The Cancer Council South Australia

Centre for Cancer Control Research
South Australian Cancer Statistics

Monograph No 9

Cancer mortality by age in South Australia between 1980 and 2003

April 2006

Preface to

Cancer mortality trends by age in South Australia between 1980 and 2003

This is the ninth monograph in our series on cancer statistics in South Australia. It shows time trends in cancer mortality in this State, both for all cancers combined and for leading cancers. These trends are presented by age.

The statistics for younger age groups are of special interest because deaths prevented at an early age save more years of life. There is also the potential for trends in younger people to translate to older age ranges as these younger age groups move up the age ladder.

The 45% reduction in mortality for children aged 0-14 years between 1980-84 and 1997-2003 is particularly encouraging, reflecting advances in the treatment of childhood cancers. Corresponding reductions were evident in older age groups, although lower at 20% for 15-49 year olds and 15% for 50-69 year olds. By comparison, an increase in mortality applied to older South Australians between 1980-84 and 1990-96, although there was also the suggestion of a decline in mortality in this age range during 1997-2003.

The monograph indicates likely reasons for time trends in mortality for individual cancers and the opportunities available to further reduce mortality from cancer in South Australia.

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February 2006

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Acknowledgements

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Previous monographs in this series

- South Australian Cancer Statistics. Monograph No 1. *Cancers of the digestive system*. November, 2001.
- South Australian Cancer Statistics. Monograph No 2. *Sun-related cancers of the skin and lip*. January, 2002.
- South Australian Cancer Statistics. Monograph No 3. *Cancers of the respiratory organs, throat and mouth*. May, 2002.
- South Australian Cancer Statistics. Monograph No 4. *Cancers of the female breast and gynaecological organs*. July, 2002.
- South Australian Cancer Statistics. Monograph No 5. *Lymphomas, myelomas and leukaemias*. January, 2003.
- South Australian Cancer Statistics. Monograph No 6. *The cancer experience - the time after treatment*. September, 2003.
- South Australian Cancer Statistics. Monograph No 7. *Cancers of the prostate, testis, and urological organs.* September 2003.
- South Australian Cancer Statistics. Monograph No 8. *Time trends in cancer mortality in South Australia between 1990 and 2011.* September 2005.

Contents

Abstract

Abstract

Death registrations in South Australia showed a reduction in age-standardised cancer mortality during 1990-2003. This amounted to a 10% reduction over a 10-year period. As a result, 234 fewer cancer deaths occurred annually in 1997-2003 than would have been expected from 1990-96 mortality rates.

Younger age groups contributed larger percentage reductions in mortality than older individuals, such that in many instances, the prevention of these deaths would have saved many years of remaining life. The larger reductions in younger individuals is also reassuring, in that it may translate into larger reductions in mortality in the elderly as these younger individuals move up the age ladder.

The 45% reduction in cancer mortality in children aged 0-14 years between 1980-84 and 1997-2003 was particularly encouraging and is attributed to treatment advances, including advances in chemotherapy and bone marrow transplantation. In general, reductions in mortality were more pronounced in percentage terms among younger than older age groups for individual cancer types. This applied for example to cancers of the lung (males), large bowel, gallbladder, pancreas (males), and leukaemia.

This was not so for cancer of the cervix, probably due the policy emphasis since around 1990 on increasing screening coverage among older women. Also, breast-cancer mortality reductions were more evident in women over 50 years of age than in younger women, which is consistent with the priority given to 50-69 year olds as the principal target for mammography screening.

For those cancers experiencing an increase in mortality, the increase either was non-existent, or tended to be smaller in scale, in the younger than older age groups. This applied for example to cancers of the lung (females), skin, oesophagus, possibly the liver, and lymphomas.

It can be concluded that irrespective of whether secular trends in cancer mortality for individual cancers were upwards or downwards, they tended to be more favourable in younger than older age groups. Regardless of these trends, future reductions in mortality should be pursued through multiple means, including:

- **Preventive initiatives**

  Examples:
  - Cessation of tobacco use.
  - Adoption of healthier diets high in fruit and vegetables, and low in calorie-rich items, fat, and salt.
  - Avoidance of excess alcohol intake.
  - Obtaining regular exercise.
  - Controlling bodyweight.
  - Sun protection.

- **Screening**

  Examples:
  - Extension of breast and cervix screening.
  - Introduction of bowel screening.

- **Treatment and support**

  Examples:
  - Undertaking further research of clinical and palliative care, with incorporation of results into evidence-based guidelines for practice.
  - Extension of non-clinical support services, so that family members and other carers can be assisted to provide home and community care.
  - Implementing special projects to find the best ways of providing treatment and support in remote areas, both for Aboriginal/Torres Strait Islander and other residents.

Introduction

Introduction

Trends in cancer mortality indicate "bottom line" effects of prevention, screening and treatment, and of changes in environmental influences. They also provide a direct measure of changes in need for "end of life" care. Approximately 28% of deaths in South Australia are due to cancer, but opportunities exist to greatly reduce this figure.[1]

Since the early 1980s, Australian health agencies have striven to reduce cancer risk through a range of preventive measures.[2] These have been directed at tobacco-smoking cessation and the adoption of diets richer in fruit and vegetables and lower in fat, salt and energy-laden food items of low nutritional content.[2] Because sedentary life-styles and excess body weight are risk factors for many cancers, plus cardiovascular diseases, diabetes mellitus and other health conditions, there has been widespread promotion of regular exercise and weight control.[2] Since excess alcohol consumption predisposes to road trauma and can lead to other health consequences, including increases in risk of oral, pharyngeal, oesophageal, liver and some other cancers, this practice has been actively discouraged.[2]

Australians have recorded by far and away the highest incidence of sun-related skin cancers world wide, which has led to sun-protection campaigns.[3] These campaigns are a high priority to reduce skin cancer risk, although it is recognised that a small amount of sun exposure (eg, about 10 minutes per day) may be beneficial for vitamin D production.

It is estimated that over 50% of cancers would be preventable through smoking cessation, dietary improvement, increased exercise, weight control, sun protection, avoidance of excess alcohol consumption, and other lifestyle modifications.[4-6] Sound environmental hygiene practices also would be important for cancer prevention in high-risk occupational settings.[2]

Apart from prevention, prospects for cancer cure have been pursued through screening and allied early detection initiatives.[7]There has been active promotion of cervical and mammography screening through national health initiatives since around 1990 and prompt medical attention has been advised when skin lesions present signs indicative of cancer.[3, 7] In addition, a bowel-screening pilot program has been implemented and broader implementation is planned to commence in early 2006.[8]

The Cancer Council South Australia has introduced a range of programs to prevent cancer and to increase early detection. Together with the National Health and Medical Research Council, and other national and state health agencies, it has invested in basic and clinical research, and promoted the use of research results by health services.

Australians already have good outcomes of care by world standards. South Australian Cancer Registry data show that about 50% of patients with cancer become long-term survivors by surviving their disease for 15 years or more, and that this proportion is increasing. [9, 10] This would surpass cancer survivals in most populations and contribute to the lower cancer death rates seen in Australia than in Europe and comparable countries.[11]

In this monograph, time trends in South Australian cancer-death registrations are presented, using 1980-2003 official statistics. Emphasis is placed on time trends by age. Emerging trends in younger age groups are of special interest, since deaths prevented at a young age can save more years of life. They also may herald future trends in older people.

Time trends are analysed in this monograph for all cancers collectively and 15 leading cancers separately. Opportunities for prevention and improved treatment outcomes are indicated.

Methods

Methods

Cancer deaths registered in South Australia in 1980-2003 were analysed, using official statistics from the Australian Bureau of Statistics. Death data coded to invasive cancer (i.e., the ICD-10 "C" category) were used.[12] The data applied to people dying in South Australia, irrespective of place of residence at diagnosis. These data were extracted from the AIHW "GRIM" publication.[13]

Analyses were undertaken for all invasive cancers collectively (C00-96), the 10 leading causes of cancer mortality, and five additional leading cancers.[12] They comprised cancers of the oesophagus (C15), stomach (C16), liver (C22), gallbladder (C23, C24), pancreas (C25), colon/rectum (C18-C21), lung (C33, C34), skin (C43, C44), female breast (C50), cervix (C53), ovary (C56, C57.0-C57.4), prostate (C61), and kidney (including renal pelvis and related organs) (C64-C66, C68), plus lymphomas (C81-C85, C96) and leukaemias (C91-95).[12]

Mid-year estimates of the residential population of South Australia were obtained from the Australian Bureau of Statistics for each calendar year by five-year age group and sex, in order to calculate annual mortality rates. Age-specific rates were directly standardised to the five-year age distribution of the Australian population for 2001, in accordance with national convention.[14]

Mean annual rates (and 95% confidence limits) were calculated for 1980-84, 1985-89, 1990-96 and 1997-2003 to facilitate visualisation and interpretation of time trends. The data are presented now for all ages combined and separately for 0-14 year olds, 15-49 year olds, 50-69 year olds, and individuals aged 70 years or more. Where applicable, the data are also presented by sex.

Results (and commentary)

Results (and commentary)

All sites

Males had higher cancer mortality rates than females for all cancer types combined, with a male-to-female ratio of age-standardised rates of 1.64 to one in 1997-2003.

Between 1980-84 and 1990-96, annual age-standardised mortality rates for cancer increased marginally by about 3% in South Australia. This was followed, however, by a 7% reduction between 1990-96 and 1997-2003, comprising an 8% reduction in males and a 7% reduction in females. As a consequence, there were 234 fewer deaths per annum in 1997-2003 than would have been expected from 1990-96 mortality rates.

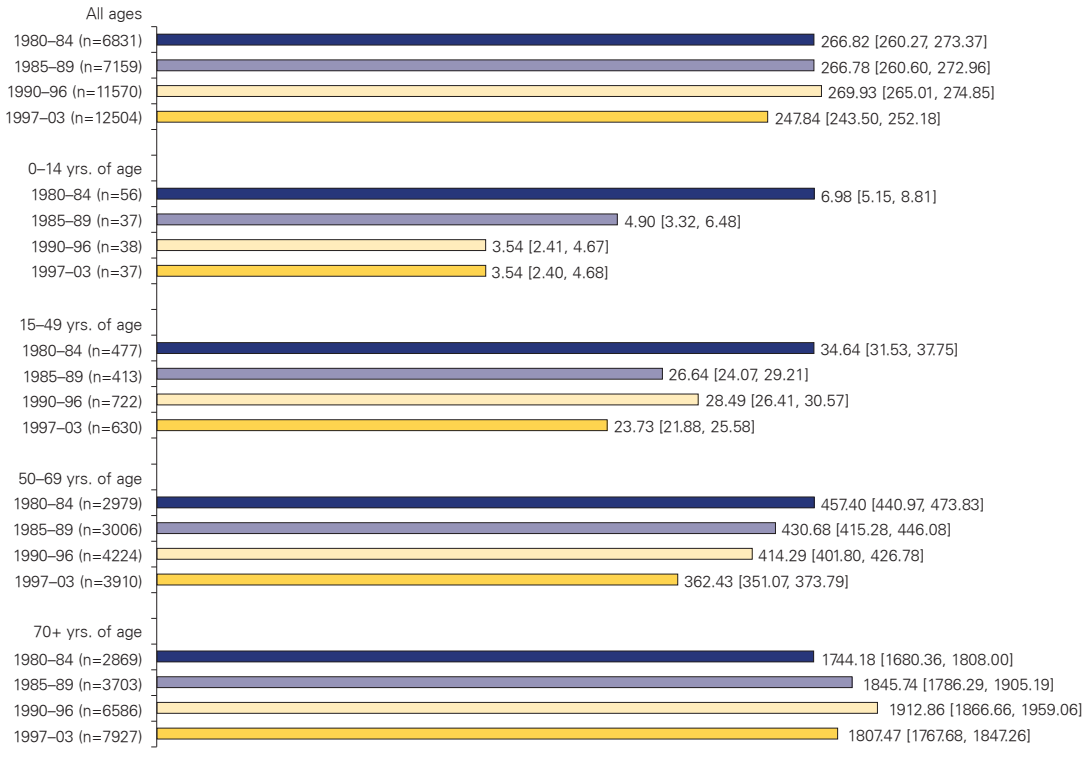
Mortality reductions applied between 1980-84 and 1997-2003 for cancers of the stomach, cervix, and lung (males). In addition, there were mortality reductions between 1990-96 and 1997-2003 for cancers of the female breast, prostate, large bowel (colon/rectum), gallbladder, and lung (females).

Mortality reductions are attributed primarily to the following factors:

- *Stomach cancer* – improved refrigeration, potentially reduced infection with *Helicobacter pylori*, and in some instances, increased consumption of fruit and vegetables, and a reduced salt intake.[8]
- *Cervix cancer* – increased screening coverage of older women and other high-risk groups.[7]
- *Lung cancer* – reduced tobacco smoking.[15]
- *Female breast cancer* – earlier detection through screening mammography and advances in adjuvant therapy.[7]
- *Prostate cancer* – potentially treatment gains and earlier detection.[16]
- *Large-bowel cancer* – gains in adjuvant therapy and earlier detection.[8]
- *Gallbladder* – potentially gains in chemotherapy.[8]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: All sites (Males)



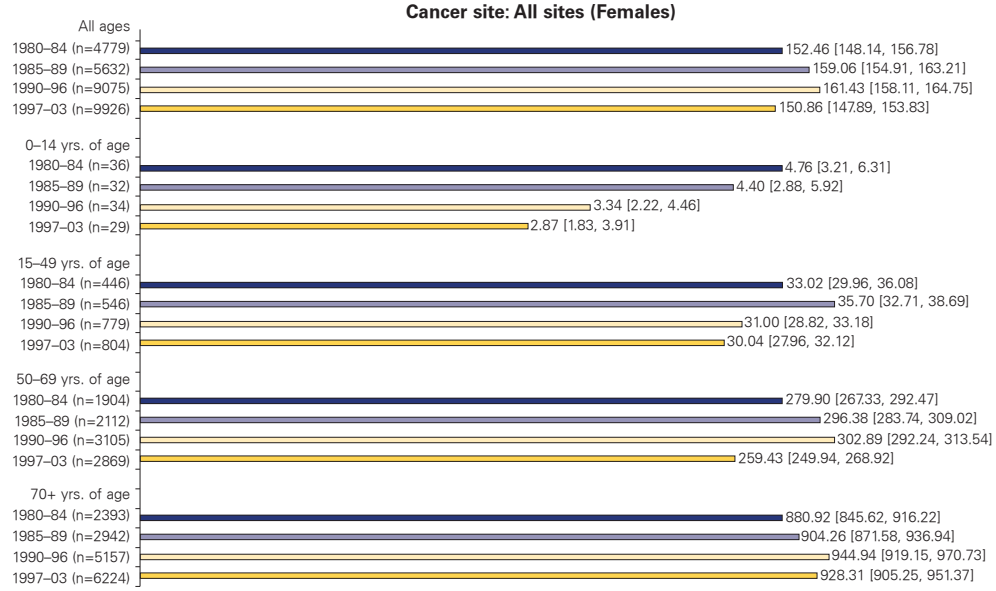
*Data source: ABS/AIHW (see text).

The largest reduction in cancer mortality in percentage terms applied to the younger age groups. Between 1980-84 and 1997-2003, the reduction was 45% for children aged 0-14 years, reflecting treatment advances, such as advances in chemotherapy and bone-marrow transplantation in the treatment of acute lymphatic leukaemia and other childhood cancers.[17] Corresponding reductions were lower at 20% for 15-49 year olds and 15% for 50-69 year olds between 1980-84 and 1997-2003.

Meanwhile, a contrasting 9% increase in cancer mortality applied to individuals aged 70 years and over between 1980-84 and 1990-96, with the suggestion of a subsequent decline. Hopefully, the larger percentage reductions applying for younger than older adults will translate in time to the older age range as these younger adults move up the age ladder.

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

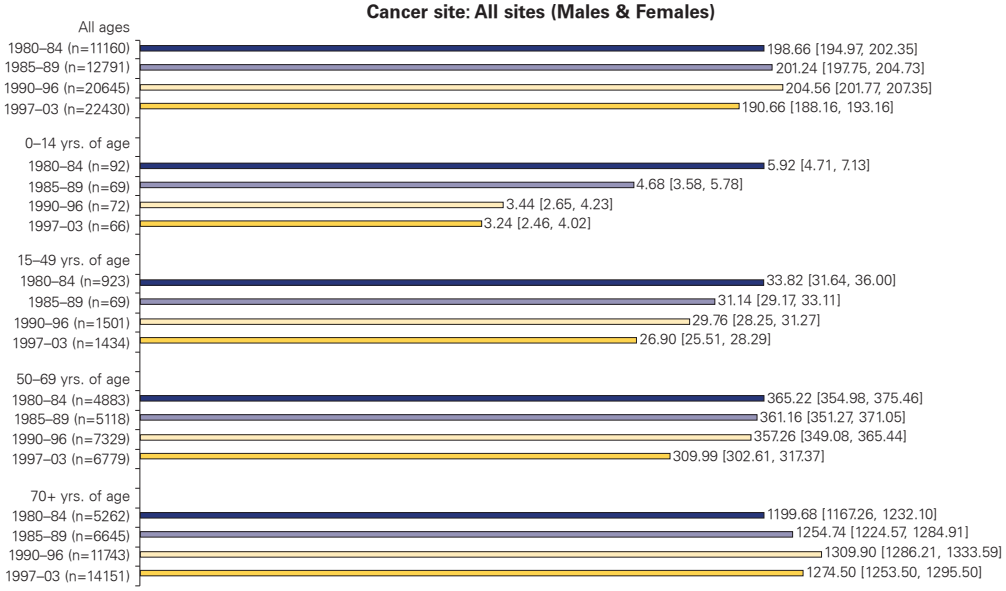
Cancer site: All sites (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: All sites (Males & Females)



*Data source: ABS/AIHW (see text).

Lung cancer

Lung cancer was the leading cause of cancer death in males and females collectively in 1997-2003, accounting for 18% of cancer deaths. Males were at a higher risk with a male-to-female ratio of age-standardised mortality rates of 2.69 to one in 1997-2003.

The age-standardised mortality rate reduced by about 10% in both sexes combined between 1980-84 and 1997-2003. Contrasting trends were evident by sex, with males showing a 25% reduction and females a 45% increase.

These divergent mortality trends paralleled divergent trends in tobacco-smoking prevalence in males and females about 20 years earlier.[15] It is reassuring that the increases in mortality in females showed evidence of slowing down during 1990-2003.

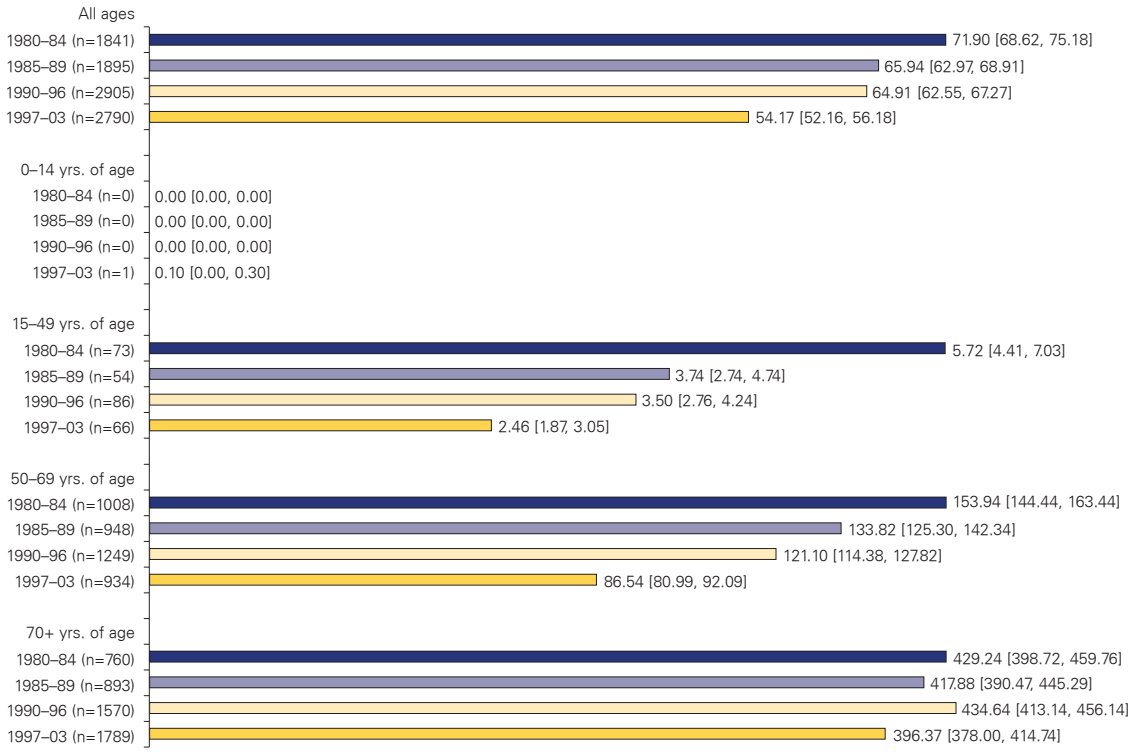
There were reductions in age-standardised mortality among 15-49 year olds between 1980-84 and 1997-2003 of around 57% in males, and possibly 25% in females. While males aged 50-69 years showed a 44% decline over this period, there was not evidence of a decline in females in this age range. Meanwhile, a reduction in mortality did not present among individuals aged 70 years and over. Indeed, an approximate two-fold increase was apparent in females in this age range.

It is hoped that more general reductions in lung cancer mortality will apply to older South Australians as the younger age groups, who are experiencing more pronounced reductions, become older. There has been a marked decrease in cigarette smoking in both sexes in South Australia over the past 20 years, which is expected to translate to further reductions in lung cancer mortality.[18]

About 89% of all lung cancers diagnosed in Australian males in 2001, and 70% of those in females, have been attributed to smoking.[14] This underscores the need to reduce the prevalence of this habit. Lung cancer is a more common disease in the overseas-born than Australian-born, and in lower socio-economic groups, highlighting the need for anti-smoking campaigns to target these population sectors.[19]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Lung (Males)



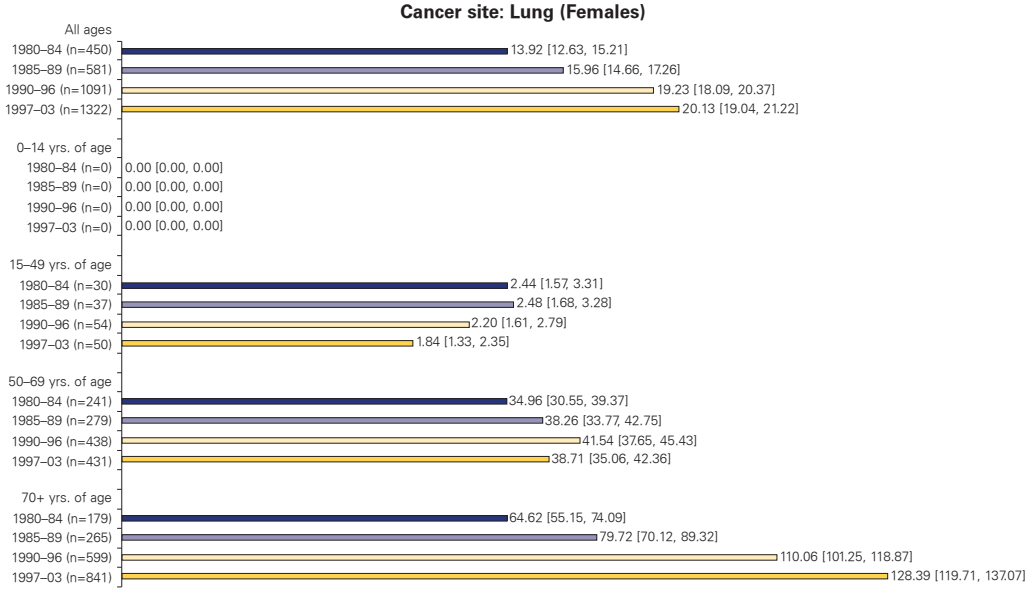
*Data source: ABS/AIHW (see text).

Other occupational exposures linked to lung cancer include exposures to asbestos; inorganic arsenic; chloromethyl ethers; chromium compounds; products of steel and nickel processing; polycyclic aromatic hydrocarbons from coal-gas generation, coke plants and other sources; silica dust; radon products in uranium and other mining settings; and ionising radiation.[15] This highlights the need for good industrial hygiene practices.

In addition, a small number of lung cancers may result from ambient air pollution, and risk may increase when there is a low dietary intake of fruit and vegetables.[15]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

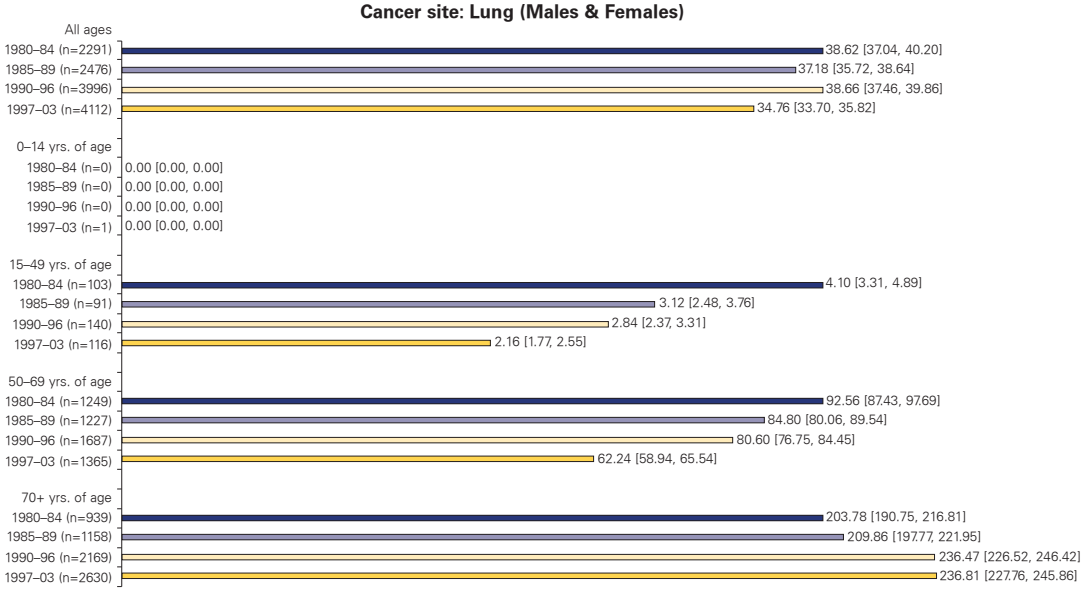
Cancer site: Lung (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Lung (Males & Females)



*Data source: ABS/AIHW (see text).

Large-bowel (colon/rectum) cancer

Large-bowel cancers were the second leading cause of cancer death in both sexes collectively during 1997-2003, accounting for 13% of all cancer deaths. Males were at higher risk with a male-to-female ratio of age-standardised rates of 1.45 to one in 1997-2003.

A decline in age-standardised mortality of about 17% was evident, however, between 1980-84 and 1997-2003. The reduction affected both sexes and mostly occurred between 1990-96 and 1997-2003.

Using the 1980-84 mortality rates as benchmarks, the 1997-2003 rates were 30% lower in 15-49 year olds, 18% lower in 50-69 year olds, and 16% lower in older individuals. Again, the greater reductions in younger adults are encouraging and may foreshadow future reductions in older age ranges.

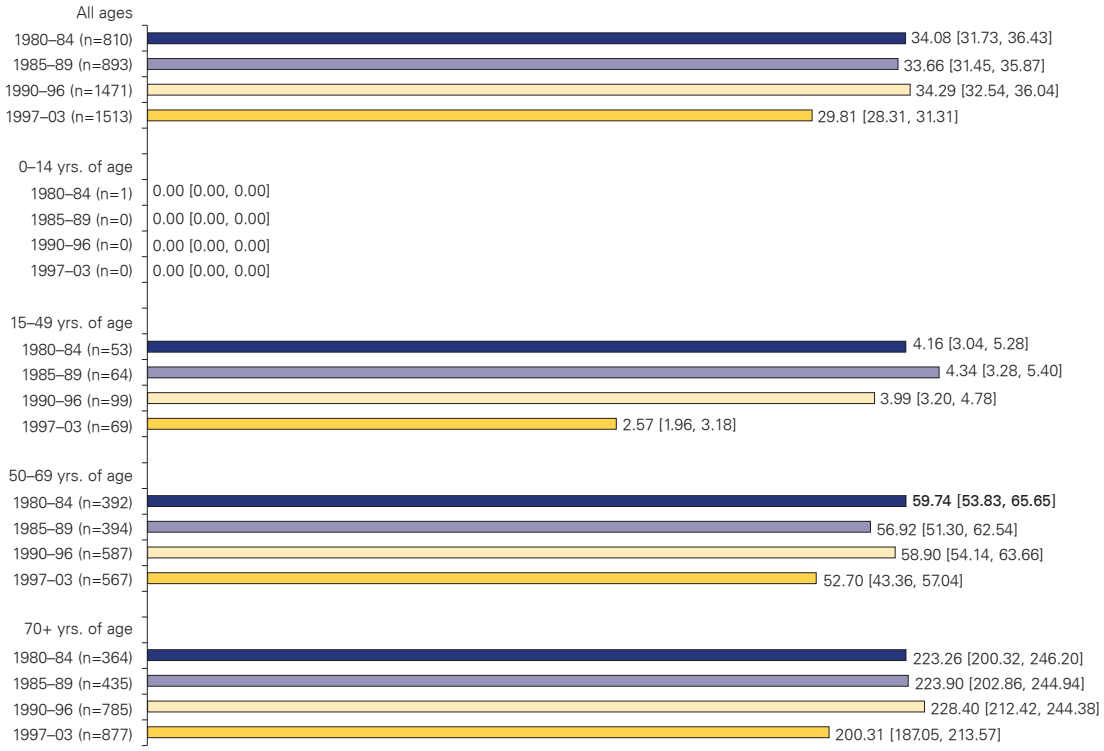
The risk of these cancers is high in Australia by world standards.[19] The Australian-born are at higher risk than the overseas-born.[19] As seen in other populations predominantly of European extraction, incidence rates are higher in upper socio-economic areas.[19]

The risk of this cancer could be reduced if the typical western diet, which is energy rich, high in processed meat and fat, and low in vegetables and fruit, were to be avoided.[8] Other preventive benefits would be expected if normal body weight and reasonable levels of exercise were obtained.[8] It is also possible that avoidance of excess alcohol would reduce risk.[8]

Benefits from earlier detection of large-bowel cancers and pre-cancerous lesions are anticipated from a national bowel-screening program, which is due to commence around May 2006. This screening plus treatment gains from adjuvant therapies should increase downward pressure on mortality.[8]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

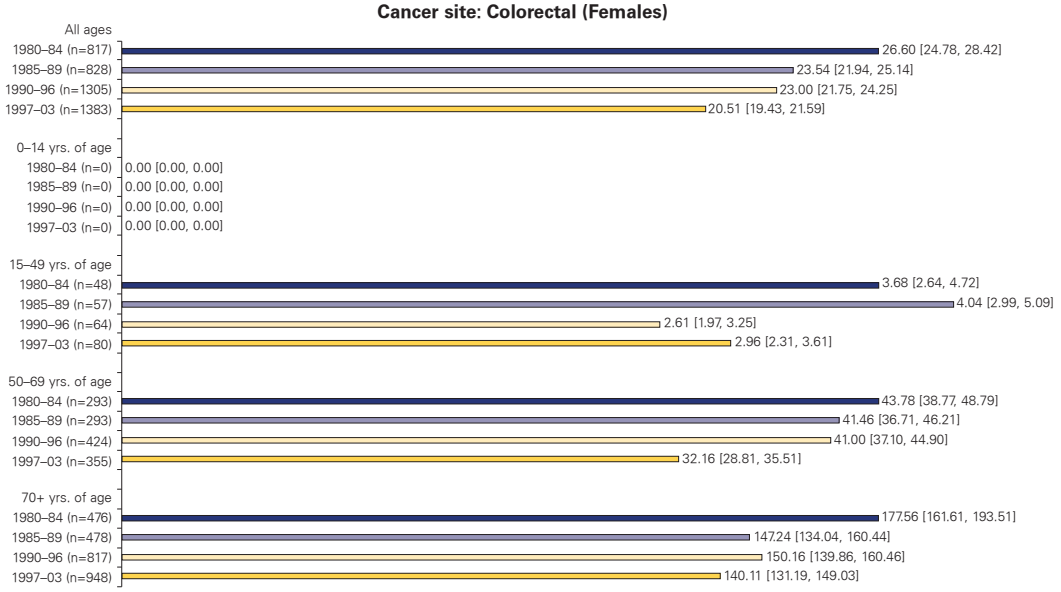
Cancer site: Colorectal (Males)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

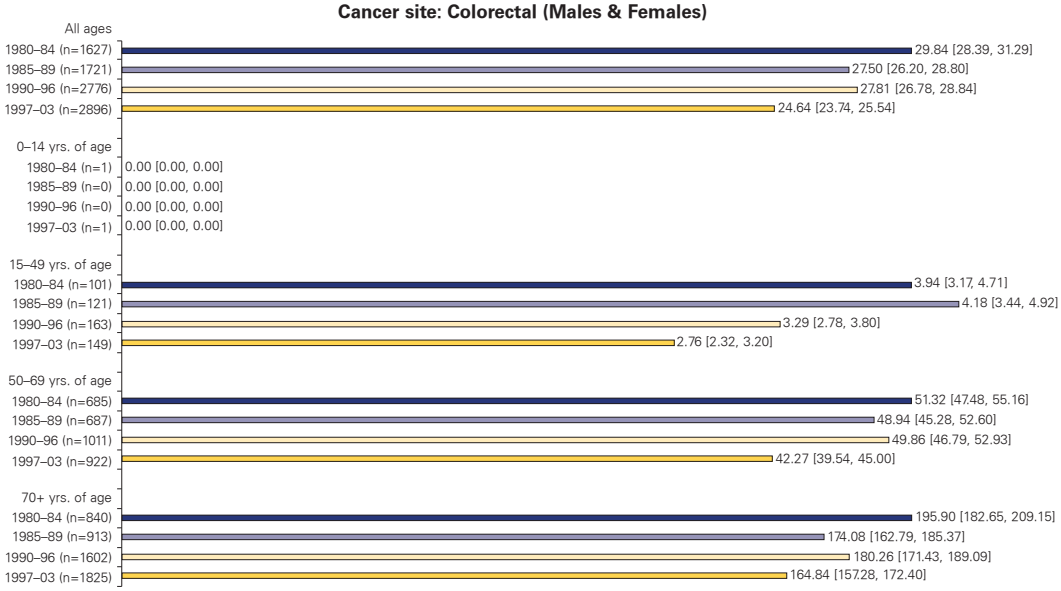
Cancer site: Colorectal (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Colorectal (Males & Females)



*Data source: ABS/AIHW (see text).

Prostate cancer

Prostate cancer was the second leading cause of cancer death in males in 1997-2003, accounting for 13% of these deaths (8% of cancer deaths in both sexes combined). Prostate cancer showed a 24% increase in age-standardised mortality rate between 1980-84 and 1990-96, but with a decrease of 13% then occurring between 1990-96 and 1997-2003 that affected a wide age range.

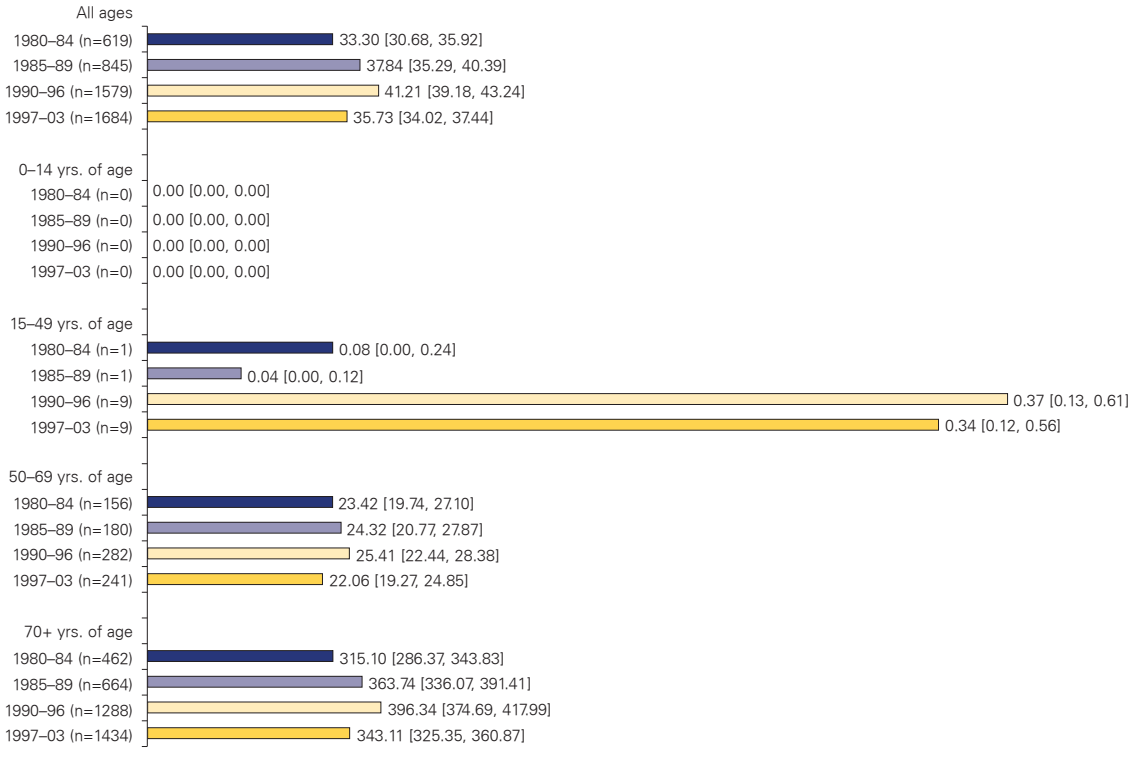
The age-standardised incidence of prostate cancer was about twice as high in South Australia in 1997-2001 as in the late 1970s.[19] This is attributed to an increase in incidence, but more so, increased detection of lesions from the widespread promotion of PSA (Prostate Specific Antigen) testing and other early detection initiatives in the 1990s. The reduction in mortality between 1990-96 and 1997-2003 may be due to earlier detection and advances in treatment.[16]

Australia and North America have recorded a comparatively high incidence of prostate cancer.[19] Within South Australia, the Australian-born are at higher risk than the overseas-born.[19] Unfortunately, proven means of preventing prostate cancer do not exist, although the typical western diet, high in fat, red meat, milk and dairy products, and low in vegetables, is suspected to be a risk factor.[16]

Population-based screening of asymptomatic men is not advocated by most Australian health authorities, in advance of the results of field trials presently underway in Europe and North America, due to uncertainties about benefits and side effects.[16] Prostate cancer is a prevalent disease where research is urgently needed to find new opportunities for prevention, screening, and more effective treatment.

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Prostate



*Data source: ABS/AIHW (see text).

Female breast cancer

Breast cancer was the leading cause of cancer death in females in 1997-2003, accounting for 17% of the total (7% of cancer deaths in both sexes combined). Australia and North America have a comparatively high incidence of this cancer.[19] Within South Australia, incidence rates generally are higher in the Australian-born than overseas-born and in upper socio-economic groups.[19]

While an increase in breast-cancer mortality was indicated between 1980-84 and 1985-89, a 13% decrease occurred between 1990-96 and 1997-2003. This equated with a 10-year reduction of about 19%.

A decrease in mortality was not indicated in females below 50 years of age, whereas a 17% reduction applied to older females between 1990-96 and 1997-2003, equating with a 10-year average reduction of about 23%. This is attributed to combination effects of screening mammography and associated early-detection initiatives, plus advances in adjuvant therapy and potentially surgical management.[7]

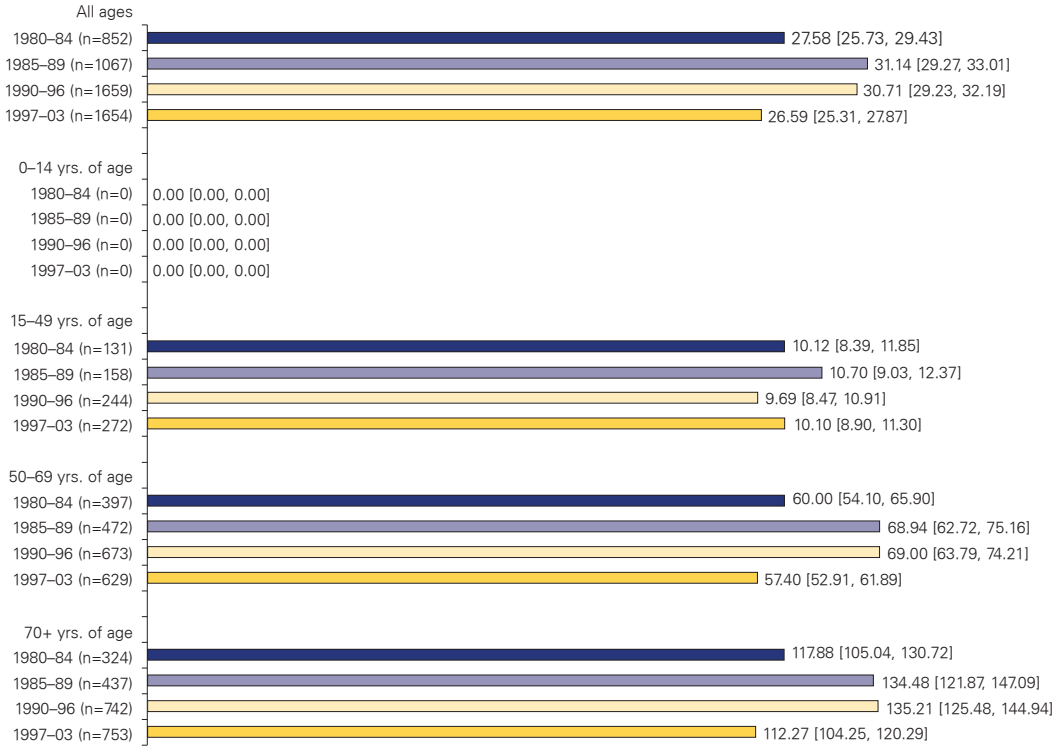
South Australian hospital registries show trends in patterns of care that are consistent with evidence-based guidelines.[9] They also show higher survivals for patients diagnosed in recent years, after adjusting for stage, grade and other prognostic indicators, which is indicative of treatment gains.[9]

The risk of female breast cancer has been linked to high body weight after menopause.[7] Risk also may be increased when diets are low in vegetables and fruit, and high in total fat and saturated/animal fat, and there is a high alcohol intake.[7]

Recent research also indicates that prolonged use of hormone replacement therapy with combined oestrogen and progestin can increase breast cancer risk.[7] Medical advice should be sought when prolonged use of this hormone replacement is envisaged. The use of mammography screening may be particularly important in these circumstances to counter the risk of death from this cancer.

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Breast



*Data source: ABS/AIHW (see text).

Pancreatic cancer

Pancreatic cancer was responsible for 5% of all cancer deaths in South Australia in 1997-2003.

Males were at a higher risk than females, with a male-to-female ratio of age-standardised mortality rates of 1.29 to one in 1997-2003. In general, Australians are not at high risk of this cancer compared with other western populations.[19]

Tobacco smoking is an established risk factor, which would have contributed to the similarity in mortality trends between pancreatic and lung cancer.[8] The age-standardised mortality rate for pancreatic cancer reduced by 20% in males between 1980-84 and 1997-2003, with more pronounced reductions occurring in the age range less than 70 years than in older individuals. By comparison, there was the indication of a higher mortality rate in females after 1980-84.

Case survivals are very low for pancreatic cancer, with only about 3% surviving five years or more from diagnosis.[9] USA data indicate that even when the disease appears to be localised at diagnosis, the five-year survival is still only about 16%.[8] This underscores the importance of prevention.

Tobacco smoking is thought to account for about 22% of pancreatic cancers in countries with a predominantly western population like South Australia.[8] Other risk factors may include diabetes mellitus and diabetes risk factors, such as obesity and high serum levels of triglycerides and cholesterol.[8] In addition, diets deficient in fruit and vegetables may be a risk factor.[8]

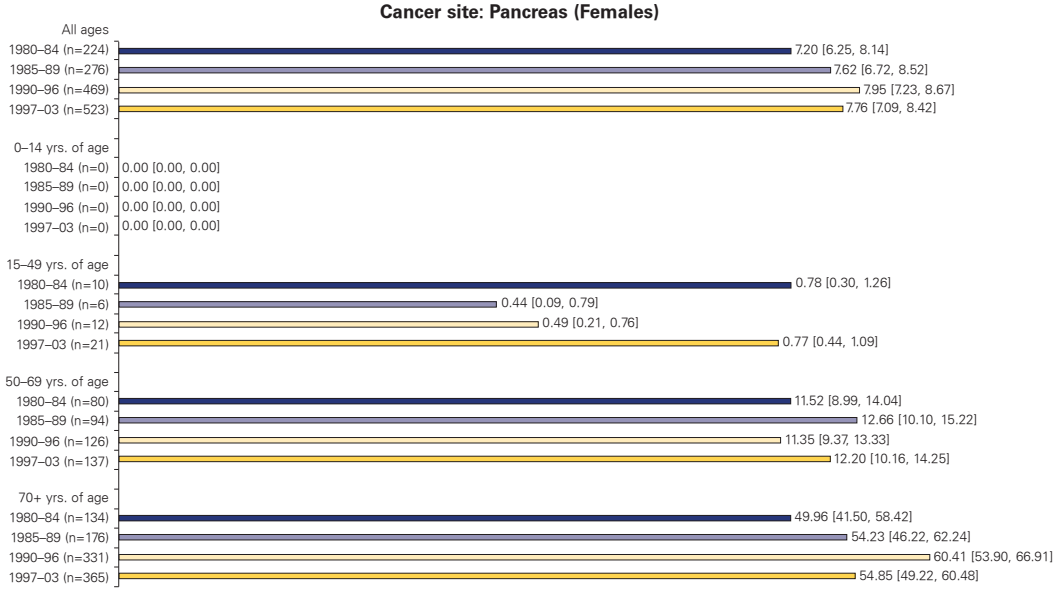
Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Pancreas (Males)

*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

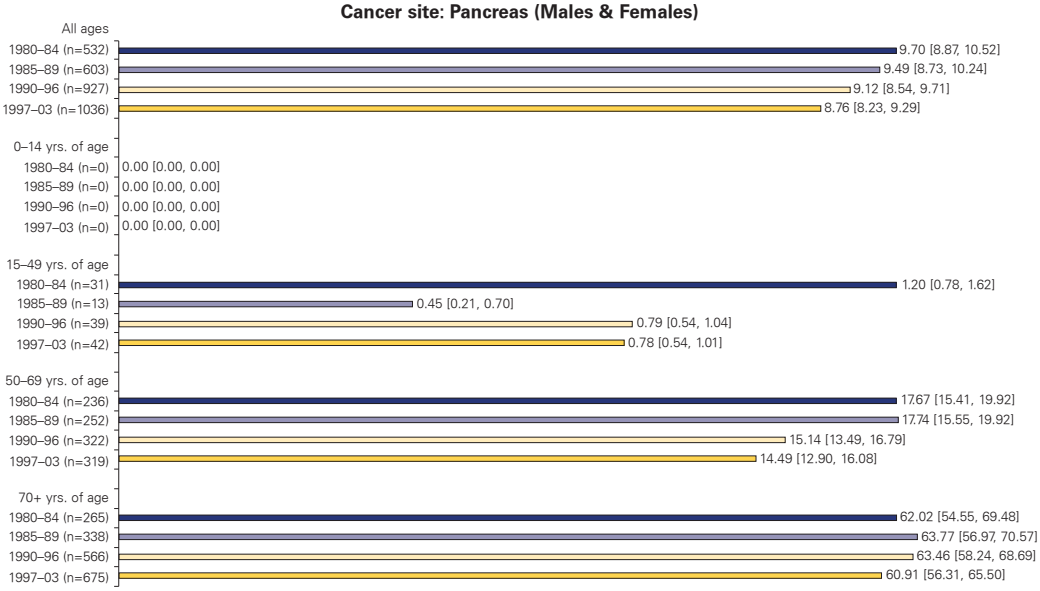
Cancer site: Pancreas (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Pancreas (Males & Females)



*Data source: ABS/AIHW (see text).

Lymphomas

These cancers accounted for 5% of all cancer deaths in 1997-2003. Incidence rates in South Australia are at the high end of the international scale, and within South Australia, incidence rates have been higher among the Australian-born than overseas-born.[19]

Age-standardised mortality rates tended to increase in South Australia, with the increase approximating 14% between 1980-84 and 1997-2003, and with most of the increase occurring between 1985-89 and 1990-96. Males were at a higher risk than females with a male-to-female ratio of age-standardised rates of 1.40 to one in 1997-2003.

Increases in mortality were most pronounced for the older age groups at 25% for ages 70 years and over, and 18% for 50-69 year olds. Indeed, there was no indication of an increase in mortality for individuals below 50 years of age, where a reverse trend was suggested. While similar trends were suggested by sex, numbers of deaths were too small for a definitive comparison.

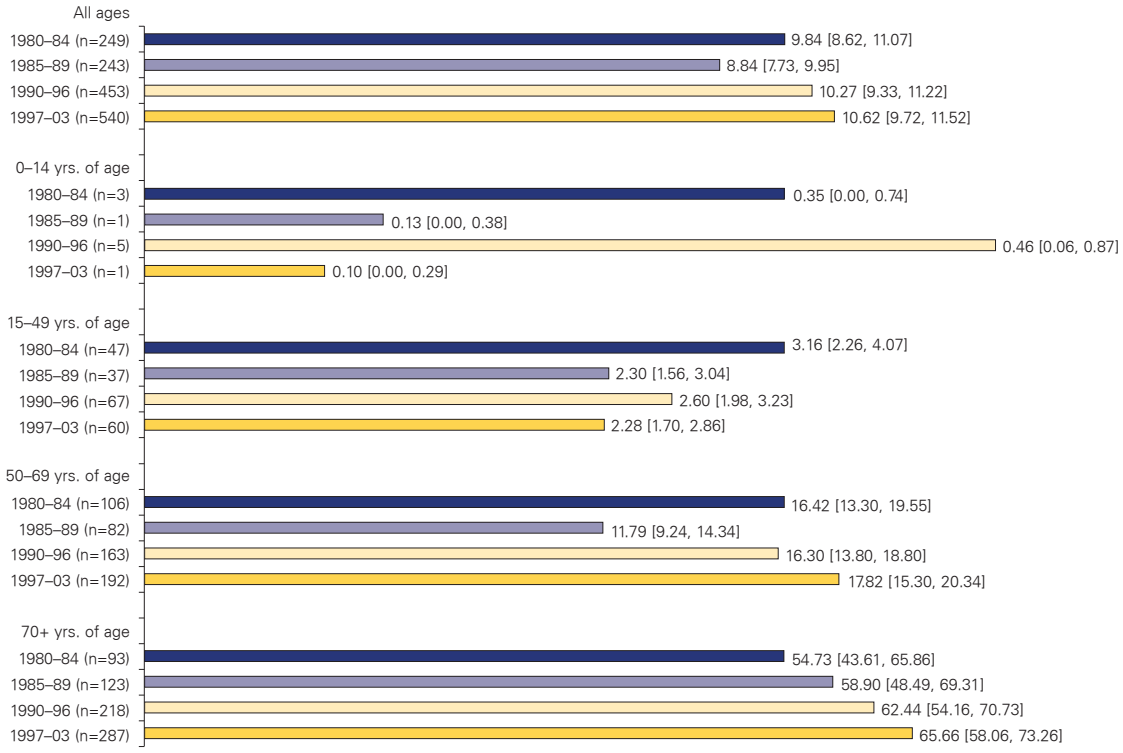
The incidence of lymphoma increased by about 46% in males and females between 1977-81 and 1997-2001.[19] Increases have also been observed in other populations, particularly for non-Hodgkin's lymphomas.[17] While HIV infection is thought to have contributed, its role would have been minor in economically developed countries, with the great majority of the increase in incidence being unexplained.[17]

Further research has been advocated to explore possible contributions from other infections, immunosuppressive states, and exposures to herbicides and other environmental agents.[17] It is suspected that lymphocyte damage from certain viral infections may play a part (eg, infection with Human T-Cell Lymphotrophic Virus and potentially the Epstein-Barr Virus).[17]

The smaller increases in lymphoma mortality than incidence is attributed to gains in case survival.[9] It is reassuring that increases in mortality are not suggested for the younger age groups. Hopefully the increases in older age groups will disappear as these younger people move up the age ladder.

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

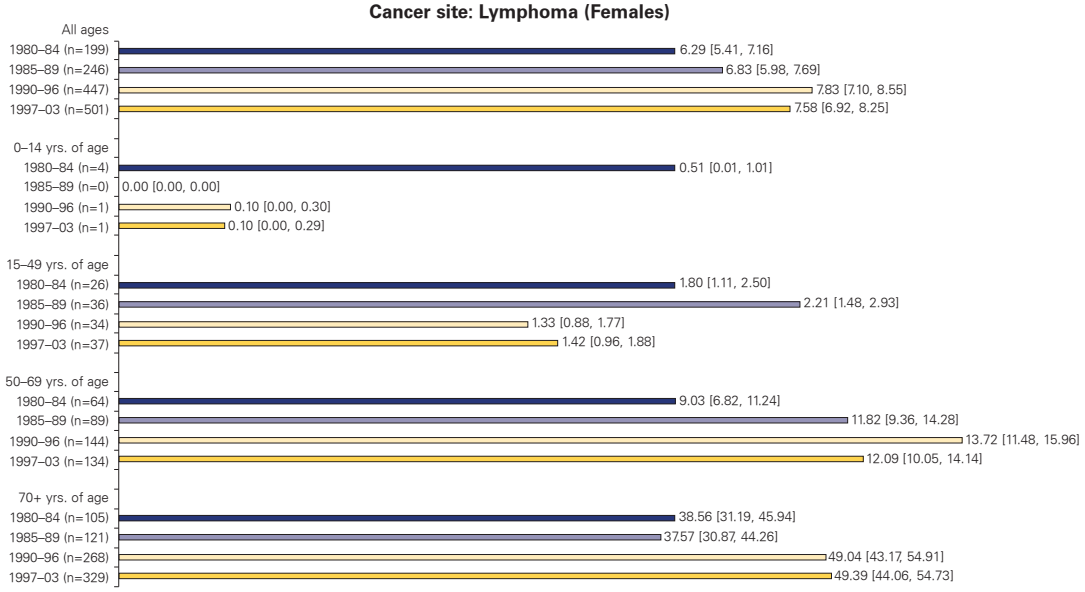
Cancer site: Lymphoma (Males)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

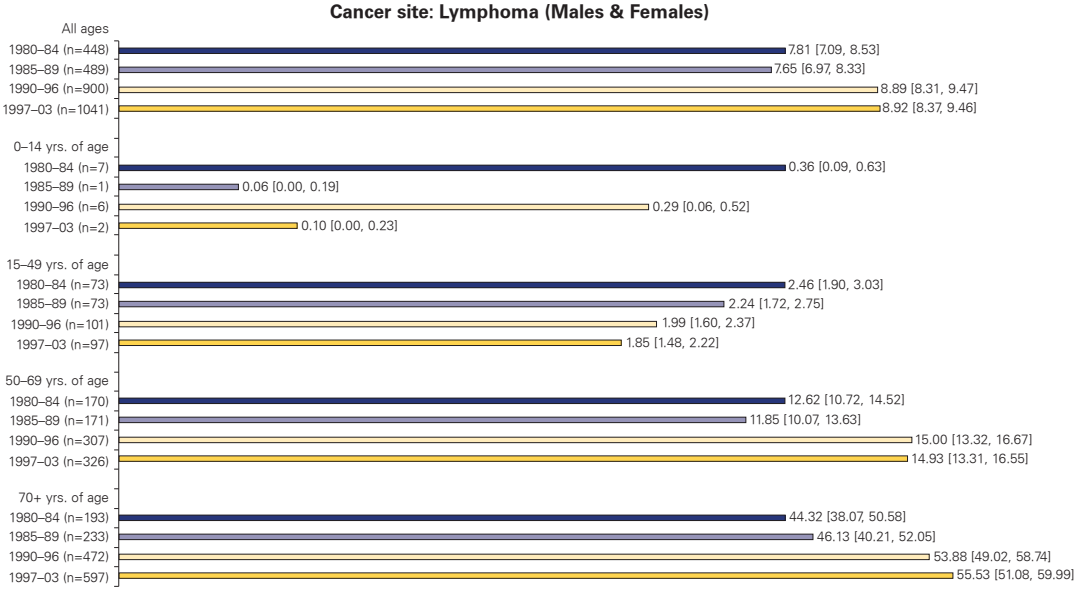
Cancer site: Lymphoma (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Lymphoma (Males & Females)



*Data source: ABS/AIHW (see text).

Stomach cancer

This cancer accounted for 4% of cancer deaths in 1997-2003. South Australians have a low risk of this cancer by international standards, especially the Australian-born, and with lower risks presenting in upper than lower socio-economic areas.[19] Males were at a higher risk than females with a male-to-female ratio of age-standardised mortality rates of 2.27 to one in 1997-2003.

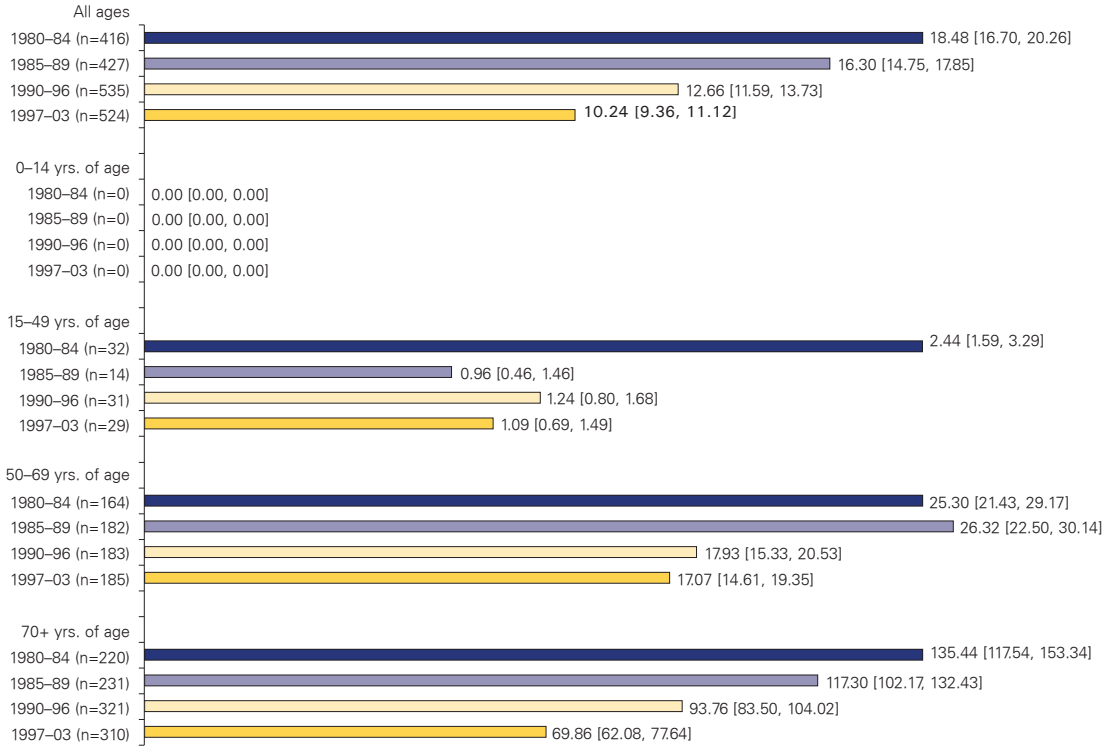
Age-standardised rates reduced by 45% between 1980-84 and 1997-2003, with similar reductions applying to both sexes. The reduction was 49% in individuals over 70 years of age and 34% in 50-69 year olds. Too few deaths occurred in individuals below 50 years of age to define trends in this age range.

The age-standardised incidence of stomach cancer has reduced progressively in both males and females since the late 1970s, which is consistent with trends in other economically developed populations.[8,19] This has been attributed to changes in diet and improvements in food storage and refrigeration.[8]

Fruit and vegetables probably are protective, whereas high-risk diets are likely to include those high in smoked, cured, pickled, salted, spiced and starchy foods, and heavily grilled or barbecued meat and fish.[8] *Helicobacter pylori* have been implicated in the aetiology of this cancer, and infection with these organisms may have reduced due to better refrigeration and potentially the widespread use of antibiotics.[8]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

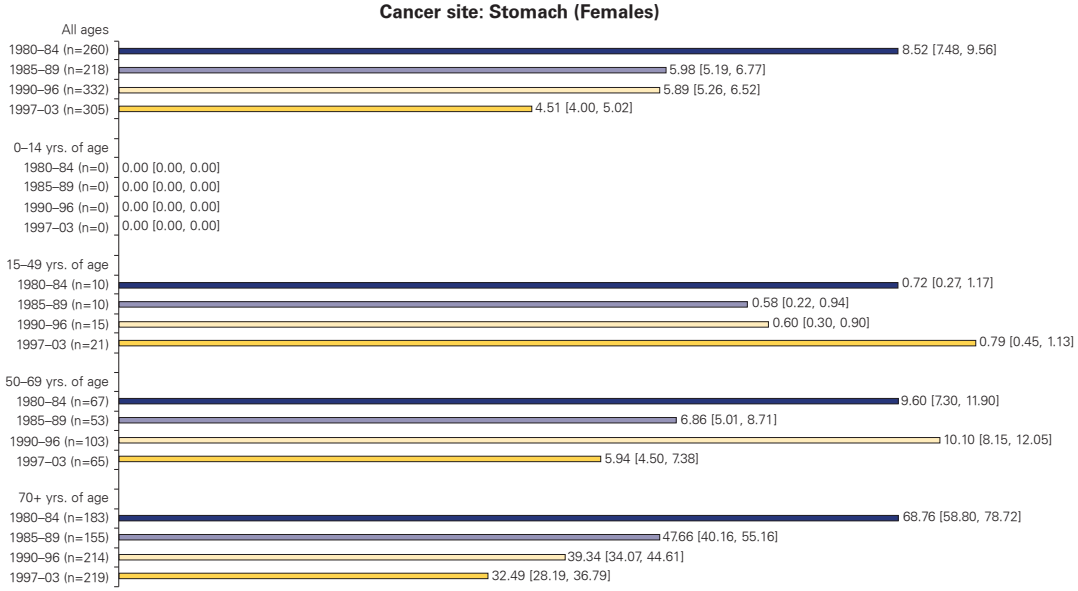
Cancer site: Stomach (Males)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

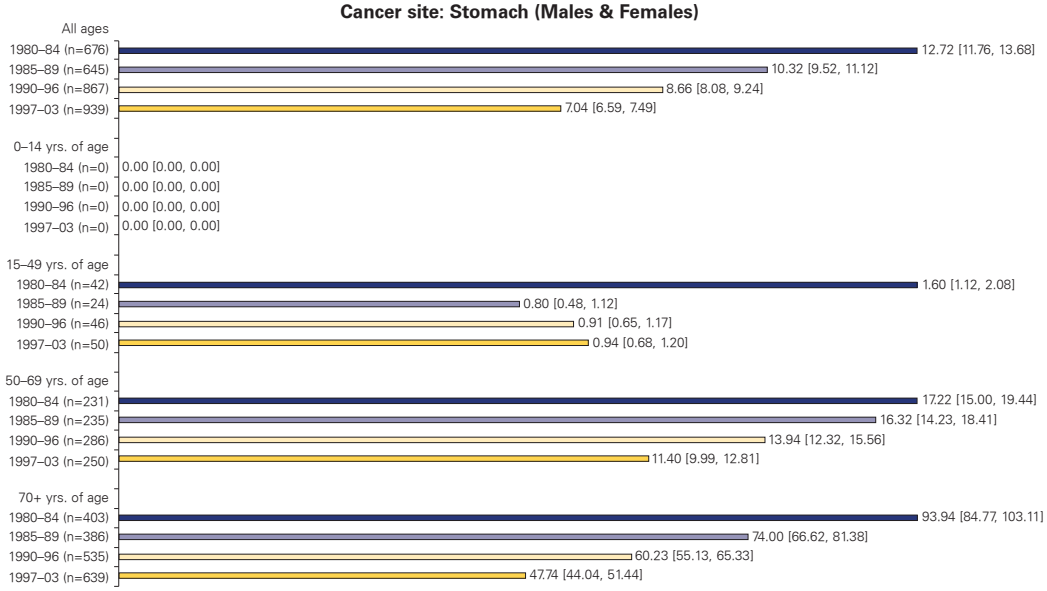
Cancer site: Stomach (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Stomach (Males & Females)



*Data source: ABS/AIHW (see text).

Leukaemias

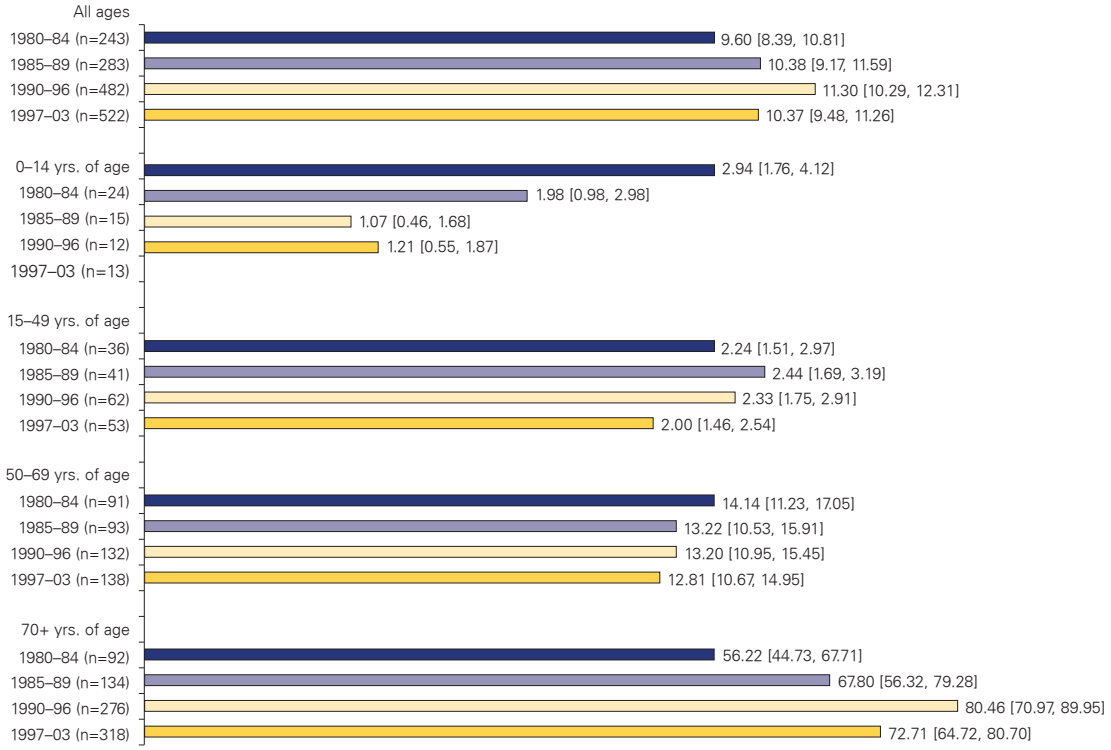
These cancers were responsible for 4% of cancer deaths in 1997-2003. Australia has a high incidence of leukaemia by international standards.[19] Males are at a higher risk than females with a male-to-female ratio of age-standardised mortality rates in South Australia of 1.67 to one in 1997-2003.

There was little evidence of a change in age-standardised mortality between 1980-84 and 1997-2003 for all ages combined, nor for adults. A major reduction of 57% occurred in children less than 15 years of age, however, which appeared to affect both sexes equivalently. This is attributed to gains in chemotherapy and associated bone-marrow transplantation.[17]

The proportion of South Australians of all ages with leukaemia, who survived their disease five years or more from diagnosis, increased from 40% for the 1977-83 diagnostic period to 50% for 1991-98.[9] Most leukaemias occur for no known reason, such that prospects for prevention are limited.[17] It would be precautionary, however, to avoid unnecessary exposures to ionising radiation, benzene and related solvents, chemicals, pesticides and herbicides.[17]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

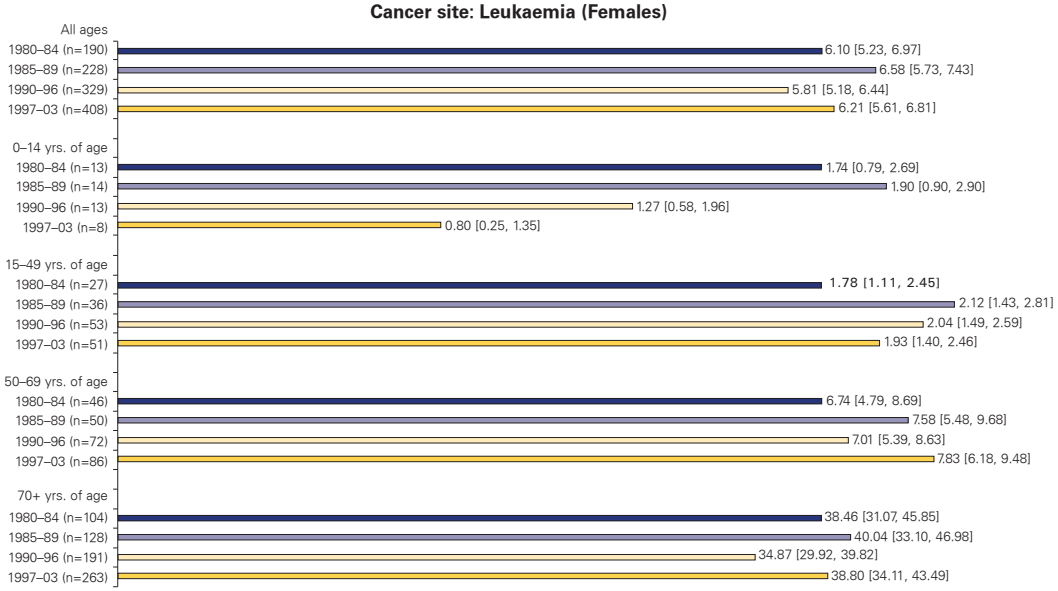
Cancer site: Leukaemia (Males)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

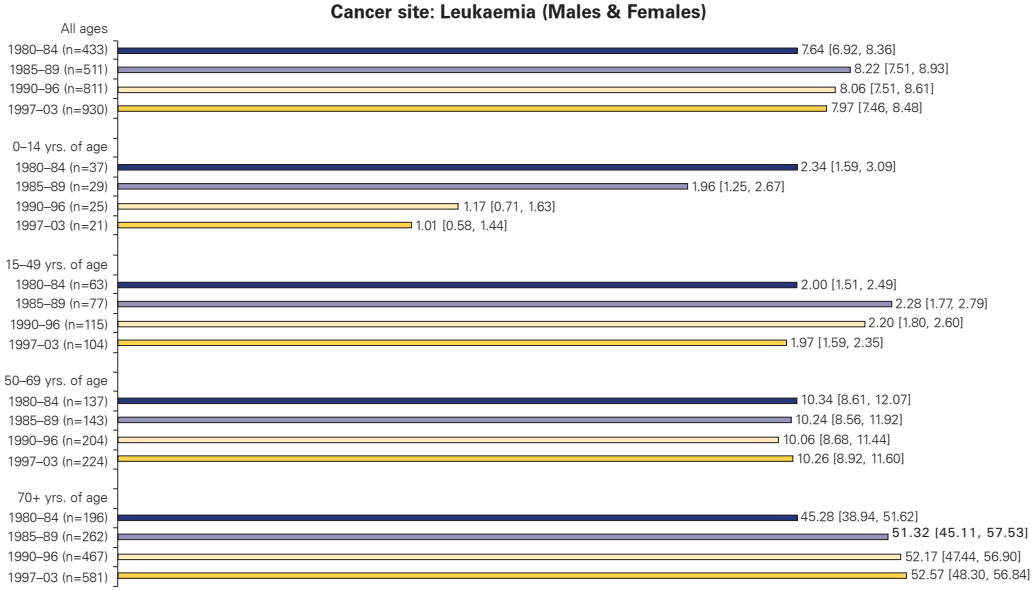
Cancer site: Leukaemia (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Leukaemia (Males & Females)



*Data source: ABS/AIHW (see text).

Skin cancers

These cancers accounted for 3% of cancer deaths in 1997-2003. Approximately three quarters were from melanoma, with the remainder primarily due to squamous cell carcinomas. Males are at a higher risk than females, with a male-to-female ratio of age-standardised mortality rates of 2.41 to one in 1997-2003.

While mortality rates were largely unchanged in individuals under 70 years, an increase of 55% occurred between 1980-84 and 1997-2003 in older people. This mostly related to older males, where the increase was 72%.

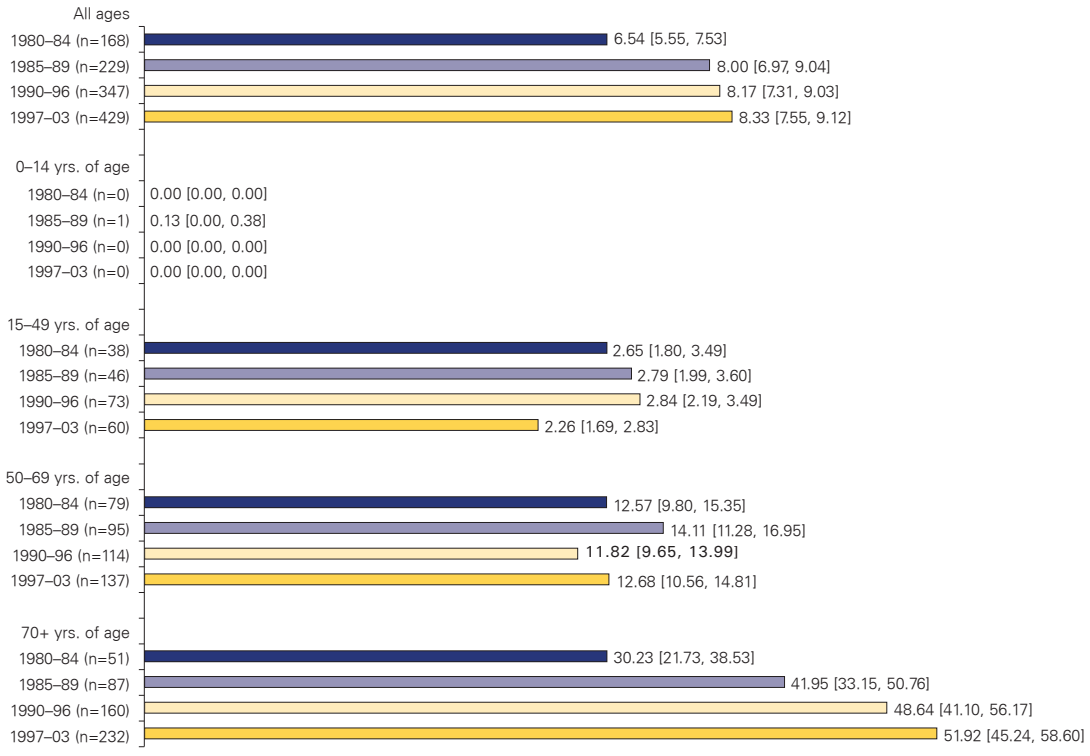
Melanoma of the skin showed a 135% increase in incidence in males between 1977-81 and 1997-2001, with a corresponding increase of 53% in females.[19] Increases were larger in older than younger age groups.[3] High-risk groups have included residents born in Australia and upper socio-economic professional groups, such as medical practitioners and mechanical engineers.[9, 19] By comparison, lower incidence rates have presented in labourers, cleaners, storemen and packers and related workers, metal workers, machine tool makers and setters, operators of earthmoving and construction equipment, and the unemployed.[9] Farmers have had an excess number of these cancers, as have military personnel, potentially due to chronic exposure to the sun.[9]

Older males in particular warrant special attention to counter increases in mortality from skin cancer, although preventive action is required for the whole population. Apart from earlier detection, sun protection should be promoted to reduce risk. There is a danger that concerns about vitamin D deficiency may diminish levels of sun protection. Notably, most Australians would receive adequate sun exposure incidentally during their normal living for vitamin D production, which would equate with about 10 minutes of exposure per day.

Australia has the highest recorded incidence of skin cancer in the world.[19] This highlights the importance of ongoing sun protection, especially in the middle of the day when the intensity of ultraviolet radiation generally peaks.[3]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

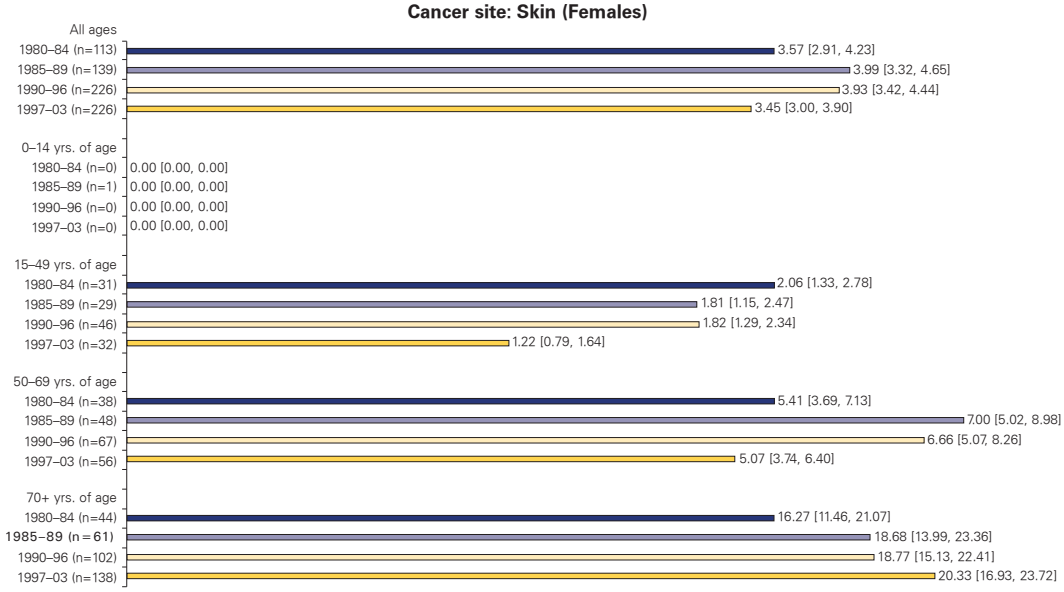
Cancer site: Skin (Males)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

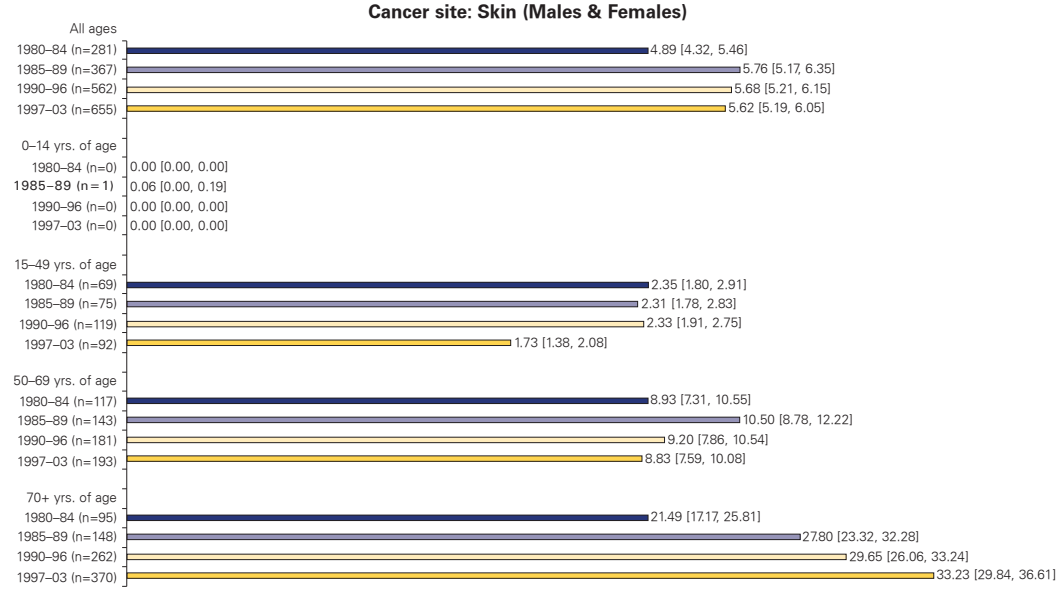
Cancer site: Skin (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Skin (Males & Females)



*Data source: ABS/AIHW (see text).

Oesophageal cancer

Three per cent of cancer deaths were due to oesophageal cancer in 1997-2003. Australia has a relatively low incidence of this cancer by world standards.[19] Males are at a higher risk than females with a male-to-female ratio of age-standardised mortality rates in South Australia of 2.89 to one in 1997-2003.

An increase in age-standardised mortality of 31% occurred between 1980-84 and 1997-2003, with similar trends presenting by age and sex, although older residents aged 70 years and over showed a larger 41% increase over this period, as compared with a corresponding 17% increase for younger residents.

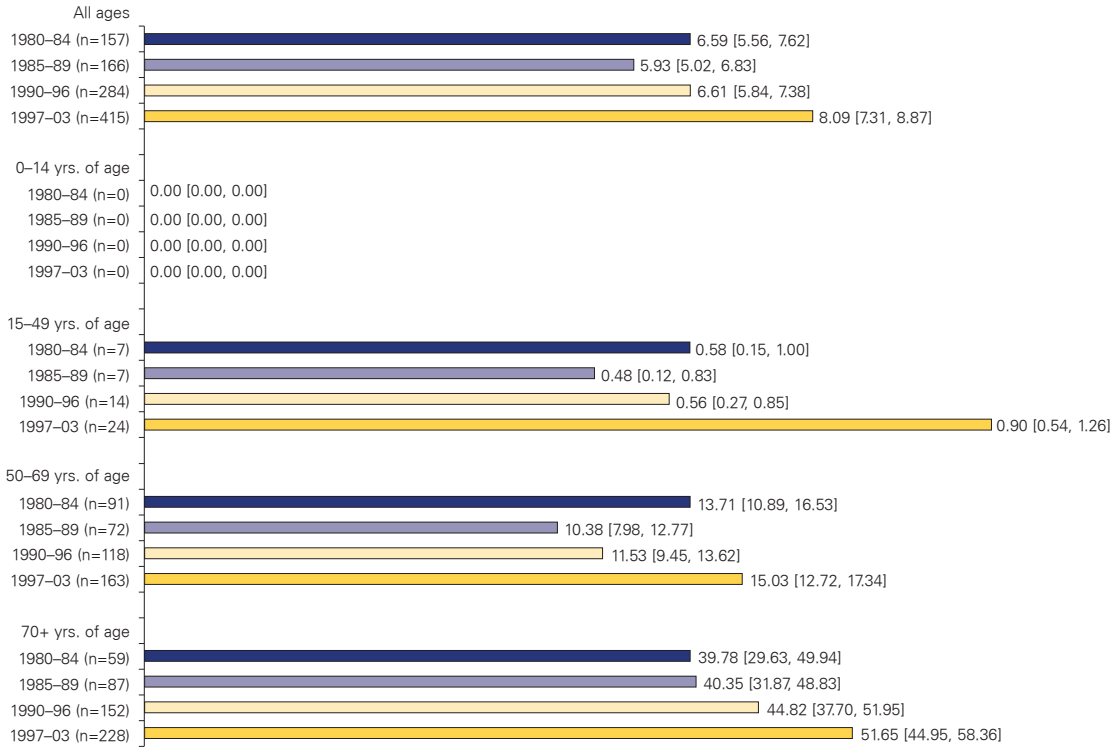
Males and females experienced an increase in incidence of about 38% between 1977-81 and 1997-2001, mostly due to increases in older residents aged 70 years or more.[19] Earlier changes in alcohol consumption and tobacco smoking are likely to have influenced these trends.[8] An excess number of cases have been seen among bartenders, potentially reflecting alcohol and tobacco consumption.[9]

As reported in North American and British males, an upward trend in ratio of adenocarcinomas to squamous cell carcinomas has been evident in South Australia.[8] Attention has been directed at reflux oesophagitis as a cause of Barrett's oesophagus (columnar metaplasia of the squamous cell epithelium of the lower oesophagus), which is thought to predispose to adenocarcinoma.[8] Obesity is regarded to be a risk factor for reflux oesophagitis.[8]

The increase in oesophageal cancer mortality highlights the importance of avoiding smoking and excess alcohol consumption, maintaining a normal body weight, and having a healthy diet rich in fruit and vegetables.[8]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

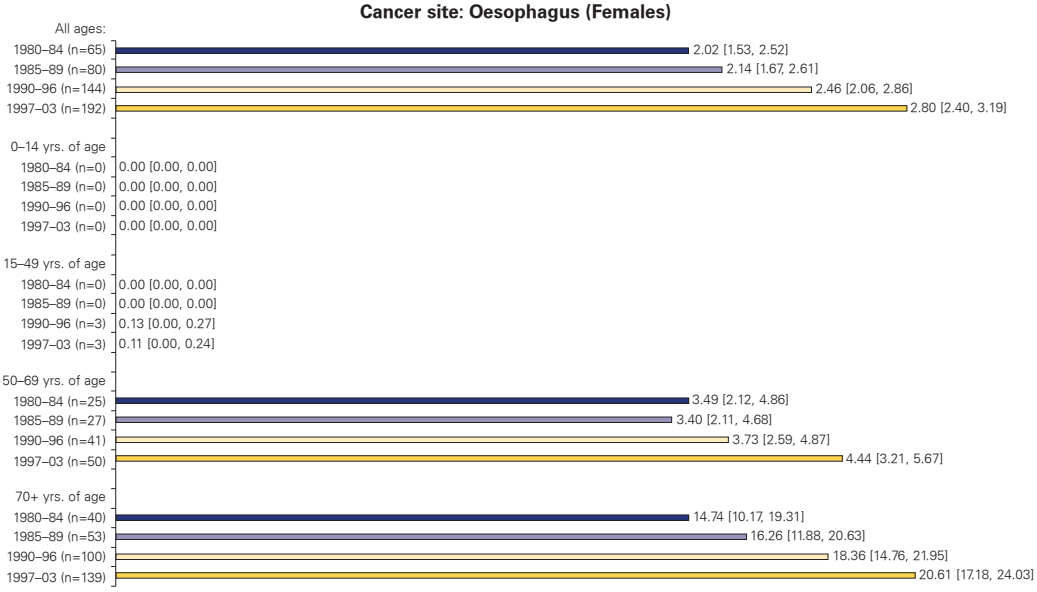
Cancer site: Oesophagus (Males)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

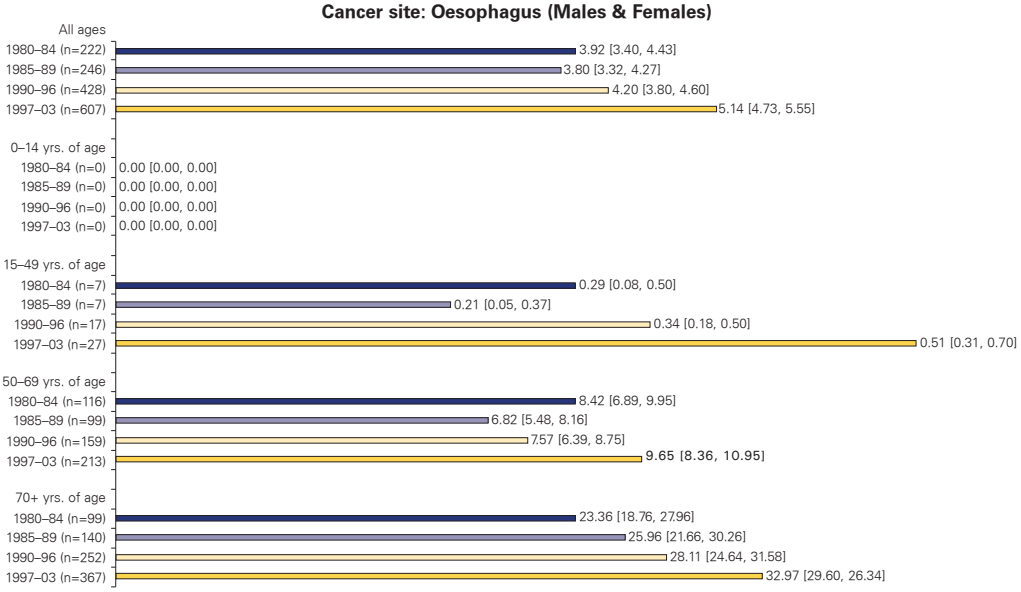
Cancer site: Oesophagus (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Oesophagus (Males & Females)



*Data source: ABS/AIHW (see text).

Kidney cancer

Approximately 2% of cancer deaths in 1997-2003 were due to kidney cancer. Males are at a higher risk than females with a male-to-female ratio of age-standardised mortality rates of 2.38 to one in 1997-2003. Australians have a mid-range incidence compared with other populations predominantly of European extraction.[19]

Changes in age-standardised mortality rates were not evident, although there was the indication of a reduction in mortality between 1980-84 and 1997-2003 in 60-69 year old females.

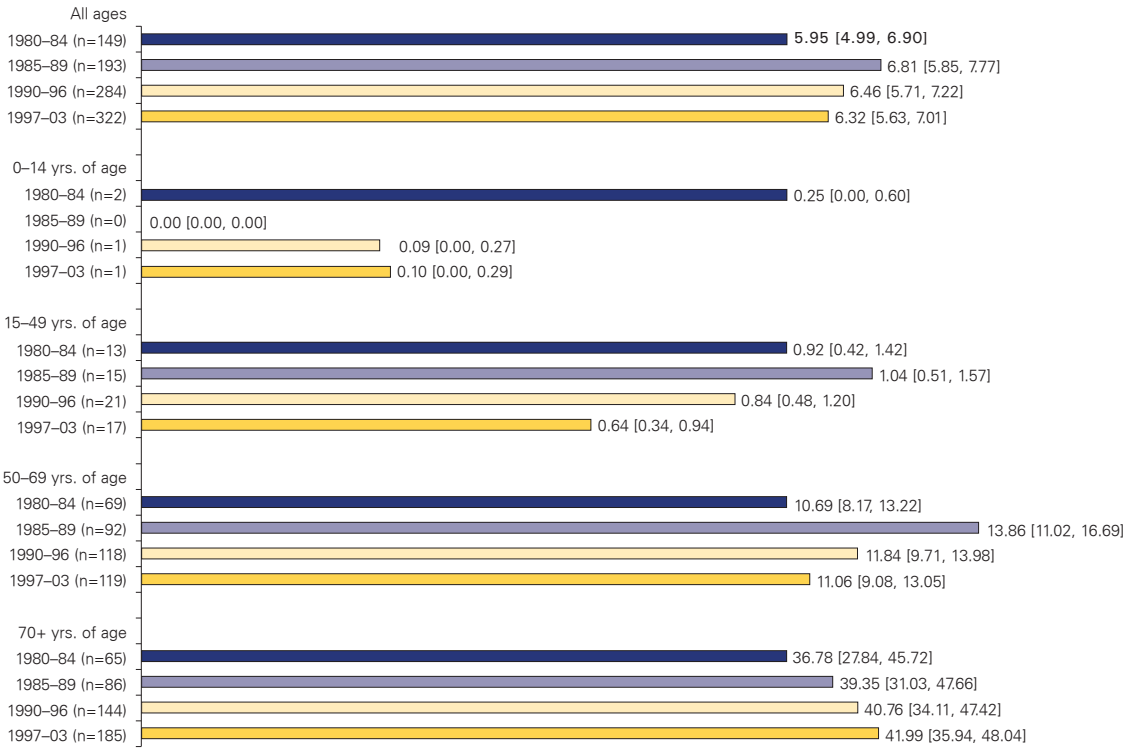
By comparison, males and females experienced an increase in incidence of diagnosed cancers of the kidney and related urinary sites of around 42% between 1977-81 and 1997-2001.[19] Increases in incidence have been reported for many populations and attributed partly to increased detection from advances in ultrasonography and other diagnostic procedures.[16]

The risk of these cancers has been found to correlate with dietary factors and obesity.[16] Accordingly, increases in prevalence of obesity may signify an increased risk.[16] Tobacco smoking is also an established risk factor and probably contributes to the higher incidence often seen in lower socio-economic suburbs.[16] WHO's International Agency for Research on Cancer has estimated that elimination of tobacco smoking would reduce the incidence of kidney cancer in western populations by about one third.[16]

Other risk factors for this cancer include large doses of ionising radiation and possibly certain occupational exposures, such as exposures to asbestos, gasoline, other petroleum products, lead and cadmium.[16]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

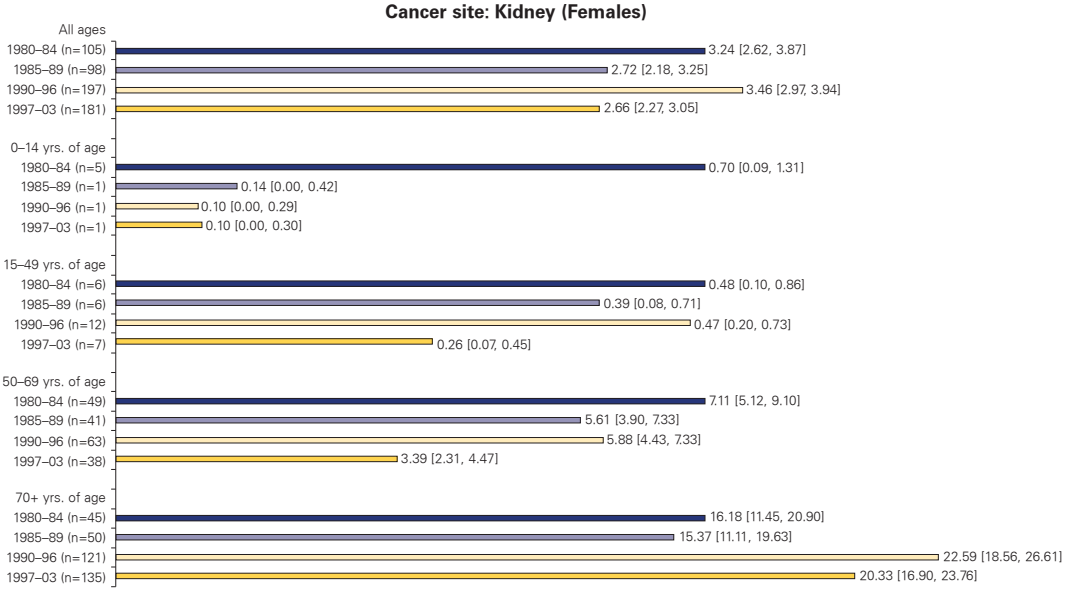
Cancer site: Kidney (Males)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

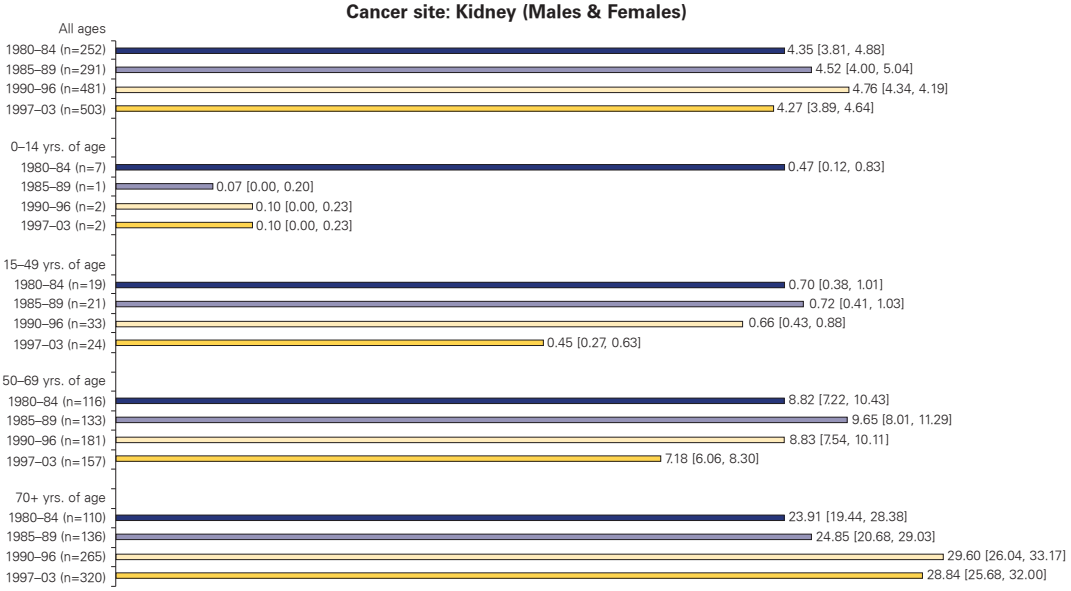
Cancer site: Kidney (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Kidney (Males & Females)



*Data source: ABS/AIHW (see text).

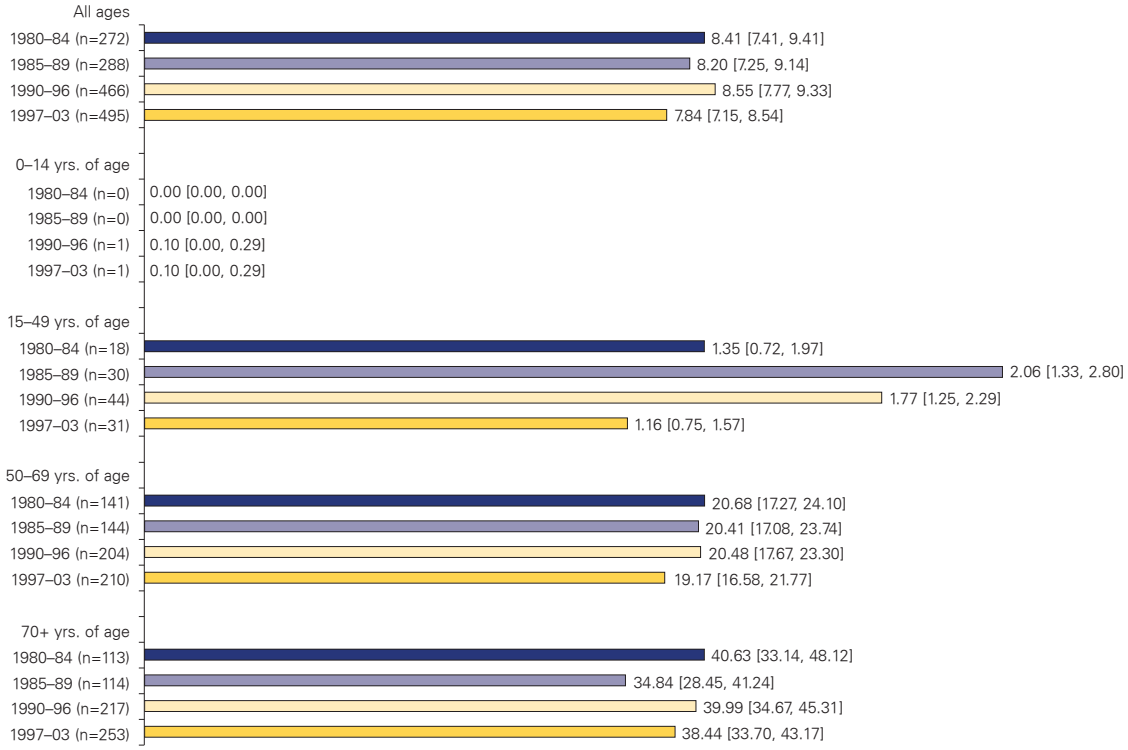
Ovarian cancer

This cancer accounted for 5% of cancer deaths in females in 1997-2003 (about 2% of cancer deaths in both sexes combined). The risk of this cancer appears to be relatively low in South Australia compared with other western populations.[19] There was not clear evidence of a change in age-standardised mortality between 1980-84 and 1997-2003, nor in age-specific rates.

Risk factors include having no or few pregnancies and experiencing a long duration between inception of menstruation and menopause.[7] Established means of prevention do not exist, although a lower risk is associated with use of oral contraceptive steroids, and having a tubal ligation or hysterectomy.[7] Women with a family history of cancer of the ovary, breast, colon or endometrium are advised to seek medical advice about the desirability of genetic counselling.[7]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Ovary



*Data source: ABS/AIHW (see text).

Liver cancer

Approximately 2% of cancer deaths were due to liver cancer in 1997-2003. This cancer has a low incidence in Australia by world standards.[19] Males are at a higher risk than females, with a male-to-female ratio of age-standardised mortality rates of 2.34 to one in South Australia in 1997-2003.

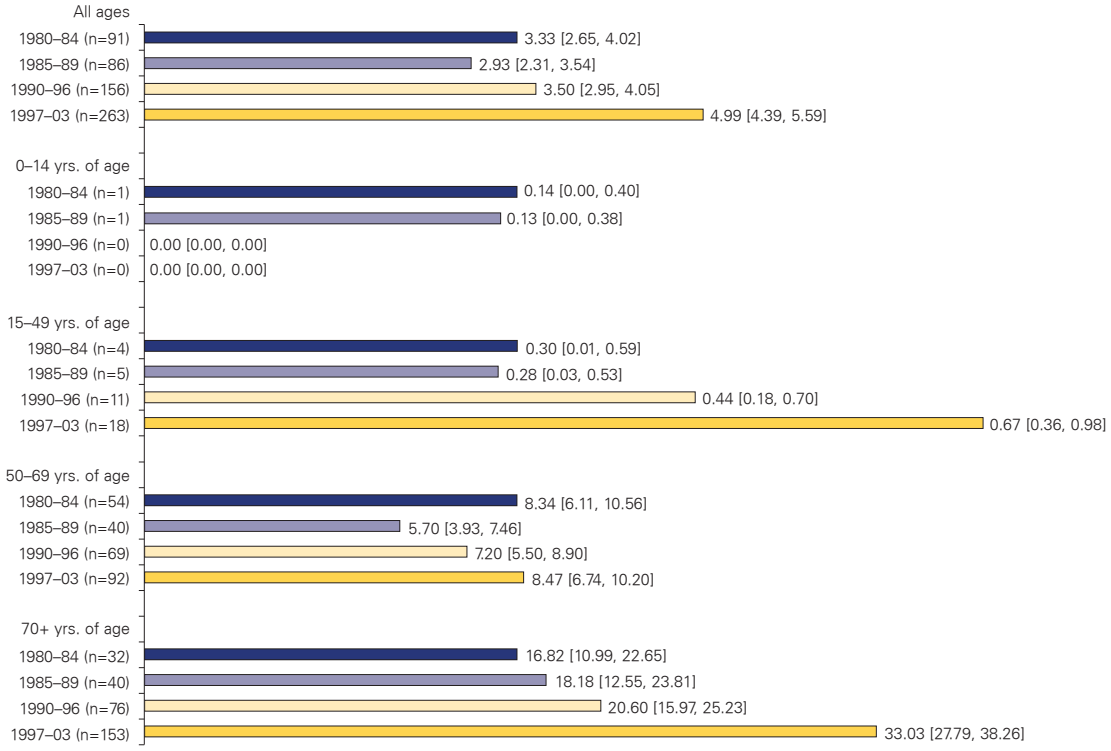
The age-standardised mortality increased by 51% from 1980-84 to 1997-2003, due mostly to increases between 1990-96 and 1997-2003 in both sexes. Peak rates applied in older people aged 70 years and over, where a 79% increase took place.

These mortality increases reflect incidence trends. The incidence of liver cancer is elevated in many migrant populations from Asia, especially among males.[19] Increased numbers of Asian migrants in South Australia would have contributed to incidence and mortality increases. Lower socio-economic groups also are at increased risk.[19]

Hepatitis B and C infections, and possibly alcohol consumption, may have affected secular trends in South Australia.[8] Vaccination against hepatitis B has been used to combat liver cancer and associated morbidity in several countries, including the Gambia.[8] It has a similar role to play for high-risk sectors of the Australian population, including Aboriginal residents at elevated risk. In addition, reductions in hepatitis C infection, avoidance of excess alcohol consumption, and tobacco smoking cessation would reduce the risk of this disease.[8]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

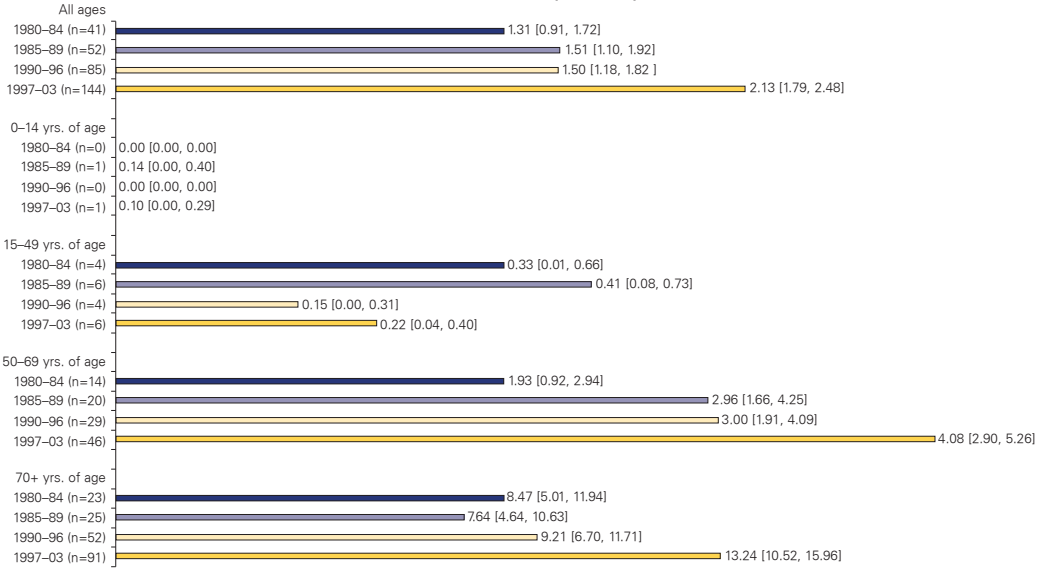
Cancer site: Liver (Males)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

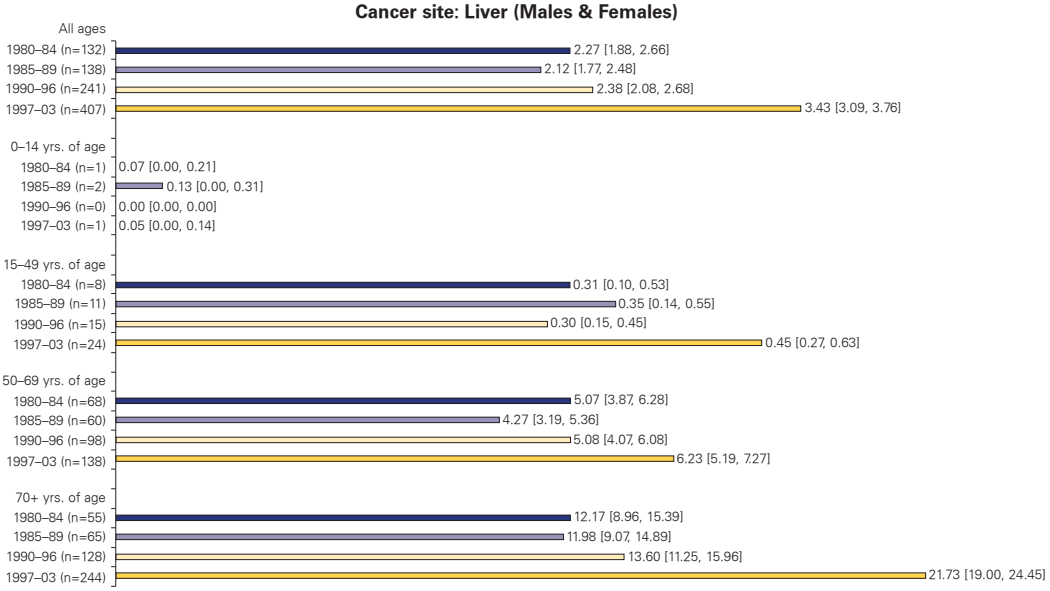
Cancer site: Liver (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Liver (Males & Females)



*Data source: ABS/AIHW (see text).

Gallbladder cancer

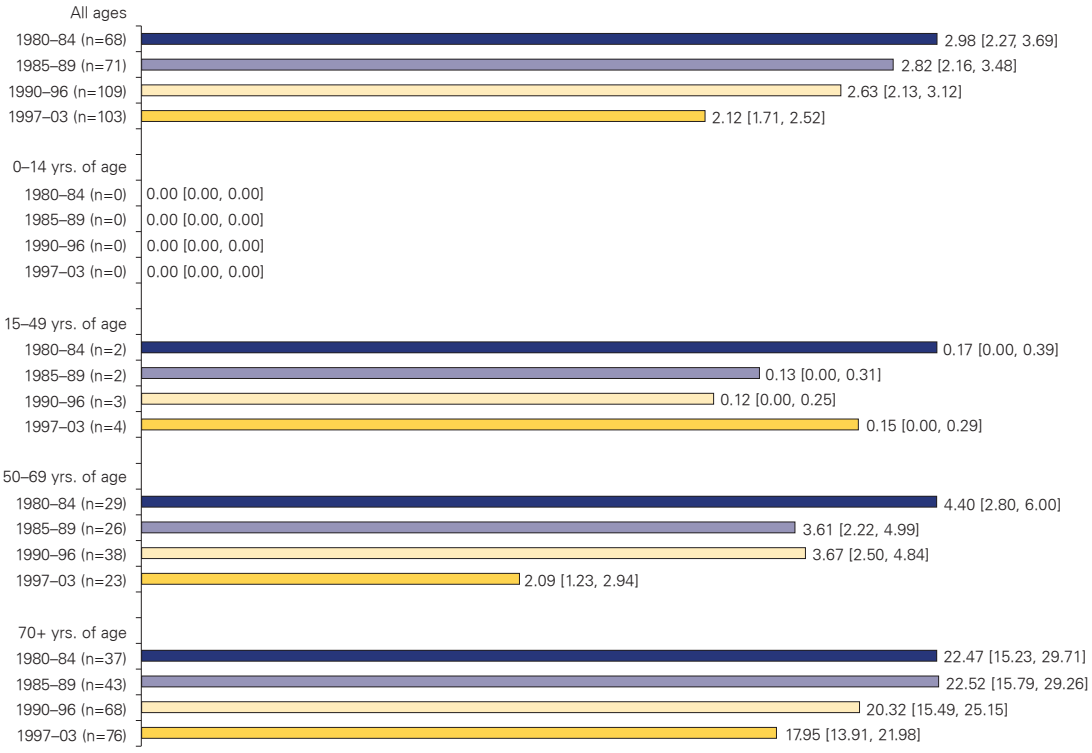
About 1% of cancer deaths in 1997-2003 were due to gallbladder cancers. Australia has a middle-ranking incidence of gallbladder cancers by international standards.[19] High-risk groups within South Australia include residents born in Southern Europe and some Eastern European countries.[19] Males tend to be at lower risk than females in South Australia, with a male-to-female ratio of age-standardised mortality rates of around 0.90 to one in 1997-2003.

The age-standardised mortality reduced about a third between 1980-84 and 1997-2003. There was evidence that both males and females were affected. A pronounced 54% reduction applied in 50-69 year olds. Gains in case survivals have been reported in South Australia and may have contributed to this mortality reduction.[9]

Gallbladder cancers usually are diagnosed late due to a lack of specific symptoms, with very poor outcomes.[8] Preventive opportunities would include avoiding obesity.[8] Cholesterol gallstones and other gallbladder disease sometimes recur with sufficient frequency to justify a cholecystectomy, which would eliminate any further risk of this cancer.[8]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

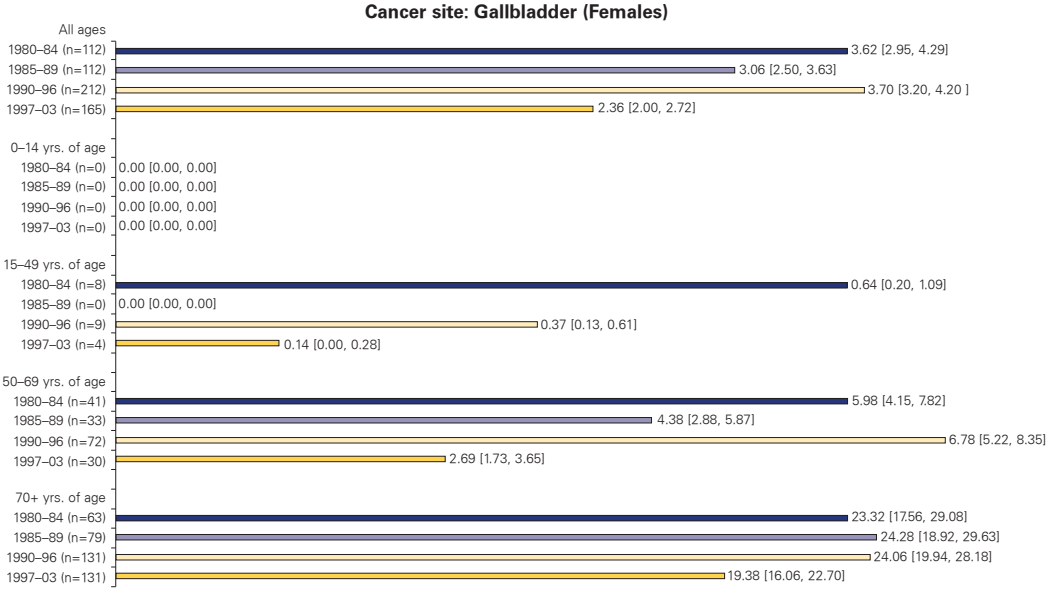
Cancer site: Gallbladder (Males)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

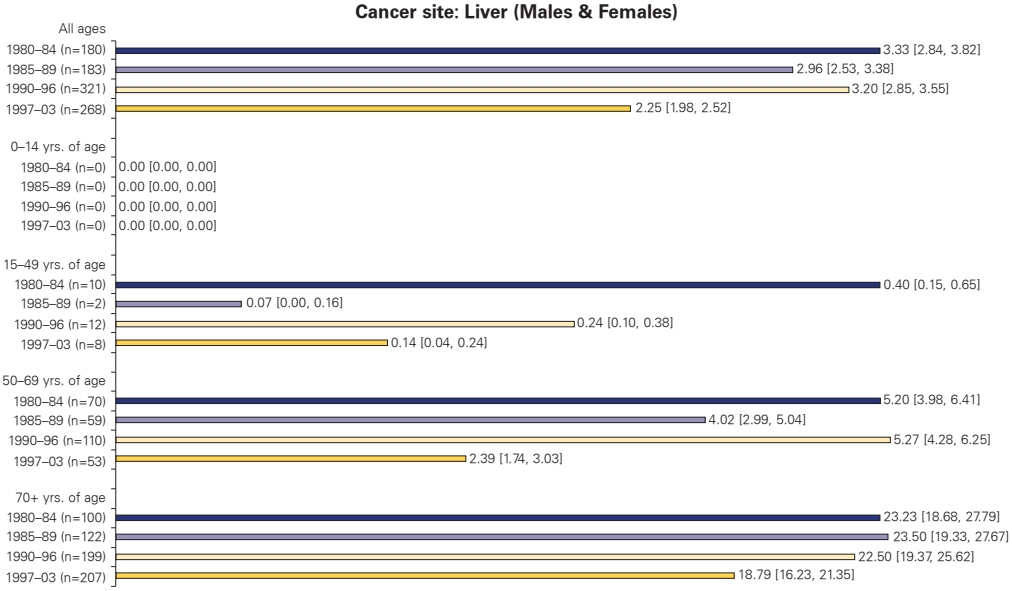
Cancer site: Gallbladder (Females)



*Data source: ABS/AIHW (see text).

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Liver (Males & Females)



*Data source: ABS/AIHW (see text).

Cervical cancer

This cancer was responsible for about 1% of cancer deaths in females in 1997-2003 (0.6% of cancer deaths in both sexes combined). South Australia has a low risk of this cancer compared with Australia more generally and most other populations.[14, 19]

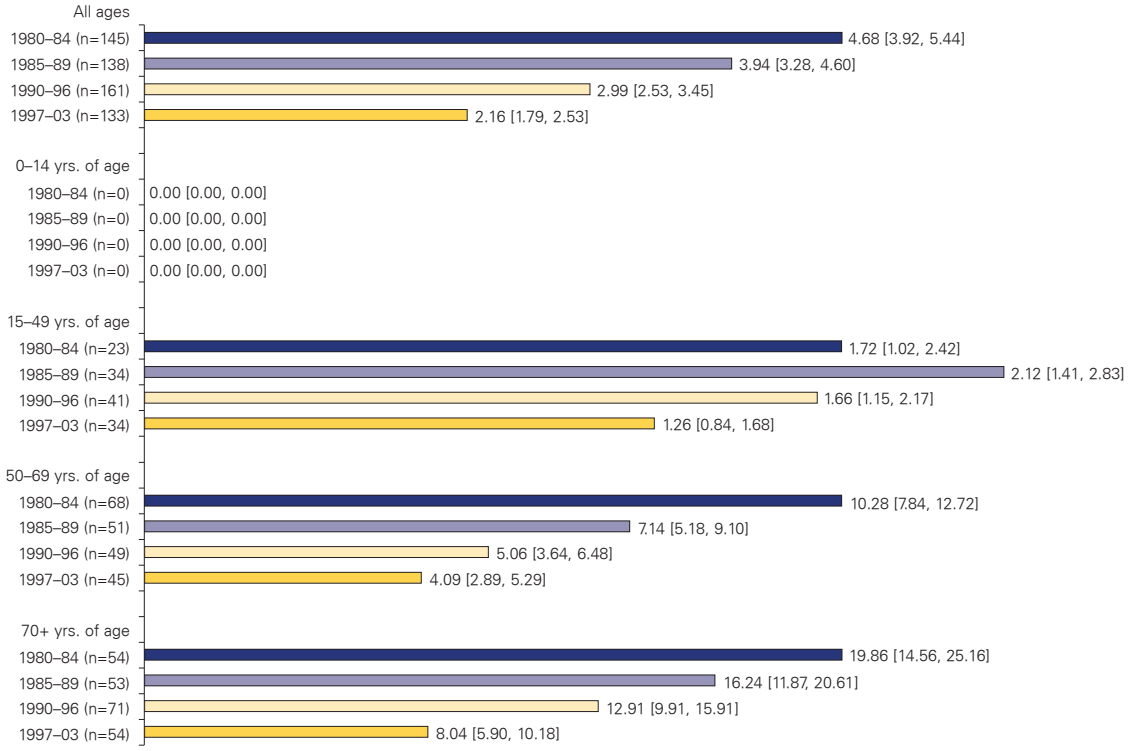
A pronounced 54% reduction in age-standardised mortality took place in South Australia between 1980-84 and 1997-2003. The reduction affected a broad cross-section of ages, but it was most evident in females over 50 years of age.

The reduction in mortality reflects downward trends in incidence, which are attributed mostly to the detection through screening of precursor lesions and their early treatment.[7] Cervical cancer is more common in lower socio-economic areas and among the unemployed.[9, 19] Aboriginal women have presented an incidence about 4-5 times higher than for non-Aboriginal women.[7] This supports a continuing policy emphasis on screening promotion among Aboriginal women and lower socio-economic groups.

HPV (Human Papilloma Virus) vaccine will soon be available in Australia. This will increase the potential for cancer prevention. The best age for vaccination needs to be determined, together with ongoing needs for screening post-vaccination.[20]

Trends in annual age-standardised (Australian population, 2001) cancer death rates per 100,000 (95% confidence limits) in South Australia by calendar year*

Cancer site: Cervix



*Data source: ABS/AIHW (see text).

Summary comments

Summary comments

The downturn in mortality rates for all cancers collectively in 1997-2003 is reassuring, with 234 fewer cancer deaths occurring per annum during that period than would have been expected from 1990-96 mortality rates. Younger age groups experienced larger percentage reductions in mortality, which also is a positive finding. Notably, more years of life would be saved when deaths are prevented from occurring at a younger age. Also, it is hoped that larger reductions in younger individuals will lead to equivalent reductions in the older age ranges as these younger individuals move up the age ladder.

Of particular interest is the 45% reduction in cancer mortality in children aged 0-14 years, which is attributed to treatment advances, including advances in chemotherapy and bone-marrow transplantation for acute lymphatic leukaemia and other childhood cancers.[17]

In general, percentage reductions in mortality for individual cancer types were more pronounced between 1980-84 and 1997-2003 for the younger age groups. This applied for example to cancers of the lung (males), large bowel, gallbladder, pancreas (males), and leukaemia.

This did not apply to cervical cancer, however, where there has been a policy emphasis since around 1990 on increasing screening in the older age groups.[7] Also, breast-cancer mortality reductions were more evident in women over 50 years of age, which is consistent with the priority given to 50-69 year olds as the principal target for screening mammography.[7]

For those cancers showing a secular increase in mortality, the percentage increase was non-existent or tended to be smaller in younger than older age groups. This was evident for cancers of the lung (females), skin, oesophagus, possibly liver, and lymphomas.

As a generalisation, it can be concluded that irrespective of cancer mortality trends, they tended to be more favourable in younger than older South Australians. Regardless of these trends, future reductions in cancer mortality should be pursued by:

- Reducing tobacco use.
- Adopting healthier diets high in fruit and vegetables, and lower in calorie-rich items, fat, and salt.
- Avoiding excess alcohol consumption.
- Obtaining regular exercise.
- Controlling bodyweight.[2]

Sun protection also is important to reduce skin cancer risk.[3] Extension of breast and cervix screening should be a priority, plus the introduction of bowel screening.[7, 8] Further research is needed into clinical and palliative care, with incorporation of results into evidence-based practice guidelines. Non-clinical support services also are needed so that family members and other carers will be assisted to provide home care to people with cancer. Special projects are needed to find the best ways of providing this support in remote areas, both for Aboriginal & Torres Strait Islander and other residents.

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