

Sex differentials in mortality in Australia, 1980-82 and 1998*

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Abstract

The gap in the expectation of life at birth of females and males in Australia reached at its maximum (7 years) in 1980-82. It has been declining since and was 5.7 years in 1998. This paper presents findings of the decomposition of the sex difference in the life expectancy at birth in terms of the age and causes of death in Australia. While the mortality rates for each five year age group declined between 1980-82 and 1998, it was the faster rate of mortality decline among males relative to females which contributed to the narrowing of the sex difference in overall mortality during this period. This was especially the case at ages 50 years and over. Among the causes of death: heart disease and respiratory diseases at ages 50 years and over contributed to the narrowing of the sex difference in the life expectancy at birth. On the other hand, sex difference in mortality due to cancer, pneumonia, diabetes mellitus, suicide and kidney related diseases increased owing to either a slower decline in the mortality of males relative to females or an increase in mortality of males with no corresponding increase in the mortality of females (for deaths due to suicide and diabetes mellitus) over time. Below the age of 50 years, reduction in sex difference in mortality occurred for deaths due to motor vehicle traffic accidents and heart disease. On the other hand, sex difference in mortality increased for deaths due to suicide and 'other' causes.

Introduction

In 1981, the World Health Organization, in collaboration with the United Nations, sponsored a meeting at the Australian National University, Canberra, entitled 'Sex differentials in mortality; trends, determinants and consequences' (Lopez and Ruzicka eds. 1983). This occurred at a time when, in the developed countries, women on average lived 6.5 years longer than men and the gap between the life expectancy at birth of females and males had reached at all time high. In the ensuing years, while the life expectancy at birth continued to improve, albeit differently for males and females, the gap between the longevity of the two sexes narrowed. The United Nations have placed this gap to be at 5 to 6 years for 2000-05 for countries such as Australia, New Zealand, Canada and the United Kingdom (United Nations, data on web site).

The determinants of the sex difference in mortality are complex and intertwined. They represent a combined contribution of biological and genetic factors on the one hand and a host of socio-cultural, behavioural and environmental factors on the other that influence health, mortality and the underlying causes of death of the two sexes differently. The individual contribution of these factors cannot be easily isolated.

This paper presents findings of the decomposition of the sex difference in the life expectancy at birth in terms of the age and causes of death categories in Australia. The

change in the causes of death by age and sex over the last two decades has given rise to the lowering of the sex difference in mortality. The two periods included in this study are 1980-82 and 1998, and are chosen because (1) they correspond to the highest (7 years) and the lowest (5.7 years) gap in the life expectancy at birth estimates between females and males since the 1950s, and (2) the classification of the causes of death for both time periods is based on the ICD-9. From 1999, deaths in Australia have been coded to the ICD-10.

Data and methods

The data used in this analysis are (1) the registered deaths in Australia during the two time periods 1980-82 and 1998 classified by age (0, 1-4, ..., 90-94, 95+), sex (males and females) and the underlying causes of death coded to the ICD-9, and (2) the population estimates for Australia at 30 June 1981 and 1998 in the same age and sex categories. For the first time period 1980-82, deaths for three years are averaged (to match the official life tables which were available for this period) and for the second period, 1998, deaths for one year only are used as this was the last year for which the causes of death were coded to the ICD-9 (the same classification as for deaths in 1980-82). The sex-age-cause-specific death rates are used in the calculation of the abridged life tables and the application of the decomposition technique. This technique, given by Pollard (1982, 1986 and 1989), disaggregates the difference in the life expectancy at birth of males (or females) at two points in time into the contribution made by the change in the age-cause-specific death rates that occurred over the time interval. In this paper this technique has been adapted for exploring the difference in the life expectancy at birth of females and males at one point in time. The details of the calculations are given in an ABS publication (3313.0,1994).

The grouping of the causes of death, their ICD codes (9th revision), and the percentage distribution of deaths by cause are given in Table 1. All deaths are classified into 11 categories of grouped causes of death. A residual category 'other' causes is added to make up the total. This category also includes causes related to infant deaths such as congenital anomalies, conditions originating in the perinatal period, and symptoms, signs and ill defined conditions. As can be seen, deaths in Australia have three major underlying causes - heart disease, malignant neoplasms (cancer) and cerebrovascular disease (stroke). Respiratory diseases (categories 4 and 7) account for the next level of the causes of death. Analysis of the cause-specific age standardised death rates is given later.

Table 1: Grouping of the causes of death into eleven categories, ICD - 9 codes, Australia

Category number	Description of diseases underlying the cause of death	ICD codes IXth revision	Deaths 1980-82		Deaths 1998	
			Males %	Females %	Males %	Females %
1	Heart disease	393-398, 402, 404, 410-416, 420-429	35.5	34.1	27.1	28.4
2	Malignant neoplasms (cancer)	140-208	22.4	20.8	29.2	24.9
3	Cerebrovascular disease (stroke)	430-438	9.2	16.6	7.2	11.9
4	Chronic obstructive pulmonary disease and allied conditions (including asthma, emphysema and bronchitis)	490-496	6.1	2.7	5.4	4.1
5	Motor vehicle traffic accidents	810-819	4.1	1.8	1.8	0.8
6	Other accidents	800-809, 820-949	2.9	1.9	2.9	1.9
7	Pneumonia	480-487	1.6	2.1	3.1	4.2
8	Diabetes mellitus	250	1.2	1.8	2.1	2.2
9	Suicide	950-959	2	0.9	3.2	0.9
10	Nephritis, nephrotic syndrome and nephrosis	580-589	0.7	1.1	1.2	1.5
11	Chronic liver disease and cirrhosis	571	1.5	0.7	1.1	0.5
	Other causes	Remainder of above	12.9	15.6	15.7	18.6
	All causes		100	100	100	100
	Total (n)		61503	49320	67073	60129

Source: ABS Deaths collections.

Life expectancy at birth in Australia and selected countries

Twentieth century witnessed a sustained but irregular decline in human mortality world-wide. Mortality decline in Australia is manifested in a continuous rise in the expectancy of life at birth. Over the century, the official life tables for the country for various time periods reveal an increase in average life span of 25 years for men and 27 years for women, rising from 51.1 years for men and 54.8 years for women in 1891-1900 to 76.6 years for men and 82.0 years for women in 1998-2000 (Table 2). More than half of these years (15 years for men and 16 years for women) were added prior to 1947 (1946-48 life tables), only a little addition (2 years for men and 4 years for women) occurred between 1947 and 1971 (1970-72 life tables), and a further 8 to 9 years were added between 1971 and 1999 (1998-00 life tables). The gain in the life expectancy at birth for females was higher than for males in the period prior to 1971 (20.6 years for males and 23.6 years for females between 1881-90 and 1970-72) but since 1970-72 the gain for males had exceeded that for females (8.7 years for males and 7.5 years for females between 1970-72 and 1998-2000).

Table 2: Life expectancy at birth, Australia, 1880-91 to 1998-00, and selected countries in 2000-05

	Period	Life expectancy at birth		Per year change		Female
		Males	Females	in life expectancy		excess
		Years	Years	Males	Females	Years
Australia	1881-1890	47.2	50.8	-	-	3.6
	1891-1900	51.1	54.8	0.39	0.39	3.7
	1901-1910	55.2	58.8	0.41	0.41	3.6
	1920-1922	59.2	63.3	0.26	0.30	4.2
	1932-1934	63.5	67.1	0.36	0.32	3.7
	1946-1948	66.1	70.6	0.19	0.25	4.6
	1953-1955	67.1	72.8	0.15	0.30	5.6
	1960-1962	67.9	74.2	0.16	0.20	6.3
	1965-1967	67.6	74.2	-0.04	0.00	6.5
	1970-1972	67.8	74.5	0.03	0.05	6.7
	1975-1977	69.6	76.6	0.25	0.30	7.0
	1980-1982	71.2	78.3	0.24	0.24	7.0
	1985-1987	72.7	79.2	0.22	0.13	6.5
	1990-1992	74.3	80.4	0.23	0.17	6.1
1995-1997	75.7	81.4	0.20	0.14	5.7	
1998-2000	76.6	82.0	0.29	0.22	5.5	
Canada	2000-2005	76.2	81.8	-	-	5.6
Japan	2000-2005	77.8	85.0	-	-	7.2
New Zealand	2000-2005	75.3	80.7	-	-	5.4
United Kingdom	2000-2005	75.7	80.7	-	-	5.0
United States of America	2000-2005	74.6	80.4	-	-	5.8

Source: For Australian data, *Australian Historical Population Statistics (ABS Cat. No. 3105.0.65.001)*, Other countries data, *United Nations Statistical Division, Web site, Social Indicators Home Page*.

The average annual gain in life expectancy at birth of males and females is an indication of the faster decline in female mortality than males until 1976 (except in the periods to 1906), and since then the male mortality rates have been declining faster. In terms of age, reductions in infant and child mortality (aged less than 5 years) contributed most to the gain in life expectancy at birth until 1947 for females and 1971 for males, and from then on reduction in mortality for persons aged 50 years and over has contributed largest and over time an increasing gain to the life expectancy at birth. The reduction in mortality up to around the 1960s has been largely attributed to general socioeconomic advances in terms of improvements in sanitation, health education, the quality of food and water supply and advances in medicine, and since 1971 to a combination of behavioural changes (such as decreased smoking, improved diet, and physical activity) and improved medical care through life saving devices. (ABS, 3302.0, 1997, pp 57-58).

Mortality rates among males have always been higher than for females in all time periods. However the differential rate of mortality decline for the two sexes caused the gap between female and male life expectancy at birth to be increasing in favour of females from 4 years in 1896 to a peak of 7 years in 1981 and then declining to 5 years in 1999. The current sex difference in the life expectancy at birth in Australia (5.5 years)

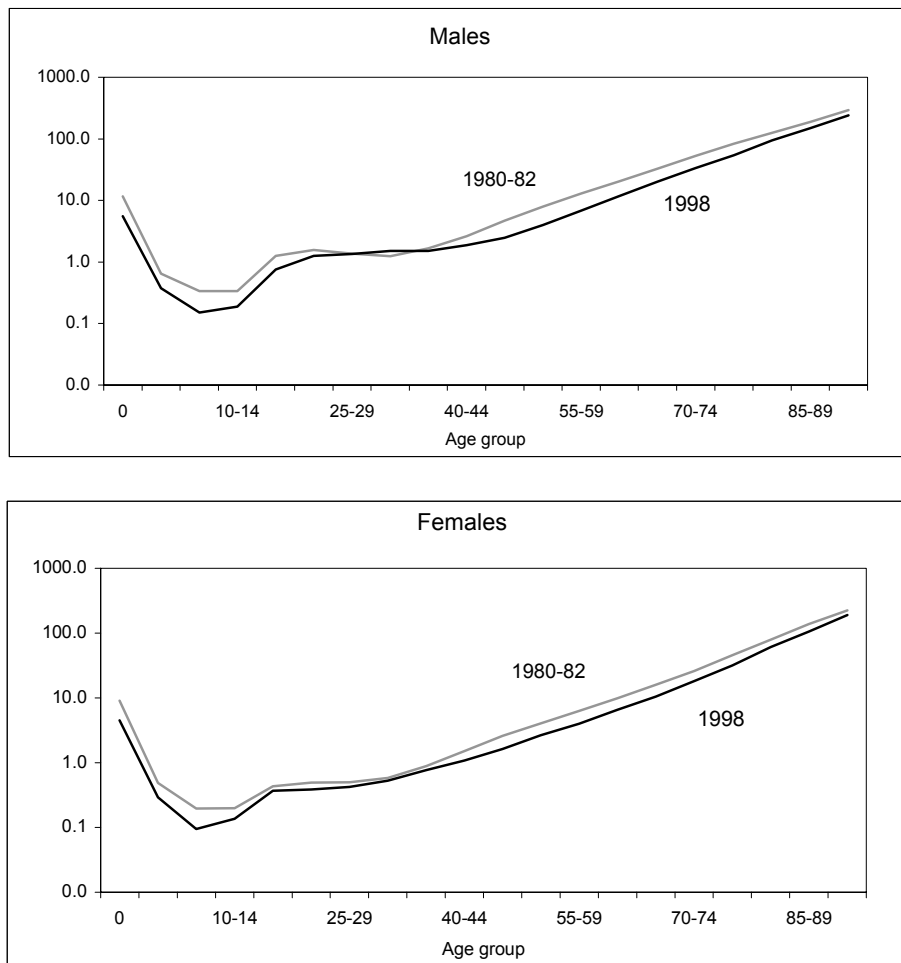
is similar to that estimated by the United Nations for the United Kingdom (5.0), New Zealand (5.4), Canada (5.6) and the United States of America (5.8) but is lower than that for Japan (7.2) for 2000-05.

Not shown in Table 2 is the sex difference in the life expectancy at age 50 years, which has mostly contributed to the sex difference in the life expectancy at birth. From 5.6 years in 1980-82, the sex difference in the life expectancy at age 50 years reduced to 4.3 years in 1998-2000. This, in itself is an indication that the sex difference in the expectation of life at birth in the post-1980 period has been mostly contributed by the sex difference in the death rates at ages 50 years and over.

Age-patterns of death rates

The age-pattern of death rates in Australia is an elongated J-shaped curve. It depicts very low infant death rate, low rates in the 1-14 years age groups, steep rising rates in the 15-24 years age groups, slightly falling rates in the 25-29 years age group, and then rising rates at ages 30 years and over. Over time, there has been a reduction in the age-specific death rates for both sexes, with very little or no reduction in the rates for males aged 25-39 years and a faster reduction in the death rates of males than females aged 40-44 years and over.

Figure 1 : Age-specific death rates, Australia



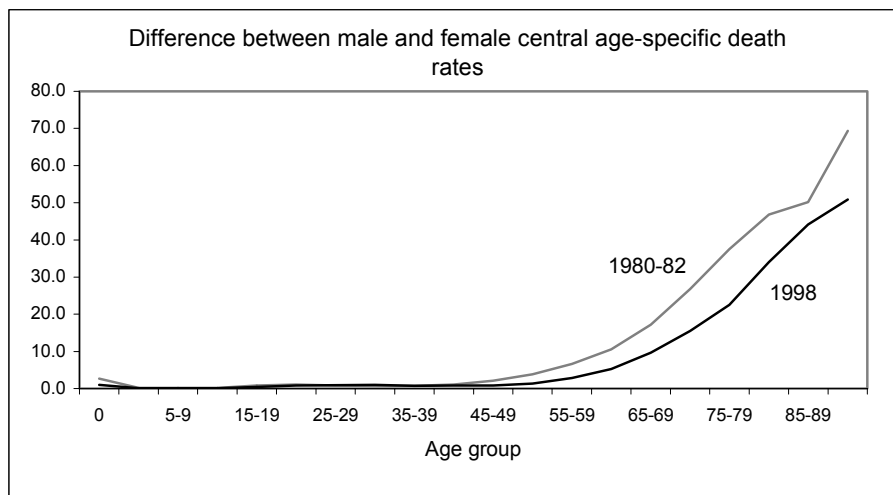
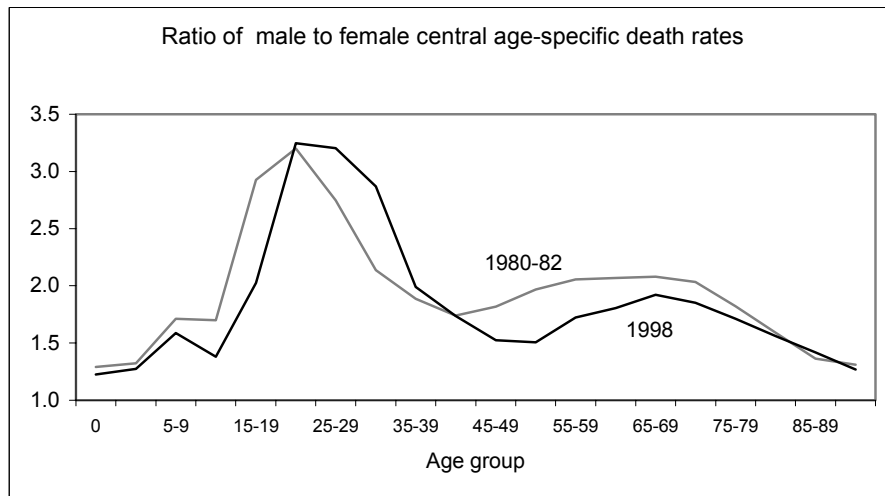
(a) Per 1,000 population
Y axis is the log scale.

Age-patterns of sex difference in death rates

Higher death rates of males than for females is reflected in the age-standardised death rate which was 77% higher for males in 1980-82 and 66% higher in 1998 than for females as well as in the *ratio* and the *difference* in the age-specific death rates of the two sexes at a point in time.

The excess death rate of males compared to females, measured by the *ratio*, occurs at each age group, with large excesses occurring at ages 20-39 years. The male death rate at age group 20-24 years is three times that of females, showing the highest ratio in death rates in any five-year age group in 1980-82 and 1998. Over time, the male-female ratio in the death rates narrowed at ages 0-19 years and at ages 45 years and over (Figure 2, panel 1).

Figure 2 : Age-pattern of sex differential in death rates, 1980-82 and 1998, Australia



Source : Central death rates of males and females are from Abridged life tables.

Measured by the *difference*, the sex difference in the death rates below the age of 50 years contributed little to the overall gap between the expectation of life at birth of females and males. The difference in the age-specific death rates rose with age and large differences occurred for ages 45-49 years and over. Between 1980-82 and 1998, while mortality rates for both sexes declined, the difference in the male and female death rates narrowed at all ages (but more so at ages 45-49 years and beyond). This was caused by a faster decline in the age-specific death rates of males relative to females during this period.

Cause-specific death rates

Heart disease, cancer and stroke have been the three leading causes of death in Australia, accounting for 68% of male deaths and 72% of female deaths in 1980-82. The corresponding figures were 63% and 65% for the two sexes respectively in 1998. Over time, the age standardised death rates declined more so for deaths due to heart disease and stroke and less for cancer (Table 3). The share of deaths due to cancer increased from 21-22% in 1980-82 to 29% in 1998. Respiratory diseases (asthma, emphysema and bronchitis) ranked fourth in the leading causes of death (accounting for 7% of male and 3% of female deaths in 1980-82 and 6% of male and 4% of female deaths in 1998).

Other leading causes of death (categories 5 to 11 in Table 3) account for a smaller proportion of deaths individually but in terms of the absolute number of deaths each of these categories tolls at least 1,000 deaths annually for the two sexes combined. In the overall decline between 1980-82 and 1998, the death rates increased due to pneumonia for both sexes, respiratory diseases (category 4) for females, and diabetes and suicide for males.

Table 3: Cause-specific death rate (a) Australia

Category number	Description of diseases underlying the cause of death	Death rates 1980-82		Death rates 1998	
		Males Rate	Females Rate	Males Rate	Females Rate
1	Heart disease	4.1	2.2	2.1	1.2
2	Malignant neoplasms (cancer)	2.4	1.4	2.2	1.3
3	Cerebrovascular disease (stroke)	1.2	1.0	0.6	0.5
4	Chronic obstructive pulmonary disease and allied conditions (including asthma, emphysema and bronchitis)	0.7	0.2	0.4	0.2
5	Motor vehicle traffic accidents	0.3	0.1	0.1	0.1
6	Other accidents	0.3	0.1	0.2	0.1
7	Pneumonia	0.2	0.1	0.2	0.2
8	Diabetes mellitus	0.1	0.1	0.2	0.1
9	Suicide	0.2	0.1	0.2	0.1
10	Nephritis, nephrotic syndrome and nephrosis	0.1	0.1	0.1	0.1
11	Chronic liver disease and cirrhosis	0.1	0.0	0.1	0.0
	Other causes	1.4	1.0	1.2	0.8
	All causes	11.3	6.4	7.6	4.6

(a) Age-standardised death rates per 1,000 population. Rates based on direct standardisation using total population at 30 June 1991 as standard.

The highest sex difference in terms of the *ratio* of the male to female cause-specific death rates in 1980-82 occurred for deaths due to respiratory diseases (category 4 in Table 3, a ratio of 4.3), followed by suicide (3.0) and motor vehicle traffic accidents (2.9). In 1998, the highest ratio was for deaths due to suicide (4.2), followed by chronic liver disease and cirrhosis (2.7) and motor vehicle traffic accidents (2.5). As mentioned before, none of these causes contribute significantly to the overall death rates during

each of the periods. Death rates of males due to heart disease and cancer have been almost twice the rates for females.

The *difference* in the death rates has been most for deaths due to heart disease (2 points per 1,000 population in 1980-82 and 0.9 points in 1998), followed by deaths due to cancer (1.1 points in 1980-82 and 0.9 in 1998), which together account for a large share of the sex difference in mortality (see below).

Median age at death

Deaths in Australia mostly occur at old ages. The median age at death in 1980-82 was 74.5 years for males and 81.5 years for females (Table 4). These median ages rose further to 79.6 years for males and 86.2 years for females in 1998. Hidden in these, is the variation in the median age which occurs for deaths due to specific causes. For both males and females, the highest median age was for deaths due to pneumonia (88.0 years for males and 89.9 years for females in 1998) and the lowest was for deaths due to the motor vehicle traffic accidents for males (37.6 years in 1998) and suicide for females (45.6 years in 1998). Between 1980-82 and 1998, the average age at death due to suicide decreased by 6 years for males and 5 years for females.

Table 4: Median age at death (a) Australia

Category number	Description of diseases underlying the cause of death	Deaths 1980-82		Deaths 1998	
		Males Years	Females Years	Males Years	Females Years
1	Heart disease	75.0	82.6	81.1	86.8
2	Malignant neoplasms (cancer)	71.9	73.8	75.6	76.9
3	Cerebrovascular disease (stroke)	78.8	84.1	83.4	87.2
4	Chronic obstructive pulmonary disease and allied conditions (including asthma, emphysema and bronchitis)	77.0	76.4	80.1	80.4
5	Motor vehicle traffic accidents	32.7	51.2	37.6	53.9
6	Other accidents	55.3	84.3	71.2	86.6
7	Pneumonia	82.6	88.0	86.4	89.9
8	Diabetes mellitus	75.3	80.3	78.4	82.1
9	Suicide	47.0	50.8	40.9	45.6
10	Nephritis, nephrotic syndrome and nephrosis	80.6	80.9	84.8	86.1
11	Chronic liver disease and cirrhosis	59.7	61.2	63.7	66.9
	Other causes	75.9	83.2	81.2	86.2
	All causes	74.5	81.5	79.6	84.9

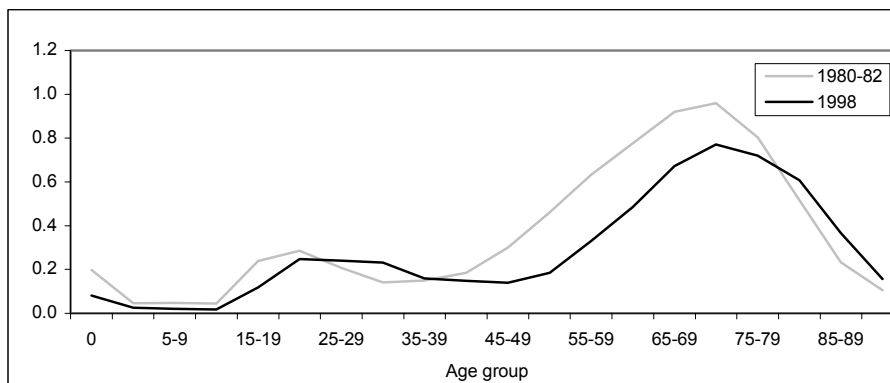
(a) Based on abridged life tables.

Disaggregation of sex difference in expectancy of life at birth into age and causes of death

Contribution of sex difference in death rates by age

Based on the abridged life tables, the life expectancy at birth of females exceeded that of males by 7.2 years in 1980-82 and 5.7 years in 1998. Using Pollard's technique (1982, 1986 and 1989), the life expectancy at birth sex difference in 1980-82 was contributed by excessive male mortality relative to female mortality at all ages; the large contribution (79%) came from sex difference in mortality at ages 45 years and over. In 1998 the situation remained the same albeit a lower contribution was made by mortality sex difference at each age group. Ages 45 years and over accounted for 77.5% of the sex difference (Figure 3 and the last row of Tables 5 and 6). The age specific death rates of males at ages 20-39 years increased in 1998 compared to the rates in 1997, the effect of which is reflected in the graph below. These rates in 1999 and 2000 have returned to their declining levels - consistent with the past trends (ABS, 3302.0, 2001). The large difference in the mortality rates of males and females at age groups 40-44 to 75-79 years in 1980-82 reduced in 1998 by a faster decline in the mortality of males relative to females over this period. At ages 80 years and over, the sex difference in mortality increased.

Figure 3: Contribution to sex-differential in life expectancy at birth by higher death rates of males than females at specific ages, Australia



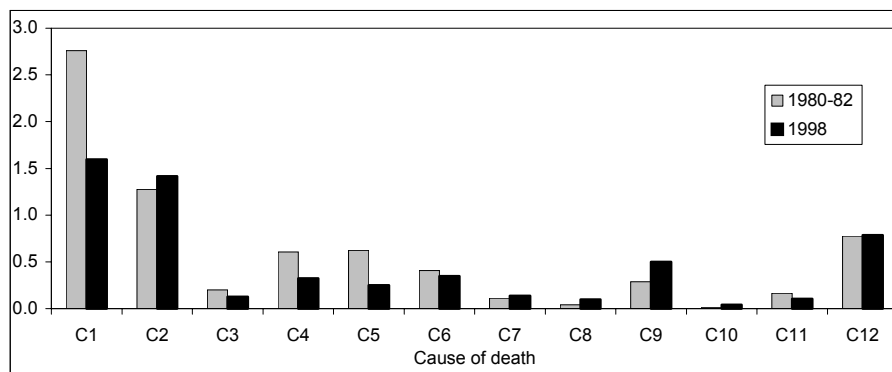
Life expectancy at birth difference between females and males was 7.2 years in 1980-82 and 5.7 years in 1998.

Contribution of sex difference in death rates by causes of death

As mentioned before, the cause-specific death rates were higher for males than for females in both time periods 1980-82 and 1998 (Table 3). The sex difference in life expectancy at birth was therefore contributed by excessive mortality of males relative to females for all causes. In 1980-82, the life expectancy at birth differential was primarily contributed by higher death rates of males than females due to heart disease (a gap of

2.8 years in the life expectancy at birth of females and males), malignant neoplasms (cancer) (1.3 years), motor vehicle traffic accidents (0.6 years), respiratory diseases (0.6 years), 'other accidents' (0.4 years) and suicide (0.3 years) (Figure 4 and the last column of Tables 5 and 6). This pattern changed in 1998. The sex difference in mortality reduced due to heart disease (1.6 years), cerebrovascular disease (0.1 years), respiratory diseases (cause 4, 0.3 years), motor vehicle traffic accidents (0.2 years), and 'other accidents' (0.3 years) and increased due to cancer (1.4 years), pneumonia (0.1 years), diabetes mellitus (0.1 years), suicide (0.5 years), and kidney related diseases (Nephritis, nephrotic syndrome and nephrosis) (0.8 years).

Figure 4: Contribution to sex-differential in life expectancy at birth by higher death rates of males than females by specific cause, Australia



Life expectancy at birth difference between females and males was 7.2 years in 1980-82 and 5.7 years in 1998.

- C1: Heart disease
- C2: Malignant neoplasms (cancer)
- C3: Cerebrovascular disease (stroke)
- C4: Chronic obstructive pulmonary disease and allied conditions (including asthma, emphysema and bronchitis)
- C5: Motor vehicle traffic accidents
- C6: Other accidents
- C7: Pneumonia
- C8: Diabetes mellitus
- C9: Suicide
- C10: Nephritis, nephrotic syndrome and nephrosis
- C11: Chronic liver disease and cirrhosis
- C12: 'Other' causes

Contribution of sex difference in death rates by age and causes of death

The difference in the female and male life expectancy at birth attributable to age-cause-specific death rates is given in Table 5 for 1980-82 and in Table 6 for 1998. At each age group and for each sex different causes of death operated, which contributed differently to the sex difference in life expectancy at birth. Negative value in Tables 5 or 6 indicate higher mortality of females than males in that age and causes of death group which

contributed *negatively* to the sex-difference in the life expectancy at birth. The highlighted values in these two tables indicate the contribution of the three main causes of death at each age to the sex difference in life expectancy at birth where mortality rates of males were higher than females. For brevity, the contribution to each age (five year age groups) has been added into broad age groups.

Age 0 years contributed 2.7% in 1980-82 and 1.4% in 1998 to the total life expectancy at birth sex difference. Higher mortality of boys than girls due to 'other' causes accounted for over 90% of the differential contributed by this age. Boys also experienced higher mortality due to 'other accidents' and respiratory diseases, which contributed further to the sex difference in life expectancy at birth.

Ages 1-14 years accounted for only 1.9% in 1980-82 and 1.1% in 1998 of the total life expectancy at birth sex difference. Higher mortality rates of boys relative to girls due to 'other accidents', motor vehicle accidents (more so at ages 5-14 years), 'other' causes and cancer contributed to the life expectancy sex difference.

About 10% of the total life expectancy at birth sex difference was accounted by excess mortality of males than females in the 15-29 years age group. Higher mortality of young males relative to females due to suicide, motor vehicle accidents and 'other accidents' mostly contributed (80% to 90%) to the life expectancy at birth sex difference.

The age group 30-49 years explained 11% to 12% of the total life expectancy at birth sex difference. Higher mortality of males relative to females due to suicide, 'other' causes, heart disease, 'other accidents' and motor vehicle accidents contributed to the life expectancy at birth sex difference. Females in this age group had higher mortality due to cancer than males, which contributed *negatively* to the sex difference in life expectancy.

The three age groups 50-69, 70-79. and 80 years and over accounted for 75% of the total life expectancy at birth sex difference in both time periods. Higher mortality of males relative to females due to heart disease, cancer, stroke, and respiratory diseases (asthma, emphysema, bronchitis, pneumonia and influenza - causes grouped as C4 and C7 in Tables 5 and 6) contributed to the life expectancy at birth sex difference. The relative ranking of the causes of death changed over time. In 1980-82, sex difference in mortality due to heart disease in each age group 50-69, 70-79 and 80 years and over dominated, but in 1998, sex difference due to cancer deaths dominated at age groups 70 years and over.

Table 5: Difference between female and male expectation of life at birth contributed by sex-variation in mortality at specific age and cause of death groups, 1980-82, Australia

Category number	Description of diseases underlying the cause of death	0 Years	1-4 Years	5-14 Years	15-29 Years	30-49 Years	50-69 Years	70-79 Years	80+ Years	Total Years
1	Heart disease	0.00	0.00	0.00	0.01	0.32	1.45	0.69	0.29	2.76
2	Malignant neoplasms (cancer)	0.00	0.00	0.01	0.02	-0.02	0.57	0.47	0.22	1.27
3	Cerebrovascular disease (stroke)	0.00	0.00	0.00	0.00	0.01	0.11	0.09	-0.01	0.20
4	Chronic obstructive pulmonary disease and allied conditions (including asthma, emphysema and bronchitis)	0.00	0.00	0.00	0.00	0.00	0.16	0.25	0.18	0.60
5	Motor vehicle traffic accidents	0.00	0.01	0.03	0.39	0.13	0.04	0.01	0.01	0.62
6	Other accidents	0.00	0.02	0.03	0.14	0.13	0.07	0.01	0.00	0.41
7	Pneumonia	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.11
8	Diabetes mellitus	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.04
9	Suicide	0.00	0.00	0.00	0.12	0.10	0.05	0.01	0.01	0.29
10	Nephritis, nephrotic syndrome and nephrosis	0.00	0.00	0.00	0.00	0.00	-0.01	0.01	0.02	0.01
11	Chronic liver disease and cirrhosis	0.00	0.00	0.00	0.00	0.05	0.10	0.01	0.00	0.16
12	Other causes	0.19	0.01	0.01	0.05	0.05	0.20	0.16	0.10	0.77
	All causes	0.20	0.05	0.09	0.73	0.78	2.79	1.76	0.85	7.25

Based on abridged life tables and using Pollard's method (1982, 1986, 1989).

Table 6: Difference between female and male expectation of life at birth contributed by sex-variation in mortality at specific age and cause of death groups, 1998, Australia

Category number	Description of diseases underlying the cause of death	0 Years	1-4 Years	5-14 Years	15-29 Years	30-49 Years	50-69 Years	70-79 Years	80+ Years	Total Years
1	Heart disease	0.00	0.00	0.00	0.01	0.14	0.66	0.48	0.31	1.60
2	Malignant neoplasms (cancer)	0.00	0.01	0.01	0.00	-0.06	0.49	0.57	0.39	1.42
3	Cerebrovascular disease (stroke)	0.00	0.00	0.00	0.00	0.01	0.06	0.06	0.01	0.13
4	Chronic obstructive pulmonary disease and allied conditions (including asthma, emphysema and bronchitis)	0.00	0.00	0.00	0.00	0.00	0.06	0.12	0.14	0.32
5	Motor vehicle traffic accidents	0.00	0.00	0.01	0.15	0.06	0.02	0.01	0.00	0.25
6	Other accidents	0.01	0.01	0.01	0.13	0.12	0.05	0.02	0.01	0.35
7	Pneumonia	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.08	0.14
8	Diabetes mellitus	0.00	0.00	0.00	0.00	0.01	0.04	0.03	0.02	0.10
9	Suicide	0.00	0.00	0.00	0.21	0.20	0.07	0.01	0.01	0.50
10	Nephritis, nephrotic syndrome and neph	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.04
11	Chronic liver disease and cirrhosis	0.00	0.00	0.00	0.00	0.03	0.06	0.01	0.00	0.10
	Other causes	0.07	0.01	0.01	0.12	0.17	0.13	0.14	0.13	0.79
	All causes	0.08	0.02	0.04	0.61	0.68	1.67	1.49	1.13	5.72

Based on abridged life tables and using Pollard's method (1982, 1986, 1989).

Explaining the decline in sex differentials over time

In the overall decline in the sex difference in the expectation of life at birth between 1980-82 and 1998 (1.53 years), the sex-difference in mortality decreased in all age groups except the age group 80 years and over, with major contribution coming from the age groups 50-69 years (-1.12) and 70-79 years (-0.27) (Figure 5 first panel). At ages 80 years and over, the sex difference in mortality increased (0.28 years).

By causes of death, the sex-difference in mortality decreased maximum due to heart disease (-1.17 years) followed by motor vehicle accidents (-0.37) and respiratory diseases (-0.28). On the other hand, the sex-difference in mortality increased for deaths due to neoplasms (0.14), pneumonia (0.03), diabetes (0.06), suicide (0.21), kidney related diseases (0.03) and 'other' causes (0.01) (Figure 5 second panel).

By age and causes of death, the decline in the sex-difference in mortality that occurred between 1980-82 and 1998 is shown in the remaining panels of Figure 5. In the age group 0-14 years, the sex-difference in mortality decreased from all causes except for a small increase for deaths due to cancer, asthma and kidney related diseases. In the age group 15-49 years, the sex-difference in mortality decreased from most causes except for deaths due to diabetes, suicide, kidney related diseases and 'other' causes. The age group 50-69 years followed the same pattern except that deaths due to 'other' causes showed a narrowing of the sex difference in mortality. For ages 70 years and over, the sex difference in mortality generally increased for all causes of death except the heart disease, stroke, asthma and motor vehicle accidents.

The two age groups 0-49 years and 50 years and over contributed respectively -0.42 years and -1.11 years. The major contribution in the first age group came from the reduction in sex difference in mortality due to motor vehicle traffic accidents (-0.34 years) and heart disease (-0.19 years). On the other hand sex difference in mortality increased for deaths due to suicide (0.19 years) and 'other' causes (0.07 years). At the age of 50 years and over, the major contribution came from the reduction in sex difference in mortality due to heart disease (-0.98 years) and respiratory diseases (category 4, -0.27 years). The death rate for females due to the respiratory diseases (category 4) increased between 1980-82 and 1998. This would have further contributed to narrowing of the sex differentials. Small increases in sex difference in mortality occurred for deaths due to cancer (0.19 years), pneumonia (0.04 years), diabetes mellitus (0.06 years), suicide (0.02 years) and kidney related diseases (category 10, 0.04 years). This would have been related to an increase in mortality due to pneumonia for both sexes, and of males due to diabetes mellitus and suicide between 1980-82 and 1998 and/or a slower decline in male mortality relative to female mortality over the period.

Figure 5 : Explaining the decline in sex-difference in life expectancy at birth between 1980-82 and 1998

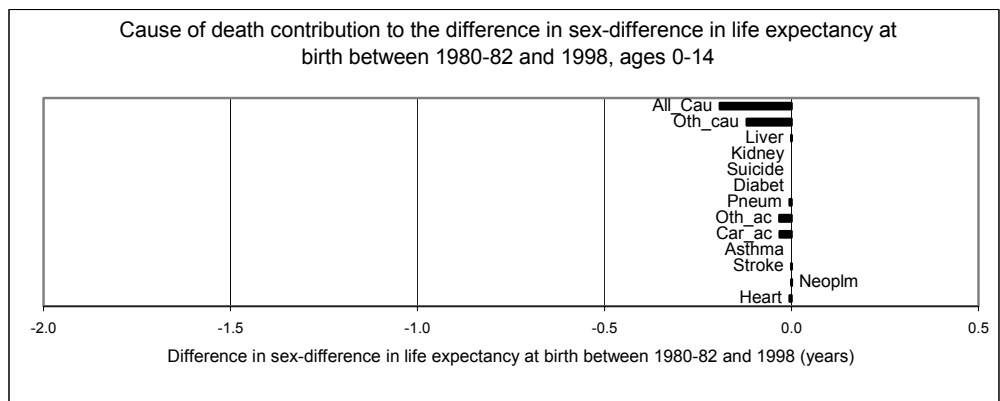
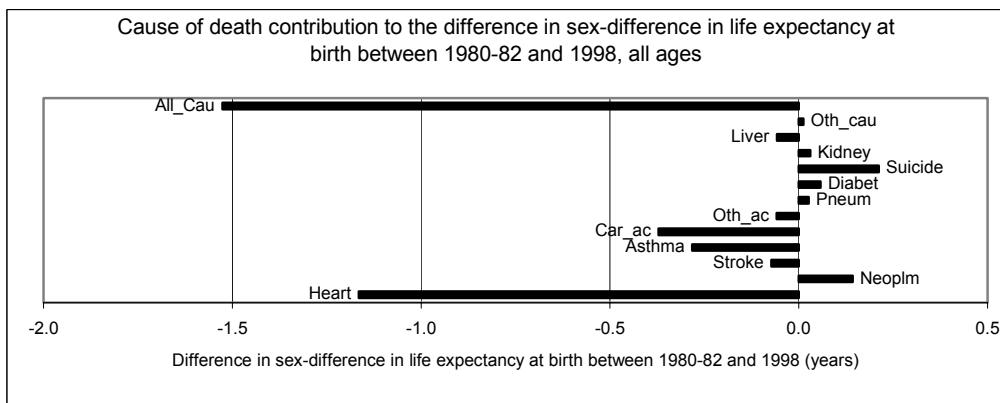
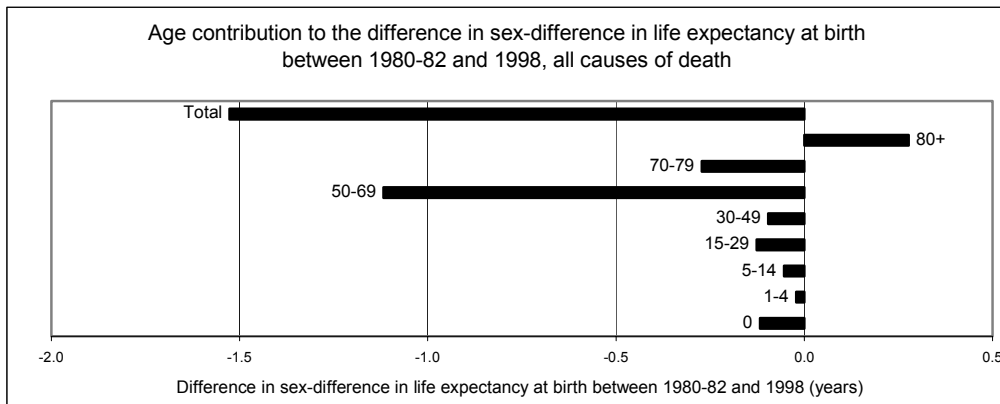
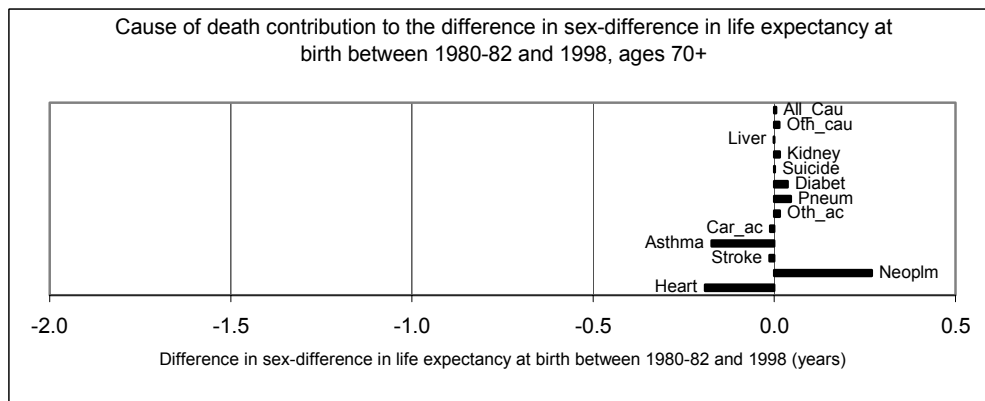
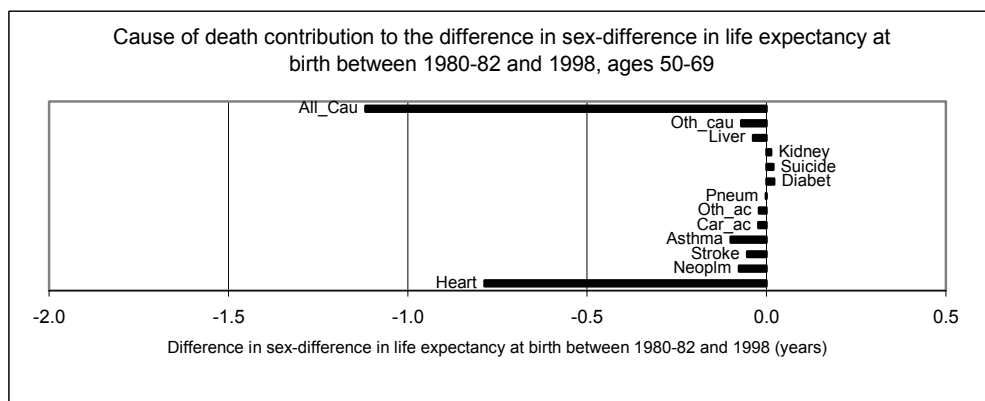
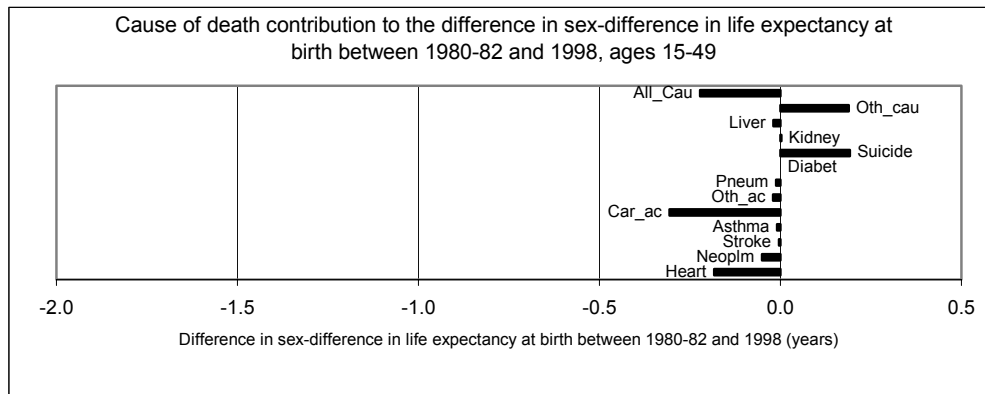


Figure 5 : Explaining the decline in sex-difference in life expectancy at birth between 1980-82 and 1998 (*Continued...*)



Source : Tables 5 and 6.

Conclusion

This paper has presented results of the decomposition of the life expectancy at birth sex difference in 1980-82 and 1998 by age and causes of death groups. Over time, the gap between female and male life expectancy at birth decreased from 7.2 years in 1980-82 (maximum ever recorded in Australia) to 5.7 years in 1998.

For both time periods, the leading causes of death remained the same, namely, the heart disease, cancer, and stroke (69% of all deaths in 1980-82 and 64% in 1998). The number of deaths due to cancer exceeded those due to heart disease from 1993.

Between 1980-82 and 1998, the mortality rates at each five year age group and most selected causes of death declined but the rate of mortality decline among males was faster than for females, causing a narrowing of the total sex difference in mortality over time. This narrowing occurred at all ages up to 80 years, with a slight increase in the sex difference in mortality rates at age groups 25-39 years and 80 years and over. In the former age groups 25-39 years, the increase in sex difference in mortality was due to a slight increase in male mortality in 1998 (which has been reversed in the post-1998 period), and in the latter age group 80 years and over, it has been due to differential rates of mortality decline for the two sexes.

The reduction in the gap between female and male life expectancy at birth of -1.53 years over this period is accounted for by the reduction in sex difference in mortality at ages 0-49 years (-0.42 years) and 50 years and over (-1.11 years). The major contribution in the first age group came from the reduction in sex difference in mortality due to motor vehicle traffic accidents and heart disease. On the other hand, sex difference in mortality increased for deaths due to suicide and 'other' causes. At the age groups 50 years and over, the major contribution came from the reduction in sex difference in mortality due to heart disease and respiratory diseases. Small increases in sex difference in mortality occurred for deaths due to cancer, pneumonia, diabetes mellitus, suicide and kidney related diseases.

Any further narrowing in the gap between the expectation of life at birth of females and males will be governed by the differential rates of mortality decline of the two sexes, vis-a-vis with the narrowing of the sex difference in mortality rates due to motor vehicle traffic accidents and suicide at the younger ages and heart disease, cancer, and respiratory diseases (including pneumonia) at the older ages.

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