

# The uptake of Mammogram screening in Malaysia and its associated factors: A systematic review

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## ABSTRACT

**Introduction:** This review aimed to summarise the trend of mammogram screening uptake published in local studies between years 2006 and 2015 among the Malaysian women aged 40 years and above, and identify the associated factors and barriers, as well as discuss limitations of the studies and research gaps.

**Methods:** A systematic review was conducted on breast cancer screening studies among Malaysian women, published between January 2006 and December 2015. Online databases were searched using keywords: "mammogram", "mammography", "uptake", "breast cancer screening" and "Malaysia".

**Results:** Thirteen original articles were reviewed. The rate of mammography uptake ranged between 3.6% and 30.9% among the general population, and 80.3% among personnel of a tertiary hospital. Factors associated with mammogram screening were clinical breast examination, age, income, knowledge on breast cancer and mammogram, perceived susceptibility to breast cancer, ethnicity and education level. Barriers to mammogram screening were lack of knowledge, embarrassment, fear of cancer diagnosis, perception that breast screening was unnecessary, lack of coping skills and pain during procedure. However, almost all of the studies could not be generalised beyond the study sample because of the limited number of sites and respondents; and most data were self-reported with no objective measures of the responses.

**Conclusion:** Mammogram screening uptake among women in selected communities were generally low. Further studies involving the general population are essential. Future studies should also explore the availability, affordability and accessibility of this service especially in the pursuit of achieving universal health coverage in breast cancer management.

## KEY WORDS:

*mammogram screening, uptake, research gaps, Malaysia*

## INTRODUCTION

In Malaysia, according to the National Cancer Registry Report 2007-2011, the incidence of breast cancer among females in Malaysia increased from 3,579 in the year 2007 to 3,766 in 2011. The age-standardised rate of breast cancer

incidence was 31.1 per 100,000 population (95%CI: 30.7 to 31.6) in Malaysia between the years 2007-2011. The report also stated that 61% of women were diagnosed at stages II and III breast cancer cases.<sup>1</sup> The lower the stage at diagnosis, the higher the better the prognosis and breast cancer survival drops dramatically for late stage diagnoses.<sup>2,3</sup> In a local study, survival was also found to have a significant association with delayed time to primary treatment (TPT), as the health behaviour of women who present at stage III or IV may cause delay in making treatment decisions.<sup>4</sup>

Several screening methods are available to make early detection or at least awareness in changes of the breast possible - breast self-examination (BSE), clinical breast examination (CBE) and mammogram screening. A systematic review of 18 multinational randomised controlled trials by the United States Preventive Services Task Force (USPSTF) showed that mammogram screening reduces breast cancer mortality of approximately 15% for women aged 39-69 years, while no benefit has been shown for CBE or BSE.<sup>5</sup> A prospective cohort study in Norway found that invitation to modern mammography screening among women aged 50-69 years may reduce deaths from breast cancer by about 28%.<sup>6</sup> A large study in Sweden found that mammographic screening may lead to reduced mortality from breast cancer, at least in women aged 55 or over.<sup>7</sup>

The Malaysian Clinical Practice Guideline (CPG) on the Management of Breast Cancer recommends the following: mammography screening may be performed biennially in women from 50-74 years of age, breast cancer screening using mammography in low and intermediate risk women aged 40-49 years old should not be offered routinely, women aged 40-49 years should not be denied mammography screening if they desire to do so and BSE is recommended for raising awareness among women at risk rather than as a screening method. Screening women at high risk for breast cancer should be done from the age of 30 years with both MRI and mammography as it is more effective than mammography alone and MRI screening should not be performed in patients with lobular carcinoma in situ and atypical hyperplasia.<sup>8</sup>

Currently mammogram screening in Malaysia is done opportunistically as opposed to population-based. There are many avenues where a woman may be able to get mammogram screening. For example, if a woman who is in the high risk category for breast cancer comes to a

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government health clinic, she will be assessed and be invited to undergo mammogram screening. There are also other subsidised screening programs such as by the Ministry of Women, Family and Community Development and the Social Security Organization in which a woman may participate if she fulfils the eligibility criteria set by these entities.<sup>9,10</sup> Alternatively, a woman may undergo mammogram screening in private facilities but at these facilities, she has to bear the full cost of the investigation. The opportunistic mammogram screening and the emphasis on BSE in promoting breast awareness currently practised in Malaysia in line with current recommendations of the World Health Organization and many other entities related to breast cancer management, because Malaysia is still categorised as a developing country.<sup>11,12</sup>

Over the years, many studies have been carried out in Malaysia on knowledge, attitude, practice, promoting factors and barriers to breast cancer screening including mammogram. Therefore the main objective of this review is to summarise the rate of mammogram screening uptake and trend over the last 10 years among the target population based on the available studies. This review also aims to discuss the promoting factors and barriers associated with mammogram screening, and identify gaps in research on mammogram screening, in preparation for universal health coverage in breast cancer management in Malaysia.

## MATERIALS AND METHODS

### Data sources and search strategy

Online databases - PubMed, Medline, and Google Scholar were searched using the Boolean operators for combinations of the following key words "mammogram", "mammography", "uptake", "breast cancer screening" and "Malaysia".

### Study selection based on inclusion and exclusion criteria

Original studies of any relevant design were included if their specific outcome was on breast cancer screening which included mammogram, study subjects were Malaysian women, and the studies were published in academic journals in the English language between January 2006 and December 2015. The search duration was as early as 2006 because the third National Health and Morbidity Survey (NHMS) was conducted in 2006.<sup>13</sup> Studies excluded were review articles, studies on breast cancer screening methods other than mammography, studies on the technical aspect of mammography and studies without available full-text article.

### Data extraction

Titles and abstracts of studies captured through the search terms were screened for eligibility. For each study which fulfilled the inclusion criteria, its full-text version was obtained. Flowchart of the searched studies is shown in Figure 1.

From the full-text version, the study objectives, methodology, population and location were obtained. The main results of each study were also recorded - the rate of uptake of mammogram screening and factors associated with it. Barriers to mammogram uptake and limitations of the study were also recorded if available. The rate of uptake was

reported as percentage of performing mammogram among the study sample. The associated factors were categorised according to the themes in the studies.

The details of the study as described above were abstracted by one investigator and a second investigator confirmed their accuracy. Investigators independently dual-rated study quality and applicability using established criteria of the PRISMA protocol.<sup>17</sup> Discrepancies were resolved through a consensus process.

## RESULTS

The online search yielded one hundred and seven articles. After removing duplicates and articles which did not fulfil the inclusion criteria, thirteen original articles between 2006 and 2015 were reviewed, as detailed in Table I. From these thirteen articles, eleven were carried out in selected states: Selangor (5), followed by Kuala Lumpur (3), Perak (1), Perak and Pahang (1) and Terengganu (1), while two were carried out nationwide.<sup>13,15</sup> No studies on mammogram screening uptake were done in the northern and southern regions of the Peninsula, nor the East Malaysia. All studies were cross sectional surveys. Data collection of these surveys were done either through interviews with semi-structured questionnaire or self-administered questionnaire.

### Mammogram uptake

Rate of mammography uptake in these studies ranged between 6.8% and 80.3% among the general population, and the highest was in 2011 among hospital personnel (Table II).

These available literatures were further analysed in terms of location of the studies. The rates differed between locations – generally uptake in urban and suburban areas seemed to be higher than that of the rural areas. For the studies carried out in the urban and suburban areas, mammogram uptake ranged between 10.5% and 80.3%, while for rural areas, mammogram uptake ranged between 6.8% and 8.3%; as detailed in Table III.

### Factors which are associated with mammogram uptake

Most studies cited similar factors that were associated with breast cancer screening uptake. These factors were: having undergone clinical breast examination (CBE), knowledge on breast cancer, education level, employment status and social support (Table IV).

### Clinical Breast Examination (CBE)

Clinical breast examination (CBE) was noted to be a factor associated with mammogram uptake, and was cited in five of the studies. One study, found that women who had reported having a regular CBE were seven times more likely to do mammography (OR=7.174, 95%CI: 1.413 to 36.426)<sup>16</sup>, while another study found that women who underwent CBE were five times more likely to undergo mammogram screening (OR=5.744, 95%CI: 2.112 to 15.623)<sup>17</sup>, and yet another study also found that older age and previous CBE were significant positive predictors of mammography screening uptake - a respondent who had a previous CBE had the adjusted odds of undergoing mammography screening which was 17.5 times more than respondents who never had a CBE.<sup>18</sup> Similarly in

the rural setting, it was found that having performed CBE was the top predicting factor of mammography uptake (OR=9.65, 95%CI: 4.25 to 21.91).<sup>19</sup>

### Knowledge

Knowledge on breast cancer was also found to be an important factor associated with mammogram uptake. The study among suburban women in Terengganu<sup>23</sup> showed that only 10.5% had ever performed mammogram and it was associated with poor knowledge on breast cancer and cancer screening. That study also found poor knowledge about the processes involved in mammography, as the majority of respondents believed that hospital admission was required prior to mammography. The authors believed that this avoidance of being admitted to hospital may be a reason for the poor uptake of mammogram screening. The study among women in Shah Alam, Selangor also found that knowledge about mammogram were significantly associated with mammogram practice, in addition to age and regular medical check-up.<sup>21</sup> Among female hospital personnel aged 40 years and above at a local tertiary hospital, the prevalence of mammography screening uptake was 80.3%.<sup>22</sup> This study also found that personnel who had physician recommendation at the wellness clinic had significantly higher odds, after adjustments for ethnicity, education, medical illness, seriousness of breast cancer, barriers to mammography, only physician recommendation was found to be significant in mammography screening uptake. The adjusted odds ratio of mammography uptake among personnel with physician recommendation was 21.25 (95%CI: 12.71 to 36.56) compared to personnel who did not have such recommendations.

### Sociodemographic factors

The cross-sectional study among Malaysian women attending a primary care clinic<sup>21</sup> showed that the sociodemographic factors that were significantly associated with uptake of mammography screening were age 50-59 years (OR=2.51, 95%CI: 1.24 to 5.07), age  $\geq$ 60 years (OR=3.87, 95%CI: 1.63 to 9.18) and first degree family history of breast cancer (OR=3.16, 95%CI: 1.02 to 9.85). In terms of predictor factors, again age was a factor: the adjusted odds of mammography screening were four times more in those aged between 50 and 59 years and seven times more in those aged 60 years and above. There was no significant association found between level of knowledge and health beliefs with uptake of mammography screening.

A study conducted in a hospital setting among female university staff members aged 40 years and above also found age as a predicting factor for mammogram uptake.<sup>23</sup> That study found that 25% of the staff members had undergone mammogram, and those who did undergo mammogram were slightly older than those who did not. The mean age of staff who went for mammogram was 48.5 years compared to those who did not do mammogram which was 44 years ( $p=0.00$ ).

In the rural areas, age also seemed an important predictor in mammogram screening. In the study which was conducted in five selected rural districts of Pahang and Perak,<sup>24</sup> the number older women who had mammogram was higher compared to younger women, but this finding was only significant among the women in Perak and not in Pahang. There was an inverse

relationship between mammogram screening and education level, whereby in both states, a higher percentage of mammogram screening was reported by women with primary education and below compared to those with secondary education and above ( $p<0.005$ ).

Relationship with a breast cancer patient was also a factor associated with mammogram uptake. A study among relatives of breast cancer patients and a study among elderly women, both showed that there is significant relationship between mammogram and relationship status with breast cancer patient.<sup>25,26</sup>

For ethnicity, the NHMS III16 found that Indians showed higher prevalence of mammography than other ethnic groups, Malays were highest for BSE while Chinese were highest for CBE (NHMS III, 2006). In the study among the rural population of Pahang and Perak the uptake of mammogram screening was highest among Chinese, followed by Indian and Malay women (15%, 10% and 7%, respectively;  $p<0.005$ ).<sup>24</sup> The study among the elderly in Selangor found that a higher percentage of women who reported to be sometimes happy with their life went for mammogram screening compared to those who reported having a happy life.<sup>29</sup> Among female hospital personnel aged 40 years and above at a local tertiary hospital, Abdullah et al found that personnel within the highest health motivation had higher odds of mammography uptake, (OR=1.75, 95%CI: 1.03 to 3.01) versus personnel in the lowest.<sup>22</sup>

### Barriers to mammogram

Barriers to mammogram screening include lack of knowledge of mammogram or where to go for mammogram, embarrassment and fear. The most common reason for reluctance of breast cancer screening practices in general was lack of knowledge followed by embarrassment, fear of cancer diagnosis, and women's perception that breast screening tests not being needed if they are in good health status.<sup>16</sup> In the study among female staff of a hospital, it was found that embarrassment due to the presence of male technicians/radiographers, low confidence with radiologist/radiographers in detecting abnormality, low coping skills in dealing with abnormal results, anticipated pain during procedure and the procedural's side-effects were reported barriers to mammogram.<sup>22</sup>

One study found that barriers to mammogram screening were lack of time, lack of knowledge, not knowing where to go for the test and a fear of the test's result (42.5%, 32%, 21%, 20%; respectively).<sup>21</sup> Similarly, the study among relatives of breast cancer patient showed that the majority of the respondents (56.3%) who never had mammogram done identified fear of positive result, lack of knowledge on how the test is done (53.1%) as the major obstacles, while cost was the least identified barrier (25%).<sup>25</sup>

In the study among the rural population, it was found that in terms of ethnicity, the awareness of breast cancer and breast cancer screening practices were poorer among Chinese and Indian women compared to Malay women. According to the author, this could be due to language barriers because most health promotion materials and methods are conducted in the Malay language.<sup>24</sup>

Table IV: Comparison of concepts and items in the original DMOQ English and Malay versions

Authors, year, title, Journal	Aims/objectives	Study design and methodology	Study site(s)	Sampling technique	Sample size	Age group
1. National Health and Morbidity Survey 2006 <sup>13</sup>	To determine the prevalence of breast examination among women aged 18 years and above by socio-demographic characteristics	<ul style="list-style-type: none"> <li>- Quantitative survey</li> <li>- Cross sectional</li> <li>- Structured questionnaire guided interview</li> </ul>	Nationwide	Two-stage stratified sampling	18,902	18 years and above, 50-69 years (for mammogram)
2. The usage and knowledge of mammogram among women in Sub-Urban area in Terengganu Malaysia <sup>20</sup> .	To study the knowledge and awareness towards mammogram amongst women aged 15 years old and above	<ul style="list-style-type: none"> <li>- Quantitative</li> <li>- Cross sectional survey</li> <li>- Structured questionnaire, guided interview</li> </ul>	Suburban area in Terengganu	Systemic random sampling	86	15 years and above
3. Predictors of adherence to clinical breast examination and mammography screening among Malaysian women <sup>16</sup> .	To determine the rates and factors related to clinical breast examination (CBE) and mammography among 425 female teachers in Selangor, Malaysia	<ul style="list-style-type: none"> <li>- Quantitative</li> <li>- Cross sectional survey</li> <li>- Self-administered questionnaire</li> </ul>	Selangor	Multistage random sampling	425	Age range= 23 to 56 years The mean age of participants was 37.2±7.16 years. 138 women aged 40 years or older.
4. Does performance of breast self-exams increase the probability of using mammography: evidence from Malaysia <sup>15</sup> .	Breast self-examination (BSE) was evaluated to see if it is a significant predictor of mammography.	<ul style="list-style-type: none"> <li>- Quantitative</li> <li>- Population-based data</li> </ul>	National	Two-stage stratified random sampling	916	25-64 years old
5. Mammography screening uptake among hospital personnel in Kuala Lumpur tertiary hospital <sup>12</sup> .	To determine the factors and barriers related to mammography screening uptake among hospital personnel.	<ul style="list-style-type: none"> <li>- Mixed method explanatory study</li> <li>- Mailed self-administered questionnaire</li> </ul>	Tertiary hospital in Kuala Lumpur	Universal sampling	707	40 years and above

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**Table IV: Comparison of concepts and items in the original DMOQ English and Malay versions**

Authors, year, title, journal	Aims/objectives	Study design and methodology	Study site(s)	Sampling technique	Sample size	Age group
6. Is breast self-examination (BSE) still relevant? A study on BSE performance among female staff of University of Malaya <sup>23</sup> .	To determine the rate of breast self-examination (BSE) among the female staff of University of Malaya and to determine the role of BSE in detecting breast abnormalities.	<ul style="list-style-type: none"> <li>Quantitative</li> <li>Cross sectional survey</li> <li>Mailed self-administered questionnaire</li> </ul>	Tertiary hospital in Kuala Lumpur	Universal sampling	1,598	35 years and above.
7. Practice and barriers of mammography among Malaysian women in the general population <sup>21</sup> .	To determine the practice and barriers of mammography and associated factors among Malaysian women in the general population.	<ul style="list-style-type: none"> <li>Quantitative</li> <li>Cross sectional survey</li> <li>Self-administered questionnaire</li> </ul>	Shah Alam locality in Selangor	Random sampling	200	40 years and above
8. Predictors of breast cancer screening uptake: a pre intervention community survey in Malaysia <sup>7</sup> .	To determine factors associated with the uptake of breast cancer screening among women in the general population.	<ul style="list-style-type: none"> <li>Quantitative</li> <li>Cross sectional survey</li> <li>Structured questionnaire, guided interview</li> </ul>	Selangor	Convenient sampling	381	20-60 years
9. Breast Cancer Awareness of Rural Women in Malaysia: Is it the Same as in the Cities <sup>24</sup>	To compare the awareness of breast cancer and the practice of breast self-examination (BSE), clinical breast examination (CBE) and mammography screening among rural females in Pahang and Perak.	<ul style="list-style-type: none"> <li>Quantitative</li> <li>Cross sectional survey</li> <li>Tool not stated</li> </ul>	Rural areas of Perak and Pahang	Random sampling	1,960 (1,241 were aged 40-60 years old)	20-60 years
10. Do elderly women in Malaysia go for mammogram screening?	To determine the prevalence of mammogram screening among elderly women in Hulu Langat, Selangor and its relationship with factors such as demographic factors, family history of breast cancer, perceived health status, perceived general psychological factor and lifestyle factors.	<ul style="list-style-type: none"> <li>Quantitative</li> <li>Cross sectional survey</li> <li>Structured questionnaire, guided interview</li> </ul>	Hulu Langat district in Selangor	Not stated	652	60 years and above

Table IV: Comparison of concepts and items in the original DMOQ English and Malay versions

Authors, year, title, journal	Aims/objectives	Study design and methodology	Study site(s)	Sampling technique	Sample size	Age group
11. Breast cancer knowledge and screening behaviour among women with a positive family history: a cross sectional study <sup>25</sup> .	To determine if age, education level, income, ethnicity, relationship with breast cancer patients and knowledge of breast cancer risk factors influence breast screening practices among women in a high risk group	<ul style="list-style-type: none"> <li>- Quantitative</li> <li>- Cross sectional survey</li> <li>- Among relatives of breast cancer patients</li> <li>- Self-administered questionnaire</li> </ul>	Public hospital in Kuala Lumpur	Purposive sampling	131	18-60 years
12. Breast screening and health issues among rural females in Malaysia: How much do they know and practice? <sup>19</sup>	This study investigated rural women's knowledge of breast cancer and screening methods by ethnicity and examined the predictors of breast screening methods.	<ul style="list-style-type: none"> <li>- Quantitative</li> <li>- Cross sectional survey</li> <li>- Structured questionnaire, guided interview</li> </ul>	Five rural districts in Perak	Random sampling	959	20-60 years old
13. Awareness and prevalence of mammography screening and its predictors— a cross sectional study in a primary care clinic in Malaysia <sup>18</sup> .	To determine the awareness and practice of mammography screening and predictors of its uptake in Malaysian women attending a primary care clinic.	<ul style="list-style-type: none"> <li>- Quantitative</li> <li>- Cross sectional survey</li> <li>- Self-administered questionnaire</li> </ul>	Primary care clinic in Selangor	Purposive sampling	447	40-74 years

Table II: Mammogram uptake trend between 2006 and 2015

No.	Year	Uptake (%)	Location
1.	2006 <sup>13</sup>	7.6 (all),	
2.	10.0 (50-69 years)	National	
3.	2010 <sup>20</sup>	10.5	Terengganu (suburban)
4.	2010 <sup>16</sup>	13.6	Selangor
	2010 <sup>15</sup>	20.0 (Indian)	
	19.0 (Chinese)		
	9.5 (Malay)		
	7.4 (Others)	National	
5.	2011 <sup>22</sup>	80.3	Kuala Lumpur (tertiary hospital)
6.	2011 <sup>23</sup>	25.0	Kuala Lumpur (tertiary hospital)
7.	2012 <sup>21</sup>	15.0	Selangor (urban)
8.	2012 <sup>17</sup>	14.6	Kuala Lumpur
9.	2013 <sup>19</sup>	6.8	Perak (rural)
10.	2013 <sup>24</sup>	8.3 (Perak), 7 (Pahang)	Perak, Pahang (rural)
11.	2013 <sup>25</sup>	11.4	Kuala Lumpur
12.	2013 <sup>26</sup>	8.3	Selangor
13.	2014 <sup>18</sup>	13.2	Selangor

Table III: Mammogram uptake based on study locations

No.	Urban/ suburban	Uptake (%)	No.	Rural	Uptake (%)
1.	Selangor <sup>26</sup>	8.3	1.	Perak <sup>22</sup>	6.8
2.	Terengganu <sup>20</sup>	10.5	2.	Pahang <sup>27</sup>	7.0
3.	Kuala Lumpur <sup>25</sup>	11.4	3.	Perak <sup>27</sup>	8.3
4.	Selangor <sup>18</sup>	13.2			
5.	Selangor <sup>16</sup>	13.6			
6.	Selangor <sup>17</sup>	14.6			
7.	Shah Alam <sup>21</sup>	15.0			
8.	Kuala Lumpur <sup>23</sup>	23.0			
9.	Kuala Lumpur <sup>22</sup>	80.3			

Table IV: Factors associated with mammogram uptake

No.	Study location	Rate of mammogram uptake	Factors associated with undergoing mammography
1.	National <sup>13</sup>	7.6% (10% among 50-69 year olds)	1. Ethnicity 2. Knowledge 3. Higher socioeconomic status
2.	Suburban Terengganu <sup>20</sup>	10.5%	1. Knowledge on cancer and screening
3.	Selangor <sup>16</sup>	13.6%	1. Higher perceived susceptibility to breast cancer 2. Regularly undergoing CBE
4.	National <sup>15</sup>	20.0% (Indian) 19.0% (Chinese) 9.5% (Malay) 7.4% (Others)	1. Having had CBE
5.	Kuala Lumpur <sup>22</sup>	80.3%	1. Being nurses 2. Having physician recommendation 3. Have high motivation in health
6.	Kuala Lumpur <sup>23</sup>	25%	1. Older age group 2. Being academician
7.	Shah Alam <sup>21</sup>	15%	1. Age 2. Family history of cancer 3. Regular medical check-up and supplement intake 4. Knowledge about mammogram
8.	Kuala Lumpur <sup>17</sup>	14.6%	1. Having had CBE
9.	Rural Perak <sup>19</sup>	6.8%	1. Having had CBE
10.	Pahang, Perak <sup>24</sup>	15.3% (7% in Pahang), (8.3% in Perak)	1. Higher level of education
11.	Kuala Lumpur <sup>25</sup>	11.4%	1. Income 2. Ethnic background, 3. Relationship with a breast cancer patient
12.	Hulu Langat <sup>26</sup>	8.3%	1. Having family history of breast cancer 2. Perceived general psychological status as positive (respondents' perception that they felt happy)
13.	Selangor <sup>18</sup>	13.2%	1. Having had CBE 2. Age

## DISCUSSION

The trend in the rate of uptake of mammogram screening over the span of the last 10 years could not be accurately summarised because of the diversity of study population and study sites. Nonetheless, in general, the findings revealed mammogram uptake was still low, between approximately 7-30% of the target population. Internationally, screening rate for mammography is reported as percentage of women aged 50-69 years screened. In the US, the Healthy People 2010 and Healthy People 2020 targets for mammogram screening was 70% and 81.1% of the target population respectively (women aged 50-74 years).<sup>27,28</sup> According to the European Union guidelines<sup>29</sup>, the desirable target screening rate of such programmes is 75%, and the acceptable target is 70%. The Organisation for Economic Co-operation and Development (OECD) countries reported an average of 61.5% of women aged 50-69 years screened in 2011.<sup>30</sup> OECD countries comprises of 35 member countries across the world, from North and South America to Europe and Asia-Pacific which include many of the world's most advanced countries but also emerging countries like Mexico, Chile and Turkey. However, it is important to note that most developed nations have population-based screening mammography programmes, for which target screening rates are set. In Malaysia, population-based screening mammography programme is not yet available, therefore such target screening rate would be inapplicable. Therefore, this current systematic review can only report the rates of uptake as a snapshot of the performance of the currently available mammogram screening program and the response of the target population between the years 2006 and 2015.

The uptake rate for mammogram screening in our neighbouring countries can be discussed for comparison. These rates are found to vary according to the type of mammogram screening program available. In Thailand where there is no population-based screening program, the mammogram screening uptake was 5.9% in 2007 and 10.1% in 2009.<sup>31</sup> Conversely in Singapore where there is a population-based screening program (BreastScreen Singapore, BSS), BSS participation rate has remained above 10% since 2005, and national mammography rates have increased from 29.7% before BSS to 39.6% in 2010 after BSS.<sup>32</sup>

In other countries where there is an opportunistic breast cancer mammogram screening such as Brazil, the estimated national coverage of mammography screening via the Brazilian Unified Health Care System was found to be 24.8%, the mammography rate ranged from 12.0% in the northern region to 31.3% in the southern region.<sup>33</sup> Studies in the European region also showed similar results - the participation rate of mammogram screening 77.8 % in the French-speaking region of Switzerland (where there is organised mammogram screening program) lies within the range of other European countries' screening uptake of 55-90%. There was much lower mammography attendance in the German-speaking region of Switzerland (34.9%), where there is an opportunistic mammogram screening program.<sup>34</sup>

In this systematic review, mammogram uptake was significantly associated with CBE and older age. This could be explained by the fact that in Malaysia, mammogram

screening is an opportunistic program. Women who present themselves at the government health clinics and who were found to have high risk of breast cancer (including being older age), are invited to undergo mammogram screening. At these health clinics also, the women would usually undergo CBE.

Knowledge on breast cancer and breast cancer screening, particularly mammogram was also a predictive factor to mammogram screening uptake. Knowledge, has been cited as a predictive factor in mammogram screening in numerous studies, such as that in Jordan,<sup>35</sup> Saudi Arabia,<sup>36</sup> and United Arab Emirates.<sup>37</sup>

Among the barriers to mammogram screening cited in the analysed studies was the women did not know where to go for mammogram screening. Interestingly, a study among health care workers in Nigeria also had similar findings: total of 67% of the study subjects had adequate knowledge of breast cancer and its risk factors and 84% of the respondents were aware of mammography as a way of detecting early cancer of the breast but only 9% of them had undergone the procedure in the last one year. The commonest reason for not undergoing the procedure was that they were not aware of the procedure being carried out in the study centre.<sup>41</sup>

Another barrier to mammogram screening is anxiety. In previous studies it was found that associations between anxiety (or fear) and screening is best shown in an inverted U-shaped curve.<sup>38,39</sup> This means that people with moderate amount of fear and anxiety would have an increase health behaviour, compared to people with very low or very high level of fear and anxiety. In fact, a study in Canada<sup>43</sup> found that among a cohort of women at elevated familial risk for breast cancer, medium levels of worry were more influential than either low or high worry levels for the uptake of screening mammography and CBE. However further studies are required to explore this aspect in the Malaysian context.

### Limitations of the studies

Almost all of the studies could not be generalised beyond the study sample because they were undertaken in one or limited number of sites and some with low number of respondents. Most data were self-reported with no objective measures to evaluate the responses.

All of the studies used questionnaires, therefore there may be information bias and misclassification biases. Validity of self-reporting of mammogram screening through radiology records was not conducted.

### Gaps in research

The authors of several of these studies had highlighted the gaps in the research on breast cancer screening. One study suggested that future studies are needed to investigate the effect of health insurance on screening practices in various setting of female population in Malaysia and to find the role of physicians to promote breast cancer behaviours.<sup>16</sup> Another study proposed that future studies should try to explore the lived experiences of women with positive family history of breast cancer, using qualitative phenomenological approach.<sup>25</sup>



The studies available in Malaysia thus far have not explored provider or supply aspect of mammogram, such as the availability, affordability and accessibility of the service. Mammography cost from the societal perspective has not been ascertained either.

Accessibility to services is one of the many ways to achieve universal health coverage (UHC). Access is a multidimensional concept, based on five main dimensions – affordability, accommodation, acceptability, availability and accessibility. Access can be divided into spatial and non-spatial. Affordability, accommodation, acceptability is non-spatial in nature – they address health care financing arrangements and access barriers created by socio-economic and cultural factors. On the other hand, availability and accessibility are spatial in nature. Availability address the adequacy of the supply of health care providers, while accessibility, namely spatial accessibility, addresses travel barriers (travel distance, cost and duration) to health care providers. Measuring spatial accessibility is common approach to evaluating access to health care.<sup>42-44</sup>

Women without adequate accessibility to timely mammography screening are more likely to develop late-stage breast cancer.<sup>45</sup> A study showed that advanced diagnoses had longer average travel distances than early stage diagnoses. After adjusting for age, race, insurance and education, the odds of advanced diagnosis were significantly greater for women residing over 15 miles from a facility, compared to those living within 5 miles (adjusted OR=1.50, 95%CI: 1.25 to 1.80).<sup>46</sup>

In an analysis of the World Health Survey, multivariate analysis of mammography screening among women ages 40 to 69 years found that travelling to a healthcare facility by public transportation was associated with reduced likelihood of mammography screening (OR=0.14, 95%CI: 0.04 to 0.50); women residing in rural areas was also associated with reduced likelihood of mammography screening (OR=0.14, 95%CI: 0.04 to 0.50) and women residing in rural areas, a travel time of 30 minutes to 1 hour compared with over one hour of travel was associated with a significant increase in the likelihood of mammography screening (OR=3.25, 95%CI: 1.09 to 9.75).<sup>47</sup> As evidenced by the above studies, spatial accessibility in terms of mode of transportation, location of homes (being in the rural area) and travelling time affect the mammogram screening uptake. Therefore, research on accessibility, both spatial (such as driving distance) and non-spatial (such as ease and mode of transportation or time taken for travelling), should be carried out in the Malaysian context to determine the current accessibility level to mammogram screening facilities, followed by remedial actions to improve accessibility, before commencing population based mammogram screening program. This is because the World Health Organization (WHO) has determined that, before a mass screening program can be implemented, at least 70% of the target population should have access to the examination.<sup>48</sup>

## CONCLUSION

Mammogram screening uptake among women in selected communities ranged from 7 to 30% between the years 2006 and 2015. As CBE and knowledge are important predictor factors to mammogram screening uptake, these factors should be further emphasised and encouraged. Better knowledge disseminating efforts need to be made and tailored to the target population. Further studies involving larger proportion of the general population are essential in order to generalise the study results and compare the trend of mammogram screening uptake. Future studies should also explore provider aspect of mammogram, such as the availability, affordability and accessibility of this service as all of these factors are extremely important especially in the pursuit of achieving universal health coverage in breast cancer management.

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