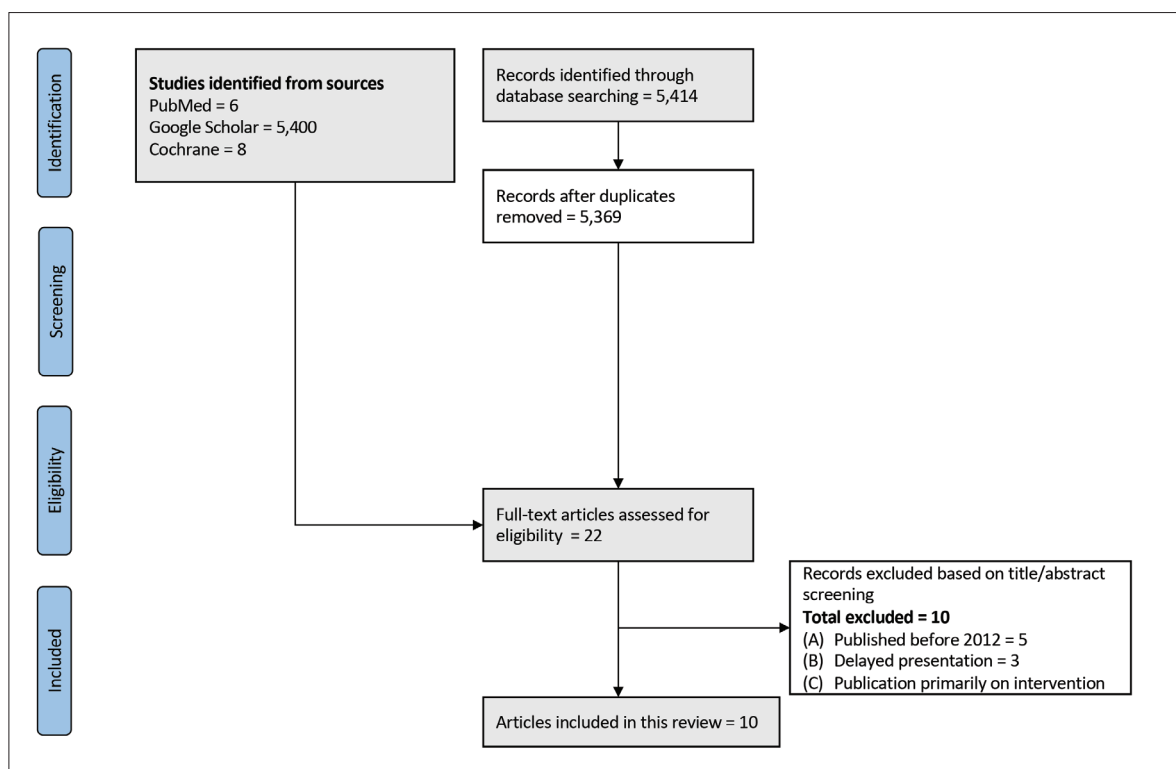


Fig. 2. Identification of studies for the thematic analysis.

screening. Women also expressed the perception that one will get cancer if one is looking for it, and that getting screened meant that something was wrong with them.^{8,18,20,21}

Perceived severity of breast cancer and cues to undergo breast cancer screening

Physicians are the main source of information for screening mammogram among women.²⁴ The doctor-patient relationship is an important cue for women in Singapore to take action and undergo breast cancer screening—particularly, doctors who are trusted by women, and those who provide regular reminders and information on screening to allay patient fears.^{8,18,27} Fatalistic beliefs that one's health outcomes were beyond one's control was also cited as a reason for poor screening uptake in this study. This factor has been observed as a barrier for women across ethnicities (Chinese, Malay and Indian), but more so among Malay women.^{21,25} In addition, women ≥ 60 years were found to cite fatalism as one of the barriers more frequently vs younger women.²¹

Studies have showed that the majority of women in Singapore were aware of the severity of breast cancer and the importance of breast cancer screening.²⁸ However,

Lim et al. found that while 81.6% of women participants were aware that breast cancer is one of the most common female cancers in Singapore, approximately one-third (33.4%) were not aware of the BSS programme and more than half (51.2%) did not know that screening was for asymptomatic women.¹⁸ In addition, 46.3% of the women were not aware of the starting age for screening, and nearly one-fifth (19.5%) could not name a single screening centre.¹⁸

Perceived self-efficacy

Women who perceived themselves to be important to family members, and who were encouraged by their loved ones to be screened were more likely to accept and adopt breast cancer screening.^{18,25}

DISCUSSION

There have been numerous studies that have explored the barriers to breast cancer screening in Singapore. To our knowledge, this is the first Singapore review that has attempted to consolidate findings across studies and identify each barrier's importance relative to others as perceived by women in Singapore. This will serve to guide prioritisation efforts towards increasing breast cancer screening rates in Singapore (Table 2).

Table 1. Themes on breast cancer screening barriers in Singapore

Themes	Subthemes	No. of times cited	Teo et al. ^{2,4} 2013	Wee et al. ²⁰ 2012	Seetoh et al. ⁸ 2014	Lim et al. ¹⁸ 2015	Wee et al. ²⁷ 2016	Wee et al. ²¹ 2016	Malhotra et al. ²² 2016	Wong et al. ¹⁹ 2017	Shaw et al. ²⁵ 2018	Bilger et al. ²³ 2020
Perceived cost/barriers versus the benefits of breast screening	Fear	8										
	Fear of screening procedure	4			✓	✓		✓		✓		
	Fear of screening outcomes/diagnosis	4		✓				✓	✓			✓
	Personal challenges	7										
	No time	4	✓	✓		✓		✓				
	Inconvenience	3		✓				✓	✓			
	Cost	6										
	Screening costs	4	✓	✓		✓		✓				
	Treatment costs	2						✓				✓
	Modesty /embarrassment	4				✓	✓		✓		✓	
Perceived susceptibility to breast cancer	Distrust	3						✓	✓		✓	
	“I’m not at risk”	5		✓	✓	✓		✓		✓		
	“I’m healthy”	5		✓	✓	✓	✓	✓				
	Fatalistic/cultural beliefs	3						✓	✓		✓	
	Doctor-patient relationship	4				✓	✓	✓	✓			
Perceived severity and cues to undergo breast cancer screening	Forgetfulness	3							✓	✓	✓	
	Awareness on seriousness of breast cancer and importance of screening	2		✓					✓			
	Self-worth and influence of family	3				✓		✓			✓	

Superscript numbers: Refer to REFERENCES

Based on our study, perceived costs/barriers vs benefits of screening emerged as the predominant theme (subthemes: fear, personal challenges, cost, modesty/embarrassment and distrust) cited by studies to explain low screening rates. This is followed by levels of perceived susceptibility (subthemes: “I’m healthy” and “I’m not at risk”), perceived severity and inadequate cues to screening (subthemes: doctor-patient relationship, fatalistic/cultural beliefs, forgetfulness, and awareness on seriousness breast cancer) and perceived self-efficacy (subtheme: self-worth and influence of family). These findings are similar to studies done in other countries, including a meta-synthesis of qualitative studies across 22 countries on breast cancer screening.²⁹

Table 2. Recommendations to improve breast cancer screening in Singapore

1.	Messaging that addresses fears of the screening procedure and its outcomes should be considered for inclusion in BSS and BCAM health education materials.
2.	Modern screening modalities could be used to improve first-time screening rates, as well as subsequent drop-out rates, on a case-by-case basis.
3.	Decentralising screening appointments from clinics to the Mammobus and having more of such buses islandwide operating in easily accessible locations, could enable more women to adopt preventive breast screening as part of their normal routine.
4.	Out-of-pocket payment for subsidised screening mammograms could be reviewed to incentivise uptake. To address concerns relating to affordability, more publicity on the use of MediSave to absorb costs could assist in improving screening rates.
5.	Regular training is crucial for healthcare providers on culturally sensitive communication, and improving awareness to patients on breast cancer screening
6.	Training of Singapore doctors on how to communicate information with appropriate interpersonal skills could potentially go a long way in increasing screening rates.
7.	Targeted health campaigns to increase screening among Malay-Muslim women could include educational materials and messaging in the mother tongue, and engaging mosques and religious leaders for dissemination.

BCAM: Breast Cancer Awareness Month; BSS: BreastScreen Singapore

Fear was the most common subtheme elicited in our study as an explanation to low screening rates. Emotions are well-documented motivators³⁰ central to both self-regulation, health behaviour,³¹ and the acceptance of health-promoting messages.³² Fear in particular can act as both a barrier and facilitator for screening.³³

These fears can be addressed through interpersonal communication between women and their family

members, HCPs and/or community members, and facilitated by public health institutions. Professionals should be provided with skills and training on how to deliver the content. Other studies also suggest that message appeals, such as in utilising testimonials taken from real survivors of breast cancer are effective in increasing willingness and alleviating fears towards mammograms.³⁴

Women who undergo screening mammogram often complain of pain, discomfort in their breasts, and anxiety as a reason to forgo consecutive screenings. However, anxiety could also be attributed to fear of the outcome. Studies have shown that modern screening modalities can be performed with less compression, which can reduce anxiety and pain levels for women without compromising the image quality.³⁵

Personal challenges due to lack of time and inconvenience of accessing screening sites, which emerged strongly as a subtheme in this study has also been identified in other studies.²⁸ Screening sites have been brought closer to target populations through the use of a mobile Mammobus, a mobile mammography service that has shown promise in improving screening rates, both in community and workplace settings.³⁶ Notably, weekday take-up rates were noted to be lower compared to weekends, reinforcing the importance of time and convenience on women’s decision-making.

Decentralising screening appointments from clinics to the Mammobus, and having more of such buses islandwide operating in easily accessible locations could enable more women to adopt preventive breast cancer screening as part of their normal routine.²⁶

The cost of screening, though not the most common theme elicited across the studies, is still important in women’s consideration in getting screened, especially in the lower socioeconomic groups in Singapore.²⁰ Higher breast cancer screening rates can be achieved when screening is provided free of charge or at low cost.²⁰ It is prudent to note that as part of the national screening programme, Screen for Life, the cost of Pap smears and faecal immunochemical test for cervical and colorectal screening respectively have been reduced to ≤SGD5 based on eligibility criteria and screening centre.⁷ Yet, the subsidised cost for a mammogram remains at SGD50 under the same programme for eligible Singapore citizens.⁷

As identified in our study, women from low-income groups or who have not had personal experience with breast cancer were less likely to be aware that mammograms can be paid for using MediSave. Bilger

et al. found that a decrease in treatment costs in their study (quantitative pilot from \$250,000 to \$0) led to an increase in predicted screening uptake rates.²³ This stems from the fact that women greatly fear the cost of treatment if tested positive for breast cancer, as shown in our study. Hence, alleviating these costs may be essential and effective.

Out-of-pocket payment for subsidised screening mammograms could be reviewed to incentivise uptake. To address concerns relating to affordability, more publicity on the use of MediSave to absorb costs could assist in improving screening rates.¹⁸

Modesty, embarrassment and distrust also emerged as common subthemes in our study. This is coherent with findings from other countries.²⁹ Asian women may be less comfortable with exposing their private parts, even if it is to a HCP.³⁷ It is therefore not surprising that negative experiences with HCPs emerged under this subtheme. This issue is confounded by any indifferent behaviour that may be exhibited by HCPs.^{18,25}

Low perceived susceptibility to breast cancer emerged as the next most common theme, though this is often linked with one's perceived severity of the disease or lack thereof.²⁸ The doctor-patient relationship is particularly important in overcoming this. This is especially important as BSS is not a fully organised programme—reminders are not sent to women who miss their first invitation and successful/missed screening attendance are not tracked. Physicians were found to be the main sources of information on breast cancer for Singapore women, and were crucial at allaying their fears and correcting misunderstandings regarding mammograms and breast cancer. Previous studies suggest that having a gynaecologist as a HCP is an important predictor for breast cancer screening.³⁸

Fatalism, often associated with cultural beliefs, was also cited as a subtheme in our study. This was seen in older women and across ethnicities, although more prominently in Malay women. Shirazi et al. highlight that members of underrepresented minority groups are at higher risk of experiencing greater breast cancer-related morbidity and mortality.³⁹ Further to this, Tan et al. observe that Malay women in Singapore usually present with histologically more aggressive breast cancer, at a more advanced stage, and with higher risk of breast cancer-related deaths.⁴⁰ They were also more likely to perceive their susceptibility to breast cancer as low, partly due to feeling healthy along with cultural and fatalistic beliefs.²⁵ Given these attitudes/beliefs, developing cancer is viewed as inevitable, and consequently, these women would not get screened

because of their belief that they cannot avoid their fate.⁴¹

Targeted health campaigns to increase screening among Malay-Muslim women, as suggested by Islam et al. could include educational materials and messages in the mother tongue, and engaging mosques and religious leaders for dissemination.⁴¹ The effectiveness of such campaigns would be strengthened if key stakeholders are actively engaged, particularly imams (religious leaders) and female leaders within mosques.⁴¹ Involvement of imams is of high importance as women frequently visit them at mosques and strongly believe in them.

Women's perceived self-efficacy for following through with screening emerged as a theme, though less prominently compared to other themes. It was found to be largely associated with family influence and self-worth of women. Family members and friends can contribute positively to women accepting breast cancer screening in 2 ways: family members can act as messengers on the importance of screening as women are likely to trust them; and with perceived sense of importance in her family, women are more inclined to sustain their health status in order to continue contributing to the family.⁴²

There are a few limitations to our study. We included a limited number of studies, with a widely distributed participant population (N=20–740) and only identified studies in a 10-year range from 2012–2020 (of note, BSS started in 2002). The Screening Test Review Committee was set up by the Academy of Medicine, Singapore in 2010 to provide evidence-based recommendations on appropriate use of screening tests; mammogram as a suitable population-level screening was recommended in 2011.⁴³ Hence, we included studies published after 2012. Most of the studies also lacked comparator arms. In our analysis, we found some barriers had been reiterated more so in some articles compared to others. The degree of impact of individual barriers is difficult to ascertain given the heterogeneity of study design and analysis. In fact, there was a high level of heterogeneity across studies that were mostly qualitative in nature, and there were few quantitative studies. Furthermore, our study had only analysed findings from studies and was not focused on their methodology. As such, we are unable to ascertain the validity of the studies. However, this allowed inclusivity, for us to analyse both qualitative and quantitative studies.

We also chose to use the constructs of HBM to elicit themes and organise our findings. While HBM has been shown to be most useful to promote and describe less

entrenched and simple preventive behaviour changes such as health screening, there have also been many criticisms of HBM and its constructs in explaining health-seeking behaviours.⁴⁴ Since we have detailed the relevant subthemes under each construct, we do not view this as a major limitation to our study. However, collapsing and condensing the findings into key overarching themes and subthemes may result in the full range of findings not being captured accurately as a trade-off.

Finally, only one coder was used to identify the themes, which may have introduced subjective bias to our findings. Although we could not ascertain intercoder reliability, studies have shown that the reliability check does not necessarily establish that codes are objective, as 2 people can apply a similarly subjective perspective to the text.⁴⁵ Therefore, a better way to judge the quality of findings in a thematic analysis is to analyse whether the study has improved the understanding of a particular phenomenon or provided information for practical actions,⁴⁶ both of which we believe our study has achieved. The ranking of themes and subthemes elicited from the studies we reviewed can serve to guide prioritisation efforts in programme development and policymaking in Singapore.

CONCLUSION

Using constructs from HBM to analyse studies on addressing barriers to breast cancer screening in the Singapore context, we identified a high perceived costs/barriers vs benefits (especially with regards to fear of screening and its impact), and a low perceived susceptibility to breast cancer, as main underlying reasons for poor breast cancer screening uptake in Singapore. Based on findings from this study, Singapore's multipronged approach to encourage breast cancer screening can be further enhanced through increased convenience to get screened, further reduction of mammogram and treatment costs, and improved engagement with families, HCPs and specific ethnic groups with disparate cancer incidence. The way health communication content and messages are crafted as part of these interventions should also consider fear and cultural differences among women in Singapore to improve the acceptability of breast cancer screening.

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