

Comparison of Breast and Colorectal Cancer Screening Programs in the Netherlands and the Kingdom of Saudi Arabia

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Abstract: *This paper presents a comparative analysis of breast and colorectal cancer screening programs in the Netherlands and Saudi Arabia. To examine the differences in screening programs in both countries, a qualitative methodology was used, consisting of extensive desk research and review of secondary literature on the subject matter as well as primary sources such as screening program brochures and ministerial websites. A framework was developed based upon which both types of cancer were analyzed in both countries according to the following dimensions: Prevalence of disease, set-up and implementation of existing screening programs, and effectiveness of screening. The analysis showed that unlike in the Netherlands, in Saudi Arabia there is a lack of a truly population-based screening model for both breast and colorectal cancer. Furthermore, it would be advisable to establish clear implementation structures and systems for evaluation and monitoring of existing programs.*

Keywords : *Breast cancer; colorectal cancer; comparative analysis; Saudi Arabia; the Netherlands*

1. INTRODUCTION

Cancer is among the leading causes of death worldwide. According to the World Health Organization [1], there were around 14 million new cases of cancer and 8.2 million cancer related deaths in 2012. In addition, the organization expects the number of cases to increase by 70 percent over the next two decades. Hence, preventing cancer has become a priority of public health policy makers worldwide. According to the American National Cancer Institute, certain types of cancer can be detected before symptoms occur. This process of checking for cancer (or for other conditions that could cause cancer) is referred to as cancer screening. Since in most cases, treatment is more effective and likely to succeed at an earlier stage of cancer, detecting the cancer as early as possible is crucial. This is where the great importance of cancer screening lies. This paper presents a comparative analysis of the cancer screening programs in the Netherlands and Saudi Arabia. In particular, the analysis will focus on breast cancer, since it is the most common type of cancer for females in both the Netherlands and Saudi Arabia, as well as colorectal cancer, since it is the second most common type of cancer in Saudi Arabia and the third most common cancer in the Netherlands [2; 3].

Regarding breast cancer, there are different methods of screening. First, there is regular breast self-examination. Studies have shown, however, that this method does not lead to reduced mortality. Second, there is clinical examination of the breast. It has been argued that this screening method is most suitable for areas of the world where screening by mammography is unavailable, but that it is not cost-effective to be conducted in addition to mammography. Mammography is the third screening method. According to the WHO as well as the Dutch Breast

Cancer Guidelines, it is the only screening method with a proven cost-effective reduction in mortality. Fourth, there is screening by ultrasound. Experts recommend it for women with an increased risk when other screening methods cannot be used. And lastly, there is screening by MRI, which has been recommended as an addition to the screening program of women at very high risk [4].

Also colorectal cancer can be tested for by various means. A non-invasive way of screening is fecal analysis. A common test used in fecal analysis is the high-sensitivity fecal occult blood test (FOBT), which checks for tiny amounts of blood in the stool. Studies have indicated that when conducted every one to two years in people aged 50 to 80 years, FOBT can help reduce the number of mortality due to colorectal cancer by 15 to 33 percent. There are also fecal tests using DNA biomarkers, but they are at an earlier stage and still being evaluated. Positive fecal analyses must then be followed-up with endoscopy, which is another method of colorectal cancer screening. Endoscopic screening techniques consist of colonoscopy or sigmoidoscopy both of which are highly sensitive to the detection of cancers as well as polyps. Specificity is high as well and false positives are very rare, but of course for the patient it is a very invasive procedure and although considered as safe it can potentially lead to complications. Virtual colonoscopy on the other hand does not have these disadvantages, but unlike conventional colonoscopy, if polyps or other abnormal growth are detected, they cannot directly be removed as part of the procedure. In addition, there are several other screening methods, which are currently still in the experimental stage [5; 6].

There are thus a variety of potential screening methods both for breast and colorectal cancer. This essay paper will investigate how the Netherlands and Saudi Arabia make use of those screening methods. For both countries as well as both types of cancer, cancer prevalence will be analyzed briefly. Then, existing screening programs will be presented both in terms of their set-up and their implementation. It will moreover be discussed how effective those programs are. The differences between the two countries will then be discussed and the situation in both countries will be assessed. Finally, a brief conclusion with recommendations for the future will be provided.

2. Comparison of different cancer screening programs in the Netherlands and Saudi Arabia

2.1 Breast cancer

2.1.2 The Netherlands

Prevalence

According to the Dutch National Institute for Public Health and the Environment, breast cancer is the most common type of cancer in the Netherlands. Every year, around 13,200 women are diagnosed with invasive breast cancer and approximately 2,000 with in-situ breast cancer. On average, Dutch women are around 60 years old at the time of diagnosis. One out of eight women in the Netherlands will develop breast cancer at some stage of her life and each year breast cancer is fatal for around 3200 women. The estimated age- standardized rate (ASR) in 2012 was 131.3 [7].

Screening programme

Breast cancer is thus a particularly pressing public health concern in the Netherlands. The Netherlands has responded to this concern at an early stage by introducing its first cancer screening pilot program already in 1975. Initially being limited to two Dutch cities – Nijmegen and Utrecht - due to its positive impact it was rolled out as a national program in 1989. This extension was completed in 1997. The Netherlands thus has been running an extensive population-based breast cancer screening program for almost 20 years. Initially, the program offered breast cancer screening every two years for all women aged between 50 and 69. In 1998, the age group was changed to women between 50 and 75. In 2010, digital mammography was introduced as part of the screening program. The advantage of digital mammography is that it increases the contrast in dense areas of the breast and that it enables

image manipulation and computer-aided diagnosis. It has been argued that it has lead to an improved workflow and overall to improved cancer detection [8].

On behalf of the Dutch government, the National Institute for Public Health and the Environment has instructed five regional organizations to implement the breast cancer screening program. Every two years, women of the above-mentioned age group receive an invitation letter to participate in the mammography. Those letters are sent based upon information provided by municipal population registers. The screenings are provided free of charge. If the suggested time and date does not suit the woman, she can re-schedule either by phone or online. Women, who do not wish to participate, are asked to fill out a form and send it back to the screening organization. If someone neither replies nor attends the screening, a second reminder will be sent within a few weeks. The screenings are performed in mobile mammography units. Results are assessed within a few days by two specially trained radiologists, who conduct their assessments independently from each other. A couple of weeks afterwards, the patients receive a letter with the results. If any abnormalities are discovered during the screenings, patients are contacted by their local general practitioner (GP)[9].

Effectiveness

The National Institute for Public Health and the Environment has published information booklets on the screening program to inform the population [9]. These booklets are also available in English, Turkish and Arabic, which can be seen as a positive step to make sure all societal groups are aware of the program and can participate. The program has been well accepted by society with around 950000 women participating each year. In the period from 2004 until 2007 the participation rate was 81.7 percent. In terms of participation one could therefore regard the program as very successful.

Furthermore, a clear system of evaluation has been established. This is an important feature of any public health policy or program, because it allows for the program to be revised continuously according to the evaluation outcomes. Since the beginning, the Dutch screening program has been evaluated on an annual basis [8]. Moreover, the LETB (National Evaluation Team for Breast Cancer Screening) and the LRCB (National Expert and Training Centre for Breast Cancer Screening) are responsible for continuous quality control particularly regarding the frequency of false-positives and false-negatives. There has been some discussion regarding the introduction of digital screenings. While it is expected to have the positive affect of around 1500 additional diagnoses per year, it has also lead to an increased referral rate and more false positives [8].

According to the National Institute for Public Health and the Environment, women who regularly participate in the program have a 50 percent lower chance of dying of breast cancer than women who do not take part. In addition, they estimate that 775 fewer women die from breast cancer as a result of the screening program [9]. Several scholars have confirmed this positive evaluation of the program. According to Timmers et al., breast cancer mortality has been reduced by 28.7 percent in 2007 compared to the starting point in 1986–88, much of which they attribute to the screening program [8].

2.1.3 Saudi Arabia

Prevalence

According to the Saudi Cancer Registry, in 2009 there were 1308 breast cancer cases in the kingdom. Breast cancer accounted for 25.1 percent of newly diagnosed cancers in women. In 2009, breast cancer was the most often diagnosed type of cancer, followed by colorectal cancer with 1109 cases. The estimated ASR was 22.7, which is significantly lower than in most industrialized Western countries including the Netherlands [2]. However, In 2008, a study by Ibrahim et al. projected that by 2025 incidence and mortality cases of breast cancer would increase by circa 350 and 160 percent respectively [10]. Moreover, breast cancer occurs around ten years earlier in Saudi women than it does in their European and American counterparts. The median age at presentation in Saudi Arabia is 48-52 and

around 50 percent of breast cancer cases are women below the age of 50 [11]. In fact, in Saudi Arabia breast cancer represents the leading cause of cancer death for women 20 to 59 years of age [12]. In addition, the cases tend to be diagnosed at a more advanced stage than in Western countries (ibid). Almost 70 percent of patients are already at an advanced stage at the time of diagnosis [13]. In Saudi Arabia, the infiltrating duct carcinoma (ICD-O-3, 8500) makes up 78.2% of all morphological breast cancer variants [14]. To summarize, while Saudi women are generally at a lower risk of developing breast cancer than Dutch women, they are nonetheless at a higher risk to develop breast cancer at an earlier age and to develop more aggressive forms of breast cancer [13]. One could therefore argue that despite the lower incidence rate, breast cancer is just as much of an urgent public health concern in Saudi Arabia as it is in the Netherlands.

Screening programme

In 2006, in a study by Al-Alaboud & Kurashi, Saudi physicians reported that the greatest barrier, which has prevented them from practicing screening programs, was the absence of a national screening program. Other barriers mentioned were time pressure, lack of training on the part of the physician, lack of good communication, lack of facilities and lack of cooperation and trust among the patients [15]. In view of the growing and ageing population of Saudi Arabia, cancer rates are projected to increase and present a growing financial burden on the health care system [12].

In 2007, the Saudi government took an important step towards dealing with this challenge by establishing the first national breast cancer screening center. Although it welcomed women from all regions, due to its location in the capital city Riyadh the majority of participants were in fact from Riyadh. To prevent any cultural barriers, participants were brought to a female-exclusive area with a trained female technician, a female family physician and a female health educator were present. All participants were self-referred [12]. In 2012, the government deployed three mobile clinics with the aim to offer digital mammography screening to 10000 women during that year. Women can now make appointments and obtain information either via a newly established breast cancer call center or the campaign's website [16]. Participants will then get an initial physical examination at a primary health center, after which they can go for digital mammography at one of the rotating mobile clinics. As a last step, the results are obtained from the King Fahd Medical City [13].

Along with the screening center, a complementary national breast cancer awareness campaign was launched together with the Saudi Cancer Society. The campaign encouraged women to get screened for breast cancer at the center. The campaign was kicked-off with the launch event attended by well-known female figures in support of the program and has been continued by awareness events in shopping malls and universities as well as an advertising campaign aimed at young woman and girls to encourage their mothers to undergo screening. Given the stigma and fear that have been associated with breast cancer in the region as well as general low levels of education about the disease, these public awareness campaigns were indeed essential (ibid). Several studies were conducted in Saudi Arabia to examine the awareness amongst women and in some studies also men, which have revealed that awareness was generally low and dependent on educational status of the individual. However, in some cases even highly educated individuals demonstrated significant gaps in knowledge [11].

Effectiveness

It has been argued that the public awareness campaign has been well received by Saudi women. In the first eight months, 1215 women participated in the screening program with a median age of 45 years [12]. However, the majority of women were from Riyadh (ibid.), which shows that although theoretically open for everyone, the geographical outreach of the center was not very great. It has been reported that a screening program was established by the local health department in the region of Al- Qaseem, which uses a mobile mammography van in order to reach remote areas (ibid.). However, results do not seem to have been published yet.

Despite this shortcoming, initial analyses of the Saudi screening programme have been favorable. In 2010, Abdulkhair et al. conducted a retrospective study on women attending the screening center between 2007 and 2008. Although long-term follow-up is needed to assess the impact, they report a strong correlation between mammographic findings and breast cancer confirmation and assess screening by mammography as an effective tool in detecting breast cancer in the Saudi patient population [12]. By mid-2014, the program had screened more than 11,000 women, with 76 women diagnosed with breast cancer and undergoing treatment as a result [13].

2.2 Colorectal cancer

2.2.1 The Netherlands

Prevalence

According to the Dutch Cancer Registry, there has been a constant increase in cases of invasive colorectal cancers in recent decades, from 7207 cases in 1990 to 15003 in 2014 [17]. Both in terms of incidence and mortality, colorectal cancer had become the second most common cancer in the country by 2004 and currently is the third most common cancer in the Netherlands. Despite improvements in prognosis if the cancer is diagnosed at an early stage, between 40 and 45 percent of all patients die within five years after diagnosis. The age-standardized rate for men and women is 40.2. When analysed separately, the ASR is higher for men (47.5) than women (33.9) [3; 5; 18].

Screening program

Already in 2004, the Dutch Cancer Society recommended the introduction of population-based colorectal cancer screening in the Netherlands. According to the organization, the cost of every life year saved through FOBT is an estimated 3000 Euros, which is similar to the costs per year of life saved through the national breast cancer screening program [5]. Based on similar recommendations from Health Council of the Netherlands and data from a feasibility study conducted by the Centre for Population Screening (CvB) at the National Institute for Public Health and the Environment (RIVM), in 2011 the Dutch Minister of Health, Welfare and Sport indeed decided to establish a population-based screening program.

The screening program's target population are men and women between 55 and 75 years old. However, at the moment not every eligible person is receiving the invitation to participate, because the program is being introduced in several phases. It began in January 2014 by first inviting 65 to 75 year old people to participate and it is planned to be completed by 2019. The reason for this phased introduction is that this time was required to train enough care providers to carry out the further examination involved. Similar to the breast cancer screening program, eligible residents are invited every two years. The invitation letter comes with a self-sampling test kit and instructions on how to take samples of four different areas of the stool. The program's website contains video instructions on how to take the sample in the right way. Participants then fill out the attached form and post the sample in the return envelope, whereafter the samples are tested in laboratories. Around two weeks later the participants receive their results by mail. If blood was detected in the stool, the patient's GP will be informed and the patient will receive further information about the intake interview and colonoscopy at that is required as follow-up. Those take place in a colonoscopy center, which is usually located in a hospital [19].

Effectiveness

Since the program is currently in its second year of the introduction phase and not expected to be fully implemented until 2019, it seems too early to evaluate its effectiveness. According to Harriët van Veldhuizen - the program director of the National Institute for Public Health and the Environment, unexpected initial results are that the program is being very well received with attendance rates being higher than expected and that positivity rates are also higher than expected [3]. A negative factor were waiting times for colonoscopies, hence capacity probably needs to be increased in this regard. Although it has been established as the most effective method of colorectal cancer screening, testing by means of FOBT has several drawbacks. The sensitivity of FOBT tests to detect cancerous tumors is limited. In addition, polyps are rarely detected. While it is theoretically possible to raise the sensitivity, this

leads to such a high decrease in specificity that the amount of follow-up colonoscopies would get unacceptably high. Furthermore, blood in stool can occur for other reasons than cancer. And even cancers tend to bleed intermittently, which can cause large variations in the amount of blood found in separate fecal samples [5]. Furthermore, some scholars have criticised the choice of fecal blood test, namely that the FOB Gold test was chosen over the OC Sensor test (for a detailed analysis in Dutch language see [20]).

However, the risks of false positives and false negatives are clearly pointed out in the program's leaflets and the patient is encouraged to weigh the advantages and disadvantages for him or herself [19]. Despite these drawbacks, it is projected that full implementation of the screening program will lead to the prevention of 2400 deaths per year as well as to an increase in the five-year survival rate from 59 to 85 percent [3].

2.2.2 Saudi Arabia

Prevalence

According to the Saudi Cancer Registry, colorectal cancer is the second most common type of cancer in the kingdom. In 2009, there was a total of 1109 cases. Colorectal cancer is the most common type of cancer in Saudi men and the third most common type of cancer in Saudi women. The overall ASR was 10.5 in 2009, which is around four times lower than in the Netherlands. The median age at diagnosis was 60 for males and 56 for females. A study of colorectal cancer incidence between 2001 and 2006 showed that the average age of patients at the time of diagnosis was 58 years and 79 percent of patients were above 45 years old. Hence, colorectal cancer seems to occur at a somewhat younger age in Saudi Arabia than in the Netherlands, where 90 percent of cases occur in patients aged 55 or older [3; 21].

Colorectal cancer is less common in Saudi Arabia than in other Arab Gulf countries and developed countries and has been regarded as a low-risk country. However, throughout the last decade, incidences have increased continuously [22]. In a recent study, Ahwat et. al. calculated a five-year observed survival rate of 44.6 percent between 1994 and 2004. They argue that this is lower than typically reported in the developed world, which in their view raises concerns regarding the system of diagnosis and care in Saudi Arabia [22]. Indeed, compared to the Netherlands – even before establishment of the screening program – the survival rate in the kingdom is lower by around 15 percent.

Screening

At this point, there is no national colorectal cancer-screening program in Saudi Arabia. Given the constant rise in incidences, Mosli and Al-Ahwal have called for a better organized national approach focused on patient education, which encourages as well as illustrates the importance of colorectal cancer screening programs [21; 22]. Moreover, Ibrahim et al. have pointed out that there is an “urgent need” to increase the population's awareness of the possible relationship between diet and colorectal cancer [24].

COMPARISONS AND DISCUSSION

Regarding breast cancer, both the Netherlands and Saudi Arabia have implemented national screening programs. Both programs utilize mammograms, which can be explained by the academic consensus on the suitability of that screening method for breast cancer. However, the two programs are quite different in nature, with the Dutch program being truly population-based and reaching every woman of the target age group and the Saudi program being quite limited in scope and reach. Of course one does have to keep in mind that unlike the very densely populated and small area of the Netherlands, Saudi Arabia is a much larger country with many remote areas and villages, which will make a population-based program much more complicated than in the Netherlands. Also cultural taboos in dealing with the disease further complicate the matter.

Moreover, it seems that unlike in the Netherlands, where responsibility for implementation of the program was given to five regional organizations, in the Saudi case there is no clear structure of implementation. In addition, the Saudi program does not have the same age limitations as the Dutch one. This, however, makes sense, since the average age at diagnosis is much lower in Saudi Arabia. An area, where the Saudi program might be more advanced is the usage of social media and advertisement in creating awareness for breast cancer screening. For instance the media campaign picturing daughters and mothers, which was created with the goal that younger women would encourage their mothers to go for a screening, was quite innovative and well designed. Arguably, in the Netherlands the need for such campaigns is not as big as in Saudi Arabia. Yet, creating awareness is important in any country and innovative ways and the use of social media are up-to-date strategies.

Despite the favorable reviews of the introduction of the Saudi national screening program, the analysis for the purpose of this paper has shown several shortcomings. First of all, the program has been referred to as a 'national' program since its inception in 2007. However, the program is offered only in the capital city. The term 'national' is thus hardly applicable and it remains unclear why the program has not been rolled out to other Saudi cities. Apparently, there are ongoing local efforts in the Qassim region as mentioned above as well as in the Eastern region, where the Saudi Cancer Foundation established a screening program in 2009 [24]. Yet, these local efforts do not seem to have been synchronized and aligned with the national program. The chair of radiology at King Fahd Hospital in Dammam – Dr. Fatma Al Mulhim - criticized that there are no uniform national guidelines or links between different programs (ibid). Moreover, as mentioned above, participants attend based on self-referral. According to Dr. Al Mulhim, there is still a lack of education and awareness among women, which is resulting in a relatively low uptake of screening. To achieve an adequate response rate more public awareness, encouragement by physicians, trust and - as mentioned - above a national programme would be required (ibid).

Last year, the Ministry of Health and the The Saudi Center for Evidence Based Health Care published a Clinical Practice Guideline on the Use of Screening Strategies for the Detection of Breast Cancer, whose main recommendation was to conduct mammography every one to two years for women aged between 40 and 49 and every two years for women aged 50 to 69. It remains to be seen how these recommendations will be specified and translated into practise on a national basis.

Regarding colorectal cancer, the differences between the Netherlands and Saudi Arabia seem even more striking. While the Netherlands is currently implementing an extensive population-based screening program, there is no sign that a similar program is being considered in Saudi Arabia, although several medical scholars have pointed out a need in this regard.

CONCLUSION AND RECOMMENDATIONS

With its very young population that is very advanced in terms of social media usage, the Netherlands could learn from the innovative media campaigns that are attracting interest also from younger women. Although the Dutch leaflets are very informative and even available in several languages, they might not be the most appealing for younger segments of society. This is important for the Netherlands as well, since it will enhance general awareness of breast cancer in society and those women will be part of the target group of the screening program once they age. It might not be likely that Saudi Arabia will introduce a population-based screening program like the Dutch model in the next couple of years. However, a good start in that direction would be to gather all individual measures and programs that are currently being implemented by local hospitals or authorities. Currently, there is no clear overview in this regard. Once such an overview is created, the involved individuals could be gathered in a small conference or expert panel to exchange their experience, learn from each other and create detailed screening guidelines. It would be of great benefit to also include members of the Dutch screening program to encourage knowledge transfer. Since

there is already intensive cooperation between the two countries in terms of medical studies at the University of Maastricht and Groningen, one could build upon this existing relationship. Then, the program could be extended step by step, for instance by first rolling it out to the biggest city of each region of the country.

Regarding colorectal cancer, it would be advisable for the Netherlands to develop a clear evaluation system like for the breast cancer program. This is especially important due to the shortcomings of fecal stool tests. The situation regarding false positives and false negatives should be monitored continuously and investments in research into future screening methods such as the DNA tests should be made. Saudi Arabia on the other hand, would be advised to conduct an extensive study on colorectal cancer in the kingdom in order to evaluate whether the implementation of a national screening program would be advisable and whether such a program could be effective in reducing incidence rates and mortality.

Of course, one could argue that the lower incidence rate of both types of cancer in Saudi Arabia compared to the Netherlands to some degree justifies that there are less screening systems. On the other hand, cancer rates have been rising considerably in the kingdom and breast and colorectal cancer are among the major death-causing factors. It would therefore be advisable to enhance existing and establish further screening systems for both breast and colorectal cancer in Saudi Arabia.

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