

CMEARTICLE

Singapore cancer trends in the last decade

Lim GH^{1,2}, MSc, Chow KY¹, MBBCh, MMed, Lee HP³, MSc, MBBS

ABSTRACT In this review, we examine the trends in cancer incidence, mortality and survival in the last decade, using published data from the Singapore Cancer Registry in the period 1998 to 2009. While overall cancer incidences have remained stable, overall cancer mortality rates have declined for both genders. Thus, it is not surprising that there was an improvement in cancer survival. A steady decrease in lung cancer among males and females was observed, thereby leading to a drop in its cancer ranking. In the last five years, the most frequently occurring cancer was colorectal cancer among the male population and breast cancer among females. Survival for both cancers remained relatively optimistic. There is good reason to pay special attention to colorectal cancer due to its high frequency of occurrence among the Singapore population and because it is amenable to early detection via screening.

Keywords: cancer, incidence, mortality, Singapore, survival
Singapore Med J 2012; 53(1): 3–10

INTRODUCTION

Cancer is one of the principal causes of death. Cancer constituted 27.7% of the total deaths in Singapore in the year 2007, before climbing to 29.3% of total deaths in Singapore in 2009.⁽¹⁾ Cancer was one of the leading causes of burden of disease and injury, accounting for 18.4% of the total disability-adjusted life years.⁽²⁾ Lung, colorectal and breast cancers were the top causes of cancer burden.⁽³⁾

In this review, we summarise the overall cancer trends in Singapore over the last decade, using publicly available cancer data from the Singapore Cancer Registry in the period 1998 to 2009.^(4–7) In addition, we highlight some cancers that are still prevalent among the Singapore population, or have been on the rise in the recent years. To facilitate discussion, Table 1 presents the age-standardised cancer incidence, mortality and survival estimates over the period of study for both males and females. Cancer trends between the genders, as well as among ethnic groups in Singapore, are also compared in this article. The trends in Singapore are also compared with those of other populations in countries such as the USA, Malaysia, China and India in order to evaluate various aspects of cancer control in the country.

OVERALL TRENDS IN SINGAPORE

Incidence

While the age-standardised incidence rates (ASRs) for cancer have been fairly stable among males from 1998 to 2009, females experienced a slight increase in cancer incidence over the same period. Cancer incidence among males remained higher than that among females, with a convergence in trends in the later years. In the last decade, cancer incidences remained stable for both genders. (Fig. 1) The ASR for males was 230.5 cases per 100,000 person-years in 1998–2002, 230.0 per 100,000 person-years in 2003–2007, and 230.2 per 100,000 person-years in

2005–2009. The ASR for females was 201.7, 203.4 and 205.9 cases per 100,000 person-years in 1998–2002, 2003–2007 and 2005–2009, respectively.^(4,5,7)

In the last decade, lung cancer incidence has been on the decline, while the trend of colorectal cancer seemed to have stabilised among males. Among females, while breast cancer incidence had risen regardless of age groups, colorectal cancer seemed to be on the decline for those aged ≥ 65 years. Colorectal cancer among women aged 35–64 years remained fairly low and stable throughout the years.

Among males, prostate cancer incidence has risen to overtake liver cancer as the third most frequent cancer in the last five years. In 1998–2002, the ASR of prostate cancer was 17.7 per 100,000 person-years, and in 2005–2009, it was 26.7 per 100,000 person-years. Among females, the three most frequent cancers were breast, colorectal and lung cancers. Breast cancer remained the most common cancer among females, with an ASR of 55.4 per 100,000 person-years in 1998–2002 and 60.0 per 100,000 person-years in 2005–2009.

The trends in cancer incidence for different ethnic groups among both genders are depicted in Fig. 2. The Chinese have the highest cancer incidence among the three ethnic groups. While a decrease in cancer incidence among Chinese males was observed over the years, there was a slight increase in cancer incidence among Malay males. However, cancer incidence among Chinese females appeared to be on the increase, with a plateau effect in the last decade, and Malay females experienced an upward trend in cancer incidence from 1968 to 2009, also with a stabilising trend over the last ten years. Regardless of ethnicity, the top most frequent cancers among males were lung and colorectal cancers in the last ten years. In 2005–2009, the percentage of lung cancer varied from 11.7% among the Indians to 19.5% among the Malays, and the percentage of colorectal cancer varied from 14.4% among the

¹National Registry of Diseases Office, Health Promotion Board, Singapore, ²Health Services Research and Evaluation Division, Ministry of Health, Singapore, ³Saw Swee Hock School of Public Health, National University Health System, Singapore

Correspondence: Ms Lim Gek Hsiang, Biostatistician, National Registry of Diseases Office, Health Promotion Board, 3 Second Hospital Avenue, Singapore 168937. lim_gek_hsiang@hpb.gov.sg

Table 1. Age-standardised incidence and mortality rates, and five-year age-standardised relative survival ratio stratified by gender and year.

| Type of cancer | Age-standardised incidence rate (per 100,000 person-years) | | | Age-standardised mortality rate (per 100,000 person-years) | | | 5-year age-standardised relative survival ratio (%) | |
|----------------|---|-----------|-----------|---|-----------|-----------|--|-----------|
| | 1998–2002 | 2003–2007 | 2005–2009 | 1998–2002 | 2003–2007 | 2005–2009 | 1998–2002 | 2003–2007 |
| Males | | | | | | | | |
| All cancers | 230.5 | 230.0 | 230.2 | 144.2 | 123.2 | 117.8 | 39.4 | 44.6 |
| Lung | 45.0 | 40.8 | 38.5 | 41.3 | 36.1 | 34.2 | 9.7 | 9.6 |
| Colon-rectum | 40.1 | 40.5 | 40.1 | - | - | 17.2 | - | - |
| Colon | 22.8 | 23.0 | - | 13.2 | 12.1 | - | 54.2 | 57.5 |
| Rectum | 17.3 | 17.5 | - | 5.8 | 5.8 | - | 56.1 | 52.8 |
| Prostate | 17.4 | 23.9 | 26.7 | 5.8 | 4.7 | 5.1 | 72.2 | 84.7 |
| Females | | | | | | | | |
| All cancers | 201.7 | 203.4 | 205.9 | 90.0 | 78.2 | 76.8 | 52.8 | 57.5 |
| Lung | 16.3 | 16.0 | 15.4 | 14.6 | 13.1 | 13.1 | 11.6 | 14.1 |
| Colon-rectum | 29.4 | 29.0 | 28.6 | - | - | 11.6 | - | - |
| Colon | 19.0 | 19.1 | - | 10.6 | 9.0 | - | 51.3 | 57.5 |
| Rectum | 10.4 | 9.9 | - | 3.4 | 3.1 | - | 56.3 | 58.7 |
| Breast | 54.9 | 58.5 | 60.0 | 14.1 | 13.6 | 14.2 | 76.6 | 76.4 |
| Cervix | 10.6 | 8.8 | 7.8 | 4.5 | 3.4 | 2.9 | 66.1 | 66.6 |
| Uterus | 9.4 | 11.7 | 12.1 | - | 1.1 | - | 67.7 | 70.4 |

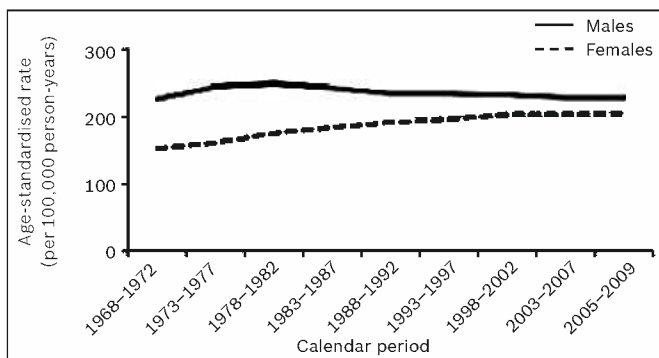


Fig. 1 Graph shows age-standardised cancer incidence rates among males and females.

Indians to 18.3% among the Chinese. Similarly, among females, colorectal cancer varied from 8.1% among the Indians to 15.4% among the Chinese, and breast cancer varied from 28.3% among the Chinese to 37.9% among the Indians.⁽⁵⁾

The ASRs of cancer among Chinese males and females were 245.6 and 212.8 per 100,000 person-years, respectively in 2005–2009, which were higher than those among the Chinese in China. In 2008, the ASRs among males and females in China were 211.0 and 152.4 per 100,000 person-years, respectively. While the ASRs among Malay males and females in Singapore were 174.8 and 183.4 per 100,000 person-years, respectively in 2005–2009, the ASRs in Malaysia were 142.9 and 145.2 per 100,000 person-years, respectively, in 2008. Cancer incidences for Singaporean Indian males and females, which have been fluctuating and hovering between 100 and 150 cases per 100,000 person-years from 1998 to 2009, were higher as compared to those among Indians in India; the reported ASRs for the latter were 92.9 and 105.5 per 100,000 person-years for males and females, respectively.⁽⁶⁾

Mortality

As illustrated in Fig. 3, a declining trend in cancer mortality rates, regardless of gender, in the last decade (recent 2000s) has been observed. Among males, lung cancer was the most

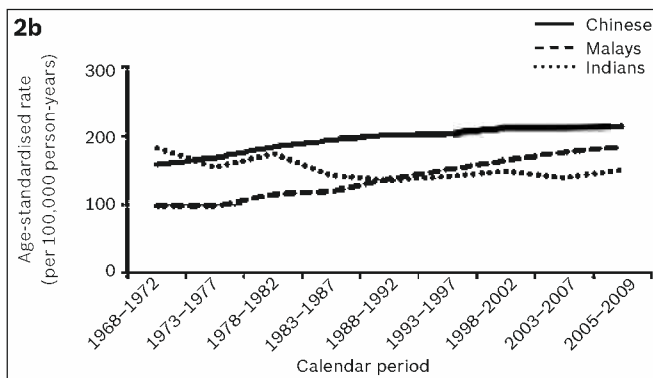
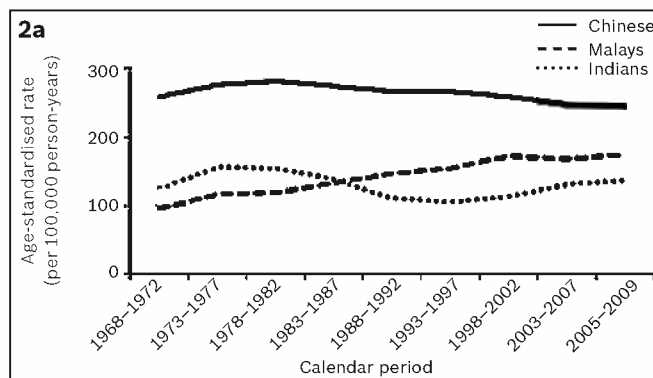


Fig. 2 Graphs show age-standardised cancer incidence rates according to race among (a) males and (b) females.

common cause of cancer deaths among all Singapore residents in the period 2005–2009 ($n = 3,541$, $ASR = 34.2$ per 100,000 person-years), followed by colorectal ($n = 1,809$, $ASR = 17.2$ per 100,000 person-years) and liver ($n = 1,561$, $ASR = 14.8$ per 100,000 person-years) cancers. Among females, breast cancer was the most common cause of cancer deaths among all Singapore residents in the period 2005–2009 ($n = 1,769$, $ASR = 14.2$ per 100,000 person-years), followed by lung ($n = 1,714$, $ASR = 13.1$ per 100,000 person-years) and colorectal ($n = 1,564$, $ASR = 11.6$ per 100,000 person-years) cancers. While the ranking of the cancers remained unchanged over the past decade for

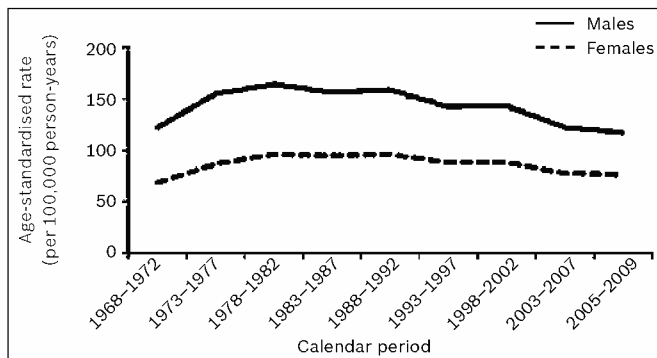


Fig. 3 Graph shows age-standardised cancer mortality among males and females.

males, breast cancer mortality has overtaken that of lung cancer among females. This was primarily due to the decline in overall lung cancer mortality rate in the last decade. While the age-standardised mortality rates for lung cancer were 14.6 and 13.1 per 100,000 person-years in 1998–2002 and 2005–2009, respectively, those for breast cancer hovered at 14.2 per 100,000 person-years in the last ten years.^(4,7)

In the period 2005–2009, the age-standardised mortality was 117.8 per 100,000 person-years for males and 76.8 per 100,000 person-years for females.⁽⁶⁾ Among males, the age-standardised mortality rate in Singapore was higher than that in Malaysia (106.6 per 100,000 person-years), China (158.6 per 100,000 person-years) and India (71.2 per 100,000 person-years), but lower than that in the USA (121.4 per 100,000 person-years). Among females, the age-standardised mortality rate in Singapore was higher than that in India (65.5 per 100,000 person-years), but lower than that in Malaysia (82.2 per 100,000 person-years), China (91.5 per 100,000 person-years) and the USA (90.6 per 100,000 person-years).⁽⁶⁾

Survival

Female cancer patients generally had better survival than male patients. An improvement in survival was seen in both genders from 1973 to 2007 (Fig. 4). Among males, the five-year age-standardised relative survival ratio (RSR) increased from 39.4% in 1998–2002 to 44.6% in 2003–2007. The ten-year age-standardised RSR increased from 35.4% in 1998–2002 to 40.7% in 2003–2007. Similarly, among females, the five-year age-standardised RSR increased from 52.8% in 1998–2002 to 57.5% in 2003–2007, and the ten-year age-standardised RSR increased from 45.8% in 1998–2002 to 52.8% in 2003–2007. Males generally had a greater percentage of advanced cancers than females.⁽⁶⁾ While improvements in survival tended to be observed among cancers in the local stage or with a favourable prognostic outlook, such as cancers of the breast and colorectum, survival among cancers with a poor prognostic outlook remained low.⁽⁹⁾

CANCERS IN FOCUS

In this section, the incidence, mortality and survival trends in cancers of the lung, colorectum, breast, cervix, prostate and

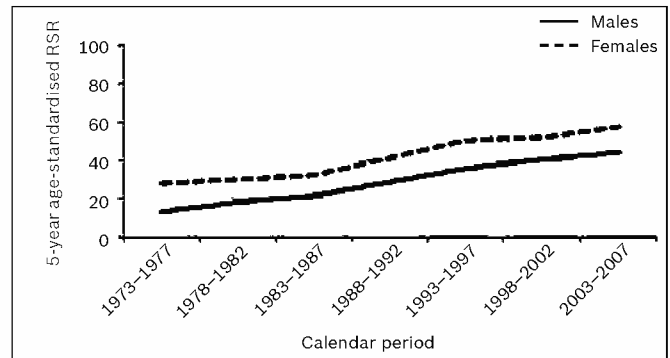


Fig. 4 Graph shows the 5-year age-standardised relative survival ratio (RSR) among males and females.

uterus are described, due to their high frequency of occurrence in the population.

Lung cancer

Cancer trends in Singapore

Lung cancer has been one of the top three most frequently occurring cancers among both genders from 1968 to 2007. During the period from 1998 to 2002, the number of newly diagnosed lung cancer cases among male Singapore residents was 3,571 (ASR: 45.0 per 100,000 person-years), and 1,597 among female Singapore residents (ASR: 16.3 per 100,000 person-years). In 2005–2009, the number of newly diagnosed lung cancer cases among male and female Singapore residents was 3,447 (ASR: 41.4 per 100,000 person-years) and 1,762 (ASR: 16.5 per 100,000 person-years), respectively. Adenocarcinomas constituted the majority of these lung cancer cases. In 1998–2002, adenocarcinomas comprised 42.1% of the cases, and in 2003–2007, they comprised 43.2% of the cases.^(5,7) However, there has been a declining trend in the lung cancer incidence among males since the year 1980, whereas the pattern remained stable among females throughout 1968–2009.⁽⁴⁾

As cigarette smoking continued to be the most important modifiable risk factor for lung cancer,^(10,11) the decrease in lung cancer incidence, especially among males, could have been due to the efforts to reduce smoking in Singapore since the 1970s. Efforts started with legislations in the 1970s to ban smoking in public areas and prohibit tobacco advertisement and promotion. In 1986, the National Tobacco Control Programme (NTCP), led by the Ministry of Health in Singapore, was set up in order to reduce the prevalence of smoking in the country. The programme was strengthened in 2001 when the Health Promotion Board was tasked to oversee and coordinate the health promotion programmes, including the NTCP. The policies and programmes implemented have reduced the smoking prevalence rate from 20.0% in 1984⁽¹²⁾ to 14.3% in 2010.⁽¹³⁾

Similar patterns were observed in the age-standardised mortality rates of lung cancer for both males and females, with a downward trend among males since the 1980s and a relatively consistent trend among females.⁽¹⁴⁾ In 2005–2009, the age-standardised mortality rate among males was 34.2 per 100,000 person-years and that among females was 13.1 per 100,000 person-

years. Although there has been a slight improvement in survival among lung cancer patients since the 1980s, the overall survival continued to be poor. In 2003–2007, the one- and five-year age-standardised RSRs among males were 33.3% (95% confidence interval [CI] 29.9–36.6) and 9.6% (95% CI 7.4–12.2), respectively. Among females, the one-year age-standardised RSR was 44.5% (95% CI 39.4–49.2) and the five-year age-standardised RSR was 14.1% (95% CI 10.4–18.4).

Comparison with other populations

The age-standardised incidence and mortality rates in Singapore were compared to those of the western population such as the USA, as well as Asian populations such as Malaysia, China, and India. While lung cancer incidence among Singapore males (ASR: 41.4 per 100,000 person-years in 2005–2009) was comparable to that among males in China and the USA, it was much higher than that among males in Malaysia and India. The ASRs of lung cancer among males in the USA, Malaysia, China and India were 49.5, 26.8, 45.9 and 10.9 per 100,000 person-years, respectively. Among females, the lung cancer incidence rate was comparable to that in China but higher than that in Malaysia and India, and much lower than that in the USA. The ASRs of lung cancer among females in the USA, Malaysia, China and India were 36.2, 9.2, 21.3 and 2.5 per 100,000 person-years, respectively.

The patterns in mortality trends among both genders were similar to those observed in the incidence trends. Among males, the age-standardised mortality rates of lung cancer in the USA, Malaysia, China and India were 38.1, 24.8, 39.6 and 9.8 per 100,000 person-years, respectively, and among females, they were 24.1, 8.5, 18.3 and 2.3 per 100,000 person-years, respectively.⁽⁸⁾ Generally, the one-year age-standardised RSR for lung cancers among both genders was lower than that in the USA (as represented by the Surveillance, Epidemiology and End Results [SEER] registries) and most of the European countries, except the UK.⁽⁶⁾

Colorectal cancer

Cancer trends in Singapore

The incidence of colorectal cancer has been rather stable in the last decade. The ASR of colorectal cancer in the periods 1998–2002 and 2005–2009 was 40.1 per 100,000 person-years among males. Although its incidence has remained stable in the last ten years, colorectal cancer has overtaken lung cancer in the last five years to become the most frequently occurring cancer among Singapore males. This was mainly due to the reduction in lung cancer incidence. Among females, the ASRs of colorectal cancer were 29.4 and 28.6 per 100,000 person-years in 1998–2002 and 2005–2009, respectively. It remained the second most frequently occurring cancer after breast cancer among females. A difference was observed among both males and females, particularly in those aged ≥ 65 years. While there was an increase in the ASRs of colorectal cancer among older men, a decrease was observed among older women.⁽⁵⁾ The difference in

trends could have been due to the difference in the amount of exposure to dietary and lifestyle factors among men and women when they were young, as well as the prophylactic removal of precancerous lesions among females.⁽¹⁵⁾

Similarly, a relatively stable trend was observed for newly diagnosed colon and rectum cancers separately. For colon cancers, the ASRs in 2005–2009 were 23.0 per 100,000 person-years among males and 19.1 per 100,000 person-years among females. Correspondingly, for rectum cancers, the ASRs in 2005–2009 were 17.5 per 100,000 person-years among males and 9.9 per 100,000 person-years among females.

A slight decline in the age-standardised mortality rates of colon cancer was observed among both genders. Comparing the periods 1998–2002 and 2003–2007, the age-standardised mortality rates of colon cancer decreased from 13.2 to 12.1 per 100,000 person-years among males, and from 10.6 to 9.0 per 100,000 among females. However, those of rectum cancers remained similar among males and females in the same periods. In 2003–2007, the rates among males and females were 5.8 and 3.1 per 100,000 person-years, respectively. Generally, a slight improvement in survival was observed among males and females for both colon and rectum cancers, with the exception of male rectum cancers. The five-year age-standardised RSR among male rectum cancers decreased from 56.1% in 1998–2002 to 52.8% in 2003–2007.

Comparison with other populations

In the last decade, the colorectal cancer incidence rates in Singapore appeared to have reached a plateau. This was similar to what was experienced in New Zealand, where stable colorectal cancer incidence was also observed. In the UK, colorectal cancer was on the rise, while in the USA and western Europe, it was on the decline.⁽¹⁶⁾ The 2005–2009 male colorectal cancer incidence rate of 40.1 per 100,000 person-years was higher than that in the UK and USA, but comparable to that in western Europe. Among males in 2008, the ASR was 36.3 per 100,000 person-years in the UK, 34.1 per 100,000 person-years in the USA and 41.3 per 100,000 person-years in western Europe. Female colorectal cancer incidence rate in 2005–2009 of 28.6 per 100,000 person-years was higher than that in the UK, USA and western Europe. Among females in 2008, the ASR was 25.3 per 100,000 person-years in the UK, 25.0 per 100,000 person-years in the USA and 26.3 per 100,000 person-years in western Europe.

Regardless of gender, the age-standardised mortality rate for colorectal cancer in Singapore was higher than that in the UK, USA and western Europe. Among males, the colorectal cancer mortality rates were 13.9, 9.9 and 15.1 per 100,000 person-years in the UK, USA and western Europe, respectively. Among females, they were 9.1, 7.7 and 9.3 per 100,000 person-years for the UK, USA and western Europe, respectively.⁽⁸⁾ The five-year survival rates for both colon and rectum cancers in Singapore were comparable to those in the USA and Europe.⁽⁶⁾ This improvement in survival was most likely brought about

by progress in the treatment of colon and rectum cancers, as screening for colorectal cancer remained opportunistic. While the development of adjuvant chemotherapy was most likely the main driving factor for the increase in survival for colon cancer patients, it was most probably preoperative radiotherapy and total mesorectal excision in the local control of rectal cancer that brought about an improvement in survival among rectal cancer patients.⁽⁶⁾

Breast cancer

Cancer trends in Singapore

The incidence of female breast cancers has been steadily increasing from 54.9 in 1998–2002 to 60.0 per 100,000 person-years in 2005–2009. It has continued to be the most frequently occurring cancer among females; thus, it also comprised the greatest proportion of cancer deaths. The increase in breast cancer incidence was different among the Chinese, Malays and Indians, as was previously reported.⁽¹⁷⁾ In the last decade, the increase in breast cancer incidence was highest among the Malays. Among the Chinese, the ASR of breast cancer increased from 57.4 to 60.8 per 100,000 from 1998–2002 to 2005–2009. The corresponding increase was from 44.8 to 58.7 among the Malays and 47.4 to 53.8 among the Indians in the same periods. However, the age-standardised mortality rate had remained fairly constant, at about 14 per 100,000 person-years in the period 1998–2007.

Although breast cancer was the most common cancer found among Singapore women, the prognostic outlook for breast cancer patients was relatively optimistic. The five-year age-standardised RSR has remained at about 76% in the period of study. Survival could be improved through screening and effective treatment at the early stages. Data from the Singapore breast screening pilot project in 1994–1997 as well as the nation-wide breast screening programme (BreastScreen Singapore) launched in Singapore in January 2002⁽¹⁸⁾ showed that breast screening is effective in improving survival in an Asian population. Screening allows for cancers in less advanced stages to be detected and treated early, thereby improving the survival of breast cancer patients. More than 30% of pre-invasive ductal carcinoma *in situ* was detected among pre-menopausal women through the screening programme.^(19,20)

Comparison with other populations

The ASR of breast cancer in Singapore was lower than that in the USA, but much higher than that of her Asian counterparts such as Malaysia, China and India. While the ASR of breast cancer in Singapore was 60.0 per 100,000 person-years in 2005–2009, the corresponding ASR in the USA was 76.0 per 100,000 person-years in 2008. In 2008, the ASRs of breast cancer were 37.0, 21.6 and 22.9 per 100,000 person-years in Malaysia, China and India, respectively. In 2008, the age-standardised mortality rate of breast cancer in Singapore was comparable to that in Malaysia and the USA, but higher than that in China and India. The age-standardised mortality rates were 14.7, 5.7, 11.1 and 14.7 per 100,000 person-years for Malaysia, China, India and

the USA, respectively.⁽⁶⁾ The five-year breast cancer survival in Singapore was lower than that in the USA (as represented by SEER) and China, but higher than that in India.⁽⁶⁾ The five-year age-standardised RSR of 76% in Singapore was slightly lower than that of countries in the Organisation for Economic Co-operation and Development (OECD) (81.2% in 2002–2007).⁽²¹⁾ However, the survival among patients in Singapore and the western countries could have been confounded by stage, as shown by a study comparing Singapore and Sweden. In this study, it was observed that although the five-year RSR of breast cancer patients in Sweden was higher than that of Singapore breast cancer patients, the survival of the patients was similar in a stage-by-stage comparison.⁽²²⁾

Cervical cancer

Cancer trends in Singapore

The age-standardised incidence of cervical cancer among all Singapore female residents dropped from 10.6 in 1998–2002 to 7.8 per 100,000 person-years in 2005–2009. Correspondingly, a decline in the age-standardised mortality rate of cervical cancer from 4.5 in 1998–2002 to 2.9 per 100,000 person-years in 2005–2009 was observed. However, the age-standardised RSR continued to hover at 66% over the study period.

Comparison with other populations

Cervical cancer incidence in Singapore was much lower than that in Malaysia and India, but higher than that in the USA and comparable to that in China. According to the GLOBOCAN 2008 estimates, the ASR of cervical cancer was 17.9, 9.6, 27.0 and 5.7 per 100,000 person-years in Malaysia, China, India and the USA, respectively. The same trend was seen in the Singapore mortality rates when compared with those of the four countries. The age-standardised mortality rates of cervical cancer were 5.6, 4.2, 15.2 and 1.7 per 100,000 person-years for Malaysia, China, India and the USA, respectively.⁽⁶⁾ Cervical cancer survival in Singapore was lower than that in the USA (as represented by SEER), but comparable to those in European countries.⁽⁶⁾ The five-year age-standardised RSR of cervical cancer in Singapore (66.6% in 2003–2007) was also similar to that of OECD countries (65.7% in period 2002–2007).

Apart from vaccination against the Human Papillomavirus,⁽²⁵⁾ screening continues to be one of the most important measures for optimising survival for cervical cancer patients.^(23,24) Hence, recognising the importance of screening for cervical cancer, CervicalScreen Singapore has implemented a nation-wide screening programme to encourage women aged 25 years and above, who have ever had sex or are sexually active, to undergo pap smear once every three years.⁽²⁵⁾

Prostate cancer

Cancer trends in Singapore

An increase in the incidence of prostate cancer among Singapore males was observed in the last decade, with the ASR at 17.4 per

100,000 person-years in 1998–2002 and 26.7 per 100,000 person-years in 2005–2009. The age-standardised mortality rate of prostate cancer remained fairly stable, at 5–6 per 100,000 person-years from 1998 to 2009. There was an increase in survival among prostate cancer patients, with an increase in the five-year age-standardised RSR from 72.2% in 1998–2002 to 84.7% in 2003–2007 (Table I). The increase in ASR was similar to those previously reported among Chinese Singapore residents from 1968 to 2002. In this study, it was also noted that the improvement in survival was more substantial for non-metastatic cases, while that for metastatic cases remained poor.⁽⁶⁾ As prostate cancer is usually clinically silent throughout the patient's course of life, the increase in the incidence and survival of prostate cancer patients in Singapore could have been due to a more widespread use of the Prostate Specific Antigen screening test among the population, which is presently done on an *ad hoc* basis.⁽⁶⁾

Comparison with other populations

The ASR of prostate cancer among Singapore males (ASR: 26.7 per 100,000 person-years in 2005–2009) was much higher than that among her Asian counterparts (Malaysia, China and India), but much lower than that in the USA, based on GLOBOCAN 2008 statistics. The ASRs of prostate cancer were 9.2, 4.3, 3.7 and 83.8 per 100,000 person-years in Malaysia, China, India and the USA, respectively. The age-standardised mortality rate in Singapore was comparable to that in Malaysia (5.8 per 100,000 person-years), higher than that in China (1.8 per 100,000 person-years) and India (2.5 per 100,000 person-years), but lower than that in the USA (5.1 per 100,000 person-years).⁽⁶⁾ The five-year age-standardised RSR among prostate cancer patients in Singapore was comparable to that in the USA (as represented by SEER) and other European countries.⁽⁶⁾

Uterine cancer

Cancer trends in Singapore

Uterine cancer has risen in ranks from the seventh most common cancer in 1998–2002 to the second most common cancer in 2003–2007 among Singapore women. The ASR of uterine cancer was 9.4 per 100,000 person-years in 1998–2002 and 12.1 per 100,000 person-years in 2005–2009. The average annual percentage change of 4.31% in the ASR of uterine cancer was the highest in 1998–2007. The increase in ASR seemed to be the most pronounced among the Indians in Singapore. While the Indians experienced an increase of 4.2 per 100,000 person-years from 1998–2002 to 2005–2009, both the Malays and Chinese experienced an increase of 2.6 per 100,000 person-years in the same period. The ASR of uterine cancer among the Indians increased from 8.5 to 12.7 per 100,000 person-years from 1998–2002 to 2005–2009.⁽⁵⁾

Uterine cancer has yet to be among one of the top ten most common cancer deaths in Singapore, except in the period 2003–2007. The survival among cervical cancer patients has improved slightly in the last ten years, with the age-standardised

RSR at 67.7% in 1998–2002 and 70.4% in 2003–2007 (Table I).

The increasing incidence of uterine cancer in the last decade could have been due to a real increase in the risk of uterine cancer among the Singapore female population, as there has not been any screening tool developed for uterine cancer.⁽⁶⁾ Endometrioid adenocarcinoma, which constituted the bulk of uterine cancer cases, formed 69.6% of all uterine cancers in 2003–2007.⁽⁵⁾ As endometrial cancer is usually localised within the uterus upon diagnosis, it allows for more effective treatment for the cancer, and hence, a good survival outcome among endometrial cancer patients. The greater use of chemotherapy for gross residual or metastatic endometrial cancer since the 1990s, as well as improved radiotherapeutic approaches as part of the treatment regimen, could have contributed to the optimistic prognostic outlook among these patients.⁽⁶⁾

Comparison with other populations

Comparing the incidence and mortality rates in Singapore in 2005–2009 with GLOBOCAN 2008 statistics, the ASR of uterine cancer in Singapore was higher than that in Malaysia (ASR: 5.2 per 100,000 person-years) and India (ASR: 1.9 per 100,000 person-years), but lower than that in China (ASR: 11.1 per 100,000 person-years) and the USA (ASR: 16.5 per 100,000 person-years). The age-standardised mortality rate of uterine cancer in Singapore was higher than that in Malaysia (ASR: 1.4 per 100,000 person-years), India (ASR: 1.1 per 100,000 person-years), China (ASR: 2.4 per 100,000 person-years) and the USA (ASR: 2.5 per 100,000 person-years).⁽⁶⁾ In 2003–2007, the five-year age-standardised RSR of uterine cancer in Singapore was slightly lower than that in the USA and European populations, but comparable to that in Osaka.⁽⁶⁾

CONCLUSION

The last decade saw a rather stable overall cancer incidence trend among males and females, regardless of ethnicity. It also saw a decreasing cancer mortality rate for both genders. Correspondingly, an improvement in survival for both male and female cancer patients was observed. Although lung cancer incidence remained high among both genders, it has declined over the last ten years. Hence, colorectal and breast cancers have become the most common cancers among males and females, respectively, in the last five years (period 2005–2009). Notably, a reduction in cervical cancer incidence and an increase in uterine cancer incidence were observed among females in Singapore in the last decade. Generally, survival among cancer patients in Singapore remained comparable to that in the USA and European populations.

The Singapore Cancer Registry provides essential data for the development of healthcare policies, programmes and infrastructure for cancer management in Singapore. One of the main guiding principles in the Ministry of Health (Singapore) is to focus on primary disease prevention and disease management, so as to reduce the incidence of important disease areas and

their associated risk factors, as well as to improve the prognostic outlook of patients.⁽²⁷⁾ In addition, the Ministry of Health publishes national clinical practice guidelines to assist healthcare providers in the management of key medical conditions.⁽²⁸⁾ In particular, the national cancer control programme emphasises cancer prevention, early detection and integrated management of disease.⁽²⁹⁾ Some of these population-based policies and programmes include the National Tobacco Control Programme to lower the prevalence of smoking in order to reduce lung cancer incidence⁽¹²⁾ and screening programmes such as BreastScreen Singapore⁽¹⁸⁾ and CervicalScreen Singapore,⁽²⁵⁾ which aim to improve the survival of breast and cervical cancer patients. In Singapore, cancers are also well-managed by improvements in technology and medications. Singapore currently has five radiotherapy centres as part of the cancer treatment process, which may be increased to cater to the needs for future demands due to an ageing population.⁽³⁰⁾ In addition, the National Cancer Centre Singapore, which was established in view of the rising trend of cancer incidence in the year 1999, provides an integrated and a comprehensive cancer service for managing patients.⁽³¹⁾ The launch of the National University Cancer Institute in 2010 is yet another important development. Hence, focus on healthcare policies, increasing public awareness, accessibility and affordability of early detection and medical treatment remain the key driving forces for better management of cancers in Singapore.

REFERENCES

- Ministry of Health. Principal Causes of Death. Health Facts Singapore [online]. Available at: www.moh.gov.sg/content/moh_web/home/statistics/Health_Facts_Singapore/Principal_Causes_of_Death.html. Accessed December 16, 2011.
- Phua HP, Chua AV, Ma S, Heng D, Chew SK. Singapore's burden of disease and injury 2004. *Singapore Med J* 2009; 50:468-78.
- Singapore Burden of Disease and Injury Study Working Group, Singapore. Ministry of Health. Singapore Burden of Disease Study 2004. 2009 [online]. Available at: www.moh.gov.sg/content/moh_web/home/Publications/Reports/2009/singapore_burdenofdiseasestudy2004.html. Accessed December 16, 2011.
- Singapore Cancer Registry. Trends in Cancer Incidence in Singapore 2005–2009 [online]. Available at: www.nrdo.gov.sg/uploadedFiles/NRDO/Cancer_Trends_Report%20_05-09.pdf. Accessed November 24, 2011.
- Singapore Cancer Registry. Trends in Cancer Incidence in Singapore 1968–2007 [online]. Available at: www.nrdo.gov.sg/uploadedFiles/NRDO/Publications/Cancer%20Registry%20lores%5B1%5D%20hcopy%20101210.pdf. Accessed November 24, 2011.
- Singapore Cancer Registry. Cancer Survival in Singapore 1968–2002 [online]. Available at: www.nrdo.gov.sg/uploadedFiles/NRDO/Publications/Cancer%20Registry%20lores%5B1%5D%20hcopy%20101210.pdf. Accessed November 23, 2011.
- Singapore Cancer Registry. Trends in Cancer Incidence in Singapore 1968–2002. 2004.
- Globocan. Cancer Fact Sheet [online]. Available at: globocan.iarc.fr. Accessed October 31, 2011.
- Lim GH, Wong CS, Chow KY, Bhalla V, Chia KS. Trends in long-term cancer survival in Singapore: 1968–2002. *Ann Acad Med Singapore* 2009; 38:99–105.
- Toh CK. The changing epidemiology of lung cancer. *Methods Mol Biol* 2009; 472:397–411.
- Lee HP. The epidemiology of lung cancer in Singapore. *Ann Acad Med Singapore* 1985; 14:485–90.
- Health Promotion Board. National Tobacco Control Programme (NTCP). 2011 [online]. Available at: www.hpb.gov.sg/ntcp.aspx. Accessed October 31, 2011.
- Ministry of Health. National Health Survey 2010 [online]. Available at: www.moh.gov.sg/content/moh_web/home/Publications/Reports/2011/national_health_survey2010.html. Accessed December 16, 2011.
- National Registry of Diseases Office. Information Paper on Lung Cancer 2011 [online]. Available at: www.nrdo.gov.sg/uploadedFiles/NRDO/Publications/INFORMATION%20PAPER%20ON%20LUNG%20CANCER_final.pdf. Accessed October 27, 2011.
- de Kok IM, Wong CS, Chia KS, et al. Gender differences in the trend of colorectal cancer incidence in Singapore, 1968–2002. *Int J Colorectal Dis* 2008; 23:461–7.
- Wan DS. [Epidemiologic trend of and strategies for colorectal cancer]. *Ai Zhong* 2009; 28:897–902.
- Sim X, Ali RA, Wedren S, et al. Ethnic differences in the time trend of female breast cancer incidence: Singapore, 1968–2002. *BMC Cancer* 2006; 6:261.
- Health Promotion Board. Breast Screen Singapore [online]. Available at: www.hpb.gov.sg/programmes/article.aspx?id=3324. Accessed October 31, 2011.
- Jara-Lazaro AR, Thilagaratnam S, Tan PH. Breast cancer in Singapore: some perspectives. *Breast Cancer* 2010; 17:23–8.
- Chuwa EW, Yeo AW, Koong HN, et al. Early detection of breast cancer through population-based mammographic screening in Asian women: a comparison study between screen-detected and symptomatic breast cancers. *Breast J* 2009; 15:133–9.
- OECD. Health Care Quality Indicators [online]. Available at: www.oecd.org/health/hcqj. Accessed October 31, 2011.
- Tan BK, Lim GH, Czene K, Hall P, Chia KS. Do Asian breast cancer patients have poorer survival than their western counterparts? A comparison between Singapore and Stockholm. *Breast Cancer Res* 2009; 11:R4.
- Tay K, Tay SK. The impact of cytology screening and HPV vaccination on the burden of cervical cancer. *Asia Pac J Clin Oncol* 2011; 7:154–9.
- Wang H, Chia KS, Du WB, et al. Population-based survival for cervical cancer in Singapore, 1968–1992. *Am J Obstet Gynecol* 2003; 188:324–9.
- Health Promotion Board. CervicalScreen Singapore [online]. Available at: www.hpb.gov.sg/programmes/article.aspx?id=3342. Accessed November 1, 2011.
- Chia SE, Tan CS, Lim GH, et al. Incidence, mortality and five-year relative survival ratio of prostate cancer among Chinese residents in Singapore from 1968 to 2002 by metastatic staging. *Ann Acad Med Singapore* 2010; 39:466–71.
- Tan CC. National disease management plans for key chronic non-communicable diseases in Singapore. *Ann Acad Med Singapore* 2002; 31:415–8.
- Lee HP, Chew CT, Consigliere DT, et al. Ministry of health clinical practice guidelines: cancer screening. *Singapore Med J* 2010; 51:170–3.
- Hock LC. An overview of the cancer control programme in Singapore. *Jpn J Clin Oncol* 2002; 32 Suppl:S62–5.
- Tey J, Baggarley S, Lee K. Cancer care in Singapore. *Biomed Imaging Interv J* 2008; 4:e38.
- Soo KC. Role of comprehensive cancer centres during economic and disease transition: National Cancer Centre, Singapore – a case study. *Lancet Oncol* 2008; 9:796–802.

SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME

(Code SMJ 201201A)

Question 1. What measure(s) has/have been used to describe cancer trends?

- (a) Incidence.
- (b) Mortality.
- (c) Survival.
- (d) Prevalence.

True False

| | |
|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |

Question 2. What are the most frequent newly diagnosed cancers among Singapore males in 2005–2009?

- (a) Cancers of the lung, colon-rectum and liver.
- (b) Cancers of the lung, colon-rectum and prostate.
- (c) Cancers of the lung, liver and nasopharynx.
- (d) Cancers of the colon-rectum, lung and stomach.

| | |
|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |

Question 3. What is the age-standardised incidence rate of breast cancer among Singapore females in 2005–2009?

- (a) 60.0 per 10,000 person-years.
- (b) 60.0.
- (c) 60.0 per 100,000 person-years.
- (d) 60.0 per 1,000,000 person-years.

| | |
|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |

Question 4. What is the cancer that has progressively risen in ranks to become one of the top five most common cancers among Singapore women in 2003–2007?

- (a) Cervical.
- (b) Colon-rectum.
- (c) Breast.
- (d) Uterine.

| | |
|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |

Question 5. What is the five-year age-standardised relative survival ratio for breast cancer in 2003–2007?

- (a) 76.4 per 10,000 person-years.
- (b) 76.4 per 100,000 person-years.
- (c) 76.4 per 1,000,000 person-years.
- (d) 76.4%.

| | |
|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |

Doctor's particulars:

Name in full : _____
 MCR number : _____ Specialty: _____
 Email address : _____

SUBMISSION INSTRUCTIONS:

(1) Log on at the SMAJ website: <http://www.sma.org.sg/cme/smj> and select the appropriate set of questions. (2) Select your answers and provide your name, email address and MCR number. Click on "Submit answers" to submit.

RESULTS:

(1) Answers will be published in the SMJ March 2012 issue. (2) The MCR numbers of successful candidates will be posted online at www.sma.org.sg/cme/smj by 14 February 2012. (3) All online submissions will receive an automatic email acknowledgment. (4) Passing mark is 60%. No mark will be deducted for incorrect answers. (5) The SMJ editorial office will submit the list of successful candidates to the Singapore Medical Council. (6) One CME point is awarded for successful candidates.

Deadline for submission: (January 2012 SMJ 3B CME programme): 12 noon, 07 February 2012.