

## RESEARCH ARTICLE

# Practice and Barriers of Mammography among Malaysian Women in the General Population

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## Abstract

**Objective:** The objective of this study was to determine the practice and barriers of mammography and associated factors among Malaysian women in the general population. **Methodology:** A cross-sectional study was conducted among 200 women in Shah Alam, Selangor; Malaysia. The questionnaire contained 27 questions and was comprised of two sections; socio-demographic characteristics and practices, knowledge and barriers of mammography. All the data were analyzed using the Statistical Package for the Social Sciences (SPSS) 13.0. **Results:** Of the 200 Malaysian women who participated in this study, the majority were under the age of 50 years (65.5%), Malay (86%), and married (94.5%). Regarding any family history of cancer in general, the majority of the participants had none (78%). However, some did report a close relative with breast cancer (16.5%). While the majority of them knew about mammography (68%), 15% had had a mammogram once in their life and only 2% had the procedure every two or three years. Univariate analysis showed that age, family history of cancer, family history of breast cancer, regular supplement intake, regular medical check-up and knowledge about mammogram were significantly associated with mammogram practice among the general population ( $p=0.007$ ,  $p=0.043$ ,  $P=0.015$ ,  $p=0.01$ ,  $p=0.001$ ,  $p<0.001$ ; respectively). Multivariate analysis using multiple linear regression test showed that age, regular medical check-up and knowledge about mammography testing were statistically associated with the practice of mammography among the general population in Malaysia ( $p=0.035$ ,  $p=0.015$  and  $p<0.001$ ; respectively). Lack of time, lack of knowledge, not knowing where to go for the test and a fear of the test result were the most important barriers (42.5%, 32%, 21%, 20%; respectively). **Conclusion:** The practice of mammogram screening is low among Malaysian women.

**Keywords:** Mammogram - Malaysian women - practice - barriers

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## Introduction

Breast cancer is the most common cancer in women and the second leading cause of death among women (Chong et al., 2002; Harris et al., 2003; Okobia et al., 2006; Taleghani et al., 2006). Although the incidence of breast cancer in developing countries is relatively low (Ko et al. 2003), about 50% of all cases of breast cancer are diagnosed in developed countries (Sadler et al., 2001; Haji-Mahmoodi et al., 2002). Based on a study during 1975-1990, Asia and Africa have experienced a more rapid rise in the annual incidence rate of breast cancer than that of North America and Europe (Ahmed et al., 2006; Shirazi et al., 2006).

In the United States, breast cancer is the most commonly diagnosed cancer among women and the second leading cause of death in women (U.S. Cancer Statistics Working Group). Screening reduces breast cancer mortality (U.S. Preventive Services Task Force). Several studies reported that breast cancer mortality is reduced by mammography screening (Nystrom et al.,

2002; Moss et al., 2006), and numerous expert groups recommend periodic mammograms, either annually (American Cancer Society, 2012) or every 1-2 years (National Cancer Institute, 2012; Zogby, 2012) for women aged 40 and older.

Mammography has been established as the primary and standard imaging screening method for breast cancer detection since its superiority was recognised when compared to clinical breast examination (CBE) and breast self-examination (BSE) (Majid et al., 2003). One study reported that the sensitivity and specificity of mammography in detecting invasive breast cancer was 33.3% and 95.0% respectively. This compared much better to CBE with 17.9% sensitivity and 79.5% specificity (Kriege et al., 2004). The contribution of mammography was impressively high in the detection of smaller cancers particularly in younger women (Baker, 1982). The likelihood of having breast cancer in negative mammography patients is low, approximately 2.6%-2.7% (Moy et al., 2002). A more recent report mentioned that the use of mammography results in a 25% to 30% decreased

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mortality rate in screened women compared with controls after 5 to 7 years (Ng and Mutarak, 2003). Despite a high sensitivity and specificity of the mammography in detecting early breast cancer and its benefits, the proportion of women who utilized it still low.

In Malaysia, breast cancer is the most common cancer among women in Peninsular Malaysia. A total of 3,525 female breast cancer cases were reported in (National Cancer Registry, 2006). The overall age standardized rate was 39.3 per 100,000 population (National Cancer Registry, 2006). The age pattern showed a peak age-specific incidence rate in the 50-59 age group (National Cancer Registry, 2006). According to the Clinical Practice Guideline, mammography screening may be considered a high risk if one of the following applies to the women being tested: a previous history of breast and/or ovarian cancer, a family history of breast cancer among first degree relatives before the age of 50 or where there are more than two of their maternal and paternal relatives with breast cancer, a previous history of atypia on breast biopsy and on hormone replacement therapy. In these situations, mammography screening should be done annually in women aged 40-49 years, and annually or biennially in those 50-75 years old (Academy of Medicine, 2002).

Although population based mammographic screening is not available in Malaysia to the general population, mammography can be done in 16 private clinics and hospitals registered with the National Population and Family Development Board (2007). The cost is highly subsidized by the Ministry of Women, Family and Community Development, and it provides RM50 (USD 14.78) for every mammography session completed, which usually costs RM100-RM130 (USD 29.56 to USD 38.43) per session. The Institute of Public Health's 3<sup>rd</sup> National Health Morbidity Survey (NHMS) documented that the prevalence of mammography utilization in the general population increased from 3.7% in 1996 to 7.6% in 2006.

**Materials and Methods**

A cross-sectional study was conducted among 200 women from the general population in Shah Alam, Selangor; Malaysia. Random sampling was used to select 10 sections in Shah Alam. Random sampling techniques were also used to select several apartments from each section. Those apartments were in the following sections: 7, 8, 13, 16, 17, 18, 24, 27, U8, U10. The questionnaire comprised 27 questions over two sections; socio-demographic characteristics and practices of mammogram. The questionnaire developed was based on the literature review done in previous studies (Al-Naggar et al., 2009). Before distributing the questionnaires to the respondents, consent letters were given to them asking for their permission. Once the respondents understood the purpose of survey, the questionnaire was then handed to them. Distribution of the questionnaires was done during weekdays and on weekends from evening until night. The criteria for participation were: female, aged 40 years or older, voluntary, ability to speak Malay or English. All the data has been analyzed by using the Statistical Package for the Social Sciences (SPSS) 13.

**Results**

A total of 200 women from the general population participated in this study. The majority of them were younger than 50 years (65.5%), Malay (86%), married (94.55%), and with a monthly income of less than or equal to 5000 Ringgit Malaysia (77.5%). Regarding a family history of cancer in general; the majority of the participants did not have family history of cancer (78%). However, some of them reported a family history of breast cancer (16.5%). For lifestyle; the majority of the participants take supplements regularly, exercise, eat fruits regularly (62.5%, 75.5%, 72%; respectively). However, some of the participants (60%) had medical check-ups regularly (Table 1). Regarding their knowledge of mammogram; the majority knew about mammogram (68%).

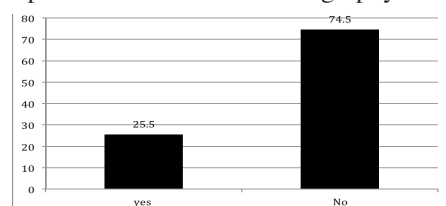
In this study the practice of mammography screening among the general population was 25.5% (Figure 1).

Regarding the frequency of mammography practice among the general population in Malaysia; the highest frequency was once per life (15%) and the lowest were every two or three years (2%) (Figure 2).

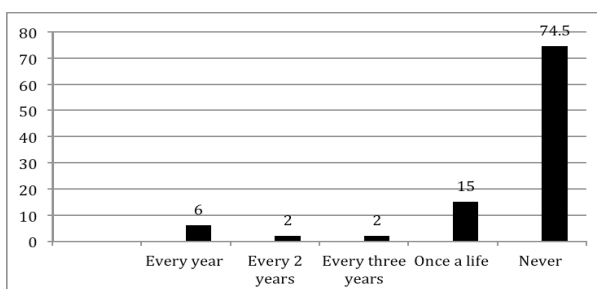
Regarding the factors significantly associated with mammogram practice (Table 1); age, family history of cancer, family history of breast cancer, regular supplement intake, regular medical check-up and knowledge about mammogram were significantly influenced by the practice of mammogram among the general population (p=0.007, p=0.043, P=0.015, p=0.01, p=0.001, p<0.001; respectively).

Regarding the barriers towards mammography screening among those who had never done it before, the most important barriers 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) (Table 2). In terms of attitudes toward mammography screening, the majority of them showed very positive attitudes towards mammography screening and that they are interested to know more about mammography (87%).

Regarding the reasons that motivate some of the participants to have the mammography test, the most



**Figure 1. Practice of Mammography Screening among the General Population (n=200).**



**Figure 2. Frequency of Mammogram Screening Practice among the General Population.**

**Table 1. Socio-Demographic Characteristics and Factors Associated with Practice of Mammogram among the General Population (n=200)**

Variable	No.	%	t	p-value
Age:			2.91	0.007
<50	131	65.5		
≥50	69	34.5		
Race:			1.33	0.23
Malay	172	86		
Non-Malay	28	14		
Marital status:			0.13	0.89
Single	11	5.5		
Ever-married	189	94.5		
Income:			0.95	0.314
≤5000	155	77.5		
>5000	45	22.5		
Family history of cancer:			2.28	0.043
Yes	44	22		
No	156	78		
Family history of breast cancer:			2.92	0.015
Yes	33	16.5		
No	167	83.5		
Regular Supplements and vitamins intake:			2.41	0.01
Yes	125	62.5		
No	75	37.5		
Exercise:			0.94	0.347
Ever	151	75.5		
Never	49	24.5		
Regular fruits intake:			0.46	0.641
Yes	144	72		
No	56	28		
Regular medical check-up:			3.246	0.001
Yes	80	40		
No	120	60		
Know about Mammogram:			6.16	<0.001
Yes	136	68		
No	64	32		

**Table 2. Barriers and Attitudes Towards Mammogram Screening among the Study Participants (n=200)**

Barriers	Categories	No.	%
Lack of time	Yes	85	42.5
	No	64	32
	Had mammogram	51	25.5
Do not know the purpose of mammogram screening	Yes	64	32
	No	58	42
	Had mammogram	51	25.5
know where to go for the test	Yes	42	21
	No	107	53.5
	Had mammogram	51	25.5
Afraid of the result of the test	Yes	40	20
	No	109	54.5
	Had mammogram	51	25.5
Expensive	Yes	35	17.5
	No	114	57
	Had mammogram	51	25.5
Unnecessary test	Yes	28	14
	No	121	60.5
	Had mammogram	51	25.5
Are you interested to know more about mammogram	Yes	174	87
	No	26	13

reported reasons were detection of breast cancer and screening is very necessary (22.5%, 20.5%) (Table 3).

Multivariate analysis (Table 4) using multiple linear regression test showed that age, regular medical check-

**Table 3. Reasons for Practicing Mammogram Screening among the General Population (n=200)**

Reason	No.	%
To detect breast cancer	Yes	45 22.5
	No	6 3.0
	Have not done it before	149 74.5
Mammogram screening is very necessary	Yes	41 20.5
	No	10 5.0
	Have not done it before	149 74.5
Doctor advice	Yes	16 8.0
	No	35 17.5
	Have not done it before	149 74.5
Because of the family history of cancer	Yes	15 7.5
	No	36 18.0
	Have not done it before	149 74.5
Because of there are breast cancer symptoms	Yes	9 4.5
	No	42 21.0
	Have not done it before	149 74.5
Due to death of family member/relative/friends from breast cancer	Yes	8 4.0
	No	43 21.5
	Have not done it before	149 74.5

ups and knowledge about the mammography test were statistically associated with the practice of mammography testing among general population in Malaysia ( $p=0.035$ ,  $p=0.015$  and  $p<0.001$ ; respectively).

## Discussion

This study showed a poor practice of mammography screening among women from the general population in Malaysia. About 74.5% never had mammography screening in their lifetime. About 8% reported having mammogram every 1-2 years. Similar findings reported by Aswad (2001) that 31.1% of female respondents stated they had never had a mammogram. A lower percentage was reported by Schwartz et al. (2008) when 70% of the study participants had never had mammography screening. A later Malaysian study showed that 10.5% of women in a sub-urban area in Trerngganu had never had a mammogram (Rosmawati, 2010). The rate of mammography usage in Malaysian women approximately several years ago was reported as 3.8% (Parsa et al., 2006). Compared with more recent studies in other countries, the proportion of women who had had at least one mammogram was reported as 37.5% in Turkey (Nur, 2010), 28 % in Hong Kong (Abdullah et al., 2001), 52 % amongst African American women and 83% of Asian Indian women (Skinner et al., 1998; Somanchi et al., 2010). Dündar et al. (2006) reported that 94.9% had never had a mammogram.

In this study, 32% of the participants had no knowledge about mammography. A previous study in Turkey found that 27.9% of women had had no knowledge of mammography (Dundar et al., 2006). Heidari et al. (2008) reported that 3.4% had good knowledge about mammography. In a similar study conducted in Hong Kong, 58% had never heard of mammography screening

(Chua et al., 2005). Dündar et al. (2006) reported that 27.9% of women indicated that they had no knowledge of mammography.

In this study 20% of the participants who had had mammogram screening said they were fearful of the test result. A previous study reported that 5.5% of non mammogram users said that they were afraid of having a mammogram (Sadikoglu et al., 2010). Similar findings on the fear surrounding the detection of cancer as a barrier have been reported previously (Garbers et al., 2003; Baron-Epel et al., 2004; Azaiza and Cohen 2006; Wu et al., 2006). Fear of detection of cancer is a barrier cited by Arabic women in Jordan (Petro-Nustas, 2001). Al-Naggar et al. (2009) showed that concerns about the side effects were the reasons for low utilization of mammography screening. Lack of trust in the system and fear are deeply rooted barriers to mammography and other screening procedures (Schulz et al., 2002; Tinley et al., 2004; Powell et al., 2005). Similarly, fear of radiation was significant among women who never had mammography (Allen et al., 2002). Likewise, expression of fear of mammography was significant (for example; fear of result and fear of x-rays) among women aged 50 to 69 years old (Beaulieu et al., 1996). Fear and anxiety as barriers were also reported in an Italian study (Donato et al., 1991). Chinese women in Hong Kong reported key barriers were concerns about the discomfort of mammography (Abdullah and Leung, 2001).

A lack of time and being too busy to schedule a mammography were previously reported (Abdullah and Leung, 2001). Lack of time was the most frequently reported reason for women's reluctance to participate in clinical breast examinations or mammography screenings (Chua et al., 2005)

A previous study reported that 25.3% of participants mentioned that having a mammogram was not necessary without any breast complaints (Sadikoglu et al., 2010). Previous literature focusing on barriers for women, especially in Asian countries, is consistent with the results of the present study. This may be due to the fact that Asian women are unwilling to show their breasts to others, including health care providers (Im et al., 2004; Juon et al., 2004; Smith et al., 2006).

The health care system itself is often found to be a barrier, due to fragmented care (Schulz et al., 2002), long service wait times (Schulz et al., 2002; Holt et al., 2003; Johansson & Bertero, 2003; Peek & Han, 2004; Tinley et al., 2004; Rauscher et al., 2005; Young & Severson, 2005), and poor interaction with the physician (Young & Severson, 2005). Other barriers that may limit the utilization of mammography as reported by previous studies were embarrassment, low income, lack of health insurance, lack of physician recommendation, lack of trust in hospitals and doctors, language barriers, lack of transportation (Alexandraki and Mooradian, 2010), being a single woman and not having breast related complaints (Nur, 2010).

In this study 53.5% of the participants did not know where to go for a mammogram test. This is an indication that information about the mammography screening center is still not well known within the general public.

In this study one of the barriers towards mammogram screening was the cost. Although population based mammographic screening is not available to the general population, mammography can be done in 16 private clinics and hospitals registered with the National Population and Family Development Board (2007). The cost is highly subsidized by the Ministry of Women, Family and Community Development where it provides a RM50 (USD 14.78) subsidy for every mammography session done which usually costs RM100-RM130 (USD 29.56 to USD 38.43) per session. Commonly recognized economic barriers to mammography are often related to accessibility to mammography facilities including proximity, transportation, and child care (Powell et al., 2005; Ferrante et al., 2006); and accessibility to mammography services including insurance (Mayberry, Mili & Ofili, 2000; Royak-Schaler, et al., 2003; Morales et al., 2004; Peek & Han, 2004). Cost was the most frequently reported reasons for a reluctance to participate in clinical breast examinations or mammography screenings (Chua et al., 2005)

In this study, age was a significant influence in the practice of mammogram among the participants. A similar finding was reported by Miller and Champion (1993).

In this study, knowledge about mammogram screening was found to be a significant influence on the practice of women. A similar study reported that the level of knowledge about breast cancer was the only factor that varied significantly (Dündar et al., 2006).

In this study, a family history of cancer in general and family history of breast cancer were significant influences women's practice of mammogram screening. A family history of breast cancer is associated with a woman's risk of developing the disease, and the risk is of the greatest magnitude when a first-degree relative is affected (Calle et al., 1993; Slattery and Kerber, 1993). Early detection through mammography screening is effective in significantly decreasing breast cancer mortality (Tabar et al., 1985, Larsson et al., 1996). Recent mammography use was higher in women with a family breast cancer history compared with women with a family history of other cancer and women without a family history of cancer (Murabito et al., 2001). Several earlier studies found no association between a family history of breast cancer and an increased use of mammography (Vogel et al., 1990; Coleman and Feuer, 1991; Kaplan et al., 1991; Constanza et al., 1992).

Our study was limited by reliance on self-reporting on the use of mammography. Self-reporting questionnaires may give inaccurate information due to recall bias or over-reporting. Validation of self-reporting against radiology records was not conducted.

In conclusion, strategies to improve future use of mammography should include assessment of family breast cancer history, education reflecting currently recognized breast cancer risk factors, and discussion of the benefits of detecting breast cancer early through mammography screening to alleviate any fears associated with knowing one's risk status. Health education should emphasize the importance of early detection. It should include information addressing concerns of the procedure, for

example, the very small radiation risk of developing breast cancer due to mammography, and pain during procedure. Pre-mammography counseling should be given to increase the level of confidence in managing the disease and to reduce fear and anxiety. For the fight against breast cancer to be successful, it is necessary to promote behavioural changes in both women and health professionals, especially those providing care to the poor, and to improve women's knowledge, attitude and practice regarding mammography screening. There is a need for an ongoing program for early detection of breast cancer. Women cannot rely on seasonal campaigns only, many of which are motivated more by political interests than people's health and wellbeing. From this viewpoint, it is essential to provide accurate information focusing on disease prevention, particularly breast cancer prevention, to both the target population and health professionals working directly with them. There is a need for resources to identify breast tumors, provide better training on clinical breast examination and practical procedures and improve referral of suspected cases.

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## References

- Abdullah A, Leung T (2001). Factors associated with the use of breast and cervical cancer screening services among Chinese women in Hong Kong. *Public Health*, **115**, 212-7.
- Academy of Medicine (2002). Clinical Practice Guideline on Management of Breast Cancer, Putrajaya, Malaysia.
- Ahmed F, Mahmud S, Hatcher J, Khan SM (2006). Breast cancer risk factor knowledge among nurses in teaching hospitals of Karachi, Pakistan: a cross-sectional study. *BMC Nursing*, 5:6.
- Alexandraki I, Mooradian AD (2010). Barriers related to mammography use for breast cancer screening among minority women. *J Natl Med Assoc*, **102**, 206-18.
- Allen B, Bastani R, Bazargan S, et al (2002). Assessing screening mammography utilization in an urban area. *J Natl Med Assoc*, **94**, 5-14.
- Al-Naggar RA, Isa ZM, Shah SA, et al (2009). Mammography screening: Female doctors' attitudes and practice in Sana'a, Yemen. *Asian Pac J Cancer Prev*, **10**, 743-6.
- American Cancer Society. Guideline for the early detection of cancer. [http://www.cancer.org/docroot/CRI/content/CRI\\_2\\_4\\_3X\\_Can\\_breast\\_cancer\\_be\\_found\\_early\\_5.asp?sitearea=CRI](http://www.cancer.org/docroot/CRI/content/CRI_2_4_3X_Can_breast_cancer_be_found_early_5.asp?sitearea=CRI).
- Aswad M. Health survey of the Arab, Muslim, and Chaldean American Communities in Michigan. [http://www.accesscommunity.org/site/DocServer/health\\_and\\_research\\_center\\_19.pdf](http://www.accesscommunity.org/site/DocServer/health_and_research_center_19.pdf).
- Azaiza F, Cohen M (2006). Health beliefs and rates of breast cancer screening among Arab women. *J Womens Health*, **15**, 520-30.
- Baker LH (1982). Breast cancer detection demonstration project: five-year summary report. *CA Cancer J Clin*, **32**, 194-225.
- Baron-Epel O, Granot M, Badarna S, Avrami S (2004). Perceptions of breast cancer among Arab Israeli women. *J Womens Health*, **40**, 101-16.
- Beaulieu M-D, Beland F, Roy D, et al (1996). Factors determining compliance with screening mammography. *Canadian Med Association J*, **154**, 1335-42.
- Calle EE, Martin LM, Thun MJ, et al (1993). Family history, age, and risk of fatal breast cancer. *Am J Epidemiol*, **138**, 675-81.
- Chong PN, Krishnan M, Hong CY, Swah TS (2002). Knowledge and practice of breast cancer screening amongst public health nurses in Singapore. *Singapore Med J*, **43**, 509-16.
- Chua MST, Mok TS, Kwan WH, Yeo W, Zee B (2005). Knowledge, perceptions, and attitudes of Hong Kong Chinese women on screening mammography and early breast cancer management. *Breast J*, **11**, 52-6.
- Coleman EA, Feuer EJ (1992). Breast cancer screening among women from 65 to 74 years of age in 1987-88 and 1991. NCI Breast Cancer Screening Consortium. *Ann Intern Med*, **117**, 961-6.
- Constanza ME, Stoddard A, Gaw VP, et al (1992). The risk factors of age and family history and their relationship to screening mammography utilization. *J Am Geriatr Soc*, **40**, 774-8.
- Donato F, Bollani A, Spiazzi R, et al (1991). Factors associated with non-participation of women in a breast cancer screening programme in a town in northern Italy. *J Epidemiol Commun Health*, **45**, 59-64.
- Dündar PE, Özmen D, Öztürk B et al (2006). The knowledge and attitudes of breast self-examination and mammography in a group of women in a rural area in western Turkey. *BMC Cancer*, **6**, 43.
- Ferrante J M, Chen P H, Jacobs A (2006). Breast and cervical cancer screening in obese minority women. *J Womens Health (Larchmt)*, **15**, 531-41.
- Garbers S, Jessop D, Foti H, Uribealrrea M, Chiasson M (2003). Barrier to breast cancer screening for low-income Mexican and Dominican women in New York City. *J Urban Health*, **80**, 81-91.
- Haji-Mahmoodi M, Montazeri A, Jarvandi S, et al (2002). Breast self-examination: knowledge, attitudes, and practices among female health care workers in Tehran, Iran. *Breast J*, **8**, 222-5.
- Harris DM, Miller JE, Davis DM (2003). Racial differences in breast cancer screening, knowledge and compliance. *J Natl Med Assoc*, **95**, 693-701.
- Heidari Z, Mahmoudzadeh-Sagheb HR and Sakhavar N (2008). Breast cancer screening knowledge among women in southeast of Iran. *Acta Medica Iranica*, **46**, 321-8.
- Holt CL, Clark EM, Kreuter MW, et al (2003). Spiritual health locus of control and breast cancer beliefs among urban African American women. *Health Psychol*, **22**, 294-9.
- Im EO, Park Y S, Lee EO (2004). Korean women's attitudes toward breast cancer screening tests. *Int J Nurs Stud*, **41**, 583-9.
- Institute Public Health (2006). The 3rd National and Morbidity Survey, Kuala Lumpur.
- Johansson I, Bertero C (2003). Getting no respect: barriers to mammography for a group of Swedish women. *Health Care Women Int*, **24**, 8-17.
- Juon HS, Kim M, Shankar S (2004). Predictors of adherence to screening mammography among Korean American women. *Prev Med*, **39**, 474-81.
- Kaplan KM, Weinberg GB, Small A, et al (1991). Breast cancer screening among relatives of women with breast cancer. *Am J Public Health*, **8**, 1174-9.
- Ko CM, Sadler GR, Ryujin L, Dong A (2003). Filipina American women's breast cancer knowledge, attitudes, and screening behaviors. *BMC Public Health*, **3**, 27.
- Kriege M, Brekelmans C, Boetes C, et al (2004). Efficacy

- ofMRI and mammography for breast-cancer screening in women with a familial or genetic predisposition. *N Engl J Med*, **351**, 427-37.
- Larsson LG, Nystrom L, Wall S, et al (1996). The Swedish randomized mammography screening trials: analysis of their effect on the breast cancer related excess mortality. *J Med Screen*, **3**, 129-32.
- Majid AS, de Paredes ES, Doherty RD, et al (2003). Missed Breast Carcinoma: Pitfalls and Pearls. *Radiographics*, **23**, 881-95.
- Mayberry R M, Mili F, Ofili E (2000). Racial and ethnic differences in access to medical care. *Med Care Res Rev*, **57**, 108-45.
- Miller AM, Champion VL (1993). Mammography in women ≥50 years of age. Predisposing and enabling characteristics. *Cancer Nurs*, **16**, 260-9.
- Ministry of Health (1996). Breast Examination.National Health Morbidity Survey, Putrajaya, Malaysia.
- Morales LS, Rogowski J, Freedman VA, et al (2004). Sociodemographic differences in use of preventive services by women enrolled in Medicare+Choice plans. *Prev Med*, **39**, 738-45.
- Moss S, Cuckle H, Evans A, et al (2006). Effect of mammographic screening from age 40 years on breast cancer mortality at 10 years' follow-up: a randomised controlled trial. *Lancet*, **368**, 2053-60.
- Moy L, Slanetz PJ, Moore R, et al (2002). Specificity ofMammography and US in the Evaluation of a Palpable Abnormality: Retrospective Review. *Radiology*, **225**, 176-81.
- Murabito JM, Evans JC, Larson MG, et al (2001). Family Breast Cancer History and Mammography. *Am J Epidemiol*, **154**, 916-23.
- National Cancer Institute. Screening mammograms: questions and answers. <http://www.cancer.gov/cancertopics/factsheet/Detection/screening-mammograms>.
- National Cancer Registry (2006). Malaysia Cancer Statistics-Data and Figure, Peninsular Malaysia, Putrajaya.
- National Population and Family Development Board (2007). Subsidy Programme for Mammogram Screening. Ministry of Women,Family & Community Development, Kuala Lumpur.
- Ng KH, Muttarak M (2003). Advances in mammography have improved early detection of breast cancer. *J Hong Kong College of Radiologists*, **6**, 126-31.
- Nur N (2010). Breast cancer knowledge and screening behaviors of the female teachers. *Women Health*, **50**, 37-52.
- Nystrom L, Andersson I, Bjurstam N, et al (2002). Long-term effects of mammography screening: updated overview of the Swedish randomised trials. *Lancet*, **359**, 909-19.
- Okobia MN, Bunker CH, Okonofua FE, Osime U (2006). Knowledge, attitude and practice of Nigerian women towards breast cancer: a cross-sectional study. *World J Surg Oncol*, **4**, 11.
- Parsa P, Kandiah M, Abdul Rahman H, et al (2006). Barriers for breast cancer screening among Asian women: a mini-literature review. *Asian Pac J Cancer Prev*, **7**, 509.
- Peek ME, Han JH (2004). Disparities in screening mammography. Current status, interventions and implications. *J Gen Intern Med*, **19**, 184-94.
- Petro-Nustas W (2001). Young Jordanian women's health beliefs about mammography. *J Community Health Nurs*, **18**, 177-94.
- Powell M E, Carter V, Bonsi E, et al (2005). Increasing mammography screening among African American women in rural areas. *J Health Care Poor Underserved*, **16**, 11-21.
- Rauscher GH, Hawley ST, Earp JA (2005). Baseline predictors of initiation vs. maintenance of regular mammography use among rural women. *Prev Med*, **40**, 822-30.
- Rosmawati NN (2010). The usage and knowledge of Mammogram among women in suburban area in Terengganu, Malaysia. *Asian Pac J Cancer Prev*, **11**, 767-71.
- Royak-Schaler R, Chen S, Zang E, et al (2003). Does access to screening through health maintenance organization membership translate into improved breast cancer outcomes for African American patients? *J Am Womens Assoc*, **58**, 154-6.
- Sadikoglu G, OzcakilA, Dogan F, Gokgoz S, Bilgel N (2010). Mammography utilization among Turkish Women. *Asian Pac J Cancer Prev*, **11**, 377-81.
- Sadler GR, Ryujiun LT, Ko CM, Nguyen E (2001). Korean women: breast cancer knowledge, attitudes and behaviors. *BMC Public Health*, **1**, 7.
- Schulz M A, Ludwick R, Cukr PL, et al (2002). Outcomes of a community-based three-year breast and cervical cancer screening program for medically underserved, low income women. *J Am Acad Nurse Pract*, **14**, 219-24.
- Schwartz K, Fakhouri M, Bartoces M, Monsur J, Younis A (2008). Mammography screening among arab american women in metropolitan detroit. j immigrant minority health: DOI 10.1007/s10903-008-9140-8
- Shirazi M, Champeau D, Talebi A (2006). Predictors of breast cancer screening among immigrant Iranian women in California. *J Womens Health (Larchmt)*, **15**, 485-506.
- Slattery ML, Kerber RA (1993). A comprehensive evaluation of family history and breast cancer risk. The Utah Population Database. *JAMA*, **270**, 1563-8.
- Smith R, Maira C, Ute S (2006). Breast cancer in limited resource countries: Early detection and access to care. *Breast J*, **12**, 16-26.
- Tabar L, Fagerberg G, Gad A, et al (1985). Reduction in mortality from breast cancer after mass screening with mammography. Randomized trial from Breast Cancer Screening Working Group of the Swedish National Board of Health and Welfare. *Lancet*, **1**, 829-32.
- Taleghani F, Yekta ZP, Nasrabadi AN (2006). Coping with breast cancer in newly diagnosed Iranian women. *J Adv Nurs*, **54**, 265-72.
- Tinley ST, Houfek J, Watson P, et al (2004). Screening adherence in BRCA1/2 families is associated with primary physicians' behavior. *Am J Med Genet A*, **125**, 5-11.
- U.S. Cancer Statistics Working Group. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute (2006). United States Cancer Statistics: 2003 Incidence and Mortality. [http://www.cdc.gov/cancer/npcr/npcrpdfs/US\\_Cancer\\_Statistics\\_2003\\_Incidence\\_and\\_Mortality.pdf](http://www.cdc.gov/cancer/npcr/npcrpdfs/US_Cancer_Statistics_2003_Incidence_and_Mortality.pdf)
- U.S. Preventive Services Task Force. Screening for Breast Cancer: Recommendations and Rationale. Agency for Healthcare Research and Quality; Rockville, MD (2002). <http://www.ahrq.gov/clinic/3rduspstf/breastcancer/brcanrr.htm>.
- Vogel VG, Graves DS, Vernon SW, et al (1990). Mammographic screening of women with increased risk of breast cancer. *Cancer*, **66**, 1613-20.
- Wu T, West B, YW C, Hergert C (2006). Health beliefs and practices related to breast cancer screening in Filipino, Chinese and Asian- Indian women. *Cancer Detec Prev*, **30**, 58-66.
- Young R F, Severson R K (2005). Breast cancer screening barriers and mammography completion in older minority women. *Breast Cancer Res Treat*, **89**, 111-8.
- Zogby J. Arab Americans. Demographics. <http://www.aaiusa.org/arab-americans/22/demographics>.