

2 Cancer in Australia

General

Non-melanocytic skin cancer is the most common cancer in Australia (Marks et al. 1993). Incidence data for this cancer are not collected on a routine basis by cancer registries, and are not reported in this publication. However, survey-based estimates show age-standardised incidence rates (standardised to the World Standard Population) for treated non-melanocytic skin cancers in 1995 were 1,374 per 100,000 for males and 857 per 100,000 for females (Giles G, personal communication). These rates are 8 times the next most common male cancer (prostate) and 7 times the next most common female cancer (breast). Non-melanocytic skin cancer has a relatively low mortality rate at 1.9 per 100,000 compared with the high mortality rates of male lung cancer at 59.0 per 100,000, female breast cancer (26.6) and prostate cancer (35.0). Non-melanocytic skin cancer will be excluded from any further comparisons in this publication. The totality of other cancers will be referred to as 'registerable cancers'.

In this publication the term 'cancer site' is used to represent cancers located in specific organs or tissues as well as systemic cancers such as leukaemia and lymphoma.

Excluding non-melanocytic skin cancers, there was an average of 69,200 new cancer cases and 32,010 deaths due to cancer each year in Australia over the 1991–1994 period. At the rates prevailing during that period, 1 in 3 men and 1 in 4 women would be directly affected by cancer in the first 75 years of life. Further, over 263,000 potential years of life would be lost to the community each year as a result of people dying of cancer before the age of 75.

Most common cancers

Prostate cancer is the most common registerable cancer with 12,787 new cases registered in 1994 (Table 1). Among all persons, the combination of cancers of the colon and rectum (10,016 new cases), often referred to as bowel or colorectal cancer, is the next most common registerable cancer. Prostate and colorectal cancers are followed by breast (9,764) and lung (7,306) cancers, and melanoma (6,776). Together these five cancers account for 62% of all registerable cancers in 1994.

In males, the most common registerable cancers after prostate cancer are colorectal cancer (5,433 new cases diagnosed in 1994), lung cancer (5,196) and melanoma (3,695) (Table 1, Figure 1). These four cancers account for 64% of all registerable cancers in males.

In females, breast cancer (9,694) is the most common registerable cancer, followed by colorectal cancer (4,583), melanoma (3,081) and lung cancer (2,110) which in total account for 59% of all cancers in females.

The most common cancers causing death are lung (4,833), prostate (2,613) and colorectal (2,501) cancers in males, and breast (2,669), colorectal (2,126) and lung (1,901) cancers in females (Table 1). Lung cancer causes approximately seven times as many deaths as melanoma in females, despite the higher incidence of melanoma in this group. This

indicates the poor survival rates of those diagnosed with lung cancer compared with those diagnosed with melanoma.

The number of person-years of life lost due to cancer is generally dominated by the most common cancers due to the large numbers of cases diagnosed. Lung cancer is responsible for the highest number of person-years of life lost before 75 years of age (46,798 in 1994), followed by colorectal cancer (32,730) and breast cancer (31,378). Cancer of the brain and nervous system is responsible for the fourth highest number of person-years of life lost (16,253). This contrasts with its ranking as the thirteenth most common cancer (1,169 new cases diagnosed in 1994). Further, the ratio of person-years of life lost to new cases for cancer of the brain and nervous system (13.2) is much higher than that for lung cancer (6.4), colorectal cancer (3.3) or breast cancer (3.2). This is a direct result of the relatively large number of younger people diagnosed with, and dying from, cancer of the brain and nervous system.

The most common cancers vary depending on age (Figure 2). In people aged less than 15, the most common cancers diagnosed are lymphatic leukaemia and cancers of the brain and central nervous system. These two cancer sites account for 46% of all cancers in this age group. In those aged 15–44, melanoma and breast cancer are the most common cancers, while breast, colorectal, prostate and lung cancers are predominant in people aged over 45 years.

Table 1: Most frequently occurring cancers in Australia, 1994

	New cases				Deaths			
	Number	% of all new cancer cases	AS Rate	Lifetime risk*	Number	% of all cancer deaths	AS Rate	PYLL*
Males								
Prostate	12,787	30.0	158.7	1 in 8	2,613	13.7	34.9	6,455
Colorectal	5,433	12.7	65.6	1 in 18	2,501	13.1	30.7	19,710
Lung	5,196	12.2	63.1	1 in 19	4,833	25.3	59.0	32,830
Melanoma	3,695	8.7	42.9	1 in 28	609	3.2	7.3	7,468
Bladder	1,772	4.2	22.1	1 in 61	509	2.7	6.7	2,008
Unknown primary site	1,547	3.6	19.0	1 in 68	1,164	6.1	14.5	8,505
Non-Hodgkin's lymphoma	1,468	3.4	17.2	1 in 70	790	4.1	9.6	9,195
Stomach	1,199	2.8	14.7	1 in 89	827	4.3	10.2	6,105
Kidney	1,036	2.4	12.2	1 in 89	464	2.4	5.6	4,453
Pancreas	767	1.8	9.3	1 in 128	790	4.1	9.7	5,830
Females								
Breast	9,694	29.5	100.9	1 in 11	2,669	18.6	26.6	31,273
Colorectal	4,583	13.9	44.9	1 in 27	2,126	14.9	20.1	13,020
Melanoma	3,081	9.4	32.4	1 in 37	288	2.0	2.9	3,565
Lung	2,110	6.4	21.1	1 in 51	1,901	13.3	18.9	13,968
Unknown primary site	1,306	4.0	12.3	1 in 109	957	6.7	8.9	5,518
Uterus	1,304	4.0	13.4	1 in 77	248	1.7	2.4	1,478
Non-Hodgkin's lymphoma	1,217	3.7	12.2	1 in 98	639	4.5	6.1	4,505
Cervix	1,121	3.4	12.0	1 in 101	340	2.4	3.5	5,135
Ovary	1,039	3.2	10.8	1 in 100	743	5.2	7.5	7,638
Pancreas	708	2.2	6.7	1 in 201	690	4.8	6.5	3,375
Persons								
Prostate	12,787	16.9	69.3	1 in 17	2,613	7.8	13.8	6,455
Colorectal	10,016	13.3	54.1	1 in 22	4,627	13.8	24.8	32,730
Breast	9,764	12.9	52.9	1 in 21	2,689	8.0	14.4	31,378
Lung	7,306	9.7	39.6	1 in 28	6,734	20.1	36.5	46,798
Melanoma	6,776	9.0	36.9	1 in 32	897	2.7	4.9	11,033
Unknown primary site	2,853	3.8	15.3	1 in 85	2,121	6.3	11.3	14,023
Non-Hodgkin's lymphoma	2,685	3.6	14.5	1 in 82	1,429	4.3	7.7	13,700
Bladder	2,367	3.1	12.7	1 in 99	725	2.2	3.9	2,630
Stomach	1,819	2.4	9.7	1 in 131	1,293	3.9	6.9	8,690
Kidney	1,697	2.2	9.2	1 in 117	784	2.3	4.2	6,770

Notes

1. Rates are expressed per 100,000 population and age-standardised to the Australian 1991 Population (AS Rate).
 2. Non-melanocytic skin cancer, known to be the most common cancer type, is excluded from this list as it is not a registerable cancer.
- * These measures are calculated for ages 0–74 years; PYLL refers to person-years of life lost. Methods for the calculation of these measures are presented in Appendix B.

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

Most frequently occurring cancers

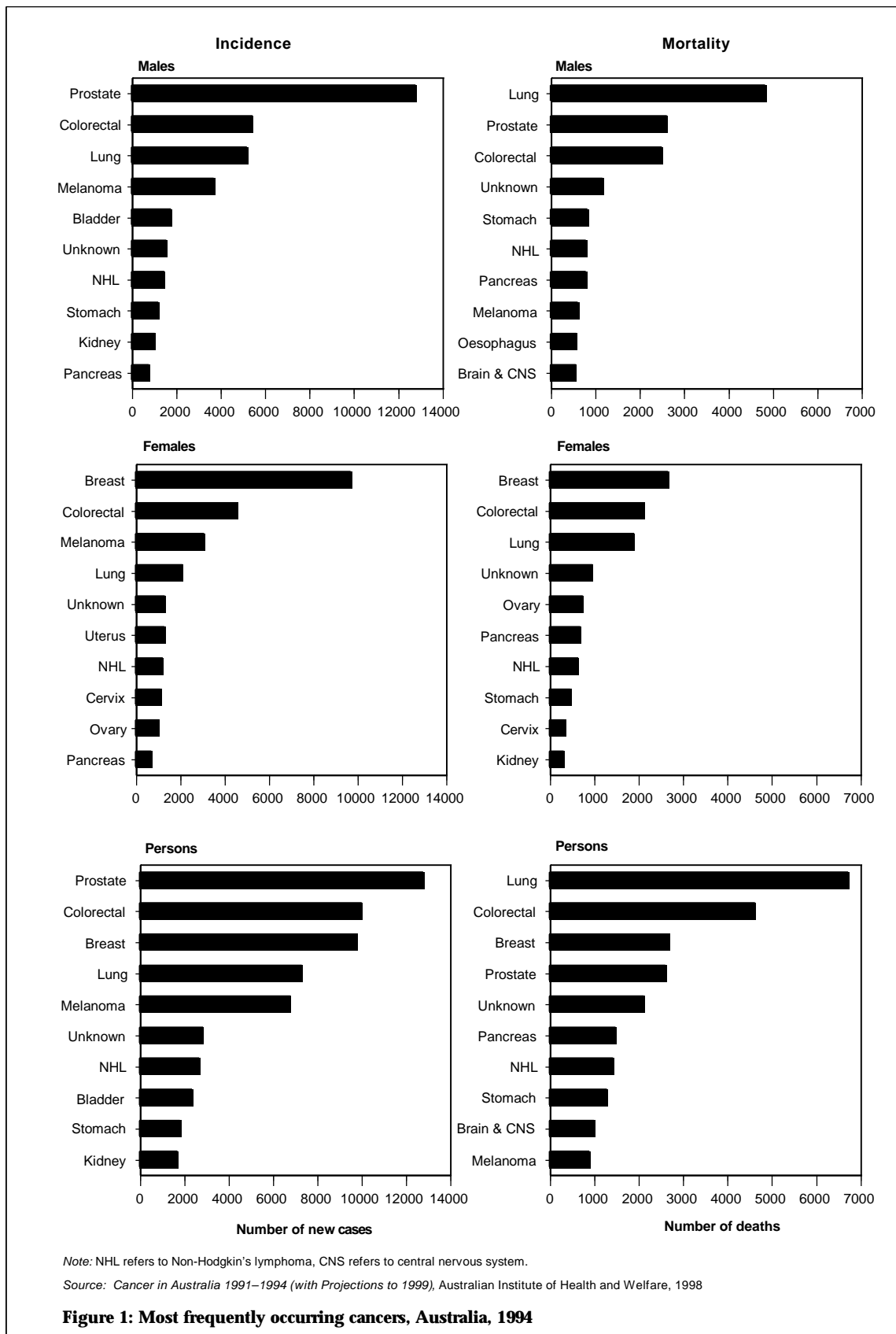
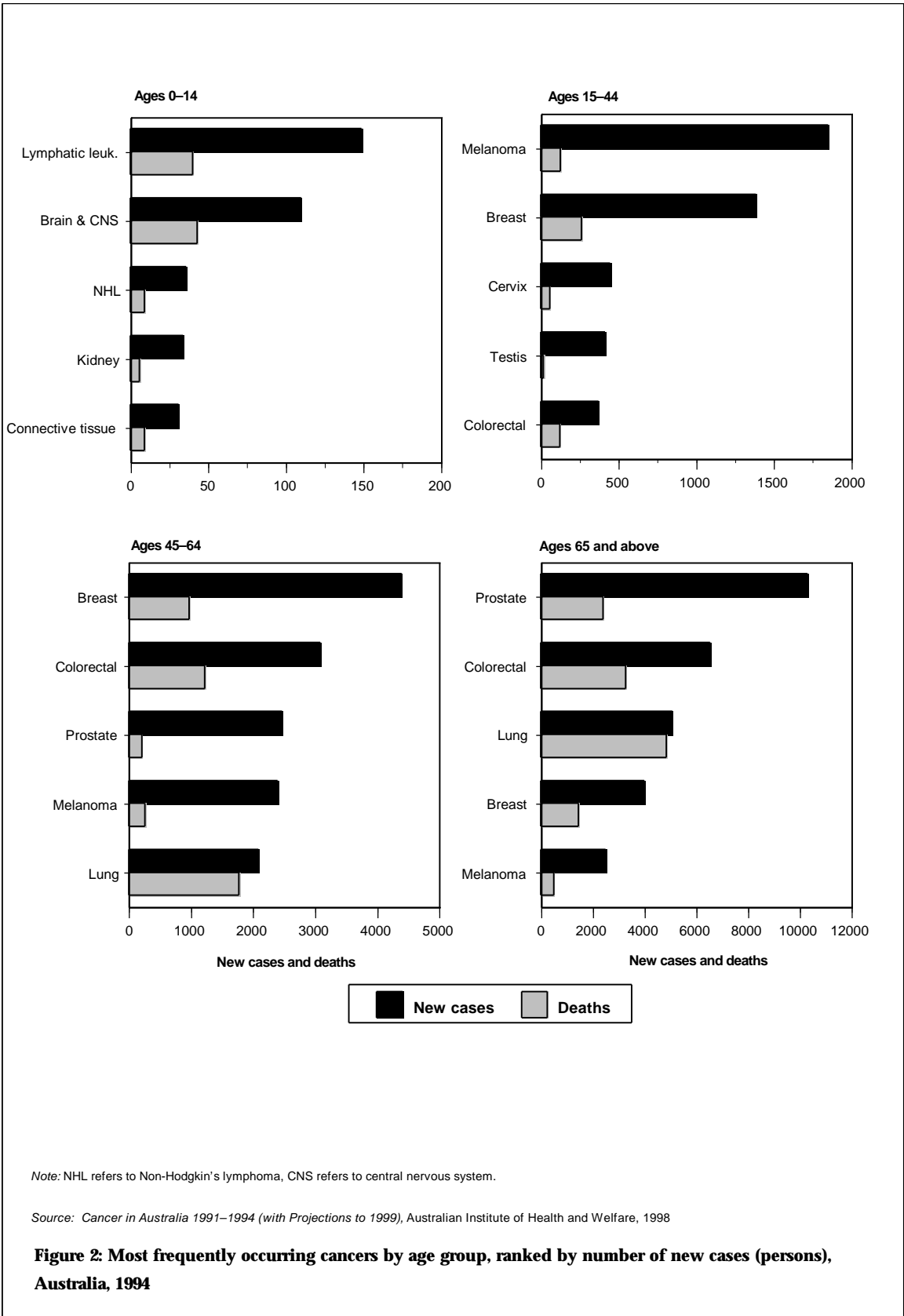


Figure 1: Most frequently occurring cancers, Australia, 1994

Most frequently occurring cancers by age group



Note: NHL refers to Non-Hodgkin's lymphoma, CNS refers to central nervous system.

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

Figure 2: Most frequently occurring cancers by age group, ranked by number of new cases (persons), Australia, 1994

Age and sex differences

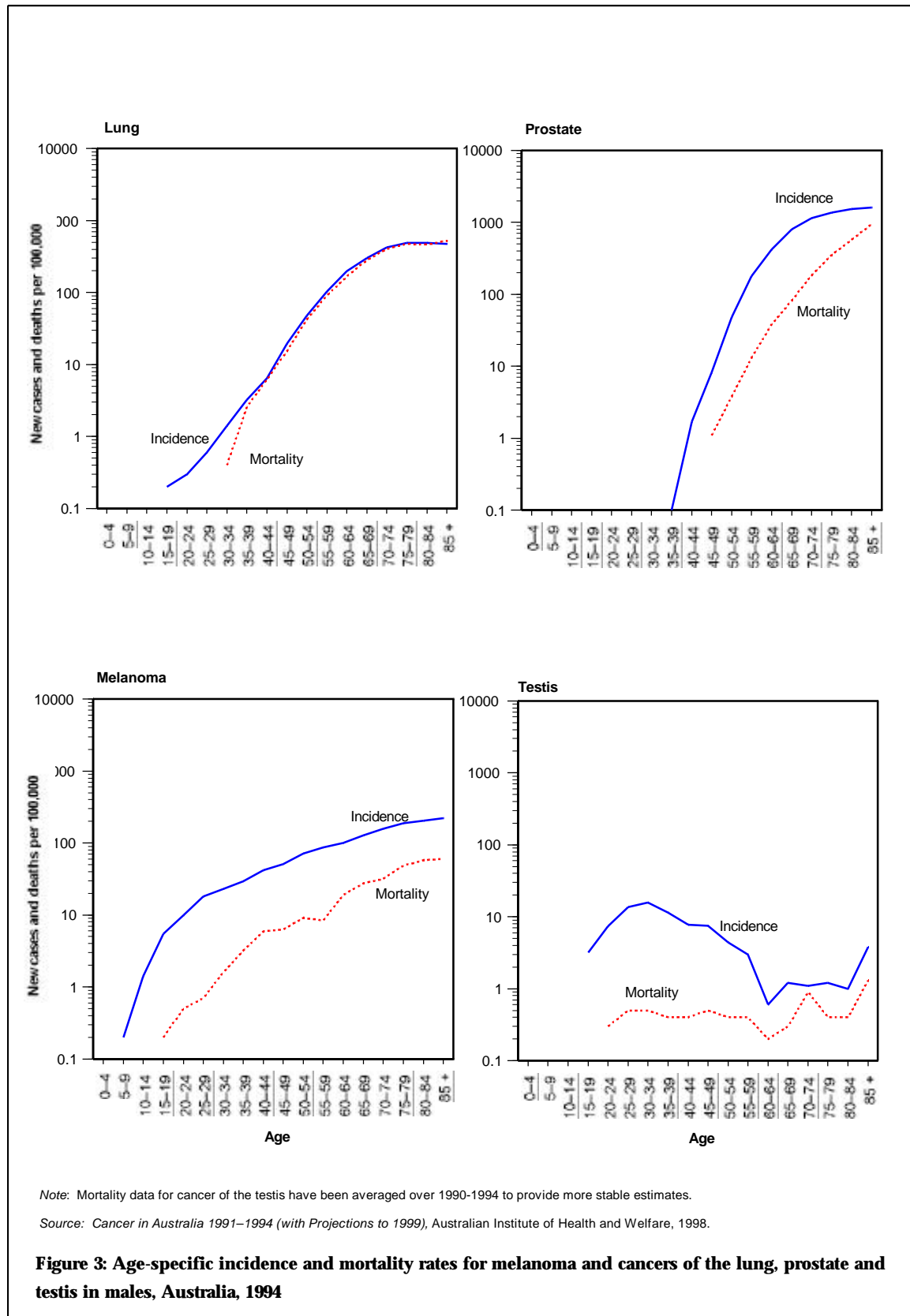
Cancer occurs more commonly in males than females. The age-standardised incidence rate in 1994 for all cancers (excluding non-melanocytic skin cancers) was 515.9 new cases per 100,000 for males and 333.8 per 100,000 for females, resulting in an age-adjusted sex ratio of 1.5 male cases to every female cancer case. Males have an excess of cases for every major cancer site, except for cancers of the breast, gallbladder, thyroid, other nervous system, and monocytic leukaemia.

The risk of cancer increases with age. The age-standardised incidence rate in 1994 for all cancers (excluding non-melanocytic skin cancers) was 14.1 per 100,000 for people aged less than 15 years; 88.2 per 100,000 for 15–44 year olds; 654.6 per 100,000 for 45–64 year olds; and 2,106.5 per 100,000 for people aged 65 years and over.

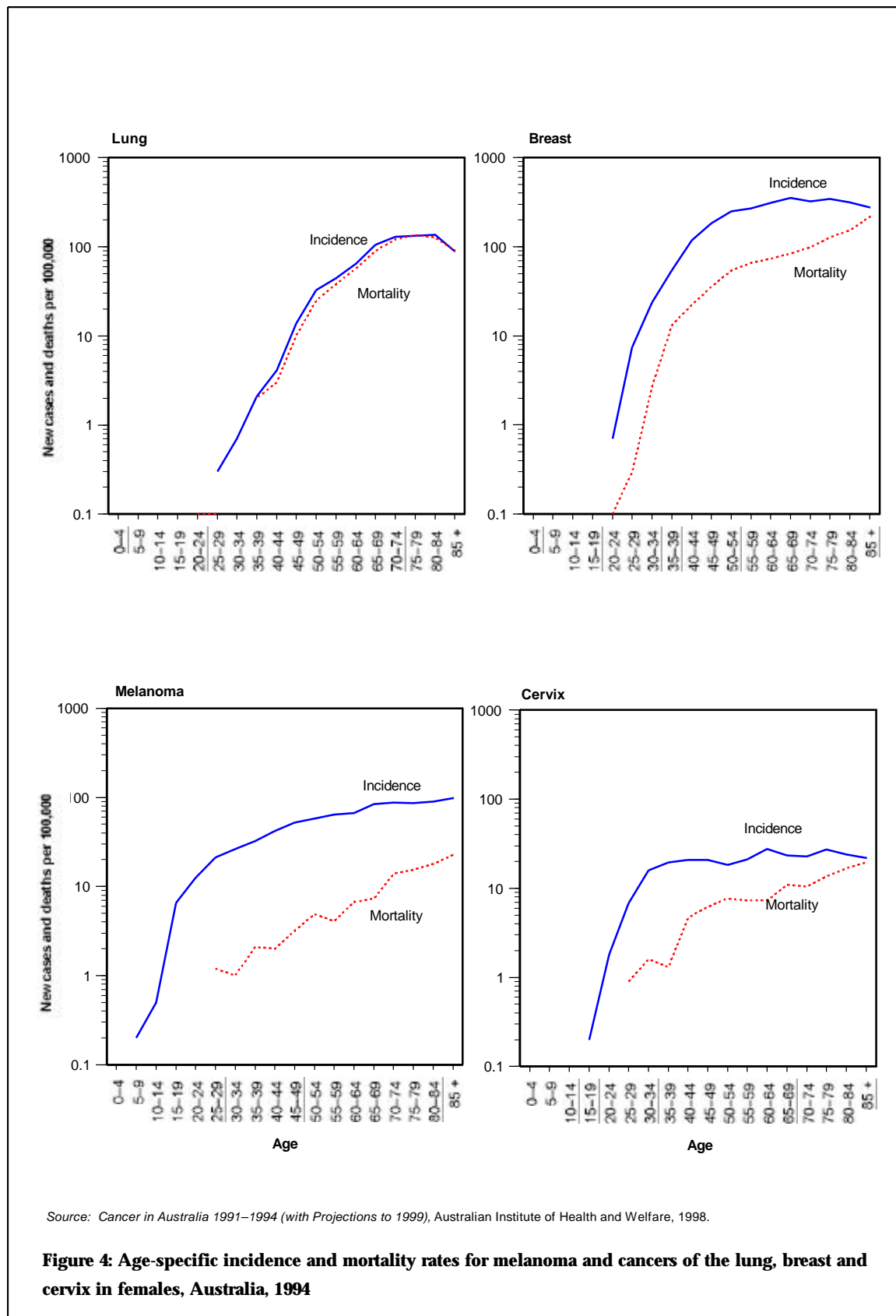
Of people diagnosed with cancer, 0.7% of all cancers (excluding non-melanocytic skin cancers) occur in those aged less than 15 years, 9.8% in the 15–44 age group, 30.4% in the 45–64 age group, and 59.1% in those aged 65 and over. While the pattern of deaths across age groups is similar to that of incidence, a larger proportion (70%) of cancer deaths occur in those aged 65 and over. Cervical and testicular cancer are exceptions to the age pattern with the number of cases in the 15–44 age group exceeding that in the 45–64 and 65 and over age groups.

Age-specific incidence and mortality rates vary depending upon the cancer site (Figures 3–6). For example, lung cancer incidence and mortality rates parallel each other closely, rising sharply from ages 20–24 through to 80–84 before dropping in the oldest age group, whereas the age-specific incidence rates for melanoma of the skin rise much more steadily across the whole age range.

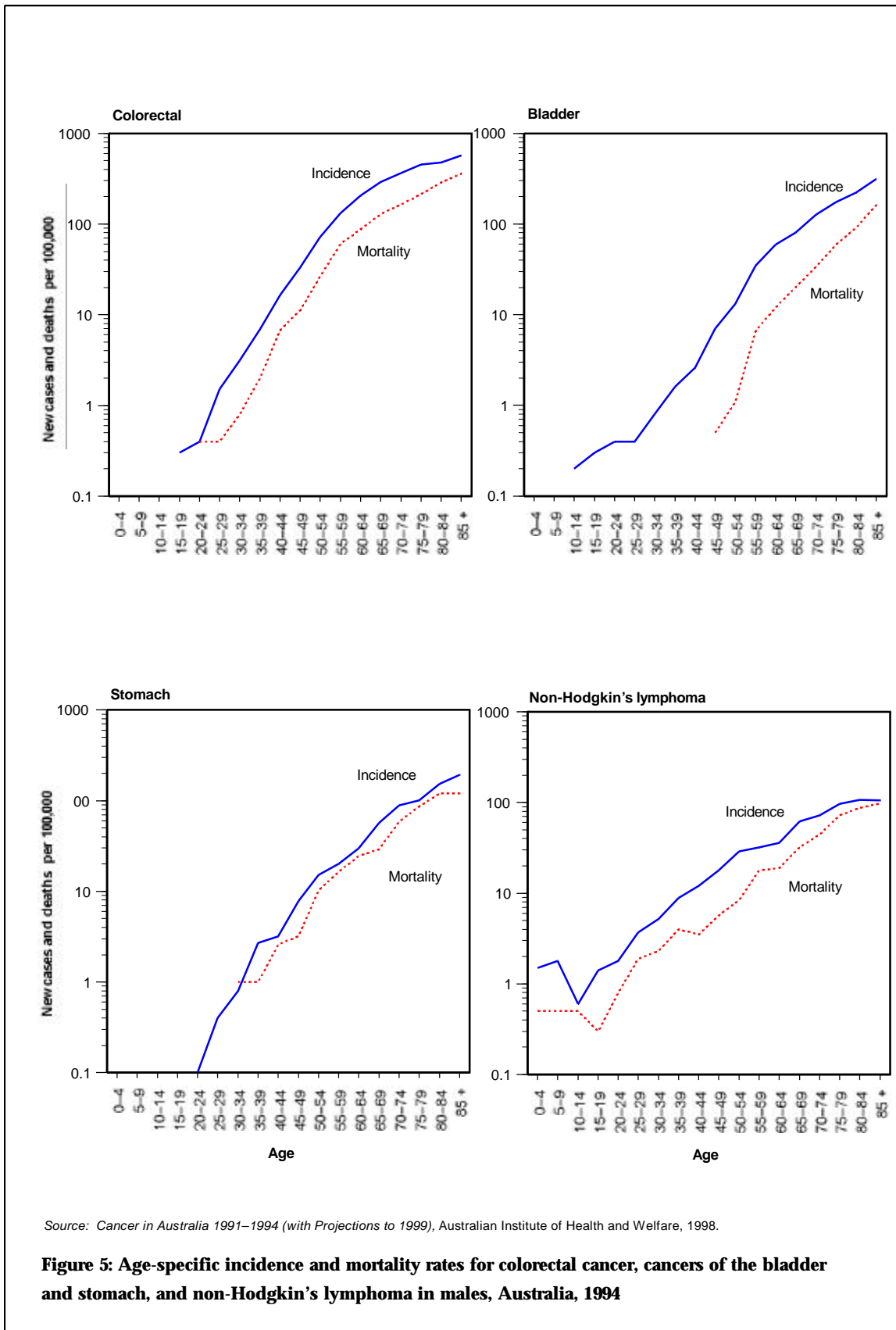
Age-specific incidence and mortality rates—males



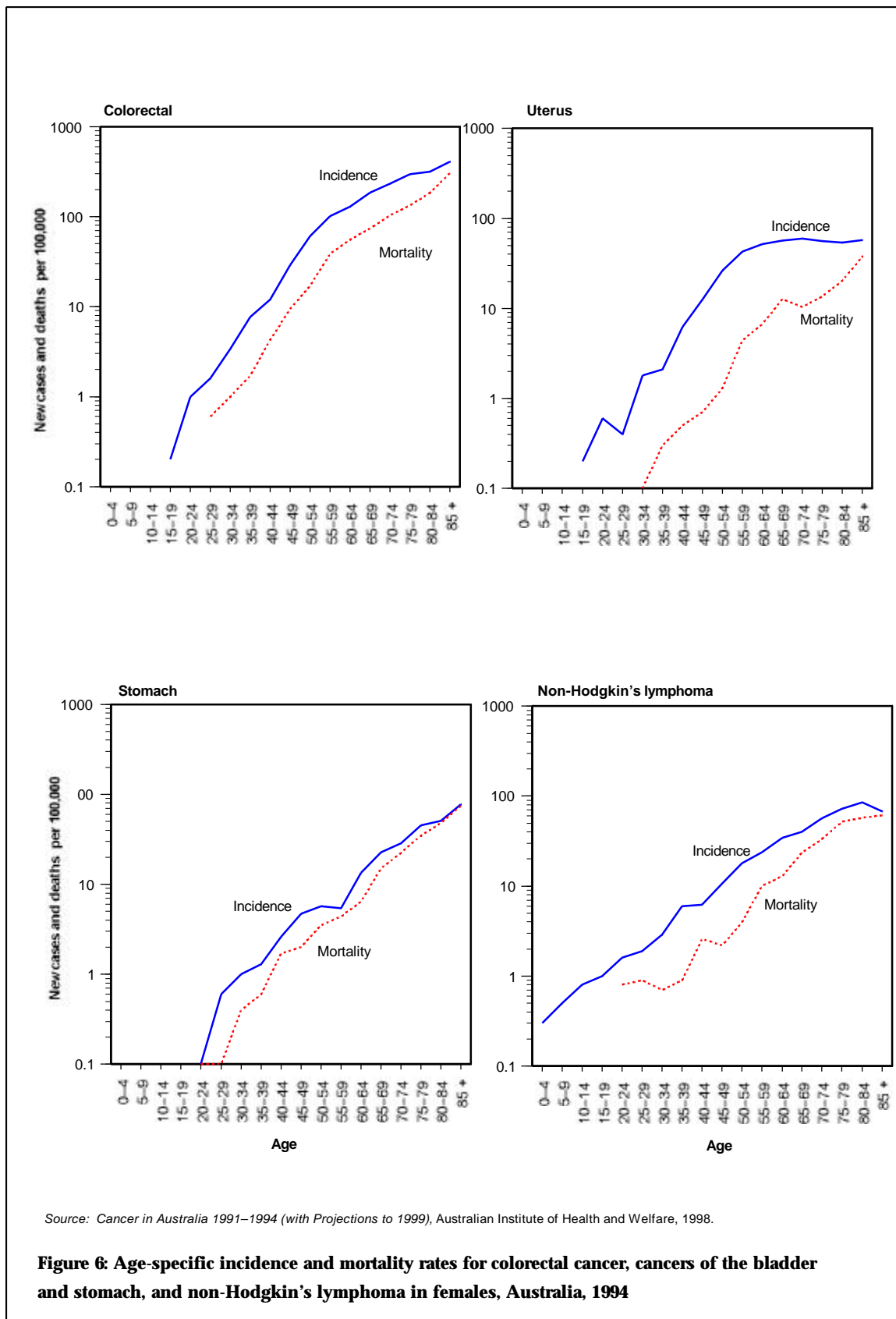
Age-specific incidence and mortality rates—females



Age-specific incidence and mortality rates—males



Age-specific incidence and mortality rates—females



Alcohol- and smoking-related cancers

Alcohol and smoking are risk factors for some cancers. In 1994, alcohol-related cancers accounted for 0.8% of all new cancers, while smoking-related cancers accounted for 12.6%. Smoking-related cancers also accounted for a large proportion of deaths from cancer in 1994 (20.8% of all cancer deaths). These data and those in Tables 32–33 are derived from a series of age- and sex-specific aetiological fractions developed by English et al. (1995) and the cancer incidence estimates for specific cancer sites for 1991 to 1994. These fractions are based on an analysis of international and Australian studies and estimate the probability that a specific agent (alcohol or tobacco) causes a specific disease (cancer). The cancers thought to be directly attributable to smoking (excludes passive smoking) and alcohol are listed in Table 2.

It is estimated that 641 new cases of cancer were directly attributable to hazardous and harmful alcohol consumption in 1994 at a rate of 3.5 per 100,000, as were 300 deaths at a rate of 1.6 per 100,000. While other cancers may be indirectly caused by alcohol consumption in combination with other risk factors, alcohol is believed to be the primary causative agent for differing proportions of specific cancers. The mechanism by which alcohol causes cancer has not been fully determined, but the major metabolite of ethanol has been shown to be carcinogenic in animal experiments (English et al. 1995). The lifetime risk of an alcohol-related cancer is 1 in 242 for males and 1 in 294 for females. Between 1989 and 1994, the incidence rate for alcohol-related cancers in males fell by an average of 1.5% per annum, while the rate in females increased by 3.5% per annum.

Smoking-related cancers account for 17.0% of all cancers in males and 7.0% of all cancers in females. This large difference is attributable to the higher rates of smoking among men than women in the past 30 years. Twenty-five years ago smoking rates in men were almost double those in women. However, this is no longer the case with the latest estimates indicating that 27.3% of men and 22.7% of women aged over 18 years currently smoke (AIHW 1995). Organs associated with the respiratory system are the ones most affected by cigarette smoke, probably as a result of the known carcinogens in cigarette smoke such as aromatic amines (Table 2). Epidemiological evidence indicates that other cancers, including cancer of the upper digestive tract, bladder, renal pelvis and pancreas are also associated with cigarette smoking.

Cigarette smoking is estimated to have caused 9,539 new cases of cancer (51.9 new cases per 100,000) and 6,952 deaths (37.7 per 100,000) in 1994. Between 1989 and 1994, the male incidence rate for smoking-related cancers fell by an average of 1.2% per year, while the rate for females rose marginally at 0.3% per year, both probably a reflection of the changing lung (Figure 10) and oesophagus cancer incidence rates. Over the same period, mortality rates fell by 1.7% per annum for males and rose by 0.4% per annum for females. These trends in incidence and mortality rates for smoking-related cancers are depicted in Figure 10.

Table 2: Per cent of cancers attributable to alcohol and smoking

	Males (%)	Females (%)
Alcohol-related cancers		
Oropharynx	21	8
Oesophagus	14	6
Liver	18	12
Larynx	21	13
Female breast cancer	—	3
Smoking-related cancers		
Oropharynx	57	51
Oesophagus	54	46
Stomach	14	11
Anus	48	41
Pancreas	24	19
Larynx	73	66
Lung	84	77
Uterus	—	10
Cervix	—	19
Vulva	—	40
Penis	30	—
Bladder	43	36
Renal parenchyma	28	21
Renal pelvis	55	48

Source: English et al. (1995).

Cancer rates in the States and Territories 1990–1994

Cancer incidence and mortality are reported here for the combined period 1990–1994 for all States and Territories. However, incidence data for Queensland are preliminary estimates for 1990–1994 combined and are based on data provided by the Queensland cancer registry. They are expected to be revised in June 1998. For some individual cancer sites Queensland's preliminary incidence rates are the highest in Australia; it is anticipated that for some of these sites the rates will be revised downward. This revision is not expected to affect melanoma or breast cancer rates as they have been the subject of a special registration process.

Cancer incidence varies between States and Territories. Tasmania reported the highest incidence rate for all cancers (excluding non-melanocytic skin cancers) among males (502.7 per 100,000), while the Northern Territory reported the lowest with 354.1 cases per 100,000. For females, Western Australia reported the highest rate (326.7 per 100,000) and the Northern Territory reported the lowest (282.4 per 100,000) (Figure 7, Table 14).

The cancer mortality rates reported for males across the States and Territories ranged from 224.0 per 100,000 in Western Australia to 262.9 per 100,000 in the Australian Capital Territory and 251.6 per 100,000 in the Northern Territory (Table 14). For females, the mortality rates varied from a low of 132.0 per 100,000 in Queensland to a high of 177.1 per 100,000 in the Northern Territory.

There is more variation among the States and Territories when selected cancer sites are examined. The cancer with the greatest variation between States and Territories is melanoma. Melanoma incidence rates are highest in Queensland and lowest in the Northern

Territory for both males and females (Figure 7, Table 19). The high incidence rate in Queensland has been consistent since the early 1980s, and is currently the focus of a major epidemiological study. Despite the large differences in melanoma incidence, there is relatively little variation in mortality rates between States and Territories (Figure 7).

Lung cancer incidence rates are highest for males in Tasmania and the Northern Territory (approximately 69 cases per 100,000), and for females in the Northern Territory (39.0 per 100,000) (Table 18). The lowest lung cancer incidence rates are reported for males in the Australian Capital Territory (50.5 per 100,000) and for females in Queensland (19.3 per 100,000) and New South Wales and South Australia (both 21.0 per 100,000).

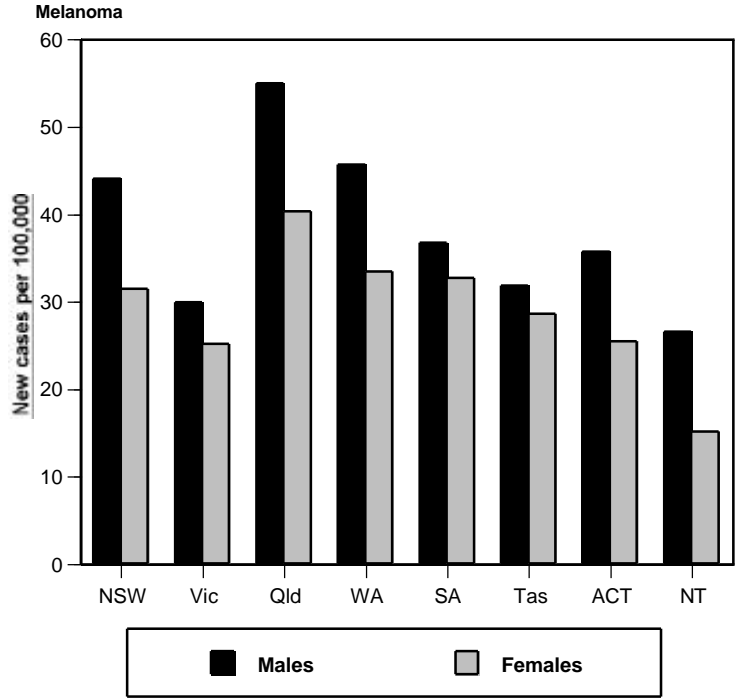
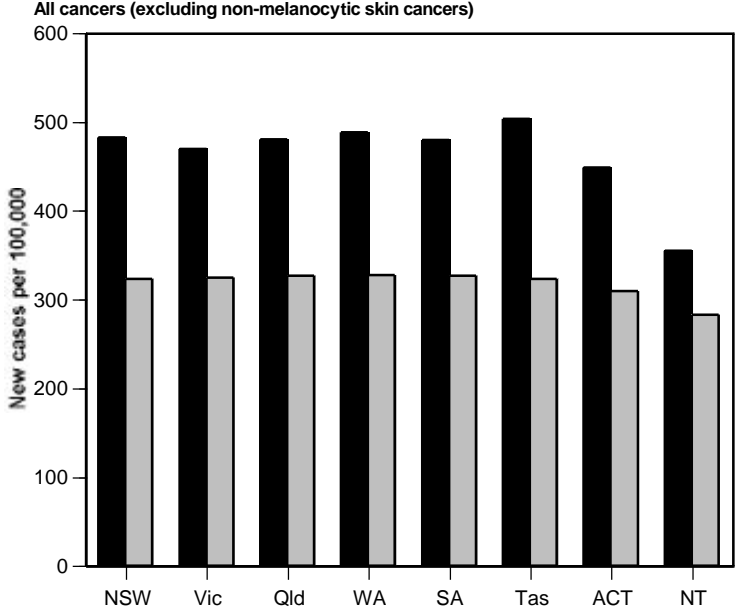
Queensland and Western Australia reported the highest incidence rates for breast cancer (92.8 per 100,000 and 91.9 per 100,000 respectively), while the Northern Territory reported the lowest incidence rate (59.6 per 100,000) (Table 20). Tasmania and Western Australia reported high rates of prostate cancer (approximately 129 cases per 100,000) while significantly lower rates were reported in Victoria (105.6 per 100,000) and the Northern Territory (53.8 per 100,000) (Table 24). These variations in prostate cancer incidence might be explained by differences in the time and rate of uptake of prostate specific antigen (PSA) testing in the States and Territories.

State and Territory variations in smoking-related cancers generally reflect those observed for lung cancer (Table 33). Tasmania (98.3 per 100,000) and the Northern Territory (95.5 per 100,000) reported the highest incidence rates for males, and the Northern Territory (35.8 per 100,000) the highest for females. The Australian Capital Territory reported the lowest smoking-related cancer incidence rates for both males (74.7 per 100,000) and females (22.2 per 100,000). Death rates from smoking-related cancers were highest in the Northern Territory for both males and females.

These patterns of incidence probably reflect smoking behaviour approximately 10–20 years ago, due to the lag-time between exposure to carcinogens in the tobacco smoke and the diagnosis of cancer. Differentials in smoking rates between the States and Territories reported in the 1995 National Health Survey (ABS 1997b) are likely to affect smoking-related cancer incidence rates in the future. Tasmania (57.3%) reported the highest proportion of current and ex-smokers followed by the Northern Territory with 56.0%. The lowest smoking and ex-smoking rates were found in New South Wales at 49.2%. In the other States and the Australian Capital Territory the proportions of smokers and ex-smokers ranged from 50–53%.

Differences in State and Territory cancer incidence rates may also be explained by variations in underlying cancer risk, the availability and utilisation of diagnostic procedures, reporting and coding inconsistencies, and normal incidence rate fluctuations. A case in point is bladder cancer (Table 26), where State and Territory comparisons vary by as much as 100%. This is largely due to differences in local coding practices, particularly in regard to the inclusion or exclusion of tumours of uncertain behaviour. The AACR plans to address this issue in the near future by standardising coding practices. Care should be taken when interpreting incidence rates, especially for less common cancers and for States and Territories with small populations. To reduce the problems of statistical variation due to a small number of cases, the numbers and rates presented for the States and Territories in Tables 14 to 33 in this publication, and in the tables on floppy disk, are annual averages of 5-year periods (1987–1991, 1988–1992, 1989–1993 and 1990–1994). Therefore these data will not correspond to the annual data published by the individual State and Territory cancer registries. For annual sex- and cancer-specific data, or data cross-classified by other variables (e.g. age, geographic area), the State and Territory cancer registries should be contacted directly (see page 84 for contact details).

All cancers



■ Males □ Females

Note: Data for Queensland are preliminary only.
 Source: *Cancer in Australia 1991–1994 (with Projections to 1999)*, Australian Institute of Health and Welfare, 1998.

Figure 7: Age-standardised incidence rates for all cancers (excluding non-melanocytic skin cancers) and for melanoma by State and Territory, 1990–1994