PDF version

Council countries Karima Chaabna,[1] Heta Ladumor[2] and Sohaila Cheema [1]Institute for Population Health, Weill Cornell Medicine – Qatar, Doha, Qatar

Abstract

Background: Breast cancer incidence is increasing in the Gulf Cooperation Council (GCC) countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates.

Aims: This study analysed geographical patterns, time trends, and age distribution of female breast cancer incidence among nationals and non-nationals in GCC countries.

Methods: Available cancer registry data for 1979–2016 were retrieved for the GCC countries. Age-standardized rates (ASRs) per 100 000 women were calculated using the World standard population. Comparisons were made by calculating comparative incidence figures.

Results: From 1998 to 2012, incidence among nationals was highest in Bahrain (ASR 61.85), Kuwait (ASR 52.66), and Qatar (ASR 56.90) and lowest in Saudi Arabia (ASR 19.76), Oman (ASR 22.33), and United Arab Emirates (ASR 31.05). In the most recent period, data were available only in Qatar (2014–2016) and Saudi Arabia (2013–2015). Non-nationals and nationals in Qatar had higher incidence rates than in Saudi Arabia. Incidence among nationals in Qatar was at least twice that in Saudi Arabia (comparative incidence figure 2.32). Incidence among non-nationals in Qatar was 3 times higher than in Saudi Arabia. Among nationals in Kuwait, 10.8% of cases of breast cancer occurred in women aged

Conclusion: Breast cancer incidence has increased over time among women in most GCC countries, likely reflecting the improvements in healthcare access and screening programmes. Nationals and non-nationals developed breast cancer at a younger age than women in other high-income countries. Increased screening uptake is still required in the region. Evidence-based, locally-informed interventions should be implemented to address risk factors specific to the nationals and non-nationals in the GCC countries.

Keywords: breast cancer, cancer incidence, cancer screening, mammography, cancer prevention, Gulf Cooperation Council, nationals, non-nationals

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Introduction

Breast cancer is the second most common cancer and the leading cause of cancer-related mortality in women worldwide (1). Although there has been an improvement in the overall survival rate of breast cancer, there are differences by country and region. Limited screening, diagnosis, and therapy are likely contributing factors (2).

The Gulf Cooperation Council (GCC) is an alliance of 6 countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates (UAE). These countries have rich endowments of natural resources, generous government-supported subsidies and welfare policies, large populations of expatriate workers, and common cultural, religious, and social heritage (3, 4). To support economic development in the past 2 decades, the GCC countries have experienced substantial population growth due to mass migration of temporary workers (4). Intense non-national population growth has reached > 80% of the population size in Qatar and UAE. Young healthy migrants have contributed mainly to the non-national population growth, which has skewed the age distribution towards the 15–49 years group (5). In parallel, there has been an increased adoption of westernized and sedentary lifestyles in the GCC countries (6) that has

been linked to a variety of cancers including breast cancer (7). Breast cancer incidence is 3–5 times lower among nationals in GCC countries than in other high-income countries (8); however, incidence among GCC nationals increased by 40% between 1998 and 2009 (6). To the best of our knowledge, incidence has not been assessed separately for GCC nationals and non-nationals. As a result of the unique demographic profile of non-nationals in the region and the potential healthy migrant effect on trends (3,4), it is essential to analyse breast cancer incidence time trends, geographical patterns, and age distribution according to nationality.

This study aimed to characterize female breast cancer incidence in GCC countries. The study objectives were to: (1) analyse geographical patterns and time trends of female breast cancer incidence among GCC nationals and non-nationals separately; (2) explore incidence differences between nationals and non-nationals; and (3) assess breast cancer age distribution among nationals and non-nationals.

Methods

Study design

We used an ecological study design to evaluate breast cancer incidence among nationals and non-nationals in GCC countries.

Incidence data sources

We retrieved publicly available secondary cancer registry data from 4 sources (Table 1): International Agency for Research on Cancer (IARC); Gulf Centre for Cancer Control & Prevention (GCCCP); Qatar National Cancer Registry (QNCR); and Saudi National Cancer Registry (SNCR). IARC and GCCCP report cancer surveillance data collected by national cancer registries (Bahrain Cancer Registry, Kuwait Cancer Registry, Oman National Cancer Registry, QNCR, SNCR, and United Arab Emirates Cancer Registry). Cancer registry incidence data for Oman were also obtained from the report by Al-Lawati et al. (9). Data from GCCCP, QNCR, SNCR, and Al-Lawati et al. were primarily used to supplement missing information from IARC to allow for a comprehensive and up-to-date description of breast cancer incidence in GCC countries. No data estimated from modelling analysis (e.g. GLOBOCAN 2020) were used in our analysis, which used only real data.

GCCCP reported 15-year incidence data (1998–2012) for nationals of GCC countries (10). These data were used to analyse geographical patterns of incidence across the countries between 1998 and 2012. The IARC Cancer in Five Continents (CI5) database was searched for available data on breast cancer incidence for GCC nationals and non-nationals, without time restriction (Table 1). Data were not available in the IARC database for UAE and for non-nationals of Bahrain, Oman, Qatar, and Saudi Arabia. From the QNCR, we retrieved

separate incidence data for nationals and non-nationals in Qatar for 2014–2016. From the SNCR, we retrieved separate incidence data for nationals and non-nationals in Saudi Arabia for 2013–2015. Al-Lawati et al. (9) reported 20-year incidence data (1996–2016) for nationals in Oman, which were used to supplement the minimal data available for Oman from IARC. The retrieved incidence data were used to further analyse geographical patterns, and to investigate time trends (1979–2016), age distribution, and national versus non-national incidence.

Statistical analysis

To conduct a valid comparison between populations with different age structures, we calculated the age-standardized rate (ASR), which is the weighted average of age-specific incidence rates using the direct standardization method with the World Standard Population (11). Incidence rates were standardized per 100 000 women. Age-specific incidence rate was calculated as number of new breast cancer cases per 100 000 women for a specific period, country, nationality, and narrow age range. The number of cases was extracted by sex, nationality, and 5-year-age groups (0 to > 75 or > 85 years). The comparative incidence figure (CIF) and its 95% confidence interval (CI) were calculated to assess ASR differences according to time period, country, and nationality (11). CIF was a ratio of the ASR in a specific period, country, and nationality compared with the ASR in another period, country, and nationality. We considered the difference to be significant if the value of 1.0 was not included within the 95% CI of CIF.

The population at risk for female breast cancer included all individuals susceptible to breast cancer. Person-years at risk by nationality and age group were retrieved from the same cancer incidence data source, except for the data from QNCR (2014–2016). Person-years at risk were calculated by the sum of population size in women by age group and nationality for all 3 years retrieved from the Labor Force Survey conducted by the Ministry of Development Planning and Statistics (https://www.psa.gov.qa/en/statistics1/Pages/default.aspx).

Results

Geographic patterns of breast cancer incidence in GCC countries

Over the period 1998–2012, breast cancer incidence in nationals was highest in Bahrain (ASR = 61.85), while it was 3 times lower in Saudi Arabia (ASR = 19.76; CIF = 3.13; 95% CI: 3.12932–3.12933) and 2 times lower in UAE (ASR = 31.05; CIF = 1.99; 95% CI: 1.9919–1.9920). Breast cancer incidence among nationals was 56.90, 52.66, and 22.33 per 100 000 in Qatar, Kuwait, and Oman, respectively.

The geographical pattern over shorter periods of time differed from that over the 15-year period

(Figure 1). Until 2003–2007, nationals in Bahrain had the highest ASRs when compared with the nationals of other GCC countries (except for UAE where data were not available) and compared with non-nationals in Kuwait. Thereafter, incidence among nationals in Bahrain declined in 2008–2012 and was lower than among nationals in Kuwait (CIF = 0.87; 95% CI: 0.86594–0.86595) and Qatar (CIF = 0.93; 95% CI: 0.93607–0.93608) but still higher than among nationals in Saudi Arabia (CIF = 2.1; 95% CI: 2.051829–2.051833) and among non-nationals in Kuwait (CIF = 1.22; 95% CI: 1.221258–1.221261). In the most recent period, data were available only in Qatar (2014–2016) and Saudi Arabia (2013–2015). Non-nationals and nationals in Qatar had higher incidence than non-nationals and nationals in Saudi Arabia. Breast cancer incidence among nationals in Qatar was at least twice that of nationals in Saudi Arabia in 2003–2007 (CIF = 2.17; 95% CI: 2.16753–2.16754), 2008–2012 (CIF = 2.19; 95%CI: 2.19194–2.19195), and 2013–2016 (CIF = 2.32; 95% CI: 2.32574–2.32575). Incidence among non-nationals in Qatar was 3 times higher than among non-nationals in Saudi Arabia.

Time trends of breast cancer incidence in GCC countries

Overall, breast cancer ASR increased in all GCC countries (Figure 1). However, a decline in the trends (among nationals in Qatar and Saudi Arabia) and even a decrease (among nationals in Bahrain and non-nationals in Kuwait) was observed in recent years. Breast cancer incidence among nationals in Bahrain increased between 1998–2002 and 2003–2007 (CIF = 1.2; 95% CI: 1.196026–1.196030) and decreased between 2003–2007 and 2008–2012 (CIF = 0.9; 95% CI: 0.899017–0.899019). Breast cancer incidence among nationals in Kuwait doubled between 1979–1982 and 1988–1993 (CIF = 2.01), remained the same until 1994–1997 (CIF =1.0; 95% CI: 1.00030–1.00031), and increased between 1994–1997 and 1998–2002 (CIF = 1.26; 95% CI: 1.257689–1.257693), 1998–2002 and 2003–2007 (CIF = 1.21; 95% CI: 1.211430–1.211433, and 2003–2007 and 2008–2012 (CIF = 1.16; 95% CI: 1.162534–1.162536). Breast cancer incidence among non-nationals in Kuwait increased between 1979–1982 and 1988–1993, remained the same until 1994–1997 (CIF = 1.0; 95% CI: 0.998832–0.998837), increased between 1994–1997 and 2003–2007 (CIF = 1.3; 95% CI: 1.302703–1.302708), and decreased in 2008–2012 (CIF = 0.92; 95% CI: 0.922989–0.922992). Breast cancer incidence among nationals in Oman increased between 1993–1997 and 1998–2001 (CIF = 1.15; 95% CI: 1.146130–1.146132). The ASR (22.33) estimated for 1996–2015 using data reported by Al-Lawati et al. (9) was similar to that in 1998–2012 (ASR = 20.75). Data for breast cancer incidence in Qatar were not available before 2003. The incidence among nationals increased between 2003–2007 and 2008–2012 (CIF = 1.18; 95% CI: 1.175398–1.175403) and between 2008–2012 and 2014–2016 (CIF = 1.04; 95% CI: 1.039074–1.039079). Data for breast cancer incidence in Saudi Arabia were not available prior to 2003. The incidence among nationals increased between 2003–2007 and 2008–2012 (CIF = 1.16; 95% CI: 1.162481–1.162483) and slightly decreased thereafter (2014-2016 CIF = 0.98).

Breast cancer incidence among nationals versus non-nationals

Breast cancer incidence in Kuwait was significantly lower among nationals than non-nationals and the gap between the 2 populations diminished until 1994–1997 (1988–1993: CIF = 0.96, 95% CI: 0.956013–0.956017; 1994–1997: CIF = 0.96, 95% CI: 0.957419–0.957424). Thereafter, breast cancer incidence was higher among nationals than non-nationals and the gap increased over time (CIF =1.06; 95% CI: 1.056254–1.056257, in 1998–2002 and CIF = 1.41; 95% CI: 1.410320–1.410323 in 2008–2012). Breast cancer incidence in Qatar was 50% lower among nationals than non-nationals during 2014–2016 (CIF = 0.50; 95% CI: 0.502528–0.502530; ASR = 55.89 and 111.23, respectively). Incidence in Saudi Arabia was lower among nationals than non-nationals during 2013–2015 (CIF = 0.69; 95% CI: 0.687872–0.687873; ASR = 24.0 and 34.9, respectively).

Breast cancer incidence by age group

Breast cancer incidence increased with age among nationals and non-nationals (Figure 2). No breast cancer was reported among nationals or non-nationals aged
Figure 3
).

Discussion

Breast cancer incidence was highest among nationals and non-nationals in Qatar, followed by nationals in Kuwait and Bahrain, nationals and non-nationals in Saudi Arabia, and nationals in Oman and UAE. In recent years, the incidence of breast cancer increased in all GCC countries but appeared to have decreased among nationals in Qatar and Saudi Arabia, and even reversing among nationals in Bahrain and non-nationals in Kuwait. Breast cancer incidence data for non-nationals were available only for Kuwait, Qatar, and Saudi Arabia. Non-nationals in Qatar and Saudi Arabia were more likely to have breast cancer than nationals, whereas in recent years, nationals in Kuwait were more likely than non-nationals to have breast cancer. Nationals and non-nationals in GCC countries appeared to develop breast cancer at a younger age than women in other high-income countries.

Several factors likely explain why breast cancer incidence in GCC countries was lower than in other high-income countries. Estimates of cancer incidence are closely dependent on levels of

screening and detection. There is limited information on effectiveness of national-level breast cancer detection in GCC countries (14). In 2008–2009, the proportion of women aged 40–75 years who had undergone mammography within the previous 2 years was low among nationals and non-nationals (

Few studies have explored the barriers and enhancers of screening programmes in the region. Cultural, practical, and personal barriers have been reported (18–20). In GCC countries, participation in screening programmes may be low because of fear of treatment, doctors/examiners, hospitals, and consequences (18,21); embarrassment during breast examination (18,19); lack of awareness and knowledge about screening programmes (19,22) and doctor's recommendations (18,19); and concerns over consulting a male or a non-Arabic-speaking doctor (19). Conversely, feelings of susceptibility and a supportive social environment were facilitators for screening in the region (20). Therefore, awareness campaigns aimed at enhancing knowledge and changing perceptions about breast cancer and the implementation of culturally sensitive screening programmes are necessary for tackling the breast cancer burden in the region.

Despite the likelihood that low screening rates may lead to underestimation of breast cancer incidence in GCC countries, the increase in incidence may reflect improved screening practices and better access to healthcare systems in recent years, compared with the period before the socioeconomic development in the region (23). Concomitantly, improvements in the healthcare system has resulted in more robust reporting of epidemiological statistics (24). Additional incidence data to assess the recent trends, and evaluation of screening programmes are required.

Time trends of the breast cancer stage may clarify whether the observed increase in breast cancer incidence over time was a true increase (observed at all stages) or the result of earlier diagnosis (increase mainly in early stages). Unfortunately, there were limited data about the specific stage of breast cancer diagnosed over time for GCC countries (25,26).

Breast cancer incidence was compared between nationals and non-nationals in Kuwait, Qatar, and Saudi Arabia. GCC country nationals have free access to all healthcare services (28), but employers must pay annual fees that enable non-national workers to access healthcare services at a reduced cost (29). The exception is in Oman, where non-nationals must pay to access public and private health services other than emergency services (29). In Qatar, despite similar access to the healthcare system for nationals and non-nationals, we observed a higher breast cancer incidence among non-nationals – similar to that observed in other high-income countries – probably because of greater awareness of breast cancer symptoms, more

willingness to seek medical advice, and higher mammography screening uptake by non-nationals than nationals. This hypothesis needs to be investigated in future research.

Nationals and non-nationals in GCC countries seemed to have developed breast cancer at a younger age than women in other high-income countries. Breast cancer incidence was higher among women aged

A study strength was the use of cancer registry data over a long period of 38 years. In comparison, previous studies evaluated patterns and trends over 5–10-year periods and did not analyse available data for non-nationals (6,8,35). Albeshan et al. (8) used the IARC modelled GLOBOCAN incidence estimation for 2008 and 2012 instead of cancer registry incidence data. This conflicts with the recommendation of IARC that GLOBOCAN incidence estimations in 2008 and 2012 should not be compared because of methodological differences in calculating these estimates (12).

Limitations included the lack of data on breast cancer incidence among non-nationals. While the data on non-nationals in Kuwait spanned 24 years, those on non-nationals in Qatar and Saudi Arabia were available only for 3 years, precluding in-depth exploration. Therefore, there is a need for long-term data from GCC countries to investigate incidence differences between nationals and non-nationals. The IARC CI5 database contained no data relating to nationals in UAE, either because of poor quality or lack of reporting to IARC. Hence, the analysis conducted on UAE may have been of lower precision than that in the other GCC countries.

The quality of cancer-related data was limited in GCC countries than other high-income countries. The proportion of breast cancer cases that were microscopically verified and histologically confirmed cases was >97% in the region (36). Despite suggesting good data validity, such a high proportion of microscopically verified breast cancer cases may be a sign of registry incompleteness because of a lack of use of other case-finding procedures (37), and that the GCC registries are over-reliant on pathology laboratories as the primary source of information (36). This seemed to be confirmed by the percentage of breast cancer cases identified during necropsy examination of women in whom breast cancer had not been diagnosed during their lifetime (

Conclusion

Female breast cancer incidence has increased over time among most GCC countries, likely reflecting improvements in healthcare access and screening programmes. However, in contrast to other high-income countries, increased participation in screening continues to be critical for the region. GCC nationals and non-nationals appeared to have developed breast cancer at a younger age than women in other high-income countries. Risk factors specific to nationals and non-nationals in GCC countries should be further investigated. Evidence-based, locally informed

interventions addressing these factors must be implemented. Educational interventions should be implemented to increase awareness about breast cancer and eliminate associated barriers. Data collection related to breast cancer among nationals and non-nationals must be enhanced in the region to fully understand its epidemiology and improve national guidelines.

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Competing interests: None declared.

Étude écologique de l'incidence du cancer du sein chez les ressortissantes et les non-ressortissantes des pays membres du Conseil de coopération du Golfe

Résumé

Contexte : L'incidence du cancer du sein est en augmentation dans les pays membres du Conseil de coopération du Golfe (CCG) : Arabie saoudite, Bahreïn, Émirats arabes unis, Koweït, Oman et Qatar.

Objectifs : La présente étude a permis d'analyser les schémas géographiques, les tendances dans le temps et la répartition selon l'âge de l'incidence du cancer du sein chez les ressortissantes et les non-ressortissantes des pays membres du CCG.

Méthodes : Les données disponibles issues des registres du cancer pour la période 1979-2016 ont été extraites pour les pays membres du CCG. Les taux standardisés selon l'âge (TSA) pour 100 000 femmes ont été calculés sur la base de la population mondiale standard. Les comparaisons ont été faites en calculant les taux d'incidence comparatifs.

Résultats : Entre 1998 et 2012, l'incidence parmi les ressortissantes était la plus élevée à Bahreïn (TSA : 61,85), au Koweït (TSA : 52,66) et au Qatar (TSA : 56,90) et la plus faible en Arabie saoudite (TSA : 19,76), à Oman (TSA : 22,33) et aux Émirats arabes unis (TSA : 31,05). Au cours de la période la plus récente, seules des données concernant le Qatar (2014-2016) et l'Arabie saoudite (2013-2015) étaient disponibles. Les ressortissantes et les non-ressortissantes du Qatar présentaient des taux d'incidence plus élevés que celles de l'Arabie saoudite. L'incidence parmi les ressortissantes du Qatar était au moins deux fois plus élevée qu'en Arabie saoudite (voir la figure 2.32 sur l'incidence comparative), et celle parmi les non-ressortissantes était trois fois plus élevée qu'en Arabie saoudite. Parmi les ressortissantes du Koweït, 10,8 % des cas de cancer du sein sont survenus chez des femmes âgées de moins de 40 ans entre 2008 et 2012, tandis que ce taux était de 24,2 % chez les non-ressortissantes du Qatar pour la période 2014-2016.

Conclusion : L'incidence du cancer du sein a augmenté au fil du temps chez les femmes dans la plupart des pays membres du CCG, reflétant probablement les progrès réalisés en matière d'accès aux soins de santé et de programmes de dépistage. Les ressortissantes et les non-ressortissantes ont contracté le cancer du sein à un âge plus précoce que les femmes dans d'autres pays à revenu élevé. Une augmentation du taux de dépistage est encore nécessaire dans la Région. Des interventions fondées sur des données probantes et adaptées au contexte local devraient être mises en œuvre pour s’attaquer aux facteurs de risque spécifiques aux ressortissantes et aux non-ressortissantes des pays membres du CCG.

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