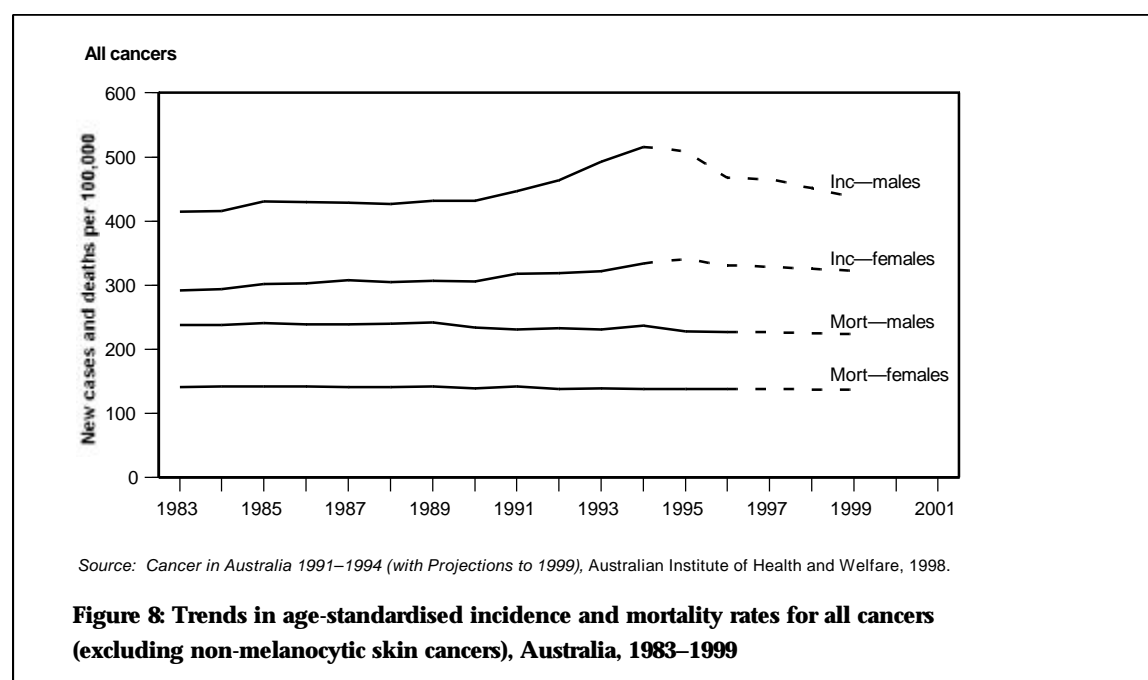


# 3 National trends and projections in cancer incidence and mortality

## Trends

National cancer incidence and mortality rates for the most common cancer sites are presented in Figures 8–14 for the period 1983–1999. On the graphs the solid lines represent available data (incidence to 1994 and mortality to 1996) while the broken lines represent projections (incidence for 1995–1999 and mortality for 1997–1999). Projections are based on knowledge of past incidence and mortality patterns and population projections (see Appendix C). Additional incidence data for breast and prostate cancers are available for some States and Territories for 1995 and 1996 and are used to supplement the projections for these two cancers (see ‘Guide to interpreting incidence and mortality tables’ page 33).

The trends in incidence and mortality data vary with cancer site. Some have shown an increase since 1983 while others have remained relatively stable or decreased. Between 1983 and 1994, age-standardised death rates for all cancers combined (excluding non-melanocytic skin cancers) have remained relatively stable, but incidence rates increased by 25% for males and by 14% for females (Figure 8). Projections to 1999 indicate that incidence rates will decline in both males and females.



Between 1990 and 1994 there was a dramatic rise in the number of new cases of prostate cancer registered (Figure 9) and this sudden upward trend has been attributed to increased detection of the disease through increased investigations, particularly the introduction of prostate specific antigen (PSA) testing. However, in States with data available for 1995 and 1996, prostate cancer incidence rates have fallen by 26% since 1994. These data lead to prediction of a further reduction by 1999. PSA tests are specifically designed to identify cancers before the onset of clinical symptoms. Many of these prevalent cancers may not show any symptoms, and therefore would not be detected except for PSA testing. Much of the rise in the incidence rates of prostate cancer can be attributed to detection of these prevalent cancers. The recent decline in incidence rates indicates a return towards the underlying incidence rate, removing the effect of these previously undetected cases. The incidence rate is also declining as the number of PSA tests conducted also fall, reducing the number of prevalent cases detected (Smith et al. 1998; Threlfall et al. (in press)). The death rate from prostate cancer, which is significantly lower than the incidence rate, increased between 1983 and 1994 but has since fallen. This results in a small decrease in the projected rate for 1999.

Among females, breast cancer is the most frequently diagnosed cancer and it is the most common cause of cancer-related death. The incidence of breast cancer in females rose from 71 cases per 100,000 in 1983 to 101 cases per 100,000 in 1994, an average annual rise of 3.3% (Figure 9). Based on the changes in incidence between 1994 and 1996, breast cancer incidence is predicted to decrease slightly by 1999. However, it was noted that this projected fall consisted of increases in incidence rates for women aged between 30 and 59 years but decreases for women aged 60 years and over. This predicted trend is based on early downturns in incidence rates in some States and Territories and the knowledge that the number of cancers detected by the breast cancer screening program is likely to decrease as an increasing proportion of women have been screened (diagnosing a large proportion of prevalent cancers) and are now having a repeat screen (where incident cancers are detected). Despite this national trend, there may be some States and Territories where this effect has not yet occurred due to the staged introduction of screening across Australia. The breast cancer mortality rate has been relatively stable since 1983 and is expected to remain so. However, the mortality projection does not take into account any effect of breast cancer screening, as there are presently no national data on which to model this effect.

For colorectal cancer, there were marginal increases in incidence among both males and females between 1983 and 1994 (Figure 9). Trends since the early 1990s indicate that incidence rates will continue to increase slowly to 1999. In comparison, mortality rates have fallen slightly since 1983.

Between 1983 and 1994, the incidence of lung cancer among males fell by an average of 1.7% per year (Figure 10). Mortality from lung cancer in males also fell at a similar rate and, as expected, incidence and mortality rates parallel each other closely. These declining rates are attributed to decreased tobacco smoking among men. In contrast, lung cancer incidence among females increased at an average rate of 2% per annum to 1994, and rates are expected to continue to rise. However, the increase in lung cancer incidence is predominantly in women aged 65 years and over, while rates in younger women have generally remained stable or fallen. The death rate from lung cancer among females is also increasing.

The incidence rates for melanoma among males and females increased sharply between 1983 and 1988, levelled until 1991 and have increased at a lower rate since then (Figure 10). The early high increases are partly due to improved notification. Mortality rates for melanoma have changed very little since 1983.

The incidence of non-Hodgkin's lymphoma increased by 30% for males and by 21% for females from 1983 to 1994 (Figure 11). Some of this rise in incidence may be linked to an increased number of cases of non-Hodgkin's lymphoma among people with HIV. A similar trend has been observed for Kaposi's sarcoma in HIV-affected people. The mortality rate in females with non-Hodgkin's lymphoma has risen steadily since 1983, whereas in males the mortality rate increased between 1990 and 1994 but has since fallen.

Between 1983 and 1991 the incidence of bladder cancer decreased in males; however, beyond 1991 it increased and this pattern has continued for the projections (Figure 11). It is likely that the increase in incidence since 1991 is a result of the increased use of screening for prostate cancer leading to a diagnosis of bladder cancer as part of the diagnostic work-up. In contrast, the incidence rate in females declined marginally between 1983 and 1994 and is now expected to remain stable. Despite fluctuations in the incidence of bladder cancer in males, mortality rates remained relatively static throughout the period.

Stomach cancer incidence fell by 26% in males over the period 1983–1994 (Figure 11). The fall in the incidence rate for females over the same period was even higher at 34%. Mortality rates also decreased substantially for both sexes.

The incidence rate for leukaemias in females increased slightly between 1983 and 1994, and is projected to continue to rise (Figure 12). At the same time the mortality rate decreased marginally, and is expected to continue to decline. There were fluctuations in the incidence rates in males; however, generally an inverse trend to the female pattern is seen in leukaemias in males. As with the female rates, these changes are relatively small.

Recently there has been debate surrounding the effect of mobile phone use and placement of mobile phone towers on the incidence of brain cancer. Although these data cannot answer this issue directly, it is able to indicate general patterns in Australia and set baselines for further study. Trends in brain cancer in males and females between 1983 and 1994 show only minor increases in incidence, with most of the increase being attributable to those aged over 85 years. Some of this increase may be attributable to the detection of cancer of the brain when investigating stroke using imaging technologies, as the use of these technologies has increased in recent years. The trend in incidence rates in the early 1990s for males and females suggests marginal decreases in incidence to 1999. Between 1992 and 1996, the mortality rate rose slightly in males and it is expected that there will be little change to 1999. In contrast, the mortality rate in females has fallen since 1992 and this trend is predicted to continue to 1999 (Figure 12).

There was little change in incidence or mortality rates for cancer of the pancreas between 1983 and 1994. Trends since the early 1990s indicate that incidence rates will rise by 1999 in both males and females, while mortality rates will fall slightly in males but remain fairly stable in females (Figure 12).

The incidence rate for cancer of the uterus increased by 13% between 1983 and 1994 (Figure 13). Over the same period, there were falls in the age-standardised incidence rates for cancers of the cervix and ovary, by 13% and 3% respectively (Figure 13). Mortality rates for cancer of the uterus and ovary remained relatively stable between 1983 and 1996, while mortality from cancer of the cervix fell by 35%. Some of the decline in mortality from cancer of the cervix can be attributed to the population-based cervical cancer screening program.

'Cancer of unknown primary site' is a category that captures cancer diagnoses which cannot be attributed to a particular body site. While some of these cancers have common features, at least in terms of aetiology, behaviour and outcome, others are a mixed collection. This makes it difficult to interpret with certainty the patterns of this cancer, particularly for mortality where often little histological evidence is available to identify a cancer site, and

therefore an accumulation of cancers occurs in this category. However, given that this cancer group represents approximately 4% of new cases and 6% of deaths it is important to know the current and likely future trends. Between 1983 and 1991 there was little variation in incidence or mortality; however, since 1991, in both males and females a small decline was apparent in the incidence rates which is projected to continue through to 1999. However, this is contrasted by a small rise in mortality rates for males and females since 1994

(Figure 14).

Between 1983 and 1994, incidence rates for cancer of the kidney rose by 1.2% per annum for males and 1.6% per annum for females (Figure 14). Mortality rates for cancer of the kidney have changed very little in males since 1983 but have increased slightly in females.

The incidence of testicular cancer has increased steadily since 1987 (Figure 14), rising by an average of 4.3% per annum between 1987 and 1994. Projections indicate this trend will continue. Despite the increase in the incidence rate, the mortality rate for cancer of the testis is low and is not expected to change.

## Projections

The projections of cancer incidence and mortality (Tables 4 and 5) to 1999 show an increasing number of new cases and deaths for all cancers combined (722 additional new cases and 3,156 additional deaths since 1994) and for many of the most common cancer sites. This was expected as the population increased by 1.2% per annum over this period and the proportion of those aged over 65, who are at high risk of cancer, increased from 11.8% to 12.2%. The overall population increase was higher than the estimated growth in new cancer cases.

Projections by sex, however, indicate a rise in the number of new cases of all cancers for females (2,340 additional new cases) and a fall for males (1,620 fewer cases). This projected fall in new cases of cancer in males results from the expected fall in prostate cancer incidence based on data from Victoria, Western Australia, South Australia and Tasmania for 1995 and 1996. However, the projections indicate increases in the number of new cases for all other common cancer sites in males. Specifically, the biggest projected increases in the number of new cases in males between 1994 and 1999 are for melanoma (approximately 1,000 new cases) and colorectal cancer (approximately 900 new cases). In females, the largest increases are projected for breast cancer (approximately 850 new cases), colorectal cancer (approximately 700 new cases) and melanoma (approximately 700 new cases). In some instances the projected number of new cases or deaths for some cancers may be increasing even though the incidence or mortality rate is falling, for example lung cancer incidence in males or breast cancer incidence in females. This can be explained by the increase in and ageing of the population.

It should be noted that, while in terms of numbers of cases or deaths the percentage change in the age-standardised rate may be relatively large, the impact will depend on how common the cancer is in the community. For example, a 2.1% increase in melanoma incidence in females resulted in a projected increase of approximately 700 new cases whereas a similar percentage increase in cancer of the pancreas (2.2%) resulted in only 180 additional cases. The increase or decrease in these cancers may not necessarily be shared across both sexes, or age groups within each sex. For example, the 0.5% projected decrease in breast cancer incidence consisted of increases in incidence rates for women aged between 30 and 59 years but decreases for women aged 60 years and over.

The largest projected increases in the age-standardised incidence rates in males between 1994 and 1999 are for melanoma (2.8% per annum), multiple myeloma (1.7% per annum), non-Hodgkin's lymphoma (1.7% per annum), and cancer of the bladder (1.4% per annum) (Table 3). Among females, the largest increases are non-Hodgkin's lymphoma (2.4% per annum), cancers of the pancreas (2.2% per annum) and uterus (2.2% per annum), and melanoma (2.1% per annum).

The age-standardised incidence rate for prostate cancer is estimated to decline by an average of 7.6% per annum between 1994 and 1999. This would mean approximately 2,750 fewer cases of prostate cancer diagnosed in 1999 compared to 1994. In males, declines are also projected for lymphatic leukaemia (−1.8%) and cancers of the larynx and lung (both −1.5% per annum). In females, falls in age-standardised incidence rates are projected for multiple myeloma (−5.8% per annum), cancer of the cervix (−2.8% per annum) and breast cancer (−0.5%). Age-standardised incidence rates for cancer of the stomach are projected to fall in both males and females.

Changes in the mortality rates over the period 1994–1999 are generally similar to those in the incidence rates, although of a smaller magnitude. The incidence and mortality trends over the period 1983–1994 and the projections to 1999 are presented in Figures 8–14.

**Table 3: Projected changes in incidence and mortality rates 1994–1999 by sex, Australia**

Cancer description	Incidence		Mortality	
	Per cent change per annum 1994–1999		Per cent change per annum 1994–1999	
	Males	Females	Males	Females
Oesophagus	1.0	1.8	1.3	1.9
Stomach	−1.4	−3.0	−3.5	−2.1
Colorectal	0.6	0.4	−1.4	−1.7
Pancreas	0.5	2.2	−1.5	1.9
Larynx	−1.5	−3.6	−4.2	−3.2
Lung	−1.5	1.6	−2.0	2.0
Melanoma	2.8	2.1	−0.4	−0.2
Breast	—	−0.5	—	−1.3
Cervix	—	−2.8	—	−4.1
Uterus	—	2.2	—	3.7
Ovary	—	0.4	—	1.0
Prostate	−7.6	—	−1.2	—
Bladder	1.4	−0.3	1.0	−0.6
Kidney	0.8	1.3	0.2	0.6
Brain	−0.5	−0.3	0.6	−3.2
Unknown primary	−1.9	−3.7	−0.7	1.3
Non-Hodgkin's lymphoma	1.7	2.4	−3.1	2.4
Multiple myeloma	1.7	−5.8	−0.1	−3.7
Lymphatic leukaemia	−1.8	−1.3	−0.6	−5.6
Smoking-related cancers	−0.9	0.1	−1.8	1.3
All cancers (excluding non-melanocytic skin cancers)	−3.2	−0.7	−1.1	−0.2

**Table 4: Projections of incidence for selected cancer sites, Australia, 1995–1999**

ICD-9	Cancer description	New cases*					Age-standardised incidence rates*				
		1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
<b>Males</b>											
140–208	All cancers (excluding NMSC)	43,230	40,770	41,650	41,340	41,000	509.2	467.6	465.5	451.4	437.4
150	Oesophagus	590	590	590	590	590	6.9	7.0	7.1	7.2	7.3
151	Stomach	1,220	1,240	1,250	1,260	1,270	14.6	14.4	14.2	14.0	13.8
153–154	Colorectal	5,600	5,780	5,960	6,130	6,320	66.0	66.3	66.7	67.1	67.4
157	Pancreas	790	820	850	870	900	9.3	9.4	9.5	9.5	9.6
161	Larynx	510	510	510	510	510	5.9	5.7	5.5	5.4	5.2
162	Lung	5,150	5,230	5,300	5,370	5,440	61.1	60.5	59.8	59.2	58.6
172	Melanoma	3,920	4,110	4,310	4,510	4,720	44.6	45.7	46.8	48.0	49.1
185	Prostate	12,580	10,040	10,840	10,460	10,040	150.5	117.1	122.4	114.7	107.0
188	Bladder	1,830	1,910	2,000	2,090	2,180	22.1	22.5	22.9	23.3	23.7
189	Kidney	1,070	1,110	1,140	1,180	1,210	12.4	12.5	12.6	12.7	12.7
191	Brain	670	680	700	710	720	7.6	7.6	7.6	7.6	7.6
195–199	Unknown primary	1,560	1,570	1,570	1,570	1,570	18.8	18.4	18.0	17.7	17.3
200+202	Non-Hodgkin's lymphoma	1,570	1,630	1,690	1,740	1,800	18.0	18.2	18.4	18.6	18.7
203	Multiple myeloma	450	470	490	510	530	5.4	5.5	5.6	5.7	5.8
204	Lymphatic leukaemia	460	460	470	480	490	5.4	5.4	5.3	5.3	5.2
	Smoking-related cancers	7,320	7,440	7,550	7,660	7,780	85.8	85.1	84.5	83.8	83.1
<b>Females</b>											
140–208	All cancers (excluding NMSC)	34,320	34,090	34,590	34,900	35,220	340.8	330.9	329.0	325.6	322.3
150	Oesophagus	360	360	360	360	360	3.3	3.3	3.4	3.4	3.5
151	Stomach	610	610	610	600	600	5.6	5.5	5.4	5.2	5.1
153–154	Colorectal	4,720	4,860	5,010	5,150	5,300	45.0	45.2	45.4	45.6	45.8
157	Pancreas	760	790	820	860	890	7.0	7.1	7.2	7.4	7.5
162	Lung	2,200	2,290	2,380	2,480	2,590	21.4	21.7	22.0	22.4	22.8
172	Melanoma	3,240	3,370	3,510	3,640	3,780	33.4	34.0	34.7	35.3	35.9
174	Breast	10,370	9,950	10,270	10,400	10,540	105.7	99.2	100.2	99.4	98.6
180	Cervix	1,070	1,070	1,070	1,070	1,070	11.2	11.0	10.8	10.6	10.4
179+182	Uterus	1,360	1,420	1,480	1,550	1,620	13.7	14.0	14.3	14.6	14.9
183	Ovary	1,080	1,110	1,130	1,150	1,180	10.9	11.0	11.0	11.0	11.0
188	Bladder	590	610	630	650	670	5.6	5.6	5.6	5.6	5.6
189	Kidney	710	730	750	760	790	7.0	7.0	7.0	7.0	7.1
191	Brain	520	530	530	540	550	5.3	5.3	5.3	5.2	5.2
195–199	Unknown primary	1,330	1,310	1,300	1,280	1,250	12.2	11.7	11.2	10.7	10.2
200+202	Non-Hodgkin's lymphoma	1,290	1,350	1,420	1,480	1,550	12.6	12.9	13.2	13.4	13.7
203	Multiple myeloma	300	290	290	280	270	2.8	2.6	2.5	2.3	2.2
204	Lymphatic leukaemia	330	330	340	340	350	3.3	3.3	3.3	3.2	3.2
	Smoking-related cancers	2,350	2,410	2,470	2,520	2,580	23.4	23.4	23.5	23.5	23.5

Note: Rates are expressed per 100,000 population and age-standardised to the Australian 1991 Population (AS Rate).

\* Projected number of new cases are rounded to the nearest 10.

Source: *Cancer in Australia 1991–1994 (with Projections to 1999)*, Australian Institute of Health and Welfare, 1998.

**Table 5: Projections of mortality for selected cancer sites, Australia, 1995–1999**

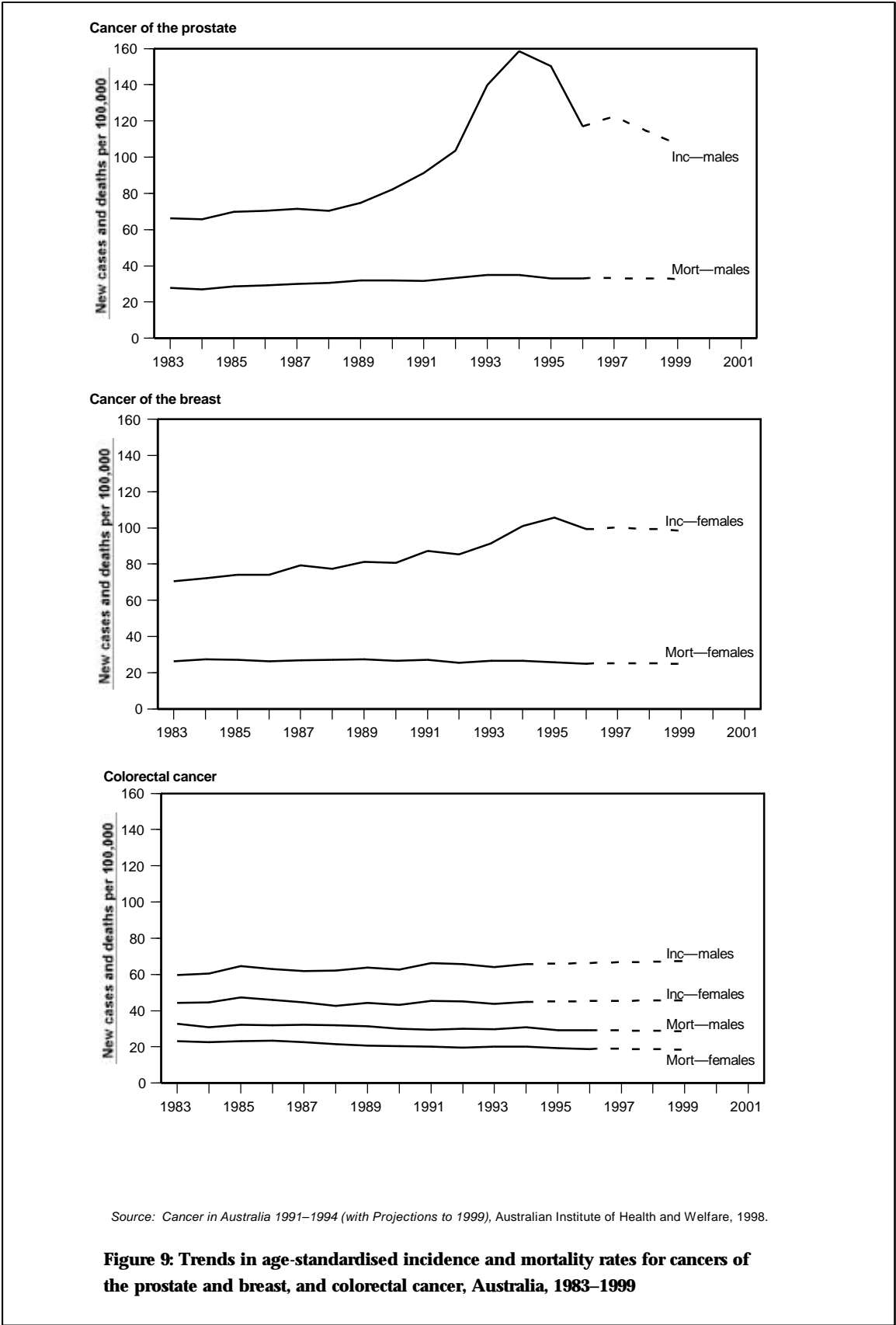
ICD-9	Cancer description	Deaths*					Age-standardised death rates*				
		1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
<b>Males</b>											
140–208	All cancers (excluding NMSC)	18,885	19,333	19,830	20,190	20,580	228.2	227.1	226.8	225.3	223.9
150	Oesophagus	615	616	640	660	690	7.3	7.2	7.3	7.3	7.4
151	Stomach	818	749	800	800	800	10.0	8.8	9.1	8.8	8.6
153–154	Colorectal	2,418	2,506	2,560	2,610	2,650	29.1	29.2	29.1	28.9	28.7
157	Pancreas	776	776	810	820	830	9.3	9.0	9.1	9.1	9.0
161	Larynx	203	219	200	190	190	2.4	2.5	2.2	2.1	2.0
162	Lung	4,697	4,773	4,840	4,880	4,930	56.0	55.4	54.9	54.1	53.3
172	Melanoma	601	586	630	650	670	7.1	6.7	7.1	7.1	7.2
185	Prostate	2,564	2,660	2,760	2,830	2,910	33.1	33.1	33.3	33.1	32.8
188	Bladder	580	550	590	600	630	7.4	6.7	7.0	7.0	7.0
189	Kidney	463	453	490	500	520	5.5	5.3	5.5	5.6	5.7
191	Brain	556	598	600	610	630	6.3	6.7	6.6	6.6	6.7
195–199	Unknown primary	1,132	1,190	1,210	1,240	1,280	13.7	14.1	14.0	14.0	14.0
200+202	Non-Hodgkin's lymphoma	730	718	760	760	770	8.6	8.3	8.5	8.3	8.2
203	Multiple myeloma	304	328	340	350	360	3.7	3.9	3.9	3.9	3.9
204	Lymphatic leukaemia	219	267	270	280	290	2.6	3.2	3.1	3.2	3.2
	Smoking-related cancers	5,230	5,300	5,360	5,410	5,460	62.0	61.2	60.6	59.8	58.9
<b>Females</b>											
140–208	All cancers (excluding NMSC)	14,613	14,968	15,330	15,670	16,020	138.1	137.7	137.8	137.6	137.5
150	Oesophagus	295	324	340	360	370	2.7	2.8	2.9	3.0	3.0
151	Stomach	458	478	470	460	460	4.2	4.2	4.0	3.9	3.9
153–154	Colorectal	2,090	2,112	2,160	2,180	2,210	19.3	18.9	18.9	18.7	18.5
157	Pancreas	757	834	830	860	890	6.9	7.3	7.0	7.1	7.1
162	Lung	1,998	2,054	2,170	2,260	2,360	19.3	19.4	20.0	20.4	20.9
172	Melanoma	334	326	320	320	330	3.3	3.0	2.9	2.9	2.8
174	Breast	2,634	2,623	2,720	2,760	2,800	25.6	25.0	25.3	25.1	25.0
180	Cervix	334	302	320	310	310	3.3	2.9	3.0	2.9	2.8
179+182	Uterus	290	281	300	310	320	2.7	2.6	2.7	2.8	2.8
183	Ovary	724	814	830	860	900	7.0	7.7	7.6	7.8	7.9
188	Bladder	235	239	240	240	240	2.1	2.0	1.9	1.9	1.9
189	Kidney	353	339	360	360	370	3.3	3.1	3.2	3.2	3.2
191	Brain	399	402	400	400	410	4.1	4.0	3.9	3.8	3.8
195–199	Unknown primary	1,084	1,130	1,120	1,150	1,170	9.8	9.9	9.6	9.5	9.5
200+202	Non-Hodgkin's lymphoma	700	688	730	760	790	6.6	6.3	6.6	6.8	6.9
203	Multiple myeloma	251	267	270	270	270	2.3	2.4	2.4	2.3	2.3
204	Lymphatic leukaemia	166	156	160	150	150	1.5	1.4	1.3	1.2	1.2
	Smoking-related cancers	1,710	1,770	1,840	1,910	1,980	16.8	17.0	17.3	17.5	17.8

Note: Rates are expressed per 100,000 population and age-standardised to the Australian 1991 Population (AS Rate).

\* 1995–1996 are current data, 1997–1999 are projected data, projected number of deaths for 1997–1999 are rounded to the nearest 10.

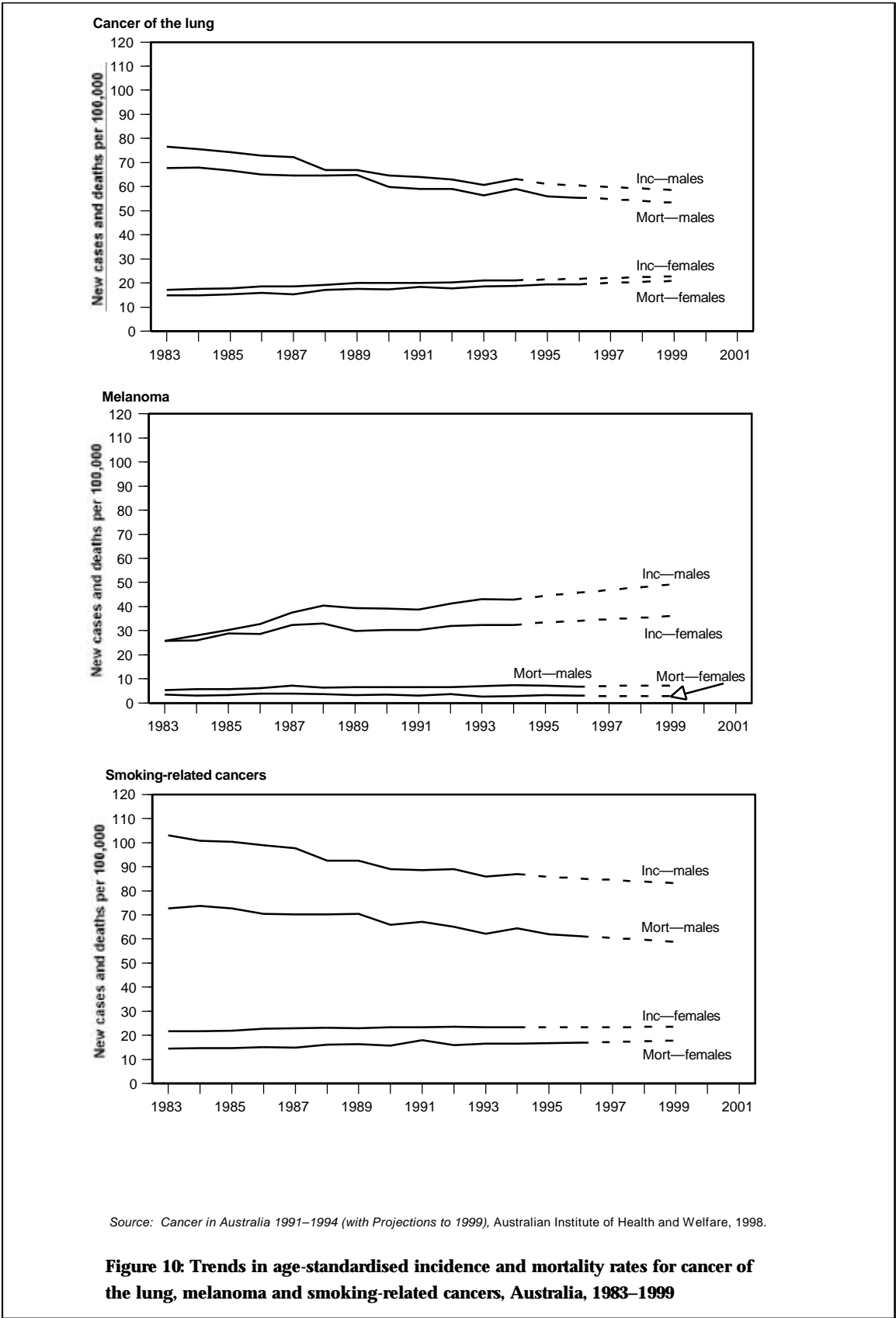
Source: *Cancer in Australia 1991–1994 (with Projections to 1999)*, Australian Institute of Health and Welfare, 1998.

**Cancers of the prostate and breast, and colorectal cancer**





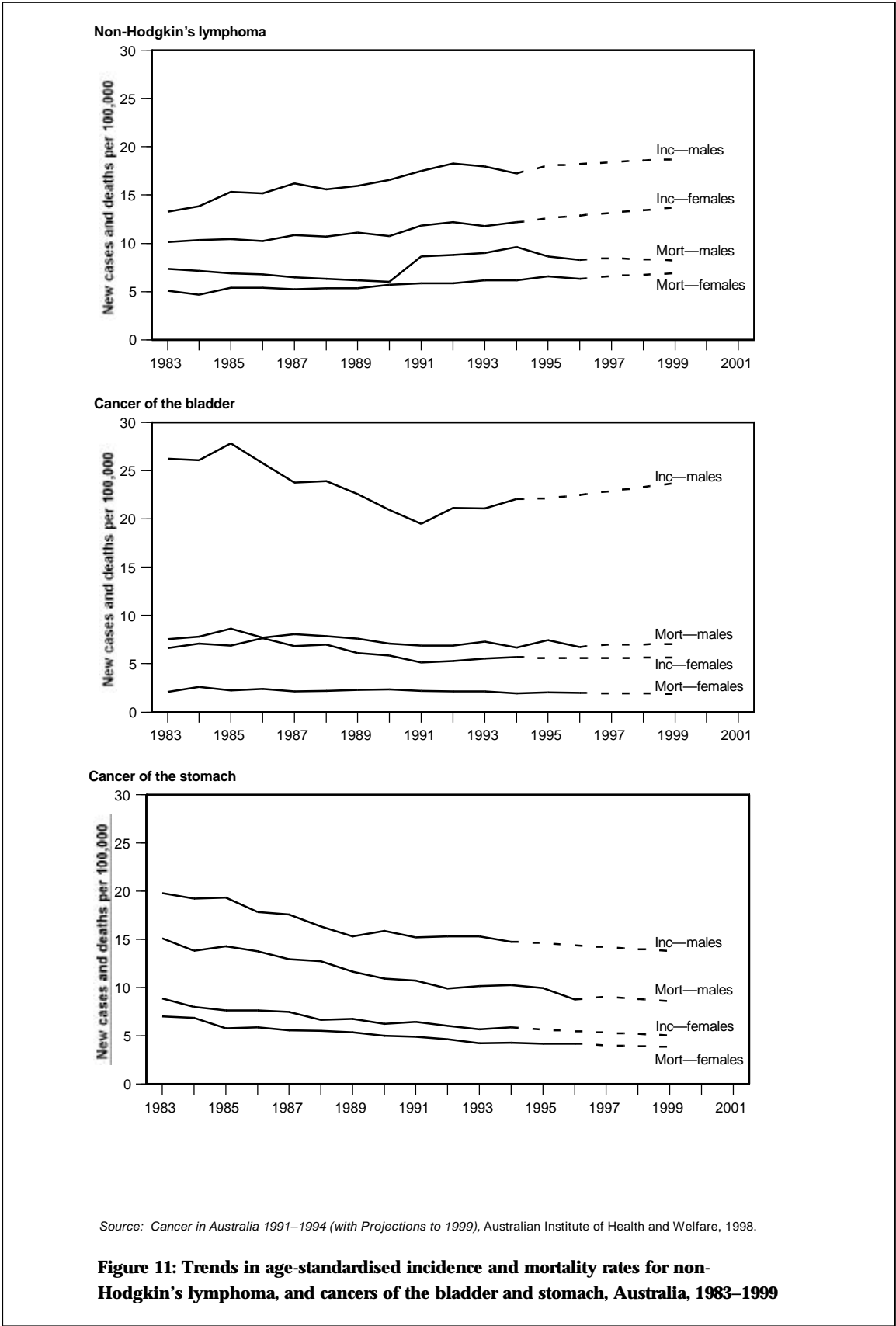
**Cancer of the lung, melanoma and smoking-related cancers**



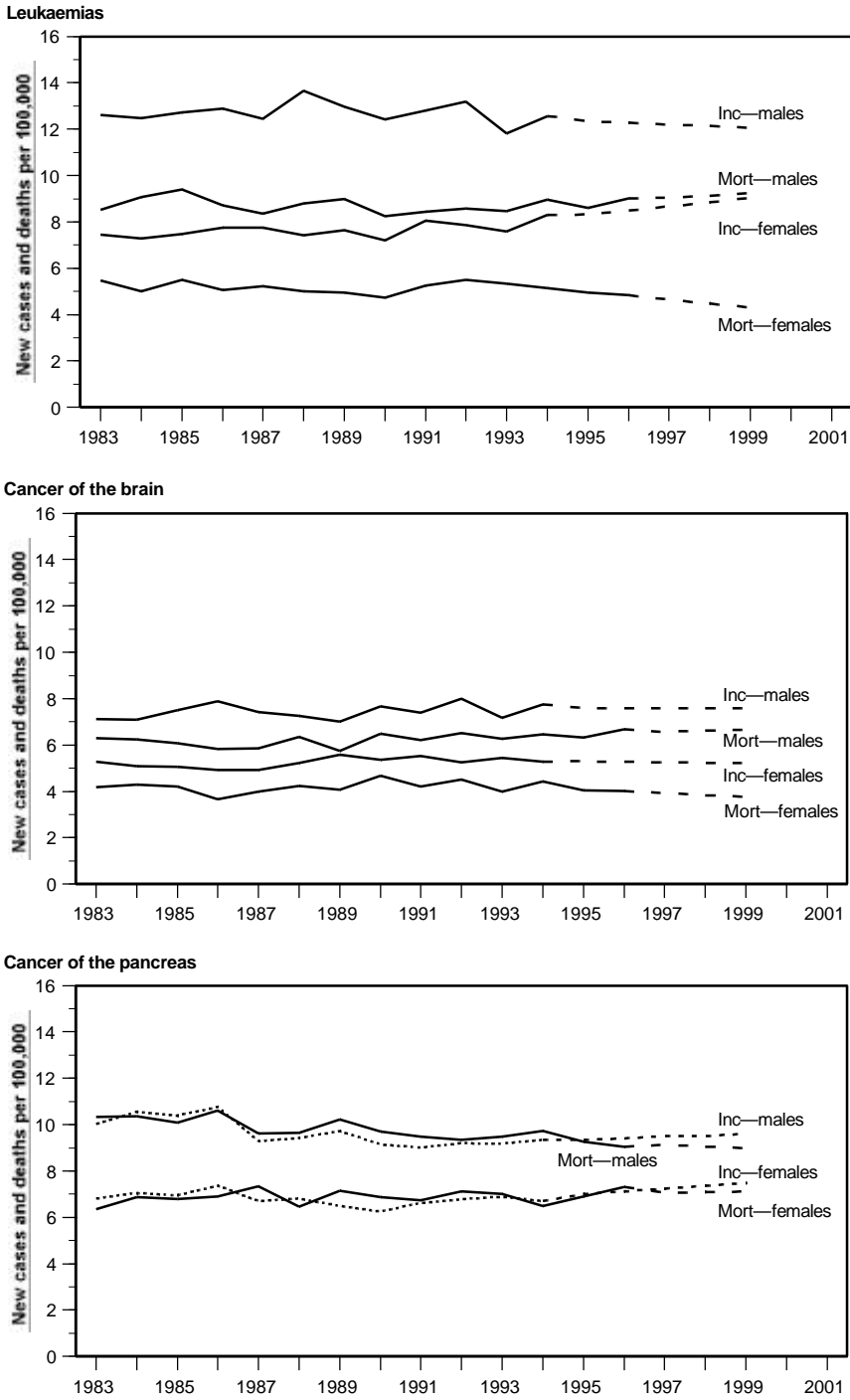
Source: *Cancer in Australia 1991-1994 (with Projections to 1999)*, Australian Institute of Health and Welfare, 1998.

**Figure 10: Trends in age-standardised incidence and mortality rates for cancer of the lung, melanoma and smoking-related cancers, Australia, 1983-1999**

**Non-Hodgkin's lymphoma, cancers of the bladder and stomach**



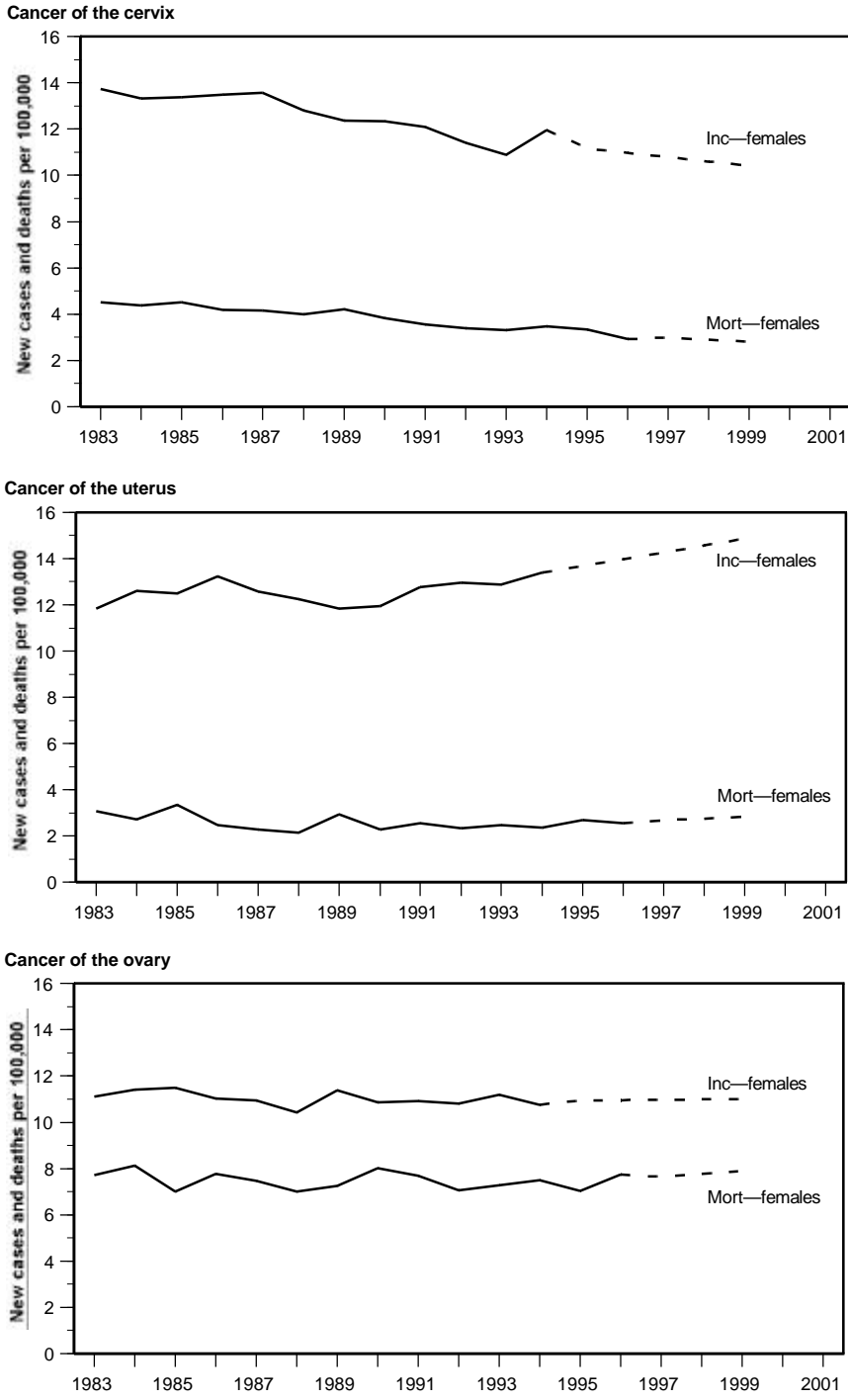
**Leukaemias and cancers of the brain and pancreas**



Source: *Cancer in Australia 1991–1994 (with Projections to 1999)*, Australian Institute of Health and Welfare, 1998.

**Figure 12: Trends in age-standardised incidence and mortality rates for leukaemias and cancers of the brain and pancreas, Australia, 1983–1999**

**Cancers of the cervix, uterus and ovary**



Source: *Cancer in Australia 1991-1994 (with Projections to 1999)*, Australian Institute of Health and Welfare, 1998.

**Figure 13: Trends in age-standardised incidence and mortality rates for cancers of the cervix, uterus and ovary, Australia, 1983-1999**

**Cancer of unknown primary site, and cancers of the kidney and testis**

