

Cancer Incidence and Mortality in the Kingdom of Bahrain Statistics and Trends

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Background: The availability of baseline data for cancer incidence and trends could help policy makers in implementing evidence-based strategies for cancer prevention, early detection and management.

Objective: To evaluate the epidemiology of cancer among the Bahraini population from 1998-2011.

Design: A Retrospective Study.

Setting: Cancer Registry, Ministry of Health, Bahrain.

Method: All cancer cases in the Bahrain Cancer Registry from 1 January 1998 to 31 December 2011 were reviewed.

Result: Between January 1998 to December 2011, 5,966 newly diagnosed cases of cancer were documented, an annual average of 426 cases; 2,815 (47.2%) were males, and 3,151 (52.8%) were females. The average annual crude incidence cancer rate was 86.3/100,000 Bahraini males and 97.5/100,000 Bahraini females. The average annual world ASRs were 136.4 and 135.8/100,000 Bahraini males and females, respectively. During the 14-year period, the world ASRs for the Bahraini population appear to have declined in both sexes. The decline was more marked among males, as rates dropped from 160.9 in 1998 to 111.2/100,000 in 2011. The average annual age-specific incidence rates were observed to increase dramatically with advancing age in both genders.

Conclusion: During the 14-year period, the average annual world ASRs were 136.4 and 135.8 per 100,000 Bahraini males and females respectively, which is higher than GCC states and lower than Australia/New Zealand.

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Cancer is a major challenge to health planners and strategists. The estimated number of new cases of cancer each year is expected to rise from 10 million in 2000 to 16 million by 2020¹. The number continues to grow every year by 3 to 4%. Nearly 60% of the increase would occur in developing countries where healthcare facilities and patients' care are limited. In the Eastern Mediterranean Region (EMR), the incidence of cancer is expected to increase by 1.8-fold during the next decade¹.

Change of lifestyle in developing countries has resulted into an increased incidence of cancer. The increase is mainly due to tobacco use, physical inactivity, and unhealthy food habits¹.

Yearly more than 6 million people worldwide die of cancer. Cancer is the second most common cause of death in the majority of developed countries and is the fourth leading cause of death in the EMR after cardiovascular diseases, infectious

diseases, and injuries¹. Members of many families are affected with cancer in different regions of the world¹.

However, 40% of all cancers are preventable; another 40% are curable. Palliative therapy for cancer patients could be used for the remaining 20%. Integration between primary, secondary and tertiary care is necessary for controlling cancer.

One hundred nineteen thousand two hundred eighty-eight were diagnosed with cancer from January 1998 to December 2009 among Gulf Cooperation Council (GCC) states' nationals (UAE, Bahrain, Saudi Arabia, Oman, Qatar and Kuwait); 58,629 cases (49.1%) were males and 60,659 (50.8%) were females².

The average annual world age-standardized cancer incidence rates (ASR) during the 12-year period from 1998 to 2009 were

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found to be similar between GCC males and females (82.9 per 100,000 in males and 83.7 per 100,000 in females). In males, the ASRs per 100,000 ranged between 75.7 in the Kingdom of Saudi Arabia (KSA) and 155.2 in Qatar, whereas, in females, the ASRs per 100,000 ranged between 75.2 in KSA and 180.3 in Qatar. The average annual age-specific incidence rates increase dramatically with advancing age in both genders².

Breast cancer is the most common female cancer in the 6 GCC countries; it is about 18.2% in Oman, 45.6% in Qatar and 37.1% in Bahrain of all female cancers. Bahrain and Qatar could be classified as medium breast cancer incidence areas whereas UAE, KSA and Oman are considered low incidence areas^{2,3,4}. GCC rates are about half those of the high-risk area countries, such as the United Kingdom and similar to the rates in medium-risk countries such as the Philippines and Singapore³.

The aim of this study is to evaluate the epidemiology of cancer among the Bahraini population from 1998 to 2011.

METHOD

All Bahraini cancer cases registered in Bahrain Cancer Registry between 1 January 1998 and 31 December 2011. CanReg-4 software was used to calculate incidence rates. Age and sex were standardized using the world standard population^{5,6}. SPSS version 20 was used to analyze the data. Data for Bahraini population was taken from Central Information Organization^{7,8}.

RESULT

Between January 1998 and December 2011, there were 5,966 newly diagnosed cases of cancer among the Bahraini population in the Kingdom of Bahrain with an annual average of 426 cases; 2,815 (47.2%) were males and 3,151 (52.8%) were females, see tables 1 and 2.

Table 1: Most Common Cancers among Bahraini Male Nationals, 1998 to 2011

MALES (N = 2,815)			
Site	No.	%	ASR
Lung	475	16.9	26.1
Colorectal	287	10.2	14.0
Bladder	220	7.8	11.7
Prostate	214	7.6	11.3
Leukemia	180	6.4	6.9
NHL	170	6.0	7.1
Stomach	115	4.1	6.2
Brain	101	3.6	3.8
Liver	97	3.4	4.7
Pancreas	90	3.2	4.6

Table 2: Most Common Cancers among Bahraini Female Nationals, 1998 to 2011

FEMALES (N = 3,151)			
Site	No.	%	ASR
Breast	1173	37.2	47.4
Colorectal	220	7	9.2
Lung	183	5.8	10
Thyroid	155	4.9	6
Ovary	147	4.7	6.5
NHL	123	3.9	5.4
Leukemia	122	3.9	4.4
Corpus Uteri	121	3.8	5.4
Cervix	111	3.5	5.1
Stomach	85	2.7	4

The average annual crude incidence cancer rate was 86.3/100,000 Bahraini males and 97.5/100,000 Bahraini females. The average annual world ASRs were 136.4 and 135.8 per 100,000 Bahraini males and females, respectively.

During the 14-year period, the world ASRs for the Bahraini population appear to have declined for both genders. The decline was more marked among males, as rates dropped from 160.9 in 1998 to 111.2/100,000 males in 2011, see figure 1.

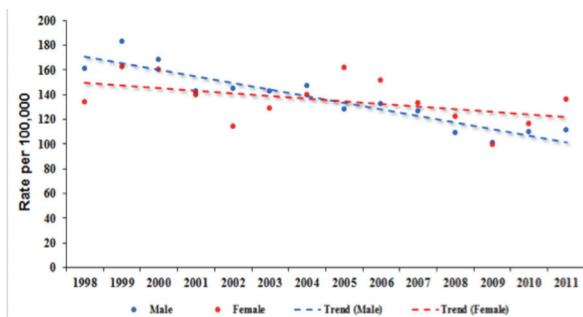


Figure 1: Age-Standardized Incidence Rates of Cancers among Bahrainis 1998 to 2011

The average annual age-specific incidence rates were observed to increase dramatically with advancing age in both genders, see figure 2.

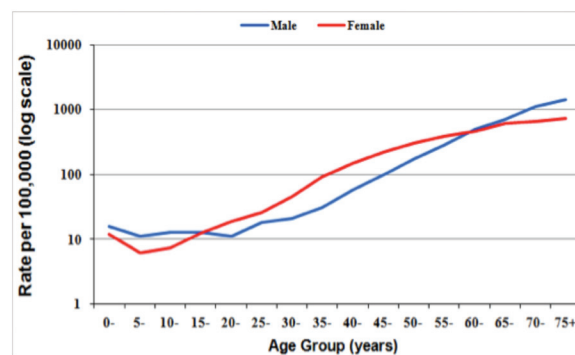


Figure 2: Average Annual Age-Specific Incidence Rates of Cancers among Bahrainis, 1998 to 2011

Breast cancer (1,191 cases), lung cancer (658 cases), colorectal cancer (507 cases), leukemia (302 cases), Non Hodgkin Lymphoma (293 cases), bladder cancer (276 cases), prostate cancer (214 cases) and thyroid cancer (195 cases) constituted more than half of the total cancer burden (61%; 3,636 new cases) during the 14-year period.

Between 1998 and 2011, lung cancer was observed to be the leading malignancy in Bahraini males (475 new cases), followed by cancers of the colorectum, bladder, prostate, and leukemia. Breast cancer was the leading malignancy in Bahraini females with 1173 new cases, followed by cancers of the colorectum, lung, thyroid and ovary.

During the 14-year period, lung cancer accounted for 16.9% of all cancers in males with an average annual ASR of 26.1/100,000 people. The incidence of lung cancer was observed to decline from 1998 to 2011. The lowest ASR (12.9/100,000) was reported in 2009 and the highest (36.7/100,000) in 1998. This could be due to the stringent tobacco control and preventive anti-smoking measures led by government and non-government bodies during this period⁹. On an average, the incidence begins at 30 years of age and was found to increase sharply with age, with the highest rates observed in males over 75 years of age, see figures 3 and 4.

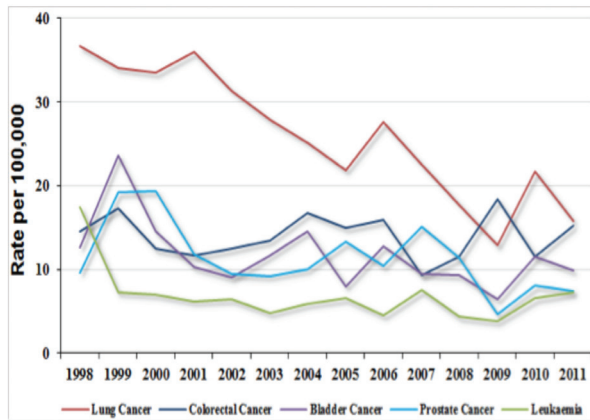


Figure 3: Age-Standardized Incidence Rates of Most Common Cancers among Bahraini Males, 1998 to 2011

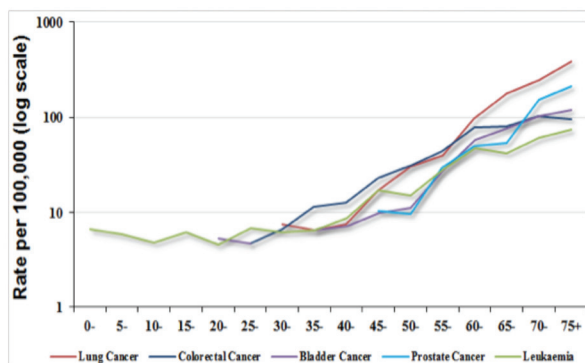


Figure 4: Average Annual Age-Specific Incidence Rates of Most Common Cancers among Bahraini Males, 1998 to 2011

Colorectal cancer accounted for 10.2% of all cancers in males with an average annual ASR of 14.0/100,000. Overall, colorectal cancer incidence continued to rise over the years; the lowest ASR (9.4/100,000) was reported in 2007 and the highest (18.4/100,000) in 2009. Age-specific incidence among males begins in the 25 to 29-year age group and steadily rises to a peak in the 70 to 74-year age group, see figures 3 and 4.

Bladder cancer was the third most common cancer in Bahraini males and accounted for 7.8% of all cancers in females, with an average annual ASR of 11.7/100,000. The incidence had a tendency to decline during the 14-year period; the lowest ASR (6.4/100,000) was reported in 2009 and the highest (23.6/100,000) in 1999. Bladder cancer first appears in early adulthood and directly increases with age after the age of 40 years, see figures 3 and 4.

Prostate cancer accounted for 7.6% of all incident cancers in Bahraini males, with an average annual ASR of 11.3/100,000. The incidence was observed to decline over time. The lowest ASR (4.6/100,000) was reported in 2009 and the highest (19.3/100,000) in 2000. Age-specific incidence of prostate cancer follows a pattern of sharp incline similar to that of lung cancer, but with a delayed start during late adulthood, see figures 3 and 4.

Leukemia was the fifth most common male cancer and accounted for 6.4% of all cancer cases in Bahraini males. The average annual ASR was 6.9/100,000. A decreasing ASR trend is observed from 1998 to 2011; the lowest ASR (3.9/100,000) was reported in 2009 and the highest (17.5/100,000) in 1998. Leukemia incidence has an initial peak at 15 years and then increases with advancing age after 40 years to reach its highest peak at age 75 and above, see figures 3 and 4.

Breast cancer is by far the most common female cancer and accounted for 37.2% of all incident cancer cases in Bahraini women between 1998 and 2011, with an average annual ASR of 47.4/100,000. Overall, breast cancer incidence showed a slight upward trend; the lowest ASR (30.8/100,000) was noted in 1998 and the highest (59.1/100,000) in 2005. The implementation of the mammography-based mass breast screening program in 2005 could account for the rise in incidence during 2005-2009⁹. The age-specific incidence follows a bimodal distribution among Bahraini females with the first mode between 45 and 55 years, and the second in the 65 to 69-year age group, see figures 5 and 6.

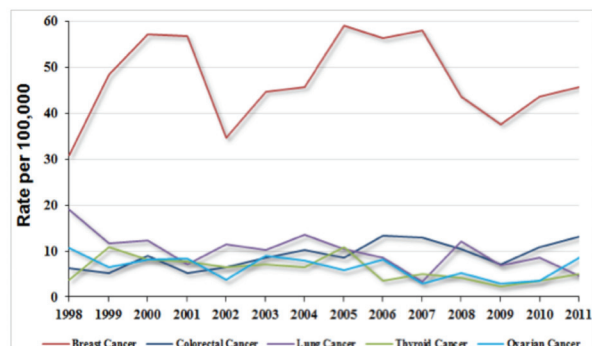


Figure 5: Age-Standardized Incidence Rates of Most Common Cancers among Bahraini Females, 1998 to 2011

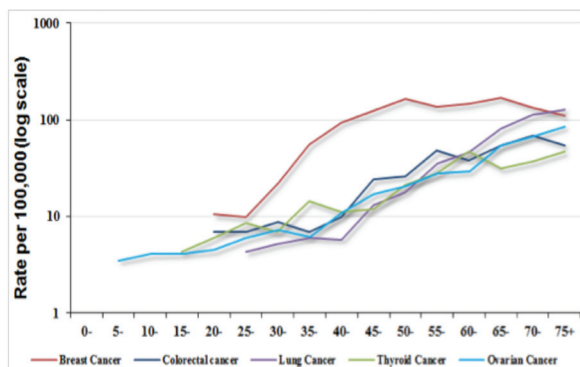


Figure 6: Average Annual Age-Specific Incidence Rates of Most Common Cancers among Bahraini Females, 1998 to 2011

Colorectal cancer accounted for 7% of all cancers in females with an average annual ASR of 9.2/100,000 people. Female incidence rates demonstrated a marked increase over the years. The ASR was lowest (5.3/100,000) in 2001 and highest (13.4/100,000) in 2006. Age-specific incidence rates indicate a slow and gradual increase with age; the peak in the 55-59-year age group and higher rates from 65 years and above, see figures 5 and 6.

During the 14-year period, lung cancer accounted for 5.8% of all new female cancers, with an average annual ASR of 10.0/100,000. Lung cancer incidence in females also showed a decline, though less dramatic than that in males. The lowest ASR (3.4/100,000) was reported in 2007 and the highest (19.0/100,000) in 1998. As with Bahraini males, lung cancer incidence was found to increase with age, with the highest rate observed in older age groups, see figures 5 and 6.

Thyroid cancer was the fourth most common female cancer between 1998 and 2011 and accounted for 4.9% of all incident cancer cases in Bahraini females, with an average annual ASR of 6.0/100,000 people. The incidence of thyroid cancer declined gradually; the ASR was lowest (2.2/100,000) in 2009 and highest (10.8/100,000) in 2005. Cases were seen in females as young as 15 years of age, and the incidence was found to increase with age with its highest peak at 60 to 64 years, see figures 5 and 6.

Ovarian cancer accounted for 4.7% of all incident cases in females, with an average annual ASR of 6.5/100,000. Incidence decreased from 1998 to 2011; the lowest ASR (3.0/100,000) was reported in 2009 and the highest (10.6/100,000) in 1998. Ovarian cancer begins in childhood at five years of age and the incidence increases with age to peak at ages of 75 years and above, see figures 5 and 6.

DISCUSSION

The incidence of cancers of the breast, lung, bladder, thyroid, uterus, and ovary in Bahrain is higher compared to other Gulf countries^{2,7,8}.

During the 14-year period, the average annual world ASRs were 136.4 and 135.8 per 100,000 Bahraini males and females respectively, which is higher than other GCC states². In GCC (1998-2009) the average ASR 82.9/100000 in males

and 83.7/100000 for females². Globally, the overall age-standardized cancer incidence rate is nearly 25% higher in men (205/100000) than women (165 per 100000). Among males, the incidence rate ranges from 79/100,000 in Western Africa to 365/100,000 in Australia/New Zealand. Among females, the incidence rate ranges from 103/100,000 in South-Central Asia to 295/100,000 in Northern America¹.

The world ASRs for the Bahraini population appear to have declined in both genders⁵. The decline was more marked among males, as the rate dropped from 160.9 in 1998 to 111.2/100,000 males in 2011.

Between 1998 and 2011, lung cancer was observed to be the leading malignancy in Bahraini males with an average annual ASR of 26.1/100,000. During the 14-year period, lung cancer accounted for 5.8% of all new female cancers, with an average annual ASR of 10.0/100,000. Lung cancer is the seventh most common cancer in GCC with overall ASR 7.2 and 2.2/100000 populations for males and females respectively².

Lung cancer is the most common cancer among males. The highest rates were in Central and Eastern Europe (53.5/100,000); the lowest incidence rates were in Western Africa (1.7/100,000)^{1,6}.

In females, the incidence rate of lung cancer is lower than males with some geographical variation which may be explained by the historical exposure to tobacco smoking. The highest estimated rates are in Northern America (33.8) and the lowest rates again in Middle Africa (0.8)¹.

The incidence of lung cancer was observed to decline from 1998 to 2011 in males and females. This could be due to the stringent tobacco control and preventive anti-smoking measures led by government and non-government bodies during this period. In other GCC states, lung cancer incidence continues to increase (1998 to 2009)².

Breast cancer is by far the most common female cancer and accounted for 37.2% of all cancer cases in Bahraini females between 1998 and 2011, with an average annual ASR of 47.4/100,000. Overall, breast cancer incidence showed a slight upward trend; Breast cancer is the most common cancer in GCC with an average ASR 20.4/100000. Breast cancer incidence continues to increase from 1998 to 2009 in GCC². Worldwide, breast cancer is the second most common cancer with an estimated 1.67 million new cancer cases diagnosed in 2012 (25% of all cancers). The incidence rates vary from 27/100,000 in Middle Africa and Eastern Asia to 96 in Western Europe^{1,6}.

Colorectal cancer was the second most common cancer in Bahrain. Accounted for 10.2% of all incident cancers in males with an average annual ASR of 14.0/100,000e. Colorectal cancer accounted for 7% of all incident cancers in females with an average annual ASR of 9.2/100,000. In Bahrain, colorectal cancer incidence continued to rise over the years.

Colorectal cancer is the second most common cancer in GCC with ASR 8.5 and 7.2/100000 for males and females respectively. Colorectal cancer incidence continues to increase in GCC from 1998 to 2009². The highest rate was found in

Australia (ASR 44.8 in males and 32.2 in female and the lowest rate was found in Western Africa (4.5 in males and 3.8 in females)⁹.

CONCLUSION

During the 14-year period, the average annual world ASRs were 136.4 and 135.8/100,000 Bahraini males and females respectively, which is higher than GCC states and lower than Australia/New Zealand.

Cancer is a major public health problem which needs thorough review and analysis by the policy makers. Further researches are needed to understand the multifactorial role of the risk factors of cancer. Future researches should also clarify the reasons behind the higher cancer incidence rate relative to other GCC countries.

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REFERENCES

1. World Health Organization. The GLOBOCAN Project. International Agency for Research on Cancer. <http://globocan.iarc.fr> Accessed on 16 June 2015.
2. Cancer incidence among nationals of the GCC states, 1998–2009, Riyadh, Saudi Arabia. Gulf Centre for Cancer Control and Prevention 2013. [http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(15\)70034-3/fulltext](http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(15)70034-3/fulltext) Accessed on 18 June 2015.
3. World Health Organization. International Agency for Research on Cancer. Parkin DM, Whelan SL, Ferlay J, et al, eds. Cancer Incidence in Five Continents Vol. VIII. LARC Scientific Publication No.155. <http://www.iarc.fr/en/publications/pdfs-online/epi/sp155/> Accessed on 19 July 2015.
4. Alsayyad J, Hamadeh R. Cancer Incidence among the Bahraini Population: A Five-Year (1998-2002) Experience. *Ann Saudi Med* 2007; 27(4): 251-8.
5. Ahmad OB, Boschi-Pinto C, Lopez AD, et al. Age Standardization of Rates: A New Who Standard GPE Discussion Paper Series: No.31. World Health Organization 2001.
6. Forman D, Bray F, Brewster DH, et al, eds. Cancer Incidence in Five Continents Vol. X. Lyon, France: International Agency for Research on Cancer, 2014: 112-113.
7. General Directorate of Statistics 2011. Central Informatics Organization. http://www.cio.gov.bh/cio_eng/default.aspx Accessed on 19 July 2015.
8. Census Summary Result 2010 – Population, Housing, Buildings, Establishments and Agriculture Census. Central Informatics Organization. http://www.cio.gov.bh/CIO_ARA/English/Publications/Census/2011%2009%2018%20Final%20English%20Census%202010%20Summary%20%20Results%20-%20Review%201.pdf Accessed on 20 July 2015.
9. Hamadeh RR, Alsayyad J. Cancer Incidence among Nationals in Bahrain. In: Tuncer AM, ed. Asian Pacific Organization for Cancer Prevention Cancer Report 2010. Ankara, Turkey: New Hope in Health Foundation, 2010: 295-6.