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MORTALITY AND INCIDENCE TRENDS FOR LEADING CANCERS IN QUEENSLAND, 1982 TO 2003

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Summary

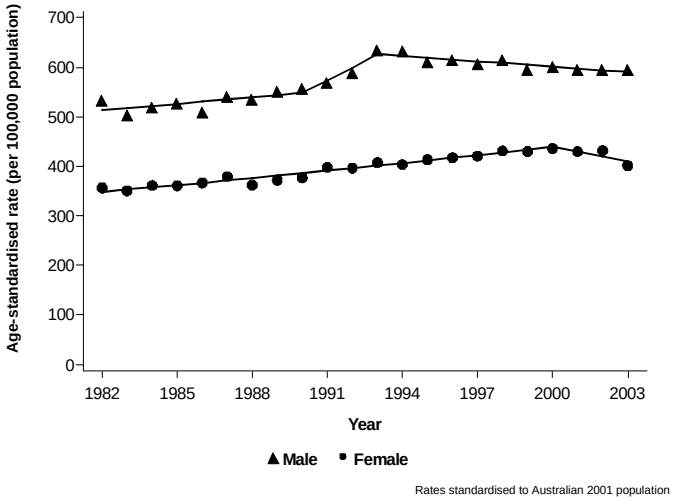
- The aim of this publication is to provide information on the cancer mortality and incidence trends in Queensland, using the latest data available (1982 to 2003). Trends are presented for all cancers combined and for seven of the eight[a] National Health Priority cancers: lung, colorectal (large bowel), prostate, breast, cervix, melanoma, and non-Hodgkin's lymphoma. Results for two other important cancers, stomach and ovary, are also reported. Trends for males and females are presented separately.
- For certain cancers the trend was not the same over the entire period 1982 to 2003. For example, a slow increase occurred for breast cancer mortality between 1982 and 1994, followed by a decrease in more recent years. A statistical technique called "joinpoint analysis"[1] was used to describe changing trends over successive segments of time (see Appendix A).
- Mortality rates for all cancers combined have been decreasing for both sexes since the mid-1990s. For women, the overall decline in cancer mortality rate corresponds with improvements in mortality due to breast cancer and continuing decreases in mortality from colorectal, cervical, stomach, and ovarian cancer. For men, the recent decline in the overall cancer death rate appears to be mainly driven by recent improvements in the mortality rate of prostate cancer and continuing improvements in mortality rates due to lung, colorectal and stomach cancer.
- The mortality rate for lung cancer has continued to decrease among men but increase among women.
- The mortality rate has continued to increase for non-Hodgkin's lymphoma for both men and women.
- Cancer incidence rate trends are sometimes difficult to interpret and may be related to changes in screening practices and public awareness, rather than a real change in the underlying incidence of the specific cancer.
- The incidence rate (or rate of new cases) of cancers among women had increased consistently since 1982 until the early 2000's, followed by a decrease in the trend of the incidence rate in recent years. This initial increasing trend was driven mainly by increases in breast cancer, lung cancer, non-Hodgkin's lymphoma and melanoma. However, the recent change in trend to a decreasing incidence rate was largely due to a corresponding change to a decrease in breast cancer incidence as well as a drop in the incidence of cervix and stomach cancers over time.
- Trends in the incidence of cancer among men have decreased since 1993, mainly associated with continuing decreases in lung and stomach cancer. However, the incidence of melanoma and non-Hodgkin's lymphoma continue to increase among men.

Incidence trends for all cancers combined

A total of 18,202 new cancers (incidence) were diagnosed in Queensland during 2003. Of these, 10,360 new cancers were reported for males and 7,842 for females.

For females, overall cancer incidence rates had increased by 1.3% per year until 2000, but has since decreased by 2.3% per year in very recent years from 2000-2003 (Figures 1 and 2, Appendix B). The initial increase in overall cancer incidence rates was driven by increases in the incidence rates of breast cancer (mainly due to increased screening), lung cancer, and non-Hodgkin's lymphoma. The change in the trend to a decreasing incidence rate in 2000 coincided with a similar change in trend for breast cancer, where the incidence rate had increased by 2.1% per year until 2000, but then decreased by 1.7% per year from 2000-2003. There have also been significant decreases in incidence rates for ovarian (from the mid 1990's), cervical and stomach cancers.

Figure 1: Incidence trends for all cancers combined by sex, Queensland, 1982-2003



[a] Trends for the eighth National Health Priority cancer, non-melanocytic skin cancer, are not presented in this report because incidence data for this cancer are not routinely collected by the Queensland Cancer Registry (or any of the other state and territory registries).

Figure 2: Recent trends in incidence by type of cancer and sex (annual percentage change)

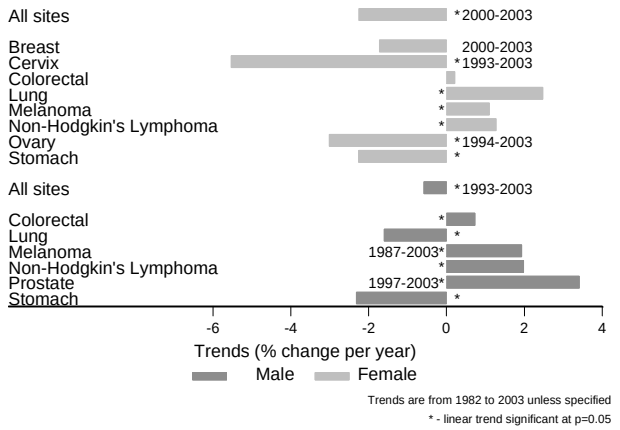
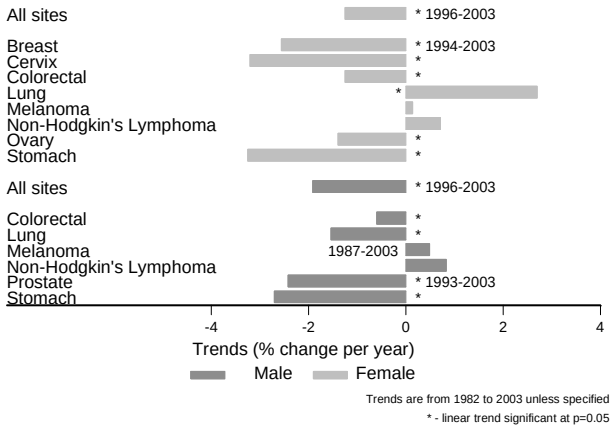


Figure 4: Recent trends in mortality by type of cancer and sex (annual percentage change)

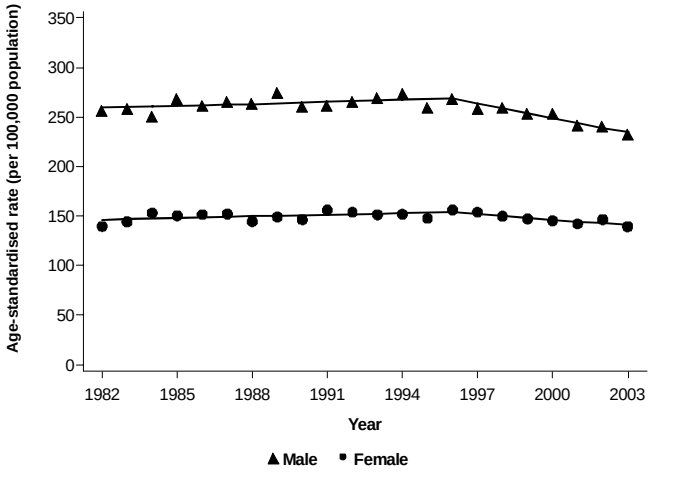


For males, cancer incidence rates increased to 1993 but since then has decreased by 0.6% per year (Figures 1 and 2, Appendix B). This recent trend is due to significant decreases in the incidence rates of stomach and lung cancers, and a large fall in the incidence rate of prostate cancer during the mid-1990s, which may have resulted from a depletion in prevalent cases from the pool of men having prostate-specific antigen (PSA) testing during that time[2]. The incidence rate of prostate cancer has been on the increase again since 1997. The decreasing trend for all cancers has been somewhat offset by increases in the incidence rates of colorectal cancer, non-Hodgkin's lymphoma and melanoma.

Mortality trends for all cancers combined

In 2003 there were 6,667 deaths from cancer recorded in Queensland (3,874 males and 2,793 females).

Figure 3: Mortality trends for all cancers combined by sex, Queensland, 1982-2003



For females, the mortality rate increased slightly (0.4% per year) from 1982 to 1996 but has since decreased by 1.3% per year, corresponding to an overall decrease in the mortality rate for women of 8.4% between 1996 and 2003 (Figures 3 and 4, Appendix C). This decrease in the cancer mortality rate for females is due to a falling trend in mortality for breast cancer since 1994 and continuing decreases in the mortality rates for stomach, cervical, ovarian and colorectal cancers. In contrast to the decline in overall mortality rates, there have been large increases in mortality rate among women for lung cancer, with the rate increasing by 2.7% per year. The mortality rate for non-Hodgkin's lymphoma has continued to increase slowly over the study period, however, this increase did not quite achieve statistical significance.

The pattern of mortality rates for males for all cancers combined is very similar to that observed for females with an increase of 0.4% per year between 1982 and 1996, followed by a decrease of 1.9% per year since then (Figures 3 and 4, Appendix C). This represents a decrease in the cancer mortality rate for males of 12.6% for the seven years from 1996 to 2003. The down turn in mortality rates for males is due to recent decreases in the mortality rate for prostate cancer and continuing improvements in mortality rates caused by lung, stomach and colorectal cancers. However, there have been increases in the mortality rate due to non-Hodgkin's lymphoma.

Specific cancers

Breast cancer

The incidence rate of breast cancer increased by 2.1% per year between 1982 and 2000, but then decreased by 1.7% per year from 2000 to 2003 (Figure 5). Much of the earlier increase in incidence was due to increased breast cancer screening. However, a decrease in the incidence rate over very recent years may be the result of a successful breast screening program where a large proportion of the Queensland target population has now been screened and the rate of detection of new cases is starting to settle to an

equilibrium level. Two or three more years of data will be needed to confirm this trend.

Figure 5: Incidence trend for breast cancer, Queensland, 1982-2003

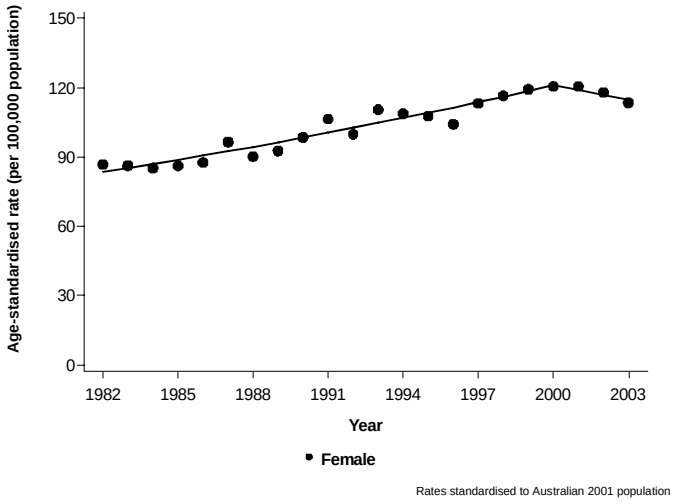
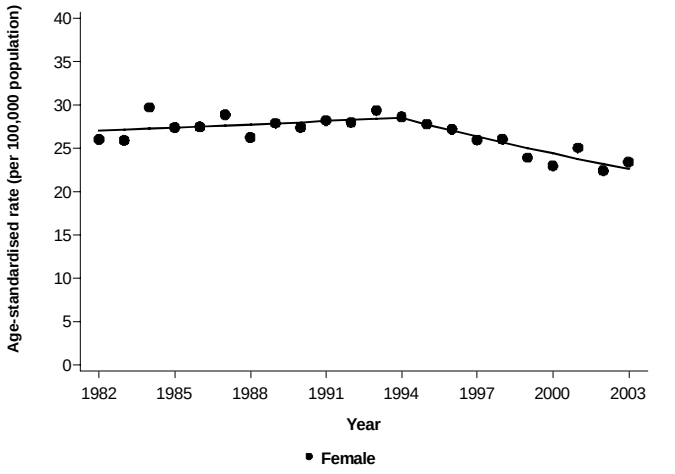


Figure 6: Mortality trend for breast cancer, Queensland, 1982-2003



Breast cancer mortality rates increased slowly by 0.4% per year between 1982 and 1994, but since then the trend in mortality rates has been reversed and it is now decreasing by 2.6% per year (Figure 6). This corresponds to an overall decrease in the mortality rate for the nine years from 1994 to 2003 of 20.8%.

A decline in breast cancer mortality rates has also been observed in the other States of Australia and in several other countries such as Britain and the United States[2,3]. This decrease is commonly attributed to two main factors: screening and better treatment. Between January 2003 and December 2004, a total of 354,720 women were screened by the BreastScreen Queensland program. Of these, 226,083 women were in the 50-69 year old target group corresponding to a participation rate of 57.8% within that age group[4].

Cervical cancer

Between 1982 and 1993 the incidence rate for cervical cancer declined by an average of 2.0% per year. Since 1993 the incidence rate of cervical cancer has decreased by 5.5% per year. This corresponds to an overall decrease in the incidence rate of 43.4% for the ten years from 1993 to 2003 (Figure 7).

Mortality rates for cervical cancer have also shown a steady decline in Queensland during the study period (Figure 8). Between 1982 and 2003 the mortality rate decreased by a total of 49.5%.

Experts agree that the continuing decrease in mortality rates is largely due to the organised cervical screening program[5]. A total of 611,255 women aged 20-69 years old were screened for cervical cancer in Queensland in the years 2003 and 2004, giving an age-standardised participation rate of 57.6% within the target cohort[4].

Figure 7: Incidence trend for cervical cancer, Queensland, 1982-2003

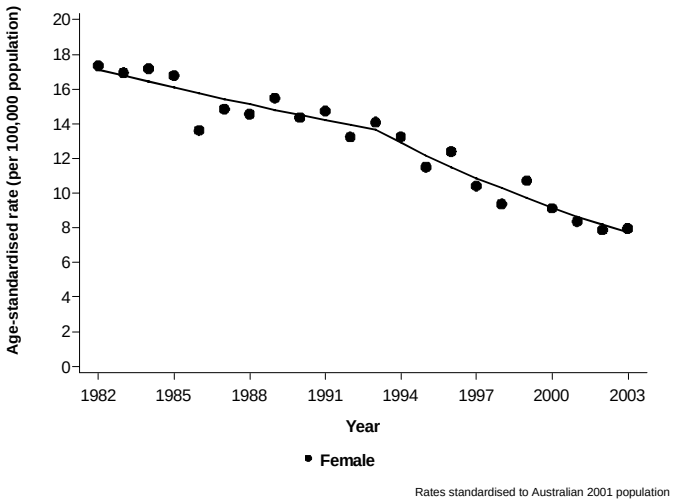
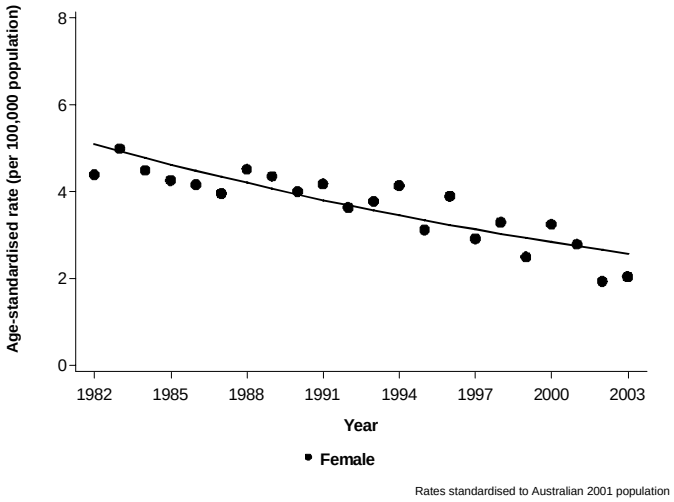


Figure 8: Mortality trend for cervical cancer, Queensland, 1982-2003



Colorectal cancer

There has been a steady increase in the incidence rate of colorectal cancer for both men (0.7% per year) and women (0.2% per year) since 1982, although the trend for women failed to reach statistical significance (Figure 9). In contrast, mortality rates have decreased for both men and women, with a decrease of 0.6% per year for males and 1.3% per year for females (Figure 10). This represents an overall improvement in the mortality rate since 1982 of 11.9% for men and 23.2% for women.

Figure 9: Incidence trends for colorectal cancer, Queensland, 1982-2003

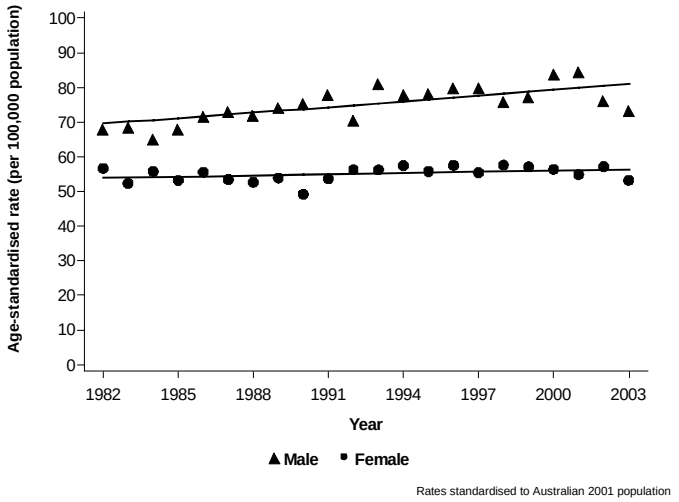
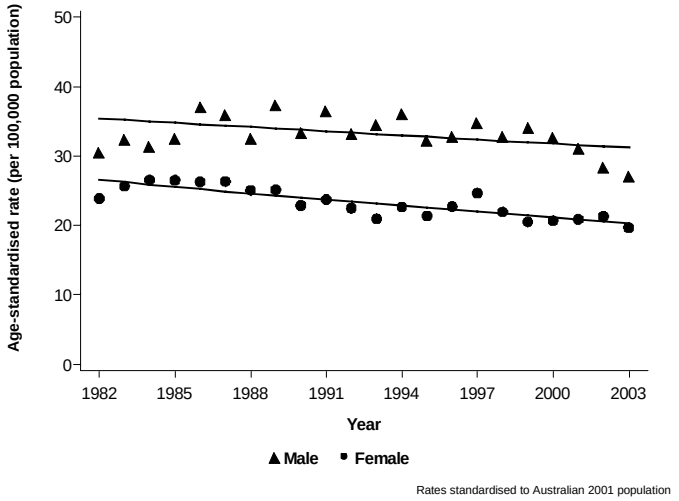


Figure 10: Mortality trends for colorectal cancer, Queensland, 1982-2003



Lung cancer

Both incidence and mortality rates for lung cancer have shown ongoing improvement for males, decreasing by 1.6% and 1.5% per year respectively (Figures 11 and 12). Since 1982, this corresponds to a 27.8% decrease in the mortality rate for males in Queensland.

However the trends for females continue to increase, with incidence and mortality rates showing annual increases of 2.5% and 2.7% respectively (Figures 11 and 12). This corresponds to a 75% increase in mortality for females between 1982 and 2003.

Figure 11: Incidence trends for lung cancer by sex, Queensland, 1982-2003

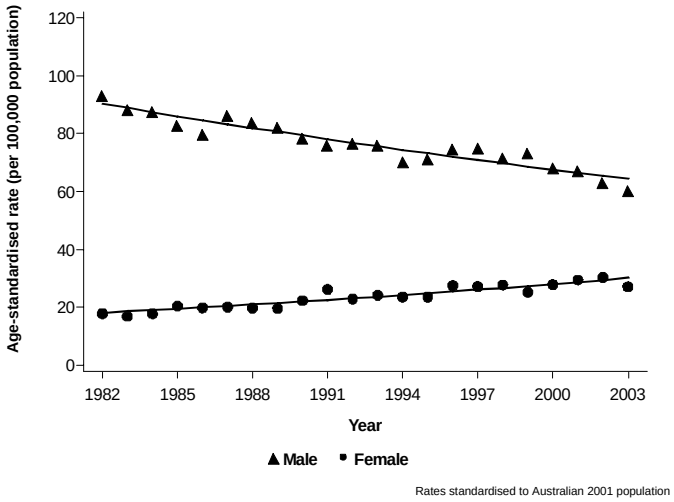
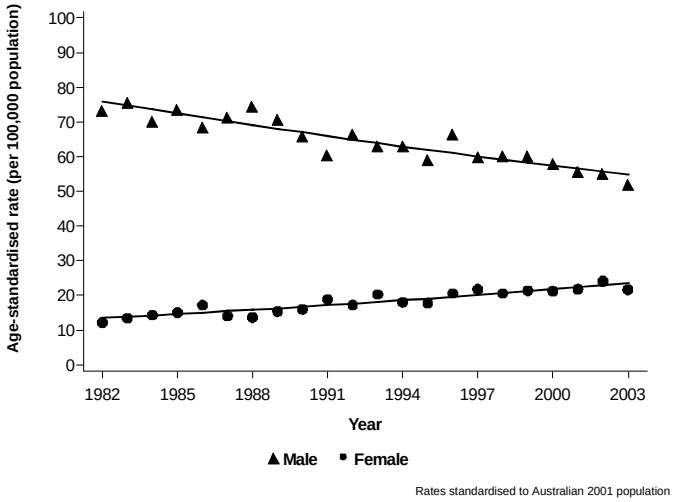


Figure 12: Mortality trends for lung cancer by sex, Queensland, 1982-2003



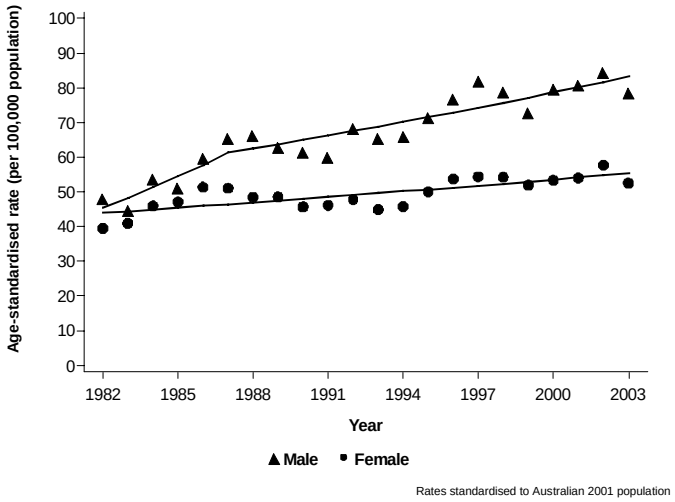
Despite these differing trends, both the incidence and mortality rates for men remain around threefold those currently experienced by women. The differences observed in lung cancer rates between males and females can be attributed to past patterns of smoking prevalence. It is widely accepted that smoking is the cause of most lung cancers, with current incidence rates reflecting smoking behaviour 20 or more years earlier[6].

Melanoma

Australia has the highest incidence rate of melanoma of any country in the world, and Queensland in turn has a much higher rate of melanoma incidence than any other

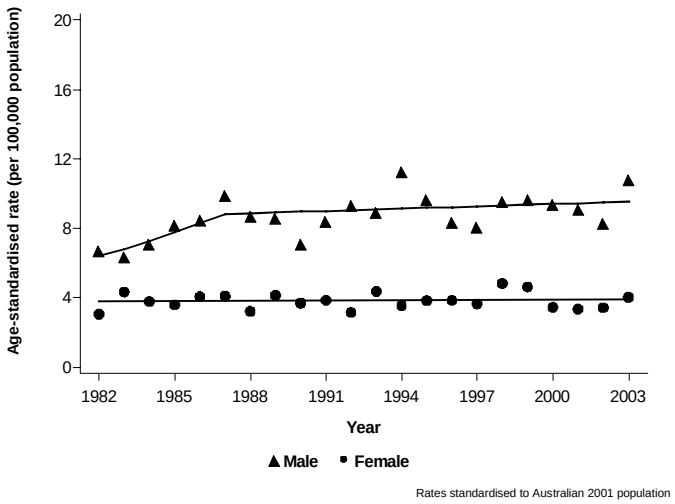
State or Territory[2,7]. Incidence rates of melanoma can fluctuate according to public awareness. For example, notifications tend to increase following publicity about skin cancer on television. Nevertheless, the long-term trend in the incidence rate for both men and women is increasing, with the growth being more pronounced for men (6.2% from 1982 to 1987 followed by a 1.9% increase per year from 1987 to 2003, compared with a continuous increase of 1.1% per year for women between 1982 and 2003) (Figure 13).

Figure 13: Incidence trends for melanoma by sex, Queensland, 1982-2003



Mortality rates due to melanoma are relatively stable for both sexes with the male mortality rate increasing slightly by 0.5% per year since the mid 1980s and the female mortality rate increasing slightly by 0.1% per year between 1982 and 2003 (Figure 14). These slight increases failed to reach statistical significance.

Figure 14: Mortality trends for melanoma by sex, Queensland, 1982-2003



Non-Hodgkin's lymphoma

Incidence rates for non-Hodgkin's lymphoma in Queensland have continued to go up, with an annual increase of 2.0% for males and 1.3% for females (Figure 15). Mortality rates for this disease are also continuing to increase, although at a slower rate compared to the rise in incidence: 0.8% per year for males and 0.7% per year for females (did not achieve statistical significance) (Figure 16). This corresponds with an overall increase in the mortality rate of 19% for males and 16% for females since 1982.

Figure 15: Incidence trends for non-Hodgkin's lymphoma by sex, Queensland, 1982-2003

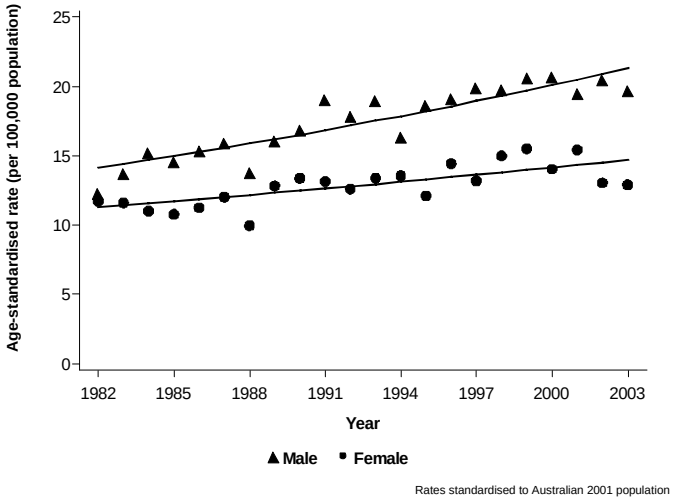
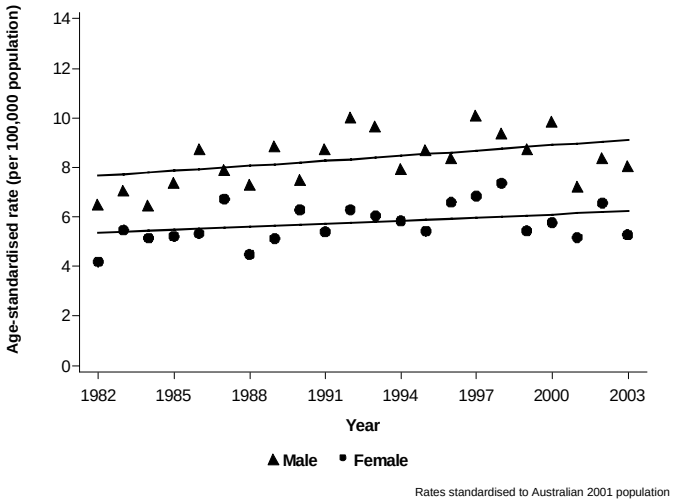


Figure 16: Mortality trends for non-Hodgkin's lymphoma by sex, Queensland, 1982-2003



Despite ongoing international research, the causes of non-Hodgkin's lymphoma remain largely undefined[8]. Immunodeficiency status, both congenital and acquired (eg. HIV), has been shown to raise the risk of developing non-Hodgkin's lymphoma, but this does not account for all of the increase in incidence rates. A number of potential environmental sources are also being investigated.

Ovarian cancer

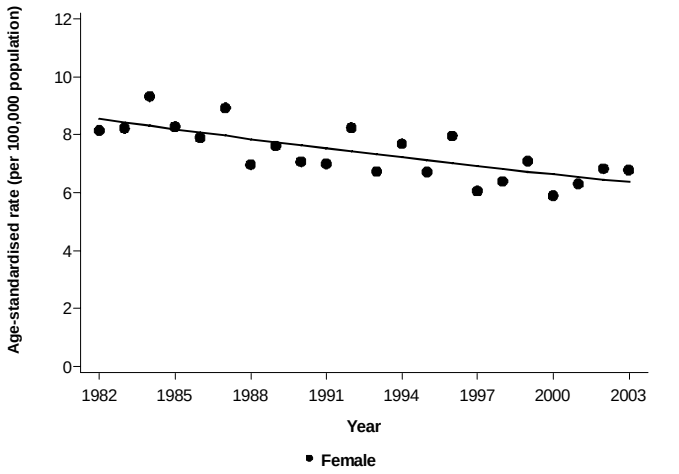
This is the first report of incidence trends for ovarian cancer since the data in the Queensland Cancer Registry (1982 to 2003) were back coded using the International Classification of Diseases for Oncology, 3rd edition (ICD-O-3) coding rules. These rules mean that ovarian cancers of borderline malignancy are now not counted as malignant cancers. As a results, the incidence rates for (malignant) ovarian cancer in this Information Circular are lower than in previous reports. A decrease in the incidence rates is now apparent since 1994 (Figure 17), although this is largely driven by the final data point for 2003 and would need to be confirmed by a two or three more years of data before being declared a real trend.

The mortality rate from ovarian cancer, which has not been affected by the change in coding rules, has shown a continuing decrease of 1.4% per year on average, corresponding to a total drop in the mortality rate of 25.5% between 1982 and 2003 (Figure 18).

Figure 17: Incidence trend for ovarian cancer, Queensland, 1982-2003

Rates standardised to Australian 2001 population

Figure 18: Mortality trend for ovarian cancer, Queensland, 1982-2003



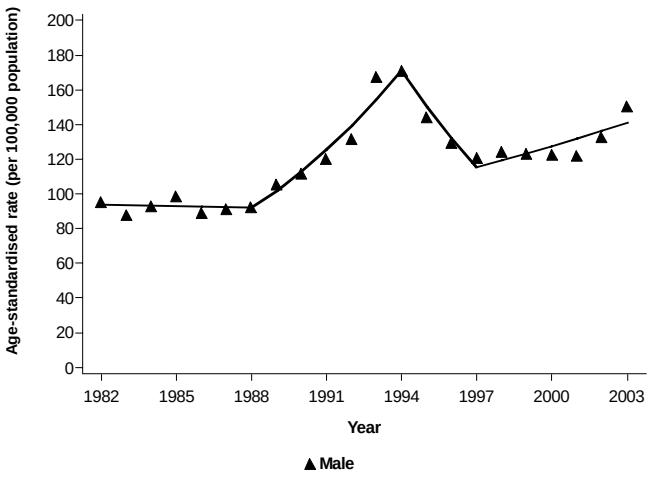
Rates standardised to Australian 2001 population

Prostate cancer

Prostate cancer is the leading registrable cancer amongst males[2]. The sharp increase in the incidence rate of prostate cancer in Queensland between 1988 and 1994 coincided with increases in the use of PSA and allied testing (Figure 19). The incidence rate then decreased between 1994 and 1997 which probably represents depletion of prevalent cases due to men having earlier PSA testing. Since 1997 there has been an increase of 3.4% per year.

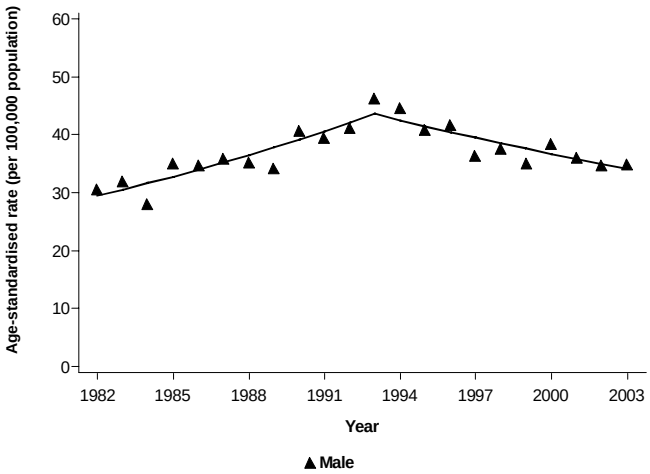
The mortality rate from prostate cancer peaked in Queensland in 1993, and has been decreasing by 2.4% per year since then. The total drop in mortality rate for the ten years to 2003 was 21.7%. It is not clearly understood why prostate cancer mortality rates have decreased. In particular, we still do not have definitive evidence that PSA screening can reduce mortality. Also, it is possible that the mortality reduction could be due to better treatment of early-stage disease with surgery or radiotherapy, or better treatment of advanced prostate cancer with medical anti-androgenic therapies.

Figure 19: Incidence trend for prostate cancer, Queensland, 1982-2003



Rates standardised to Australian 2001 population

Figure 20: Mortality trend for prostate cancer, Queensland, 1982-2003



Rates standardised to Australian 2001 population

Stomach cancer

Incidence rate and mortality rate trends for stomach cancer continue to show significant decreases for both sexes. Specifically, incidence rates for both men and women in Queensland are decreasing by an average of 2.3% per year (Figure 21). Mortality rates have been dropping even more quickly, with an annual decline of 2.7% for males and 3.3% for females (Figure 22). This represents an overall reduction in the mortality rate of 43.7% and 50.0% for males and females in Queensland respectively in the period from 1982 to 2003.

Figure 21: Incidence trends for stomach cancer by sex, Queensland, 1982-2003

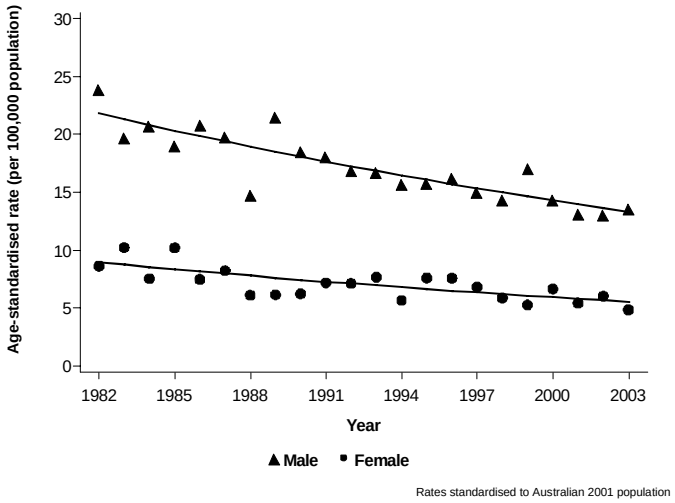
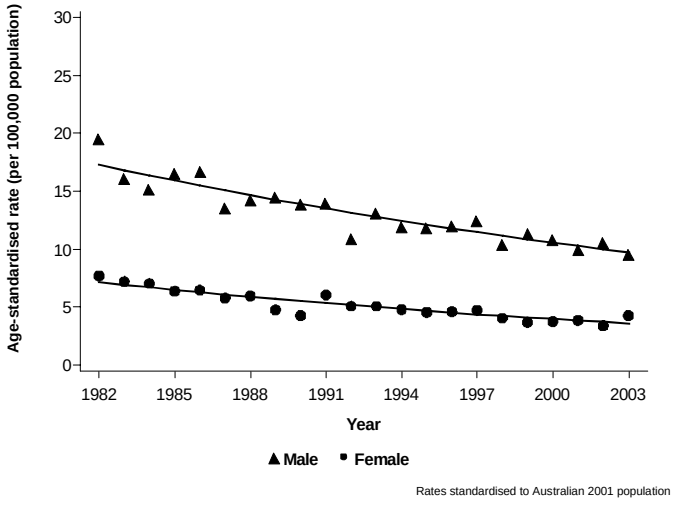


Figure 22: Mortality trends for stomach cancer by sex, Queensland, 1982-2003



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Appendix A

Joinpoint analysis

Joinpoint analysis is a statistical method that describes changing trends over successive segments of time and also determines the amount of increase or decrease within each time period. Joinpoint analysis chooses the best fitting point, called a joinpoint, at which the rate of increase or decrease changes significantly.

The analysis begins with the assumption of constant change over time (i.e., no joinpoint). Up to three joinpoints were tested in each model. The selected model is the simplest one (i.e. the least number of joinpoints) supported by the data.

Annual percent change (APC)

The APC is the average rate of change in the cancer trend per year, as determined by the selected joinpoint model. A negative APC describes a decreasing trend, and a positive APC describes an increasing trend. A trend is deemed to be statistically significant if the 95% confidence interval does not include zero.

Age-standardisation

All information in this publication was age-standardised to the 2001 Australian estimated resident population.

Source of data

Queensland Cancer Registry 2005.

Appendix B
Cancer incidence trends, Queensland, 1982-2003

Site	ICD0 codes	Period	Trend 1 APC[1] (95% CI)	Period	Trend 2 APC[1] (95% CI)	Period	Trend 3 APC[1] (95% CI)
Females							
All sites	C00-C80	1982-2000	+1.29 (+1.12, +1.47)	2000-2003	-2.25 (-4.36, -0.09)		
Breast	C50	1982-2000	+2.09 (+1.74, +2.44)	2000-2003	-1.72 (-5.64, +2.36)		
Cervix	C53	1982-1993	-2.03 (-3.20, -0.85)	1993-2003	-5.53 (-6.90, -4.13)		
Colorectal	C18-C20,C218	1985-2003	+0.21 (-0.05, +0.47)				
Lung	C33,C34	1982-2003	+2.47 (+1.98, +2.95)				
Melanoma	C44, M872-M879	1982-2003	+1.10 (+0.68, +1.53)				
Non-Hodgkin's Lymphoma	M959, M967-M971	1982-2003	+1.27 (+0.67, +1.87)				
Ovary	C56	1982-1994	+0.49 (-0.90, +1.89)	1994-2003	-3.01 (-4.85, -1.13)		
Stomach	C16	1982-2003	-2.26 (-3.17, -1.33)				
Males							
All sites	C00-C80	1982-1990	+0.84 (+0.17, +1.52)	1990-1993	+4.52 (-0.93, +10.26)	1993-2003	-0.58 (-0.94, -0.23)
Colorectal	C18-C20,C218	1982-2003	+0.73 (+0.36, +1.10)				
Lung	C33,C34	1982-2003	-1.60 (-1.86, -1.34)				
Melanoma	C44, M872-M879	1982-1987	+6.16 (+0.79, +11.82)	1987-2003	+1.93 (+1.28, +2.58)		
Non-Hodgkin's Lymphoma	M959, M967-M971	1982-2003	+1.98 (+1.51, +2.45)				
Prostate[2]	C61	1988-1994	+10.94 (+6.46, +15.61)	1994-1997	-12.33 (-25.63, +3.34)	1997-2003	3.41 (+0.82, +6.07)
Stomach	C16	1982-2003	-2.32 (-2.87, -1.76)				

1. Annual percentage change
2. The trend for prostate cancer incidence among males between 1982 and 1988 was -0.30 (-4.49,+4.07)

Appendix C
Cancer mortality trends, Queensland, 1982-2003

Site	ICD0 codes	Period	Trend 1 APC[1] (95% CI)	Period	Trend 2 APC[1] (95% CI)	Period	Trend 3 APC[1] (95% CI)
Females							
All sites	C00-C80	1982-1996	+0.35 (-0.01, +0.71)	1996-2003	-1.25 (-2.08, -0.41)		
Breast	C50	1982-1994	+0.44 (-0.32, +1.20)	1994-2003	-2.56 (-3.53, -1.58)		
Cervix	C53	1982-2003	-3.20 (-4.09, -2.30)				
Colorectal	C18-C20,C218	1982-2003	-1.25 (-1.61, -0.89)				
Lung	C33,C34	1982-2003	+2.70 (+2.16, +3.24)				
Melanoma	C44, M872-M879	1982-2003	+0.14 (-0.77, +1.05)				
Non-Hodgkin's Lymphoma	M959, M967-M971	1982-2003	+0.71 (-0.24, +1.66)				
Ovary	C56	1982-2003	-1.39 (-1.98, -0.80)				
Stomach	C16	1982-2003	-3.25 (-3.87, -2.62)				
Males							
All sites	C00-C80	1982-1996	+0.25 (-0.04, +0.55)	1996-2003	-1.91 (-2.60, -1.21)		
Colorectal	C18-C20,C218	1982-2003	-0.60 (-1.14, -0.06)				
Lung	C33,C34	1982-2003	-1.54 (-1.83, -1.25)				
Melanoma	C44, M872-M879	1982-1987	+6.60 (-2.68, +16.76)	1987-2003	+0.49 (-0.67, +1.67)		
Non-Hodgkin's Lymphoma	M959, M967-M971	1982-2003	+0.83 (-0.03, +1.07)				
Prostate	C61	1982-1993	+3.61 (+2.37, +4.87)	1993-2003	-2.42 (-3.42, -1.40)		
Stomach	C16	1982-2003	-2.70 (-3.17, -2.23)				

1. Annual percentage change