POLICY PAPER

SHEIKH SAUD BIN SAQR AL QASIMI
FOUNDATION FOR POLICY RESEARCH

EXECUTIVE SUMMARY

In the past few decades, the United Arab Emirates (UAE) has undergone substantial economic, social, and cultural changes that have resulted in a significant transition from a traditional to a more Western lifestyle. Although the incidence and death rates from breast cancer are lower in the UAE compared to Western countries, there is a noticeable upward trend in both rates among Emirati women with more aggressive forms of the disease being noted, particularly among younger women. Effective, well-designed early detection and screening strategies with high participation rates are essential if the burden of breast cancer is to be reduced. However, these preventive strategies should be tailored to Emirati women's needs and practices. Therefore, the current project was carried out in 2015-2016 among women living in Ras Al Khaimah, which explored attitudes towards breast health and breast cancer and examined mammographic density profiles in order to transform breast cancer diagnosis. This paper presents evidence-based recommendations for increasing breast cancer awareness, promoting education, and improving early detection practices.

Transforming Breast Cancer Diagnosis in Ras Al Khaimah

Salman M. Albeshan, Martin G. Mackey, Syeda Z. Hossain, & Patrick C. Brennan

Introduction

Breast cancer is the most common cancer-related disease in the United Arab Emirates (UAE) (International Agency for Research on Cancer, 2012). The number of new cases of breast cancer has increased rapidly since 2002 (Albeshan, Mackey, Hossain, Alfuraih, & Brennan, in press). Breast cancer in the UAE is characterized by three features; first an increasing number of new but late diagnoses, which is also associated with a higher number of deaths; second, cultural taboos and fatalistic beliefs that deter women from adopting effective preventive and diagnostic strategies; and third, a younger age of diagnosis, which makes detection more difficult due to an associated increased mammographic density in younger women. These three factors indicate that a tailored approach to breast cancer early detection and screening for the UAE women is required.

Breast cancer screening programs are being initiated in many emirates in the UAE, including Ras Al Khaimah (RAK); however, for these programs to be successful, two key elements are required: evidence the tools used for breast screening such as mammography that have been developed and tested in Western countries are appropriate for breast screening for RAK women, and information on women's willingness to engage in breast screening programs, which is critically important to early detection and prevention of premature death. This gap in knowledge means there is a pressing need for further research in the UAE into breast cancer and breast cancer screening practices.

This policy paper therefore lays the foundation for future research on breast cancer awareness and screening strategies in RAK. The paper presents the results from two studies, one which respectively explored the perceptions of 102 RAK women towards breast cancer and breast cancer screening practices, and the second which determined mammographic density profiles of 366 women. This paper presents evidence-based recommendations with the aim of increasing breast cancer awareness, promoting education and early detection practices. The paper also makes recommendations about the optimal breast imaging method(s) for RAK women based on mammographic density level.

Background

Breast cancer is the most common fatal disease in the UAE. Although the frequency of breast cancer is lower in the UAE compared with Western countries, its occurrence is increasing rapidly. The number of new breast cancer diagnoses has increased over a 10-year period from 19.4 per 100,000 women in 2002 (Sreedharan, Muttappallymyalil, Venkatramana, & Thomas, 2010), to 39.2 per 100,000 women in 2012 (International Agency for Research on Cancer, 2012). This trend coincides with increases in several breast cancer risk factors evident amongst the same population including obesity, smoking, lack of physical activity, and fewer children (Albeshan et al., in press).

Women in the UAE are diagnosed with breast cancer a decade earlier (median age 49 years) than their counterparts in Western countries (60 years)(Chouchane, Boussen, & Sastry, 2013; Najjar & Easson, 2010). Moreover, the vast majority (65%) of women with breast cancer are not diagnosed until their condition is at an advanced stage (Elobaid, Aw, Grivna, & Nagelkerke, 2014), when the prospects for a positive outcome are much poorer and

there is an increased likelihood of death (Al-Othman et al., 2015; Chouchane et al., 2013). Recent data from the World Health Organization (WHO) showed that 24.2% of all female deaths in the UAE are caused by breast cancer, compared with 15.7% of deaths among Australian women (International Agency for Research on Cancer, 2012).

Although breast cancer is one of the most commonly diagnosed cancers in the world, if it is detected early, it is generally associated with greater likelihood of survival than other tumours (DeSantis et al., 2015; Youlden et al., 2012). The favorable survival rates in the United States and other Western countries have been credited firstly to early detection and screening, followed by effective and timely treatment (DeSantis et al., 2015; Youlden et al., 2012). Low rates of breast screening are therefore a cause for concern.

A previous study conducted in Al-Ain city (UAE) found that only 48.6% of the study participants had practiced breast self-examination (BSE), 49.4% had undergone clinical breast examination (CBE), and 44.9% had a mammography screening (Elobaid et al., 2014). This indicates that there is only limited awareness of the importance of such screening practices among UAE women. These low participation rates were found to be largely influenced by cultural, religious, psychological, and personal factors (Donnelly et al., 2013; Donnelly & Hwang, 2015a). It is unclear if these rates and barriers to breast screening are also relevant for RAK women. This knowledge gap needs to be addressed before effective and acceptable breast cancer information and education strategies can be developed.

Another important issue in this context is the need to identify what breast imaging method(s) is most suitable for a given population. Although mammography is a well-established breast imaging technique, it becomes less effective at detecting breast cancer in the presence of increased mammographic density (Boyd et al., 2007). This reduction in accuracy occurs because of the similar attenuation properties of x-rays by cancerous and other dense tissues (Johns & Yaffe, 1987), making it difficult to identify a cancer if it is present.

Most of what we know about the usefulness of mammography screening comes from studies of Western populations. It is important to evaluate mammographic density in different communities to determine the optimum breast imaging modality and better understand breast cancer risks (Ekpo, Hogg, Highnam, & McEntee, 2015; McCormack et al., 2016).

This policy paper therefore reports the results of two studies conducted in 2015–2016 by the University of Sydney in partnership with the Sheikh Saud bin Saqr Al Qasimi Foundation, RAK Hospital and RAK Medical and Health Sciences University. The findings will be presented in four parts:

- The **first** part of the paper discusses the results from Study 1 in relation to the knowledge, beliefs, attitudes, and practices of 102 RAK women regarding breast cancer and screening practices, comprising breast self-examination (BSE), clinical breast examination (CBE), and mammogram.

- The **second** part identifies the most common barriers to, and enablers of, breast cancer screening practices (CBE and mammography) reported by the women who participated in Study 1.

- The **third** part presents the results of Study 2, which investigated the mammographic density profiles in a sample of 366 RAK women to help determine the optimal breast imaging method(s).

- The **fourth** part discusses the overall implications of our research findings for RAK women and for breast health delivery in RAK. Evidence-based recommendations are made to enhance breast cancer early detection in RAK women.

Knowledge, Beliefs, and Attitudes of Breast Cancer and Screening Practices

Methods

The study comprised a structured survey administered by trained female interviewers between January and July 2015. Eligible participants were women aged more than or equal to 30 years living in RAK for at least 10 years. Both convenience and snowball sampling techniques were used to recruit study participants. Volunteer women interested in participating in the study were provided with an information sheet about the content and process of the study and were asked to provide written consent to participate in the interview.

The interview-administered survey comprised a total of 64 questions, translated into Arabic, concerning the attitudes, beliefs, and knowledge of the women regarding breast cancer and breast cancer screening practices. After consenting to participate, face-to-face interviews were conducted by four female medical students from RAK Medical and Health Sciences University, and a female staff member from RAK Hospital. The interviewers were trained by the researchers on how to conduct the interviews, as well as survey techniques and data collection methods.

Results

One hundred and two women with an average age of 41.6 years participated in interviews. Most of the women were married (91.2%), of Muslim faith (99%), employed (75.5%), university-educated (78.2%), and had Emirati citizenship (72.5%). Seventy-two percent of women described their health status as "good" or "excellent," while 26.5% reported having a family history of breast cancer. Nearly 43% had a monthly family income of more than 20,000 AED; while 38% refused to disclose or did not know their income.

Beliefs and attitudes about breast cancer

The participants reported a variety of beliefs and attitudes regarding cancer and nearly 70% wanted to be told if they were given a diagnosis of breast cancer. Only 22.5% believed that cancer could be prevented whilst the majority believed that people get cancer due to 'fate', 'unhealthy lifestyle' or 'hereditary factors'. Many of them believed that a diagnosis of breast cancer would threaten their relationship with a loved one (63%) and their career (49%) and less than a third believed that it would threaten their marriage or financial security (see Figure 1 and 2).

Awareness of and participation in breast cancer screening practices

More than 70% of the participants were aware of front line breast cancer screening practices (BSE and CBE) and 50%, 54.8%, and 37.6% had previously practiced BSE, CBE, and mammography, respectively. Overall, participation in these screening practices was more common among women who were more than 40 years old, non-Emirati, and those who were unemployed.

Women who participated in CBE and mammography were more likely to have lower levels of education and to
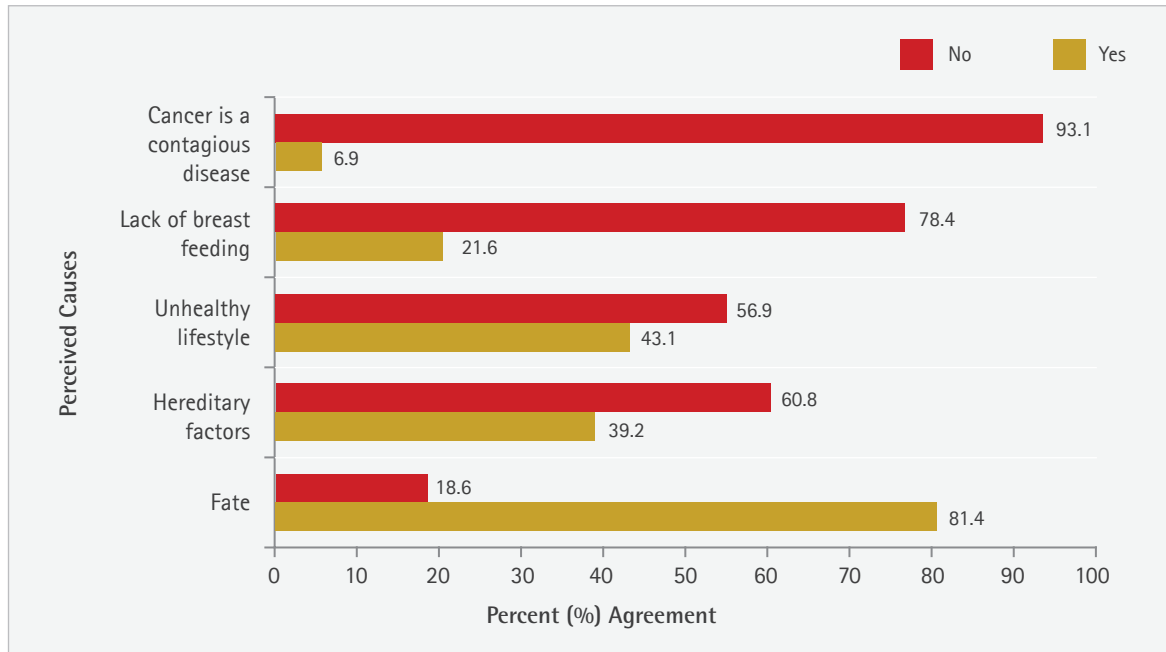

Figure 1. Participants' beliefs about the causes of breast cancer
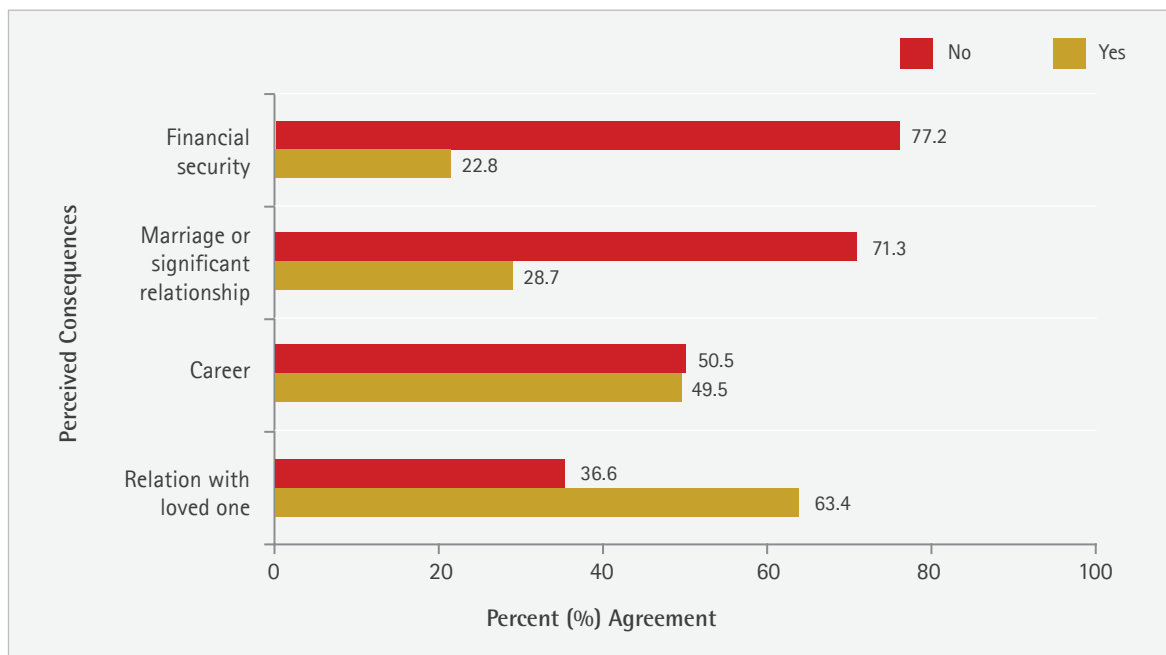

Figure 2. Beliefs about the personal and life consequences of breast cancer

have reported their health as being fair or poor. Although it is generally assumed that women with higher levels of education are likely to be more aware of breast cancer and breast cancer screening practices, our data and that of other researchers suggest that being knowledgeable about breast cancer, rather than having a high level of education, is the driving force behind women's active engagement in breast cancer screening practices (Donnelly et al., 2013; Lagerlund, Hedin, Sparén, Thurfjell, & Lambe, 2000).

In regard to participants' health status, it has been reported that Arab women tend to visit doctors when they become symptomatic (i.e., experience illness or pain) rather than for preventive reasons such as breast cancer screening practices (Othman, Ahram, Al-Tarawneh, & Shahrouri, 2015). This could explain the higher screening uptake among women who report their health as 'fair' or 'poor'.

Knowledge of breast cancer and breast cancer screening guidelines

The majority of participants were unaware of the common indicative signs of breast cancer other than breast lump (65.7%) and a swollen underarm (53.5%). Only 15.2% were able to correctly identify all six breast cancer signs (breast lump, nipple discharge, crusting/ulcer/redness of nipples, dimpling of breast, swollen underarms and breast swelling).

In terms of the women's knowledge of international mammography screening practice guidelines, only a small proportion of the participants (15.7%) knew that mammography should be performed every two years and should preferentially target women aged 40 years and older (4%). While around 70% of participants were aware of front line breast cancer early detection practices (BSE and CBE), less than 55% had engaged in these activities. Those who had participated, failed to adhere to the international recommendations for frequency of BSE (monthly), CBE (every 3 years for women under 40 years old; every year for women over 40 years old), and mammography (every 2 years) (Smith et al., 2015). This indicates that health promotion and awareness campaigns in the UAE have not fully achieved the desired outcomes in terms of breast cancer screening practices participation. Lack of knowledge, as well as the barriers to screening discussed below, could explain the low participation rates in breast cancer screening practices.

Barriers and Facilitators to CBE and Mammography

Nearly half of the participants of Study 1 (53 and 48 out of 102) were planning to undergo CBE or mammography respectively in the next 12 months. The most commonly reported facilitators of breast screening were a desire to take care of their own health, a doctor's recommendation, and the fear of being diagnosed with breast cancer.

Conversely, 32 of the participants were not planning to undergo CBE, and 40 were not planning on receiving a mammography in the next 12 months, citing fear of being diagnosed with breast cancer, fear of possible pain/discomfort during screening and the absence of a doctor's recommendation as the main barriers to participation.

Mammographic Density Profiles of Women Living in RAK

Methods

The second study conducted as part of this research investigated the mammographic density profiles of women living in RAK using two data sets. The first data set comprised archival retrieval of the mammographic images of 257 women who had undergone prior screening at RAK Hospital. Demographic information (age, nationality, height, weight, and marital status) related to these data was also collected. The second data set consisted of 109 women who had undergone a mammography screening at RAK Hospital and additional demographic and obstetric information (age at menarche, age at first delivery, and number of children) collected from detailed interviews at the time of screening. In total, 366 mammography cases were included in the study.

Mammographic density reports were assessed by a skilled radiologist using the American College of Radiology Breast Imaging Reporting and Data System (ACR, BI-RADS, 5th edition)(Sickles et al., 2013). The BI-RADS system divides mammographic density into four categories (a-d).[1] In category "a", the breast tissue is mostly fatty. In category "b", the breast tissue has scattered fibro-glandular densities. In category "c", the breast tissue is heterogeneously dense, which could obscure detection of small tumors. In category "d", the breast tissue is extremely dense, which may reduce the mammography ability to detect small tumors.

Results

On average, participants were middle aged (mean value: 45.8 years) and overweight (mean value: body mass index 29 kg/m^2). The mammographic density distributions among women living in RAK are shown in Figure 3. Most of the women in our sample were categorized as having a mammographic density of either scattered fibro-glandular density (BI-RADS category b-43%) or heterogeneously dense breasts (BI-RADS category c-25%). Only 11% had extremely dense breasts (BI-RADS category d).

More than a quarter (27.3%) of all women included in Study 2 were Emirati, while 19.8% were Arab, 14% African, 17.6% Asian, and 21.2% were Western ethnicity. Variation in mammographic density was observed between women of different ethnicity (see Figure 4). Emirati and Arab participants tended to have low mammographic density (BI-RADS categories a and
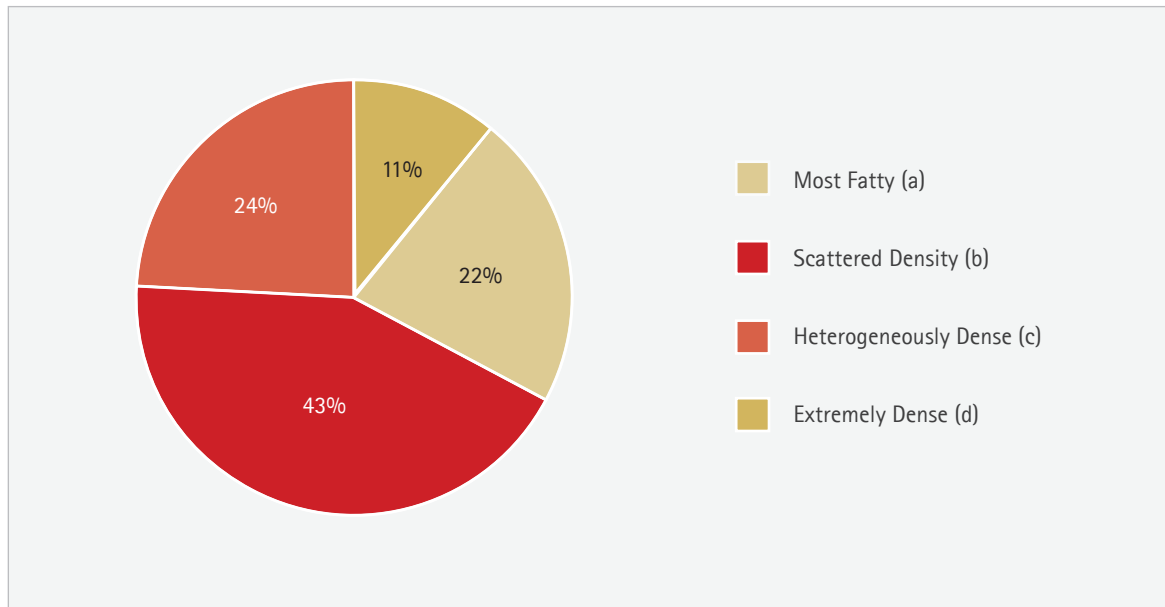
Figure 3. Distributions of mammographic density using BI-RADS among women living in RAK

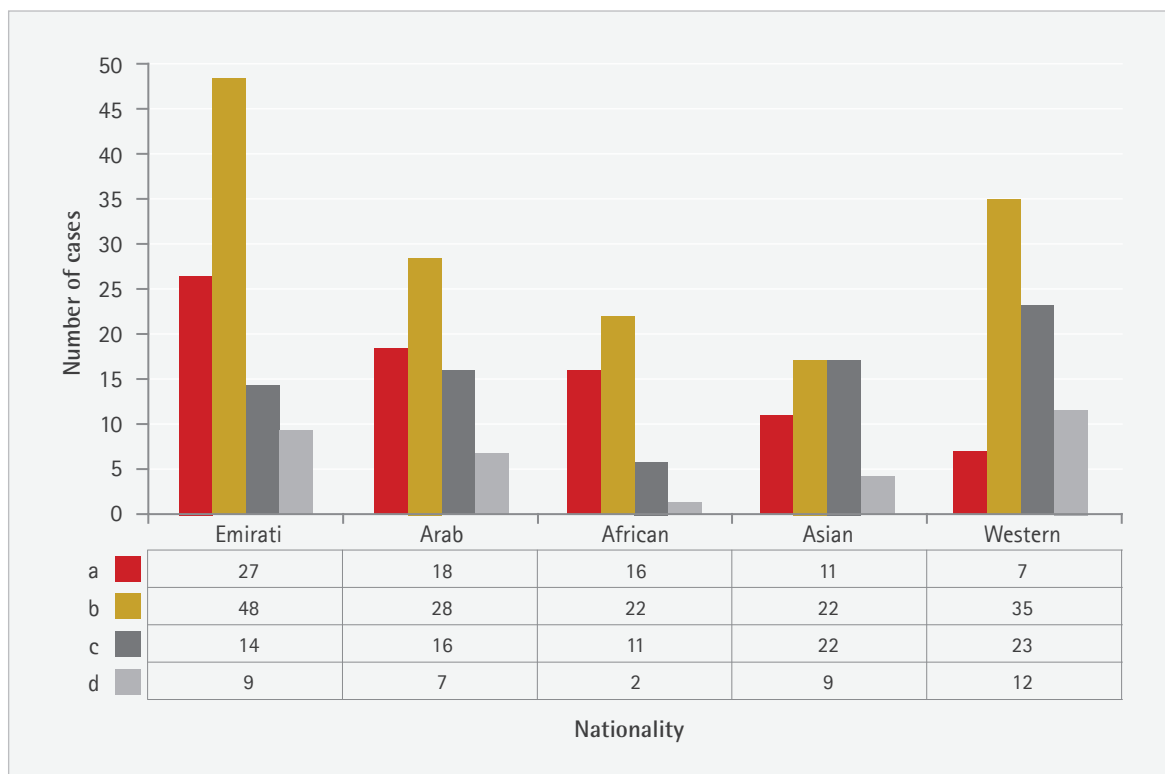|		Emirati	Arab	African	Asian	Western
a		27	18	16	11	7
b		48	28	22	22	35
c		14	16	11	22	23
d		9	7	2	9	12

Figure 4. Distributions of mammographic density by nationality

b), while increased mammographic density (BI-RADS category c and d) was found among Western and Asian women. Low mammographic breast density reported among Emirati and Arab women was largely associated with increased body weight among those women (62% and 41% of Emirati and Arab women were categorized as being overweight and obese, respectively).

Summary

Overall, the results of this study suggest that mammographic density for most women living in RAK appears to be similar, or lower than that of Western women. This finding implies that mammographic screening, which is the mainstay for breast cancer detection in Western countries, would be a preferred breast cancer screening method, particularly for Emirati, Arab, and African women among whom low mammographic density is more prevalent (del Carmen et al., 2007; Roubidoux et al., 2003). Mammography images are easier to read and interpret when cancerous lesions are not hidden by dense breast tissue (Galukande & Kiguli-Malwadde, 2012; Kerlikowske et al., 2013).

The study findings indicate that current-screening practices using mammography should be promoted in line with the public awareness strategy to address current gaps in knowledge and unfounded beliefs in the community evident in Study 1. There is, however, a reasonably large number of women who have higher densities (categories c and d), and our findings have helped to identify the characteristics of women in these categories. Mammographic density was higher in women who were single, aged 45 years or less, who reported a body mass index (BMI) of 27 kg/m^2 or less, and were of Western ethnicity. Such information can be valuable for indicating alternative or additional imaging procedures to ensure that diagnostic effectiveness is optimized when mammographic density is high.

Overall Implications for Women and Health Care Delivery in RAK

Breast cancer is a major public health concern in the UAE, and early detection via breast cancer screening practices can play a significant role in reducing the number of cancer diagnoses at advanced stages (Anderson et al., 2008).

Based on our study findings, and consistent with the existing scientific evidence in the region (Donnelly et al., 2013; Donnelly & Hwang, 2015a), there is a pressing need to develop a culturally-sensitive breast cancer screening program that includes comprehensive and effective public awareness and educational campaigns across all sectors of the RAK community and the UAE. Thus, the following recommendations could be applied.

Education and Awareness Programs

A. Improve health literacy (targeting adolescent girls) on breast cancer risk factors, physical symptoms, and early detection practices (BSE, CBE, and mammography) to enhance accurate knowledge about breast cancer and the importance of timely breast cancer screening practices (Donnelly & Hwang, 2015a). Health literacy that targets young adult women would promote greater awareness of the importance of breast cancer screening by the time they reach the recommended age of screening in later adulthood (Donnelly & Hwang, 2015a). Such interventions would aim to increase participation rates in breast cancer screening practices by emphasizing factors that facilitate engagement (such as doctors' recommendations) while minimizing known barriers.

B. Early detection in the absence of screening requires education of both women and healthcare professionals to ensure there is a prompt response to any observable changes in the breast. Breast cancer could potentially be detected earlier by educating women to consult their health care provider promptly if they notice any changes in the breast or experience any breast cancer symptoms. Ensuring that health care providers are adequately trained to correctly assess these changes will also assist in earlier breast cancer detection (Panieri, 2012).

Health Care Professionals

Encourage healthcare professionals to take a positive role in promoting early detection practices.

This study found that 65% of participants reported that they understood and trusted their health care providers and would undergo mammography screening if advised to do so. However, healthcare professionals in RAK do not appear to be as actively engaged in breast health education and promotion, as would be ideal. Even though our findings suggest that their advice appears to be a key factor in changing breast cancer screening practices, only 50.5% of the participants had ever had a conversation about breast cancer with their doctors. With regards to source of information, media was the main source of information (newspapers and magazines 58.8%, television or radio 54.9%, pamphlets 47.1%) followed by family members (49%) and health care professionals (including doctors 33.3%, health care educators 24.5%, and nurses 17.6%). The following strategies are proposed for improving breast cancer screening participation.

A. Train the trainer (TTT) (Orfaly et al., 2005). This strategy involves an expert breast cancer educator providing training to other health care professionals about breast cancer and breast cancer screening practices to increase early detection. This strategy would involve the development of a cohort of empathetic, culturally-sensitive, and informed health care professionals, including medical doctors, who are trained to recognize the signs and symptoms of breast cancer and who understand the importance of effective screening.

B. Expert counseling should be provided routinely to RAK women during normal visits to health centers so that existing breast screening barriers are minimized, women's knowledge about breast cancer is increased and the benefits of early detection are explained (Donnelly et al., 2015b; Smith et al., 2015). The importance of ongoing, knowledgeable engagement between healthcare providers and women across the UAE cannot be understated.

Increasing Participation and Screening Rates

A. Improve the knowledge of breast health among religious and community leaders in RAK and strengthen their role in breast cancer prevention (Donnelly & Hwang, 2015a). Fatalistic beliefs about cancer were evident among women in our study, with approximately 82% of participants believing that cancer is due to fate or destiny. Islam plays a major role in the lives of Muslim women, so religious leaders should be encouraged to take an active role

Table 1. Breast Cancer Early Detection and Screening Approaches According to the Resource Availability

Level of Resources	Public Education and Awareness	Detection Method(s)	Evaluation Goal
Basic	Establishment of culturally-tailored local awareness program (Education and BSE)	Clinical history and CBE	Increased knowledge in regard to breast cancer symptoms, risk factors, and the important regular early detection practices
Limited	Outreach and education program encouraging CBE for women at targeted age group (>30) *The engagement of healthcare providers is crucial	Positive CBE: US± diagnostic mammography based on the clinical assessment	Down-staging of the disease in symptomatic women
Enhanced	Development of awareness programs regarding women's health including breast cancer (opportunistic screening of asymptomatic women)	*For women aged 40-49, screening mammography every 12-18 months *For women aged 50-69, screening mammography every 2 years	Down-staging of the disease in asymptomatic women in the targeted age group
Maximal	Nation-wide mammographic screening campaigns	*Annual screening at 40 years old *For women who are considered a high-risk group, other screening modalities may be considered	Down-staging and downsizing of asymptomatic disease in the entire population

Note. Abbreviations: BSE: Breast-Self Examination, CBE: Clinical Breast Examination, US: Ultrasonography. Adapted from Breast cancer screening: review of benefits and harms, and recommendations for developing and low-income countries. In *Medical Oncology* by Al-Foheidi et al., 2013.

in motivating women to actively engage in regular breast screening for the benefit of their families as well as themselves (Donnelly et al., 2013). The above findings highlight the important role that the religious and community leaders have towards encouraging breast cancer prevention.

B. Adopt methods to increase women's participation in mammography screening at recommended ages, including reminders in the form of SMS, letters, and telephone calls, and provide regularly scheduled and available mammographic screenings (Donnelly & Hwang, 2015a).

C. Encourage men to take an interest in breast cancer screening early detection practices for their wives and female relatives (Donnelly et al., 2013).

Scientific Research

Establish a sustainable research culture to support these preliminary findings. Research is one of the most important pillars on which to build robust breast cancer prevention strategies. To facilitate maximum translation of research findings, a comprehensive and locally-relevant database on breast cancer and relevant publications is required (Al-Othman et al., 2015).

Approaches of Early Detection and Diagnosis

Implement a systematic approach to transform breast cancer diagnosis in RAK. To be successful, preventive screening programs such as mammography require a high level of adherence (Al-Foheidi, Al-Mansour, &

Ibrahim, 2013). However, in the Arab world, women are either referred by a physician or self-motivated to have a mammography (Donnelly et al., 2013). Even though mammography screening services are freely available for UAE nationals (Elobaid et al., 2014), the participation rate among women in our study (37%) is low, and is close to rates reported among women in other Arab countries (Donnelly et al., 2013). Thus, the effectiveness of such programs can be questioned. Alternatively, promotion of early detection practices including BSE and CBE should be a priority in RAK, since these have been shown to be cost-effective in facilitating early detection and diagnosis of breast cancer (Brennan, 2016; Miller & Baines, 2011).

It is recommended that the health policy makers in RAK consider adopting a stepwise systematic approach to breast cancer early detection and screening practices as suggested by the Global Summit Early Detection Panel and the Breast Health Global Initiative (BHGI) (Anderson et al., 2008; Echavarria, Anderson, Duggan, & Thompson, 2014). Table 1 details four levels of public awareness intervention according to the resource availability and the expected outcome of each intervention. The main goal proposed by BHGI is to detect breast cancer at early stages. However, early detection programs cannot be effective if women are unaware of the value of early detection practices. Therefore, these programs should be preceded by a culturally-tailored education and awareness programs as essential first steps (Anderson et al., 2008).

Overall, the achievement of the desired outcomes depends on multi-level collaboration among all stakeholders. When healthcare professionals, community and religious leaders, researchers, and policy makers are brought together, the health and welfare of women and their families in RAK should be transformed.

Mr. Salman Albeshan is a PhD candidate at the University of Sydney and a lecturer at King Saud University (KSU), Saudi Arabia. His research focuses in improving breast cancer early detection and diagnosis in Gulf Cooperation Council (GCC) countries and empowering women's engagement in breast cancer screening programs.

Dr. Martin Mackey is Associate Dean Research Education and the director of Middle East engagement for the Faculty of Health Sciences at the University of Sydney. He is a research member of the ageing, work and health research unit and clinical and rehabilitation sciences at the University of Sydney and is a co-principal investigator for the study.

Dr. Syeda Zakia Hossian is a senior lecturer at the University of Sydney. She is involved with a range of health research in Australia and internationally that focuses on understanding Muslim women's beliefs and attitudes toward breast cancer as well as cost-effective ways for improving public awareness of the disease. She is a co-principal investigator for the study.

Professor Patrick Brennan is the leader of the Imaging, Optimisation and Perception Group MIOPeG at the University of Sydney. His research has involved most major imaging modalities including X-ray, computerised tomography, ultrasound and magnetic resonance imaging, with a particular focus on breast and chest imaging. He is the chief investigator for the study.

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