



## Cancer Incidence in Oman (1996–2015)

Jawad A. Al-Lawati<sup>1\*</sup>, Ibrahim Al-Zakwani<sup>2</sup>, Ibtihal Fadhil<sup>3</sup> and Bassim J. Al-Bahrani<sup>4</sup>

<sup>1</sup>Directorate General of Primary Health Care, Ministry of Health, Muscat, Oman

<sup>2</sup>Department of Pharmacology and Clinical Pharmacy, College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman

<sup>3</sup>Eastern Mediterranean NCD Alliance, Kuwait, Kuwait

<sup>4</sup>National Oncology Centre, Royal Hospital, Muscat, Oman

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Cancer remains a major public health problem worldwide. In 2018, the International Agency for Research on Cancer (IARC) estimated that over 18 million new cases of cancer were diagnosed and nearly 10 million people lost their lives to this group of diseases.<sup>1</sup> Yet, cancer is not invincible and can be abated through effective cancer control programs that implement evidence-based strategies for prevention, early detection, treatment, palliation, and making the best use of available resources.<sup>2</sup> Such programs aim to reduce cancer incidence, its associated morbidity and mortality, and improve quality of life.<sup>3</sup> However, this requires careful planning, continuous monitoring and evaluation of processes, and output and outcome indicators to assess whether program objectives are achieved. One of the most common methods to obtain such indicators is through cancer surveillance systems in the form of population-based cancer registries that systematically collect, analyze, and report cancer data of a well-defined geographical area.

In this issue, Al-Lawati and colleagues provide evidence of the cancer burden in Omanis over the past two decades (1996–2015).<sup>4</sup> This publication comes 24 years after the Oman National Cancer Registry (ONCR) was transformed from a hospital-based registry (documenting only cases diagnosed and histologically confirmed in tertiary hospitals in the Muscat governorate) to a population-based registry covering the entire country and including all cancers diagnosed by multiple modalities and all medical disciplines. Data of the ONCR were assessed by the IARC and were included in volume VIII and IX of *Cancer Incidence in Five Continents*.<sup>5–7</sup>

Currently, this registry covers nearly five million Omanis and expatriates with three-trained cancer registrars and a medical supervisor. It also provides an important database<sup>4</sup> for policy makers in setting priorities for the prevention and control of cancer in Oman as well as being a tool for monitoring its incidence trends over time.

The reported incidence data<sup>4</sup> are limited to Omani nationals and exclude expatriates working in Oman due to their skewed distribution (mostly young males coming from diverse geographical regions worldwide making it complex to define a denominator to calculate incidence).

From 1996 to 2015, over 21 000 cases of cancer were registered among Omanis, with an average of 1050 cases/year. The frequency of cases among both genders was similar (51% men vs. 49% women). The average annual age-standardized incidence rates (ASR) reported were slightly higher in men than women (105.2 vs. 96.3 cases per 100 000, respectively). These rates are half the rates reported globally (218.6 and 182.6 per 100 000 in males and females, respectively)<sup>8</sup> mostly due to the young structure of the Omani population with only 3–4.3% aged above 65 years. Similar low rates were also reported from neighboring Gulf Corporation Council (GCC) countries (Bahrain 105.2 per 100 000, Qatar 112.5 per 100 000, Saudi Arabia 88.7 per 100 000, Kuwait 121.8 per 100 000, and the UAE 112.5 per 100 000 population).<sup>9</sup>

The 20-year trends data show breast and thyroid cancers to be the most common malignancies affecting Omani women (accounting for 21.2% and 10.0% of all cases, respectively).<sup>4</sup> A similar pattern was seen in all GCC states between 1998 and 2007.<sup>10</sup>

The incidence rate of breast cancer nearly doubled between 1996 and 2015 from 13.6 to 26.9 per 100 000 women.<sup>4</sup> This increase is classically thought to be related to a higher prevalence of some known risk factors related to menstruation (early menarche, late menopause), hormonal intake (oral contraceptive/hormone replacement therapy), nutrition (alcohol), body weight (obesity), and inactive lifestyles.<sup>11</sup> Better awareness of breast cancer signs and symptoms (one study showed that 81% of women in Oman have average or excellent knowledge of breast cancer)<sup>12</sup> combined with Oman's social and economic developments, including the postponement of childbearing and having fewer children, better surveillance, ad hoc mammography screening, and breast examination, may have contributed to its earlier detection and treatment, which inflated incidence rates<sup>1</sup> seen in Oman. Current data also show an increase in thyroid cancer from 2010, just about the same period of increased breast cancer frequencies.<sup>4</sup> The significance of this association remains unclear and warrants further research, as higher rates of thyroid cancer in women with a history of breast cancer are expected.<sup>13</sup>

In the past 20 years, breast cancer in males has accounted for 4.3% of all breast malignancies, a frequency much higher than reported from the USA (1%) for example.<sup>14</sup> Genetic factors including BRCA2 mutations, family history, age, androgen/estrogen imbalance, and environmental exposures may predispose male breast cancer and thus may require further investigation in Oman.<sup>14</sup>

While breast and thyroid cancers have mostly dominated the trends of cancer among Omani women, the trends among Omani men have changed. Between 1996 and 2005, stomach cancer was the leading malignancy among men with an ASR of between 11.6 and 16.2 cases per 100 000.<sup>4</sup> Oman always reported the highest incidence of stomach cancer among all Arab states.<sup>7,15,16</sup> However, in 2015, the risk of gastric cancer declined to half what it was in 2005 (5.7 cases per 100 000). The reasons for this decline are unclear and could be partly linked to increased use of refrigeration for food storage<sup>1</sup> owing to the wide availability of electricity throughout the country since 1970. This increased the availability of fresh fruits and vegetables and decreased the need for salt-preserved foods (containing nitrosamines implicated in the etiology of stomach cancer). Some also link this decline in stomach cancer to the

frequent use of triple therapy antibiotics and proton pump inhibitors to treat *Helicobacter pylori* infection (a risk factor for gastric cancer).<sup>1</sup>

As stomach cancer incidence declined from 2006 onwards, prostate cancer has overtaken stomach as the leading malignancy in Omani men (9.3% of all male cancers) followed by colorectal cancer (8.9% of all male cancers).<sup>4</sup> Similarly, in neighboring GCC countries, prostate cancer was also emerging as one of the leading cancers among men with 8.1% of males affected in Bahrain, 9.5% in Qatar, 12.2% in the UAE, and 14.4% in Kuwait.<sup>9</sup> This pattern is also consistent with trends observed in Western Europe, the Americas, Australia, and Sub-Saharan Africa, where prostate cancer dominates all other male malignancies.<sup>1</sup> This increase in colorectal cancer and the concomitant decline of gastric cancer in Oman could also be attributed to the increase in Oman's Human Development Index ranking from high to very high in 2011.<sup>17</sup> This could also be a reflection of overdiagnosis due to the frequent use of prostatic specific antigen and ultrasonography in the diagnosis of prostatic cancer.<sup>1</sup>

Although lung cancer is the most common cancer among both sexes worldwide,<sup>1</sup> in Oman it ranked the fifth among men and lower among common cancers affecting both men and women.<sup>4</sup> This could be due to Oman being one of the lowest prevalence countries for tobacco use in the world, ranking 11<sup>th</sup> among 149 countries for current age-standardized smoking rates (8.1% for both genders, 15.6% in men and 0.5% in women).<sup>18</sup> Before 1970, smoking in public places was a crime punishable by imprisonment.<sup>19</sup> This might have led to the formation of a non-smoker-cohort with a low incidence of lung cancer. Any negative impact of the current generations' smoking habits will only become apparent on lung cancer incidence rates in the next 15 to 20 years. Oman's government imposes custom tariffs (at the rate of 100% ad valorem tax) on all tobacco products. Recently, additional selective taxes, at a rate of 100% of retail prices, on all tobacco products, alcoholic beverages, and energy drinks, and 50% on sugary drinks were added to curb the burden of non-communicable diseases risk factors including cancer.<sup>20</sup> Such fiscal policy when coupled with other tobacco control strategies<sup>19</sup> (e.g., comprehensive bans on indoor smoking in public places, bans on tobacco advertisement, promotion and sponsorship, and public education on the dangers of tobacco use) is likely to reduce chances of future lung cancer epidemics.

The current published ONCR data<sup>4</sup> illustrate the essential role of such tools in documenting and monitoring cancer trends and for effective planning of cancer control services in any nation/region. Twenty-four years on, the ONCR should strive to consolidate this surveillance tool and provide in its annual publication reports data on patients' five-year survival rates for most common cancers affecting Omanis, collect data on the staging of all tumors to monitor down-staging of some malignancies following implementation of educational programs for some common cancers. The availability of timely and outcome-driven clinical endpoints in the cancer registry data will lead to greater use of this information by cancer epidemiologists and clinical oncology research teams to reduce the cancer burden in the long run in Oman.

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