

Supplementary Table S1. Studies included in the thematic analysis

Study	Methodology	Sample size	Participant demographics	Key themes	Key findings
Teo et al. <sup>24</sup> 2013	Cross-sectional study, questionnaire, multivariate analysis using Cox regression	208	<p><b>Ever had a mammogram versus goes for a regular mammogram:</b>  <b>Age:</b> younger &lt;50 years (71.2% vs 49.2%), older ≥50 years (79.2% vs 32.2%)  <b>Ethnicity:</b> Chinese (85.6% vs 44.2%), Indians (69.2% vs 34.6%), Malay (67.3% vs 25.0%)  <b>Education:</b> higher education &gt;10 years (90.4% vs 76.9%), lower education ≥10 years (72.4% vs 23.7%)  <b>Prior mammogram knowledge:</b> higher mammogram knowledge (90.5% vs 49.6%), lower mammogram knowledge (50.7% vs 12.7%)  <b>Family history of BC:</b> (83.3% vs 50.0%)  <b>Screening participation:</b> Prior breast biopsy (90% vs 70%), received reminders for mammograms (73.3% vs 52.3%)</p>	<p><b>Perceived cost/barriers:</b> personal challenges (no time), cost (screening cost)</p>	<p>Only 37% of participants underwent regular mammography. Lack of time (56.7%) and cost (54.3%) were the main barriers. Chinese ethnicity, higher education, mammography knowledge, positive motivator scores and receiving reminders were predictors of regular mammography. Participants were only willing to pay ~USD24 for a mammogram vs the subsidised cost of ~USD40.</p>
Wee et al. <sup>20</sup> 2012	Interviews, thematic analysis	1081	<p><b>Owner-occupied flats vs rental flats:</b>  <b>Age:</b> 40–50 years (21.1% vs 26.0%), &gt;50 to &lt;60 years (32.9% vs 23.4%), 60 to &lt;70 years (20.2% vs 15.6%), ≥70 years (25.6% vs 35.0%)  <b>Male:</b> 40.1% vs 44.4%  <b>Ethnicity:</b> Chinese (68.8% vs 52.3%)  <b>Currently employed:</b> 42.3% vs 37.3%  <b>Family history of BC:</b> 4.2% vs 3.5%</p>	<p><b>Perceived cost/barriers:</b> Fear of screening outcomes/diagnosis, personal challenges (no time and inconvenience), cost (screening costs)  <b>Perceived susceptibility:</b> “I’m at no risk”, “I’m healthy”  <b>Perceived severity and cues to perform available courses of action:</b> Awareness of the seriousness of BC and importance of screening</p>	<p>Despite the subsidised screening programme, there is inequality in BC screening. Low BC screening rate was associated with the socioeconomic status of participants and poverty areas. Access enhancing outreach (e.g. free and convenient screening at doorstep) has advantages over the existing national screening programme. People with high education and income were more likely to participate in screening. Misperceptions and costs were barriers to screening.</p>

Seetoh et al. <sup>8</sup> 2014	Quasi-randomised pragmatic trial	778	<p><b>Age:</b> 40–49 years (27.9%), 50–59 years (40.2%), 60–69 years (31.9%)  <b>Ethnicity:</b> Chinese 67.2%, Malay 23.4%, Indian/Others 9.4%  <b>Education:</b> no formal (8.5%), primary (33.7%), secondary (40.4%), tertiary (17.4%)  <b>Employment:</b> employed (40.5%), not employed (48.3%), retired (11.2%)  <b>Screening history:</b> never been screened (34.2%), ever been screened (65.8%)  <b>Knowledge score:</b> low (41.6%), high (58.4%)  <b>Attitude score:</b> low (56.2%), high (43.8%)  <b>Belief score:</b> low (33.8%), high (66.2%)  <b>Barriers score:</b> low (50.4%), high (49.6%)</p>	<p><b>Perceived barriers/cost:</b>  Fear (fear of screening procedure)  <b>Perceived susceptibility:</b>  “I’m not healthy”, “I’m healthy”.</p>	<p>Those who received a cost reduction were likely to attend screening compared to participants in other intervention arms (odds ratio 2.4, 95% confidence interval 1.2 to 4.5, <math>P=0.009</math>). Cost of screening, ethnicity, prior screening history and attitudes towards mammography screening were predictors of mammogram attendance.</p>
Lim et al. <sup>18</sup> 2015	Survey, logistic regression analysis	1011	<p><b>Age:</b> Mean 49 years (21–83 years)  <b>Ethnicity:</b> Chinese (70.0%), Malay (21.3%), Indian (5.9%), Others (2.8%)  <b>Education:</b> diploma/degree holder or higher (40.2%), secondary education (42.0%), primary education or less (17.8%)  <b>Employment:</b> professional/executive (30.6%), clerical/technical (30.5%), homemaker (22.9%), others (16.0%)  <b>Knows someone with BC:</b> 50.2%  <b>Attend polyclinic with mammogram facilities:</b> 48.5%</p>	<p><b>Perceived cost/barriers:</b>  Fear of screening procedure, personal challenges (no time), costs (screening costs), modesty/embarrassment  <b>Perceived susceptibility</b>  “I’m healthy”, “I’m at no risk”  <b>Perceived severity and cues to perform available courses of action:</b> doctor-patient relationship  <b>Perceived self-efficacy:</b> self-worth and influence of family</p>	<p>Women with lower household income, those who did not know anyone with BC or did not perform SBE had lower knowledge scores and did not attend health screening. Women <math>\geq 40</math> years had higher overall knowledge scores. Many perceived mammography to be embarrassing. Many did not know that screening is for the asymptomatic (51.2%), or the age to start screening (46.3%). Most respondents preferred to have their mammograms at the polyclinics (62.2%).</p>
Wee et al. <sup>21</sup> 2016	Interviews, mixed methods, multivariate logistic regression	1996	<p><b>Owner occupied blocks vs rental-flat blocks:</b>  <b>Age:</b> &lt;60 years (47.3% vs 49.5%)  <b>Ethnicity:</b> 76.2% vs 53.0%  <b>Female:</b> 59.5% vs 55.9%  <b>Employment:</b> employed 41.3% vs 37.6%</p>	<p><b>Perceived cost/barriers:</b>  modesty/embarrassment  <b>Perceived susceptibility:</b> “I’m healthy”  <b>Perceived severity and cues to perform available courses of action:</b> doctor-patient relationship.</p>	<p>For BC screening, in the low-socioeconomic status community, proximity to primary care was associated with less participation in regular screening, while in the higher-socioeconomic status community, regular primary care was associated with lower screening participation, possibly due to</p>

			<b>Education:</b> primary and below (37.7% vs 74.8%), secondary (34.6% vs 22.9%), tertiary (27.6% vs 2.4%)		embarrassment regarding BC screening modalities.
Wee et al. <sup>27</sup> 2016	Interviews, thematic analysis	29	<b>Demographics of patients:</b> <b>Age:</b> 40–59 (55.0%), ≥60 (45.0%) <b>Female:</b> 45.0% <b>Ethnicity:</b> Chinese 85.0% <b>Education:</b> primary education and below (75.0%), finished secondary education (25.0%) <b>Employment:</b> currently unemployed (60.0%), currently employed (40.0%) <b>Screening participation:</b> did not participate in any screening 50.0%, participated in ≥1 screening modality 50.0% <b>Demographics of the provider:</b> doctors 88.9%, nurses 11.1%, female 55.6%	<b>Perceived cost/barriers:</b> fear (fear of screening procedure, fear of screening outcomes/diagnosis), personal challenges (no time, inconvenience), cost (screening cost, treatment costs), distrust <b>Perceived susceptibility:</b> “I’m healthy”, “I’m not at risk” <b>Perceived severity and cues to perform available courses of action:</b> doctor-patient relationship, fatalistic/cultural belief <b>Perceived self-efficacy:</b> self-worth and influence of family	For patients, barriers towards mammography were knowledge (41.4%) and sources of information (15.9%), while providers rated knowledge (28.8%) and procedural issues (19.2%) as the main barriers for BC mammography screening.
Malhotra et al. <sup>22</sup> 2016	Focus group and survey, thematic analysis	865	<b>Focus group vs survey demographics:</b> <b>Breast cancer screening group vs survey:</b> 50% vs 49.9% <b>Age:</b> 40–49 years (21.9% vs 37.7%), 50–59 years (59.4% vs 42.5%), 60–65 years (18.7% vs 19.8%) <b>Ethnicity:</b> Chinese (90.6% vs 69.7%) Malay (3.1% vs 14.7%), Indian (4.7% vs 10.9%), Others (1.6% vs 4.7%) <b>Education:</b> no formal education/primary (10.9% vs 18.9%), secondary/vocational/ITE (45.3% vs 39.6%), JC/polytechnic/diploma/university and above (43.7% vs 41.6%) <b>Employment:</b> working full-time/part time (70.3% vs 60.3%), homemaker/retired/not working (29.7% vs 39.7%)	<b>Perceived cost/barriers:</b> Fear (fear of screening outcomes/diagnosis), personal challenges (inconvenience), modesty/embarrassment, distrust <b>Perceived severity and cues to perform available courses of action:</b> doctor-patient relationship, fatalistic/cultural beliefs, forgetfulness, awareness of the seriousness of BC, and the importance of screening	Focus group participants had misconceptions related to screening, believing that the procedures were painful. Cost was an issue, as well as efficacy and fatalism.

Wong et al. <sup>19</sup> 2017	Focus group discussions, thematic analysis	27	<p><b>Age:</b> 40–49 years (52%), 50–59 years (33%), 60–69 years (15%)</p> <p><b>Ethnicity:</b> Chinese (74%), Malay (15%), Indian (11%)</p> <p><b>Occupation:</b> employed (67%), homemaker (30%), retiree (4%)</p> <p><b>Mammogram attendance:</b> within past 12 months (30%), within past 24 months (19%), within past 36 months (4%), &gt;2 years ago (48%)</p>	<p><b>Perceived cost/barriers:</b> fear (fear of screening outcomes/diagnosis)</p> <p><b>Perceived susceptibility:</b> “I’m not at risk”</p> <p><b>Perceived severity and cues to perform available courses of action:</b> forgetfulness</p>	Barriers to repeat mammogram attendance were laziness to make appointments, and painful and uncomfortable screening process. Ease of making an appointment and timely reminders were facilitators to repeat mammograms.
Shaw et al. <sup>25</sup> 2018	Peer-based focus groups, thematic analysis	27	<p><b>Family history of cancer:</b> 37%</p> <p><b>Mammogram attendance:</b> age 40–69 years; never received a mammogram (14.3%), received a prior mammogram within 2 years (71.4%), in the last 10 years (7.1%), in the last 15 years (7.1%)</p>	<p><b>Perceived cost/barriers:</b> modesty/embarrassment, distrust</p> <p><b>Perceived severity and cues to perform available courses of action:</b> fatalistic/cultural beliefs, forgetfulness</p> <p><b>Perceived self-efficacy:</b> self-worth and influence of family</p>	Spiritual and religious beliefs act as barriers to uptake of screening and genetic testing. Preference for traditional medicine competes with clinical recommendations. Family and community influence health-related decisions, complexed by differences in intergenerational beliefs, creating contrasting attitudes toward BC screening and prevention.
Bilger et al. <sup>23</sup> 2020	Discrete choice experiment	400	<p><b>Underwent mammography according to the guideline vs did not:</b></p> <p><b>Age:</b> 40–65 years (mean age 52.9 years for screened as per guidelines vs 51.7 years for not screened as per guidelines)</p> <p><b>Ethnicity:</b> Chinese (73.9% vs 74.0%), Malay (11.3% vs 12.4%), Indian (10.6% vs 9.7%), Other (4.2% vs 3.9%)</p> <p><b>Education</b> No formal education/primary (21.1% vs 27.1%), secondary/vocational/ITE (38.7% vs 46.1%), JC/polytechnic/diploma/university and above (40.1% vs 26.7%)</p> <p><b>Employment:</b> working full-time (40.9% vs 34.1%), working part-time (18.3% vs 17.8%), homemaker/retired or not working (40.9% vs 48.1%)</p>	<p><b>Perceived cost/barriers:</b> fear of screening outcomes/diagnosis, treatment costs</p>	The gain-framed message did not influence uptake, and given the levels shown, respondents were influenced more by treatment attributes, including effectiveness and out-of-pocket cost should they test positive, than by BC screening attributes, including the offer of a monetary incentive for screening. Respondents also underestimated the survival chances of screen-detected BC.

			<b>Ever been diagnosed with cancer:</b> 9.2% vs 3.1%		
			<b>Go for a regular check-up at least once in every 2 years:</b> 88.0% vs 55.8%.		

BC: breast cancer; ITE: Institute of Technical Education; JC: junior college; SBE: self breast examination