2 Cancer in Australia

General

Each year, approximately 345,000 new cancer cases are diagnosed in Australia. A large proportion of these, approximately 270,000, are non-melanocytic skin cancers. Incidence data for this cancer are not collected on a routine basis by cancer registries, and are not reported in this publication, however data are collected on a survey basis (Staples et al. 1998).

Excluding non-melanocytic skin cancers, there were 77,666 new cancer cases and 34,089 deaths due to cancer in Australia in 1996. At the incidence rates prevailing in 1996, it would be expected that 1 in 3 men and 1 in 4 women would be directly affected by cancer in the first 75 years of life. Further, nearly 261,300 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. Cancer currently accounts for 28% of male deaths and 25% of female deaths.

The latest 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 (Staples et al. 1998). These rates are eight times the next most common male cancer (prostate) and seven times the next most common female cancer (breast). Despite non-melanocytic skin cancer's high incidence rate it has a relatively low mortality rate at 1.8 per 100,000 compared with the high mortality rates of male lung cancer at 56.0 per 100,000, female breast cancer (24.9) and prostate cancer (33.0). Non-melanocytic skin cancer will be excluded from any further comparisons in this publication. The totality of other cancers will be referred to as 'registrable 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.

Most common cancers

Among all persons, the combination of cancers of the colon and rectum (10,998 new cases), often referred to as bowel or colorectal cancer, is the most common registrable cancer in 1996 (Table 1). Colorectal, prostate (10,055), breast cancer (9,706), melanoma (7,761), and lung cancer (7,621) together account for 59% of all registrable cancers in 1996.

In males, the most common registrable cancers after prostate cancer are colorectal cancer (6,067 new cases diagnosed in 1996), lung cancer (5,228) and melanoma (4,313) (Table 1, Figure 1). These four cancers account for 60% of all registrable cancers in males.

In females, breast cancer (9,621) is the most common registrable cancer, followed by colorectal cancer (4,931), melanoma (3,448) and lung cancer (2,393) which in total account for 58% of all cancers in females.

The most common cancers causing death are lung (4,743), prostate (2,644) and colorectal (2,474) cancers in males, and breast (2,619), colorectal (2,132) and lung (2,021) cancers in females (Table 1). 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,

rather than by those less common cancers which occur earlier in life. Lung cancer is responsible for the highest number of person-years of life lost before 75 years of age (46,020 in 1996), followed by breast cancer (31,143) and colorectal cancer (30,903). Cancer of the brain and nervous system is responsible for the fourth-highest number of person-years of life lost (17,260). This contrasts with its ranking as the thirteenth most common cancer (1,300 new cases diagnosed in 1996). Further, the ratio of person-years of life lost to new cases for cancer of the brain and nervous system (13.3) is much higher than that for lung cancer (6.0), colorectal cancer (2.8) 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 47% of all cancers in this age group. In those aged 15–44, melanoma and breast cancer are the most common cancers, while breast, colorectal, melanoma, prostate and lung cancers are predominant in people aged over 45 years.

The ranking of the most frequently occurring cancers by age group (Figure 2) is based on the number of new cases, and for those cancers the number of deaths is also shown. However, some cancers that would be ranked in the top five cancers based on number of deaths (rather than new cases) are not presented in Figure 2. Cancers which have a substantial number of deaths in each age group that are not presented in Figure 2 are those of the other endocrine glands (16 deaths) and myeloid leukemia (15 deaths) in the 0–14 age group and cancer of the brain (165) in the 15–44 age group. In the age group 45–64, cancers of unknown primary site (477 deaths) and cancer of the brain and nervous system (360 deaths) are responsible for a substantial number of deaths. Cancers of unknown primary site (1,789 deaths) are also a significant cause of death in the 65 and over age group.

The mortality to incidence ratio (MIR) gives a rough indication of the survival rates for people diagnosed with cancer. Cancers affecting vital organs or systems tend to have a high MIR as few people survive from these cancers. Cancers of the liver, pancreas and oesophagus have MIRs of more than 0.9 while cancers of the brain and lung, and myeloid leukemia, have ratios of between 0.8 and 0.9. MIRs for some other important cancers are 0.42 (colorectal), 0.33 (cervix), 0.26 (prostate) and 0.27 (female breast cancer). Melanoma is one of the few common cancers with a consistently low MIR of approximately 0.12.

Table 1: Most frequently occurring cancers in Australia, 1996 [a] [b]

	New cases					Deaths				
Cancer site	Number	% of all new cancer cases	ASR (A)	ASR (W)	Lifetime risk[c]	Number	% of all cancer deaths	ASR (A)	ASR (W)	PYLL[c]
Males										
Prostate	10,055	23.5	117.4	79.1	1 in 10	2,644	13.8	33.0	18.5	6,228
Colorectal	6,067	14.2	69.2	49.5	1 in 17	2,474	12.9	28.8	19.7	17,788
Lung	5,228	12.2	60.1	41.9	1 in 19	4,743	24.7	55.0	37.2	31,038
Melanoma	4,313	10.1	48.0	37.3	1 in 25	580	3.0	6.7	4.7	6,955
Bladder	1,921	4.5	22.4	15.3	1 in 56	543	2.8	6.6	3.9	2,108
NHL	1,718	4.0	19.4	14.6	1 in 63	707	3.7	8.2	5.6	6,750
Unknown site	1,625	3.8	19.0	12.7	1 in 72	1,189	6.2	14.1	9.2	7,663
Kidney	1,209	2.8	13.7	10.2	1 in 84	460	2.4	5.4	3.7	3,583
Stomach	1,190	2.8	13.8	9.3	1 in 91	752	3.9	8.8	5.8	5,373
Lip	826	1.9	9.2	7.1	1 in 131	5	0.0	0.1	0.0	63
Females										
Breast	9,621	27.5	95.5	78.4	1 in 12	2,619	17.6	24.9	19.1	30,955
Colorectal	4,931	14.1	46.0	33.0	1 in 26	2,132	14.3	19.0	12.9	13,115
Melanoma	3,448	9.9	35.0	29.0	1 in 34	323	2.2	3.0	2.2	3,820
Lung	2,393	6.9	23.0	16.9	1 in 47	2,021	13.6	19.1	13.7	14,983
Unknown site	1,406	4.0	12.5	8.5	1 in 109	1,142	7.7	10.0	6.5	6,015
NHL	1,387	4.0	13.3	10.1	1 in 85	681	4.6	6.2	4.3	5,135
Uterus	1,316	3.8	12.9	10.2	1 in 83	273	1.8	2.5	1.7	1,468
Ovary	1,166	3.3	11.4	9.0	1 in 98	797	5.4	7.6	5.5	7,290
Cervix	923	2.6	9.4	7.8	1 in 130	301	2.0	2.9	2.2	4,253
Pancreas	801	2.3	7.2	4.6	1 in 201	822	5.5	7.2	4.5	3,413
Persons										
Colorectal	10,998	14.2	56.6	40.7	1 in 21	4,606	13.5	23.4	16.0	30,903
Prostate	10,055	12.9	52.2	36.3	1 in 21	2,644	7.8	13.1	7.5	6,228
Breast	9,706	12.5	50.0	40.4	1 in 23	2,640	7.7	13.5	10.1	31,143
Melanoma	7,761	10.0	40.6	32.7	1 in 29	903	2.6	4.6	3.4	10,775
Lung	7,621	9.8	39.6	28.4	1 in 28	6,764	19.8	35.0	24.4	46,020
NHL	3,105	4.0	16.1	12.3	1 in 73	1,388	4.1	7.1	4.9	11,885
Unknown site	3,031	3.9	15.4	10.4	1 in 87	2,331	6.8	11.8	7.7	13,678
Bladder	2,544	3.3	13.1	9.1	1 in 91	778	2.3	3.9	2.3	2,745
Kidney	2,000	2.6	10.4	7.9	1 in 109	793	2.3	4.1	2.8	5,788
Stomach	1,857	2.4	9.5	6.6	1 in 129	1,225	3.6	6.2	4.1	8,098

(a) Rates are expressed per 100,000 population and age-standardised to the Australian 1991 Population ASR (A) and to the World Standard Population ASR (W). The rates age-standardised to the two populations (World and Australia 1991) differ due to the age distributions of these populations. For example the World population gives more weight to younger age groups where there are fewer cancers, consequently the rate is lower compared with the Australian 1991 population. A greater weight is given to the older age groups in the Australian 1991 population where there are more cancers, consequently these rates tend to be higher.

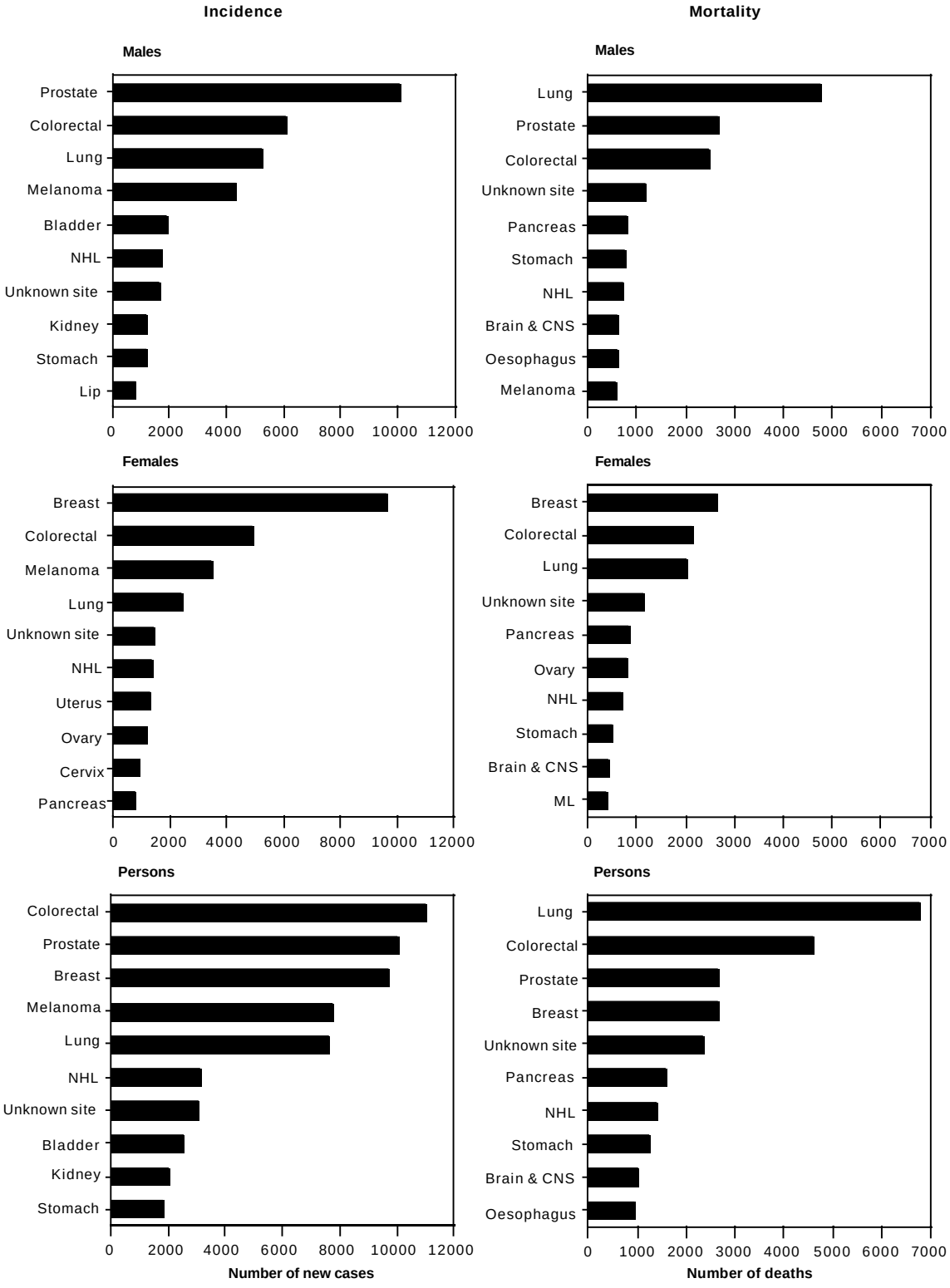
(b) Non-melanocytic skin cancer, known to be the most common cancer type, is excluded from this list, as it is not a registrable cancer.

(c) 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.

Note: NHL refers to non-Hodgkin's lymphoma.

Source: Cancer in Australia 1996, AIHW & AACR 1999.

Most frequently occurring cancers

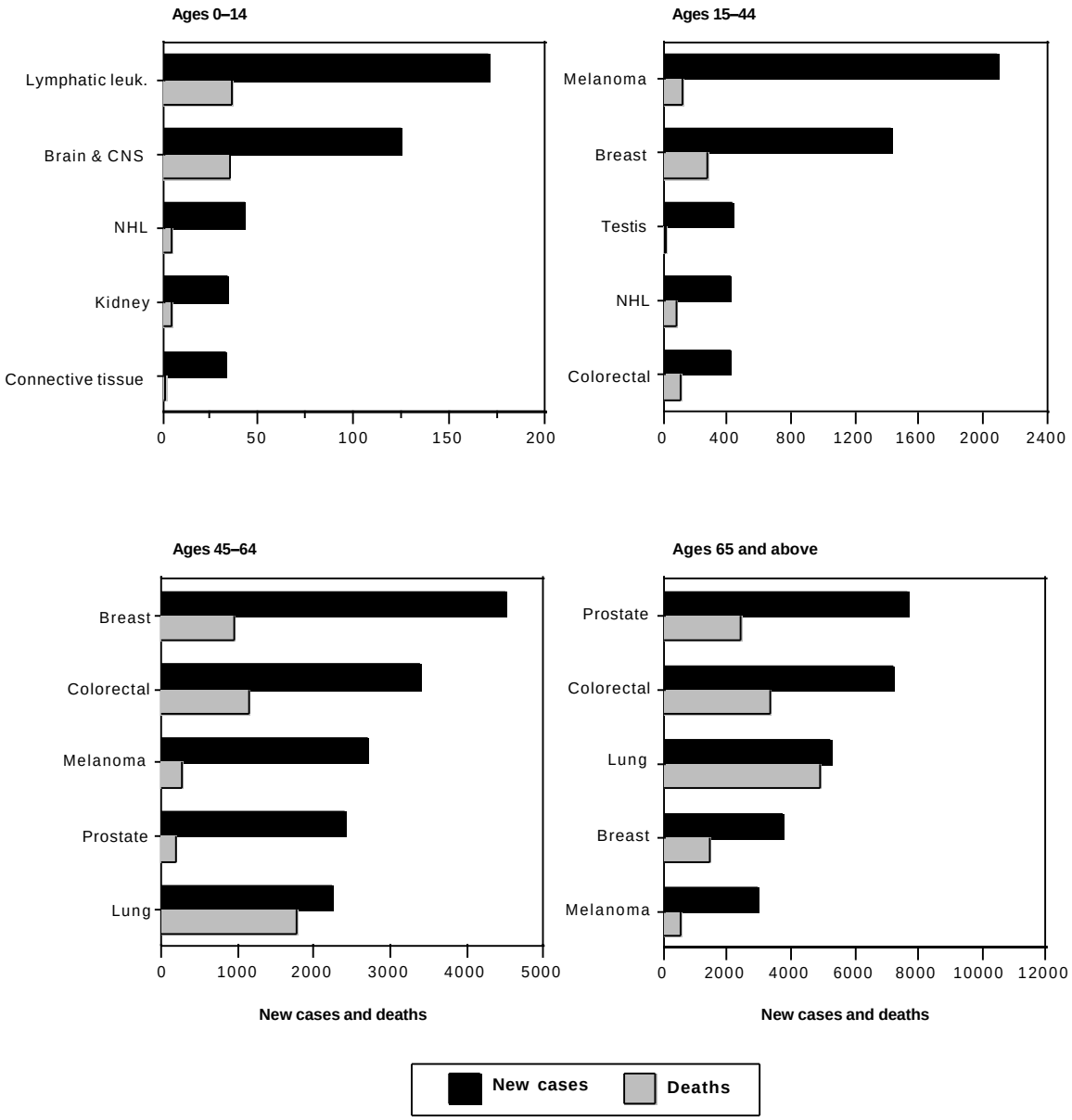


Note: NHL refers to non-Hodgkin's lymphoma, CNS refers to central nervous system, ML refers to myeloid leukemia.

Source: Cancer in Australia 1996, AIHW & AACR 1999.

Figure 1: Most frequently occurring cancers, Australia, 1996

Most frequently occurring cancers by age group



Notes

1. NHL refers to non-Hodgkin's lymphoma, CNS refers to central nervous system.
2. Each age group is graphed on a different scale.

Source: Cancer in Australia 1996, AIHW & AACR 1999.

Figure 2: Most frequently occurring cancers by age group, ranked by number of new cases (persons), Australia, 1996

Age and sex differences

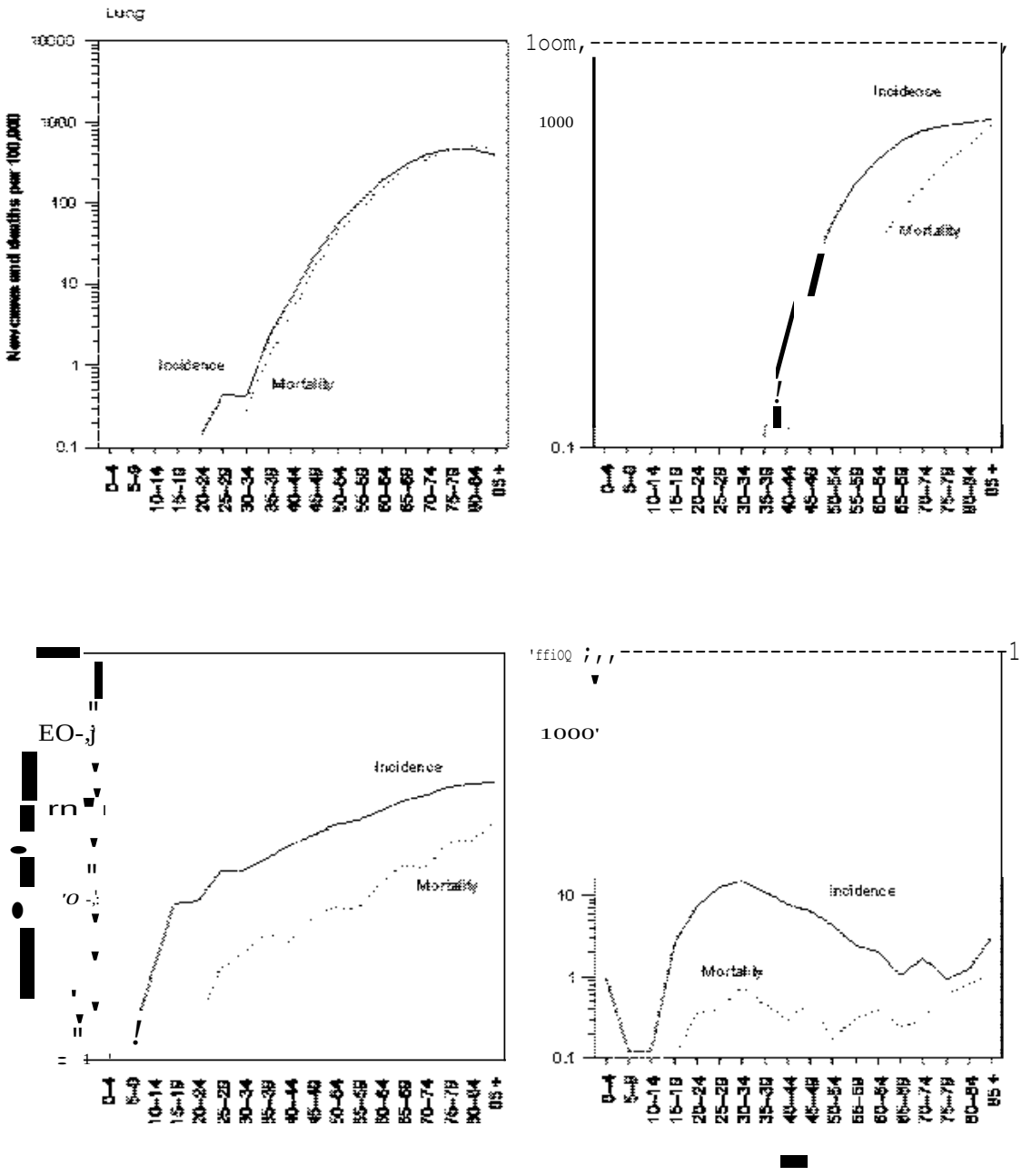
Cancer occurs more commonly in males than females. The age-standardised incidence rate in 1996 for all cancers (excluding non-melanocytic skin cancers) was 489.1 new cases per 100,000 for males and 338.8 per 100,000 for females, resulting in an age-adjusted sex ratio of 1.4. Males have a higher incidence rate for every cancer site, except for cancers of the breast, thyroid, gallbladder, peritoneum and parts of the nervous system.

The risk of cancer increases with age. The age-standardised incidence rate in 1996 for all cancers (excluding non-melanocytic skin cancers) was 16.1 per 100,000 for people aged less than 15 years; 97.5 per 100,000 for 15–44 year olds; 699.3 per 100,000 for 45–64 year olds; and 2149.6 per 100,000 for people aged 65 years and over.

Of people diagnosed with cancer, 0.8% of all cancers (excluding non-melanocytic skin cancers) occur in those aged less than 15 years, 10.5% in the 15–44 age group, 31.3% in the 45–64 age group, and 57.3% in those aged 65 and over. While the pattern of deaths across age groups is similar to that of incidence, a larger proportion (71.3%) of cancer deaths occurs in those aged 65 and over. Cervical and testicular cancers 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 75–79 before falling slightly in the oldest age groups. The age-specific incidence rates for melanoma of the skin, on the other hand, rise much more steadily across the whole age range. Some cancers, however, have their highest rates in early or middle life and remain fairly constant in the higher age groups (i.e. cancer of the cervix) or even decline with age (incidence of cancer of the testis).

Age-specific incidence and mortality rates-males



Note: Data for cancer of the testis have been averaged over 1992–1996 to provide more stable estimates.

Source: Cancer in Australia 1996. AIHW & AACR 1999.

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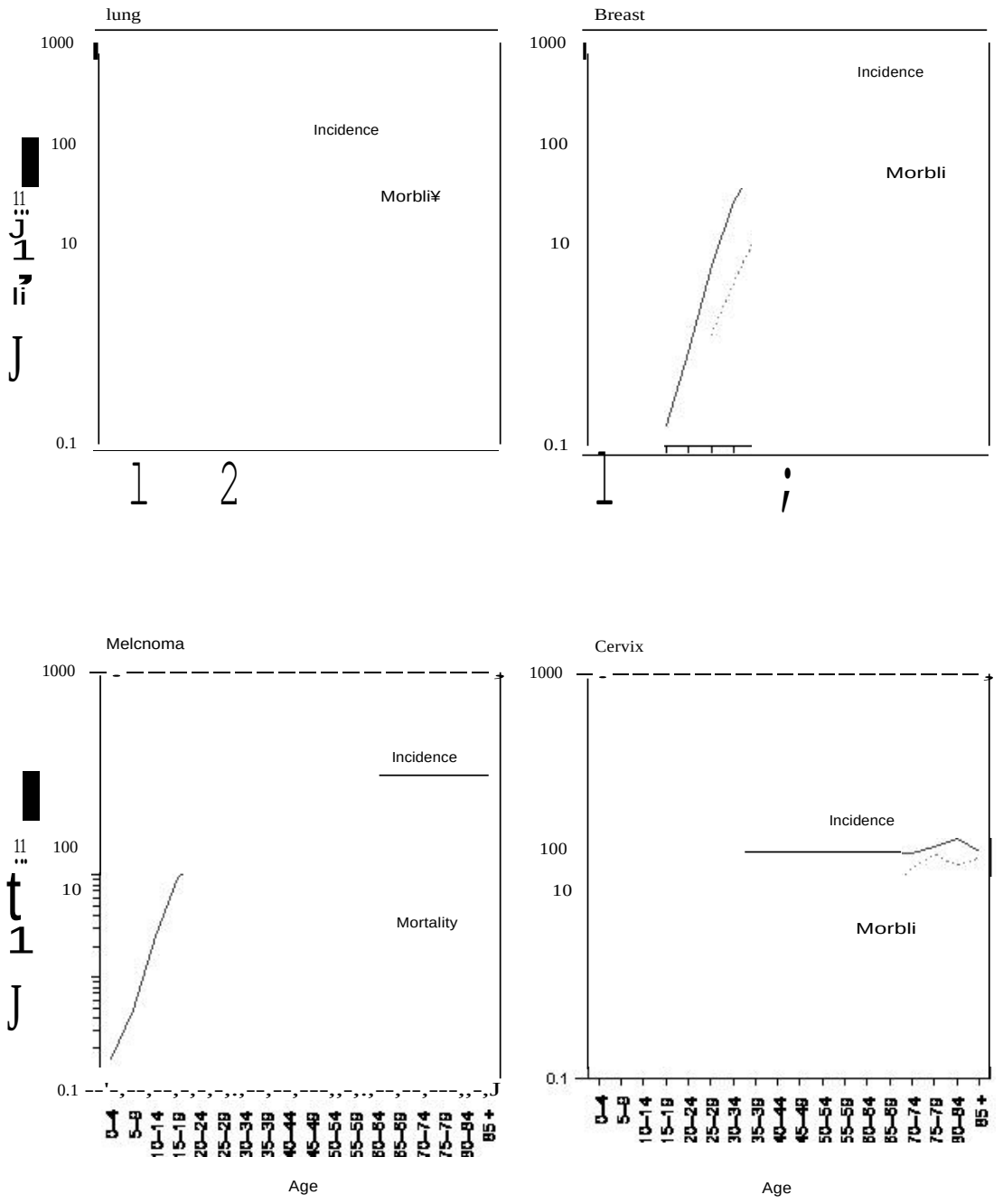
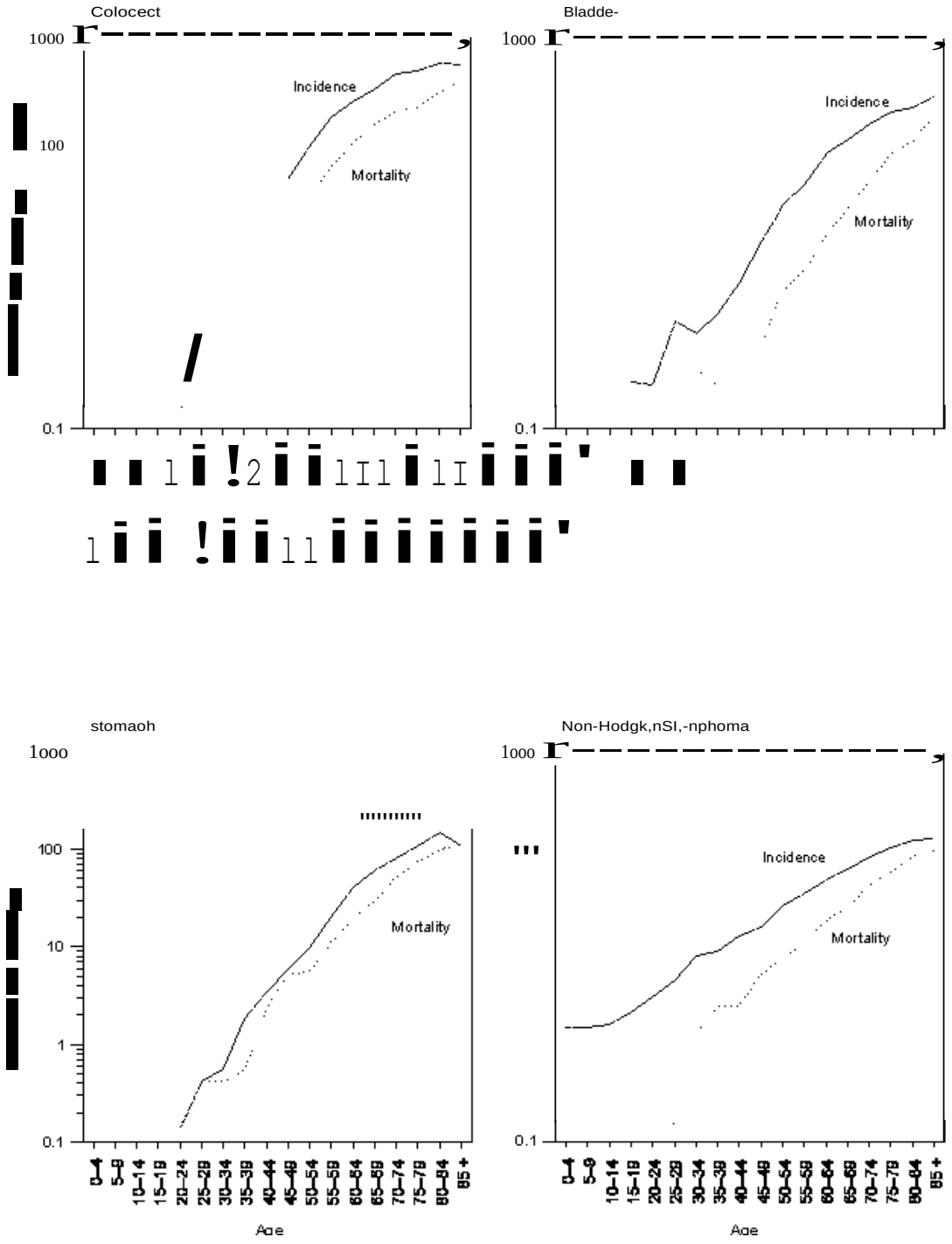
Age-specific incidence and mortality rates-females



Source: cancer in Austali-3 1996,AJHW& AA.CR 1999.

Figure 4:Age..specific incidence and mortality rate.s for melanoma and cancer.s of the lung, brea.st and cervix in female.s,Au.stralia,1996

Age-specific incidence and mortality rates-males



Sowc• *Cancwn Aus! /"* 1996, AIHW & MCR 1999

Figure 5: Age-..pecific incidence and mortality rate.s for colorectal cancer, cancer.s of the bladder and .stomach, and non-Hodgkin'.s lymphoma in male.s, Au.stralia, 1996

Age-specific incidence and mortality rates-females

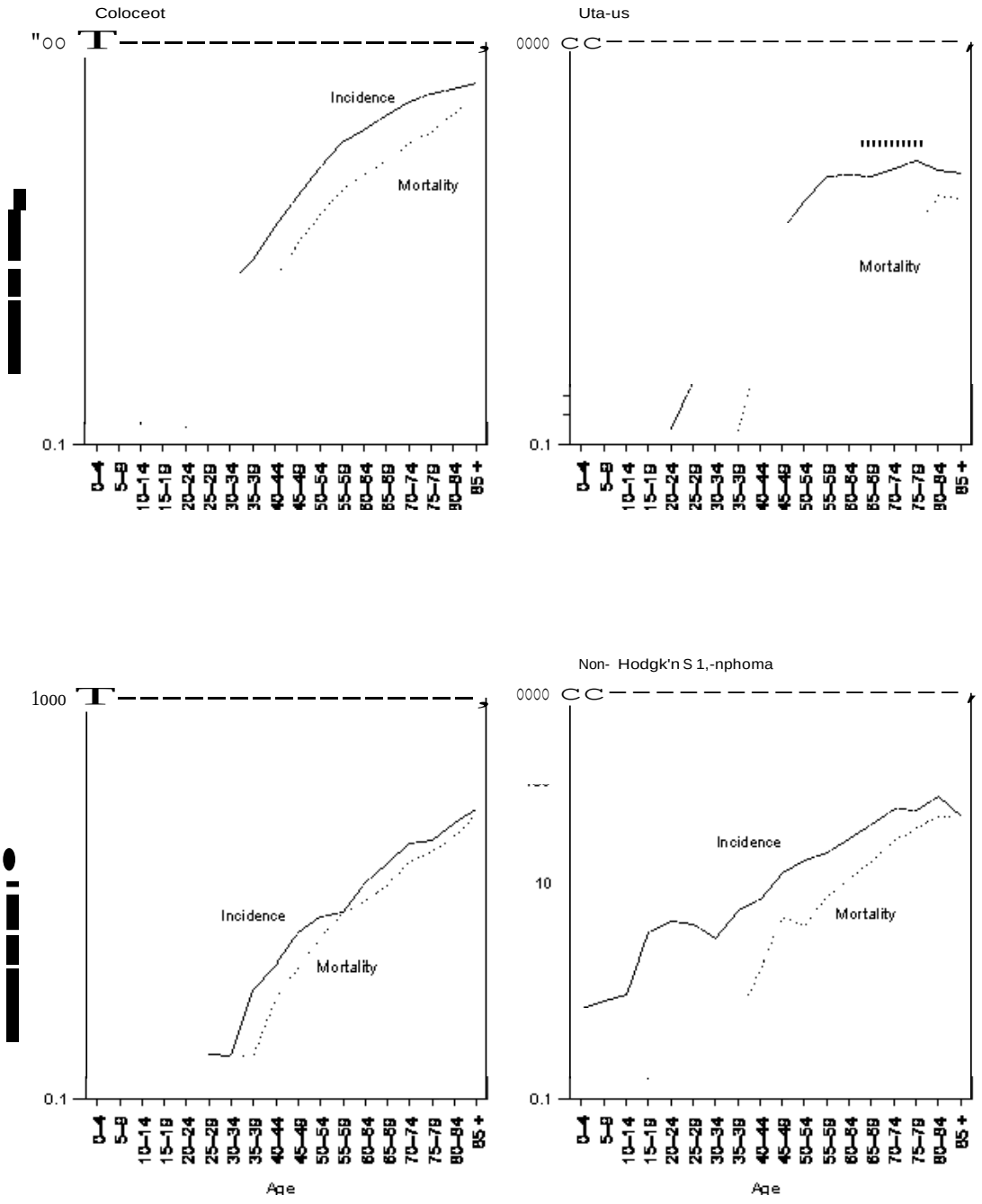


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Figure 6: Age-..pecific incidence and mortality rate.s for colorectal cancer, cancer.s *eA* the uteru.s and .stomach, and non-Hodgkin'.s lymphoma in female.s, Au.stralia, 1996

Alcohol- and smoking-related cancers

Alcohol and smoking are risk factors for some cancers. In 1996, alcohol-related cancers accounted for 0.8% of all new cancers, while smoking-related cancers accounted for 13.1%. Smoking-related cancers also accounted for a large proportion of deaths from cancer in 1996 (20.5% of all cancer deaths). These data and those in Tables 24–25 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 1996. 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 (excluding passive smoking) and alcohol are listed in Table 2.

Table 2: Cancer site and 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.

It is estimated that 657 new cases of cancer were directly attributable to hazardous and harmful alcohol consumption in 1996 at a rate of 3.4 per 100,000, as were 307 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 237 for males and 1 in 309 for females. Between 1990 and 1996, the incidence rate for alcohol-related cancers in males fell by an average of 1.1% per annum, while the rate in females increased by 2.9% per annum.

Smoking-related cancers account for 17.8% of all new cases of cancer in males and 7.3% of all new cases of cancer 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 polycyclic aromatic hydrocarbons (Table 2). Epidemiological evidence indicates that other cancers, including cancer of the upper digestive tract, bladder, renal pelvis (kidneys) and pancreas are also associated with cigarette smoking.

Cigarette smoking is estimated to have directly caused 10,148 new cases of cancer (52.9 new cases per 100,000) and 6,986 deaths (36.2 per 100,000) in 1996. Between 1990 and 1996, the male incidence rate for smoking-related cancers fell by an average of 1.2% per year, while the rate for females rose by 0.6% per year, both probably a reflection of the changing lung (Figure 14) and oesophagus cancer incidence rates. Over the same period, mortality rates fell by 1.2% per annum for males and rose by 0.8% per annum for females. These trends in incidence and mortality rates for smoking-related cancers are depicted in Figure 14.

To illustrate the improvement in the male mortality rate for smoking-related cancers, if the 1986 age-specific rates were applied to the 1996 male population there would be an additional 798 male deaths due to smoking in 1996. In contrast, the female mortality rate for smoking-related cancers is increasing. There would be 192 fewer female deaths in 1996 if the 1986 rates were applied to the 1996 female population.

Cancer rates in the States and Territories 1992–1996

Cancer incidence and mortality are reported here for the combined period 1992–1996 for all States and Territories.

Cancer incidence varies between States and Territories. Queensland reported the highest incidence rate for all cancers (excluding non-melanocytic skin cancers) among males (540.5 per 100,000), while the Northern Territory reported the lowest with 423.7 cases per 100,000. For females, Queensland reported the highest rate (362.3 per 100,000) and the Australian Capital Territory reported the lowest (316.8 per 100,000) (Figure 7, Table 6).

The order of States and Territories with the highest and lowest cancer incidence rate for males changes after exclusion of non-melanocytic skin cancer and melanoma. Tasmania reported the highest incidence rate for all cancers (excluding non-melanocytic skin cancers and melanoma) among males (499.7 per 100,000), while the Northern Territory reported the lowest with 390.9 cases per 100,000. The remaining States and Territories reported the following rates for males: Queensland 477.4 per 100,000, Western Australia 461.2 per 100,000, South Australia 460.3 per 100,000, Victoria 454.0 per 100,000, New South Wales 450.8 per 100,000 and the Australian Capital Territory 442.9 per 100,000. For females, Queensland reported the highest rate (316.7 per 100,000) and the Australian Capital Territory reported the lowest (288.4 per 100,000). The remaining States and Territories reported the following rates for females: Tasmania 312.1 per 100,000, Victoria 309,3 per 100,000, the Northern Territory 301.4 per 100,000, South Australia 301.4 per 100,000, Western Australia 299.1 per 100,000 and New South Wales 297.5 per 100,000.

The cancer mortality rates reported for males across the States and Territories range from 226.7 per 100,000 in New South Wales to 253.1 per 100,000 in the Australian Capital

Territory and 254.1 per 100,000 in the Northern Territory (Table 6). For females, the mortality rates vary from 132.5 per 100,000 in Queensland to 178.5 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 11). The incidence rate in Queensland has been consistently high since the early 1980s. The variation between the States and Territories mortality rates is smaller than the variation in incidence rates (Table 11).

Lung cancer incidence rates are highest in the Northern Territory (for males 85.5 cases per 100,000, for females 41.8 per 100,000) (Table 10). The lowest lung cancer incidence rates are reported for males in the Australian Capital Territory (46.4 per 100,000) and for females in South Australia (21.0 per 100,000).

State and Territory variations in smoking-related cancers generally reflect those observed for lung cancer (Table 25). The Northern Territory reported the highest incidence rates for males and females (109.8 per 100,000 and 42.1 per 100,000 respectively). The Australian Capital Territory reported the lowest smoking-related cancer incidence rates for males (69.5 per 100,000) and South Australia had the lowest rate for females (22.4 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 time lag 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 1997a) 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%.

Western Australia reported the highest incidence rates for breast cancer in females (98.2 per 100,000), while the Northern Territory reported the lowest incidence rate (65.2 per 100,000) (Table 12). Tasmania, Western Australia and the Australian Capital Territory reported high rates of prostate cancer (156.7 per 100,000, 150.5 per 100,000 and 149.0 per 100,000 respectively) while significantly lower rates were reported in the Northern Territory (74.7 per 100,000) (Table 16), a rate influenced by the low Indigenous population incidence rates (d'Espaignet et al. 1996). These interstate variations in prostate cancer incidence might also be explained by differences in the time and rate of uptake of prostate specific antigen (PSA) testing in the States and Territories (Smith et al. 1998; Threlfall et al. 1998).

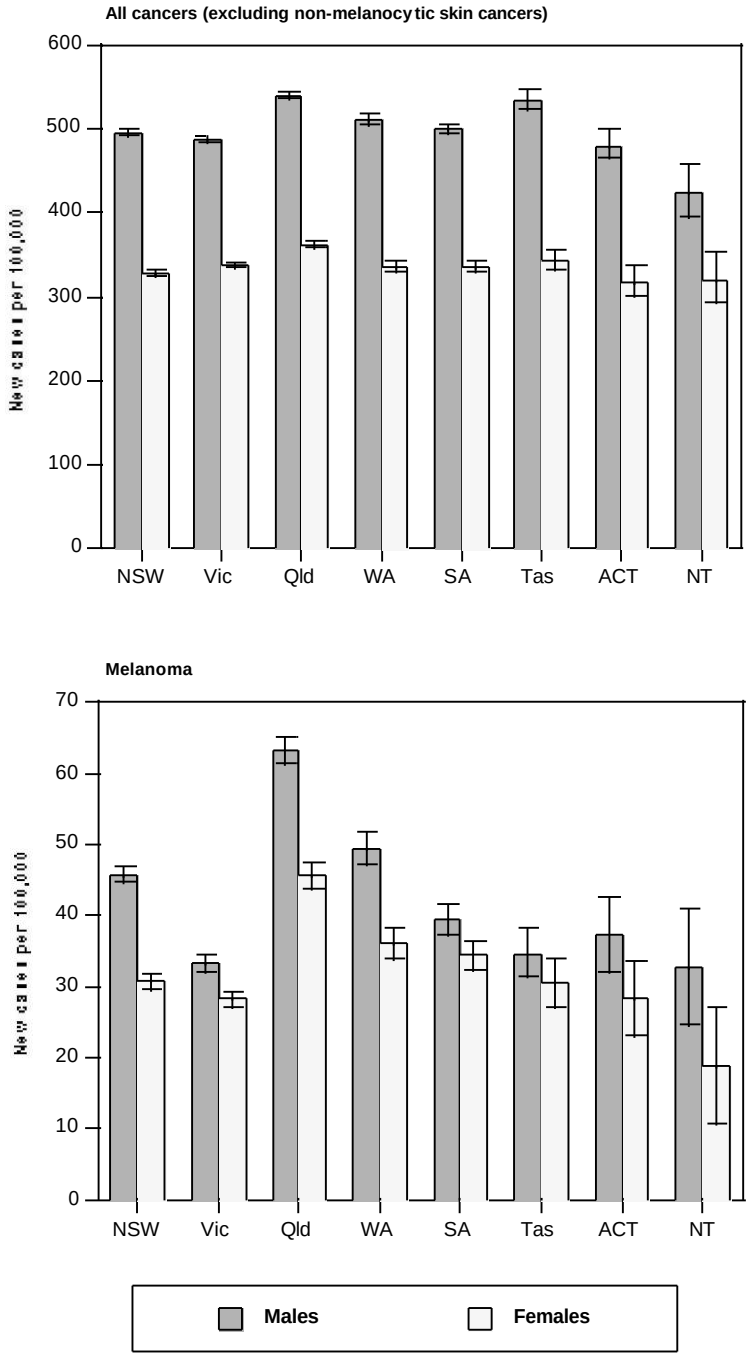
There were differences in cervical cancer incidence between the States and Territories. This probably reflects in part the relative impact of the screening programs in each jurisdiction. Most of the large States show consistent rates of approximately 11 new cases per 100,000, however South Australia shows a substantially lower rate of 7.8 and the Australian Capital Territory 9.0 per 100,000. The Northern Territory, while having relatively small numbers of new cases has a very high incidence rate of 21.8 per 100,000. A major contributor to this incidence rate is the high rate of cervical cancer amongst the Indigenous population, which d'Espaignet et al. (1996) indicated was up to three times the non-Indigenous population rate. This situation is also reflected in a high mortality rate (13.3 deaths per 100,000) and mortality incidence ratio (0.6) compared with a national average of 0.3. This high ratio is an indicator of late stage detection of these cancers.

While 1996 incidence data are the latest national data, some States and Territories have released data for 1997—Tasmania and the Northern Territory—and data for 1998—Western Australia and South Australia. These four jurisdictions account for approximately 19% of new cancer cases. A combination of the 1997 and 1998 incidence rates for these jurisdictions compared with their 1996 combined rates for the most common cancers, show some changes which may be early indicators for the larger states of New South Wales, Victoria and Queensland. The male incidence rate for all cancers continued to decline, driven mainly by the prostate rate, but colorectal cancer, lung cancer and melanoma also registered declining rates. The female trend is less clear with only breast cancer showing a consistent increase in rates. The decline in male melanoma incidence rates is at odds with the current national increase in melanoma, although this may be explained by the increases in the national rate being driven predominantly by Queensland, which is excluded from this comparison. Most other cancers showed some minor fluctuations but were within expectations.

Differences in State and Territory cancer incidence rates may 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 18), 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 6 to 25 in this publication are annual averages of the 5-year period 1992–1996. 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 pages 74 and 75 for contact details).

All cancers and melanoma incidence rates by sex and by State and Territory



Source: Cancer in Australia 1996, AIHW & AACR 1999.

Figure 7: Age-standardised incidence rates (95% confidence intervals) for all cancers (excluding non-melanocytic skin cancers) and for melanoma by State and Territory, 1992–1996

International comparisons

Cancer incidence and mortality patterns vary internationally. This variation may be the result of variations in risk factor exposure (e.g. smoking, diet, UV radiation), in genetic susceptibility, in detection and treatment of cancer or in the level of cancer registration.

Australia is one of the few countries in which cancer registration occurs on a national basis. Many countries either have State/Province, regional or hospital based cancer registries to record cancer incidence, although most countries have national mortality collections. Data have been presented in Figures 8–11 for a selection of common cancers—lung, colorectal, stomach, prostate, bladder, breast and cervix—and for a selection of countries who have similar economic development to that of Australia. In order to gain some data consistency between these countries internationally standardised data sources have been used, however they are not as up to date as the latest Australian data. The 1988–1992 international incidence data is sourced from the publication *Cancer Incidence in Five Continents VII* (IARC 1997) and the 1992 mortality data is sourced from the World Health Organization publication *World Health Statistics 1995* (WHO 1996) and *World Health Statistics* 1996 (WHO 1998). Figures 8–11 present Australian incidence and mortality rates for both 1992 and 1996 to show a direct comparison between rates at a similar time and for the latest available data.

Australia's incidence rate for the aggregation of all cancers in both males and females is similar to that of a number of countries (e.g. Canada, United States) however is slightly higher than that for countries such as England & Wales and Japan. The spread of international cancer incidence rates for the countries selected is nearly twofold, but when other countries are considered (not reported here) the spread is up to fourfold.

Differences between countries are more noticeable when individual cancer sites are examined. Incidence and mortality rates for melanoma in Australia are at very high levels matched only by New Zealand, although consistent incidence and mortality data for this cancer are not available from all countries and a graph is not presented here. However a comparison between Australia and England & Wales shows a tenfold difference in incidence, but it is known that this ranges up to 150-fold compared with other countries. The international spread of mortality rates is more narrow as melanoma has a relatively high survival rate.

In comparing Australia's incidence and mortality rates for other cancers with those of the selected group of countries it was found that:

- Australian males have relatively low rates of lung cancer incidence and mortality, however Australian females show a slightly higher ranking compared with other developed countries;
- Colorectal incidence and mortality rates for both males and females are ranked amongst the countries with the highest rates;
- Australian males and females have low rates of stomach cancer;
- Prostate cancer incidence rates are similar to those of the United States and Canada but at a level significantly higher than the European countries in the group. Mortality rates are similar across the group;
- Breast and cervical cancer incidence and mortality rates are similar to those of other countries; and
- Bladder cancer has a wide international distribution, some of which is due to variations in diagnosis and coding issues, and some may be related to real variation. The patterns

shown in Figure 10 indicate a very high rate in Italy and the United States, but a moderate level in Australia.

The 1992 and 1996 incidence and mortality rates in the Figures 8–11 indicate that Australia's incidence and mortality rates in many instances have not shifted significantly in the intervening period. An assessment of Australia's 1996 incidence and mortality rates with 1996 rates for other specific countries where available (not shown here) indicate that the general patterns indicated above remain in place.

Cancer in New Zealand

A first for the *Cancer in Australia* series of reports is a special feature on one of the Australasian Association of Cancer Registries members, New Zealand. One of Australia's closest neighbours, New Zealand, shares a similar heritage to Australia and a similar level of economic development. The New Zealand population at 3.6 million is slightly larger than that of Queensland (3.2 million) and slightly smaller than that of Victoria (4.5 million). New Zealand serves as a good comparison for Australia in cancer patterns, as the two countries share similar patterns of cancer risk factors, e.g. diet, smoking patterns and UV exposure and also shares some similarities in their cancer control programs, e.g. cervical and breast cancer screening. Both countries have a sizeable indigenous population which exhibit lower life expectancies relative to the rest of the population. New Zealand Maoris comprise approximately 14.5% of total population and Australia's Aboriginals and Torres Strait Islanders comprise approximately 2%.

The New Zealand Health Information Service has supplied 1995 incidence and 1996 mortality data (Table 3) which enables a direct comparison of recent rates for cancers between Australia and New Zealand. These rates have been standardised to the World Standard Population. Tables 3, 4 and 5 have been used for purposes of comparing the two countries'cancer patterns.

New Zealand has approximately 16,000 new cancers diagnosed each year and 7,500 deaths occur as a result of cancer. The most frequently occurring cancers in Australia and New Zealand are very similar with prostate, colorectal and lung cancers in males and breast, colorectal and melanoma in females being the dominant cancers. The other common cancers are ranked similarly between the two countries, although the policy for reporting a combination of all leukaemias (New Zealand) and unknown primary (Australia) in the dominant cancers makes for some minor variations in the rankings (Table 1 and 3).

In comparing the age-standardised incidence rates for all cancers (excluding non-melanocytic skin cancer) it is apparent that there is some variation at this aggregate level. New Zealand males (377.0 new cases per 100,000) and females (295.0) have rates approximately 10% higher than that of Australian males and females. Mortality rates in males also show approximately the same variation. In females however, mortality rates in New Zealand (125.0 deaths per 100,000) are nearly 30% higher than those of Australian females (96.8). This difference in female mortality rates appears to be spread across a range of cancers, some of which are described below.

Breast cancer incidence rates are similar in both Australian (78.4 new cases per 100,000) and New Zealand females (80.8). However there is a substantial difference in mortality rates (New Zealand 25.5, Australia 19.0 deaths per 100,000). The breast screening program in Australia has been operating since approximately 1990 and may have had some impact on mortality rates. The New Zealand breast screening program only commenced in 1999 and benefits from this program may not be seen for some time.

A comparison of prostate cancer incidence in males, shows that New Zealand (103.2 new cases per 100,000) and Australia (96.7) have similar rates for 1995, however due to the rapidly changing use of PSA testing, Australia's rate in 1996 has fallen to 79.1.

There are some differences in the patterns of colorectal cancer between the two countries. Males in New Zealand (53.2 new cases per 100,000) show a slight elevation above their Australian counterparts (49.5), however there is a more substantial difference between the females (New Zealand 43.9 and Australia 33.0). These differences between the countries are carried over to the mortality from colorectal cancer.

Both Australians and New Zealanders are known for their outdoor lifestyle, which places both populations at risk of melanoma and non-melanocytic skin cancers from the increased UV radiation exposure. This is reflected in high incidence rates of melanoma in both countries on an international basis. Of note in assessing the melanoma incidence rates, is the relatively small difference between males and females in New Zealand, a sex ratio of 1.05, compared with a ratio of 1.4 for Australia. Australia had approximately the same sex ratio as New Zealand in the early 1980s, however there has since been a significant divergence in rates.

Lung cancer incidence in New Zealand and Australian males is similar (42 new cases per 100,000), however the incidence and mortality rates in New Zealand females are approximately 25% higher than in Australian females.

There appears to be substantial differences in the reported cancer incidence and mortality rates between New Zealand and Australia for some of the most common cancers. These differences would suggest some differences in the impact of particular risk factors, and in relation to mortality, a difference in the stage at detection and treatment. Investigation of these differences will be pursued further in later reports in this series.

Table 3: Most frequently occurring cancers in New Zealand [a] [b]

	New cases 1995				Deaths 1996			
Cancer site	Number	% of all new cancer cases	ASR (W)	Lifetime risk[c]	Number	% of all cancer deaths	ASR (W)	PYLL[c]
Males								
Prostate	2,481	29.1	103.2	1 in 8	502	13.0	18.4	1,258
Colorectal	1,202	14.1	53.2	1 in 16	587	15.2	25.0	4,473
Lung	967	11.3	42.2	1 in 19	904	23.3	38.0	6,290
Melanoma	879	10.3	41.1	1 in 22	107	2.8	4.7	1,403
Bladder	366	4.3	15.8	1 in 53	111	2.9	4.3	433
NHL	276	3.2	12.9	1 in 69	145	3.7	6.2	1,453
Leukaemia	253	3.0	12.2	1 in 89	141	3.6	6.2	2,143
Stomach	232	2.7	10.0	1 in 87	176	4.5	7.4	1,613
Kidney	185	2.2	8.6	1 in 98	89	2.3	3.8	753
Oesophagus	143	1.7	6.3	1 in 123	124	3.2	5.2	790
Females								
Breast	1,865	25.3	80.8	1 in 12	681	19.0	25.5	8,240
Colorectal	1,201	16.4	43.9	1 in 20	546	15.2	18.2	3,640
Melanoma	880	12.0	39.1	1 in 25	87	2.4	3.3	1,173
Lung	535	7.3	20.7	1 in 37	502	14.0	18.2	3,613
Ovary	291	4.0	12.4	1 in 75	179	5.0	6.9	1,855
Cervix	232	3.2	10.6	1 in 94	82	2.3	3.4	1,508
NHL	231	3.2	9.6	1 in 92	141	3.9	4.9	1,260
Uterus	224	3.1	9.6	1 in 82	58	1.6	1.9	445
Leukaemia	177	2.4	7.1	1 in 151	114	3.2	4.1	1,523
Pancreas	160	2.2	5.3	1 in 158	167	4.7	5.4	890
Persons								
Prostate	2,481	15.6	46.3	1 in 17	502	6.7	7.4	1,258
Colorectal	2,403	15.1	48.2	1 in 18	1,133	15.2	21.2	8,113
Breast	1,865	11.8	41.4	1 in 23	681	9.1	13.5	8,240
Melanoma	1,759	11.1	39.7	1 in 24	194	2.6	3.9	2,575
Lung	1,502	9.5	30.5	1 in 25	1,406	18.8	27.0	9,903
NHL	507	3.2	11.1	1 in 79	286	3.8	5.5	2,713
Bladder	506	3.2	7.2	1 in 110	186	2.5	1.9	433
Leukaemia	430	2.7	9.5	1 in 113	255	3.4	5.0	3,665
Stomach	367	2.3	4.6	1 in 181	297	4.0	3.3	1,613
Kidney	306	1.9	4.4	1 in 201	149	2.0	1.7	753

(a) Rates are expressed per 100,000 population and age-standardised to the Australian 1991 Population ASR (A) and to the World Standard Population ASR (W).

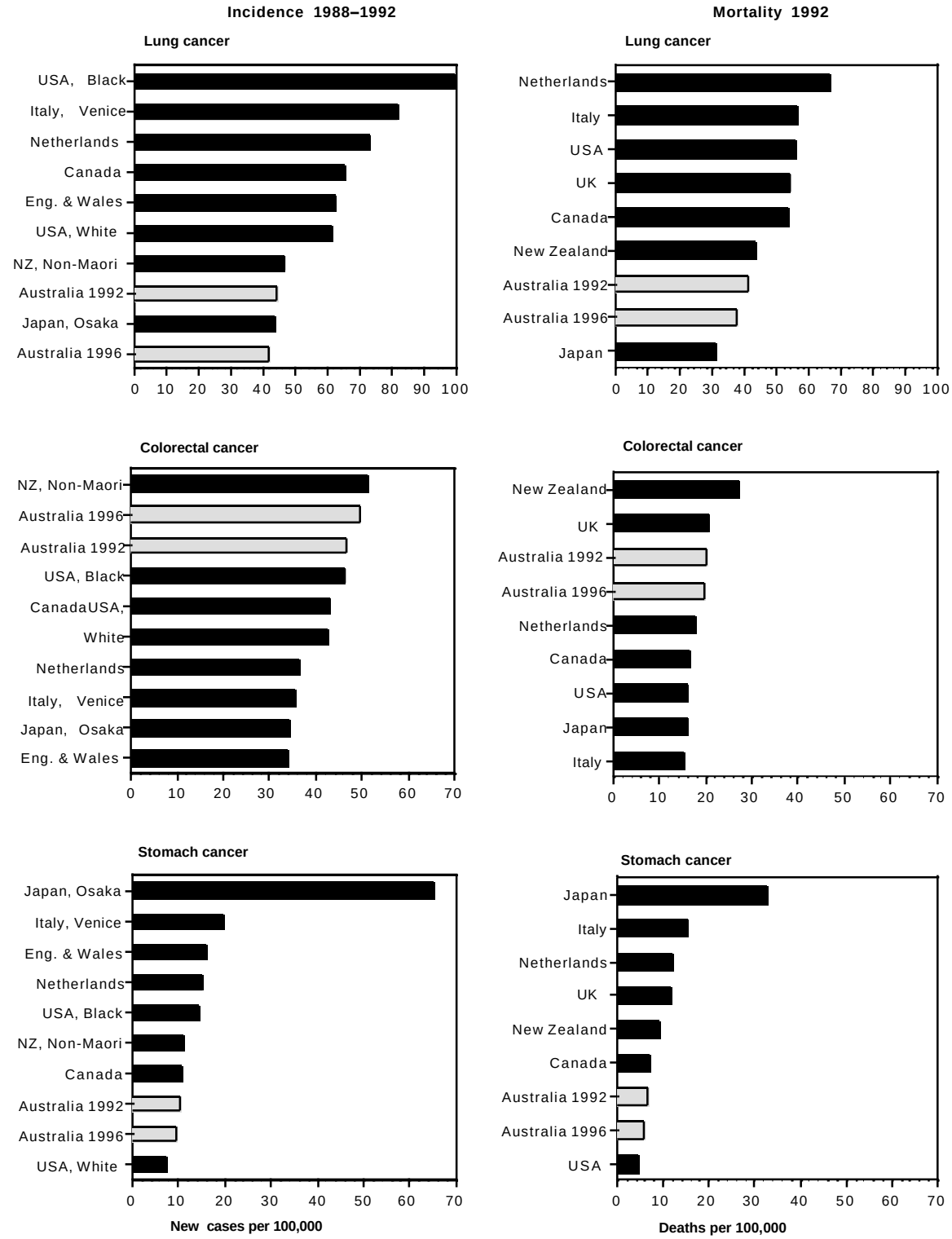
(b) Non-melanocytic skin cancer, known to be the most common cancer type, is excluded from this list, as it is not a registrable cancer.

(c) 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.

Note: NHL refers to non-Hodgkin's lymphoma.

Source: Cancer in Australia 1996, AIHW & AACR 1999.

International comparison of lung, colorectal and stomach cancer for males

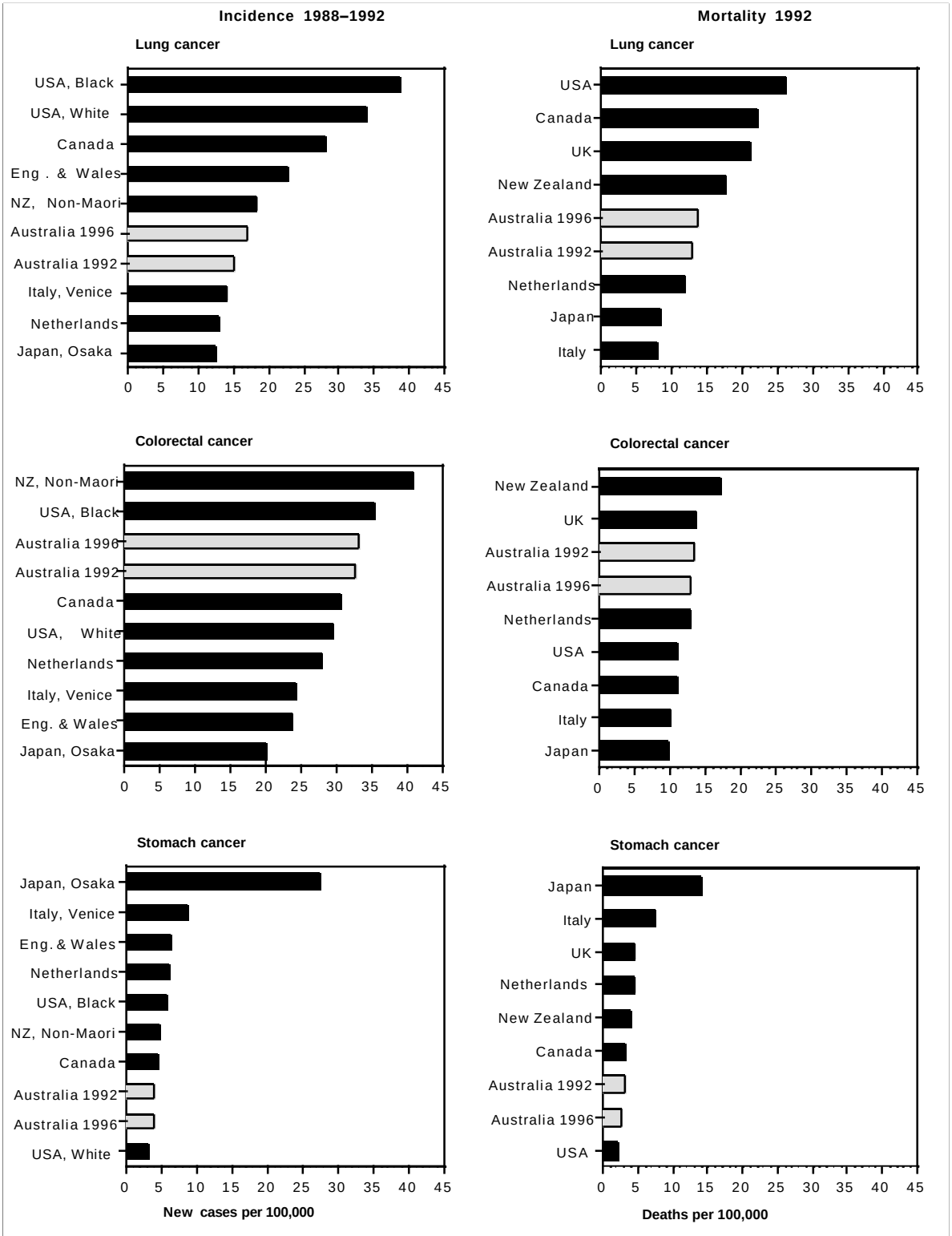


Note: Rates are age-standardised to the World Standard Population.

Source: Cancer in Australia 1996, AIHW & AACR 1999, *Cancer Incidence in Five Continents VII* (IARC 1997), *World Health Statistics* (WHO 1996 & 1998).

Figure 8: International comparison of age-standardised incidence and mortality rates for lung, stomach and colorectal cancer for males, Australia 1992 and 1996, and other selected countries, 1988–1992

International comparison of lung, stomach and colorectal cancer for females

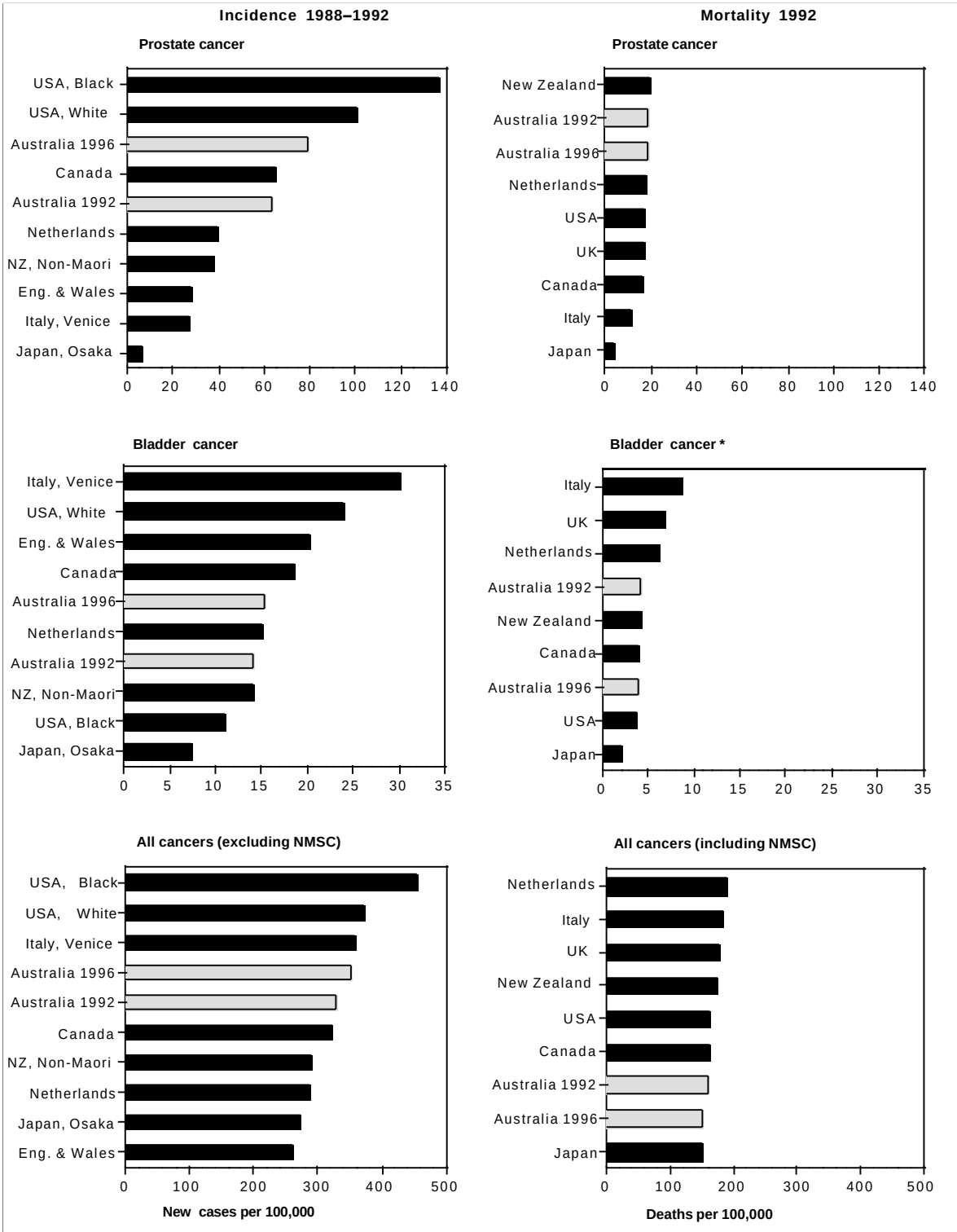


Note: Rates are age-standardised to the World Standard Population.

Source: Cancer in Australia 1996, AIHW & AACR 1999, *Cancer Incidence in Five Continents VII* (IARC 1997), *World Health Statistics* (WHO 1996 & 1998).

Figure 9: International comparison of age-standardised incidence and mortality rates for lung, stomach and colorectal cancer for females, Australia 1992 and 1996, and other selected countries, 1988–1992

International comparison of prostate, bladder and all cancers for males



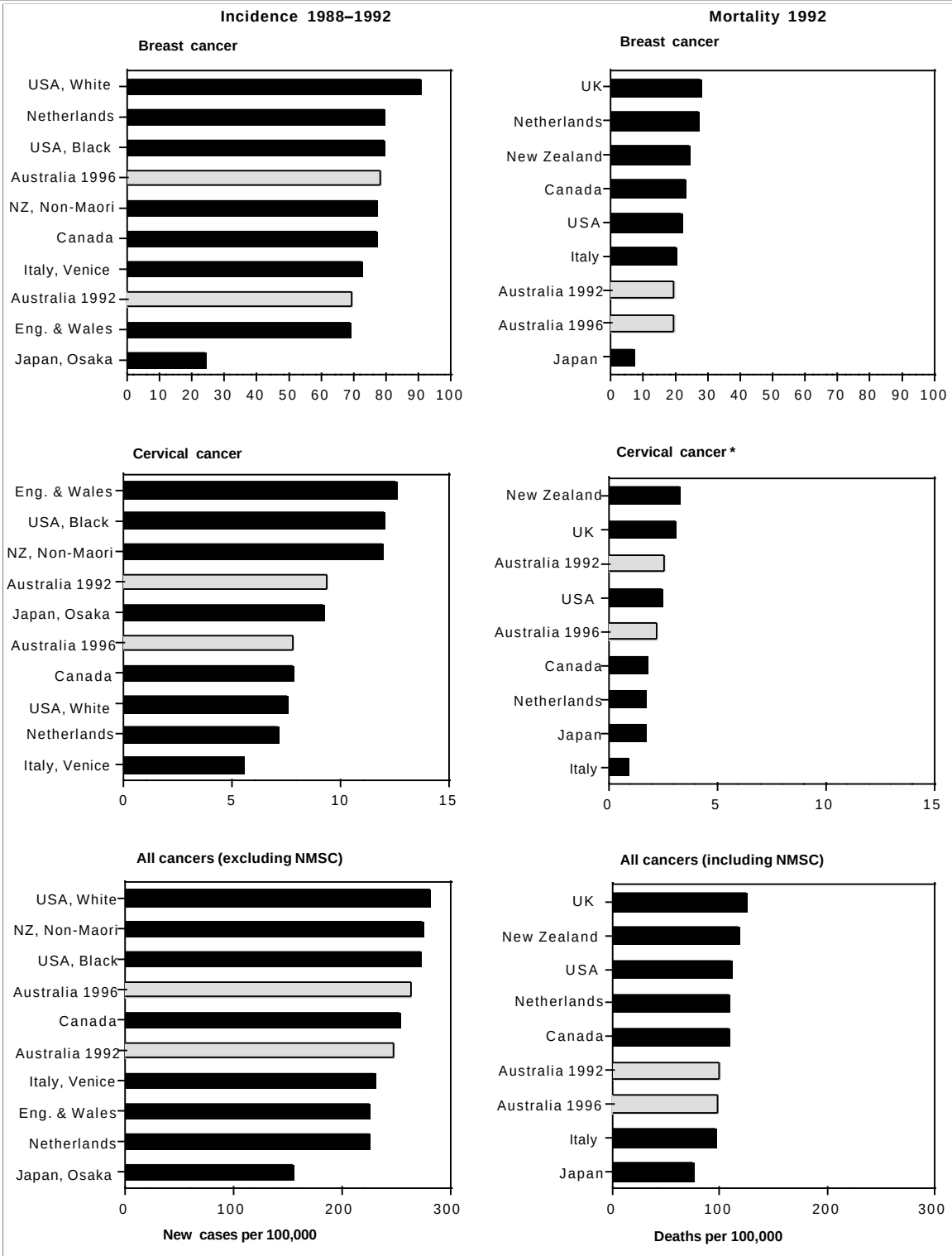
* International data varies between 1993 and 1995.

Note: Rates are age-standardised to the World Standard Population.

Source: Cancer in Australia 1996, AIHW & AACR 1999, *Cancer Incidence in Five Continents VII* (IARC 1997), *World Health Statistics* (WHO 1996 & 1998).

Figure 10: International comparison of age-standardised incidence and mortality rates for prostate, bladder and all cancers for males, Australia 1992 and 1996, and other selected countries, 1988–1992

International comparison of breast, cervix and all cancers for females



* International data varies between 1993 and 1995.

Note: Rates are age-standardised to the World Standard Population.

Source: Cancer in Australia 1996, AIHW & AACR 1999, *Cancer Incidence in Five Continents VII* (IARC 1997), *World Health Statistics* (WHO 1996 & 1998).

Figure 11: International comparison of age-standardised incidence and mortality rates for breast, cervix and all cancers for females, Australia 1992 and 1996, and other selected countries, 1988–1992