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Mortality and incidence trends for leading cancers in Queensland, 1982 to 1999

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Summary

- The aim of this publication is to report on the cancer trends in Queensland for the period 1982 to 1999. Trends are presented for all cancers combined and for the seven National Health Priority cancers: lung, colorectal (large bowel), prostate, breast, cervix, melanoma and non-Hodgkin's lymphoma. Also presented are the trends for two other cancers (stomach and ovary) that contributed significantly to the trend for all cancers combined.

- For some cancers the trend was not the same over the entire period 1982 to 1999. For example, a slow increase occurred for breast cancer mortality in the early years followed by a decrease in more recent years. To allow for this, a statistical technique called joinpoint analysis was used to describe changing trends over successive segments of time (see Appendix A).

- Mortality rates for all cancers combined have started to decrease. This has occurred after a slow and consistent increase from 1982 to the mid 1990s. For women, the recent mortality decline was due to recent decreases in mortality from breast cancer and continuing decreases in mortality from cervical and stomach cancer and to a lesser extent decreases in colorectal and ovarian cancer. For men, the recent mortality decline was due to a recent decrease in mortality from prostate cancer and continuing decreases in lung and stomach cancer and to a lesser extent colorectal cancer.

- Mortality has continued to increase for lung cancer among women and for non-Hodgkin's lymphoma among both men and women. There has been a slow but consistent increase in mortality from melanoma among men and to a lesser extent among women.

- The incidence rate increased consistently among women over the whole period, and this was driven primarily by increases in breast cancer, lung cancer and non-Hodgkin's lymphoma. In contrast, incidence rates among males have decreased recently, driven by the recent decrease in prostate cancer, and also decreases in lung and stomach cancer. Trends in incidence of registered cancers are often difficult to interpret, and may be explained by changes in screening practices and public awareness, rather than a real change in the underlying incidence of the specific cancer.

Mortality trends for all cancers combined

In 1999 there were 6064 deaths from cancer in Queensland (males: 3537, females: 2527).

For females, mortality increased slightly from 1982 to 1996 and then decreased by 2.2% per year, although this recent trend was not statistically significant (Figure 1, 2).

Figure 1: Total malignant neoplasms mortality

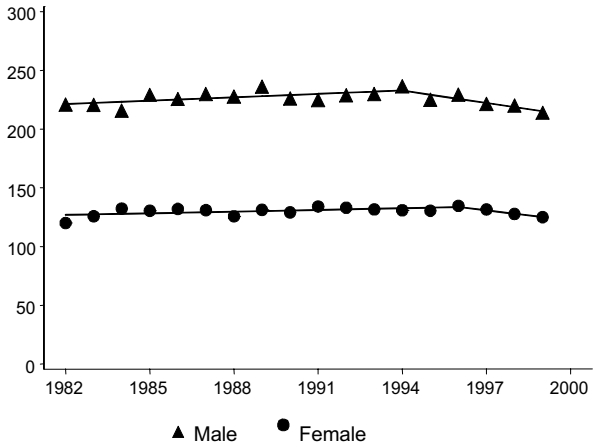
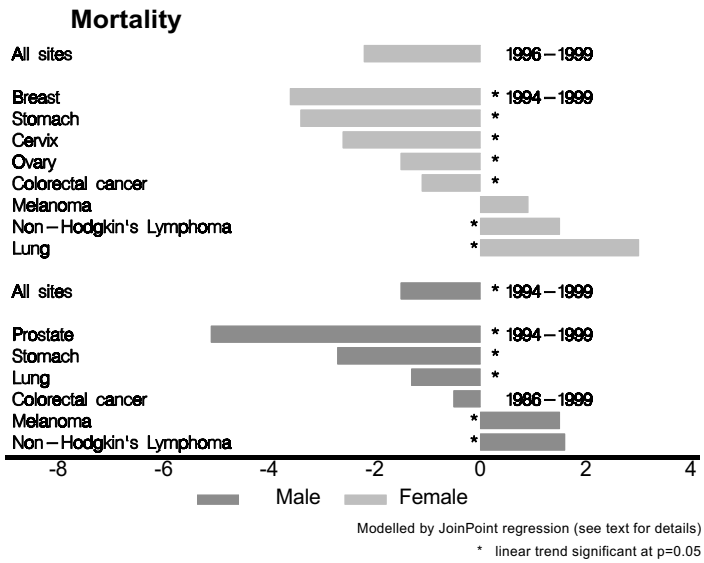


Figure 2: Recent trends in mortality due to cancer (annual percentage change)



The recent decrease in cancer mortality for females is due to recent decreases in mortality for breast cancer and continuing decreases in mortality from stomach and cervical cancer and to a lesser extent decreases in mortality from ovarian and colorectal cancer (Figure 2). The mortality declines have been offset by increases in mortality among women for lung cancer and non-Hodgkin's lymphoma (Figure 2). Mortality from melanoma has increased slightly over the 17 years to 1999, but the increase was not statistically significant.

For males, mortality rates increased slightly to 1994 and then decreased by 1.6% per year (Figure 1, 2). This represents a statistically significant overall decrease of 8.3% for the five years 1994 to 1999.

The mortality decline for males is due to recent decreases in mortality from prostate cancer and continuing decreases in mortality from lung cancer and stomach cancer, and to a lesser extent decreases in colorectal cancer. This progress has been somewhat offset by increases in mortality from non-Hodgkin's lymphoma and to a lesser extent to increases in mortality from melanoma (Figure 2).

Incidence trends for all cancers combined

In 1999 there were 15,431 new cancers diagnosed (incidence) among Queenslanders (males: 8325, females: 7106).

For females, cancer incidence increased consistently by 1.1% per year (Figure 3, 4). The increase is being driven by increases in the incidence of breast cancer (mainly due to increased screening), lung cancer and non-Hodgkin's lymphoma (Figure 4). There have been decreases in incidence for cervical, stomach and ovarian cancer and a recent but small decrease in the incidence of melanoma.

For males, cancer incidence increased up until 1993 but since then has decreased by 1.5% per year (Figure 3, 4). This most recent trend is due to decreases in the incidence of stomach and lung cancer and most recently to a large decrease in the incidence of prostate cancer, which is probably associated with a decrease in ad-hoc testing for prostate-specific antigen (PSA). The decreases have been offset by increases in the incidence of non-Hodgkin's lymphoma and melanoma and to a lesser extent colorectal cancer (Figure 4).

Figure 3: Total malignant neoplasms incidence

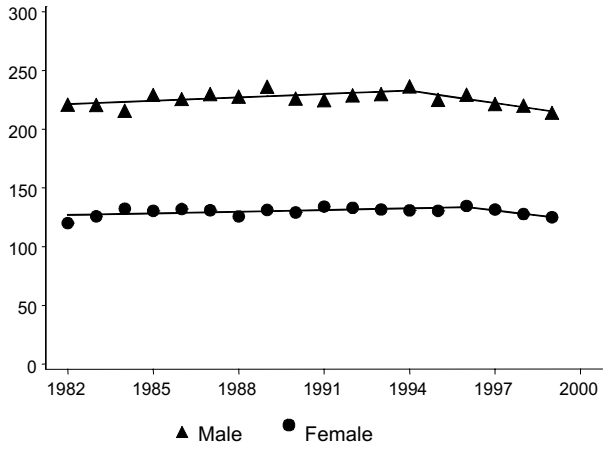
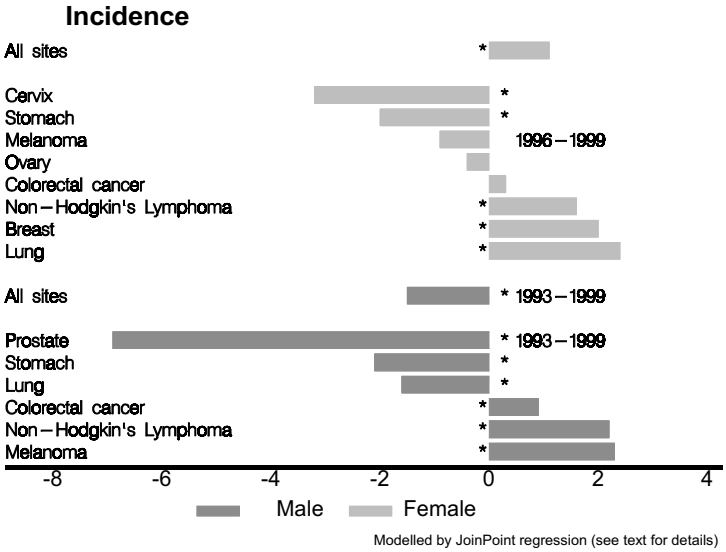


Figure 4: Recent trends in cancer incidence (annual percentage change)

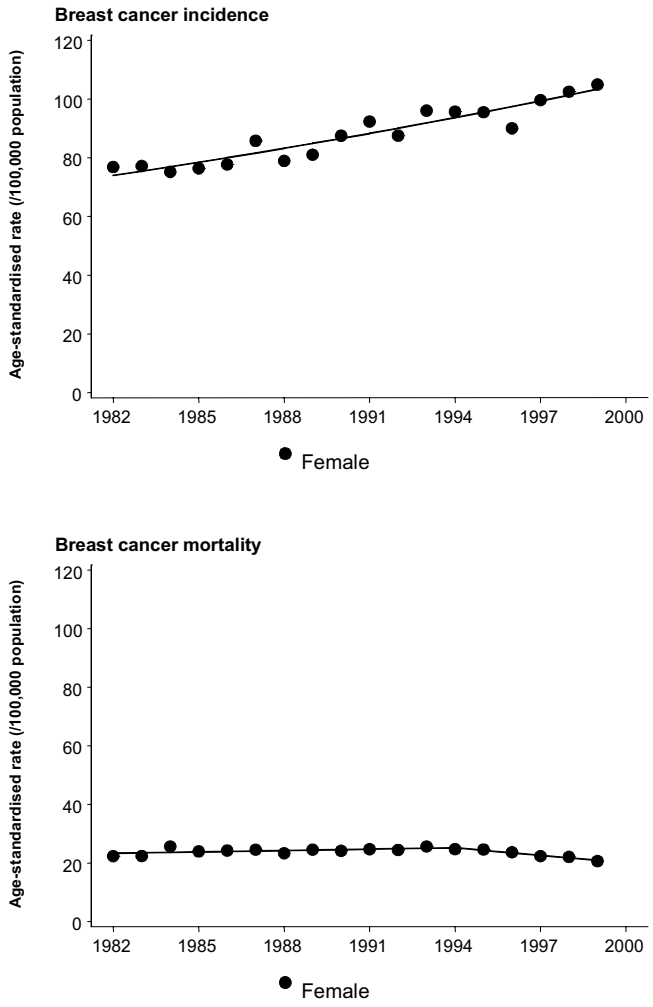


Specific cancers

Breast cancer

Until 1994, mortality from breast cancer increased slowly by 0.7% per year. After 1994, the trend reversed and mortality decreased by 3.6% per year (Figure 5, Appendix B, C). The overall decrease in mortality for the five years from 1994 to 1999 was 19.3%. In contrast, incidence has continued to increase by 2.0% per year. Much of the recent increase in incidence is due to increased screening.

Figure 5

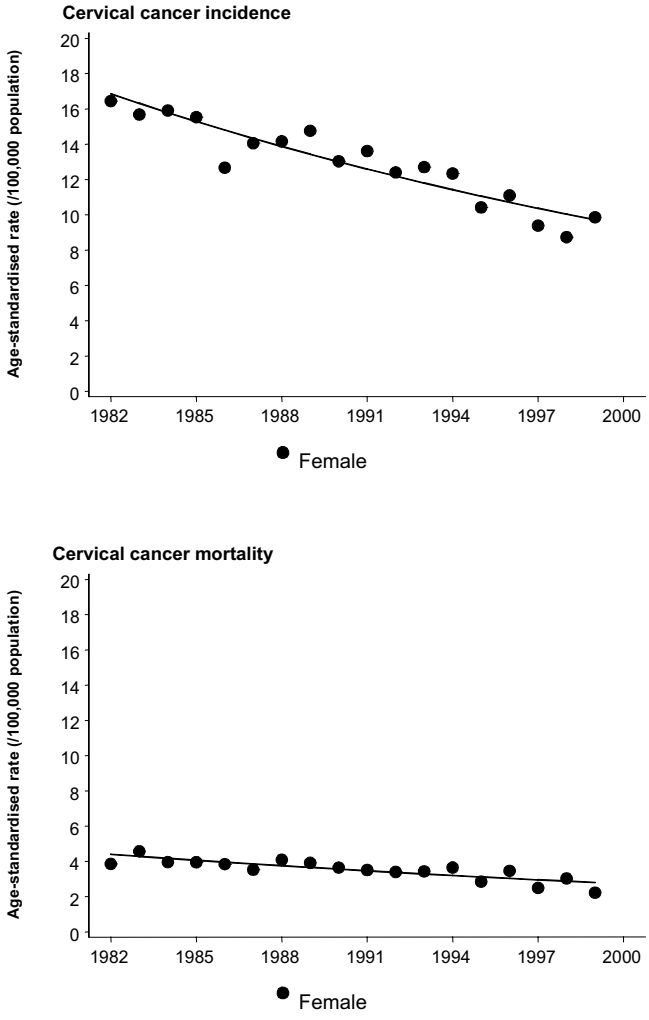


A mortality decline for breast cancer has also been observed in the other states of Australia and in several other countries such as Britain, the Netherlands and the United States [Smith et al. 1998]. A portion of the decrease is probably due to the increased use of adjuvant chemotherapy for node-positive disease, mainly in pre-menopausal women, and tamoxifen in post-menopausal women. However, many experts believe that mammographic screening has also made an important contribution.

Cervical cancer

Both incidence and mortality rates for cervical cancer continue to decline (Figure 6, Appendix B, C). Between 1982 and 1999, the incidence decreased by 2.6% per year and mortality by 3.2% per year. Experts agree that the continuing decrease is largely due to the coordinated Pap smear program [Hakama, 1996].

Figure 6



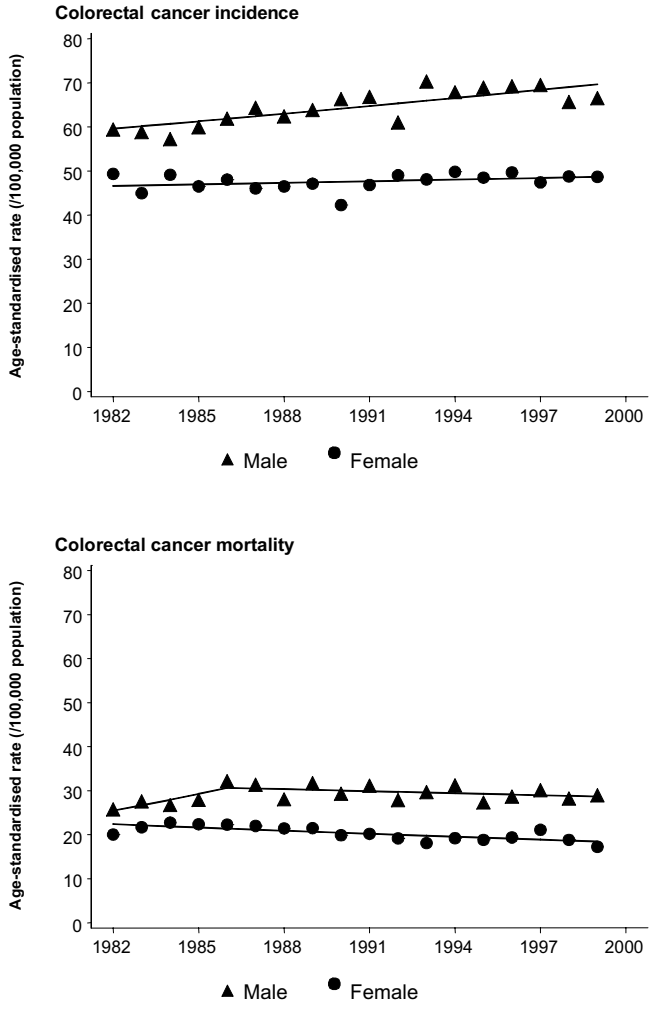
Colorectal cancer

There was a small increase in the incidence of colorectal cancer in both men (0.9% per year) and women (0.3% per year). In contrast, mortality decreased slightly in both women (-1.1% per year) and men (-0.5% per year), see Figure 7 and Appendix B, C. The mortality decline might be due to gains in case survival as a result of earlier detection and advances in clinical management.

Randomised controlled trials have shown that a coordinated program of screening using feacal occult blood testing (FOBT) can reduce mortality from colorectal cancer by 15%. The Australian Health

Technology Advisory Committee has advised that Australian research is needed to assess the feasibility screening using FOBT in this country [AHTAC, 1997]. Queensland Health has funded one such study in Ayr.

Figure 7

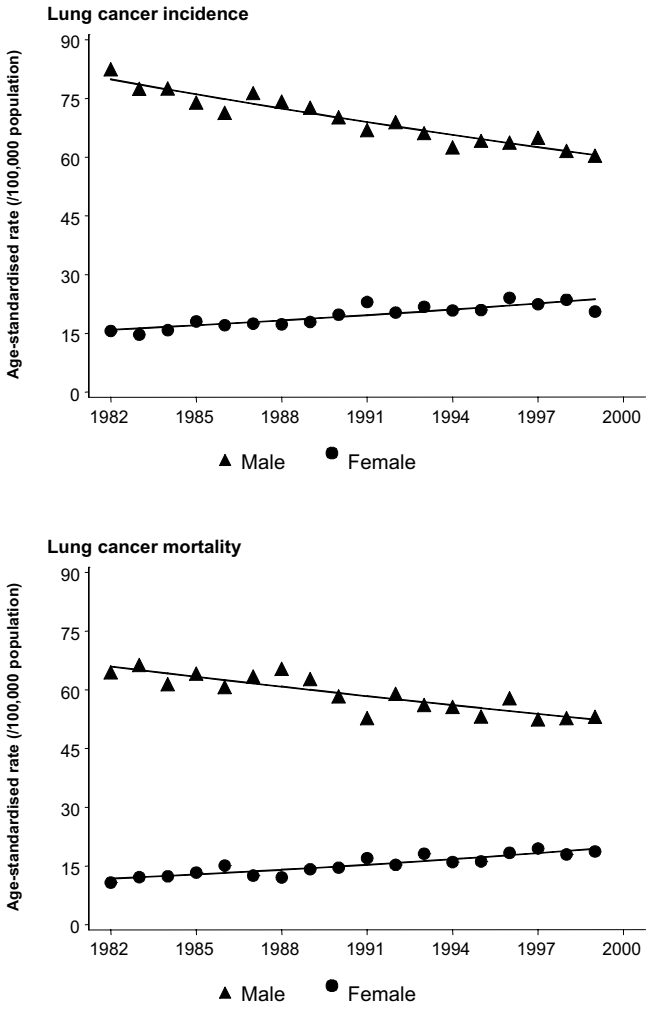


Lung cancer

Between 1982 and 1999, incidence rates for lung cancer decreased by 25% for men, but increased by 65% for women (Figure 8, Appendix B, C). Because survival from lung cancer is poor, mortality rates have followed similar trends.

More than 90% of cases of lung cancer are caused by smoking [Davila and Williams, 1993]. Researchers have estimated that the prevalence of smoking among men in Australia was as high as 72% in the years after World War II [Morgan et al. 2000]. The decrease in the rates of lung cancer in men since 1982 is associated with declines in smoking in the 1960s. However, 26% of Queensland men still smoke [AIHW, 2000] and lung cancer will remain an important disease among men for many years to come.

Figure 8



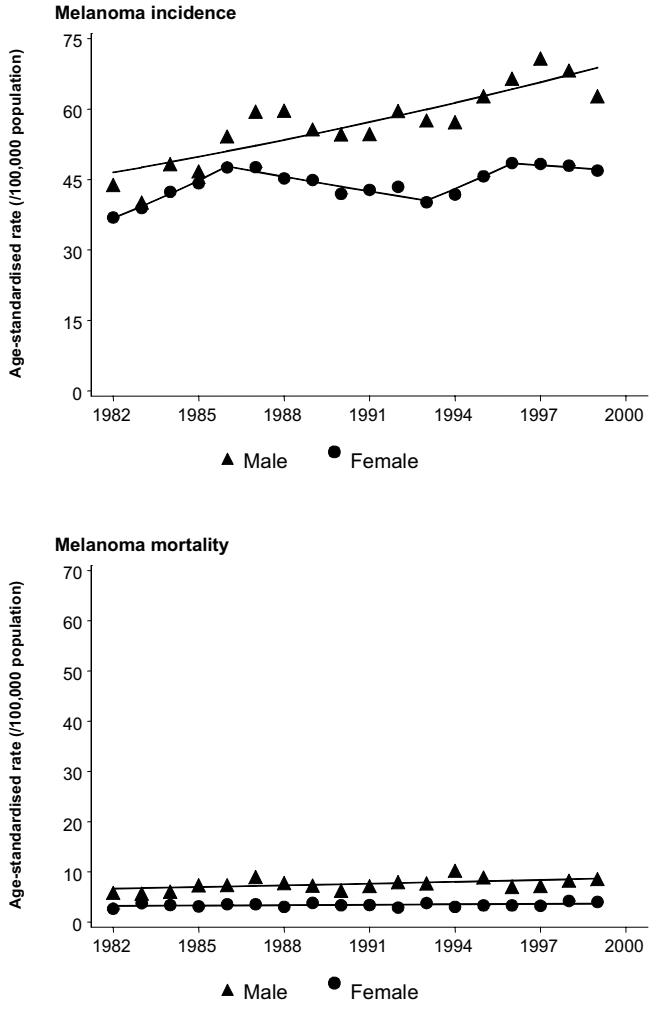
The prevalence of smoking among women never reached the peak of that for men. Perhaps 30% of women in Queensland were smoking in the 1960s and the prevalence did not start to decline until the late 1970s. We have not yet seen the effect of this in rates of lung cancer.

Melanoma

Incidence rates of melanoma can fluctuate according to public awareness (Figure 9). For example, notifications increase following publicity about melanoma on television. This fluctuation makes incidence trends difficult to interpret and the best measures of progress in controlling this disease are the mortality trends. Mortality from melanoma among women continued to increase by 0.9% per year, although this trend was not statistically significant. Among men, the mortality rate has continued to increase by 1.5% per year and this was statistically significant (Appendix B, C).

Queensland has the highest rates of melanoma in the world. The mortality trends suggest efforts to control this largely preventable cancer should continue.

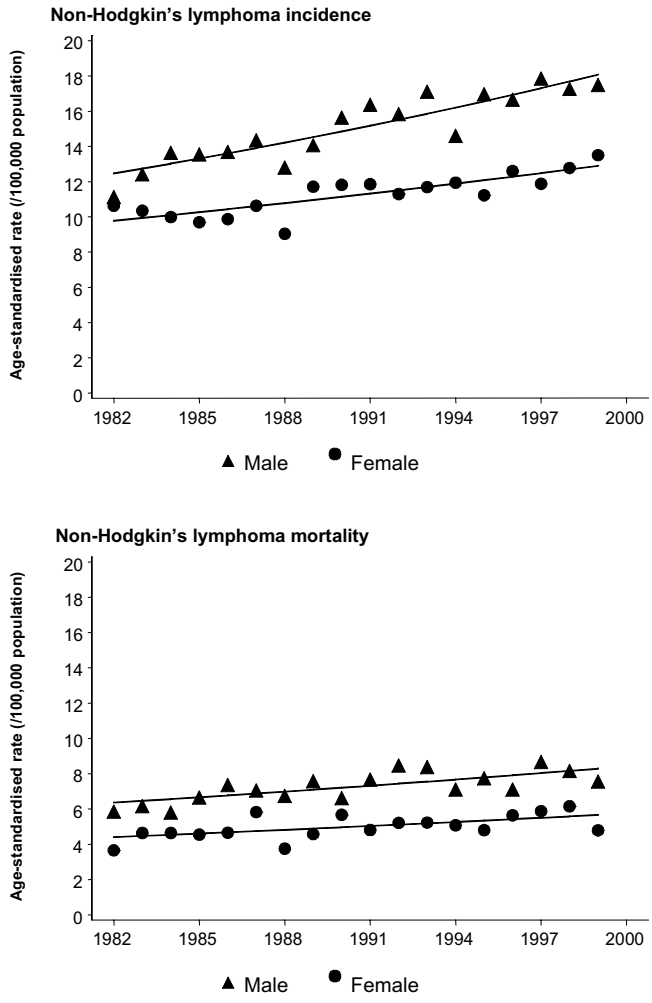
Figure 9



Non-Hodgkin's lymphoma

Incidence and mortality rates for non-Hodgkin's lymphoma continue to increase in Queensland (Figure 10, Appendix B, C), a trend that has also been observed in the other states of Australia and overseas. The cause of most cases of non-Hodgkin's lymphoma is unknown. HIV infection has played a part in the increasing trend, but its effect is insufficient to explain all of the increase [Schottenfeld & Fraumeni, 1996]. Ongoing international research is investigating the possible roles of other viral infections, hair dyes and occupational exposures such as phenoxy herbicides, polychlorinated biphenyls and solvents.

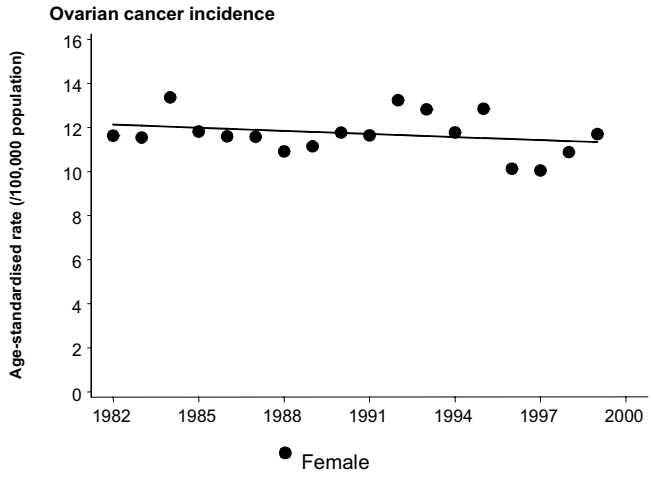
Figure 10



Ovarian cancer

Between 1982 and 1999 there was a continuing and statistically significant decrease in mortality from ovarian cancer of 1.5% per year. The total decrease in mortality over the 17-year period was 29%. A smaller decrease of 0.4% per year (not statistically significant) was observed for the incidence rates (Figure 11, Appendix B, C). The favourable trends for mortality might be due to better treatment. Ovarian cancer claims more lives each year than all the other gynaecological malignancies combined. Survival is often poor because the disease is frequently diagnosed at an advanced stage. Researchers, both in Australia and overseas, are working on tests to diagnose ovarian cancer at an earlier stage.

Figure 11



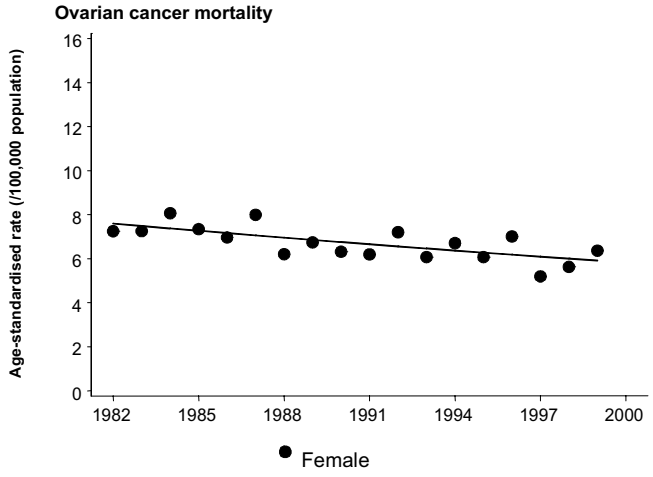
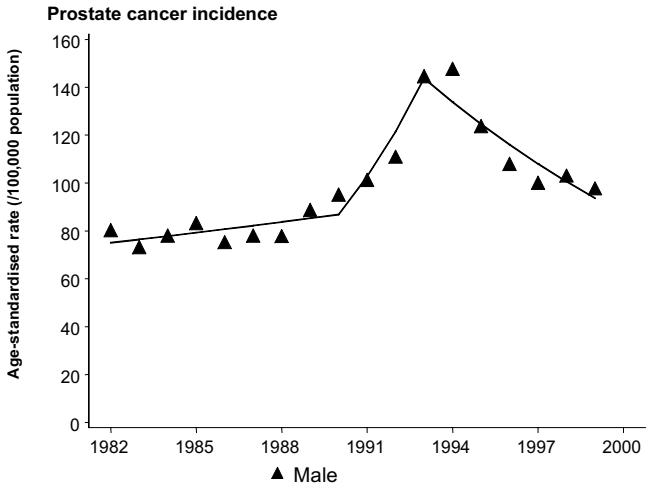
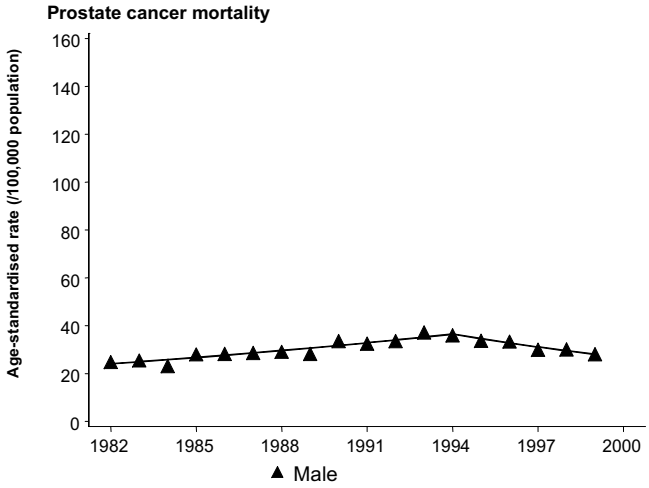


Figure 12





Prostate cancer

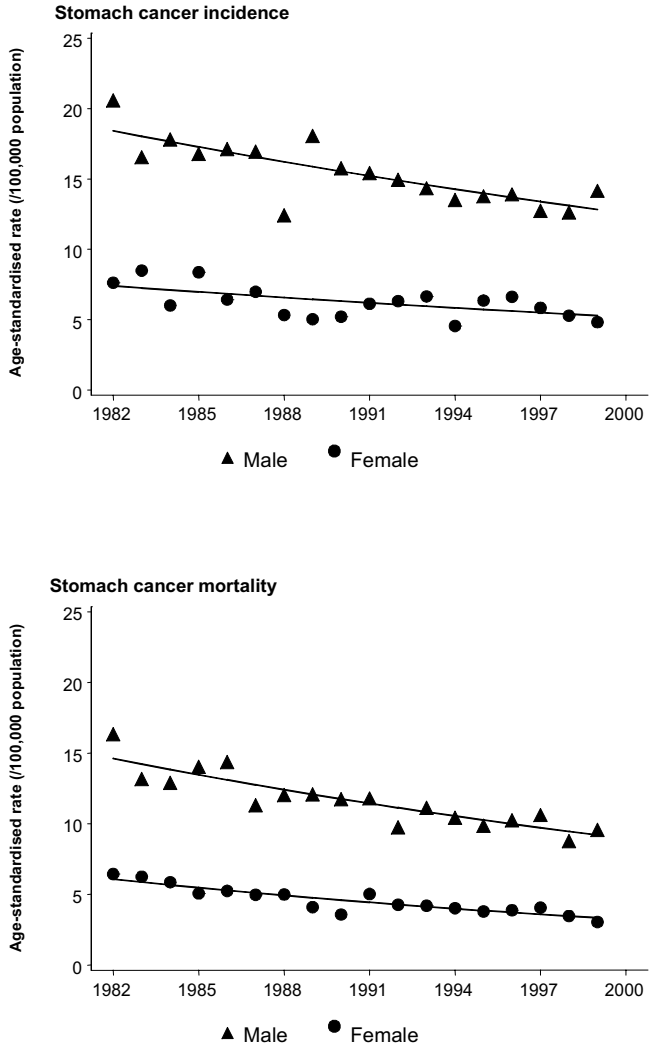
Sharp increases in the incidence of prostate cancer between 1990 and 1993 coincided with increases in ad hoc PSA and allied testing; the decrease since then is largely due to decreases in the use of PSA and other screening tests.

Between 1982 and 1994 mortality from prostate cancer increased by 3.5% per year. However, between 1994 and 1999 the trend reversed and mortality decreased by 5.1% per year (Figure 12, Appendix B, C). The total decrease in mortality rates for the five years to 1999 was 28%. As yet, there is no agreement among experts about the cause of this mortality decline.

Stomach cancer

Incidence and mortality from stomach cancer continue to decline (Figure 13, Appendix B, C). Specifically, incidence rates for women decreased by 77% between 1982 and 1999 and incidence rates for men decreased by 57%. This pattern has been observed throughout the developed world and has been attributed to the advent of refrigeration, better diet (particularly an increased intake of fruit and vegetables) and reductions in gastric infection with Helicobacter pylori [Schottenfeld & Fraumeni, 1996].

Figure 13



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Appendix A

Joinpoint analysis

The rate of change in cancer incidence and mortality rates did not necessarily remain constant over the entire period 1982 to 1999. Instead, for some cancer sites, increases occurred in the early years followed by declines in more recent years. Joinpoint analysis is a statistical method that describes changing trends over successive segments of time and the amount of increase or decrease within each. Joinpoint analysis chooses the best fitting point, called joinpoints, at which the direction or magnitude of the trend changes significantly.

Age-standardised rates were used in the modelling process. The analysis began with the assumption of constant change over time (i.e., no joinpoint). Up to three joinpoints were tested in each model. The final model was the simplest one (ie. the least number of joinpoints) that the data supported [National Cancer Institute, 2000].

Annual percent change or APC

The APC is the average rate of change in a cancer rate per year. A negative APC describes a decreasing trend, and a positive APC describes an increasing trend. A trend is said to be statistically significant if the 95% confidence interval does not include 0.

Appendix B
Cancer mortality trends, Queensland, 1982-1999

	ICDO codes 2	Period	Trend 1 APC[1] (95% CI)	Period	Trend 2 APC[1] (95% CI)	Period	Trend 3 APC[1] (95% CI)	Period	Trend 4 APC[1] (95% CI)
Site		Females							
All sites	C00-C80	1982-1996	0.4 (0.0, 0.7)	1996-1999	-2.2 (-5.2, 1.0)				
Breast	C50	1982-1994	0.7 (0.0, 1.3)	1994-1999	-3.6 (-5.6, -1.7)				
Cervix	C53	1982-1999	-2.6 (-3.6, -1.6)						
Colorectal	C18-C20, C218	1982-1999	-1.1 (-1.7, -0.6)						
Lung	C33, C34	1982-1999	3.0 (2.2, 3.8)						
Melanoma	C44, M872-M879	1982-1999	0.9 (-0.2, 2.0)						
Non-Hodgkin's Lymphoma	M959, M967-M971	1982-1999	1.5 (0.4, 2.6						
Ovary	C56	1982-1999	-1.5 (-2.3, -0.6)						
Stomach	C16	1982-1999	-3.4 (-4.3, -2.6)						
Site		Males							
All sites	C00-C80	1982-1994	0.4 (0.1, 0.8)	1994-1999	-1.6 (-2.7, -0.4)				
Colorectal	C18-C20, C218	1982-1986	4.7 (-0.9, 10.7)	1986-1999	-0.5 (-1.2, 0.2)				
Lung	C33, C34	1982-1999	-1.3 (-1.7, -0.9)						
Melanoma	C44, M872-M879	1982-1999	1.5 (0.2, 2.9)						
Non-Hodgkin's Lymphoma	M959, M967-M971	1982-1999	1.6 (0.7, 2.4)						
Prostate	C61	1982-1994	3.5 (2.6, 4.5)	1994-1999	-5.1 (-7.8, -2.4)				
Stomach	C16	1982-1999	-2.7 (-3.4, -2.0)						

1. Annual percentage change
2. International Classification of Diseases - Oncology

Appendix C
Cancer incidence trends, Queensland, 1982-1999

	ICDO codes 2	Period	Trend 1 APC[1] (95% CI)	Period	Trend 2 APC[1] (95% CI)	Period	Trend 3 APC[1] (95% CI)	Period	Trend 4 APC[1] (95% CI)
Site		Females							
All sites	C00-C80	1982-1999	1.1 (0.9, 1.2)						
Breast	C50	1982-1999	2.0 (1.6, 2.4)						
Cervix	C53	1982-1999	-3.2 (-3.9, -2.5)						
Colorectal	C18-C20, C218	1982-1999	0.3 (-0.1, 0.6)						
Lung	C33, C34	1982-1999	2.4 (1.6, 3.2)						
Melanoma	C44, M872-M879	1982-1986	6.8 (3.0, 10.7)	1986-1993	-2.3 (-3.9, -0.7)	1993-1996	6.1 (-3.0, 16.2)	1996-1999	-0.9 (-4.9, 3.3)
Non-Hodgkin's Lymphoma	M959, M967-M971	1982-1999	1.6 (1.1, 2.2)						
Ovary	C56	1982-1999	-0.4 (-1.2, 0.4)						
Stomach	C16	1982-1999	-2.0 (-3.3, -0.6)						
Site		Males							
All sites	C00-C80	1982-1990	0.8 (-0.2, 1.7)	1990-1993	4.6 (-2.9, 12.7)	1993-1999	-1.5(-2.6, -0.3)		
Colorectal	C18-C20, C218	1982-1999	0.9 (0.5, 1.3)						
Lung	C33, C34	1982-1999	-1.6 (-1.9, -1.4)						
Melanoma	C44, M872-M879	1982-1999	2.3 (1.6, 3.1)						
Non-Hodgkin's Lymphoma	M959, M967-M971	1982-1999	2.2 (1.6, 2.8)						
Prostate	C61	1982-1990	1.8 (-1.3, 5.1)	1990-1993	18.3 (-5.4, 47.9)	1993-1999	-6.9 (-9.8, -3.8)		
Stomach	C16	1982-1999	-2.1 (-2.9, -1.3)						

1. Annual percentage change
2. International Classification of Diseases - Oncology