Health Measures 2005
A report on the health of the people of Western Australia
Health Measures 2005
A report on the health of the people of Western Australia

August 2005

Epidemiology Occasional Paper 27
ISSN 1329-7252
Citation
The citation below is recommended for the referencing of this publication:

Acknowledgements
This report would not have been possible without the support of the following people. Their contributions are greatly appreciated.
Kathy Crouchley
Alison Daly
Audrey Garden
Vivien Gee
Elizabeth Lloyd
Helen Love
Daniel McAullay
Mark Peel
Miranda Poynton
Paul Saunders
Steven Spiker
The authors would also like to thank Dr Jim Codde and Dr Tim Threlfall who, in addition to providing invaluable assistance throughout the preparation of this report, also reviewed the final document. Further thanks go to Dr Gary Dowse and Carolien Giele for their contribution to the communicable diseases chapter.
Western Australia has one of the highest standards of health in the world and together with our enviable environment and high standard of living, our excellent health system plays a major role in maintaining this standard. However, the future holds many challenges for those tasked with the responsibility of maintaining the high standard of health services we have come to expect. With an ageing population, and the ever-increasing cost of new technologies, the cost of providing these services is becoming ever more expensive.

In the confines of a finite health budget, accessible, up-to-date and accurate health-related information is essential in order to inform policy makers and researchers alike. Not only does it enable measurement of the health system’s performance at the broadest level, it also makes it possible to identify, highlight and target emerging health issues, while informing health consumers of the current health status of the WA population.

Monitoring and reporting on the health of our population is therefore a basic responsibility of the Western Australian Department of Health and *Health Measures 2005* is an example of the Department’s continuing commitment to health information reporting.

*Health Measures 2005* is the Department’s flagship statistical publication, which presents a comprehensive array of health measures and factors that affect demand and supply of health interventions and services. It includes information on health and illness, determinants of health, the supply and use of health services and health services expenditure. It utilises a comprehensive set of data sources including State and National administrative data sets, disease registries and health surveys and, where possible, Western Australian data has been benchmarked against Australia.

The report authors have included a broad introduction for each of the indicators examined and have provided supplementary commentary that I am sure will prove to be a useful resource for all who use this excellent publication. I wish to commend all those who contributed to the production of this report, which I believe is a valuable addition to any health library.

---

**Neale Fong**  
Acting Director-General,  
Department of Health Western Australia.
## CONTENTS

Acknowledgements .................................................................................................................. 2

**FOREWORD** .......................................................................................................................... 3

List of tables .............................................................................................................................. 6

List of figures ............................................................................................................................. 6

Summary .................................................................................................................................. 10

Introduction ............................................................................................................................... 15

**POPULATION TRENDS** ........................................................................................................ 16

**RISK FACTORS FOR DISEASE** .......................................................................................... 23

Smoking ..................................................................................................................................... 23

Diet and nutrition ...................................................................................................................... 24

Excessive alcohol consumption ............................................................................................... 25

Inadequate physical activity ....................................................................................................... 25

Overweight and obesity ........................................................................................................... 26

High blood pressure .................................................................................................................. 27

Blood cholesterol ....................................................................................................................... 27

Illicit drug use ............................................................................................................................ 28

**SUMMARY HEALTH MEASURES** ...................................................................................... 42

Mortality .................................................................................................................................. 44

Burden of disease ...................................................................................................................... 48

Health status .............................................................................................................................. 54

Population subgroups ............................................................................................................... 56

  Perinatal and infant health ...................................................................................................... 59

  Children .................................................................................................................................. 69

  Older people ............................................................................................................................ 74

  Aboriginal health .................................................................................................................... 90

  Socioeconomic status ............................................................................................................ 102
CONTENTS

MAJOR CONDITIONS 110

Arthritis and musculoskeletal conditions 110
Asthma 120
Cancer 127
  All cancers 127
  Breast cancer 134
  Cervical cancer 138
  Colorectal cancer 142
  Lung cancer 146
  Melanoma (skin cancer) 151
  Prostate cancer 155
Cardiovascular diseases 159
  Coronary heart disease 161
  Stroke 165
Communicable diseases 170
Diabetes 190
Injury and poisoning 195
Dental health 213
Mental health 221

SERVICE UTILISATION 227

DATA ISSUES AND METHODS 239

Data sources 239
Methods 242
Glossary 244
References & sources 249
List of tables
Table 1: Ten leading causes of death, 2002 ________________________________ 47
Table 2: Total birth defects reported (per 1,000 births), WA ____________ 66
Table 3: Proportion of children immunised by Aboriginal status, WA _______ 100
Table 4: Number and proportion of notifications by disease category in WA and Australia, 2004. ___ 171
Table 5: Number and proportion of the 12 most commonly notified diseases in WA and Australia, 2004. _____________________________________________ 171
Table 6: Vaccine Coverage ___________________________________________ 188
Table 7: Average health expenditure per person, current prices ____________ 230
Table 8: State and local government expenditure on hospitals per person________________________ 231
Table 9: Total health expenditure, constant prices all sources of funding and annual growth rate ___ 232

List of figures
Figure 1: Population (,000) by Aboriginal status, WA, 2003 ___________________________ 18
Figure 2: Population, WA as a percentage of the total Australian population _____________ 19
Figure 3: Population, median age ____________________________________________ 20
Figure 4: Persons aged 65 years and over, per cent __________________________________ 21
Figure 5: Child and adult dependency ratios __________________________________________ 22
Figure 6: Tobacco-smoking status, persons aged 14 years and over, 2001_________________ 30
Figure 7: Daily smokers, persons aged 14 years and over ____________________________ 31
Figure 8: Usual daily intake of fruit, persons aged 18 years and over, 2001________________ 32
Figure 9: Inadequate fruit and vegetable intake, persons aged 18 years and over, WA ______ 33
Figure 10: Alcohol risk, persons aged 18 years and over, 2001_______________________ 34
Figure 11: Exercise level, persons aged 18 years and over, 2001_________________________ 35
Figure 12: Less than moderate physical activity, persons aged 18-64 years, WA __________ 36
Figure 13: Prevalence of overweight and obesity, persons aged 25 years and over, 2000 ____ 37
Figure 14: Trends in overweight and obesity, persons aged 20 years and over, WA__________ 38
Figure 15: Age-specific prevalence of hypertension, persons aged 25 years and over, 2000 ___ 39
Figure 16: Age-specific prevalence of high blood cholesterol, persons aged 25 years and over, 2000 _______________________________ 40
Figure 17: Illicit drug use in last 12 months, persons aged 14 years and over, 2001__________ 41
Figure 18: Life expectancy at birth _____________________________________________ 44
Figure 19: Expected age at death, persons aged 65 years ___________________________ 45
Figure 20: Mortality rate, all ages ___________________________________________________________________________ 46
Figure 21: Years of life lost, various causes of death, 1996 and 2000 ________________ 50
Figure 22: Mortality burden (YLL), leading causes, WA, 2000 ________________________ 51
Figure 23: Disability burden (YLD), leading causes, WA, 2000 ________________________ 52
Figure 24: Disease burden (DALY), leading causes, WA, 2000 ________________________ 53
Figure 25: Fair or poor health status, persons aged 18 years and over, WA ____________ 55
Figure 26: Number of live births and crude birth rate _____________________________ 59
Figure 27: Fertility rate, women aged 15-49 years ___________________________________ 60
Figure 28: Mean age of mother at confinement ______________________________________ 61
CONTENTS

Figure 29: Number and per cent of live births to women aged less than 18 years____________________ 62
Figure 30: Stillbirth and neonatal mortality rate _________________________________________________ 63
Figure 31: Perinatal mortality rate ____________________________________________________________ 64
Figure 32: Infant mortality rate ______________________________________________________________ 65
Figure 33: Sudden Infant Death Syndrome_____________________________________________________ 67
Figure 34: Number and proportion of infants weighing less than 2,500 grams _____________________ 68
Figure 35: Mortality rate, all causes, children aged 1-14 years __________________________________ 70
Figure 36: Mortality, leading causes, children aged 1-14 years, 1999-2003_________________________ 71
Figure 37: Accidental drowning, children aged 1-14 years ______________________________________ 72
Figure 38: Mean DMFT score and decay-free rate, children aged 12 years _________________________ 73
Figure 39: Hospital separation rate, persons aged 65 years and over ______________________________ 77
Figure 40: Mortality rate, persons aged 65 years and over ________________________________________ 78
Figure 41: Mortality rate, coronary heart disease, persons aged 65 years and over_________________ 79
Figure 42: Mortality rate, stroke, persons aged 65 years and over ________________________________ 80
Figure 43: Incidence rate, cancer, persons aged 65 years and over ________________________________ 81
Figure 44: Incidence rate, specified cancers, persons aged 65 years and over, 2001_________________ 82
Figure 45: Mortality rate, cancer, persons aged 65 years and over ________________________________ 83
Figure 46: Mortality rate, specified cancers, persons aged 65 years and over, 2003_________________ 84
Figure 47: Mortality rate, chronic obstructive pulmonary disease, persons aged 65 and over _______ 85
Figure 48: Mortality rate, diabetes, persons aged 65 years and over ______________________________ 86
Figure 49: Mortality rate, Alzheimer’s disease and other dementias, persons aged 65 years and over 87
Figure 50: Mortality rate, Parkinson’s disease, persons aged 65 years and over____________________ 88
Figure 51: Hospital separation rate, cataracts and other lens disorders, persons aged 65 years and over_______________________________ 89
Figure 52: Aboriginal infant mortality rate _____________________________________________________ 95
Figure 53: Proportion of Aboriginal babies weighing less than 2,500 grams ________________________ 96
Figure 54: Aboriginal life expectancy at birth __________________________________________________ 97
Figure 55: Aboriginal mortality rate _________________________________________________________ 98
Figure 56: Aboriginal mortality rate, cardiovascular disease ______________________________________ 99
Figure 57: Aboriginal mortality rate, injury and poisoning, 1998-2002 ____________________________ 101
Figure 58: Index of Relative Social Disadvantage by WA SLAs ________________________________ 105
Figure 59: All cause mortality rates and rate ratios by Index of Relative Social Disadvantage quintiles, persons aged 0-14 years, 2000-2002, WA ________________________________ 106
Figure 60: All cause mortality rates and rate ratios by Index of Relative Social Disadvantage quintiles, persons aged 15-24 years, 2000-2002, WA ________________________________ 107
Figure 61: All cause mortality rates and rate ratios by Index of Relative Social Disadvantage quintiles, persons aged 25-64 years, 2000-2002, WA ________________________________ 108
Figure 62: All cause mortality rates and rate ratios by Index of Relative Social Disadvantage quintiles persons aged 65 years and over, 2000-2002, WA ________________________________ 109
Figure 63: Hospital separation rate, hip fractures________________________________________________ 113
Figure 64: Hospital separation rate, joint replacements __________________________________________ 114
Figure 65: Age-specific prevalence rate, arthritis, WA, 2004 ____________________________ 115
Figure 66: Self-reported prevalence, arthritis, persons aged 18 years and over, WA__________________ 116
Figure 67: Age-specific prevalence rate, osteoporosis, WA, 2004 _________________________________ 117
Figure 68: Prevalence rate, arthritis, 2001 ______________________________________________________ 118
Figure 69: Prevalence rate, osteoporosis, 2001 __________________________________________________ 119
Figure 70: Asthma prevalence, persons aged 18 years and over, WA ______________________________ 123
Figure 71: Hospital separation rate, asthma, children aged 0-14 years _____________________________ 124
Figure 72: Hospital separation rate, asthma, all ages, WA ________________________________________ 125
Figure 73: Mortality rate, asthma ____________________________________________________________ 126
Figure 74: Person years of life lost per death, specific cancers, persons aged to 74 years, 2003_______________________________ 131
Figure 75: Incidence rate, all cancers __________________________________________________________ 132
Figure 76: Mortality rate, all cancers _________________________________________________________ 133
Figure 77: Incidence rate, breast cancer ______________________________________________________ 136
Figure 78: Mortality rate, breast cancer ______________________________________________________ 137
Figure 79: Incidence rate, cervical cancer, females aged 20-74 years ______________________________ 140
Figure 80: Mortality rate, cervical cancer, females aged 20-74 years, ___________________________________ 141
Figure 81: Incidence rate, colorectal cancer ____________________________________________________ 144
Figure 82: Mortality rate, colorectal cancer ____________________________________________________ 145
Figure 83: Incidence rate, lung cancer _________________________________________________________ 149
Figure 84: Mortality rate, lung cancer _________________________________________________________ 150
Figure 85: Incidence rate, melanoma _________________________________________________________ 153
Figure 86: Mortality rate, melanoma _________________________________________________________ 154
Figure 87: Incidence rate, prostate cancer _____________________________________________________ 157
Figure 88: Mortality rate, prostate cancer _____________________________________________________ 158
Figure 89: Person years of life lost per death, specific cardiovascular diseases, persons aged 0-74 years, 2003_________________________ 160
Figure 90: Procedures, coronary artery bypass grafting & percutaneous coronary intervention ______163
Figure 91: Mortality rate, coronary heart disease _______________________________________________ 164
Figure 92: Mortality rate, stroke ____________________________________________________________ 168
Figure 93: Hospital separations, stroke _______________________________________________________ 169
Figure 94: Campylobacter infection notification rate ____________________________________________ 177
Figure 95: Salmonella notification rate ______________________________________________________ 178
Figure 96: Gonorrhoea notification rate ______________________________________________________ 179
Figure 97: Genital Chlamydia notification rate ________________________________________________ 180
Figure 98: Newly diagnosed HIV infection ____________________________________________________ 181
Figure 99: AIDS notification rate __________________________________________________________ 182
Figure 100: Hepatitis C notification rate ______________________________________________________ 183
Figure 101: Ross River Virus infection notification rate _________________________________________ 184
Figure 102: Tuberculosis notification rate _____________________________________________________ 185
Figure 103: Pertussis notification rate ________________________________________________________ 186
Figure 104: Measles notification rate _________________________________________________________ 187
CONTENTS

Figure 105: Influenza vaccination coverage, persons aged 65 years or older by State and Territory, 2004 ________________________________ 189
Figure 106: Self-reported diabetes prevalence, persons aged 18 years and over, WA ___________________________ 193
Figure 107: Mortality rate, diabetes ___________________________________________________________ 194
Figure 108: Mortality rate, injury and poisoning 1999/00 ___________________________ 199
Figure 109: Hospital separation rate, injury and poisoning ___________________________ 200
Figure 110: Hospital separations, WA compared to Australia, injury and poisoning, 1999/00 ___________ 201
Figure 111: Mortality rate, transport-related injuries ___________ 202
Figure 112: Hospital separation rate, transport-related injuries ___________________________ 203
Figure 113: Mortality rate, drowning, all ages and children aged 0-4 years ___________________________ 204
Figure 114: Hospital separation rate, near-drowning, children aged 0-4 years __________________________ 205
Figure 115: Mortality rate, interpersonal violence ___________ 206
Figure 116: Hospital separation rate, children aged 0-4 and 5-9 years ___________________________ 207
Figure 117: Mortality rate, accidental falls, persons aged 65 years and over ___________________________ 208
Figure 118: Hospital separation rate, accidental falls, persons aged 65 years and over ___________________________ 209
Figure 119: Hospital separation rate, accidental poisoning, children aged 0-4 years ___________________________ 210
Figure 120: Hospital separation rate, fire, burns and scalds, children aged 0-4 years ___________________________ 211
Figure 121: Mortality rate, fire, burns and scalds, persons aged 55 years and over ___________________________ 212
Figure 122: Adults experiencing edentulism, 2002 ___________________________ 216
Figure 123: Persons aged 65 years and over experiencing edentulism ___________________________ 217
Figure 124: Mean number of missing teeth, persons aged 18 years and over ___________________________ 218
Figure 125: Time since last dental visit, persons aged 18 years and over ___________________________ 219
Figure 126: Frequency of dental visits, persons aged 18 years and over ___________________________ 220
Figure 127: Suicide rate ___________________________ 224
Figure 128: High or very high levels of psychological distress, WA, 2004 ___________________________ 225
Figure 129: Psychological distress, persons aged 18 years and over by State, 2000 ___________________________ 226
Figure 130: Hospital separation rate ___________________________ 233
Figure 131: Hospital separation rate by ICD-10 chapters, 2001/02 ___________________________ 234
Figure 132: Same-day separations, proportion of all separations ___________________________ 235
Figure 133: Average length of stay ___________________________ 236
Figure 134: Hospital separations by payment type ___________________________ 237
Figure 135: Average length of stay by payment type ___________________________ 238
Summary

Monitoring changes in the health and wellbeing of a population helps identify issues likely to impact on health service requirements. This report updates the previous version published in 2000 by specifying the measurement of over 140 indicators of health and wellbeing. Trends over time of these indicators are presented along with National comparisons, benchmarking the health status of the Western Australian population.

In this report, information about disease risk factors and potential prevention strategies to reduce exposure to these risks helps to integrate the health measures presented with health service interventions and programs.

The most current and comparable data available for WA and Australia were derived from National and State health registers, surveys and ad hoc studies to compile trend analyses for the WA and Australian populations.

Demographics

The WA population has a younger age profile and higher proportion of Aboriginal people than the Australian population. Despite this, the median age of the WA population increased steadily between 1983 and 2003. This was the result of a number of factors including the increasing longevity of the population and the steady fall in birth and fertility rates, which in turn has resulted in an ever-increasing proportion of the WA population being aged 65 years and over.

Perinatal and infant health

Infant mortality fell in WA throughout the 1990s, reaching a low of 3.8 and 3.0 deaths per 1,000 live births for boys and girls respectively by 2003. This was slightly lower than the rate recorded across Australia. The leading causes of infant mortality in WA in 1999-2001 were certain conditions originating in the perinatal period, genetic malformations, deformations and chromosomal abnormalities. Sudden Infant Death Syndrome (SIDS) accounted for slightly more than 10% of all infant deaths in WA.

In 1986, the total fertility rate recorded by WA females aged 15-49 years was slightly higher than that recorded by their Australian counterparts. Over the subsequent decades, fertility rates in WA remained higher than Australia, but followed a similar pattern to that recorded nationally. However, by 2003 fertility rates recorded across these two jurisdictions were similar.

In both WA and Australia, fertility rates have declined over the past 15 years. This societal change has coincided with an increase in the mean age of WA mothers at confinement from almost 28 years of age in 1986 to around 30 years in 2003. Due in part to the fall in fertility rates and the increasing age of WA mothers, the crude birth rate has fallen steadily over the past two decades.

Over the past ten years, there has been little change in the proportion of WA mothers aged less than 18 years. WA continues to have a higher proportion of young mothers aged less than 18 years than Australia.

Child health

Among children aged 1-14 years in WA, accidents and injuries were responsible for the greatest number of deaths. Overall, the mortality rate for boys within this age group was almost twice that of their female counterparts. Since 1983 mortality rates for both boys and girls aged 1-14 years have fallen. Compared to national figures, WA boys recorded lower mortality rates throughout the first half of the 1990s, but higher from 1995 onwards, whereas WA girls consistently recorded lower mortality rates.

Asthma

Hospital separation rates for asthma fell significantly throughout the 1990s for both boys and girls aged 0-14 years, with rates consistently higher among males than their female counterparts.

From 1993/94 onwards, WA hospital separation rates for both boys and girls were higher than those recorded nationally. WA females recorded similar rates to Australian females from 1999/2000 onwards.

General trends indicated a decline in mortality due to asthma throughout the 1980s and 1990s for both males and females, with mortality rates for asthma in WA generally lower than in Australia.

Dental health

The proportion of people experiencing edentulism was lower in WA than in Australia and declined slightly across both jurisdictions between 1999 and 2002. Edentulism also fell between 1987-88 and 1999 among WA residents aged 65 years and over.

In 1999, around 60% of Western Australians had visited a dentist in the past 12 months (slightly higher than the national average). The proportion of WA residents who had visited a dentist in the past 12 months fell slightly by 2002, to a level slightly lower than the figure recorded nationally.
SUMMARY

Hospital utilisation
Hospitalisation separation rates increased steadily in WA throughout the 1980s and 1990s, with the annual increase among males slightly higher than among females. Concurrently, the number of same-day separations in WA increased steadily, with private hospitals reporting a slightly higher proportion of same day cases than public hospitals. In addition, the average length of stay in WA hospitals has fallen steadily since 1990/91 and is lower than the national figure for both males and females.

Risk factors
Smoking is the principal cause of preventable death and disability in Western Australia. The prevalence of smoking in WA decreased between 1995 and 2004, at which time 18.9% of males and 15.7% of females aged 14 years or over reported smoking on a daily or weekly basis. In 2004, the prevalence of daily/weekly smoking was lower among WA males and females than their National counterparts.

After Queensland, Western Australians reported the next highest proportion of the population consuming two or more serves of fruit among the States and Territories and a higher intake than Australians. The proportion of the population reporting an inadequate intake of vegetables decreased between 2000 and 2003, however the fruit consumption of nearly 50% of the population still remains below recommended levels.

Risky levels of alcohol consumption were higher in WA than in any of the jurisdictions reported (excluding Northern Territory) in Australia, with 12.5% of the population drinking at risky or high-risk levels.

The proportion of the population who report engaging in moderate or highly physical activities was 33% in 2001, second only to the ACT among the jurisdictions of Australia and higher than the Australian average. The prevalence of people reporting no physical activity was 28%, the second lowest of all jurisdictions in Australia in 2001.

Although the prevalence of overweight and obesity was similar to that reported for Australia in 2000, it increased among WA males and females between 1995 and 2004.

In 2000, the prevalence of hypertension was similar to that nationally for both males and females, as is the case for high blood cholesterol levels.

In 2001, Western Australians reported a higher level of illicit drug use than Australia. Of the States and Territories, only the Northern Territory reported higher usage.

Diabetes
The self-reported prevalence of diabetes increased among both males and females in WA since 1995, although the use of self-reporting underestimates the prevalence. Comparisons of measured blood glucose level survey results and self-reporting suggest that about half the people with diabetes were unaware they had the disease. Following an increase in the mortality rate for diabetes in the early 1990s, the rate has stabilised.

Injury and poisoning
Both WA and Australian male mortality rates for injury and poisoning decreased significantly over the past two decades; however, there was no significant change in mortality rates recorded by females. In WA, the leading causes of injury and poisoning, excluding intentional self-harm, were transport injuries, drowning, falls and accidental poisoning. Despite a decrease in the mortality rate due to transport injuries (mainly to motor vehicle accidents) in WA, rates among WA males remained higher than Australian males. Mortality rates for drowning and hospitalisations for near-drowning among WA children aged 0-4 years were higher than among Australian children of the same age and remained unchanged over time. While the hospital separation rate for falls among WA children aged 0-4 years has increased and remained higher than the Australian rate for children of the same age, the rate among children aged 5-9 years remained unchanged and was lower than the rate recorded by their Australian counterparts.

The mortality rate for falls among the elderly (65 years and older) in WA increased and was higher among WA females than among Australian females. The risk of death due to injury is estimated to be almost four times higher for Aboriginal Western Australians than non-Aboriginal people, and 1.5 times higher for people living in rural WA than their counterparts living in the Perth metropolitan area.

Stroke
While age-standardised hospital separations for stroke decreased significantly among both males and females in WA and Australia from the mid-1990s onwards, crude rates increased, reflecting the increasing age of the population. Mortality rates for stroke generally declined in WA over the past 20 years. However, throughout this period, males have consistently recorded higher mortality rates than females. Overall, WA males and females recorded lower rates than their Australian counterparts.
SUMMARY

Arthritis and musculoskeletal conditions

The prevalence of arthritis increases with age, with the prevalence among people aged 75 years and over in WA at least twice that of people aged 45-54 years. However, a small proportion of younger Western Australians aged 18-24 years experience the effects of arthritis.

Osteoporosis is also related to age, with prevalence rates among females increasing rapidly from age 45-54. While osteoporosis is more common among females, a significant number of WA males also suffer from this condition, with those aged 65-74 years recording the highest prevalence rates. The prevalence for arthritis in WA was similar to the national average, while prevalence rates for osteoporosis were lower than the national average.

Mental health

The National Health Priority Area program uses suicide as an indicator of mental health, as disorders such as depression and alcohol-dependence and abuse are risk factors for suicide and suicidal behaviour. The rate of suicide in WA remains unchanged and similar to the National rate.

The prevalence of high or very high psychological distress in WA was 9.2% in 2004, with women reporting the highest levels particularly those aged between 35 and 39 years. In 2000, the prevalence of low or no psychological distress was lower in WA than in SA, whilst the prevalence of very high psychological distress was similar to that in SA and the NT.

Communicable diseases

In recent times the impact of communicable disease has been reduced by improvements in hygiene, the introduction of antibiotics and mass immunisation. However, not all communicable diseases have followed the same patterns. Since HIV was first identified in the early 1980s notification rates among males in WA increased steadily before marked declines were recorded from around 1993 onwards. Notification rates among WA females on the other hand followed similar patterns to those recorded by Australian females and remained relatively low. Notification rates for Australian males have continually been higher than WA males.

The AIDS notification rate in WA followed a different pattern to that of HIV with the highest number of cases reported in the early to mid-1990s. This was most probably due to the lead-time between HIV infection and the progress to AIDS. From this time onwards, notification rates for WA males have fallen substantially. The notification rate for WA females remained relatively low between 1986 and 2003. While the female rate was similar to the rates recorded by Australian females, WA males experienced rates around half that of Australian males in 2003.

The notification rate for gonorrhoea and chlamydia increased in WA throughout the 1990s with the crude notification rates for gonorrhoea almost twice that recorded throughout Australia.

Cancer

Neoplasms (cancers) were second only to diseases of the circulatory system as the leading cause of death in WA in 2003, with lung cancer responsible for the greatest number of deaths. The only cancers for which death rates were increasing were lung cancer and melanoma among females. Decreased exposure to risk factors and early detection through increased screening improving the likelihood of a full recovery have led to declining death rates for most cancers. Despite declining mortality for most cancers, mortality rates in WA for colorectal cancer among males, lung cancer and cervical cancer were higher than those recorded Australia wide.

Overall, cancer incidence in WA has increased over the past two decades. Increased screening for breast, prostate cancers and melanoma only explains part of this increase. Female smoking prevalence is yet to show the decrease seen in male prevalence during the 1980s and consequently female lung cancer incidence continues to rise. Female lung cancer incidence in WA was higher than rates among females Australia wide, as was the case for breast cancer and melanoma.

Coronary heart disease

Coronary heart disease (also known as ischaemic heart disease) is a leading cause of death in Australia and WA. After peaking in the late 1960s and early 1970s, mortality rates for coronary heart disease have fallen steadily. Between 1983 and 2003, mortality rates for coronary heart disease among WA males and females have been consistently lower than their national counterparts, while male rates were around 60% higher than females.

Apart from reduced exposure to risk factors, one of the primary reasons for the decline in coronary heart diseases that has occurred over the last decade was the introduction of advanced procedures including Coronary Artery Bypass Grafting (CABG) and Percutaneous Coronary Intervention (PCI). The
SUMMARY

procedure rate for CABG increased rapidly in WA between 1989 and 1993, reflecting similar figures reported nationally. From 1993 onwards, the procedure rate in WA fell dramatically coinciding with a rapid increase in the rate of PCI procedures performed in WA.

Mortality

Coronary heart disease was responsible for around one in every five deaths reported throughout WA in 2003. Between 1983 and 2003, deaths resulting from coronary heart disease continued the improvements realised throughout the earlier parts of the twentieth century, with rates for all persons decreasing by an average of 2.3% per year. Improvements in the State's mortality rate were reflected by the increased life expectancy recorded by WA males and females over the past two decades. In 2003, the life expectancy of a Western Australian at birth was 78.1 years for males and 83.0 years for females. These figures were both slightly higher than the figures reported nationally.

Older persons

Monitoring the health of older people (65 years of age and older) is becoming increasingly important as the proportion of the population in this age group rises. Older people report a higher number of chronic conditions than other age groups, with arthritis, high blood pressure and cataracts most commonly self-reported.

Older people represent 11.3% of the WA population, but account for about three-quarters of the total disease burden (measured by disability adjusted life years). Cardiovascular disease, cancer and neurological conditions contribute most to the disease burden in this age group, with coronary heart disease, stroke, lung cancer and dementia the leading causes of death. The mortality rate among older people was similar to that Nationally and declining, due mainly to improvements in cardiovascular and male cancer mortality. Mortality rates among females for lung cancer and Chronic Obstructive Pulmonary Disease (COPD) continue to increase.

The increase in hospital separation rates among older people over the last decade was significant, as this age group accounts for around 30% of all admissions. Over this period, separation rates in WA were similar to those nationally, with admissions for falls and cataracts resulting in high hospital costs. The hospitalisation rate for cataracts has increased with the WA rate similar to that recorded nationally.

Disadvantaged groups

Mortality rates among WA males and females from areas defined as the most disadvantaged (based on SEIFA) were significantly higher than their counterparts from the least disadvantaged areas of the State for most age groups and both genders. The exception was for females aged 65 years and over from the most disadvantaged areas, who recorded mortality rates significantly lower than those from the least disadvantaged areas.

Aboriginal health

Within the limitations of the quality of Aboriginal identification on death records and the accuracy of Aboriginal populations, Aboriginal mortality trends were derived for WA and compared to the Northern Territory (NT) and South Australian (SA) Aboriginal population. Over the last decade, mortality rates among the WA Aboriginal population have decreased, while among the NT and SA Aboriginal populations, mortality rates have remained stable. A decline in cardiovascular mortality among WA Aboriginal people also occurred over the last decade. Despite the decline in mortality among WA Aboriginal people and the resultant increase in the life expectancy at birth to a level higher than that among NT and SA Aboriginal people, Aboriginal mortality in WA remains more than double that of the total population.

Infant mortality among Aboriginal babies remained stable over the last decade, but was lower than that for NT Aboriginal babies and higher than that for SA Aboriginal babies. The proportion of low birthweight babies also remained stable and marginally higher than that reported nationally over the last decade. Immunisation rates among Aboriginal children in WA aged 12-15 months and 72-75 months were lower than those for non-Aboriginal children of the same ages.

Burden of disease

Burden of disease is a summary health measure that includes both mortality and non-fatal health outcomes into the single metric (DALYs) without relying exclusively on administrative data sets, which have historically been used for this purpose. The disease burden in WA in 2000 was lower than that reported for Australia in 1996.

The mortality component (Years of Life Lost) accounted for 54% and 47% of the total burden among males and females, respectively. The leading causes included largely preventable diseases such as ischaemic heart disease, stroke, lung cancer, COPD, and injury among males, with breast cancer an
additional leading cause among females. There were substantial decreases in the Years of Life Lost from 1996 to 2000 for both WA and Australia.

Measurement of non-fatal health outcomes (Years Lost to Disability) was based on disease incidence, duration and severity and accounted for 46% and 53% of the total burden among males and females, respectively. A large proportion of the disability burden among males (46%) and females (49%) was accounted for by mental and neurological disorders, with the leading causes of disability including depression, dementias, hearing loss and alcohol dependence and abuse.

Years of Life Lost and Years Lost to Disability were summed for each disease to derive the total disease burden (Disability-Adjusted Life Years). Among males, smoking-related diseases and injuries were the leading causes, whereas mental disorders and breast cancer accounted for a large proportion of the female disease burden.

Health Status
The majority of the WA population rate their health as good, very good or excellent when asked. In 2004, 89% of females and 86% of males rated their health as good or better than good. The proportion of women rating their health as poor decreased from 1995 to 2004, while the proportion of males rating their health as poor remained stable. Self-rated health status of the WA population, as determined by the WA Health and Wellbeing Surveillance System (WAHWSS), compares favourably with that of the Australian population, as determined by the National Health Survey.
INTRODUCTION

This report updates health status indicators and extends trend data for the Western Australian population from an earlier edition published in 2000. Changes in health status are described over time and where possible National data is included to provide a benchmark against which to assess WA findings.

Health budgets are under increasing demand from health services due to escalating costs. In Western Australia (WA) the demand is exacerbated by an ageing population with an increasing life expectancy who have an expectation of receiving the best in medical care, knowledge and technology. Under budgetary constraints, decisions concerning the allocation of resources need to consider how to maximise the health gains from health expenditure while maintaining equity of health services. Monitoring the level of, and changes in, health status is important to assess the impact on health service requirements in order to inform decision-making in the allocation of resources.

To relate health status information to health services, this report reviews the epidemiologic evidence for risk factors identified for each topic along with some of the leading intervention strategies to reduce exposure. Furthermore, clinical interventions such as treatments and procedures are described to broaden the account of relevant health services.

Although the majority of Western Australians enjoy good health, this report draws on a wide range of indicators to summarise the health status of the WA population from data sources mostly reporting illness. The majority of the information was derived from routine data collections on demographics, births, deaths, hospitalisations and specific disease registers maintained by State and National organisations. Data used to capture a more broad description of health status have been obtained from surveys, such as the National Health Survey and the Western Australian Health and Wellbeing Surveillance System, and specific research studies including the National and WA Burden of Disease Studies. Where possible, the most recent comparable data for WA and Australia were reported from these sources. In some instances, this means the data reported is not the most current available and in particular this is true for survey-based statistics. Trend information was available for the last two decades for a number of indicators, but some relied on data from a single survey. The majority of the indicators reported in the previous version have been retained and in some cases have been extended with the inclusion of regional comparisons, which are available as an appendix to this report on the Department of Health’s web site <http://www.health.wa.gov.au/publications/>

Based on international standards, the health of Western Australians and Australians, in general, ranks highly. However, constant monitoring of changes in the health and wellbeing of the population is important to identify differences within and between various groups throughout our society. In recent decades, the Western Australian population has aged due to both reduced mortality and decreasing fertility rates. These changes have seen the shift away from death due to infectious diseases to the more chronic diseases such as cardiovascular disease and cancer, which are now the leading causes of death in the State. Other more recent changes included a marked increase in the prevalence of mental illness, with suicide and alcohol and other drug dependence now also significant causes of death. In addition, new diseases such as legionnaire’s disease, AIDS and SARS have appeared over the last two to three decades. Information of this type plays an important role in determining priorities for public health initiatives, identifying emerging issues that require action and monitoring the effects of public health programs.
To assess the health status of a population, or plan for their health care needs, the size and characteristics of the population need to be understood. The major demographic determinants of fertility, mortality, migration and the size and age structure of the base population allow us to explain and forecast population change (McDonald, 2002).

Increases in population size are influenced by births and immigration, while deaths and emigration may negatively impact on a population. Fertility is the most influential demographic determinant, as births not only add to a current generation of children, but also provide the potential for exponential increases in the size of future generations.

Decreases in mortality among those with reproductive potential will not only affect the relevant age cohort at the time, but also the size of succeeding generations. Child bearing at very young (under 18) or older (over 35) ages and short intervals between births (less than 18 months) have particular risks, so reductions in these will decrease the risk of maternal and infant mortality (Grundy, 1997).

Much of a population’s future is contained in its present age structure, which in turn is primarily the result of its past fertility history. Australia’s fertility was relatively low in the 1930s and 1940s, high in the 1950s and 1960s and very low in the 1980s and 1990s. This history of fertility is reflected in Australia’s present age structure and is the main reason that Australia will experience substantial ageing of its population in the coming decades, as the baby boomers, born in the 1950s and 1960s, replace the small number of people born in the 1930s and 1940s at the older ages, while at younger ages, there is no increase in the size of age cohorts. The ageing population is the most important demographic issue to emerge in the past two decades in Australia (McDonald, 2002).

Annual rate of population increase

In 1984, the total population of WA was estimated to be around 1.39 million persons. By 2003, this had increased by 40% to 1.95 million persons. This was a larger increase than that reported throughout Australia (27%) over the same period.

The rate of population growth in WA was greater in the 1980s than the 1990s. While there was a slight increase in the rate during the mid-1990s, recent years have seen a continued decline in the growth rate (Ridolfo & Codde, 2000; ABS, 2003b, 2004).

The impact of fertility rates on the population structure

Falling fertility and increased longevity are the primary causes of the ageing population in WA and Australia. Since 1990, Australia’s total fertility rate has fallen steadily and now stands at 1.76 babies per woman (2003), compared to 1.90 babies per woman in 1990. This is below the replacement level of 2.1 (the level needed for a woman to replace herself and her partner) and Australia has been below this figure since 1976 (ABS, 2002).

Sixty-nine per cent of Australian women aged 15 to 49 years live in the major cities. These women have the lowest total fertility rate (1.65 babies per woman), while women living in remote and very remote areas of Australia have the highest fertility rates (2.27 and 2.28 respectively) (ABS, 2002).

The fall in fertility is associated with women having babies later in life. Delayed child bearing reduces overall fertility in two ways. Firstly, it stretches out each generation, resulting in fewer children overall in a given time period. Secondly, later commencement is associated with lower individual lifetime total fertility (Barnes, 2001). The median age of women giving birth has been increasing because of trends in delayed partnering and childbearing and, following divorce, repartnering and subsequent family formation. In 2001, the median age of women giving birth in Australia reached 30 years for the first time. In Western Australia, this milestone was reached in 2003.

With the age structure of a population predominantly influenced by fertility, decreasing fertility has caused a reduction in the proportion of the population in younger age groups and additionally, an increase in the proportion of the population in older age groups (Grundy, 1997).

In 2001, 12.5% of the Australian population were aged 65 years or more, while children aged less than 15 years accounted for 20.5% of the population. These proportions are projected to change to 14.3% and 17.7% respectively by 2011 (ABS, 2002). By 2051, about a quarter of the Australian population (Barnes, 2001) and about 22% of the WA population are expected to be aged 65 years and over (Ridolfo & Codde, 1998). This will, in turn, lead to an increase in the median age of the population. The median age of the population has increased by 6.1 years in the last 20 years (from 29.6 in 1981 to 35.7 years in 2001), and is projected to increase to 38.5 years by 2011 (ABS, 2002).
Total fertility is a function of family planning, biological and behavioural factors. In ageing populations, fertility decisions are normally couple (or woman) based, and are implemented through contraception and abortion. Other reasons, besides advances in the availability and effectiveness of birth control, have been cited for the falling fertility rates in developed countries. These include increased participation of women in the workforce and attitudinal shifts (Grundy, 1997). Many women, through choice or circumstances, are not having children and the proportion is increasing. In 1981, 35% of women aged 25-29 years were childless and 8% of women aged 40-44 years were childless. By 2001 these proportions had increased to 59% and 13% respectively.

**Implications of recent demographic trends**

The ageing population in Australia is cause for concern. As the proportion of elderly people, many of whom have substantial support needs, increases, the ability or the willingness of younger generations to meet these needs may diminish. For example, changes in family patterns such as the increase in divorce, sole parenthood, and the participation of married women in the labour force may reduce the capacity of younger generations to provide support for their elders. In addition, children could be disadvantaged by these changes in family patterns, which may adversely affect their health (Grundy, 1997).

If patterns of declining fertility continue within developed populations such as Australia, the population may eventually decline, unless increased immigration or an increase in the fertility rate offsets this. Furthermore, the proportion of the population aged 65 years and over will increase dramatically, which will have major implications for the provision of health care in Australia (Grundy, 1997). The ageing population, coupled with population growth, will require a commensurate increase in health care services related to fatal disease and chronic degenerative conditions such as circulatory diseases, cancers, respiratory diseases, diabetes, dementia, and arthritis or musculoskeletal disorders. In the future, there is likely to be more demand for general surgical and medical services, and less demand for obstetric and paediatric service provision.

The ageing population also has implications for the workforce. People aged between 20 and 64 years form the primary tax base, which has remained unchanged for several decades. As the proportion of older people in the Australian population increases, the rate of growth within the workforce will decline. A significant issue for the future is the changing balance between the working and non-working sections of the population as the population ages and increasing proportions move into retirement. This has significant implications for labour market programs and retirement and income support policies (ABS, 2003).

From a more global perspective, differing demographic trends within developed countries (ageing populations) and less developed countries (younger, fertile populations) will reduce the relative population size of developed countries, increasing pressure for migration from less to more developed countries, such as Australia (Grundy, 1997).

**Migration**

WA has a higher concentration of overseas-born people than any other Australian state. Nearly a third of the State’s population was born overseas (30%), compared with a national average of 23% (Department of Immigration and Multicultural Affairs, 1996).

Immigration to WA has a strong Indian Ocean connection, with high numbers of migrants coming from South Africa, Indonesia, Malaysia, Singapore and India. The State attracts fewer immigrants from East Asian areas, such as Vietnam and China, who are attracted to the eastern states (Department of Immigration and Multicultural and Indigenous Affairs, 1996).

**References**


Figure 1: Population (,000) by Aboriginal status, WA, 2003

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Non-Aboriginal</th>
<th>Aboriginal</th>
<th>Total</th>
<th>Non-Aboriginal</th>
<th>Aboriginal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>59,122</td>
<td>4,240</td>
<td>63,362</td>
<td>56,795</td>
<td>4,159</td>
<td>60,954</td>
</tr>
<tr>
<td>5-9</td>
<td>64,127</td>
<td>4,484</td>
<td>68,611</td>
<td>60,594</td>
<td>4,148</td>
<td>64,742</td>
</tr>
<tr>
<td>10-14</td>
<td>67,627</td>
<td>4,460</td>
<td>72,087</td>
<td>64,514</td>
<td>4,079</td>
<td>68,593</td>
</tr>
<tr>
<td>15-19</td>
<td>69,685</td>
<td>3,785</td>
<td>73,470</td>
<td>66,349</td>
<td>3,647</td>
<td>69,996</td>
</tr>
<tr>
<td>20-24</td>
<td>67,878</td>
<td>2,905</td>
<td>70,783</td>
<td>64,844</td>
<td>2,930</td>
<td>67,774</td>
</tr>
<tr>
<td>25-29</td>
<td>64,687</td>
<td>2,574</td>
<td>67,261</td>
<td>62,742</td>
<td>2,528</td>
<td>65,270</td>
</tr>
<tr>
<td>30-34</td>
<td>71,784</td>
<td>2,666</td>
<td>74,450</td>
<td>70,842</td>
<td>2,809</td>
<td>73,651</td>
</tr>
<tr>
<td>35-39</td>
<td>70,312</td>
<td>2,257</td>
<td>72,569</td>
<td>70,569</td>
<td>2,402</td>
<td>72,971</td>
</tr>
<tr>
<td>40-44</td>
<td>74,710</td>
<td>1,936</td>
<td>76,646</td>
<td>74,912</td>
<td>2,082</td>
<td>76,994</td>
</tr>
<tr>
<td>45-49</td>
<td>69,565</td>
<td>1,543</td>
<td>71,108</td>
<td>70,150</td>
<td>1,583</td>
<td>71,733</td>
</tr>
<tr>
<td>50-54</td>
<td>65,603</td>
<td>1,138</td>
<td>66,741</td>
<td>64,593</td>
<td>1,300</td>
<td>65,893</td>
</tr>
<tr>
<td>55-59</td>
<td>56,685</td>
<td>783</td>
<td>57,468</td>
<td>53,075</td>
<td>847</td>
<td>53,922</td>
</tr>
<tr>
<td>60-64</td>
<td>41,468</td>
<td>542</td>
<td>42,010</td>
<td>39,941</td>
<td>636</td>
<td>40,577</td>
</tr>
<tr>
<td>65-69</td>
<td>32,526</td>
<td>373</td>
<td>32,899</td>
<td>33,111</td>
<td>468</td>
<td>33,579</td>
</tr>
<tr>
<td>70-74</td>
<td>26,817</td>
<td>271</td>
<td>27,088</td>
<td>28,436</td>
<td>332</td>
<td>28,768</td>
</tr>
<tr>
<td>75-79</td>
<td>20,449</td>
<td>113</td>
<td>20,562</td>
<td>24,609</td>
<td>133</td>
<td>24,742</td>
</tr>
<tr>
<td>80-84</td>
<td>12,146</td>
<td>87</td>
<td>12,233</td>
<td>18,254</td>
<td>86</td>
<td>18,340</td>
</tr>
<tr>
<td>85+</td>
<td>7,573</td>
<td>117</td>
<td>7,690</td>
<td>16,673</td>
<td>118</td>
<td>16,791</td>
</tr>
<tr>
<td>Total</td>
<td>942,574</td>
<td>34,274</td>
<td>976,848</td>
<td>941,003</td>
<td>34,387</td>
<td>975,390</td>
</tr>
</tbody>
</table>

Source: Epidemiology Branch, Department of Health, WA.

- In 2003, the total population of WA was around 1.95 million, with similar proportions of males and females.
- The proportion of the population in each five-year age group gradually increases until 40-44 years, than decreases with increasing age.
- Aboriginal people represented 3.5% (68,661) of the total WA population in 2003. Census figures for 2001 reported that 2.4% of the Australian population identified as either Aboriginal or Torres Strait Islander.
- The age structure of the Aboriginal population is younger than that of the total population. The highest proportion of Aboriginal people was in the younger age groups, and this decreased with age, resulting in very few Aboriginal people aged 65 years or older.
In 2003, around 1 in every 10 Australians lived in WA.

As a proportion of the total Australian population, the WA population increased from 8.9% in 1983, to 9.8% in 2003.

The rate of increase has been similar for both WA males and females, although males make up a higher proportion of the Australian population than females.
Figure 3: Population, median age

- Between 1983 and 2003, the median age of WA males and females increased from 28.7 to 34.9 years and 29.5 to 36.2 years respectively.
- While WA population trends reflect those of the Australian population, the median age of WA males and females was generally around 1 year younger than that of the Australian population.
- In 2003, the median age of WA females was 1.3 years higher than their male counterparts.

Note: 2003 data is preliminary.
Source: Ridolfo et al., 2000; ABS, 2003, Cat No. 3201.0.
Between 1983 and 2003, the proportion of Western Australians aged 65 years and over increased from 8.8% to 11.3%. In 2003, persons aged 75 years and over represented 5.1% of the total WA population, compared to 3.3% in 1983.

The Australian population showed similar trends to those seen in WA. However, in 2003, 12.8% of the Australian population was aged 65 years and over, compared to 11.3% of the WA population.
Figure 5: Child and adult dependency ratios

<table>
<thead>
<tr>
<th>Year</th>
<th>Australia - Child</th>
<th>Australia - Aged</th>
<th>WA - Child</th>
<th>WA - Aged</th>
<th>WA - Dep. Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>32.9</td>
<td>16.6</td>
<td>34.6</td>
<td>14.2</td>
<td>48.8</td>
</tr>
<tr>
<td>1991</td>
<td>32.9</td>
<td>16.9</td>
<td>34.6</td>
<td>14.5</td>
<td>49.0</td>
</tr>
<tr>
<td>1992</td>
<td>32.7</td>
<td>17.2</td>
<td>34.3</td>
<td>14.8</td>
<td>49.0</td>
</tr>
<tr>
<td>1993</td>
<td>32.6</td>
<td>17.5</td>
<td>33.9</td>
<td>15.1</td>
<td>49.0</td>
</tr>
<tr>
<td>1994</td>
<td>32.5</td>
<td>17.7</td>
<td>33.5</td>
<td>15.2</td>
<td>48.8</td>
</tr>
<tr>
<td>1995</td>
<td>32.3</td>
<td>17.9</td>
<td>33.2</td>
<td>15.4</td>
<td>48.6</td>
</tr>
<tr>
<td>1996</td>
<td>32.1</td>
<td>18.1</td>
<td>33.0</td>
<td>15.5</td>
<td>48.5</td>
</tr>
<tr>
<td>1997</td>
<td>31.7</td>
<td>18.2</td>
<td>32.5</td>
<td>15.6</td>
<td>48.0</td>
</tr>
<tr>
<td>1998</td>
<td>31.5</td>
<td>18.4</td>
<td>32.3</td>
<td>15.8</td>
<td>47.9</td>
</tr>
<tr>
<td>1999</td>
<td>31.3</td>
<td>18.5</td>
<td>31.9</td>
<td>15.9</td>
<td>47.7</td>
</tr>
<tr>
<td>2000</td>
<td>31.0</td>
<td>18.6</td>
<td>31.5</td>
<td>16.2</td>
<td>47.5</td>
</tr>
<tr>
<td>2001</td>
<td>30.7</td>
<td>18.7</td>
<td>31.1</td>
<td>16.4</td>
<td>47.3</td>
</tr>
<tr>
<td>2002</td>
<td>30.3</td>
<td>18.9</td>
<td>30.4</td>
<td>16.6</td>
<td>46.9</td>
</tr>
<tr>
<td>2003</td>
<td>29.8</td>
<td>19.1</td>
<td>30.2</td>
<td></td>
<td>46.7</td>
</tr>
</tbody>
</table>

Note: Child dependency range is 0–14 years; aged dependency is 65 years and over.
Source: Ridolfo et al., 2000; ABS Cat No. 3201.0 various years.

- In 1985, the overall Australian child dependency rate was 35.7%. By 2003, this had decreased to 29.8%. WA recorded a similar decline, with the child dependency ratio falling from 36.9% to 30.2% between 1985 and 2003.
- Between 1985 and 2003, the aged dependency ratios in Australia and WA increased from 15.5% to 19.1% and 13.6% to 16.6% respectively. However, the overall dependency ratios for both Australia and WA remained relatively stable, primarily due to the decline in the child dependency ratio.
- In 2003, Australia recorded a dependency ratio of 48.9%, while WA was slightly lower at 46.7%. 
2 Risk factors for disease

The probability of developing disease will increase in association with exposure to risk factors in certain individuals (Detels, 1997). Disease risk factors may be behavioural (smoking and drinking), background (genetic and environmental), or physiological (high blood pressure and obesity) (AIHW, 1998).

Knowledge about the distribution of such risk factors allows public health professionals to design effective programs that enable interventions to occur prior to the development of disease (Detels, 1997).

For example, a wide range of studies have demonstrated that smoking is the largest single risk factor for ill health (cardiovascular disease, chronic respiratory disease and lung cancer) and that it is the leading cause of disability and death in developed countries.

Poor lifestyle habits such as smoking, excessive alcohol consumption, unbalanced nutrition, physical inactivity, and incorrect posture are likely to result in pulmonary diseases, chronic inflammation and musculoskeletal disorders, which contribute to a high proportion of disability and mortality (Hoffmeister & Mensink, 1997). These behaviours are also associated with the onset of some physiological risk factors such as obesity, high blood pressure and high blood cholesterol, which account for additional disability and mortality (AIHW, 2002a).

Today, chronic diseases such as cardiovascular disease, cancer and adult onset diabetes, are major concerns, particularly because of the ageing population. As these diseases develop over a long period of time and may not influence a person’s quality of life in the early stages of their development, prolonged periods of exposure to risk factors may occur before diagnosis (Hoffmeister & Mensink, 1997). Not only does this make it more difficult to alter exposures, it also means that any intervention designed to reduce hazardous exposures will take time to show benefits.

Most strategies for population health enhancement to reduce the population’s risk of disease (preventive medicine) can be divided into two approaches (Hoffmeister & Mensink, 1997):

- **Targeted:** The medical or high risk approach identifies people at high risk by screening for risk factors and then provides individual treatment for those detected. However, this approach may exclude large proportions of chronic diseases that occur in those who do not show high risk factor levels. Furthermore, screening, treatments, and individual health counselling are expensive, and particular drug treatments may have undesired side effects.

- **Population:** The public health approach is conducted at a population level rather than on an individual basis. This approach promotes healthy lifestyles and the avoidance of health risks; therefore, design of intervention strategies to reduce the prevalence of these risk factors is an important issue in public health.

### Smoking

#### Smoking status and its consequences

Tobacco smoking is the principal cause of preventable deaths and disease in Australia, contributing to more drug-related hospitalisations and deaths than alcohol and illicit drug use combined (AIHW, 2002a). Smoking was attributed with a high proportion of the total disease burden in WA in 2000 (males 10.3%; females 6.7%) (Somerford et al. 2004). This is because smoking is responsible for the majority of lung cancer cases, as well as an increased risk of coronary heart disease, stroke, peripheral vascular disease and a range of other cancers and conditions.

In 2001, tobacco was responsible for an estimated 966 male deaths (18% of all male deaths) and 480 female deaths (10% of all female deaths) in WA. In the same year, there were an estimated 12,733 hospital admissions in WA for treatment of tobacco-caused conditions. This represented 1.9% of all hospital admissions and cost in excess of $50 million (Unwin et al. 2004a).

The 2004 National Drug Strategy Household Survey found that the prevalence of those aged 14 years or over smoking on a daily or weekly basis WA (17.3%) was lower than the national figure (19.0%). The WA Health and Wellbeing Surveillance System estimated that 20.8% of the WA population aged 16 years and over in 2004 were current smokers (i.e. smoked daily or occasionally) – a decrease from 21.7% in 2000.

The 1999 Australian School Students Alcohol and Drug Survey found that 52% of 12-17-year-old school students surveyed in WA had smoked at least part of a cigarette at some time in their life. Thirty-five per cent had smoked in the last year, 21% in the last month, and 17% in the week prior to the survey (current smokers) (Alcohol and Other Drugs Program, 2001).
Anti-smoking strategies
The WA Tobacco Action Plan 2001-2004 (WATAP) provides a framework for tobacco control in WA. The goal of WATAP is to improve the health of Western Australians by reducing or eliminating their exposure to tobacco in all its forms. It does this by aiming to prevent the uptake of tobacco use in non-smokers, especially in children; reduce the number of tobacco users; reduce the exposure of users to the harmful health consequences of tobacco products; and reduce exposure to tobacco smoke (Department of Health WA, 2001).

Seven key strategy areas have been identified. These are:
- strengthening community action on tobacco;
- promoting cessation of tobacco use;
- reducing exposure to environmental tobacco smoke;
- reducing the availability and supply of tobacco;
- regulating tobacco;
- reducing tobacco promotion; and
- research and evaluation.

Diet and nutrition
Prevalence of poor diet and nutrition and its consequences
A healthy eating pattern is fundamental to the maintenance of good health and wellbeing. While many Australians enjoy a varied and healthy diet, there is still considerable room for improvement (Department of Health and Ageing, 2003).

Diet-related diseases have a significant impact on the health and wellbeing of Australians. For example, a high intake of saturated fats is associated with high blood cholesterol and overweight and obesity, while high salt consumption has been associated with high blood pressure. Hypertension accounted for 4.1% of WA’s burden of disease, excess weight for 3.9%, and high blood cholesterol for 1.9%, thus impacting significantly on heart disease, stroke, diabetes and various cancers (Somerford et al. 2004).

There is increasing evidence that eating fresh fruit and vegetables offers protection against many cancers and coronary heart disease. The WA Burden of Disease and Injury Study found that inadequate fruit and vegetable consumption (less than five servings of fruit and vegetables a day) accounted for 2.4% of the total burden of disease in the State (Somerford et al. 2004). The prevalence of self-reported insufficient fruit and vegetable intake was higher among males than females across all ages, and highest in the 25-34 year age group for both sexes (Katzenellenbogen et al. 2003).

The 2001 National Health Survey found that females were more likely to consume higher levels of fruit and vegetables, to use low fat or skimmed milk, and to use less salt than males (ABS, 2002). Data from the 1995 and 2000 WA health surveys and the latest (2004) data from the Western Australian Health and Wellbeing Surveillance System (WAHWSS) also reported higher levels of fruit and vegetable consumption among WA females than WA males.

The effect of good nutrition on health begins early in life. Insufficient folate in the diets of women who are, or intend to become pregnant, increases the risk of the foetus developing neural tube defects. Breastfeeding is also an important contributor to infant health and influences health status as an adult, having a protective role in several chronic diseases, including type 1 diabetes, inflammatory bowel disease, allergic diseases and obesity (AIHW, 2002b).

Diet improvement strategies
Public health nutrition concentrates on issues affecting the whole population, rather than the specific dietary needs of individuals. It encompasses topics such as food production, distribution and consumption, and focuses on the nutritional status and health of particular population groups, together with the nutritional knowledge, skills, attitudes and behaviours of the general community (Department of Health and Ageing, 2003).

The Dietary Guidelines for Australian Adults (NHMRC, 2003) promote a diet high in fruit, vegetables, legumes and cereals, and including lean meat, fish or poultry and dairy products. The guidelines also advise people to limit fat, salt, alcohol and sugars, and to drink plenty of water, be physically active, prepare and store food safely, and they encourage and support breastfeeding.

Intervention strategies that promote healthier eating patterns require a collaborative public health approach, including education, promotion of nutrition policy and making nutritional foods more available and accessible (Milligan, 1998). In order to plan, implement and evaluate these interventions, data from attitudinal and dietary surveys, together with diet-related mortality and morbidity data, are necessary.
**Excessive alcohol consumption**

**Prevalence and consequences of excessive alcohol consumption**

Excessive alcohol consumption increases the risk of chronic diseases such as stroke, mental health disorders, cancers and liver and pancreatic diseases, as well as the risk of acute conditions such as accidents, assaults and self-harm. Long-term health risks can be avoided by following the Australian Alcohol Guidelines. For males, this involves consuming no more than four standard drinks a day on average, or no more than 28 drinks a week, and for females, by consuming no more than two standard drinks a day and no more than 14 per week. Short-term health risks are increased for males who consume more than six standard drinks a day and for females who consume more than four standard drinks a day (NHMRC, 2001).

Nationally, in 1998, alcohol was responsible for an estimated 1,230 deaths among persons aged 35-64 years, and 814 deaths among people aged 15-34 years. In 1997/98, there were an estimated 23,594 and 25,207 alcohol-caused hospital admissions in these two age groups respectively (Miller & Draper, 2001).

In WA, the harmful effects of alcohol consumption were attributed to 5.5% of the total disease burden for 2000 (Somerford et al. 2004). There were an average of 416 deaths per year over the period 1983 to 2001, and 8,196 hospital admissions in 2001 due to conditions related to the harmful effects of alcohol (Unwin et al. 2004b).

In 2000, data from the WA health survey found that around 24% of males and 28% of females drank outside of recommended guidelines. However, the consumption of absolute alcohol per person among those aged 15 years and older decreased between 1988/89 and 1998/99 in both WA and Australia by 7.1% and 13.1% respectively. In WA over this period, the consumption of regular beer decreased, while the consumption of reduced strength beer increased (Unwin et al. 2004b).

**Inadequate physical activity**

**Physical inactivity and its consequences**

Physical inactivity contributes to the development of cardiovascular diseases, stroke, colorectal cancer, diabetes, osteoarthritis and osteoporosis. Consequently, a general increase in physical activity levels in the Australian population may assist in preventing these conditions (AIHW, 2002b).

In 2000, physical inactivity was responsible for 4.9% of the burden of disease and disability in WA, ranking second only to smoking in terms of the burden of disease from modifiable risk factors (Somerford et al. 2004).

The 2001 National Health Survey found that 70% of Australian adults had exercised for recreation, sport or fitness during the two weeks prior to the survey. Females were more likely to walk for exercise than males (58% and 50% respectively), while males were more likely to undertake moderate (40%) and vigorous (20%) exercise than females (33% and 11% respectively) (ABS, 2002).

In terms of exercise level, 65% of males and 74% of females were classified to sedentary or low exercise.
levels. Only 9% of males and 4% of females were classified to the high exercise level, with males aged 18-24 years being most likely to be classified to this level (ABS, 2002). Among Western Australians aged 16-64 years in 2004, 18.3% of males and 26.4% of females reported that they undertook less than adequate levels of physical activity.

People in the lowest socioeconomic groups and Aboriginal adults were more likely than other Australian adults to report no physical activity in their leisure time (AIHW, 2002a).

The National Physical Activity Guidelines (1999) recommend that Australian adults participate in at least 30 minutes of moderate intensity physical activity on most days of the week. The 2002 Adult Physical Activity Survey found that 55% of Western Australians reported participating in sufficient physical activity - this was a slight fall from the 1999 figure (58%). Males were more likely to be sufficiently active (57%) compared with females (52%), while 13% of Western Australians did not participate in any physical activity (McCormack et al. 2003).

**Strategies to promote exercise**

Measuring physical activity in populations is a challenging task. Physical activity for health benefit comprises several components (e.g. intensity, duration and number of times per week) that can be carried out in different settings (e.g. during leisure time, at work, for daily living or mode of transport). Measurement is further complicated because there are several dimensions of physical activity related to health, such as energy expenditure, aerobic intensity, strength and flexibility (AIHW, 2002a).

Physical activity levels have declined in Australia in recent years, and the rise in obesity is in all probability associated with this (Dunstan et al. 2001). In 2002, a Western Australian study found that 35% of WA residents were overweight, while a further 13% were obese. This represented an increase of 25% and 20% respectively since 1999 (McCormack et al. 2003).

Intervention strategies aimed at increasing the adoption and maintenance of physical activity tend to concentrate on both environmental and personal behaviour changes (Milligan, 1998).

There is a need to increase community awareness of the benefits of incorporating incidental physical activity into the day and to encourage it through the design of the physical environment. For example, making staircases in public places and workplaces more accessible and attractive, providing more exercise areas for dogs, incorporating local shops and facilities into the design of neighbourhoods, and making walking to the shop easier and more attractive than driving by providing safe, accessible walking routes and restrictions on car access and parking (McCormack et al. 2003).

There are a number of population groups who are less likely to undertake sufficient physical activity and these groups need to be targeted in future campaigns and programs. These include women, people aged 30 years and over, people with low levels of education, adults with children under five years of age, and those who are overweight or obese.

**Overweight and obesity**

Obesity is strongly linked to type 2 diabetes, and is also a risk factor for other conditions such as musculoskeletal conditions, cardiovascular disease, several cancers, sleep apnoea, and hypertension. Numerous studies have shown a clear relationship between high body mass index (BMI) and increased mortality and morbidity (AIHW, 2003).

Aside from genetic factors, overweight and obesity are caused by an energy imbalance, where energy intake exceeds energy expenditure over an extended period of time. Hence, good nutrition and adequate levels of physical activity play an important role in the prevention of weight gain (AIHW, 2003).

Factors affecting children early in life have the potential to contribute to the development of obesity in later life. These include poor intrauterine nutrition, low birthweight, absence of breastfeeding, the timing of minimal BMI (occurring between the ages of 5 and 7 years) and of maturation, as well as levels of physical activity and diet in childhood. Problems associated with excess weight in children and adolescence include heat intolerance, breathlessness on exertion, tiredness and flat feet (AIHW, 2003).

The prevalence of overweight and obesity has almost doubled amongst Australian adults over the last two decades, with Australia now ranked as one of the fattest developed nations, closely following the USA (AIHW, 2003).

In Australia, the prevalence of overweight and obesity has been determined by self-reporting and measurement surveys collecting height and weight information that enable BMI estimates to be calculated. Surveys relying on self-reporting, such as the National Health Survey and the WA Health and Wellbeing Surveillance System tend to underestimate the true prevalence of obesity as people are inclined to overestimate their height and underestimate their weight. Measurement surveys such as the 1999-2000...
Australian Diabetes, Obesity and Lifestyle Study (AusDiab) more accurately estimate the prevalence of overweight and obesity.

The AusDiab study found that two-thirds of WA males were either overweight (51%) or obese (16%), while around half of WA females were either overweight (31%) or obese (18%). The prevalence of obesity was highest in the 55-64 year age group for both genders in both Australia and WA. Generally, the prevalence of obesity among WA males was similar to that of Australian males, while WA females had a lower prevalence than females nationally. For overweight status, apart from a higher prevalence among Western Australians aged 75 years and older, the prevalence was similar in WA and Australia (Dunstan et al. 2001).

The 2001 National Health Survey found that half of all Australian adults were either overweight (males 42%; females 25%) or obese (males 16%; females 17%). For both males and females, the proportion classed as overweight or obese was highest in the age groups from 45 to 74 years. Nearly half the males who were overweight perceived their weight to be in the acceptable range, whereas women tended to be more realistic about their weight (ABS, 2002).

This represented an increase of around 26% for males and 31% for women from the figures reported in the 1989 National Health Survey (ABS, 2002). If this trend continues, it is estimated that at least 60% of all Australian adults will be overweight or obese by 2010, increasing to 65% by 2020. The situation appears to be similar for children and adolescents, with 20 to 25% of Australian children estimated to be either overweight or obese (AIHW, 2003).

WA estimates from 2004 indicated that around 61% of males and 44% of females aged 20 years and over were either overweight or obese. This was a considerable increase on the 1995 figure (47% and 35% respectively).

**High blood pressure**

Hypertension is an important physiological risk factor for cardiovascular and renal disease, as well as increasing the risk of cardiovascular disease, along with obesity, diabetes and high blood cholesterol (Dunstan et al. 2001). There is no threshold level of risk because of the continuous relationship between blood pressure and cardiovascular risk. The WHO defines someone with high blood pressure as having systolic blood pressure of 140 mmHg or more, or diastolic blood pressure of 90 mmHg or more, or receiving medication for high blood pressure (AIHW, 2004).

Based on a stricter definition of high blood pressure (160/95 mmHg) the burden of disease attributed to hypertension in WA in 2000 was 4.1% of the total (Somerford et al. 2004).

The 1980 and 1983 National Heart Foundation Risk Factor Prevalence Surveys found that hypertension (treated or untreated and defined as diastolic pressure $\geq$ 95 millimetres of mercury) was almost twice as common among men than women in Perth, and that it declined over time among both sexes (Hatton, 1985).

The AusDiab study found that the prevalence of hypertension (140/90 mmHg) in WA was slightly lower than the national prevalence for both males and females; however, the study showed a similar increase with age. In Australia, there was estimated to be one untreated and possibly undiagnosed person with hypertension for every person on treatment, indicating that self-reported survey data are likely to significantly underestimate the prevalence of hypertension by around half (Dunstan et al. 2001).

Analysis of the National Heart Foundation Risk Factor Prevalence Surveys of 1980, 1983 and 1989, the 1995 National Health Survey and the AusDiab study shows that the prevalence of hypertension in the Australian population has decreased significantly since 1980 among 25 to 64-year-old males and females living in capital cities (Dunstan et al. 2001).

According to WAHWSS data, around 14% of males and 16% of females aged 18 years and over reported that they were currently experiencing or taking medication for hypertension. However, it should be noted that surveys that rely on self-reported measures for indicators such as hypertension often underestimate the true prevalence as many of those with this condition are unaware of the fact.

**Blood cholesterol**

Like hypertension, the risk of cardiovascular disease increases with increasing levels of blood cholesterol. Total cholesterol levels are considered a crude but consistent measure of cardiovascular risk (Dunstan et al. 2001). While there is no threshold level, a total cholesterol level of 5.5mmol/L or more is considered high (AIHW, 2004).

The AusDiab study measured high blood pressure and found that more than half of WA males and females had high blood cholesterol in 2000 (Dunstan et al. 2001), with the total disease burden attributed to high blood cholesterol in WA estimated to be around 1.9% (Somerford et al. 2004).
The prevalence of high blood cholesterol was highest among females aged 75 years and above and males aged 55-64 years. Generally, the prevalence among WA males was similar to that of Australian males, while WA females had a marginally higher prevalence than their Australian counterparts.

The National Heart Foundation Risk Factor Prevalence Surveys and the AusDiab study showed little change in high blood cholesterol prevalence and mean total cholesterol levels among Australians aged 25-64 years living in capital cities between 1980 and 2000 (Dunstan et al. 2001). This is concerning, as it may contribute to a major burden of cardiovascular disease in the future (Dunstan et al. 2001).

Results from the National Health Survey (ABS, 2003) and the WA Health and Wellbeing Surveillance System (WAHWSS) (unpublished) present self-reported, rather than measured data for those with high blood cholesterol. According to the NHS, around 8% of Australians aged 15 years and over reported high blood cholesterol, while the WAHWSS found that 14% of WA males and 12% of WA females aged 18 years and over had high blood cholesterol. Measured prevalence figures for high blood cholesterol, as reported by the AusDiab study indicated that slightly more than 50% of males and females in both Australia and WA experienced this condition.

The difference between self-reported and measured prevalence for high blood cholesterol indicates that there is a significant number of people in the wider community who are unaware that they have high blood cholesterol.

**Illicit drug use**

In addition to being a direct cause of drug dependence and abuse, illicit drug use is also a risk factor for many conditions, including HIV/AIDS, hepatitis C, low birthweight, malnutrition, infective endocarditis, poisoning, suicide and self-inflicted injury.

The use of drugs other than alcohol and tobacco (including drugs used for medicinal purposes) accounted for 2.5% of the total disease burden of the population of WA in 2000. Among people aged less than 45 years, the abuse of drugs other than alcohol and tobacco represented 8.0% and 4.3% of the male and female disease burden respectively (Somerford et al. 2004).

In 2001, 22% of Western Australians had used an illicit drug within the previous 12 months. This was second only to the Northern Territory (29%) among Australian jurisdictions, and higher than the prevalence for the total Australian population (17%) (AIHW, 2002c). The primary illicit drug used in WA within the past 12 months was cannabis, with nearly 18% of the population reporting its use. This was higher than the Australian prevalence of reported cannabis use (13%). Of the other drugs, WA had the highest use of hallucinogens and non-medical use of analgesics and tranquilisers compared to other jurisdictions. In addition, in 2001 it was estimated that there were 19,300 injecting drug users in WA, which was higher than any other Australian State or Territory (AIHW, 2002c).

The variation in illicit drug use by age and sex was similar for WA and Australia, with the prevalence highest among males and the youngest age groups (AIHW, 2002c). The relatively younger age structure of the WA population compared to Australia and other States may account for part of the difference in drug use.

**References**

Alcohol and Other Drugs Program (2001). *Illicit and licit use of drugs by WA school students in 1999*. (Bulletin No. 16). Perth: Health Department of WA.


Figure 6: Tobacco smoking status, proportion of the population aged 14 years and over, Australian States and Territories, 2004

<table>
<thead>
<tr>
<th>Smoking status</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>NT</th>
<th>WA</th>
<th>Aust</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Per cent) Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>17.2</td>
<td>18.8</td>
<td>21.5</td>
<td>17.3</td>
<td>22.0</td>
<td>18.7</td>
<td>28.6</td>
<td>17.0</td>
<td>18.6</td>
</tr>
<tr>
<td>Weekly</td>
<td>2.0</td>
<td>2.6</td>
<td>1.5</td>
<td>1.7</td>
<td>1.6</td>
<td>3.1</td>
<td>1.8</td>
<td>1.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Less than weekly</td>
<td>2.1</td>
<td>2.2</td>
<td>1.7</td>
<td>1.6</td>
<td>1.5</td>
<td>1.9</td>
<td>2.3</td>
<td>1.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Ex-smokers(a)</td>
<td>26.8</td>
<td>28.0</td>
<td>32.6</td>
<td>32.9</td>
<td>29.8</td>
<td>26.2</td>
<td>28.3</td>
<td>31.7</td>
<td>29.2</td>
</tr>
<tr>
<td>Never smoked(b)</td>
<td>52.0</td>
<td>48.4</td>
<td>42.7</td>
<td>46.5</td>
<td>45.1</td>
<td>50.0</td>
<td>39.0</td>
<td>48.0</td>
<td>48.2</td>
</tr>
<tr>
<td>(Per cent) Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>15.8</td>
<td>16.1</td>
<td>18.1</td>
<td>15.7</td>
<td>21.0</td>
<td>13.7</td>
<td>25.9</td>
<td>14.0</td>
<td>16.3</td>
</tr>
<tr>
<td>Weekly</td>
<td>1.1</td>
<td>1.3</td>
<td>1.4</td>
<td>0.9</td>
<td>1.1</td>
<td>1.6</td>
<td>1.4</td>
<td>1.7</td>
<td>1.2</td>
</tr>
<tr>
<td>Less than weekly</td>
<td>1.4</td>
<td>1.3</td>
<td>1.3</td>
<td>1.1</td>
<td>1.1</td>
<td>2.5</td>
<td>1.7</td>
<td>1.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Ex-smokers(a)</td>
<td>22.8</td>
<td>23.2</td>
<td>23.4</td>
<td>24.7</td>
<td>26.6</td>
<td>25.0</td>
<td>22.9</td>
<td>26.2</td>
<td>23.6</td>
</tr>
<tr>
<td>Never smoked(b)</td>
<td>58.9</td>
<td>58.2</td>
<td>55.8</td>
<td>57.6</td>
<td>50.2</td>
<td>57.3</td>
<td>48.0</td>
<td>56.9</td>
<td>57.5</td>
</tr>
<tr>
<td>(Per cent) Persons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>16.5</td>
<td>17.4</td>
<td>19.8</td>
<td>16.5</td>
<td>21.5</td>
<td>16.1</td>
<td>27.3</td>
<td>15.5</td>
<td>17.4</td>
</tr>
<tr>
<td>Weekly</td>
<td>1.5</td>
<td>1.9</td>
<td>1.4</td>
<td>1.3</td>
<td>1.3</td>
<td>2.3</td>
<td>1.6</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>Less than weekly</td>
<td>1.7</td>
<td>1.7</td>
<td>1.5</td>
<td>1.3</td>
<td>1.3</td>
<td>2.2</td>
<td>2.0</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Ex-smokers(a)</td>
<td>24.8</td>
<td>25.6</td>
<td>27.6</td>
<td>28.8</td>
<td>28.2</td>
<td>25.6</td>
<td>25.7</td>
<td>28.9</td>
<td>26.4</td>
</tr>
<tr>
<td>Never smoked(b)</td>
<td>55.5</td>
<td>53.4</td>
<td>49.4</td>
<td>52.1</td>
<td>47.7</td>
<td>53.7</td>
<td>43.4</td>
<td>52.5</td>
<td>52.9</td>
</tr>
</tbody>
</table>

(a) Smoked at least 100 cigarettes (or equivalent amount of tobacco) in their lifetime, but reported no longer smoking.
(b) Never smoked more than 100 cigarettes (or equivalent amount of tobacco).

- In 2004, 15.5% of Western Australians aged 14 years or over reported smoking tobacco on a daily basis.
- Less than one in five WA males (18.9%) aged 14 years or over reported that they smoked on either a daily or weekly basis. This was slightly lower than the national average (20.6%) and lower than any other State or Territory.
- A lower proportion of WA females (15.7%) aged 14 years or over reported smoking on either a daily or weekly basis in 2004. This was lower than the national figure (17.5%), and lower than any other state or territory except for the ACT.
Figure 7: Daily smokers, persons aged 14 years and over

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - males</td>
<td>25.9</td>
<td>25.1</td>
<td>21.1</td>
</tr>
<tr>
<td>Australia - females</td>
<td>21.8</td>
<td>20.0</td>
<td>18.0</td>
</tr>
<tr>
<td>WA - males</td>
<td>24.2</td>
<td>24.7</td>
<td>20.7</td>
</tr>
<tr>
<td>WA - females</td>
<td>23.1</td>
<td>20.5</td>
<td>19.5</td>
</tr>
</tbody>
</table>


- In 1995, 24% of males and 23% of females in WA reported smoking on a daily basis.
- By 2001, the percentages of daily smokers in WA had fallen to 21% for males and 20% for females.
- Trends in the prevalence of daily smoking in WA were similar to those reported for the total Australian population.
- The proportion of WA males reporting daily smoking was lower than that reported for the total Australian male population.
- In 1995, the proportion of WA females smoking on a daily basis was lower than that reported for females nationally. However, by 2001, WA had a higher proportion of female daily smokers than among the total Australian female population.
Figure 8: Usual daily intake of fruit, persons aged 18 years and over, 2001

<table>
<thead>
<tr>
<th>Exercise level</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>WA</th>
<th>Aust</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 serve or less</td>
<td>48.7</td>
<td>46.7</td>
<td>44.8</td>
<td>52.5</td>
<td>49.8</td>
<td>45.7</td>
<td>45.3</td>
<td>47.5</td>
</tr>
<tr>
<td>2-3 serves</td>
<td>41.4</td>
<td>42.2</td>
<td>44.6</td>
<td>40.6</td>
<td>40.2</td>
<td>43.5</td>
<td>42.1</td>
<td>42.1</td>
</tr>
<tr>
<td>4-5 serves</td>
<td>8.5</td>
<td>8.9</td>
<td>8.6</td>
<td>5.4</td>
<td>8.0</td>
<td>8.9</td>
<td>10.6</td>
<td>8.5</td>
</tr>
<tr>
<td>6 serves or more</td>
<td>1.4</td>
<td>2.1</td>
<td>2.0</td>
<td>1.4</td>
<td>2.0</td>
<td>1.9</td>
<td>1.9</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Note: NT sample contributes to national estimate.

- In 2001 it was estimated that 54.6% of the WA population consumed the recommended (NHMRC, 2003) two or more servings of fruit daily. This was higher than any other State or Territory except for Queensland (55.2%) and higher than the Australia average (52.4%).
Figure 9: Inadequate fruit and vegetable intake\(^{a}\), persons aged 18 years and over, WA

- The proportion of Western Australians reporting an inadequate intake of fruit and vegetables was generally higher among males than females throughout the 1995 to 2004 survey periods.
- The proportion of males reporting an inadequate intake of fruit and vegetables increased between 1995 and 2000; however a decrease was reported in 2003 and 2004, with vegetable consumption falling below the 1995 figure. Fruit intake among females remained relatively stable.
- The proportion of females reporting an inadequate intake of vegetables decreased between 1995 and 2003, and remained stable.
- While the trends noted between 1995 and 2003 may be due to genuine behaviour change, they may also be due to seasonal factors related to when the survey was conducted.

<table>
<thead>
<tr>
<th></th>
<th>1995(^{a})</th>
<th>2000</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit intake</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>45.8</td>
<td>55.7</td>
<td>52.3</td>
<td>52.5</td>
</tr>
<tr>
<td>Females</td>
<td>40.7</td>
<td>41.8</td>
<td>40.6</td>
<td>40.8</td>
</tr>
<tr>
<td>Vegetable intake</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>28.8</td>
<td>32.9</td>
<td>28.1</td>
<td>27.4</td>
</tr>
<tr>
<td>Females</td>
<td>30.2</td>
<td>18.6</td>
<td>16.7</td>
<td>16.7</td>
</tr>
</tbody>
</table>

Note: Age-standardised prevalence.
(a) Less than one serve daily.
(b) The method used to calculate total serves in 1995 was different from subsequent years.
Sources: 1995 WA Health Survey; WA Collaborative Health and Wellbeing Survey; WA Health and Wellbeing Surveillance System.
Figure 10: Alcohol risk, persons aged 18 years and over, 2001

- In 2001, one in every eight Western Australians reported drinking at risky/high risk levels. This was higher than the national average, and highest of the six States and one Territory presented (separate estimates were not available for the Northern Territory).
- Around one in every eight (12.5%) Western Australians age 18 years or over reported that they drank alcohol at either risky/high-risk levels in the week prior to participating in the 2001 National Health Survey.
- Victoria recorded the lowest proportion of persons aged 18 years or over who drank alcohol at either risky/high risk levels (9.3%).

### Alcohol risk

<table>
<thead>
<tr>
<th>Alcohol risk</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>WA</th>
<th>Aust(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risky(b)</td>
<td>6.7</td>
<td>5.9</td>
<td>7.3</td>
<td>6.7</td>
<td>6.3</td>
<td>7.5</td>
<td>7.6</td>
<td>6.1</td>
</tr>
<tr>
<td>High risk(c)</td>
<td>4.1</td>
<td>3.4</td>
<td>4.6</td>
<td>4.2</td>
<td>3.5</td>
<td>4.2</td>
<td>4.9</td>
<td>4.1</td>
</tr>
<tr>
<td>Risky/high risk</td>
<td>10.8</td>
<td>9.3</td>
<td>11.9</td>
<td>10.9</td>
<td>9.8</td>
<td>11.7</td>
<td>12.5</td>
<td>10.2</td>
</tr>
</tbody>
</table>

(a) Separate estimates for NT were not available, however NT contributes to the Australian total.
(b) Males – more than 50 and up to 75 ml; Females – more than 25 and up to 50 ml.
(c) Males – more than 75 ml; Females – more than 50 ml.

In 2001, one in three (33%) Western Australians were estimated to be either moderately or highly physically active. This was slightly higher than the national figure (31%). Only the ACT had a higher level of moderate or high physical activity (38%).

The prevalence of people reporting no physical activity (sedentary) in WA (28%) was lower than the Australian average (32%), with only the ACT having a lower proportion of sedentary people (24%) in 2001.
Figure 12: Less than moderate physical activity, persons aged 18-64 years, WA

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>21.3</td>
<td>18.7</td>
<td>18.3</td>
</tr>
<tr>
<td>Females</td>
<td>28.7</td>
<td>26.0</td>
<td>26.4</td>
</tr>
</tbody>
</table>

Note: Age-standardised prevalence.
Sources: WA Collaborative Health and Wellbeing Survey; WA Health and Wellbeing Surveillance System.

- The proportion of males aged 18-64 years engaging in less than moderate physical activity decreased between 2002 and 2004.
- For females aged 18-64 years, the proportion engaging in less than moderate physical activity generally decreased during this same period.
- A higher proportion of males engaged in less than moderate physical activity compared to females over the three-year period, with more than a quarter of all females aged 18-64 years engaging in less than moderate physical activity in 2004, compared to less than 20% of males.
Figure 13: Prevalence of overweight and obesity, persons aged 25 years and over, 2000

- In 2000, WA had a slightly lower prevalence of obesity but a slightly higher prevalence of people who were overweight compared with Australia.

- The age distribution of those who are overweight or obese in WA fluctuates more than the national figure due to a smaller sample size. In addition, prevalence estimates for WA may not be representative of the whole State, as only areas of the Perth metropolitan area were sampled.

- The prevalence of obesity in WA increased with age up to 64 years for males and 74 years for females, after which time it decreased. The prevalence of obesity among females in WA was lower for all ages than among females nationally. For males in WA, the prevalence of obesity was similar to that of Australian males, except for the lower prevalence reported among WA males aged 25-34 years.

- A higher proportion of males were overweight than females at all ages. Overweight status for females in WA increased with age, and among those aged 75 years and over the prevalence was higher than for Australian females. Male overweight status peaked at ages 35-44 years, while levels among those aged 75 years and over were higher than levels among males nationally.

Source: Australian Diabetes, Obesity and Lifestyle Report (AUSDiab).
Figure 14: Trends in overweight and obesity, persons aged 20 years and over, WA

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>46.8</td>
<td>53.9</td>
<td>58.4</td>
<td>61.1</td>
</tr>
<tr>
<td>Females</td>
<td>35.2</td>
<td>38.8</td>
<td>42.3</td>
<td>44.4</td>
</tr>
</tbody>
</table>

Note: Age-standardised prevalence.
(a) Ages 18 and over.
Source: 1995 WA Health Survey; WA Collaborative Health and Wellbeing Survey; WA Health and Wellbeing Surveillance System.

- The prevalence of overweight and obesity among WA males and females aged 20-64 years in 2004 was 61% and 44% respectively, increasing from 47% and 35% in 1995.
- From 1995 to 2004, the prevalence of overweight and obesity was higher among males than among females.
Figure 15: Age-specific prevalence of hypertension, persons aged 25 years and over, 2000

- The prevalence of hypertension (140/90 mmHg or on medication) among WA males and females was lower than that among their counterparts nationally. Only males aged 55-64 years and females aged 75 years and over in WA had a higher prevalence than Australian males and females of the same age.

- The age distribution of the prevalence of hypertension among males and females in WA was similar to that of Australian males and females, with prevalence increasing with age. However, the prevalence estimates for WA may not be representative of the whole State as areas selected for sampling were located entirely within the Perth metropolitan area.

Source: Australian Diabetes, Obesity and Lifestyle Report.
Figure 16: Age-specific prevalence of high blood cholesterol, persons aged 25 years and over, 2000

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Australia - males</th>
<th>Australian - females</th>
<th>WA - males</th>
<th>WA - females</th>
</tr>
</thead>
<tbody>
<tr>
<td>25–34</td>
<td>32</td>
<td>31</td>
<td>30</td>
<td>39</td>
</tr>
<tr>
<td>35–44</td>
<td>55</td>
<td>39</td>
<td>61</td>
<td>36</td>
</tr>
<tr>
<td>45–54</td>
<td>61</td>
<td>55</td>
<td>63</td>
<td>57</td>
</tr>
<tr>
<td>55–64</td>
<td>61</td>
<td>71</td>
<td>65</td>
<td>79</td>
</tr>
<tr>
<td>65–74</td>
<td>54</td>
<td>75</td>
<td>51</td>
<td>75</td>
</tr>
<tr>
<td>75+</td>
<td>50</td>
<td>65</td>
<td>45</td>
<td>80</td>
</tr>
</tbody>
</table>

Source: Australian diabetes, Obesity and Lifestyle Report.

- More than half of the population of WA over the age of 25 years was estimated to have high blood cholesterol. While the prevalence among WA males was similar to that of Australian males, the prevalence among WA females was marginally higher than that of females nationally. However, the prevalence estimates for WA may not be representative of the whole State, as areas selected for sampling were located solely in the Perth metropolitan area.

- The prevalence of high blood cholesterol among WA females increased with age, whereas among males it peaked among those aged 55 to 64 years after which age it reduced. Consequently, the prevalence of high blood cholesterol was higher in males younger than 54 years and higher in females older than 54 years.
**Figure 17: Illicit drug use in last 12 months, persons aged 14 years and over, 2001**

<table>
<thead>
<tr>
<th>Drug</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>NT</th>
<th>WA</th>
<th>Aust</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Marijuana/cannabis</em></td>
<td>11.9</td>
<td>11.8</td>
<td>12.7</td>
<td>14.2</td>
<td>11.9</td>
<td>14.4</td>
<td>24.2</td>
<td>17.5</td>
<td>12.9</td>
</tr>
<tr>
<td><em>Amphetamines</em></td>
<td>3.4</td>
<td>2.4</td>
<td>2.9</td>
<td>4.3</td>
<td>2.1</td>
<td>4.5</td>
<td>6.3</td>
<td>5.8</td>
<td>3.4</td>
</tr>
<tr>
<td><em>Pain-killers/analgesics</em></td>
<td>2.5</td>
<td>3.2</td>
<td>3.4</td>
<td>3.1</td>
<td>2.2</td>
<td>3.3</td>
<td>3.8</td>
<td>3.9</td>
<td>3.1</td>
</tr>
<tr>
<td><em>Ecstasy/designer drugs</em></td>
<td>3.4</td>
<td>3.0</td>
<td>1.7</td>
<td>2.0</td>
<td>0.8</td>
<td>4.8</td>
<td>2.8</td>
<td>4.0</td>
<td>2.9</td>
</tr>
<tr>
<td><em>Cocaine</em></td>
<td>1.8</td>
<td>1.3</td>
<td>0.7</td>
<td>0.7</td>
<td><em>0.2</em></td>
<td>1.5</td>
<td><em>0.5</em></td>
<td>1.5</td>
<td>1.3</td>
</tr>
<tr>
<td><em>Tranquilisers/sleeping pills</em></td>
<td>0.9</td>
<td>1.1</td>
<td>1.2</td>
<td>1.4</td>
<td>1.0</td>
<td>1.4</td>
<td>1.1</td>
<td>1.7</td>
<td>1.1</td>
</tr>
<tr>
<td><em>Hallucinogens</em></td>
<td>0.9</td>
<td>0.9</td>
<td>0.8</td>
<td>1.9</td>
<td>1.0</td>
<td>1.8</td>
<td>1.7</td>
<td>2.0</td>
<td>1.1</td>
</tr>
<tr>
<td><em>Injected drugs</em></td>
<td>0.3</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>1.0</td>
<td><em>0.3</em></td>
<td>1.9</td>
<td>1.3</td>
<td>0.6</td>
</tr>
<tr>
<td><em>Inhalants</em></td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.7</td>
<td><em>0.2</em></td>
<td>0.5</td>
<td><em>0.5</em></td>
<td>0.6</td>
<td>0.4</td>
</tr>
<tr>
<td><em>Other opiates</em></td>
<td>0.2</td>
<td>0.4</td>
<td>0.3</td>
<td><em>0.3</em></td>
<td>0.7</td>
<td>0.6</td>
<td>0.8</td>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td><em>Heroin</em></td>
<td>0.2</td>
<td>0.3</td>
<td><em>0.2</em></td>
<td><em>0.1</em></td>
<td><em>0.3</em></td>
<td><em>0.4</em></td>
<td><em>0.1</em></td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td><em>Barbiturates</em></td>
<td><em>0.1</em></td>
<td>0.2</td>
<td><em>0.2</em></td>
<td><em>0.3</em></td>
<td><em>0.1</em></td>
<td><em>0.2</em></td>
<td><em>0.1</em></td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td><em>Steroids</em></td>
<td><em>0.1</em></td>
<td>0.3</td>
<td><em>0.1</em></td>
<td><em>0.3</em></td>
<td><em>0.1</em></td>
<td><em>0.1</em></td>
<td><em>0.1</em></td>
<td><em>0.1</em></td>
<td>0.2</td>
</tr>
<tr>
<td><em>Methadone</em></td>
<td><em>0.1</em></td>
<td><em>0.1</em></td>
<td>-</td>
<td><em>0.1</em></td>
<td><em>0.1</em></td>
<td>-</td>
<td><em>0.3</em></td>
<td><em>0.1</em></td>
<td>0.1</td>
</tr>
<tr>
<td>Any illicit</td>
<td>15.8</td>
<td>16.0</td>
<td>16.5</td>
<td>17.8</td>
<td>14.3</td>
<td>18.1</td>
<td>29.2</td>
<td>22.0</td>
<td>16.9</td>
</tr>
</tbody>
</table>

(a)  Used in the past 12 months.
(b)  For non-medical purposes.
(c)  For non-maintenance purposes.
* Relative standard error greater than 50%.

- The prevalence of illicit drug use within the last 12 months in WA was 22% compared with 17% nationally. As illicit drug use is most prevalent in younger age groups, the younger age structure of the WA population compared to the Australian population may account for this difference.
- Cannabis was the most frequently used illicit drug in both WA (18%) and Australia (13%). In 2001, the prevalence of illicit drug use other than cannabis was higher in WA (3.9%) than Australia (3.5%).
3

Summary health measures

Mortality

Mortality is one of the most widely available, and therefore better known measures of ill-health. The advantages of mortality data are that they are easily obtainable, are not biased by collection, and provide information about a one-off event for individuals. However, mortality data provide information about only a very small proportion of the population (about 0.5% of the population dies each year) who are at the extreme end of the health-disease spectrum.

Several different measures are used to evaluate and compare the effect of mortality in populations: number of deaths, mortality rates, years of life lost and life expectancy. Monitoring changes in the long-term pattern of mortality, in terms of cause, age, sex, population group, socioeconomic status and geographical distribution, highlights changes in the health status of the population that may need investigating. Thus, patterns of mortality in the community inform the work of epidemiologists, medical personnel, and those working in health policy, planning and administration.

Trends in mortality

Considerable improvements to the health of Australians have been made over the last century, resulting in substantial decreases in mortality rates and increases in life expectancy. Between 1907 and 2003, age-standardised mortality rates for males fell by around 64.8% (from 2,234 to 786 deaths per 100,000 persons), and female mortality rates fell by 71.8% (from 1,844 to 520 deaths per 100,000 persons). This decline in mortality has contributed to Australia’s ageing population.

Generally, mortality rates increase with age. In 2000, more than 70% of males and 80% of females who died were aged 65 years or older. Over 20% of male deaths and 14% of female deaths were among those aged 25-64 years, whereas only 3.5% of male deaths and 2.0% of female deaths occurred in people younger than 25 years.

Person Years of Life Lost (PYLL) is a measure of mortality that places more importance on deaths that occur at younger ages, with the aim of providing an indicator of premature mortality. As with mortality rates, PYLL per 1,000 persons has fallen steadily in both WA and Australia. The fall in PYLL recorded in WA between 1990 and 2003, from 80 to 54 years per 1,000 persons for males and 44 to 31 years per 1,000 persons for females indicated a decline in premature deaths. This decline was similar to that recorded throughout Australia with similar figures among males and females in WA and Australia recorded in 2003.

Causes of death vary with age. Conditions originating in the perinatal period (e.g. disorders related to the length of gestation and foetal growth) are the major cause of death for infants aged less than one year. Injury and poisoning is the most common cause of death for females aged 1-24 years, and for males aged 1-44 years. Cancers are the leading cause of death for females aged 25-64 years and males aged 45-64 years, while cardiovascular disease is the main cause of death among people aged 65 years and older.

The main causes of death have also changed over time. In the early 1900s, most deaths were due to infectious and parasitic diseases, respiratory diseases, circulatory diseases and cancer. Deaths resulting from infectious and parasitic diseases have decreased dramatically, from 25% of all deaths in 1907 to about 1% in 2003, while the contribution of respiratory conditions has fallen from 13% to 8% over this period.

However, deaths from circulatory diseases and cancer continue to be the leading causes of death, and have increased as a percentage of all deaths. Deaths from circulatory disease increased from about 15% of all deaths in 1907, to 40% in 2003, while deaths from cancer have increased from 7% of all deaths in 1907 to around 30% in 2003.

Several factors are responsible for the decline in death rates, and the change in mortality patterns recorded in Australia over the past century. These include:

- a better understanding of the environmental factors that affect health and the resulting improvements to public infrastructure;
- a better understanding of health risks and beneficial factors, and improvements in education levels within the general population, which have contributed to behavioural changes resulting in reductions in the incidence of some diseases;
- medical and surgical advances, and improvements in access to medical and other health services.

Life expectancy

Life expectancy is often used to indicate changes in the health status of a community or to make comparisons between population groups. It is defined as the average number of years of life remaining to a
person at a specified age, assuming current age-specific mortality rates continue during the person’s lifetime.

The expected length of a life is inversely related to the mortality rates at that time, and low infant mortality rates and an ageing population are both indicative of longer life expectancy. In Australia, life expectancy has increased significantly over the past century.

Based on the latest mortality rates, a boy born in WA in 2003 could expect to live to 78.1 years on average, while a girl could expect to live to 83.0 years (ABS, 2005). However, a person’s life expectancy also depends on the age they have already reached. For example, of Western Australians who turned 30 in 2002, males can expect to live to the age of 79.3 years and females to the age of 83.8 years, whereas for those who turned 65 in 2003, males can expect to live to the age of 82.8 years and females to the age of 86.2 years.

Over the period 1901-2000, Australian life expectancy at birth increased by 21.4 years for males and 23.3 years for females. There are many influences on mortality and life expectancy. For instance, the rise in cigarette-smoking over the past century resulted in large increases in mortality from lung cancer, cardiovascular disease, respiratory and other conditions, which had a retarding effect on life expectancy.

Life expectancy is not uniform across all populations within Australia. Aboriginal people have a lower life expectancy than the general Australian population (ABS, 2001). Life expectancy also varies between regions. For example, life expectancy at birth in the Northern Territory is lower than the national average by 5.3 years for males and 6.5 years for females. These differences reflect the higher mortality rates of the Aboriginal population who make up nearly 30% of the Northern Territory population (Mathers et al. 1999). Australians from lower socioeconomic areas also experience lower life expectancy. In 1998-2000, males aged 25 years from the most disadvantaged areas of the country had a life expectancy of 51.8 years compared to 55.1 years for males from the least disadvantaged areas. Females aged 25 years from the most disadvantaged areas recorded a life expectancy of 57.5 years, while their counterparts from the least disadvantaged areas could expect to live for 59.2 years (Draper et al. 2004).

References
Figure 18: Life expectancy at birth

- Life expectancy at birth increased for both WA and Australian males and females between 1984 and 2003.
- Life expectancy at birth was consistently higher for WA males and females than for their Australian counterparts over this period.
- Over the past decade, females in both WA and Australia consistently reported higher life expectancies than their male counterparts.
- In 2003, male life expectancies were 78.1 years in WA and 77.8 years nationally, while female life expectancies were 83.0 years and 82.8 years respectively.

Note: Life expectancy calculations based on year of registration.
Sources: Ridolfo et al 2000; ABS 1993–2003 Cat No 3302.0; ABS 1993-2003 Cat No 3311.5; ABS 2005 Cat No 3311.0.55.001.
Figure 19: Expected age at death, persons aged 65 years

- The expected age at death for a person at 65 years of age increased for both males and females in WA and Australia between 1991 and 2003.
- Male and female life expectancies at age 65 years in WA were higher than the national figure.
- In 2003, the expected age at death for WA males having reached 65 years was 82.8 years compared to 82.6 years for Australian males. For females, the expected ages at death having reached 65 years were 86.2 years in WA and 86.0 years nationally.

Note: Life expectancy calculations based on year of registration.
Male and female mortality rates in WA were lower than those recorded by their Australian counterparts between 1991 and 2003.

Female mortality rates were consistently lower than male rates in both WA and Australia; however, the gap has narrowed in recent years due to a faster decline in male mortality rates.

Male and female mortality rates in WA decreased steadily between 1983 and 2003, falling by an average of around 2.3% and 1.7% per year respectively.

Nationally, between 1991 and 2003, similar falls were recorded for males (2.9% per year) and females (2.2% per year). Over the same period in WA, mortality rates fell by 2.6% for males and 2.0% for females.
**Table 1: Ten leading causes of death, 2002**

<table>
<thead>
<tr>
<th>Cause of death and ICD-10 code</th>
<th>No</th>
<th>% of all deaths</th>
<th>Cause of death and ICD-10 code</th>
<th>No</th>
<th>% of all deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Western Australia</strong></td>
<td></td>
<td></td>
<td><strong>Australia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Ischaemic heart disease (I20–I25)</td>
<td>1,056</td>
<td>18.5</td>
<td>1 Ischaemic heart disease (I20–I25)</td>
<td>954</td>
<td>17.7</td>
</tr>
<tr>
<td>2 Lung cancer (C33, C34)</td>
<td>473</td>
<td>8.3</td>
<td>2 Cerebrovascular disease (I60–I69)</td>
<td>529</td>
<td>9.8</td>
</tr>
<tr>
<td>3 Cerebrovascular disease (I60–I69)</td>
<td>365</td>
<td>6.4</td>
<td>3 Dementia &amp; related disorders</td>
<td>311</td>
<td>5.8</td>
</tr>
<tr>
<td>4 Chronic obstructive pulmonary disease</td>
<td>233</td>
<td>4.1</td>
<td>(F01–F03, G30–G32)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Colorectal cancer (C18–C21)</td>
<td>225</td>
<td>3.9</td>
<td>4 Breast cancer (C50)</td>
<td>226</td>
<td>4.2</td>
</tr>
<tr>
<td>6 Suicide (X60–X84)</td>
<td>188</td>
<td>3.3</td>
<td>2 Cerebrovascular disease (I60–I69)</td>
<td>529</td>
<td>9.8</td>
</tr>
<tr>
<td>7 Prostate cancer (C61)</td>
<td>185</td>
<td>3.2</td>
<td>6 Colorectal cancer (C18–C21)</td>
<td>177</td>
<td>3.3</td>
</tr>
<tr>
<td>8 Diabetes (E10–E14)</td>
<td>140</td>
<td>2.4</td>
<td>7 Chronic obstructive pulmonary disease (J41–J44)</td>
<td>166</td>
<td>3.1</td>
</tr>
<tr>
<td>9 Transport related accidents (V01–V99)</td>
<td>128</td>
<td>2.2</td>
<td>8 Diabetes (E10–E14)</td>
<td>155</td>
<td>2.9</td>
</tr>
<tr>
<td>10 Diseases of the arteries, arterioles &amp; capillaries (I70–I79)</td>
<td>122</td>
<td>2.1</td>
<td>9 Organic psychotic conditions (F00–F09)</td>
<td>142</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Total leading causes</strong></td>
<td><strong>3,115</strong></td>
<td><strong>54.4</strong></td>
<td><strong>Total leading causes</strong></td>
<td><strong>3,014</strong></td>
<td><strong>56.1</strong></td>
</tr>
<tr>
<td><strong>All deaths</strong></td>
<td><strong>5,721</strong></td>
<td><strong>100</strong></td>
<td><strong>All deaths</strong></td>
<td><strong>5,376</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Sources: AIHW 2004; ABS mortality data.

- In 2002, ischaemic heart disease was the leading cause of death in WA and Australia for both males and females, accounting for around one in five deaths. Variations in the order of the leading causes between WA and Australia may be partly due to the younger age structure of the WA population.
- Among WA males, lung cancer was responsible for the second highest number of deaths (8.3% of all male deaths) followed by cerebrovascular disease (6.4%) and chronic obstructive pulmonary disease (4.1%). Nationally, cerebrovascular disease was the second most common cause of death for males, accounting for 7.2% of all male deaths. Lung cancer (6.9%) and chronic obstructive pulmonary disease (4.8%) were the next most common causes among Australian males.
- Among WA females, the second most reported cause of death after ischaemic heart disease was cerebrovascular disease (9.8%), followed by dementia and related disorders (5.8%), breast cancer (4.2%) and lung cancer (4.1%). These four causes were also the leading causes of death after ischaemic heart disease for Australian females, responsible for 11.7%, 4.7%, 4.2% and 3.9% of all female deaths, respectively.
- The younger age distribution of the WA population may account for some of the differences from the Australian population in the order of the leading causes.
Burden of disease

Although measures of mortality are useful when examining the health outcomes of a population, they are limited in their ability to reflect other dimensions of health status, such as disease incidence and severity, disability and quality of life. Hence, an alternative health summary measure is required to evaluate the impact of disease groups (including non-fatal conditions) on the health of populations.

The Burden of Disease (BOD) methodology, which was initiated and promoted by the World Health Organisation, provides such a measure. The BOD describes the impact of different diseases and risk factors on both the quantity and quality of life in a population. The Disability Adjusted Life Year (DALY) is the measure used to estimate the BOD. DALYs have a quantity of life component called years of life lost (YLL) and a quality of life component called Years of Life Lost Due to Disability (YLD). Thus, they calculate the amount of full health lost due to illness or injury (Murray & Lopez, 1996).

The advantages of the BOD approach over more traditional population health measures such as mortality rates and hospital utilisation rates are:

- it integrates both quantity and quality of life measures;
- it allows the aggregation and disaggregation of diseases in many different ways (e.g. by age, sex, cause, risk factor or geography);
- it provides information about the contribution of risk factors to the BOD profile, thus highlighting the preventable proportion;
- it provides information about the total disability experienced by the population (rather than just hospital admissions), so providing a more holistic measure;
- the inputs to the BOD model are based on epidemiological data, so the results are not affected by factors affecting hospital utilisation; and
- the BOD model is based on the entire course of a disease, therefore it has the capacity to examine the impact of changes following the onset of disease.

Years of Life Lost due to mortality (YLL)

Years of Life Lost is a measure of premature mortality; however, unlike Potential Years of Life Lost (PYLL), it includes deaths at all ages and so includes all years lost to death among the population. In WA in 2000, mortality accounted for about half of the total disease burden (54% for males and 47% for females). Among most ten-year age groups, male YLL were higher than that reported by females, except for those aged 75 years and older (Katzenellenbogen et al. 2003).

Cardiovascular disease, cancers and injuries accounted for more than 70% of the mortality burden in both males and females. Injuries were responsible for the majority of YLL among children and young adults, particularly for males. Cardiovascular diseases accounted for over a third of the mortality burden among those aged 75 years and older. The mortality burden from cancer increased from 35 years among males and 45 years among females to become a major cause of mortality burden at older ages (Katzenellenbogen et al. 2003).

Comparison of age-standardised rates of YLL for 1996 and 2000 in WA show a substantial reduction over the five-year period, with rates among males declining more rapidly than among females. Of the major disease groups only the rate of injury among females increased over this period. Age-standardised rates for the Australian population were similar to those reported in WA and showed a similar decline over the five-year period (Katzenellenbogen et al. 2003).

While ischaemic heart disease was the leading cause of mortality burden for both sexes, other leading causes varied with sex. For males, suicide was the second leading cause, accounting for more than four times the mortality burden among females. Other leading causes for males were lung cancer, road traffic accidents and stroke. Females were more at risk from diseases associated with age, due to their greater longevity. Stroke was the second leading cause for females and accounted for more mortality burden than among males. Breast, lung and colorectal cancer were the next most common causes among females (Katzenellenbogen et al. 2003).

Years of Life Lost Due to Disability (YLD)

Years of Life Lost Due to Disability measures the non-fatal component of the burden of disease and is referred to as the disability component. Disability accounted for about half of the total burden of disease for WA (53% of the female burden and 47% of the male burden) (Somerford et al. 2004a).

A large proportion of the disability burden among males (46%) and females (49%) was due to mental disorders and neurological conditions. Females had a higher disability burden for mental disorders, neurological and sense organ disorders, and musculoskeletal conditions than males. Males had a higher disability burden for cancer, cardiovascular, chronic respiratory conditions, injury and diabetes (Somerford et al. 2004a).
Disability burden peaked in early childhood and early adulthood, before increasing with age. The female disability burden was higher than the male burden between the ages of 15 and 55 years due to the greater mental health burden among females during these ages (Somerford et al. 2004a).

Depression was the leading cause of disability burden for both sexes, and contributed more to the female disability burden than to the male burden. Dementia and osteoarthritis were the second and third leading causes for females and also contributed more to the female burden than the male burden. Among males, the other leading causes of disability burden were hearing loss and alcohol dependence and abuse (Somerford et al. 2004a).

**Disability-Adjusted Life Years**

In 2000, the estimated burden of disease and injury in WA was 117,048 DALYs for males and 105,703 for females, with a crude rate of 118 DALYs per 1,000 population (Somerford et al. 2004b). After adjusting for age, the WA rate was 122 DALYs per 1,000 persons, lower than the Australian rate of 137 estimated in 1996 (Mathers et al. 1999).

Cardiovascular disease, cancer and mental disorders were the leading causes, accounting for more than half of the disease burden for both sexes. Neurological and sense organ disorders was the next leading cause, contributing 13% to the female burden and 9% to the male burden. For males, injury contributed 13% of the burden compared to 6% for females (Somerford et al. 2004b).

The age distribution of the total disease burden was highest for the oldest age groups, with minor peaks in early childhood and among youths (15–24 years) reflecting the disability burden among these age groups. Among youths the burden is almost entirely accounted for by disability, with mental disorders and injury the dominant disease groups. Among older people, cardiovascular diseases, cancer and neurological disorders contributed most to the burden for both sexes, consequently the mortality burden accounted for the greatest proportion of the total burden. The rate of disease burden for males was higher than that for females at all ages (Somerford et al. 2004c).

Apart from ischaemic heart disease, which was the leading cause of burden for both sexes in WA in 2000, the leading causes of burden differed between the genders. For males, smoking-related diseases (lung cancer and chronic obstructive pulmonary disease) and injuries (suicide and self-inflicted injury, road traffic accidents) were major contributors to the burden. Mental disorders (dementias and depressions) and breast cancer accounted for a major proportion of the burden among females. Stroke and diabetes ranked highly for both sexes (Somerford et al. 2004b).

**References**


In 1996 and 2000, the rate of YLL among males and females was similar for both WA and Australia.

There were substantial reductions in both WA and national age-standardised YLL from 1996 to 2000 for both sexes. Male all-cause rates decreased by 16% in WA and 13% in Australia, while female rates decreased by 10% in both WA and Australia.

The rate for most disease groups decreased from 1996 to 2000, except for injury rates, which increased among WA and Australian females. For females in WA, the injury rate increased by 19% compared to 11% for Australian females. The greatest rate reduction was for cardiovascular disease; in WA, the male rate decreased by 24% and the female rate decreased by 20%. WA males showed a greater decrease in the rate for cancer (13%) compared to WA females (5%).
Figure 22: Mortality burden (YLL), leading causes, WA, 2000

- The 20 leading causes of YLL accounted for over two-thirds of the male and female YLL. Ischaemic heart disease was the leading cause for both sexes.
- Among males, suicide, lung cancer, road traffic accidents and stroke were the other leading causes of YLL. For females, the other leading causes were stroke, lung, colorectal and breast cancer.
Figure 23: Disability burden (YLD), leading causes, WA, 2000

- The 20 leading causes of YLD accounted for nearly two-thirds of the male and female YLD.
- Depression was the leading cause of YLD for both sexes, but contributed a greater proportion to the female YLD than to the male YLDs. Of the other leading causes eight were mental disorders.
- For males, other leading causes were hearing loss and alcohol dependence and abuse, which contributed a greater proportion to the male YLD than to the female YLD. Among females, dementia and osteoarthritis were the next leading causes.

The 20 leading causes of disease burden (DALYs) accounted for 58% of the burden for both sexes.

Ischaemic heart disease was the leading cause of disease burden for both sexes and stroke and diabetes also ranked highly for both males and females.

Lung cancer, suicide, COPD and road traffic accidents were leading causes among males, while dementia, depression and breast cancer were leading causes among females.
Health status

Self-rated health is widely used internationally as a global indicator of morbidity. A poor health rating has been associated with higher mortality, poorer physical functioning and psychological distress compared to excellent or good health ratings (Manor et al. 2001). In addition, self-rated health has been associated with level of education, ethnicity and socioeconomic status (Burstrom & Fredlund, 2001).

In 2003, the WA Health and Wellbeing Surveillance System asked respondents to rate their health as generally excellent, very good, good, fair or poor. The majority of adult Western Australians (86% of males and 89% of females) rated their health as good or better. The proportion of WA females who rated their health as good or better had increased from 86% in 1995, but the proportion of WA males who considered their health to be good or better remained unchanged from 1995.

The 2001 National Health Survey found that 81% of Australians rated their health as good or better (ABS, 2002). This represented a decrease from 1995 when 83% of Australians rated their health as good or better (AIHW, 2004).

References


Figure 25: Fair or poor health status, persons aged 18 years and over, WA

- Based on the self-rated health assessment of respondents, 14% of WA males and 11% of WA females rated their health as either fair or poor in 2004.

- The proportion of females in WA who considered their health to be fair or poor declined from 14% in 1995, whereas the proportion of males in WA who considered their health to be fair or poor remained the same as in 1995 at around 14%.

Note: Age-standardised prevalence.
Sources: 1995 WA health survey; WA collaborative health and wellbeing survey; WA health and wellbeing surveillance system.
Population subgroups

Perinatal and infant health

The majority of pregnancies and confinements in Australia do not result in mortality or severe illness. However, pregnancy, childbirth and infancy remain a time of vulnerability for mothers and their children, and illness in an infant’s first few days of life, and problems associated with the health of the mother, can impact on a child’s future health as well as their immediate wellbeing and development (AIHW, 2002).

Many factors that affect the health of children have their origin in the womb. For example, smoking during pregnancy can have a number of detrimental effects. A Sydney study found that women who smoked during pregnancy had higher rates of abruptio placenta, threatened premature labour and premature labour, and gave birth to babies who were more likely to be of a low birthweight and have increased neonatal morbidity (Bai et al. 2000).

Excessive alcohol intake can also have a number of effects on the foetus, such as increased heartbeat, dilation of the small blood vessels and, in extreme cases, foetal alcohol syndrome (National Institute on Alcohol Abuse and Alcoholism, 2000).

Maternal nutrition is important for the developing foetus, with poor nutrition possibly leaving the offspring susceptible to disease later in life (Barker, 1998). Diseases and conditions linked to undernourishment of the foetus include coronary heart disease, hypertension and non-insulin-dependent diabetes. Evidence suggests that an adequate intake of folate by the mother before and in early pregnancy can prevent up to 70% of neural tube birth defects and possibly other non-neural tube defects (Lumley et al. 2001).

Maternal age can also impact on the development of the foetus. Both adolescents and women of advanced reproductive age have special needs and are susceptible to different obstetric risks. Pregnant teenagers appear to be at an increased risk of poor maternal weight gain, terminations, hypertensive disorders and low birthweight infants. Pregnant women over the age of 34 have an increased risk of chromosomal aneuploidies and are more likely to have a chronic disease, such as chronic hypertension or diabetes mellitus, to complicate pregnancies (Ozalp et al. 2003).

Adequate antenatal care is important for the health of the neonate (Dixon et al. 2000). Antenatal care can be seen as a screening process during which pregnancies at high risk of poor foetal or maternal outcome are identified, and appropriate obstetric services are prescribed to reduce perinatal and infant deaths and the prevalence of birth defects (Hobbs & Jamrozik, 1997).

Perinatal and infant deaths

Perinatal deaths are caused by maternal and foetal conditions arising at any time before, during or soon after birth, including pre-term birth and congenital malformations (birth defects). Perinatal deaths are composed of foetal and neonatal deaths from all causes. In 2000, there were 2,076 perinatal deaths in Australia. Of these, 63% were foetal deaths and 37% were neonatal deaths. In WA in 2003, there were 184 foetal deaths and 53 neonatal deaths for a perinatal mortality rate of 9.6 deaths per 1,000 total births (Gee & Green, 2004).

Over the ten-year period 1991 to 2000, the national perinatal death rate fell by 25%, from 10.6 to 8.3 per 1,000 total births (AIHW, 2002).

Infant mortality (the death of a child in the first year of life) is used internationally as a key indicator of the hygiene and health conditions prevailing in a community. Studies have shown the lowest risk of infant death is for babies of mothers aged 25-34 years, having a second child, who are advantaged socioeconomically. Specifically, infant mortality increases with decreasing levels of occupational skills of the father and the risk is high for babies of single mothers (Alberman & Pharoah, 1997).

Over the period 1999-2003, the leading cause of infant mortality in WA and Australia was certain conditions originating in the perinatal period. These conditions accounted for 47% of male deaths and 42% of female deaths in WA and 51% male and female deaths in Australia.

Low birthweight

Birthweight is the best indicator of early mortality, as infant mortality increases with falling birthweight (Alberman & Pharoah, 1997). Low birthweight results from premature birth or intrauterine growth retardation (IUGR), for which the risk factors include young maternal age, low pre-pregnancy weight, nulliparity and nutritional status of the mother. Additional risks for IUGR are related to cigarette smoking and maternal height. Other risk factors for preterm labour are obstetrical factors (prior spontaneous or induced abortion, previous stillbirth, incompetent cervix and uterine anomaly) and an education to only high school level (Lang et al. 1996). Other studies have demonstrated the association of low socioeconomic status, multiple births, and high
alcohol consumption with a pregnancy outcome of low birthweight (Abraham et al. 1995). Research has also indicated that assisted conception is a risk factor for low birthweight (Helmerhorst et al. 2004).

A NSW study found that infant sex, maternal age, marital status, Aboriginality, parity, maternal smoking behaviour during pregnancy and maternal hypertension all influenced premature birth and low birthweight. First-born infants, and infants born to mothers aged less than 20 years, or who were single, separated or divorced, or who were Aboriginal, or who smoked during the pregnancy, were at increased risk of being born prematurely or of low birthweight. Gestational age was confirmed to be the single most important risk factor for low birthweight (Mohsin et al. 2003).

Low birthweight babies (i.e. those less than 2,500 grams) are more likely to suffer from physical and neurological complications than normal weight infants (Hobbs & Jamrozik, 1997; Fryers, 1997). These complications are potentially fatal, but mortality has been reduced by improvements in neonatal intensive care and monitoring of intraterine growth and foetal distress during labour. However, low birthweight babies who survive may show more morbidity and disability in future years (Hobbs & Jamrozik, 1997). Babies born with an extremely low birthweight (less than 1,000 grams) have an increased risk of major disabilities such as cerebral palsy, mental retardation, blindness and deafness. In addition, they are also more likely to experience behavioural problems later in childhood (Hille et al. 2001; Weindrich et al. 2003).

Sudden Infant Death Syndrome
Sudden Infant Death Syndrome (SIDS) is the sudden and unexpected death of an infant where the death remains unexplained despite a complete post-mortem examination. A review conducted by the National SIDS Council of Australia (Henderson-Smart et al. 1998) recommended that to reduce the risk of SIDS, babies should sleep on their backs, have their heads uncovered during sleep, and be kept in a smoke-free environment before and after birth. Smoking is one of the most important preventable risk factors for SIDS, and the risk has been found to increase with the number of cigarettes smoked near the baby (Klonoff-Cohen et al. 1995).

From 2001 to 2003, SIDS was cited as the underlying cause of death for 6 boys and 9 girls in WA, representing a total of 3.6% and 6.5% of all infant deaths over this period respectively. In Australia in 2001-2003, SIDS represented 8.4% of all male infant deaths and 6.9% of all female deaths.

Birth defects
Birth defects are anatomical defects or chromosomal abnormalities that are present at birth. Major birth defects are those that are lethal or significantly affect the individual’s function or appearance. The WA Birth Defects Registry records birth defects of babies born in WA up to six years of age. Data collected nationally may be influenced by the completeness of clinical detection, notification of major malformations and the extent to which the various sources of notification are used within each State and Territory (Lancaster et al. 1997).

Some birth defects have a genetic basis and can be explained by numerical or structural chromosomal aberrations, monogenetic mode of inheritance and exposure to exogenous agents, such as radiation, teratogenic drugs and viruses during early pregnancy (Vogel & Motulsky, 1997). Studies of factors associated with dysplasia of the hip have identified breech presentation, postmaturity and female sex of the baby, as well as primiparity and older age of the mother (Chan et al. 1997; Yiv et al. 1997).

Interventions are available to prevent the majority of birth defects (Hobbs & Jamrozik, 1997). For example, genetic counselling of couples with genetic disorders to avoid pregnancy; routine neonatal screening to identify conditions (some may be remedied through early neonatal medical treatment and surgery, while for others termination of pregnancy may be deemed appropriate); increasing awareness of all known teratogens and prevention of exposure to them; and supplementation of the maternal diet with folate, both before and after pregnancy, to protect against neural tube defects.

The proportion of births with defects has increased from under 5% in the early birth cohorts (1980-1982) to a peak of 7.0% in 1996-1997. As birth defects are recorded up to six years after birth, current figures available for children aged less than 6 years will underestimate the prevalence of those born with defects (Bower et al. 2004).

References


**Figure 26: Number of live births and crude birth rate**

<table>
<thead>
<tr>
<th>Year</th>
<th>Australia - live births</th>
<th>Australia - crude birth rate</th>
<th>WA - live births</th>
<th>WA - crude birth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>260,229</td>
<td>14.7</td>
<td>25,137</td>
<td>15.0</td>
</tr>
<tr>
<td>1994</td>
<td>258,051</td>
<td>14.5</td>
<td>25,220</td>
<td>14.8</td>
</tr>
<tr>
<td>1995</td>
<td>256,190</td>
<td>14.2</td>
<td>25,223</td>
<td>14.6</td>
</tr>
<tr>
<td>1996</td>
<td>253,834</td>
<td>13.9</td>
<td>25,334</td>
<td>14.3</td>
</tr>
<tr>
<td>1997</td>
<td>251,842</td>
<td>13.6</td>
<td>25,085</td>
<td>14.0</td>
</tr>
<tr>
<td>1998</td>
<td>249,616</td>
<td>13.3</td>
<td>25,513</td>
<td>13.8</td>
</tr>
<tr>
<td>1999</td>
<td>248,870</td>
<td>13.1</td>
<td>25,592</td>
<td>13.3</td>
</tr>
<tr>
<td>2000</td>
<td>249,636</td>
<td>13.0</td>
<td>25,022</td>
<td>13.0</td>
</tr>
<tr>
<td>2001</td>
<td>246,394</td>
<td>12.7</td>
<td>24,773</td>
<td>12.8</td>
</tr>
<tr>
<td>2002</td>
<td>250,988</td>
<td>12.8</td>
<td>24,590</td>
<td>12.6</td>
</tr>
<tr>
<td>2003</td>
<td>251,161</td>
<td>12.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


- In 2003, there were 251,161 live births recorded in Australia, with nearly 10% (24,683) of these in WA.
- The crude birth rate for WA fell from 16.2 live births per 1,000 persons in 1986 to 12.7 in 2003. This was similar to the national trend.
- The crude birth rate for WA was slightly higher than that for Australia except in 2002 when the crude birth rates for both were 12.8.
Figure 27: Fertility rate, women aged 15-49 years

![Fertility Rate Graph](image)

- Between 1986 and 2003, the total fertility rate for females aged 15-49 years decreased in both WA (from 1.93 to 1.74 births per female) and Australia (from 1.87 to 1.76 births per female).

- Over the last decade, the total fertility rate for WA was generally higher than that for Australia, but in 2002 and 2003 the total fertility rate for Australia was slightly higher than that for WA.
Figure 28: Mean age of mother at confinement

- Between 1986 and 2003, the mean age of mothers at confinement increased by around 2.5 years in both WA and Australia.
- Mothers in WA tended to be around 2-3 months younger than their Australian counterparts.
Figure 29: Number and per cent of live births to women aged less than 18 years

<table>
<thead>
<tr>
<th>Year</th>
<th>Australia Number of babies</th>
<th>Australia Per cent of live births</th>
<th>WA Number of babies</th>
<th>WA Per cent of live births</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>4,330</td>
<td>1.7</td>
<td>508</td>
<td>2.0</td>
</tr>
<tr>
<td>1991</td>
<td>4,186</td>
<td>1.7</td>
<td>520</td>
<td>2.1</td>
</tr>
<tr>
<td>1992</td>
<td>3,977</td>
<td>1.5</td>
<td>513</td>
<td>2.0</td>
</tr>
<tr>
<td>1993</td>
<td>3,844</td>
<td>1.5</td>
<td>496</td>
<td>2.0</td>
</tr>
<tr>
<td>1994</td>
<td>3,863</td>
<td>1.5</td>
<td>526</td>
<td>2.1</td>
</tr>
<tr>
<td>1995</td>
<td>3,840</td>
<td>1.5</td>
<td>505</td>
<td>2.1</td>
</tr>
<tr>
<td>1996</td>
<td>3,964</td>
<td>1.6</td>
<td>486</td>
<td>2.0</td>
</tr>
<tr>
<td>1997</td>
<td>3,715</td>
<td>1.5</td>
<td>465</td>
<td>1.9</td>
</tr>
<tr>
<td>1998</td>
<td>3,685</td>
<td>1.5</td>
<td>501</td>
<td>2.0</td>
</tr>
<tr>
<td>1999</td>
<td>3,561</td>
<td>1.4</td>
<td>511</td>
<td>1.9</td>
</tr>
<tr>
<td>2000</td>
<td>3,478</td>
<td>1.4</td>
<td>481</td>
<td>1.9</td>
</tr>
<tr>
<td>2001</td>
<td>3,444</td>
<td>1.4</td>
<td>460</td>
<td>1.9</td>
</tr>
<tr>
<td>2002</td>
<td>3,366</td>
<td>1.3</td>
<td>463</td>
<td>1.9</td>
</tr>
<tr>
<td>2003</td>
<td>3,244</td>
<td>1.3</td>
<td>470</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Source: Ridolfo et al. 2000; ABS Cat No. 3301.0 (various years); WA Midwives Notification System.

- WA has consistently had a higher proportion of babies born to mothers aged 17 years or younger than Australia.
- In 1986, around 2.2% of all live births in WA and 1.8% in Australia were to females aged 17 years or less. By 2003, these figures had fallen to 1.9% and 1.3% respectively.
Figure 30: Stillbirth and neonatal mortality rate

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - stillbirths</td>
<td>6.4</td>
<td>5.5</td>
<td>5.5</td>
<td>5.9</td>
<td>6.5</td>
<td>6.0</td>
<td>5.3</td>
<td>5.1</td>
<td>5.2</td>
<td>5.2</td>
<td>4.9</td>
<td>—</td>
</tr>
<tr>
<td>Australia - neonatal deaths</td>
<td>4.3</td>
<td>3.7</td>
<td>3.7</td>
<td>3.5</td>
<td>3.5</td>
<td>3.2</td>
<td>3.0</td>
<td>3.4</td>
<td>3.1</td>
<td>3.3</td>
<td>3.1</td>
<td>—</td>
</tr>
<tr>
<td>WA - stillbirths</td>
<td>6.6</td>
<td>6.9</td>
<td>7.5</td>
<td>7.7</td>
<td>7.8</td>
<td>6.7</td>
<td>6.4</td>
<td>6.9</td>
<td>8.2</td>
<td>6.7</td>
<td>7.1</td>
<td>7.5</td>
</tr>
<tr>
<td>WA - neonatal deaths</td>
<td>4.5</td>
<td>3.1</td>
<td>3.8</td>
<td>3.0</td>
<td>3.8</td>
<td>2.6</td>
<td>2.7</td>
<td>2.9</td>
<td>2.6</td>
<td>2.9</td>
<td>2.2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Note: Fetal, neonatal and perinatal deaths based on year of registration with 400 grams/20 weeks gestation.

- Over the last decade, the rate of stillbirths reported in WA has generally been higher than Australia. However, WA has consistently reported a lower neonatal mortality rate.
- In 2003, there were around 7.5 stillbirths and 2.2 neonatal deaths reported in WA per 1,000 births. This compared to 4.9 stillbirths and 3.1 neonatal deaths per 1,000 births in Australia in 2002.
Figure 31: Perinatal mortality rate

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>10.7</td>
<td>9.2</td>
<td>9.2</td>
<td>9.4</td>
<td>10.0</td>
<td>9.2</td>
<td>8.3</td>
<td>8.5</td>
<td>8.3</td>
<td>8.4</td>
<td>8.0</td>
<td>—</td>
</tr>
<tr>
<td>Western Australia</td>
<td>11.0</td>
<td>10.0</td>
<td>11.1</td>
<td>10.7</td>
<td>11.5</td>
<td>9.3</td>
<td>9.1</td>
<td>9.9</td>
<td>10.7</td>
<td>9.6</td>
<td>9.2</td>
<td>9.6</td>
</tr>
</tbody>
</table>

Note: Fetal, neonatal and perinatal deaths based on year of registration with 400 grams/20 weeks gestation.

- Between 1992 and 2002, the perinatal mortality rates for WA and Australia fell slightly, from 11.0 to 9.2 deaths per 1,000 births and 10.7 to 8.0 deaths per 1,000 births respectively.
- In 2003 the perinatal mortality rate in WA was 9.6 deaths per 1,000 births.
- From 1989 onwards, WA has generally recorded higher perinatal mortality rates than Australia.
Figure 32: Infant mortality rate

Between 1986 and 2003, infant mortality in WA fell from 10.5 to 3.8 deaths per 1,000 live births for males and 7.5 to 3.0 deaths per 1,000 live births for females.

Over this same period, infant mortality in Australia fell from 10.0 to 4.8 deaths per 1,000 live births for males and from 7.7 to 3.9 deaths per 1,000 live births for females.

Females experienced lower infant mortality rates than males in both WA and Australia.
### Table 2: Total birth defects reported (per 1,000 births), WA

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>49.1</td>
<td>52.0</td>
<td>61.0</td>
<td>66.0</td>
<td>52.2</td>
</tr>
<tr>
<td><strong>Nervous system</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neural tube defects</td>
<td>4.3</td>
<td>4.3</td>
<td>4.7</td>
<td>4.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Anencephalus</td>
<td>1.9</td>
<td>1.9</td>
<td>2.0</td>
<td>1.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Spina bifida</td>
<td>0.8</td>
<td>0.9</td>
<td>0.9</td>
<td>0.7</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Cardiovascular</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventricle septal defect</td>
<td>7.8</td>
<td>8.7</td>
<td>11.9</td>
<td>12.6</td>
<td>12.1</td>
</tr>
<tr>
<td>Atrial septal defect</td>
<td>4.0</td>
<td>4.4</td>
<td>6.6</td>
<td>7.1</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>Gastro-intestinal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleft palate</td>
<td>1.5</td>
<td>1.3</td>
<td>1.9</td>
<td>2.1</td>
<td>1.8</td>
</tr>
<tr>
<td>Total cleft lip</td>
<td>1.2</td>
<td>1.4</td>
<td>1.0</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Uro-genital</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undescended testis (treated)</td>
<td>6.5</td>
<td>6.7</td>
<td>6.7</td>
<td>5.7</td>
<td>3.3</td>
</tr>
<tr>
<td>Hypospadias</td>
<td>2.7</td>
<td>3.0</td>
<td>3.5</td>
<td>3.6</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Musculoskeletal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developmental dysplasia of hip</td>
<td>6.8</td>
<td>6.1</td>
<td>6.0</td>
<td>7.0</td>
<td>5.2</td>
</tr>
<tr>
<td>Talipes</td>
<td>2.4</td>
<td>2.0</td>
<td>2.1</td>
<td>2.0</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>Chromosomal defects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Down Syndrome</td>
<td>2.0</td>
<td>2.6</td>
<td>3.5</td>
<td>4.3</td>
<td>5.1</td>
</tr>
</tbody>
</table>

Source: Bower et al. 2004

- There has been an increase in the birth defects notified from 1980-84 to 1995-99. The reduction in 2000-03 is due to incomplete ascertainment as the cohort born after 1998 has not yet lived to six years of age and additional defects will be diagnosed up to that age.
- From 1980 to 2003 musculoskeletal and urogenital defects were the leading birth defect categories.
- Neural tube defects have decreased since 1990-94, as have anencephaly and spina bifida. An increased maternal intake of folate during pregnancy, as folic acid supplements and in food fortified with folate is thought to account for the decrease (WA Birth Defects Registry 2004).
- Due to the increased ascertainment of birth cardiovascular defects, especially ventricular septal defects, the number of defects report, increased between 1980 and 2003 (WA Birth Defects Registry 2004).
- The increase in pregnancies among women aged over 35 years is thought to partly explain the increase in chromosomal defects (WA Birth Defects Registry 2004).
PERINATAL AND INFANT HEALTH

SIDS

Figure 33: Sudden Infant Death Syndrome

- There has been a general decline in Sudden Infant Death Syndrome (SIDS) cases reported in both WA and Australian over the past 15 years. This may be due to public education programs outlining NHMRC guidelines concerning babies’ sleeping positions. The National SIDS Council of Australia public education campaign on the sleeping position of infants was introduced in 1991. Tasmanian research indicated that up to 70% of the decline in SIDS in that state was due to the change in sleeping position from the stomach to the back (Al-Yaman et al. 2002).

- The National SIDS Council of Australia public education campaign on the sleeping position of infants was introduced in 1991.

- From 1990 to 2003, SIDS rates in WA fell by 96%, from 231.2 to 8.1 deaths per 100,000 births, while SIDS rates nationally fell by 86%, from 192 to 27.3 deaths per 100,000 births.

- In 1990, 60 SIDS deaths were recorded in WA (males 35; females 25), whereas in 2003 there were 2 SIDS deaths.

### Table: Sudden Infant Death Syndrome (SIDS) Rates

<table>
<thead>
<tr>
<th>Year</th>
<th>Australia Rate</th>
<th>WA Rate</th>
<th>WA Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>192.0</td>
<td>231.2</td>
<td>60</td>
</tr>
<tr>
<td>1991</td>
<td>144.0</td>
<td>193.0</td>
<td>48</td>
</tr>
<tr>
<td>1992</td>
<td>115.5</td>
<td>93.4</td>
<td>24</td>
</tr>
<tr>
<td>1993</td>
<td>102.0</td>
<td>114.7</td>
<td>29</td>
</tr>
<tr>
<td>1994</td>
<td>86.5</td>
<td>107.2</td>
<td>27</td>
</tr>
<tr>
<td>1995</td>
<td>80.0</td>
<td>101.7</td>
<td>26</td>
</tr>
<tr>
<td>1996</td>
<td>83.5</td>
<td>89.6</td>
<td>23</td>
</tr>
<tr>
<td>1997</td>
<td>58.0</td>
<td>83.6</td>
<td>21</td>
</tr>
<tr>
<td>1998</td>
<td>53.5</td>
<td>82.6</td>
<td>21</td>
</tr>
<tr>
<td>1999</td>
<td>62.0</td>
<td>58.1</td>
<td>15</td>
</tr>
<tr>
<td>2000</td>
<td>51.5</td>
<td>39.7</td>
<td>10</td>
</tr>
<tr>
<td>2001</td>
<td>42.0</td>
<td>40.6</td>
<td>10</td>
</tr>
<tr>
<td>2002</td>
<td>41.6</td>
<td>12.3</td>
<td>3</td>
</tr>
<tr>
<td>2003</td>
<td>27.3</td>
<td>8.1</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: ICD-9 798.0, ICD-10 R95.; Children aged <1 year.
Figure 34: Number and proportion of infants weighing less than 2,500 grams

- In 2002, 17,554 Australian babies were born weighing less than 2,500 grams. Of these, around one in ten (1,670) were born in WA.
- Throughout the 1990s, the proportion of infants weighing less than 2,500 grams was generally higher in WA than Australia, although in recent years the difference has decreased.
- The proportion of infants weighing less than 2,500 grams remained stable throughout the first half of the decade. Over recent years, the proportion has increased slightly in both WA and Australia.
Child health

Children in Australia generally enjoy good health, and like other Australians their health has continued to improve over the last few decades. In 2004, there were 3.7 million children aged 1-14 years in Australia, accounting for around 18.5% of the total population. In WA in 2004, 18.9%, or 374,111 children were aged 1-14 years.

Among children aged 0-14 years, the majority of deaths occur amongst those aged less than 1 year of age. Over the period 1998-2000, age-specific mortality rates for males and females aged less than 1 year in Australia were 587 and 469 deaths per 100,000 persons respectively (Draper et al. 2004). By comparison, mortality rates for children aged 1-14 years over this period were much lower (males 21 deaths per 100,000 persons; females 15 deaths per 100,000 persons).

These two groups also have different burden of disease and illness profiles. The leading causes of death for children aged less than 1 year in 2003 in Australia were conditions originating in the perinatal period (551 deaths, 50% of all deaths in this age group) and congenital malformations, deformations and chromosomal abnormalities (262 deaths, 23% of total).

In 2003, accidents and injuries were responsible for the greatest number of deaths nationally among children aged 1-14 years, (214 deaths, 40.1% of all deaths in this age group). For children aged 1-14 years living in WA, accidents and injuries were also the leading cause of death, with transport accidents and drowning constituting a significant proportion.

In WA in 2003, 31 males and 27 females aged 1-14 years died, representing 0.5% of all male and female deaths in WA. Nationally in 2003, deaths among children aged 1-14 years accounted for 0.5% of all deaths for males and 0.4% of all female deaths.

References
Figure 35: Mortality rate, all causes, children aged 1-14 years

- In both Australia and WA, female mortality rates for children aged 1-14 years were considerably lower than for their male counterparts.

- Mortality rates for WA boys aged 1-14 years fluctuated. Rates decreased between 1983 and 1991 (from 34 to 21 deaths per 100,000 persons), before increasing to 28 deaths per 100,000 persons in 1996. Since then, mortality rates have been generally declining again, reaching 19 deaths per 100,000 persons in 2003.

- Mortality rates for WA girls aged 1-14 years showed a steady decline from 28 deaths per 100,000 persons in 1983 to 15 deaths per 100,000 persons in 2003.

- Between 1991 and 2003, the Australian mortality rate for boys and girls aged 1-14 years fell by 31% and 34% respectively. Over this period in WA, the mortality rate for children aged 1-14 years increased by 11% for males and decreased by 21% for females.
Figure 36: Mortality, leading causes, children aged 1-14 years, 1999-2003

<table>
<thead>
<tr>
<th>Cause of death and ICD-10 code</th>
<th>Western Australia</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Cancers (C00–C97)</td>
<td>3.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)</td>
<td>1.5</td>
<td>1.3</td>
</tr>
<tr>
<td>Accidents and injuries (V01–Y98)</td>
<td>8.4</td>
<td>5.1</td>
</tr>
<tr>
<td>Transport accidents (V01–V99)</td>
<td>3.6</td>
<td>2.4</td>
</tr>
<tr>
<td>Drowning (W65–W74)</td>
<td>2.0</td>
<td>0.9</td>
</tr>
<tr>
<td>All causes</td>
<td>21.8</td>
<td>14.7</td>
</tr>
</tbody>
</table>

Source: ABS mortality data.

- Over the period 1999-2003, accidents and injuries were the leading cause of death for children aged 1-14 years in both WA and Australia.
- For males aged 1-14 years in WA, around 11 deaths per 100,000 persons were due to accidents and injuries over this period, while females recorded a rate of 6.5 deaths per 100,000 persons. These rates were slightly higher than the national rates of 8.4 deaths per 100,000 persons for males and 5.1 deaths per 100,000 persons for females.
Figure 37: Accidental drowning, children aged 1-14 years

Over the period 1983 to 2003 in WA, the annual number of accidental drownings for boys and girls aged 1-14 years was low; consequently, there were no significant changes in rates.

In 2003 in WA, there were 2.9 accidental drownings per 100,000 persons for boys aged 1-14 years and 1.7 per 100,000 persons for girls.

Nationally between 1991 and 2003, the drowning rate among boys aged 1-14 years fell from 3.0 to 1.4 deaths per 100,000 persons. Among girls aged 1-14 years, drowning deaths fell from 1.5 per 100,000 persons in 1991, to 0.8 deaths per 100,000 persons in 2003 (an average annual decrease of around 5% per year for boys and girls).
Figure 38: Mean DMFT score and decay-free rate, children aged 12 years

In WA in 2000, the mean deciduous decayed missing and filled teeth (DMFT) score among children aged 12 years was 0.9, a decrease from an average of 3.0 in 1982.

Nationally, the mean DMFT score among 12 year old children fell from 3.0 in 1982 to 0.8 in 1999.

Between 1989 and 2000, the proportion of children aged 12 years in WA reporting no decay increased from 33% to 61%.

Nationally, between 1982 and 1999, the decay-free rate for children aged 12 years increased from 22% to 64%.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia DMFT</td>
<td>1.4</td>
<td>1.2</td>
<td>1.2</td>
<td>1.1</td>
<td>1.1</td>
<td>1.0</td>
<td>0.9</td>
<td>0.9</td>
<td>0.8</td>
<td>0.8</td>
<td>—</td>
</tr>
<tr>
<td>Australia - DMFT =0 (%)</td>
<td>48.0</td>
<td>52.5</td>
<td>53.8</td>
<td>55.8</td>
<td>57.5</td>
<td>59.1</td>
<td>61.8</td>
<td>61.9</td>
<td>63.3</td>
<td>64.5</td>
<td>—</td>
</tr>
<tr>
<td>WA DMFT</td>
<td>1.8</td>
<td>1.5</td>
<td>1.2</td>
<td>1.2</td>
<td>1.1</td>
<td>1.0</td>
<td>1.0</td>
<td>0.9</td>
<td>0.8</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>WA - DMFT =0 (%)</td>
<td>40.8</td>
<td>47.6</td>
<td>51.3</td>
<td>51.1</td>
<td>56.1</td>
<td>54.8</td>
<td>57.4</td>
<td>61.5</td>
<td>62.5</td>
<td>64.7</td>
<td>60.6</td>
</tr>
</tbody>
</table>

Older people

With the proportion of older people increasing in Australia, it is important to monitor the health profile of this sub-population in order to assess the impact of the ageing population on health service requirements. A good understanding of the health conditions that affect the elderly provides information that enables the development of preventive measures targeted towards this age group.

In 2004, of the 230,057 Western Australians who were aged 65 years and older, 55% were female. The same proportion of Australians in this age group were female (i.e. 1.41 of 2.55 million people) (ABS, 2004a).

Older people are living longer than before. Between 1984 and 2003, the life expectancy of 65 year olds in WA increased from 14.8 to 17.8 years for males and from 18.9 to 21.2 years for females (Ridolfo et al. 2000; ABS, 2004b).

General health and wellbeing

Several findings from the WA Health and Wellbeing Surveillance System for 2002-2004 help to establish a general health profile of older people.

The general health of older people is affected by the number of chronic conditions they sustain, which generally increase with age. Consequently, the elderly are more likely to report reduced physical and mental functioning, higher levels of psychological distress and increased frequency of visits to health services.

Increasing age is also associated with greater use of special equipment to assist with physical functioning (e.g. cane, wheelchair, special telephone, etc.). About 5% of Western Australians aged 65-69 years required such special equipment, compared to 31% of males and 39% of females aged 80 years and over.

Major diseases and health conditions

In WA, arthritis (64%), high blood pressure (42%) and cataracts (36%) are the chronic conditions most commonly reported by people aged 65 years and over. Heart disease (24%), cancer (17%), osteoporosis (15%) and diabetes (14%) are conditions that are also reported by older people. Additionally, older females are at a greater risk of falls than the general Western Australian population. Among Western Australians aged 80 years and over, 16% of females and 7% of males reported falling in the previous twelve months, compared to 6% of females and 3% of males aged 65-69 years (WAHWSS).

From a burden of disease perspective, diseases and deaths incurred by Western Australians aged 65 years and over during 2000 contributed 57,730 years of life lost due to mortality (51.1% of the total) and 28,110 years lost due to disability (25.7% of the total) to the population’s overall disease burden. Similar proportions have been reported for the Australian population (AIHW, 2001). Among elderly Western Australians, cardiovascular diseases, cancer and neurological conditions (including dementias, hearing and vision disorders, Parkinson’s disease, etc.) accounted for three-quarters of the total disease burden (i.e. disability-adjusted life years) for both males and females (Katzenellenbogen et al. 2003; Somerford et al. 2004).

Twelve health conditions contribute the most to the disease burden of the elderly in WA. These are coronary heart disease (16.7%), Alzheimer’s disease and other dementias (9.1%), stroke (8.5%), lung cancer (5.6%), chronic obstructive pulmonary disease (4.1%), colorectal cancer (3.8%), diabetes (3.1%), impaired hearing (2.8%), prostate cancer (2.4%), Parkinson’s disease (2.3%), impaired vision (2.2%) and osteoarthritis (2.1%). In addition to accounting for a large proportion of life lost due to mortality and disability among the elderly, most of these conditions are associated with high hospital bed usage and costs as well. Furthermore, injuries due to falls and cataracts are responsible for considerable hospital costs among the elderly.

Risk factors

The likelihood of suffering from a major chronic disease is related to a number of behavioural risk factors. The WA Health and Wellbeing Surveillance System found that more than half those aged 65 years and over in WA are current or ex-smokers, and half are defined as overweight or obese. More than 60% have insufficient physical activity during leisure time (i.e. less than 2.5 hours per week), and one in five report not doing any physical activity at all. Additionally, one-third usually eat less than the recommended two portions of fruit per day and 84% eat less than five serves of vegetables daily.

WA males aged 65 years and over are significantly more likely than females to be current or ex-smokers (71% and 34%), to carry excess weight (57% and 48%), to eat insufficient fruit (44% and 30%) and to consume fewer vegetables than recommended (88% and 81% respectively). A slightly higher proportion of older females (65%) do not do enough physical activity compared to males (58%), although these figures are not significantly different.
Overall, excessive alcohol consumption appears to be less of a problem among the elderly, with only about 4% of WA males and females aged 65 years and over reporting that, on days when they drink, they consume more than the recommended daily alcohol intake (WAHWSS).

**Prevention**
The general disease prevention strategies used for the population as a whole are also of relevance for the elderly population, especially in relation to the reduction of major lifestyle risk factors and the promotion of health-enhancing behaviours. However, prevention initiatives that specifically target older people focus primarily on preserving function and quality of life and extending the duration of independent living. Such initiatives include exercises for improving balance and muscle strength, education in relation to the use of medication, and promotion of influenza vaccination (Health Department of WA, 2000).

**Mortality**
In WA between 1983 and 2003, among persons aged 65 years and over, there were an average of 667 male deaths (69% of all male deaths) and 3,583 female deaths (80% of all female deaths) per year. Cardiovascular diseases and cancer were the leading causes of death among elderly people for both males and females. About 45% of elderly male deaths and 51% of elderly female deaths were due to cardiovascular diseases, while 29% (male) and 21% (female) were due to cancer.

In Australia between 1991 and 2003, an average of 47,939 (72%) of all male deaths and 49,510 (83%) of all female deaths per year involved elderly people. Like WA, cardiovascular diseases and cancer accounted for the majority of deaths, and in similar proportions.

WA mortality rates for males and females aged 65 years and over have declined steadily over time, with rates for males remaining 50-60% higher than for females. Mortality rates for elderly male and female Australians also decreased significantly, but the WA rates have been slightly lower than the corresponding Australian rates since the early 1990s.

**Hospital separations**
In 2003/04, about 30% of all hospital separations in WA and Australia involved people aged 65 years and over. Among elderly Western Australians, cardiovascular diseases (19%), cancer (13%) and injuries (10%) accounted for the greatest proportions of hospital bed usage each year.

Hospital separation rates for males and females aged 65 years and over were similar in WA and Australia and increased significantly over the last decade. Hospitalisation rates for elderly males were 30-40% higher than their female counterparts.

**Other morbidity**
In 2003, Western Australians aged 65 years and over sought assistance from a community health service on approximately 48,000 occasions. One-fifth of these occasions of service were related to endocrine and nutritional health issues (e.g. diabetes, obesity) and one-fifth were related to musculoskeletal problems (e.g. arthritis, osteoporosis).

The number of general practitioner (GP) consultations each year for the treatment of elderly patients is difficult to estimate. However, based on data from the WA Health and Wellbeing Surveillance System for 2002-2003, 91% of Western Australians aged 65 years and over attended a GP surgery at least once within a given twelve-month period. In addition, it is estimated that 39% of elderly Western Australians attended an allied health service, 24% attended a hospital-based emergency or outpatient service, 41% attended a dental service and 1% attended a mental health service over a one-year period.

Nationally, the proportion of elderly people who visit a GP within a year is similar to WA. Based on a recent national study of GP consultations, females accounted for 59% of GP encounters among elderly Australians. For every 100 GP consultations, the primary reason for the encounters were issues related to the circulatory system (25%), the musculoskeletal system (19%), the respiratory system (19%) or conditions of the skin (15%), whereas 38% of encounters were for general or unspecified reasons. Hypertension is by far the most frequently managed problem by GPs, involving almost one in every five encounters (O’Halloran et al. 2003).

**Health system costs**
The higher rate of health service utilisation by elderly people is associated with considerable health system costs. In 2000/01, people aged 65 years and over accounted for 38% ($18.7 billion) of Australia’s total allocated health expenditure, yet constituted only 12% of the Australian population at that time.

For those aged 65-74 years, health expenditure per person was about double the average per capita cost for the Australian population as a whole, and among those aged 75 years and over it was about four times higher (AIHW, 2004b).
SUMMARY HEALTH MEASURES

References


Health Department of WA (2000). 'Older People and Promoting Health'. In Health and quality of life for older West Australians. Perth: Health Department of WA.


**Figure 39: Hospital separation rate, persons aged 65 years and over**

- Hospital separation rates for people aged 65 years and over in WA remained similar to the Australian rate between 1988/89 and 2003/04.

- Separation rates for males were 30-40% higher than female rates among people aged 65 years and over in both WA and Australia.

- In WA between 1988/89 and 2003/04, the separation rate for people aged 65 years and over increased significantly: males by an average of 3.2% per year (from 671 to 1,089 separations per 100,000 persons), and females by an average of 3.9% per year (from 487 to 821 separations per 100,000 persons).

- Nationally between 1993/94 and 2002/03, separation rates increased significantly by an average of 3.3% per year for males and 3.8% for females.
Mortality rates among Western Australians aged 65 years and over were slightly lower than those reported by their Australian counterparts between 1983 and 2003.

Male mortality rates were 50-60% higher than female rates for people aged 65 years and over in both WA and Australia.

In WA between 1983 and 2003, mortality rates for people aged 65 years and over decreased significantly: males by an average of 2.2% per year (from 73.3 to 47.7 deaths per 100,000 persons), and females by an average of 1.6% per year (from 44.6 to 32.5 deaths per 100,000 persons).

Nationally between 1991 and 2003, mortality rates for those aged 65 years and over also decreased significantly: males by an average of 2.7% per year (from 64.9 to 49.3 deaths per 100,000 persons), and females by an average of 2.0% per year (from 42.2 to 33.6 deaths per 100,000 persons).
Figure 41: Mortality rate, coronary heart disease, persons aged 65 years and over

In 2003, 1,637 (87%) of the 1,873 Western Australians who died from coronary heart disease were aged 65 years and over.

Between 1991 and 2003, males and females aged 65 years and over in WA had slightly lower mortality rates for coronary heart disease than their Australian counterparts.

Male mortality rates for coronary heart disease were 55% and 65% higher than female rates among those aged 65 years and over respectively in WA and Australia.

In WA between 1983 and 2003, mortality rates for coronary heart disease among the elderly fell significantly, by an average of 4.5% per year for males (from 22.8 to 9.7 deaths per 1,000 persons), and by 4.0% per year for females (from 13.7 to 6.2 deaths per 1,000 persons).

Nationally between 1991 and 2003, mortality rates for coronary heart disease among the elderly also declined significantly, by 5.0% per annum for males (from 18.8 to 10.9 deaths per 1,000 persons), and by 4.4% for females (from 12.0 to 6.9 deaths per 1,000 persons).
In WA in 2003, 837 (93%) of the 898 people who died from stroke were aged 65 years and over.

Since 1991, mortality rates for stroke among those aged 65 years and over have been lower in WA than Australia, except for in 1993 and 1994 when the WA and Australian male rates were similar.

Male mortality rates for stroke among those aged 65 years and over were slightly higher than female rates in both WA and Australia.

In WA between 1983 and 2003, the mortality rate for stroke among those aged 65 years and over declined significantly; for males by an average of 3.3% per year (from 7.3 to 4.0 deaths per 1,000 persons), and for females by 3.0% per year (from 6.8 to 3.6 deaths per 1,000 persons).

In Australia between 1991 and 2003, the mortality rate for stroke among those aged 65 years and over also declined significantly, for males by an average of 3.8% per year (from 6.5 to 4.5 per 1,000), and for females by 3.3% (from 6.2 to 4.3 per 1,000).
Since the early 1980s, cancer incidence rates for males and females aged 65 years and over have been similar in both WA and Australia.

The rate of cancer incidence in males was about twice that in females among people aged 65 years and over in WA and Australia.

In WA between 1982 and 2003, the cancer incidence rate for people aged 65 years and over increased significantly: males by an average of 0.7% per year (from 23.5 to 28.2 per 1,000), and females by 0.6% per year (12.6 to 14.9 per 1,000).

Nationally, between 1983 and 2001, cancer incidence rates for elderly males and females increased significantly by about 1.3% per year, from 23.5 and 12.2 per 100,000 to 28.4 and 15.1 per 1,000, respectively.

Improved screening and detection methods have contributed to the increase in reported cancer incidence among the elderly. For instance, the sharp increase in male cancer incidence in 1994 was associated with the introduction of the prostate-specific antigen (PSA) test in Australia around that time (de Looper & Bhatia, 2001).
In 2001, the incidence rates for lung, colorectal and female breast cancers among people aged 65 years and over living in WA were similar to corresponding Australian rates, except for the incidence rate of prostate cancer which was slightly lower in WA (657 cases per 100,000 persons) than in Australia (775 cases per 100,000 persons).

In both WA and Australia, incidence rates for lung and colorectal cancer were significantly higher among males aged 65 years and over than for their female counterparts. In WA, the male/female ratios were 2.5 for lung cancer and 1.6 for colorectal cancer, while in Australia, the ratios were 2.6 and 1.5 respectively.

The incidence of prostate cancer among males aged 65 years and over was more than twice as high as the incidence of breast cancer among their female counterparts, in both WA and Australia.

Although incidence rates among the elderly for the cancers presented above are much higher than the incidence rates observed throughout the total population, general trends are similar to those in the broader population.
In 2003, 2,297 (71%) of the 3,250 Western Australians who died from cancer were aged 65 years or older.

Since 1991, cancer mortality rates for male and female Western Australians aged 65 years and over have been similar to corresponding Australian rates.

Cancer mortality rates among people aged 65 years and over were almost twice as high for males than females in both WA and Australia.

In WA between 1983 and 2003, cancer mortality rates for males aged 65 years and over fluctuated slightly; however, overall rates decreased significantly by 0.4% per annum. There was no significant change recorded in the cancer mortality rate for elderly females.

In Australia between 1991 and 2003, there was a significant decline in cancer mortality rates among people aged 65 years and over: males by an average of 1.2% per year (from 16.2 to 14.4 deaths per 1,000 persons), and females by 0.6% (from 8.4 to 7.8 deaths per 1,000 persons).
Figure 46: Mortality rate, specified cancers, persons aged 65 years and over, 2003

In 2003, mortality rates for lung, colorectal and breast cancers among females aged 65 years and over in WA were similar to corresponding Australian female rates. For elderly males in WA, the mortality rate for lung cancer was similar to the Australian rate, but the colorectal cancer rate was slightly higher and the prostate cancer rate slightly lower than Australian rates.

Mortality rates for lung and colorectal cancers among people aged 65 years and over were significantly higher in males than females. For lung cancer, the male-female ratio was 2.3 in WA and 2.4 in Australia. For colorectal cancer, the male-female ratios were 1.9 (WA) and 1.5 (Australia).

The mortality rate for prostate cancer among males aged 65 years and over was around twice as high as the mortality rate for breast cancer among their female counterparts in both WA and Australia.

Although mortality rates among the elderly for the cancers presented above are much higher than the mortality rates in the total population, general trends are similar to those in the broader population.

Sources: WA Cancer Registry, ABS mortality data.
In 2003, 429 (94%) of the 457 Western Australians who died from chronic obstructive pulmonary disease (COPD) were aged 65 years and over.

Between 1991 and 2002, COPD mortality rates among males and females aged 65 years and over were slightly lower in WA than Australia. However, in 2003, the rates between the two jurisdictions converged.

Male mortality rates for COPD remained higher than female rates, despite a large reduction in the male-female ratio. In WA in 1983, the male-female rate ratio was over 6.0; by 1991 it was 3.5, and by 2003 it was 2.0. Since 1991, the Australian rate ratio has been similar to the WA rate ratio.

In WA between 1983 and 2003, COPD mortality rates for elderly males decreased significantly by an average of 4.0% per year (from 592.2 to 281.5 deaths per 100,000 persons). However, the rate for elderly females increased significantly by 1.4% per annum (from 96.9 to 139.3 deaths per 100,000 persons).

Trends in COPD mortality rates among the elderly reflect changes in smoking patterns over time. Rates for males have decreased significantly over the last 20 years, while rates for females increased before decreasing from 1997 onwards.
Figure 48: Mortality rate, diabetes, persons aged 65 years and over

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - males</td>
<td>126.2</td>
<td>128.2</td>
<td>135.0</td>
<td>136.2</td>
<td>141.6</td>
<td>140.2</td>
<td>140.8</td>
<td>133.7</td>
<td>131.6</td>
<td>131.7</td>
<td>136.5</td>
<td>136.4</td>
<td>137.6</td>
</tr>
<tr>
<td>Australia - females</td>
<td>96.9</td>
<td>96.5</td>
<td>98.4</td>
<td>98.3</td>
<td>99.8</td>
<td>100.2</td>
<td>97.2</td>
<td>95.0</td>
<td>90.2</td>
<td>89.0</td>
<td>87.7</td>
<td>87.9</td>
<td>88.7</td>
</tr>
<tr>
<td>WA - males</td>
<td>115.0</td>
<td>118.2</td>
<td>127.3</td>
<td>133.3</td>
<td>149.2</td>
<td>148.4</td>
<td>138.0</td>
<td>120.9</td>
<td>118.0</td>
<td>130.8</td>
<td>134.2</td>
<td>137.6</td>
<td>130.4</td>
</tr>
<tr>
<td>WA - females</td>
<td>92.8</td>
<td>98.9</td>
<td>106.1</td>
<td>107.9</td>
<td>105.5</td>
<td>105.6</td>
<td>102.8</td>
<td>100.6</td>
<td>94.8</td>
<td>95.3</td>
<td>98.3</td>
<td>96.2</td>
<td>95.9</td>
</tr>
</tbody>
</table>

Note: ICD9 250; ICD10 E10-E14; rates based on rolling averages.
Source: ABS mortality data.

- In WA in 2003, 237 (86%) of the 275 diabetes deaths were aged 65 years and over.
- The mortality rate for diabetes among males aged 65 years and over in WA has fluctuated around the Australian rate since 1991. The rate for elderly females in WA has been slightly higher than the Australian rate since 1992.
- In WA between 1983 and 2003, the mortality rate for diabetes among people aged 65 years and over was higher for males than females, ranging from 9% higher in 1984 to 41% higher in 1995 and 1996. Nationally, between 1991 and 2003, the mortality rate for elderly males was 30-56% higher than the female rate.
- In WA between 1983 and 2003, the diabetes mortality rate for males aged 65 years and over fluctuated slightly, but overall it increased significantly by an average of 1.4% per annum. There was no significant change in the diabetes mortality rate for elderly females.
- Nationally, between 1991 and 2003, the diabetes mortality rate for males aged 65 years and over did not change significantly; however, the mortality rate for elderly females decreased significantly by an average of 1.1% per year.
In 2003, 431 (98%) of the 440 Western Australians who died from Alzheimer’s disease and other dementias were aged 65 years and over.

From 1991 to 2003, mortality rates from Alzheimer’s disease and other dementias among elderly males and females in WA were higher than corresponding Australian rates.

In WA, the mortality rate for Alzheimer’s disease and other dementias among elderly males was slightly higher than the female rate in the early 1980s, similar from 1989 to 1995, then slightly lower until 2003. Nationally, since the early 1990s to 2003, males had slightly lower mortality rates than females.

In WA over the period 1983 to 2003, mortality rates for Alzheimer’s disease and other dementias among males and females aged 65 years and over increased significantly by an average of 1.1% and 2.8% per year respectively.

Nationally between 1991 and 2003, mortality rates for Alzheimer’s disease and other dementias among elderly males decreased significantly by an average of 1.0% and for females increased significantly by an average of 0.6% per year.

Part of the decline in mortality rates for Alzheimer’s disease and other dementias from 1997 is due to changes in coding practices introduced by the ABS around that time.
In 2003, 79 of the 81 deaths (97%) from Parkinson’s disease in WA involved people aged 65 years and over.

The mortality rate for Parkinson’s disease among males aged at least 65 years in WA has fluctuated around the corresponding Australian rate throughout the 1990s. By comparison, the rates among elderly females in WA and Australia have remained similar since 1991.

Despite the fluctuations in the WA rate, both the WA and Australian mortality rates for elderly males were more than twice the equivalent female rate.

In WA between 1983 and 2003, there was no significant change in male or female rates for Parkinson’s disease among people aged 65 years and over. The rates in 2003 were 43.9 and 30.0 deaths per 100,000 persons, for males and females, respectively.

Nationally, between 1991 and 2003, mortality rates for Parkinson’s disease among elderly males and females increased significantly by an average of 0.9% and 1.0% per annum, from 43.0 and 19.5 deaths per 100,000 persons, to 51.7 and 22.7 deaths per 100,000 persons, respectively.
Figure 51: Hospital separation rate, cataracts and other lens disorders, persons aged 65 years and over

<table>
<thead>
<tr>
<th></th>
<th>90/91</th>
<th>91/92</th>
<th>92/93</th>
<th>93/94</th>
<th>94/95</th>
<th>95/96</th>
<th>96/97</th>
<th>97/98</th>
<th>98/99</th>
<th>99/00</th>
<th>00/01</th>
<th>01/02</th>
<th>02/03</th>
<th>03/04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - males</td>
<td>—</td>
<td>—</td>
<td>2,954</td>
<td>3,277</td>
<td>3,609</td>
<td>3,730</td>
<td>3,980</td>
<td>4,188</td>
<td>4,376</td>
<td>4,211</td>
<td>4,158</td>
<td>4,233</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Australia - females</td>
<td>—</td>
<td>—</td>
<td>3,291</td>
<td>3,687</td>
<td>4,092</td>
<td>4,297</td>
<td>4,530</td>
<td>4,719</td>
<td>4,808</td>
<td>4,787</td>
<td>4,337</td>
<td>5,028</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Sources: AIHW data cubes; WA Hospital Morbidity Data System.

- Hospital separation rates due to cataracts and other lens disorders among males and females aged 65 years and over in WA were similar to corresponding Australian rates over time, despite fluctuations in WA rates.
- Hospital separation rates due to cataracts and other lens disorders among elderly males were 10% and 15% lower than elderly female rates in WA and Australia respectively.
- In WA between 1988/89 and 2003/04, separation rates for cataracts and other lens disorders among males and females aged 65 years and over increased significantly, for males by an average of 3.9% per year, and for females by 3.8%.
- Nationally, between 1993/94 and 2002/03, hospital separation rates for cataracts and other lens disorders among both males and females aged 65 years and over increased significantly by an average of 3.5% per year respectively.
Aboriginal health

Across Australia, Aboriginal cultures are wide and varied, having adapted to a diverse range of living conditions and despite the impact of European settlement, these cultures are still dynamic and evolving. Nevertheless, European settlement has had a profound effect on the health and wellbeing of Aboriginal people. Throughout the subsequent years, various policies and programs have adversely affected the health status of Aboriginal people.

In many cases, Aboriginal people have been removed from their lands, often being moved on to reserves, missions and stations. Many of these communities were overcrowded, while those who lived there had poor diets, and were in contact with introduced diseases and lacked adequate health care. In many cases, family groups were broken up, with communities formed that bore little relationship to traditional kinship structures. Until relatively recently, legislation supported different wage systems, rights, education, and health and welfare services for Aboriginal people. To this day, despite many changes, Aboriginal people are still the most disadvantaged group of Australians (NATSIHC, 2000).

Health of Aboriginal and Torres Strait Islander people

Aboriginal people experience much poorer health and die at a much younger age than non-Aboriginal Australians. For almost every health status indicator where information is available, the Aboriginal level is worse than that among non-Aboriginal Australians (ABS & AIHW, 2003). While comparison to non-Aboriginal health is important in quantifying the potential health gains that can be made within the Aboriginal population, it may mask significant changes in Aboriginal health status. For this reason, health indicators for the Aboriginal population of WA were compared to those of South Australia and the Northern Territory.

There are limitations to measuring the health status of Aboriginal people due to incomplete identification of Aboriginal status in administrative data collections and the scarcity of survey data. In addition, the quality of Aboriginal population estimates is affected by the uncertainty associated with the propensity to identify as Aboriginal and the accuracy of birth and death data. The magnitude of these limitations varies from State to State and by data collection. Over the last decade, there has been a large increase in the number of Aboriginal people counted in the population census, to an extent greater than can be explained by natural population increases alone. The smallest discrepancies among Australian states between the 1991-based projections and the 1996-based estimates were observed for Western Australia, the Northern Territory and South Australia (ABS & AIHW, 2003). Also, these three jurisdictions are the only ones with mortality data considered adequate for analysis by Aboriginal status by the ABS for the years 1991 through 2003. Hence, when interstate comparisons are made within this report, the health status of Western Australian Aboriginal people will be compared to the status among Northern Territory and South Australian Aboriginal and Torres Strait Islanders, as this is considered to be a more accurate comparison than provided by a comparison with Australian Aboriginal and Torres Strait Islander people as a whole.

Health risk factors

Aboriginal people are more socioeconomically disadvantaged than non-Aboriginal people, placing them at greater risk of ill health (ABS & AIHW, 2003). Of the major lifestyle-related risk factors, smoking is about twice as common among Aboriginal people compared with non-Aboriginals. Aboriginal people have higher rates of illness and death from causes linked to smoking, yet smoking is not perceived as an important problem by many Aboriginal people. Aboriginal people are more likely to abstain from drinking alcohol than are non-Aboriginal Australians; however, those who do drink are more likely to drink at unsafe levels (ABS & AIHW, 2003). Research has shown that elimination of deaths from smoking and alcohol consumption would result in substantial gains in the health of Aboriginal and Torres Strait Islander people in terms of increases in life expectancy (ABS & AIHW, 2003).

In Western Australia, respiratory, gastrointestinal, infectious and parasitic diseases are disproportionately higher among Aboriginal people, especially the young. Factors that put Aboriginal people, especially those residing in rural and remote areas at a higher risk of poor health are related to inadequate housing or harmful levels of community or personal hygiene. A survey of communities in Western Australia reported large problems with water supply and sanitation problems, overcrowding and substandard housing, waste-water disposal problems and the absence of rubbish disposal that resulted in a high prevalence of vermin and pests and a lack of hygiene (ABS & AIHW, 2003). Other factors include poor nutrition, obesity, substance abuse and exposure to violence.

Poor nutrition is an issue for Aboriginal people because of limited availability and the expense of nutritious foods in remote areas where they are more likely to live. The economic disadvantage that many Aboriginal people contend with means that they
cannot afford to make healthy food choices (ABS & AIHW, 2003).

It has been suggested that insulin resistance, which was important for the survival of Aboriginal people as hunter-gatherers, is the underlying metabolic characteristic predisposing them to obesity, diabetes and coronary heart disease since their adoption of a Westernised lifestyle. The traditional hunter-gatherer lifestyle of Aboriginal and Torres Strait Islander people, characterised by high physical activity and a diet of low energy density (low fat, high fibre), promoted the maintenance of a very lean body weight. Improvements in carbohydrate and lipid metabolism in diabetic and non-diabetic Aboriginal people after a temporary reversion to a traditional lifestyle emphasises the value of lifestyle modification. To be effective, intervention programs that seek to achieve lifestyle modification will need to be developed and controlled by Aboriginal communities (ABS & AIHW, 2003).

Demographics

The age structure of a population is predominantly influenced by fertility and mortality. The higher fertility and lower survival of Aboriginal people in Australia results in a young age structure, with a higher proportion of the population in younger age groups than the non-Aboriginal population.

In WA, Aboriginal women have a higher total fertility rate (2.32 babies per woman) than all Western Australian women (1.74) in 2003. This is generally due to their high fertility at younger ages (ABS & AIHW, 2003). In 2003, the median age of Aboriginal women who registered a birth was 24.2 years (6.0 years younger than the median age of all Western Australian women). In Australia, the median age of Aboriginal women giving birth was slightly higher than the WA figure (24.9 years).

Nationally, the number of people who identified themselves as being of Aboriginal and Torres Strait Islander origin increased by 33% between the 1991 and 1996 population censuses and 16% between the 1996 and 2001 population census. This represents an increase from 1.6% to 2.4% of the total Australian population. The increase, over and above demographic processes, is partly explained by the increased willingness of people to declare their Aboriginal and Torres Strait Islander origins. However, in Western Australia, Northern Territory and South Australia the majority of the growth rate was due to natural increase, particularly from 1996 to 2001 (ABS, 2002).

In 2001, the Northern Territory Aboriginal population represented 29% of the total Territory population, while the South Australian Aboriginal population represented 1.6% of the State population. The Aboriginal and Torres Strait Islander population is younger than the Australian population and Aboriginal and Torres Strait Islander people are more likely to live outside of urban areas than their non-Aboriginal counterparts (ABS & AIHW, 2003).

The 2001 population census showed that Aboriginal people represented 3.5% of the total Western Australian population. In 2001, the Western Australian Aboriginal population was 58,496 (males 28,970; females 29,526) increasing by 15.1% in five years (ABS, 2002).

Life expectancy

Aboriginal life expectancy, while a readily available and recognisable measure of ill-health which is based on age-specific mortality, must be interpreted with caution as accurate age-specific mortality rates not only depend on the adequate identification of Aboriginal deaths but also on accurate Aboriginal population figures (ABS & AIHW, 2003).

In 2002, the life expectancy of an Aboriginal boy born in Western Australia was 64.0 years (Northern Territory 57.3 years; South Australia 62.8 years). Aboriginal girls born in WA in 2002 had a life expectancy of 67.7 years (Northern Territory 63.5 years; South Australia 64.5 years). Life expectancy was 13-14 years lower among Aboriginal people than the whole Western Australian population.

From 1991 to 2002, Western Australian Aboriginal life expectancy among males and females has generally been higher than among the Northern Territory Aboriginal population, but similar to that of Aboriginal males and females from South Australia.

Life expectancy improved between 1990 and 2002 among Western Australian and South Australian Aboriginal males, while the life expectancy of Northern Territory Aboriginal males remained unchanged. Life expectancy also improved for Western Australian and Northern Territory Aboriginal females from 1990 to 2002, while South Australian Aboriginal female life expectancy remained unchanged. Similar to the total population, Aboriginal females in all three jurisdictions had a higher life expectancy than their male counterparts.

Mortality

Aboriginal people experience higher mortality rates than non-Aboriginals at every age, however the largest gap between the mortality rates of Aboriginal and non-Aboriginal peoples was among adults aged 35-54 years, where death rates were around five times higher (ABS & AIHW, 2003).
In 2002, the mortality rate among Western Australian Aboriginal males was 13.6 deaths per 1,000 persons (Northern Territory 21.9 deaths per 1,000 persons; South Australia 18.9 deaths per 1,000 persons). Among Aboriginal females, mortality rates were 11.9 deaths per 1,000 persons (Northern Territory 11.0 deaths per 1,000 persons; South Australia 16.2 deaths per 1,000 persons). Despite mortality rates among Western Australia’s Aboriginal people being relatively low compared to other jurisdictions, these rates are still double those reported for the total Western Australian population (males 7.6 per 1,000; females 5.0 per 1,000).

Between 1991 and 2002, Western Australian Aboriginal male and female mortality rates decreased, while in the other two jurisdictions, only Aboriginal females from the NT recorded a decline in mortality. Similar to the total population, Aboriginal females in all three jurisdictions recorded lower age-standardised mortality rate than their male counterparts.

**Infant mortality and low birthweight**

The health disadvantage of Aboriginal people begins early in life and continues throughout the life cycle. A study to develop national birthweight percentiles by gestational age and to compare them for Aboriginal and non-Aboriginal infants found that Aboriginal women were more likely than non-Aboriginal women to give birth pre-term, and were more likely to give birth to small-for-gestational-age infants at term (Roberts & Lancaster, 1999).

A South Australian study found that women who smoke during pregnancy have elevated relative risks of pre-term birth, small-for-gestational-age and low birthweight infants, with a dose-response relationship. Aboriginal women had a higher rate of smoking during pregnancy than non-Aboriginal women and high rates for all age groups, while rates decreased with age among non-Aboriginal women. Heavy smoking increased with age. Consequently, population-attributable risks were significantly higher for small-for-gestational-age, low birthweight and preterm birth among Aboriginal people (Chan et al. 2001).

In the Kimberley, significant associations were found between birthweight and maternal age, remoteness of locality, sex of the infant and maternal height. Low birthweight was also more common among Aboriginal mothers. Teenage mothers aged 19 years or less were no more likely to have low birthweight babies than older mothers. Of the variables examined, the only significant predictor of low birthweight was a previous low birthweight baby. The study concluded that pre-term birth, rather than intrauterine growth retardation, is likely to be the most common cause of low birthweight in this population (Rousham & Gracey, 2002).

A comparison of perinatal outcomes found that there were significantly more pre-term births, lower birthweight and longer length of stay among Aboriginal babies than non-Aboriginal babies. Aboriginality was not associated with neonatal death, however, gestation of less than 28 weeks, congenital anomalies, and high-grade cerebral haemorrhage were independent risk factors for neonatal death. Maternal risk factors, including poor antenatal care attendance, were more prevalent amongst Aboriginal women (Panaretto et al. 2002). On average, Aboriginal mothers give birth at a younger age than non-Aboriginal mothers. In most States and Territories of Australia, babies born to Aboriginal mothers are about twice as likely to be of low birthweight and about twice as likely to die at birth than are babies born to non-Aboriginal women (ABS & AIHW, 2003).

Over the period 2001-2003, the infant mortality rate among the Western Australian Aboriginal population was 15.9 per 1,000 live births (Northern Territory 14.8; South Australian 9.1). From 1991-2003, while the Northern Territory and South Australian Aboriginal populations both experienced generally decreasing infant mortality rates, the Western Australian Aboriginal population infant mortality rates remained unchanged.

Low birthweight infants are more likely to suffer from physical and neurological complications than are normal weight infants, resulting in increased health problems. In 2000, the proportion of Aboriginal low birthweight babies (less than 2500 grams) was double that of the total population (babies born to Aboriginal mothers 15.1%; all babies 6.9%) and also higher than that among babies born to non-Aboriginal women (13.6%).

For the period between 1991 and 2000, the proportion of low birthweight babies of Aboriginal origin in Western Australia was higher than among babies born to Australian Aboriginal mothers. Furthermore, the proportion of low birthweight babies born to Aboriginal mothers has remained static over the past decade. In Western Australia during 2000, the proportion of extremely low birthweight (less than 1,000 grams) babies born to Aboriginal mothers was 2.2% (all Western Australian babies 0.9%).

In 1998-2000, the leading causes of death by ICD-10 chapter levels among Aboriginal children aged less than one year were certain conditions originating in the perinatal period (39.0% of all deaths), symptoms signs and abnormal laboratory findings, (23.7% of all deaths), congenital malformations (11.9% of all deaths) and diseases of the respiratory system (8.5% of all deaths).
As a single cause of deaths, Sudden Infant Death Syndrome (SIDS) accounted for 15.3% of all deaths recorded by Aboriginal children aged less than 1 year during the period 1998-2002. Over the same period, SIDS accounted for 8.6% of all deaths among non-Aboriginal children aged less than one year.

Cardiovascular disease
Cardiovascular disease is the leading cause of death among Aboriginal people. The mortality rate for coronary heart disease among the Aboriginal population was around three times higher than the total Australian rate during the period 1999-2001 (ABS & AIHW, 2003).

In 2002, the cardiovascular disease mortality rate was 3.7 deaths per 1,000 persons (Northern Territory 5.6 deaths per 1,000 persons; South Australia 4.8 deaths per 1,000 persons). The fall recorded in the WA rate, and the stable rate in the Northern Territory and South Australia from 1991-2002 saw the WA rate fall below that of these two jurisdictions in 2002.

Injury and poisoning
Injury and poisoning is one of the leading causes of death among Aboriginal people in Western Australia. During 1998-2002 the age-standardised mortality rate due to injury and poisoning was 152 deaths per 100,000 persons among Aboriginal males and 63 deaths per 100,000 persons among Aboriginal females.

Aboriginal people have significantly higher injury rates than non-Aboriginal people. The WA Aboriginal injury mortality rate is 4 times higher, hospitalisation 3.5 times higher and community health consultation rate 5 times higher than their non-Aboriginal counterparts. Aboriginal people have significantly higher rates of interpersonal violence, transport-related injuries, drowning and poisoning fatalities, and for all injury causes resulting in hospitalisation and community health consultations.

Interpersonal injuries, in particular, result in 13-16 times the non-Aboriginal mortality rates (females and males, respectively) and 13-100 times the non-Aboriginal hospitalisation rate (country males and metropolitan females, respectively). Community health consultation rates resulting from domestic violence, burns, traffic and trauma/accidents, are at least 14 times higher amongst the Aboriginal population than the non-Aboriginal population. Aboriginal people also have approximately five times the rate of victimisation (victims of personal or violent crime) than non-Aboriginal people, and account for a greater proportion of total victimisation than expected (expected number based upon proportion of Aboriginals in the State population) (Gawthorpe et al. 1998).

A greater proportion of Aboriginal people are injured as a result of crime; furthermore, a greater proportion of these injuries are severe or result in death. In particular, Aboriginal females have a higher proportion of non-sexual violent crimes perpetrated against them than non-Aboriginal females (Gawthorne et al. 1998).

Age-standardised mortality rates for injury of Western Australian Aboriginal males and females to South Australian and Northern Territory Aboriginal males and females indicated that death rates were higher among the Aboriginal populations of SA and the NT over the period 1998-2002.

Other conditions
Aboriginal Australians are about twice as likely to be hospitalised as Australians overall. Care involving dialysis, respiratory disease and injury are among the most common causes for both Aboriginal males and females. Aboriginal males and females were hospitalised at a rate 2-3 times higher than non-Aboriginal people. Furthermore, hospital separation rates among male and female Aboriginal people for respiratory diseases and injury were 6 and 12 times higher respectively, than non-Aboriginal males and females (ABS & AIHW, 2003).

Endocrine, nutritional and metabolic diseases (mostly diabetes mellitus) were the cause of the highest amount of excess deaths among Aboriginal people based on non-Aboriginal rates. Diabetes is more commonly coded as the underlying cause of death and is also reported more frequently as an additional cause of death among Aboriginal people. Aboriginal people also suffer higher rates of infectious disease, including tuberculosis and sexually transmitted diseases. There were 2-3 times more hospitalisations and 5 times more deaths from infectious diseases than expected, based on rates for all Australia (ABS & AIHW, 2003).

Based on hospital admissions and mortality indicators, there is evidence to suggest that Aboriginal people are more likely to experience some indicators of mental illness such as self-inflicted harm, substance abuse and suicidal behaviour, although the extent of the problems is difficult to determine (ABS & AIHW, 2003).

Access to and use of health services
Many factors have been proposed that may affect the likelihood of an Aboriginal person attending a facility or using a service in Australia. Because Aboriginal people are more likely than non-Aboriginal people to live in rural and remote areas, they are more likely to live at a greater distance from health facilities and health professionals. Other factors include the degree
of Aboriginal involvement in the facility, whether Aboriginal staff are available, the level of awareness of issues which impact on Aboriginal health, the frequency with which health professionals visit and perceptions about the quality and importance of certain services (ABS & AIHW, 2003).

Health programs for Aboriginal people

The majority of the excess ill-health experienced by the Aboriginal population in WA is preventable. The factors influencing Aboriginal health are complex, involving socioeconomic, cultural and environmental issues that are usually managed from outside health services. Outside of the health sector, interventions to improve standards of housing and environmental infrastructure require collaboration between various government bodies and communities.

Through the Office of Aboriginal Health, the Department of Health in Western Australia supports a number of programs that aim to identify the Aboriginal population at risk, to establish culturally appropriate services that will achieve a reduction in the prevalence of risk factors, to monitor clients identified as high risk and to improve access to relevant and appropriate clinical services. The Western Australian Framework Agreement on Aboriginal and Torres Strait Islander Health underpins the way in which Aboriginal health strategies, programs and services are developed and delivered. The framework agreement incorporates the domains reflected in the WA Aboriginal Health Strategy 2000.

Most fundamentally, the WA framework agreement establishes the partnership for Aboriginal health between the State, the Commonwealth and the Aboriginal community-controlled health sector. This partnership operates through Regional Aboriginal Health Planning Forums in the seven Aboriginal health regions covering the State. A number of initiatives are currently supported by the Office of Aboriginal Health within the Department of Health WA using the intersectoral approach of the WA framework agreement. The current initiatives of the OAH include:

- Support the development of Aboriginal early years health and wellbeing strategy involving whole-of-government human services as well as the health system, ensuring that it is evidence based, action oriented, concrete and achievable.
- Development in partnership with the Drug and Alcohol Office and framework partners of an Aboriginal alcohol and drug plan that reflects the State’s implementation of the national Aboriginal Alcohol and Drug Complementary Action Plan.
- Development of a cultural respect implementation strategy encompassing the use of an Aboriginal impact statement in policy and program development; services reform through cultural partnerships, education, review and practice development; and Aboriginal workforce development.
- Development and implementation of an Aboriginal social and emotional wellbeing and mental health strategy in partnership with the Office of Mental Health and WA framework partners.
- Further development of the Building Solid Families program with the Office of Aboriginal and Torres Strait Islander Health in conjunction with the social and emotional wellbeing and mental health strategy.
- Development and implementation of an Aboriginal health promotion strategy in partnership with the Health Promotion Directorate and the WA framework partners.

References


National Aboriginal and Torres Strait Islander Health Council (NATSIHC) (2000). National Aboriginal and Torres Strait Islander Health Strategy (Consultation Draft). Canberra: NATSIHC.


In 2001-03, the Aboriginal infant mortality rate in WA was 15.9 deaths per 1,000 live births. This was slightly higher than the Northern Territory (NT) rate (14.8 deaths per 1,000 live births) and much higher than the South Australian (SA) rate (9.1 deaths per 1,000 live births).

Between 1991-93 and 2001-03, of the three jurisdictions, SA recorded the largest decrease in Aboriginal infant mortality rates, falling from 23.3 to 9.1 deaths per 1,000 live births.

Aboriginal infant mortality rates in WA were relatively stable except for a slight rise in 1994-96.
Figure 53: Proportion of Aboriginal babies weighing less than 2,500 grams

Between 1991 and 2000, the proportion of Aboriginal low birthweight babies born each year fluctuated in both WA and Australia.

Generally, WA had a higher proportion of Aboriginal low birthweight babies than Australia, except for 1992.

### Table: Proportion of Aboriginal low birthweight babies (LBW) in WA and Australia (1991-2000)

<table>
<thead>
<tr>
<th>Year</th>
<th>Australia - LBW</th>
<th>Australia - % births</th>
<th>WA - LBW</th>
<th>WA - % births</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>923</td>
<td>13.0</td>
<td>220</td>
<td>14.9</td>
</tr>
<tr>
<td>1992</td>
<td>942</td>
<td>12.9</td>
<td>189</td>
<td>11.8</td>
</tr>
<tr>
<td>1993</td>
<td>866</td>
<td>11.8</td>
<td>191</td>
<td>13.1</td>
</tr>
<tr>
<td>1994</td>
<td>956</td>
<td>12.8</td>
<td>206</td>
<td>12.1</td>
</tr>
<tr>
<td>1995</td>
<td>926</td>
<td>11.8</td>
<td>176</td>
<td>14.2</td>
</tr>
<tr>
<td>1996</td>
<td>992</td>
<td>12.6</td>
<td>189</td>
<td>13.3</td>
</tr>
<tr>
<td>1997</td>
<td>1,067</td>
<td>13.1</td>
<td>213</td>
<td>13.7</td>
</tr>
<tr>
<td>1998</td>
<td>1,029</td>
<td>11.8</td>
<td>191</td>
<td>12.6</td>
</tr>
<tr>
<td>1999</td>
<td>1,154</td>
<td>13.0</td>
<td>232</td>
<td>14.8</td>
</tr>
<tr>
<td>2000</td>
<td>1,188</td>
<td>13.6</td>
<td>229</td>
<td>15.1</td>
</tr>
</tbody>
</table>

Figure 54: Aboriginal life expectancy at birth

- Between 1991 and 2002, WA Aboriginal people generally had a higher life expectancy than their counterparts from the NT and SA.
- Female life expectancy was higher than male life expectancy in all three jurisdictions.
- In 2002, life expectancy among Aboriginal males and females in WA were 64.0 and 67.7 years respectively. In SA, life expectancy for an Aboriginal male was 62.8 years, while females recorded a life expectancy of 64.5 years. In the Northern Territory, life expectancies for Aboriginal people were 57.3 and 63.5 years respectively.
**Figure 55: Aboriginal mortality rate**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WA - males</td>
<td>20.5</td>
<td>19.4</td>
<td>18.6</td>
<td>17.3</td>
<td>18.2</td>
<td>18.2</td>
<td>19.3</td>
<td>18.7</td>
<td>18.6</td>
<td>18.2</td>
<td>18.0</td>
<td>18.3</td>
<td>17.2</td>
<td>17.2</td>
<td>16.1</td>
<td>14.8</td>
<td>13.6</td>
</tr>
<tr>
<td>WA - females</td>
<td>13.9</td>
<td>13.2</td>
<td>13.4</td>
<td>13.6</td>
<td>15.4</td>
<td>15.3</td>
<td>17.0</td>
<td>16.6</td>
<td>16.6</td>
<td>15.0</td>
<td>14.1</td>
<td>13.6</td>
<td>12.8</td>
<td>12.7</td>
<td>11.8</td>
<td>12.2</td>
<td>11.9</td>
</tr>
<tr>
<td>SA - males</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>SA - females</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>NT - males</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>NT - females</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Note: Rates based on rolling averages; rates per 1,000 persons.

Source: ABS mortality data.

- Between 1986 and 2002, Aboriginal mortality rates in WA decreased significantly by 1.3% per year for males, from 20.5 to 13.6 deaths per 1,000 persons. Among females, mortality rates fell significantly by 1.2%, from 13.9 to 11.9 deaths per 1,000 persons.
- Between 1991 and 2002, Aboriginal mortality rates for WA also decreased significantly by 2.7% per year for males and 3.3% for females.
- Aboriginal mortality rates in the Northern Territory and South Australia did not change significantly. However, a significant fall in mortality was recorded by NT females between 1991 and 2002 (1.4% per year).
Cardiovascular disease mortality rates among Aboriginal Western Australians fell significantly between 1991 and 2002, by an average of 5.0% per year.

Mortality rates for CVD among Aboriginal people in WA fell from 6.9 deaths per 1,000 persons in 1991, to 3.7 deaths per 1,000 persons in 2002.

Although a fall was recorded in Aboriginal cardiovascular disease mortality rates in SA and the NT, this figure was not statistically significant.
Table 3: Proportion of children immunised\(\textsuperscript{a}\) by Aboriginal status, WA

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Aboriginal status</th>
<th>OPV</th>
<th>MMR</th>
<th>HIB</th>
<th>HEPB</th>
<th>DTP</th>
<th>FULL</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-&lt;15 months</td>
<td>non-Aboriginal</td>
<td>92%</td>
<td>0%</td>
<td>94%</td>
<td>94%</td>
<td>92%</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>Aboriginal</td>
<td>77%</td>
<td>0%</td>
<td>90%</td>
<td>90%</td>
<td>77%</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>91%</td>
<td>0%</td>
<td>94%</td>
<td>93%</td>
<td>91%</td>
<td>89%</td>
</tr>
<tr>
<td>24-&lt;72 months</td>
<td>non-Aboriginal</td>
<td>94%</td>
<td>93%</td>
<td>93%</td>
<td>95%</td>
<td>94%</td>
<td>91%</td>
</tr>
<tr>
<td></td>
<td>Aboriginal</td>
<td>94%</td>
<td>92%</td>
<td>91%</td>
<td>97%</td>
<td>94%</td>
<td>88%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>94%</td>
<td>93%</td>
<td>93%</td>
<td>95%</td>
<td>94%</td>
<td>91%</td>
</tr>
<tr>
<td>72-&lt;75 months</td>
<td>non-Aboriginal</td>
<td>82%</td>
<td>82%</td>
<td>0%</td>
<td>0%</td>
<td>82%</td>
<td>81%</td>
</tr>
<tr>
<td></td>
<td>Aboriginal</td>
<td>77%</td>
<td>77%</td>
<td>0%</td>
<td>0%</td>
<td>77%</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>82%</td>
<td>81%</td>
<td>0%</td>
<td>0%</td>
<td>82%</td>
<td>80%</td>
</tr>
</tbody>
</table>

\(\textsuperscript{a}\) As at June 2004.

Source: Australian Childhood Immunisation Register.

- In 2004, the proportion of children who were fully immunised was higher among non-Aboriginal people than Aboriginal people, across all age groups.
- The proportion of children immunised for each of the immunisations presented was higher among non-Aboriginal children in all age groups except those aged 24-<72 months, where the proportion of Aboriginal children immunised was similar to their non-Aboriginal counterparts.
Figure 57: Aboriginal mortality rate, injury and poisoning, 1998-2002

Aboriginal mortality rates for injury and poisoning for the period 1998-2002 were significantly higher among males than females across WA, SA and the NT.

WA and SA Aboriginal mortality rates for injury and poisoning were slightly lower than the NT for females, while male rates were similar across all three jurisdictions.

<table>
<thead>
<tr>
<th></th>
<th>WA</th>
<th>SA</th>
<th>NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>152.2</td>
<td>195.3</td>
<td>193.0</td>
</tr>
<tr>
<td>Females</td>
<td>63.3</td>
<td>60.4</td>
<td>103.6</td>
</tr>
</tbody>
</table>

Note: ICD-10 V01–Y98.
Sources: ABS mortality data.
**Socioeconomic status**

The social and economic environment is defined as the manner in which society, and individuals within that society, organise their collective lives. As a determinant of health, the socioeconomic environment influences the physical and mental welfare of individuals (Hart, 1997).

It is now well established that health inequalities based on socioeconomic position (SEP) occur in most Western countries. Persons from lower socioeconomic backgrounds tend to report higher mortality rates for most causes, experience more ill health, and are less likely to take preventive measures to avoid illness (Draper et al. 2004; Davey Smith et al. 1998; Kaplan et al. 1996; Turrell & Mathers, 2000). In addition, SEP has been associated with many health-related behaviours and risk factors, with disadvantaged groups more likely to engage in behaviours that may negatively impact on their health (Fox & Benzeval, 1995; Blane et al. 1996). For example, disadvantaged persons are more likely to smoke, do insufficient exercise, and be overweight (AIHW, 2002).

While behaviour has been cited as one possible explanation for the health differences that exist between various socioeconomic groups, it is more likely that these differences are the result of a variety of factors, including diet, education, access to health services, occupational exposures, housing quality and psychosocial factors (AIHW, 2002). The most important socioeconomic factors that determine variations in life expectancy within national populations include gender, race, employment status, occupational class, education, housing tenure and marital status (Hart, 1997).

**Employment status**

Factors affecting the quality of employment for workers include pay rates, hours of work, job security and a balance in work and social life. ‘Family friendly’ provisions, such as part-time work, flexible working hours and provision of parental leave, are associated with higher job satisfaction for employees, lower absenteeism and higher productivity benefits for employers (ABS, 2003a).

Satisfactory employment has many benefits that unemployed people are denied. Besides the obvious financial benefits are identity and status, increased social contact, being part of a collective purpose and joint effort, and being able to engage in regular activity (Creed, 1998).

Recent decades have seen a trend towards more diverse patterns of working arrangements, with increasing numbers of people working either part-time or more than full time. The proportion of people working part-time increased from 22% in 1991 to 27% in 2001 (with 71% being female). In 2002, about a quarter of part-time workers said they would prefer to work more hours. In contrast, the proportion of full-time workers working 50 hours or more a week increased from 20% in 1982 to about 25% in 2002. Working such long hours may lead to deterioration in health and quality of life (ABS, 2003a).

**Unemployment**

The official unemployment rate is widely used as a measure of under-utilised labour resources in the economy, and as a key indicator of the economy’s performance. Since the early 1980s, the unemployment rate has been higher than in the 1960s and 1970s. Despite the general decline in the unemployment rate since the recession of the early 1990s, it appears to have stabilised at around 6-7% (ABS, 2003a). As of February 2005, the unemployment rate in Australia stood at 5.1%, with the WA rate slightly lower at 4.5% (ABS, 2005).

The burden of unemployment tends to be concentrated within particular regions and amongst particular population groups, such as recent migrants, young people, people with disabilities and Aboriginal people (ABS, 2003a; Creed, 1998).

Some people remain unemployed for long periods of time. In March 2002, nearly a quarter of unemployed people had been without work for a year or more; of this group 57% had been unemployed for over two years. The likelihood of remaining unemployed increases with the duration of unemployment, as long-term unemployment is associated with a loss of skills and on-the-job training, a reduced intensity of job searching, and a reluctance by employers to hire (ABS, 2003a).

The long-term unemployed and their families may be at risk of poverty and welfare dependence. About 18% of children live in households where no parent is employed, and children whose parents remain unemployed for a considerable period of time may grow up in households where welfare benefits are the main source of income. This may lead to problems of welfare dependence in adulthood (ABS, 2003a).

**Health and unemployment**

Unemployment, particularly long-term unemployment, involves costs to the individual, the economy and the community. At the individual level, people who are...
unemployed have reduced incomes and may be at greater risk of experiencing depression and ill health (ABS, 2003a). At the community level, there is evidence that high levels of unemployment have an adverse effect on those in the workforce, with job insecurity being associated with elevated stress levels (Creed, 1998).

The relationship between unemployment and health is complex and associated with factors of socioeconomic disadvantage, such as low income, job insecurity and poor housing, so it is difficult to separate out the effects of any single aspect. It also varies for different population groups. However, a review of international studies on the health effects of unemployment found unemployed people had higher mortality rates, poorer psychological health, more illness, poorer self-reported health and higher levels of health service use, compared to employed people (Mathers & Schofield, 1998).

Although some individuals suffering prior ill health may be unemployed for health reasons, evidence from longitudinal studies suggests unemployment has a direct adverse effect on health outcomes. Unemployment may cause poorer health through lower income, which restricts purchasing power, reduced participation in society or by causing psychological stress (Mathers & Schofield, 1998). Over the longer term, unemployment may induce individuals to work under conditions they might not otherwise have accepted. Therefore, increasing insecurity of work and reductions in health and safety precautions may also damage health (Bartley, 1988).

Long-term solutions to address the impact of unemployment on health lie in increasing employment and training opportunities and addressing the cycle of poverty and its effect on families, individuals, and communities; thus, an intersectoral approach is needed. However, there is a role for the health care system in treating existing health problems, preventing further health problems, and ensuring that poor health does not act as a barrier to returning to work (Harris et al. 1998).

Index of socioeconomic disadvantage

The ABS derived a number of summary measures to describe the socioeconomic variation within the Australian population for analysis of 2001 Census data (ABS, 2003c). One of these measures, the Index of Relative Socioeconomic Disadvantage (IRSD) was based on attributes such as low income, low educational attainment, high unemployment, jobs in relatively unskilled occupations and other measures reflecting disadvantaged groups (e.g. Aboriginal people). The higher the score on the index, the lower the socio-economic disadvantage.

In 2001, using the IRSD, socio-economic disadvantage was found to be highest in remote areas of WA. Within the Perth metropolitan area, the highest disadvantage was found in the southern areas.

Mortality

There is clear evidence that socioeconomically disadvantaged groups experience higher mortality rates than their economically advantaged counterparts. Recent research has also demonstrated that, in many countries including Australia, these inequalities have increased (Turrell & Mathers, 2000; Draper et al. 2004; Royal Australian College of Physicians, 2005).

Nationally, for all causes of mortality, working aged males and females aged 25-64 years from the most disadvantaged areas of Australia experienced mortality rates 75% and 52% higher respectively than their counterparts from the least disadvantaged areas in 1998-2000. Compared to males from the least disadvantaged areas, disadvantaged males recorded mortality rates 45% higher for all cancers, 102% higher for lung cancer, 112% higher for diseases of the circulatory system and 144% higher for heart attacks. Among females, these differences were: 17% higher for all cancers, 73% higher for lung cancer, 127% higher for diseases of the circulatory system, and 170% higher for heart attacks (Draper et al. 2004).

In 2002, people aged 25-64 years residing in the most disadvantaged areas of WA recorded mortality rates for all causes of death around 56% higher for males and 26% higher for females, compared to those from the least disadvantaged areas of the State.

References


SUMMARY HEALTH MEASURES

Figure 58: Index of Relative Social Disadvantage by WA SLAs

Produced by: Epidemiology Dept Health WA - May 2004 -- Source: ABS 2003, Department of Land Information 2004
Figure 59: All cause mortality rates and rate ratios by Index of Relative Social Disadvantage quintiles, persons aged 0-14 years, 2000-2002, WA

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Males Rate</th>
<th>Males Rate ratio</th>
<th>Females Rate</th>
<th>Females Rate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quintile 1</td>
<td>23.1</td>
<td>1.00</td>
<td>22.0</td>
<td>1.00</td>
</tr>
<tr>
<td>Quintile 2</td>
<td>34.0</td>
<td>1.50</td>
<td>27.4</td>
<td>1.26</td>
</tr>
<tr>
<td>Quintile 3</td>
<td>37.4</td>
<td>1.68</td>
<td>34.0</td>
<td>1.60</td>
</tr>
<tr>
<td>Quintile 4</td>
<td>62.5</td>
<td>2.86</td>
<td>38.2</td>
<td>1.84</td>
</tr>
<tr>
<td>Quintile 5</td>
<td>92.2</td>
<td>4.42</td>
<td>54.3</td>
<td>2.78</td>
</tr>
</tbody>
</table>

Note: Quintile 1 = least disadvantage; quintile 5 = most disadvantaged.
Source: ABS mortality data.

- In 2000-2002, males aged 0-14 years from the most disadvantaged areas of WA (quintile 5) recorded mortality rates four times higher than their counterparts from the least disadvantaged areas of the State (92 and 23 deaths per 100,000 persons respectively). If mortality rates among males aged 0-14 years from the most disadvantaged areas of WA were equivalent to those from the least disadvantaged areas, around 85 deaths could have been avoided.

- In 2000-2002, females aged 0-14 years from the most disadvantaged areas of WA recorded mortality rates nearly 2.5 times higher than their counterparts from the least disadvantaged areas of the State (54 and 22 deaths per 100,000 persons respectively). If mortality rates among females aged 0-14 years from the most disadvantaged areas of WA were equivalent to those from the least disadvantaged areas, around 40 deaths in this age group could have been avoided.
Figure 60: All cause mortality rates and rate ratios by Index of Relative Social Disadvantage quintiles, persons aged 15-24 years, 2000-2002, WA

- In 2000-2002, males aged 15-24 years from the most disadvantaged areas of WA (quintile 5) recorded mortality rates around 1.8 times higher than their counterparts from the least disadvantaged areas of the State (110 and 63 deaths per 100,000 persons respectively). If mortality rates among males aged 15-24 years from the most disadvantaged areas of WA were equivalent to those from the least disadvantaged areas, around 44 deaths could have been avoided.

- In 2000-2002, females aged 15-24 years from the most disadvantaged areas of WA recorded mortality rates 1.6 times higher than their counterparts from the least disadvantaged areas of the State (48 and 32 deaths per 100,000 persons respectively). If mortality rates among females aged 15-24 years from the most disadvantaged areas of WA were equivalent to those from the least disadvantaged areas, around 15 deaths could have been avoided.
Figure 61: All cause mortality rates and rate ratios by Index of Relative Social Disadvantage quintiles, persons aged 25-64 years, 2000-2002, WA

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Rate Male</th>
<th>Rate Female</th>
<th>Rate Ratio Male</th>
<th>Rate Ratio Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quintile 1</td>
<td>225.6</td>
<td>150.7</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Quintile 2</td>
<td>224.1</td>
<td>124.0</td>
<td>0.97</td>
<td>0.82</td>
</tr>
<tr>
<td>Quintile 3</td>
<td>248.6</td>
<td>135.5</td>
<td>1.09</td>
<td>0.90</td>
</tr>
<tr>
<td>Quintile 4</td>
<td>339.0</td>
<td>197.3</td>
<td>1.46</td>
<td>1.30</td>
</tr>
<tr>
<td>Quintile 5</td>
<td>383.1</td>
<td>202.8</td>
<td>1.56</td>
<td>1.26</td>
</tr>
</tbody>
</table>

Note: Quintile 1 = least disadvantage; quintile 5 = most disadvantaged.
Source: ABS mortality data.

- In 2000-2002, males aged 25-64 years from the most disadvantaged areas of WA (quintile 5) recorded mortality rates around 1.6 times higher than their counterparts from the least disadvantaged areas of the State (383 and 226 deaths per 100,000 persons respectively). If mortality rates among males aged 25-64 years from the most disadvantaged areas of WA were equivalent to those from the least disadvantaged areas, around 395 deaths could have been avoided.
- In 2000-2002, females aged 25-64 years from the most disadvantaged areas of WA recorded mortality rates around 1.3 times higher than their counterparts from the least disadvantaged areas of the State (203 and 151 deaths per 100,000 persons respectively).
Figure 62: All cause mortality rates and rate ratios by Index of Relative Social Disadvantage quintiles persons aged 65 years and over, 2000-2002, WA

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Rate (Males)</th>
<th>Rate ratio</th>
<th>Rate (Females)</th>
<th>Rate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quintile 1</td>
<td>4,415</td>
<td>1.00</td>
<td>4,211</td>
<td>1.00</td>
</tr>
<tr>
<td>Quintile 2</td>
<td>3,249</td>
<td>0.73</td>
<td>2,982</td>
<td>0.70</td>
</tr>
<tr>
<td>Quintile 3</td>
<td>3,985</td>
<td>0.94</td>
<td>3,155</td>
<td>0.78</td>
</tr>
<tr>
<td>Quintile 4</td>
<td>6,089</td>
<td>1.34</td>
<td>4,538</td>
<td>0.97</td>
</tr>
<tr>
<td>Quintile 5</td>
<td>5,183</td>
<td>1.08</td>
<td>4,084</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Note: Quintile 1 = least disadvantage; quintile 5 = most disadvantaged.
Source: ABS mortality data.

- WA males aged 65 years and over from quintiles 4 and 5 recorded mortality rates higher than their counterparts from the least disadvantaged areas (quintile 1), while males from quintiles 2 and 3 recorded mortality rates lower than males from quintile 1.
- Females aged 65 years and over from quintiles 2, 3 and 5 recorded mortality rates significantly lower than their counterparts from the least disadvantaged areas (quintile 1). This may be due to a healthy selection process where only the healthy individuals survive into old age.
**MAJOR CONDITIONS**

**ARTHRITESS**

**Major conditions**

Arthritis and musculoskeletal conditions

The common nature of musculoskeletal conditions and the cost of treatment means that these conditions have a large impact on the health system. Musculoskeletal conditions are among the leading causes of admission to hospital, attendances at casualty, outpatient and emergency departments, visits to general practitioners, prescriptions for medication, allied health professional consultations and nursing home residency (Arthritis Foundation of Australia, 2001). In 2000-01, musculoskeletal conditions were ranked the third leading cause of health expenditure in Australia, with a total cost of $4.7 billion (AIHW, 2004).

The majority of musculoskeletal conditions substantially reduce quality of life, with many resulting in chronic disability. In terms of Disability Adjusted Life Years, almost the entire burden caused by these conditions is accounted for by disability, with a minor proportion related to mortality. Arthritis accounted for the majority of the musculoskeletal burden, with osteoarthritis ranked in the top 20 specific causes of overall burden in WA (Somerford et al. 2004).

Osteoporosis is another important condition affecting the musculoskeletal system, as it is common among the elderly and may have serious outcomes.

**Arthritis**

In its many forms, arthritis causes inflammation of the joints, with associated stiffness, pain and deformity. The most common form of arthritis is osteoarthritis, which develops when the cartilage covering the bones in joints degenerates. This can occur as a result of trauma, ageing or failure of joint repair and maintenance mechanisms. Rheumatoid arthritis is the next most common form of arthritis. In this condition, the membrane that lines the joint is thickened and too much synovial (joint) fluid is produced. This causes the joints to become painful, swollen and stiff, and as the process continues, deformed from damage to the cartilage and other soft tissue (Arthritis Foundation of Australia, 2001).

**Epidemiology**

Based on self-reported data, around 13% of the WA population or nearly 260,000 people suffered from arthritis in 2000. In 2001, the National Health Survey found that the self-reported prevalence of arthritis in WA (13.5%) was similar to that nationally (13.6%) (ABS, 2002). After the age of 44 years, the prevalence among females was higher than that among males. Arthritis mainly affects the elderly, with the age-specific prevalence highest among people aged 75 years and older (males 42%; females 56%). In terms of healthy life lost to disability, arthritis was the third leading cause of disability burden in WA in 2000 (Somerford et al. 2004).

**Risk factors**

Osteoarthritis is more common among females, the elderly, people who are overweight, have low socioeconomic status, have suffered chronic stress across joints or joint trauma, and have other metabolic and inflammatory disorders. Hereditary factors are also thought to influence the development of the condition (Arthritis Foundation of Australia, 2001).

Rheumatoid arthritis is also more common among females. The major risk factor for rheumatoid arthritis is a family history of the disease, while diet, ethnicity and trauma are also related. Pregnancy has a protective effect, suggesting hormonal influences (Arthritis Foundation of Australia, 2001).

**Prevention**

Major risk factors for osteoarthritis that are potentially modifiable include injury, obesity and occupational overuse. Strategies to prevent obesity and reduce injury and provide appropriate rehabilitation after injury are needed to reduce the prevalence of osteoarthritis in Australia (March & Bagga, 2004).

**Treatment**

Drugs are used to reduce pain, increase mobility and limit inflammation among patients with mild forms of osteoarthritis. In cases that have progressed to full cartilage loss, total joint replacement surgery is a cost-effective option (ABS, 2001).

Knee and hip replacements may be cost-effective; however, the demand for joint replacement surgery is increasing in WA and competing for the finite resources available for health care. In WA, the number of hip and knee replacements has increased from 4,246 in 1999-00 to 5,177 in 2002-03, an average annual increase of 2.7% for males and 3.5% for females. Nationally, the rates for males and females were lower than in WA, although they also increased between 1997-98 and 2001-02 by an average of 4.2% per year for males and 3.5% for females. In Australia between 1999 and 2002, osteoarthritis was the major reason for 90% of total hip replacements and for 95% of total knee replacements (Australian Orthopaedic Association, 2003).
Osteoporosis

Osteoporosis is characterised by low bone mass caused by progressive deterioration of the bone tissue. Common among the elderly, osteoporosis is a major contributor to fractures in this age group, as it increases bone fragility. Diagnosis of osteoporosis is usually confirmed after a fracture (Osteoporosis Australia, 2001); however, studies suggest that many individuals with low bone mineral density (BMD) and a history of fractures are not diagnosed or treated (ABS, 2002).

Epidemiology

The self-reported prevalence of osteoporosis in WA in 2004 was 5.2%, however the true prevalence is likely to be much higher, as many people are not aware they have the disease until they seek treatment for fractures. Females (7.9%) reported higher prevalence rates than males (1.9%) and the prevalence increased with age. Among people aged 75 years or older, prevalence rates for females were 34.6%, compared to 3.5% for males.

Fractures of the hip, spine, pelvis, upper arm and wrist are the most common sites for osteoporosis sufferers. The outcomes for people fracturing a hip are serious, as the condition usually requires hospitalisation for either surgical repair of the fracture or replacement of the joint. In many cases, patients do not make a full recovery and require nursing home care. In addition, hip fracture patients have a higher mortality rate than the general population of the same age (AIHW, 2002). One study estimated that less than half of all hip fractures in women aged 65 years and older were due to osteoporosis (Stone et al. 2003).

Although the number of hospitalisations for hip fractures among people aged 65 years and older in WA increased from 1,276 in 1993/94 to 1,508 in 2001/02, the rate for females declined significantly by an average of 2.1% separations per year, while the rate for males remained unchanged. Nationally over the same period, the rate of hip fractures among males aged 65 years and older increased significantly by an average of 0.8% per year, while the female rate remained unchanged. The separation rate for hip fractures among females was almost double that of males in both WA and Australia.

Risk factors

The process of ageing causes bone weakness; consequently, all elderly people are susceptible to osteoporosis. Despite this, osteoporosis is more common among females than males. This is because females have smaller bones and reach maximum Bone Mineral Density (BMD) earlier than males. Females also experience a rapid decline in oestrogen following menopause, resulting in a decline in bone mass. The inadequate intake of calcium and Vitamin D, which is required for calcium absorption during growth, has been associated with the development of osteoporosis. Other risk factors for osteoporosis include a sedentary lifestyle, smoking and family history, as genetics determine bone mass (Osteoporosis Australia, 2001).

Prevention

Primary prevention could be achieved by targeting the young and the elderly separately. Early intervention strategies to increase dietary calcium intake and exercise in young people would help them attain maximum BMD during development. Programs to reduce Vitamin D deficiencies, and prevent falls and other fracture risk factors may reduce the prevalence of fractures among the elderly. Other lifestyle changes such as improved diet and smoking cessation are also likely to be of benefit.

Screening of individuals who present to health services with possible osteoporotic fractures should increase the diagnosis and treatment of osteoporosis and thereby reduce the risk of subsequent fractures.

Treatment

Treatments to reduce the rate of bone loss and the risk of fracture include drug therapy in combination with calcium supplementation. Vitamin D supplementation is recommended for elderly patients, especially those who are institutionalised (Sambrook et al. 2002).

References


In WA, females recorded a higher separation rate for hip fractures than males between 1993/94 and 2003/04. Similar results were found nationally, with female rates around twice those of males.

Between 1993/94 and 2002/03, Australian males experienced a significant increase in hip fracture separations, averaging 0.6% per year. WA females recorded a significant annual average decrease of 2.1%. Australian females and WA males showed no significant change in separation rates for hip fractures over this period.

Note: ICD9-CM codes 820.0 to 820.9, ICD10 codes S72 to S72.2.
Sources: AIHW data cubes; WA Hospital Morbidity Data System.
From 1997/98 to 2003/04, hospital separation rates for joint replacements recorded a general increase in both WA and Australia.

Females experienced higher separation rates for joint replacements than males in both WA and Australia.

Separation rates for joint replacements were higher among WA males and females than their Australian counterparts. In 2001/02, male separation rates in WA were 256 per 100,000 persons, while Australian males recorded a rate of 236 separations per 100,000 persons. Female separation rates were 284 and 262 separations per 100,000 persons respectively.

The most recent figures for Western Australia (2003/04) showed separation rates for joint replacements of 270 and 299 separations per 100,000 persons for males and females respectively.
Figure 65: Age-specific prevalence, arthritis, WA, 2004

- Arthritis prevalence increases with age. Except in ages 25-34 and 35-44, females were more likely to experience arthritis than males in 2004, with greater differences in prevalence recorded among older age groups.

- In 2004, around 22% of the WA population aged 18 years and over reported that they currently had arthritis (males 18%; females 26%).

### Table: Age-specific Prevalence of Arthritis

<table>
<thead>
<tr>
<th>Age Group</th>
<th>18–24</th>
<th>25–34</th>
<th>35–44</th>
<th>45–54</th>
<th>55–64</th>
<th>65–74</th>
<th>75+</th>
<th>All ages(a) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>1.2</td>
<td>10.0</td>
<td>13.4</td>
<td>20.6</td>
<td>26.8</td>
<td>47.7</td>
<td>36.5</td>
<td>18.3</td>
</tr>
<tr>
<td>Females</td>
<td>4.3</td>
<td>7.2</td>
<td>10.0</td>
<td>32.8</td>
<td>43.2</td>
<td>63.9</td>
<td>67.7</td>
<td>25.6</td>
</tr>
<tr>
<td>Persons</td>
<td>2.7</td>
<td>8.4</td>
<td>11.5</td>
<td>28.0</td>
<td>36.7</td>
<td>56.7</td>
<td>55.6</td>
<td>21.7</td>
</tr>
</tbody>
</table>

\(a)\) Age standardised prevalence.
Source: WA Health and Wellbeing Surveillance System.
Self-reported arthritis prevalence for persons aged 18 years and over was higher among females than males for the survey periods 1995 to 2004.

For males, the prevalence has fluctuated; however, among females, prevalence rates decreased between 1995 and 2000, before increasing in 2003 and 2004.
Figure 67: Age-specific prevalence, osteoporosis, WA, 2004

- Osteoporosis is more prevalent among females than their male counterparts. In 2004, the prevalence of osteoporosis among Western Australians aged 18 years and over was 1.9% for males and 7.9% for females.

- The prevalence of osteoporosis in females increases steadily with age. Prevalence among females aged 65-74 years was 24.4%, nearly eight times higher than the prevalence in males (2.7%). Among those aged 75 years and over, female rates were around 9 times higher than male rates.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>25-34</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>35-44</td>
<td>0.4</td>
<td>2.3</td>
</tr>
<tr>
<td>45-54</td>
<td>2.6</td>
<td>7.7</td>
</tr>
<tr>
<td>55-64</td>
<td>6.6</td>
<td>15.5</td>
</tr>
<tr>
<td>65-74</td>
<td>2.7</td>
<td>24.4</td>
</tr>
<tr>
<td>75+</td>
<td>3.5</td>
<td>34.6</td>
</tr>
<tr>
<td>All ages</td>
<td>1.9</td>
<td>7.9</td>
</tr>
</tbody>
</table>

(a) Age standardised prevalence.
Source: WA Health and Wellbeing Surveillance System
Figure 68: Prevalence, arthritis, 2001

<table>
<thead>
<tr>
<th></th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>WA</th>
<th>Aust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthritis</td>
<td>13.9</td>
<td>12.9</td>
<td>14.1</td>
<td>12.9</td>
<td>18.7</td>
<td>11.8</td>
<td>13.5</td>
<td>13.6</td>
</tr>
</tbody>
</table>

Note: Separate estimates for the NT were not available, however, the NT contributes to the national estimates.

- In 2001, Tasmania recorded the highest prevalence rates for arthritis (18.7%), while the ACT recorded the lowest rates (11.8%).
- The prevalence of arthritis in WA (13.5%) was similar to the national prevalence (13.6%).
Figure 69: Prevalence, osteoporosis, 2001

In 2001, Tasmania and Victoria were the only Australian States or Territories to record lower prevalence rates for osteoporosis than WA.

- The prevalence rate in WA (1.5%) was similar to that in Australia (1.6%).

Note: Separate estimates for the NT were not available, however, the NT contributes to the national estimates.
**Asthma**

There is a general lack of agreement on a definition for asthma as it affects individuals in a number of different ways. One definition is: ‘asthma is an inflammatory disorder of the airways in which the small airways are hypersensitive to a wide range of stimuli that cause them to narrow too much, resulting in symptoms of wheeze, chest tightness and shortness of breath’ (CATI Technical Reference Group, 2003).

There are two main factors that cause airways to narrow:

- **Inflammation** - where the inside lining of the airway becomes red and swollen and extra mucus may be produced; and
- **Bronchoconstriction** - where the muscles around the airways tighten.

Diagnosis of asthma can be problematic in very young children (0-4 years) and in adults aged over 50 years because, in both cases, other breathing disorders may be difficult to distinguish from asthma (AIHW, 2002).

**Risk factors for asthma**

Atopy (a hypersensitive state in which an individual tends to produce abnormal amounts of Immune globulin E (IgE) antibodies in response to exposure to environmental allergens) is considered the strongest identifiable risk factor for the development of asthma. It has been estimated that 90% of children and 80% of adults with asthma are atopic. Twin and family studies have shown that atopy is at least partly under genetic control (CATI Technical Reference Group, 2003).

Asthma has generally been thought to result from exposure to allergens in infancy leading to atopy, and eventually to airway hyper-responsiveness. Agents that may provoke an attack include colds and flu, exercise, inhaled allergens (e.g. pollens, dust mites), tobacco smoke, changes in temperature and weather, certain drugs, and chemical irritants (Asthma Australia, 2004).

Epidemiological studies have identified a number of factors associated with increased incidence of asthma. These include allergen sensitisation and exposure, little contact with farm animals in early childhood and reduced exposure to infections (Tang, 2002). Childhood infections seem to be important to normal maturation of the immune system, with asthma thought to be a manifestation of a persistent ‘immature’ immune system (Abramson & Walters, 2000).

Infants exposed to tobacco smoke in the perinatal period are also at greater risk of asthma, and the prevalence of asthma in young children living in households with one or more smokers was higher than in non-smoking households (ABS, 1998).

Asthma is more common in children with an asthmatic parent, and those who had a severe chest illness in the first two years of life. Other factors that may increase the risk of asthma in childhood but for which evidence is inconclusive, include fresh fish in the diet and exercise (Woolcock, 1998).

In Australia, the prevalence of current asthma is higher among Aboriginal adults than non-Aboriginal adults, and lower in adults from non-English speaking backgrounds (ABS, 2002).

Recommendations for the primary prevention of asthma include exclusive breastfeeding for the first six months of life, avoidance of maternal smoking during pregnancy and infancy, and reducing the level of house dust mites (Tang, 2002). Living in a village community and having more than four older siblings are also thought to have a protective effect against asthma (Asthma Australia, 2004).

**The consequences of asthma**

Asthma is responsible for much ill health and suffering in Australia. It is a major cause of school absenteeism and child emergency department attendance. There is evidence that up to 60% of asthma deaths may be associated with avoidable factors, and more than 60,000 Australians are admitted to hospital each year due to asthma (DoHA, 2004). In 2000-01, the total health expenditure on asthma in Australia was $615 million, nearly half of which ($290 million) went on pharmaceuticals (AIHW, 2004). Asthma is also one of the most frequently managed problems by GPs, at an average rate of 16 GP encounters per 100 population per year, or 3% of all general practice encounters (Australian Centre for Asthma Monitoring, 2003).

In WA, asthma accounts for 2.6% of the total disease burden in males and 2.8% in females. Furthermore, it is one of the top ten leading causes of disease burden in the State.

Mortality rates from asthma have trended downwards over the past two decades in both WA and Australia, with WA rates slightly lower than the national figure. In 2003, asthma was listed as a cause of death on 103 death certificates, or 0.9% of all deaths, throughout WA. However, it was listed as the underlying (or main) cause of death in only 15 cases (0.1% of all deaths). In the other 88 deaths it was listed as an associated
cause of death, 28 (32%) of which had ischaemic heart disease as the underlying cause.

Hospital separation rates for asthma in children aged 0-14 years decreased over the past decade in WA and Australia. Separation rates in WA were slightly higher than those recorded nationally, while male rates were higher than female rates across both jurisdictions. For Western Australians of all ages, hospital separations for asthma over the last decade showed a marked downward trend, with female rates higher than those among males. An analysis of hospital separations for the 2002/03 financial year in WA found that asthma was mentioned (in any of the diagnosis fields) in 5,752 cases, or 0.8% of all hospital separations. In 3,945 or 69% of these (0.6% of all hospital separations) asthma was the principal diagnosis.

Approximately one-third to one-half of adults with asthma have moderate or severe asthma. This is a complex condition that requires careful assessment and ongoing review to be optimally managed (DoHA, 2004).

Due to the significant burden associated with asthma, it was identified as the sixth National Health Priority in 1999. This has resulted in a number of government-funded activities and projects to improve asthma management and care. The National Asthma Action Plan 1999-2002 (Department of Health and Aged Care, 2001) was developed to provide a framework for action, and a National Asthma Reference Group was established to provide expert advice on key asthma issues.

**Asthma prevalence**

The true prevalence of asthma is difficult to determine, due to there being no single objective diagnostic test and the lack of a universally applied definition of asthma. However, asthma is one of the most common chronic diseases in the world, and an estimated 300 million people worldwide, of all ethnic groups, socioeconomic levels, and ages, suffer from the condition. Moreover, the prevalence of asthma is increasing throughout the world, and the rate appears to increase as communities adopt western lifestyles and become urbanised. With the projected increase in the proportion of the world’s urban population from 45% to 59% in 2025, it is estimated that there may be another 100 million people with asthma by 2025 (Masoli et al. 2004).

Compared with other countries, the prevalence of asthma in Australia is high. In terms of the prevalence of current asthma symptoms in adults, Australia ranked second after Wales (Masoli et al. 2004).

The 2001 National Health Survey reported that about 2.2 million people in Australia suffered from asthma as a current and long-term condition. This represents 12% of the total population (males 11%; females 13%). Fourteen per cent of children aged 0-17 years and 11% of adults aged 18 years or over reported that they had asthma as a current and long-term condition. Asthma was the most commonly reported long-term condition in children aged 0-14 years and in this age group the prevalence of asthma was higher in males. However, from 15 years of age, this trend was reversed with females reporting a higher prevalence of asthma than males (ABS, 2002).

Surveys conducted in WA gave the following proportions for children who had ever been diagnosed by a doctor with asthma:

- 20% of children aged less than 13 in WA in 2001 (Daly & Roberts, 2002).
- 18% of children aged less than six years, and 26% of children aged four to five years attending childcare and family day care in Perth in 1995 (Slack-Smith et al. 2002).
- 31% of children aged six years in a follow-up of a birth cohort study from 1995 to 1998 in Perth (Oddy, 2000).

**Asthma management**

Asthma cannot be cured; however, it can be effectively controlled. Each person with asthma reacts to a different set of factors. Identification of these factors and recognising how to avoid them is a major step for each individual in learning how to control their disease (Global Initiative for Asthma, 2004).

There are two main types of medication for asthma: preventers and relievers. Preventers (especially anti-inflammatory agents such as inhaled glucocorticosteroids) usually need to be taken every day and prevent asthma attacks by making the airways less sensitive. Relievers (rapid-acting bronchodilators) provide relief from asthma symptoms by relaxing the muscles around the airways (Global Initiative for Asthma, 2004).

Asthma Australia (2004) recommend that controlling asthma involve taking medication as directed, monitoring the condition, staying active and healthy, avoiding triggers whenever possible, having a written asthma plan and visiting the doctor regularly.
References


The prevalence of asthma in persons aged 18 years and over generally increased among both males and females throughout the survey years 1995 to 2004.

Asthma prevalence was higher in females than males in each of the years presented.

In 2004, it was estimated that around 9% of males and 12% of females aged 18 years and over in WA currently experienced asthma.
The separation rate for asthma for children aged 0-14 years decreased between 1993/94 and 2003/04 in WA and between 1993/94 and 2002/03 in Australia. Over this period, the WA male rate fell by almost half, while the Australian male rate fell by around one-third.

The male hospital separation rate for asthma was consistently higher than the female rate. In WA in 2003/04, the male rate was 654 separations per 100,000 persons, while the WA female rate was 364 separations per 100,000 persons.

The WA separation rate for asthma was consistently higher than the Australian rate among both males and females.
Figure 72: Hospital separation rate, asthma, all ages, WA

- Between 1990/91 and 2003/04, hospital separation rates for asthma halved among WA males and females.
- The female separation rate for asthma was generally higher than that for males throughout this period. In 2003/04, separation rates for asthma were 182 separations per 100,000 persons for males and 204 separations per 100,000 persons for females.

Note: ICD9 493; ICD10 J45–J46.
Source: WA Hospital morbidity data system.
Figure 73: Mortality rate, asthma

- Mortality rates for asthma decreased in WA between 1983 and 2003 by an average of 7.6% per year for males and 5.9% per year for females.

- Nationally, between 1991 and 2003, asthma mortality rates decreased by an annual average of 10.5% for males and 8.8% for females. Over the same period, mortality rates for WA males decreased by an average of 8.3% per year, while rates among WA females fell by an average of 9.7% per year.

- Asthma mortality rates were lower in WA than Australia for both males and females.

- In 2003, mortality rates for asthma among Western Australians were 1.0 and 1.5 deaths per 100,000 persons among males and females respectively. Nationally, the corresponding figures were 1.5 deaths per 100,000 persons for males and 1.9 deaths per 100,000 persons for females.

Source: ABS mortality data, rates based on rolling averages.
All cancers

Cancer refers to a diverse range of diseases characterised by the abnormal proliferation of cells which do not respond to normal growth controls. Normal cells grow and multiply in an orderly manner; however, occasionally cells may multiply in an uncontrolled fashion after being affected by a carcinogen or random genetic mutation. This may result in the formation of a mass referred to as a tumour or neoplasm. Tumours can be either benign (not a cancer) or malignant (a cancer).

Malignant tumours have the ability to grow uncontrollably and invade surrounding cells and structures. They also have the ability to spread to other parts of the body through the bloodstream or lymphatic system. This can result in a new or secondary tumour developing some distance from the original neoplasm, where it may again begin the process of invading the surrounding cells (AIHW & AACR, 2003).

While cancer is primarily a disease associated with older persons, it can occur at any age. Common types of cancer in older people are cancers of the colon, lung, breast and prostate. In young people aged 1-14 years, brain cancer and leukaemia are the leading cause of cancer mortality (ABS, 2004).

A large proportion of cancer deaths occur in four principal sites: lung, bowel, breast and prostate. These cancers are far less common in the undeveloped world; however, within one or two generations of migration to high-risk areas, incidence rates tend to increase, suggesting that many cancers common in the Western world are related to environmental factors and may thus be largely preventable (Cummings & Bingham, 1998).

In Australia, cancer affects various population groups to different degrees. Males aged 25-64 years in 1998-2000 recorded mortality rates for cancer 18% higher than females, while males and females from remote or very remote areas of Australia experienced cancer mortality rates 21% and 17% higher than their counterparts from urban areas. In addition, males and females aged 25-64 years living in areas classified as disadvantaged recorded mortality rates for cancer 45% and 17% higher than males and females from the least disadvantaged areas (Draper et al. 2004).

National Health Priority Area

The contribution of cancer to the burden of disease in Australia and WA is significant. In 2001, the lifetime risk of being diagnosed with cancer in Australia and WA was 1 in 3 for males and 1 in 4 for females. Furthermore, in 2003, the lifetime risk of dying from cancer was 1 in 8 for males and 1 in 11 for females.

The Commonwealth Government designated cancer as one of seven National Health Priority Areas (NHPA) in 1996. The NHPA initiative focuses public attention and health policy on areas that both contribute significantly to the burden of disease and illness in Australia and have the potential for health gains. As well as cancer as a whole, some specific cancers are targeted as part of the NHPA strategy. These are lung cancer, melanoma, cervical cancer, breast cancer, colorectal cancer and prostate cancer (AIHW & CDHFS, 1997).

Epidemiology

In 2003, neoplasms (cancers: C00-D48) were second only to diseases of the circulatory system as the leading cause of death in WA, being cited as the underlying cause of death for 3,303 persons (30% of all deaths). Cancers were also the second most common cause of death in Australia, accounting for 38,392 deaths, or 29% of all deaths registered, in 2003.

There has been a steady increase in the number of new cancer cases reported each year in both WA and Australia. Between 1982 and 2003, cancer incidence rates in WA increased significantly by 0.8% per year for males (from 461 to 559 cases per 100,000 persons) and by 0.6% per year for females (from 342 to 390 cases per 100,000). Over the period 1983-2001, incidence rates for cancer in Australia increased significantly by 1.0% per year for males (from 460 to 541 cases per 100,000 persons) and by 1.1% per year for females (from 324 to 393 cases per 100,000). The lifetime risk of cancer incidence remained stable from 1982 to 2003 among males and females in WA. In WA the lifetime risk of being diagnosed with cancer before the age of 75 years was around 1 in 3 for males and 1 in 4 for females in 2003. Nationally, the lifetime risk of incidence was similar to that in WA for both sexes.

Despite the reported increase in cancer incidence in both WA and Australia, cancer-related mortality has fallen over the past decade. Between 1991 and 2003, cancer mortality fell by 11% (1.4% annually) among WA males (from 261 to 232 deaths per 100,000 persons) and by 10% (1.3% annually) among WA females (from 162 to 145 deaths per 100,000 persons). Consequently, the lifetime risk of death from cancer before 75 years decreased from 1 in 7 to 1 in 8 among males and from 1 in 10 to 1 in 11 among females from 1990 to 2003 in WA. These were similar to all Australian risks. Nationally, the lifetime risk of death was similar to that in WA for both sexes.
Over the past two decades in WA, PYLL per 1,000 persons for cancer remained relatively stable, with male PYLL decreasing slightly from 13.5 to 13.2 years and female PYLL falling from 12.8 to 11.9 years. Over the past decade, PYLL for both males and females in WA has been slightly lower than the figure recorded nationally.

In 2000, colorectal cancer was the most reported cancer in WA (1,066 cases) and Australia. However, lung cancer was responsible for a greater number of deaths due to its poorer prognosis for survival (AIHW & AACR, 2003).

Compared to similar industrialised countries, Australia has a relatively high incidence of cancer. However, Australian mortality rates for cancer are considerably lower than the majority of industrialised nations (Reutens et al. 2004). This is probably due to the high incidence of melanoma in Australia, which has high relative survival rates.

Survival
Survival rates are an important indicator of the impact that a particular cancer may have on the general community. Relative survival provides an indication of the proportion survival expected in the general population based on sex and age. It incorporates the crude survival time of a population, i.e. the time between diagnosis and death, and the expected survival within the general population.

Between 1994 and 1997, relative 5-year survival rates for persons aged 15 years and over diagnosed with cancer in WA were 59% for males and 63% for females. National 5-year survival rates for all ages between 1992 and 1997 were similar, males 57%, females 63% (AIHW & AACR, 2001).

Of the leading causes of cancer reported by WA males and females over the period 1994-1997, the cancers with the highest 5-year relative survival rates (90% or higher) were cancer of the lip, cutaneous melanoma, thyroid cancer and Hodgkin’s lymphoma. Those with the lowest 5-year relative survival rates (less than 20%) were mesothelioma, and cancers of the lung, pancreas and gall bladder.

Risk factors
Although the overall mechanisms involved in a cell becoming malignant are not known, there are many factors known to cause malignancy in a cell. The principal causes of cancer are environmental, and the Cancer Council of Australia has identified tobacco-smoking, sun exposure, poor diet, alcohol consumption and physical inactivity as leading risk factors (Marks et al. 2001).

Diet
Diet is associated with cancer as both a potential risk factor and protective agent. In Australia it has been estimated that up to 30% of all cancers may be diet related (AIHW, 2002a). Similar findings have been reported in the USA and the UK, where it has been estimated that dietary factors are responsible for 30-40% of all cancers (Austoker, 1995; Williams & Wynder, 1996).

The primary dietary factors associated with cancer are foods high in fat, high alcohol and salt intakes, and low fibre intakes. In the Western diet the most significant inadequacy is low fibre intake (Williams & Wynder, 1996), and research has shown an inverse relationship between cancer and the consumption of fruit and vegetables (Lester, 1994). Diets high in fat and low in fibre have been linked to cancer of the colon and breast, while high fat consumption has been linked to prostate and pancreas cancer. There is a link between stomach cancer and diets high in salt and low in fruit and vegetables, and there may be a modest inverse association between vitamin A intake and breast cancer (Williams & Wynder, 1996).

Tobacco smoking
Tobacco smoking is a major risk factor for cancer and represents the single most avoidable cause of cancer. It has been estimated that around 30% of all cancers are caused by tobacco, and around 90% of lung cancer cases occur in smokers. Besides lung cancer, tobacco smoking has been associated with a number of other cancers including cancer of the larynx, mouth, throat and bladder (Lowenthal, 1990).

Tobacco smokers have a higher risk of developing cancer than non-smokers, and although the risk increases with the amount smoked, there is no safe level of smoking (Lowenthal, 1990). Nevertheless, quitting can reduce the risk of cancer, and after five years the potential for developing cancer will have fallen substantially (Austoker, 1995).

The primary cancer-causing agents in tobacco are hydrocarbons (derivatives of tar), but scientists have identified thousands of chemicals in cigarettes that act as carcinogens (Lowenthal, 1990).

In WA, tobacco smoking was the cause of an estimated 3,965 cancer deaths between 1984 and 1995, and 3,857 cancer-related hospitalisations between 1993 and 1995 (Unwin et al. 1997). In 1998 in Australia, a total of 7,542 cancer deaths and 26,972 cancer-related hospital separations were attributed to smoking (Miller & Draper, 2001).
Sunlight
Sunlight can be beneficial, but excessive exposure over many years can lead to skin cancers. These rarely cause death, as they are often easily detectable at an early stage.

Sunlight has also been identified as the main aetiologic factor leading to malignant melanoma (Austoker, 1995). Malignant melanoma is a different form of skin cancer that can occur at any age and is considerably more serious. Its development has been linked to previous high concentrations of sunlight and sunburn. Research suggests that burning in childhood and adolescence carries significant risks (Lowenthal, 1990).

Australia has the highest incidence of skin cancer in the world (AIHW, 1998). Of the Australian States and Territories in 2000, WA recorded the second highest incidence for melanoma (46 cases per 100,000 persons). The State with the highest incidence of melanoma was Queensland (61 cases per 100,000 persons), with the lowest incidence found in the Northern Territory (33 cases per 100,000 persons). The low incidence of skin cancer in the Northern Territory is probably due to the higher proportion of Aboriginal people living there (AIHW & AACR, 2003).

Alcohol
Although alcohol is not believed to be directly capable of initiating the development of malignant tumours, it is a major risk factor for cancer. It has been estimated that 3.2% of all new cancer cases in Australia can be attributed to the excessive consumption of alcohol (AIHW & AACR, 2003).

The clearest links between alcohol and cancer are for those that occur in the head and neck, such as cancers of the mouth, tongue, throat, larynx and oesophagus (Lowenthal, 1990). Alcohol has also been linked with liver cancer and cancer of the rectum (Lawson, 1991).

In WA in 2000, 94 deaths and around 4% of the total cancer burden were attributed to alcohol consumption (Katzenellenbogen et al. 2003). By comparison, there were 1,157 cancer deaths and 6,040 hospitalisations in 1998 for cancers that were attributable to the excessive consumption of alcohol (Miller & Draper, 2001).

Genetics
The impact of hereditary influences on the development of cancer is difficult to quantify as cancer is a common disease; however, there are a number of rare cancers that are passed from parent to child. Cancer is mainly related to environmental factors although cancers that have been shown to have a hereditary component include female breast cancer, cancer of the kidney and cancer of the bowel (Lowenthal, 1990).

Primary prevention
Primary prevention strategies aimed at lifestyle and environmental factors, which play a major role in the development of many cancers, have the potential for considerable health gains across the entire community. It has been estimated that up to a third of all cancers in Australia could be avoided by reducing the exposure to various risk factors through behavioural change (CDHFS & AIHW, 1998).

In WA, a number of programs have been developed with the aim of reducing the incidence of cancer. These include programs that aim to minimise exposure to sunlight, reduce the prevalence of smoking, increase the consumption of fruit and vegetables, and increase physical activity.

Secondary prevention: screening
Secondary prevention for cancer involves early detection through screening. This can improve a patient’s prognosis as, when cancers are detected early in their development, treatments are more effective and more favourable outcomes can be achieved.

Screening tests indicate the probability that an individual has a particular disorder. While screening has the potential to provide many benefits, it also has the potential for harm, so a thorough understanding of the issues involved in screening is important (Barratt et al. 2001).

Other factors that should be considered when evaluating the potential benefits of a screening program include the sensitivity and specificity of the test. Sensitivity is the probability of a screening test correctly identifying a person as positive for a given disease, if they have the disease. The specificity of a test is the probability that a negative test result will be reported when the person screened does not have the disease (Morrison, 1998).

In WA, population-based screening is used for the early detection of breast and cervical cancer through mammograms and pap smears. Opportunistic screening by general practitioners and targeting of high-risk groups is also an effective method for the early detection of other cancers, such as melanoma.

 Despite the existence of early detection methods for colorectal and prostate cancer, there are currently no organised national screening programs for these cancers in Australia; however, this may change in the future.
Treatment
The options available for the treatment of cancer include surgery, radiotherapy, chemotherapy, hormone therapy or a combination of these treatments. The aim of these interventions is to either cure the disease or to prolong life with maintained or improved quality. Together with early detection, these treatments offer the best prognosis for improved survival (CDHFS & AIHW, 1998). To optimise results from treatment, rehabilitation and supportive care are important in the management of cancer patients.

Health system costs
In 2000/01, the total cost of cancer to the Australian health system was estimated at $2.8 billion. Of this, around $2.0 billion went on treatment, and $226 million was spent on pharmaceuticals, while research accounted for $215 million (AIHW, 2004).

In WA in 1999/2000, around $7.6 million was spent on breast cancer screening, representing 0.2% of total government health expenditure, while a further $1.3 million (0.03% of total government health expenditure) was spent on screening for cervical cancer (AIHW, 2002b).

References
Figure 74: Person years of life lost\(^{(a)}\) per death, specific cancers, persons aged to 74 years, 2003

- In 2003, PYLL per death for cancer among males aged up to 74 years was 11.8 years in WA and 11.6 in Australia, while for females it was 13.9 years in WA and 14.0 years in Australia.
- Of the leading causes of cancer-related mortality, cervical cancer was responsible for the most PYLL per death among women, accounting for 21.7 years per death in WA and 19.6 years per death in Australia.
- Of the leading causes of cancer-related death, colorectal cancer was responsible for the highest PYLL per death among males indicating that it impacts on younger people more than lung or prostate cancer. In 2003, males and females in WA had slightly higher PYLL for colorectal cancer death than their Australian counterparts.
In 2001, the cancer incidence rate among females was around 30% lower than the rate among males in both WA and Australia.

In WA between 1982 and 2003, cancer incidence rates among males increased by 21% (an average annual increase of 0.8% per year) from 461 to 559 cases per 100,000 persons. Female incidence rates for cancer increased by 14% (an average annual increase of 0.6% per year) from 342 to 390 cases per 100,000 persons.

Nationally between 1983 and 2001, cancer incidence rates increased by 17% for males and 19% for females. This represented an average annual increase of 1.0% for both males and females. Over this period, cancer incidence rates in WA increased by 14% for males and 11% for females (an average increase of 0.8% and 0.6% per year respectively).

The increase in male incidence rates recorded in 1994 coincided with an increase in prostate cancer incidence rates, largely resulting from increased use of PSA testing.
In 2003, cancer mortality was 61% higher among males than females in WA and Australia.

In WA between 1983 and 2003, cancer mortality among males fell by an average of 0.8% per year, from 266 to 234 deaths per 100,000 persons. Cancer mortality among females fell by an average of 0.4% per year, from 153 to 145 deaths per 100,000 persons.

Nationally between 1991 and 2003, cancer mortality fell by an average of 1.7% per year among males and 1.1% among females. Over this period, cancer mortality in WA fell by an average of 1.4% per year for males and 1.3% per year for females.
Breast cancer

Risk factors
Breast cancer is the most common cancer among Australian females and has a major impact on their health and wellbeing. The incidence of breast cancer is strongly related to age, with rates doubling around every ten years until menopause when the rate of increase slows considerably (McPherson et al. 2000).

Incidence rates for breast cancer differ markedly between countries, with Western nations such as Australia recording significantly higher rates than countries such as China, Japan and Singapore. However, studies have shown that migrants to countries with high incidence rates for breast cancer assume the rate of the host country within one or two generations, indicating that environmental factors play a major role in the development of breast cancer (McPherson et al. 2000).

Women with a family history of breast cancer experience a slightly higher risk of developing the disease; however, the overall risk varies according to the closeness of the relationship and the age at which the relative’s cancer occurred (Rumeau-Rouquette et al. 1997). Between 5 and 10% of all breast cancers are due to inherited susceptibility genes; however, this percentage is higher for cancers that develop in younger women. Daughters of affected women have around a 50% chance of inheriting the gene and a considerably higher risk of developing breast cancer (Craddock, 1995; Ellisen & Haber, 1998).

An increased risk of breast cancer has also been associated with early menarche and late menopause, nulliparity and late age at first birth. The group with the highest risk are those who had their first child after age 35, with this group having a higher risk than women who have never had a child. Obesity has also been linked to an increased risk in postmenopausal women and a reduced incidence in premenopausal women (McPherson et al. 2000).

To date, despite numerous studies, research has not been able to attribute a higher risk of breast cancer among women who have taken the oral contraceptive pill. However, other studies have suggested that the use of oestrogen and postmenopausal hormone replacement therapy (HRT) over a period of more than 10 years is associated with an increased risk (Rumeau-Rouquette et al. 1997; McPherson et al. 2000).

Prevention
In the absence of known modifiable risk factors, prevention efforts for breast cancer tend to focus on secondary prevention methods such as mammography screening. Screening and the early detection of cancer designed to expose the disease and, via treatment, interrupt the natural progression of a cancer and prevent development to a more advanced stage.

A meta-analysis conducted by Kerlikowske et al. (1985) demonstrated that mammography screening significantly reduced breast cancer mortality in women aged 50-74 years after 7 to 9 years of follow-up, with an overall reduction in mortality of 26%. However, findings of other pooled randomised control trials (Wald et al. 1993) and meta-analysis (Elwood et al. 1993) failed to show a statistically significant reduction in mortality following mammography screening among women aged 40-49 years of age. A recent study examining the impact of breast screening programs in England and Wales among women aged 55-69 years showed that, compared with predicted mortality in the absence of screening or other effects, the total reduction in mortality from breast cancer in 1998 was estimated at 21.3%, with the direct effect of screening estimated at 6.4% (Blanks et al. 2000).

In Australia, mammographic screening is provided by BreastScreen Australia. This program is jointly funded by the Commonwealth and State/Territory governments. In WA, the program is administered by BreastScreen WA which provides a network of dedicated breast cancer screening and assessment services throughout the State. The aim of the program is to provide free screening mammography services to women aged 50-69 years living in WA; however, the service is also available to women aged over 40 years.

Breast cancer epidemiology
In 2003, there were 1,119 female breast cancer cases diagnosed in WA, making it the most common diagnosed cancer among WA females, accounting for 29% of all cancers diagnosed in females. Breast cancer was also the most commonly reported female cancer in Australia, with 11,791 cases diagnosed in 2001. The incidence of breast cancer has increased over the past two decades in WA, reaching 116 cases per 100,000 persons in 2003. Consequently the risk for breast cancer in WA increased from 1 in 15 in 1982, to 1 in 11 in 2003. Nationally, risk for breast cancer increased from 1 in 16 in 1983 to 1 in 11 in 2001.

Despite the steady increase in breast cancer incidence recorded throughout Australia and WA, mortality rates have declined. The lifetime risk of a WA female dying as a result of breast cancer before the age of 75 years fell from 1 in 46 in 1982, to 1 in...
56 in 2003, with a similar decline occurring nationally. As a proportion of all female cancer deaths however, breast cancer remained relatively stable over the past decade accounting for 17% of female cancer deaths in 2003. PYLL for breast cancer also remained stable between 1983 and 2003. The mean PYLL over this period was 3 years.

Screening

In 2000-2001, over 1.5 million women participated in BreastScreen Australia’s screening program. Of these, 68% (1.06 million) were in the target age group of 50-69 years. In WA, where breast screen programs are administered and run by BreastScreen WA, participation in the program by eligible women aged 50-69 years was 55%. This was lower than the national figure of 57%, but slightly higher than the 1999-2000 figure of 53%. South Australia recorded the highest participation rate of 64% (AIHW, 2003).

The aim of the BreastScreen program is to maximise the detection of small-diameter (15 mm or less) invasive breast cancers. In 2001, 65% of all invasive breast cancers detected by BreastScreen were small-diameter cancers. For women who were attending for the first time, the proportion was 56%, while among women who had attended previously, 67% of detected cancers were small diameter.

Of those women in the target age group who were attending for the first time in 2001, the age-standardised rate of small-diameter invasive cancer detection was 38 per 10,000 women screened. Apart from the Northern Territory where no invasive cancers were detected, WA recorded the lowest detection rate at 30 per 10,000 attendees. The highest rate was recorded in Tasmania (98 per 10,000 attendees). However, due to the small number of cases detected, large confidence intervals were observed in the smaller States/Territories (AIHW, 2003).

References


For much of the 1980s, incidence rates for female breast cancer in WA were slightly higher than Australia. However in the 1990s rates in WA were similar to Australia. In 2001, the incidence rate for breast cancer was 116 cases per 100,000 persons in both Australia and WA.

In WA between 1982 and 2003, the incidence of breast cancer increased by 36% (an average of 1.5% per year), from 85 to 116 cases per 100,000 persons.

In Australia between 1983 and 2001, the incidence of breast cancer increased by 41% (an average of 2.1% per year), from 82 to 116 cases per 100,000 persons. Over the same period, breast cancer incidence rates in WA increased by 34% (an average annual rate of 1.5%). This trend may be accounted for by public health initiatives such as the BreastScreen Australia program, which was introduced in 1991 (de Looper & Bhatia, 2001).
Figure 78: Mortality rate, breast cancer

- In 2003, 252 Western Australian women died as a result of breast cancer.
- In WA, breast cancer mortality rates increased steadily from 25 deaths per 100,000 persons in 1982 to 32 deaths per 100,000 persons in 1989. After this period, rates decreased to 24 deaths per 100,000 in 2003.
- Nationally between 1991 and 2003, mortality from breast cancer decreased 20%, from 30 to 24 deaths per 100,000 persons. This was an average annual decrease in mortality of 2.2%. Over this period, deaths from breast cancer in WA decreased by 17% (an average of 2% per year) from 29 to 24 deaths per 100,000 persons.
Cervical cancer

Risk factors

The human papillomavirus (HPV) is present in virtually all cervical cancers and various strains of this virus are central to the aetiology of this type of cancer (Philips et al. 2003). A Danish study found that infection with HPV precedes the development of low- and high-grade squamous intraepithelial lesions. For high-grade lesions, the risk was greatest in women who tested positive for the same type of HPV on repeat testing (Kjaer et al. 2002).

The principal transmission mechanism of HPV is sexual, which may explain the relationship between sexual behaviour and cervical cancer. The risk of cervical cancer increases with age, early sexual intercourse and increasing number of sexual partners (Rumeau-Rouquette et al. 1997).

Socioeconomic status has also been associated with an increased risk of cervical cancer. As early as 1910, it was noted that mortality rates for cervical cancer were more than four times higher among the wives of labourers than the wives of professionals (Dyson, 1986). A meta-analysis of social inequality and the risk of cervical cancer found an increased risk of approximately 100% between high and low SEP categories for the development of invasive cervical cancer (Parikh et al. 2003).

Several studies have shown that parity and use of oral contraceptives increase the risk of invasive cervical cancer (Parazzini et al. 1997). Among women who have tested positive to HPV, this risk is even higher. Women who had taken the pill for 5 to 9 years were almost three times more likely than non-users to develop cervical cancer, while women who had taken the pill for more than 10 years were around four times more likely than non-users to develop the disease (Moreno et al. 2002).

While smoking has been associated with cervical cancer, research has shown that in industrial countries smoking may be associated with sexual behaviour, and therefore an increased risk for sexually transmitted disease. Case-control studies that adjust for these associations (compared to unadjusted studies) have shown smoking to have a reduced but still highly significant association with cervical cancer onset (Licciardone et al. 1990; Sood, 1991). However, a study of HPV-positive women did not show any association between smoking and cervical cancer (Bosch et al. 1994).

Prevention (screening)

Most cervical carcinoma have a long pre-invasive phase and are preceded by abnormalities of the epithelial squamous cells (Women's Cancer Screening Service, 1996). Pap smear screening for pre-invasive or pre-malignant lesions reduces both the risk for invasive cancer and mortality (Fowler & Austoker, 1997), and it has been estimated that around 90% of new squamous cervical cancer cases reported in Australia each year could be prevented through biennial Pap smear screening (AIHW & CDHFS, 1997). Victorian data have shown that between 1963 and 1993, the age-standardised mortality rate for cervical cancer dropped from 6.3 to 2.4 deaths per 100,000 persons. According to Mitchell & Giles (1996) this indicates a clear benefit from cervical screening.

An overview of organised international cervical cancer screening programs showed the programs reduced total incidence and mortality rates. Furthermore, the review found that the longer the time since the last negative smear, the higher the risk. Research has demonstrated the value of screening to protect against invasive disease in the five years following a negative smear; however, the incidence of invasive cancers among women returns to the rate for unscreened women 10 years after the last negative screen. Pap smears taken from women aged 35-60 years are 30 times more effective in detecting a lesion destined to later become invasive, than are smears taken at age 25 (Fowler & Austoker, 1997).

In Australia, the Commonwealth and State/Territory health authorities established a cervical screening evaluation project in 1988/89. This resulted in a National Cervical Screening Policy (NCSP) in 1991, based on a two-year screening intervention for women aged 18-69 years of age. In WA, a register-based cervical cancer screening program, the Cervical Cancer Prevention Recruitment Program, was introduced by the Health Department in 1992 to increase the proportion of women who undergo cervical screening on a regular basis (Women's Cancer Screening Service, 1996). The program also maintains the Cervical Cytology Registry, a confidential database of Pap smear and cervical biopsy results reported in WA. One role of the registry is to act as a reminder system for women whose Pap smears and other follow-up investigations are overdue.

In Australia in 1999/2000, over 3.3 million women participated in cervical screening programs. Of these, 98% were in the screening program target group of 20-69 years. Throughout this period, 63% of women in the target population had a Pap smear. Following a negative smear, the recommended screening interval is two years. Of a cohort of women screened in
February 1999 who had a negative Pap smear result, 32% screened again within 21 months.

Figures from the NCSP showed that 13,851 women from the target age group were detected with high-grade abnormalities in 2000. The highest proportion of abnormalities was in women aged less than 39 years (10 high grade abnormalities per 1,000 women screened), while the rate of high grade abnormalities among women aged 50 years and over was less than 2 per 1,000 persons (AIHW, 2003).

In Australia, cervical cancer is more common among Aboriginal women than non-Aboriginal women. Over the period 1997-2000, the mortality rate from cervical cancer was around five times higher among Aboriginal women than their non-Aboriginal counterparts (AIHW, 2003). Although the numbers are small, Aboriginal women in WA have a cervical cancer incidence rate five times higher than non-Aboriginal Western Australians and a mortality rate eight times higher (AIHW & CDHFS, 1997).

**Epidemiology**

In 2002, there were 78 registered cases (2.1% of all female cancers reported) of cervical cancer in WA (Threlfall & Thompson, 2004). In Australia, 734 cases of cervical cancer were registered in 2001 (10 cases per 100,000 persons). In both WA and Australia, the incidence of cervical cancer among women aged 20-74 years has fallen steadily. Over the past two decades, the lifetime risk of a WA female being diagnosed with cervical cancer before the age of 75 decreased from 1 in 65 in 1982 to 1 in 162 in 2003, whilst among Australian women the lifetime risk decreased from 1 in 89 in 1983 to 1 in 176 in 2001.

In 2003, cervical cancer accounted for 2.5% of all cancer deaths among women aged 20-74 years in WA, whereas in Australia, cervical cancer accounted for 2.0% of all cancer deaths. Mortality rates for cervical cancer among women aged 20-74 years fell over the past decade in both WA and Australia. In 2003, the lifetime risk of dying of cervical cancer was around 1 in 512 for Western Australian women and around 1 in 685 for Australian women. However, the person years of life lost per death for cervical cancer remains high (17 years per death in 2001) in WA, indicating the relatively young age of women dying of cervical cancer.

**References**


Figure 79: Incidence rate, cervical cancer, females aged 20-74 years

- In 2003, there were 68 new cases of cervical cancer reported among females aged 20-74 years living in WA.
- In WA between 1982 and 2003, the incidence of cervical cancer fell 56% (or an average of 4.4% per year), from 25 to 11 cases per 100,000 persons.
- WA had higher incidence rates for cervical cancer than Australia for much of the 1980s, but rates for WA and Australia were similar in the 1990s.
- Nationally between 1983 and 2001, cervical cancer incidence rates decreased 45% (an average annual decrease of 2.7%) from 19 to 10 cases per 100,000 persons. During this period, incidence rates in WA fell by 49% (an average annual decrease of 4.7%).
Mortality rates for cervical cancer among females aged 20-74 years were slightly higher in WA than Australia.

In WA in 2003, there were 19 deaths from cervical cancer among females aged 20-74 years.

In WA between 1982 and 2003, cervical cancer deaths decreased by 43% (an average annual decrease of 3.6%) from 4.9 to 2.8 deaths per 100,000 persons.

Nationally between 1991 and 2003, cervical cancer deaths fell 49% from 4.3 to 2.2 deaths per 100,000 persons. Over this period, cervical cancer deaths in WA fell 39% from 4.6 to 2.8 deaths per 100,000 persons. This represents an annual decline in mortality of 5.9% and 4.4% respectively.
Colorectal cancer

Colorectal cancer, commonly known as bowel cancer, is a malignant tumour that starts in the bowel wall. It is generally confined to a local area for a relatively long period before spreading through the bowel wall and metastasising to lymph nodes and other parts of the body. Survival rates are greatly improved when the disease is detected and treated in its early stages (NHMRC, 1999).

The primary treatment for colorectal cancer is surgical resection; however, over half of all patients will die as a result of metastatic disease. Median survival following diagnosis of metastatic disease is around 6 to 9 months, during which time various physical and psychological symptoms may develop which impact on the patient’s quality of life (Colorectal Cancer Collaborative Group, 2000).

Colorectal cancer is the most commonly occurring cancer affecting both men and women in Australia. For males its incidence is second only to prostate cancer, while for females it is the second most common reported cancer after breast cancer. In terms of mortality, colorectal cancer is the second most common cause of cancer death, with only lung cancer responsible for a greater number of deaths (AIHW & AACR, 2003).

Risk factors

Dietary factors play a major role in the development of colorectal cancer, with about half of all colorectal cancers thought to be due to diet (Kune et al. 1992). A recent review estimated that 66% to 75% of all colorectal cancers could be prevented through diet and physical activity. In addition, the review found that an appropriate diet also helped to maintain the health of those already undergoing treatment for colorectal cancer (NHMRC, 1999).

A high intake of dietary fat has been linked to the development of colorectal cancer, and studies have confirmed an association between increasing total energy intake (specifically from saturated fat) and increasing risk of colorectal cancer (Shetty & James, 1997). Associations have also been found between colorectal cancer and reduced physical activity and increased alcohol consumption (Ireland & Giles, 1993).

Eating fibre in the form of fruit and vegetables is thought to reduce the risk of colorectal cancer. A large European study found that individuals in the top 20% for fibre intake experienced a reduction of 40% in their colorectal cancer risk (Bingham et al. 2003).

While colorectal cancer is largely a disease related to environmental and behavioural factors, its aetiology is complex and genetic susceptibility has an important role to play (Dunlop, 1997). In particular, a family history of colorectal cancer or familial adenomatous polyposis (FAP) is associated with an increased risk of developing the disease (De Cosse et al. 1994).

Prevention

Early diagnosis before the onset of symptoms is one of the most effective ways of reducing mortality from colorectal cancer, while screening offers the best chance of early detection (Hardcastle et al. 1996). Screening involves testing people who do not have obvious symptoms in order to identify those who might have colorectal cancer, or would benefit from further investigation. A number of tests have been considered for colorectal cancer screening, including the faecal occult blood test (FOBT), sigmoidoscopy and colonoscopy (Towler et al. 1998).

Of these tests, the FOBT is the most widely available and extensively evaluated. It detects very small amounts of blood in the faeces, which may indicate the presence of cancer. However, not all cancers bleed, and not all bleeding is due to cancer. Therefore, an FOBT will not always give a positive result when cancer is present and it may also detect bleeding that is not the result of cancer. Although a FOBT cannot diagnose bowel cancer, an individual with a positive test can be offered a colonoscopy to identify the source of bleeding (DoHA, 2004).

A person who has received a positive FOBT following screening has a 30-45% chance of having an adenoma and a 3-5% chance of being diagnosed with colorectal cancer (AHTAC, 1997). Studies have shown that a higher proportion of tumours diagnosed following FOBT are less advanced than those diagnosed following symptomatic presentation (Hardcastle et al. 1996), and overseas trials have estimated that population screening reduces colorectal cancer mortality by 15-33% among persons aged 55-75 years (DoHA, 2004).

While there are currently no organised screening programs for colorectal cancer in Australia, the Commonwealth government is conducting a pilot study for bowel cancer screening with initial data collection completed in 2004. The aim of the pilot study is to provide information about the feasibility, acceptability and cost effectiveness of colorectal cancer screening in Australia (AIHW & AACR, 2003).
**MAJOR CONDITIONS**

**COLORECTAL CANCER**

**Treatment**

Treatment options for people with colorectal cancer usually consist of resection of the colon or rectum (or both), sometimes in conjunction with adjuvant chemotherapy or radiotherapy (NHMRC, 1999). However, palliative care may be the only realistic option for persons with more advanced disease (Dunlop, 1997). Efforts to improve survival rates for colorectal cancer have focused on earlier diagnosis, adjuvant chemotherapy, intensive follow-up and modifications of surgical techniques (NHMRC, 1999).

**Epidemiology**

Colorectal cancer contributes significantly to the overall burden of disease throughout the Western world, and the incidence in Australia is relatively high. Among 19 developed countries, New Zealand was the only country with higher incidence rates for colorectal cancer than Australia (Reutens et al. 2004).

In 2002, colorectal cancer was one of the leading cancers reported in WA, with 445 cases reported among females (13% of all female cancers) and 560 cases reported among males (12% of all male cancers) in WA (Threlfall & Thompson, 2004). While incidence among males and females in WA has remained steady over the last two decades, nationally both sexes have recorded increases. The lifetime risk of a colorectal cancer diagnosis before the age of 74 years was around one in 20 for males and one in 32 for females in WA.

Although mortality rates have fallen by an average of nearly 2% per year over the last decade among women in WA, they have remained stable among WA males. Nationally, mortality rates fell by an average of 2% annually over the last decade among both sexes.

Over the last two decades, the percentage of total cancer deaths due to colorectal cancer has remained stable, with the disease accounting for 14% of all male cancer deaths and 12% of all female cancer deaths in WA, while the lifetime risk of death from colorectal cancer has decreased to one in 56 for males and one in 94 for females. Since the last decade, the lifetime risk among Australian males and females was similar to that of males and females in WA.

**References**

Australian Health Technology Advisory Committee (1997). *Colorectal cancer screening*. Canberra: AGPS.


National Health and Medical Research Council (1999). *The prevention, early detection and management of colorectal cancer*. Canberra: NHMRC.


Figure 81: Incidence rate, colorectal cancer

- In WA in 2003, there were 617 new male colorectal cancer cases registered and 461 new female colorectal cancer cases registered.
- In WA between 1982 and 2003, there was no significant increase in colorectal cancer incidence among males or females.
- Nationally between 1983 and 2001, there was an increase in colorectal cancer cases among males of around 15% (an annual average increase of 0.8%), while colorectal cancer incidence among females increased by around 7.1%, an average annual increase of 0.4%.

Note: ICD-9: 153, 154; ICD-10: C18–C21; rates based on rolling averages.
Sources: WA Cancer Registry, AIHW cancer data cubes.
Figure 82: Mortality rate, colorectal cancer

- In WA in 2003, there were 252 male deaths (31 deaths per 100,000 persons) and 180 female deaths (18 deaths per 100,000 persons) from colorectal cancer.
- Male mortality rates for colorectal cancer in WA increased from 27 deaths per 100,000 persons in 1982 to a peak of 38 deaths per 100,000 persons in 1986. Rates then decreased before increasing slightly between 1991 and 1997. Since 1998 rates have fallen slightly.
- Colorectal cancer mortality among WA females fell steadily by an average of 1.6% per year between 1982 and 2003.
- Mortality rates for colorectal cancer among Australian males and females fell steadily by an average of 2.2% per year between 1991 and 2003. Over this period in WA, mortality rates for females declined by an average of 2.5% per year, while there was no significant change for males.
Lung cancer

Lung cancer is not one disease, but the term refers to a number of cancers that form on the lung. For treatment purposes, these cancers are grouped into two major groups: small-cell lung cancers and non-small-cell lung cancers. Squamous lung cancer is the most common cancer of the lung and is more likely to occur in smokers, where it primarily develops in major airways. Lung cancer spreads by invading local tissue, then spreading to the lymph nodes and into the bloodstream (Williams, 1992). In its early stages lung cancer has few effects, but as the tumour grows it begins to cause symptoms, which initially will be brought on by physical exertion.

Lung cancer is the leading cause of cancer-related mortality in Australia. In 2003, 6,723 lung cancer deaths were reported in Australia, while in WA there were 653 lung cancer deaths, making it the most common cause of death after ischaemic heart disease.

Risk factors

Tobacco smoking is the single most important risk factor for lung cancer, with an estimated 90% of all new male and 65% of new female lung cancers directly related to smoking (Ridolfo & Stevenson, 2001).

Due to the time lag between exposure and onset of disease, current incidence rates for lung cancer reflect smoking behaviours that occurred around 20 years ago (AIHW, 2002a). Among males, incidence and mortality rates for lung cancer have steadily decreased over recent years in both WA and Australia; however, female rates have increased. This is primarily due to the fall in the proportion of males who smoke on a regular basis while female smoking rates have increased (AIHW, 2002a).

In the early twentieth century there were very few cases of lung cancer. As the prevalence of smoking increased however, so too did mortality rates from lung cancer (Williams, 1992). In 1945, male and female mortality rates for lung cancer in Australia were around 97 and 30 deaths per million persons respectively. Mortality rates for males peaked at 700 deaths per million persons in 1982 and have been decreasing ever since. Lung cancer rates among females also increased, although at a much slower rate than males. However, unlike males, female mortality rates for lung cancer have continued to climb (Dunn et al. 2002).

In the 1950s, an estimated 70% of males and 30% of females in Australia smoked (AIHW, 2002a). By 2001, the proportion of persons smoking on a daily basis in Australia had fallen to 21.1% for males and 18.0% for females. In WA, 20.7% of males and 19.5% of females reported smoking daily in 2001 (AIHW, 2002b). According to the WA Health and Wellbeing Surveillance System, in 2004 a total of 20.8% of the WA population aged 16 years and over smoked tobacco on a daily basis.

Smoking has also been linked to the development of lung cancers in non-smokers through passive smoking. In 1997, the National Health and Medical Research Council conducted an extensive meta-analysis examining the impact of passive smoking on lung cancer, with the majority of studies showing a positive association (NHMRC, 1997).

An increased risk of lung cancer has also been linked to air pollution, particularly smoke from fossil fuels. However, the overall risk associated with air pollution is small compared to smoking (Williams, 1992). Although there are several atmospheric pollutants and industrial products that pose risks, exposure to asbestos is the main occupational cause of lung cancer (Sethi, 1997).

Blue asbestos was mined at Wittenoom in WA from 1937 until 1966. Among more than 6,000 persons employed at the mine, excess exposure-related deaths were identified for lung cancer, malignant mesothelioma and pneumoconiosis (de Klerk et al. 1989). In 2000, of all the Australian States and Territories, WA recorded the highest incidence rate of mesothelioma; males had an incidence rate of 77.3 cases per million persons, equating to a lifetime risk of 1 in 242, while females had a rate of 10.4 cases per million persons (lifetime risk of 1 in 1,410) (NOHSC, 2003).

People from disadvantaged backgrounds also have increased rates of lung cancer. Over the period 1998-2002, Australian males aged 25-64 years from areas defined as disadvantaged experienced mortality rates for lung cancer around 102% higher than their counterparts from the least disadvantaged areas, and females from the most disadvantaged areas experienced mortality rates around 73% higher (Draper et al. 2004). These disparities are most likely due to higher rates of smoking among people from lower socioeconomic backgrounds.
Prevention
As smoking is the most important risk factor associated with lung cancer, prevention strategies primarily focus on the reduction of smoking. Research has shown a marked reduction in the risk of dying from lung cancer among those who stop smoking compared to those who continue, with ex-smokers having around one-quarter of the risk of those who continue to smoke, ten years after quitting (Williams, 1992). The benefits for those who stop smoking are evident, even into middle age, with those who quit smoking before middle age avoiding up to 90% of the risks associated with tobacco (Peto et al. 2000).

Screening tests are available for persons who have an elevated risk of lung cancer. The usual method of diagnosis is a combination of chest X-rays and examination of sputum that has been coughed up from the lungs (Williams, 1992). Additional diagnosis may involve biopsy. There are currently no population screening programs for lung cancer in Australia.

Treatment
Treatment options for lung cancer depend on a number of factors, including the type of cancer, where it started, how the cells look under a microscope, how far it has spread and the patient’s general health. In around 65-75% of cases, an operation will not be possible as the tumour may be too extensive or may have already spread beyond the chest. Furthermore, for 10% of patients who do undergo surgery, it will be impossible to remove the tumour (Williams, 1992). Treatment options for those patients unsuitable for surgery include chemotherapy, radiotherapy and laser treatment.

Epidemiology
Survival rates for people diagnosed with lung cancer are poor. In WA over the period 1994-1997, five-year relative survival rates following diagnosis for lung cancer were around 10% for males and 13% for females (Threlfall & Brameld, 2000). This was slightly lower than the five-year survival rates report for Australia (males 11%, females 14%). However, between 1982-1986 and 1992-1997, there was a slight but significant improvement in survival proportions among those surviving one to seven years, of 1.7% for males and 2.2% for females (AIHW & AACR, 2001).

In WA, there were 799 new cases of lung cancer reported (63% male) in 2003. The age-standardised incidence was 63 cases per 100,000 persons for males and 31 cases per 100,000 persons for females, with lung cancer accounting for 12% of all male cancers (a reduction from 15% in 1982) and 7% of all female cancers (similar to 1982). Incidence over the last two decades has decreased among males but increased among females in WA. The lifetime risk of a lung cancer diagnosis before 75 years of age had decreased to one in 22 for males and increased to one in 43 for females by 2003 in WA. In Australia, 8,275 new cases of lung cancer were reported (67% male) in 2001. Lung cancer accounted for 11% of all male cancers in Australia (a reduction from 15% in 1983) and 7% of all female cancers (similar to 1983). The lifetime risk of a lung cancer diagnosis before 75 years of age had decreased to one in 22 for males and increased to one in 45 for females by 2001 in Australia.

In WA, 688 lung cancer deaths were recorded (68% male) in 2003. Lung cancer accounted for 23% of all male cancer deaths (a reduction from 31% in 1982) and 16% of all female cancer deaths (an increase from 10% in 1982). Over the last two decades the mortality rate among males has decreased, while the rate increased among females. The lifetime risk of dying as a result of lung cancer decreased for males to one in 28 and increased to one in 60 for females in 2003. Forty-two per cent of all lung cancer deaths occurred in persons aged 75 years or over.

In Australia in 2003, there were 6,723 deaths from lung cancer, of which 64% were males. As a proportion of all male cancer deaths, lung cancer deaths decreased from 26% in 1991 to 23% in 2002, whereas lung cancer as a proportion of all female cancer deaths increased from 13% to 16% over this period. The lifetime risk of dying as a result of lung cancer before the age of 75 years had decreased to one in 29 for males, but remained constant at one in 60 for females by 2003. PYLL has also decreased for WA males falling from 4.1 to 2.7 years per 1,000 persons between 1990 and 2003. However, PYLL for WA females remained stable over this period.

References
MAJOR CONDITIONS

LUNG CANCER


National Health and Medical Research Council (1997). The health effects of passive smoking: a scientific information paper. Canberra: NHMRC.


In 2003, 501 new cases of lung cancer were reported among WA males and 298 cases were reported among WA females.

In 1982, lung cancer incidence rates among WA males were more than three times higher than the female rate. By 2003, this had fallen to around twice the female rate. This was due to both a decrease in male incidence rates between 1982 and 2003, and an increase in the rate of new cases reported by WA females.

For the past two decades, lung cancer incidence among WA males fell steadily by around 29% from 89 cases per 100,000 persons in 1982 to 63 cases in 2003. This equated to an average annual fall of 2.0%. Over the same period, lung cancer incidence among WA females increased by 22% from 23 to 31 cases per 100,000 persons, equating to an average annual increase of 1.3%.

Between 1983 and 2001, male incidence for lung cancer in Australia fell 23% from 83 to 62 cases per 100,000 persons. This equated to an average annual decrease of 1.8%. Female lung cancer incidence in Australia increased between 1983 and 2001 by 45% from 18 to 28 cases per 100,000 persons, at an average of 2.1% per year.
Lung cancer mortality for males in WA increased slightly between 1982 and 1985 before declining steadily.

In 2003, 416 male and 237 female Western Australians died of lung cancer.

Male lung cancer mortality rates in WA fell by 20% between 1982 and 2003 from 69 to 55 deaths per 100,000 persons. This represented an average annual decline of 1.8%.

Between 1982 and 2003, lung cancer mortality among WA females increased by 50% at an average annual rate of 1.4% from 16 to 24 deaths per 100,000 persons.

Throughout Australia, lung cancer mortality among males fell 25% from 67 to 50 deaths per 100,000 persons between 1991 and 2003. This represented an average annual decline of 2.8%.

Female lung cancer mortality increased slightly between 1991 and 2003 by 10% throughout Australia from 20 to 22 deaths per 100,000 persons representing an average annual increase of 0.9%.

Over this period WA rates fell by an annual average of 1.8% among males, while there was no significant change recorded by females.
Melanoma (skin cancer)

Australia has the highest incidence of skin cancer in the world, with incidence rates at least three times higher than other countries that consider skin cancer to be a major public health problem (between 250,000 and 300,000 cases reported per year). Of the States and Territories, Queensland has the highest incidence of skin cancer, followed by WA (AIHW & CDHFS, 1997; Carter et al. 1999).

There are three primary types of skin cancer: malignant melanoma, basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), and all are related to sun exposure. Of these, BCC is the most common, followed by SCC. Around 11% of all skin cancers are melanoma, which is the most serious (Austoker, 1994).

Risk factors

The primary factors associated with an increased risk for skin cancer include excessive exposure to sunlight, skin type, changes to pre-existing moles, the presence of a large number of naevi (birthmarks) and previous melanoma (Austoker, 1994).

The main environmental risk factor for those who are genetically susceptible to skin cancer is sunlight, and research has shown that melanoma prevalence increases with proximity to the equator, even after controlling for skin type (Beddingfield, 2003). However, the nature of the exposure necessary for a melanoma to develop is not clear. Evidence suggests that both episodic and cumulative exposures are important, particularly if these episodes lead to sunburn (Carter et al. 1999).

There is also evidence to suggest that exposure to sunlight in childhood plays a major role in determining the lifetime risk of skin cancer in adulthood (Lowe et al. 2002). The risk of developing melanoma is highest among adults who experienced high levels of sun exposure during childhood, with an estimated two-thirds of all melanomas due to excessive exposure to sunlight in the first fifteen years of life (Giles et al. 1996; Autier & Dore, 1998). Holman et al. (1986) found that persons who immigrated to Australia before the age of 10 years experienced risk for melanoma equivalent to the native Australian population, while those who immigrated after the age of 15 had rates 75% lower than their Australian born counterparts.

Prevention

The primary prevention method for skin cancer is reducing exposure to sunlight, particularly early in life, as the majority of a person’s lifetime exposure to sunlight occurs during childhood (Marks et al. 1990).

Consequently, reducing the amount of exposure during childhood will have a greater impact on melanoma risk than reducing exposure in adulthood (NHMRC, 1996).

Preventive efforts to reduce exposure to sunlight focus on behavioural and environmental changes, such as promoting appropriate clothing (e.g. long-sleeved shirts and hats), the use of sunscreen and sunglasses, and seeking shade or remaining indoors during the middle of the day (NHMRC, 1996).

The Cancer Council Australia and the Australian College of Dermatologists do not recommend population screening for melanoma, although they have endorsed GP-developed surveillance programs for patients at high risk. Future prevention efforts may need to concentrate more on structural changes within the community to decrease time spent in the sun by increasing protective shade structures and other physical means of protection. In order to impact on future incidence rates of skin cancer in WA, the nature and amount of sun exposure among children and adolescents should be a priority.

Treatment

Provided that diagnosis is made during the early stages of the disease before metastases occurs, relative 10-year survival rates remain high. Excision remains the primary option for the treatment of melanoma and the treatment of disseminated melanoma remains difficult, with non-surgical therapy doing little to prolong survival (MacKie et al. 2003; AIHW & CDHFS, 1997).

Epidemiology

In WA, melanoma was the most commonly reported cancer in 2002, with 1,062 new melanoma cases reported (Threlfall & Thompson, 2004). In Australia, melanoma increased in WA over the last two decades, with the lifetime risk of a melanoma diagnosis increasing to one in 23 among males and one in 33 among females. In 2001, there were 8,885 new melanoma cases reported in Australia, of which 56% were males. Incidence of melanoma in Australia has also increased; however, the incidence was lower than in WA, with the lifetime risk of a melanoma diagnosis before 75 years of age of one in 25 for males and one in 35 for females in 2001.

Once patients are diagnosed with melanoma, five-year relative survival rates in WA were high (98% in 1994-97) among people aged 15 years and over (Threlfall & Brameld, 2000). In Australia, five-year relative survival rates for melanoma (all ages) for the period 1992-1997 were 90% for males and 95% for females (AIHW & AACR, 2001). Overseas studies
have shown that survival rates for melanoma have improved considerably from around 60% in the 1960s, and that rates similar to those reported in Australia are common in similar industrialised countries (Beddingfield, 2003).

Over the last decade, melanoma mortality was higher among males than females in both Australia and WA, while WA males and females recorded lower mortality rates than their counterparts nationally. Melanoma mortality among males remained relatively stable in WA and Australia over the last decade; however, rates among WA females increased. In 2003, 86 melanoma deaths were reported in WA (67% males), while 1,092 melanoma deaths were reported in Australia (67% males). The lifetime risk of dying as a result of melanoma before 75 years of age in WA was one in 271 for males and one in 446 for females. In Australia the lifetime risk was one in 190 and one in 462 respectively. In 2003, melanoma was responsible for 0.6 PYLL per 1,000 persons among WA males and 0.3 PYLL per 1,000 persons among WA females.

References


Figure 85: Incidence rate, melanoma

- In 2003, 648 new male melanoma cases and 403 new female cases were reported throughout WA.
- In the early 1980s, rates for melanoma were similar for both males and females in WA and Australia. However, from 1983 onwards, the incidence of melanoma increased at a faster rate among males than females.
- In WA between 1982 and 2003, melanoma incidence increased by 163% from 27 to 71 cases per 100,000 persons among males and by 54% among females from 28 cases to 43 cases per 100,000 persons. This equated to an average annual increase of 3.6% and 2.0% respectively.
- From 1983 to 2001, male melanoma incidence rates throughout Australia increased by 78% from 30 cases to 55 cases per 100,000 persons at an average rate per year of 2.8%.
- For Australian females, incidence rates for melanoma increased by 32% from 29 to 38 cases per 100,000 persons between 1983 and 2001. This equated to an average annual increase of 1.5%.
• Between 1991 and 2003, WA and Australian males experienced considerably higher mortality rates than females for melanoma. WA males recorded rates that were lower than their Australian counterparts, at 6.7 deaths and 8.0 deaths per 100,000 persons respectively in 2003.

• WA females recorded mortality rates for melanoma cancer at a rate lower than Australian females for much of the 1990s. However, by 2003 this difference had narrowed to rates of 2.8 and 3.1 deaths per 100,000 persons respectively.

• Mortality resulting from melanoma among WA males fluctuated between 1982 and 2003. Overall, there was a general increase recorded from 4.4 to 6.7 deaths per 100,000 persons; however, this is not significant.

• WA females experienced an increase in melanoma mortality from 2.4 to 3.1 deaths per 100,000 persons between 1982 and 2003. This equated to an average annual increase of 1.6%.

• Between 1991 and 2003, melanoma mortality among Australian males remained relatively stable, ranging from 7.5 to 8.0 deaths per 100,000 persons. Melanoma mortality among Australian females over this period ranged from 3.3 to 3.1 deaths per 100,000 persons.
Prostate cancer
The prostate is a walnut-sized gland found only in males, situated where the bladder joins the urethra (Cancer Foundation of WA, 2004). Prostate cancer is a malignant growth of the glandular cells of the prostate. Initially, the cancer will remain within the prostate, but as it grows it may spread outside the capsule or shell of the prostate gland into the fat surrounding the prostate. It may also grow into the bladder and seminal vesicles (Marks, 1997).

In many cases, there will be no symptoms to indicate the presence of prostate cancer, and even when the cancer does cause symptoms, they are not specific and could represent problems other than prostate cancer (Marks, 1997).

Risk factors
Little is known about what causes prostate cancer to develop. However, various studies have indicated that diets high in fat, particularly those high in red meat and dairy products, increase the risk of developing prostate cancer. Countries with low fat diets such as China and Japan have lower prevalence rates than countries such as the US and Australia (Marks, 1997; Ellison et al. 1998).

Prevention
With the exception of animal fat consumption, there are no known modifiable risk factors for prostate cancer. The risk of prostate cancer increases with age. In Australia, 90% of prostate cancer deaths occur in males aged 65 years and over.

Recently, the introduction of prostate specific antigen (PSA) testing has been used as a screening method for identifying tumours, mainly in younger men who would previously have either remained undiagnosed or been diagnosed later. At present there are no organised national programs for prostate cancer screening, and the Cancer Council Australia and the Cancer Foundation of WA do not advocate mass screening for prostate cancer as they feel there is insufficient reliable medical evidence that routine testing saves lives. However, they state that men should make their own decision about whether to be tested (Cancer Foundation of WA, 2004), and opportunistic PSA screening has occurred at high rates since the early 1990s (Threlfall et al. 1998).

Treatment
The optimum treatment for prostate cancer remains subject to debate. In Australia, men aged 75 years and older with low-grade tumours are currently managed under a strategy of ‘watchful waiting’, while younger men are offered treatments such as radiotherapy or radical prostatectomy.

Radial prostatectomy is the most common treatment for localised prostate cancer. While it offers the possibility of a complete cure, it involves removal of the entire prostate, fascial coverings and seminal vesicles (Australian Health Technologies Advisory Committee, 1998).

Epidemiology
In WA, prostate cancer was the most frequently reported male cancer, with 1,204 new cases reported in 2002 (Threlfall & Thompson, 2004). In WA between 1982 and 2001, the incidence of prostate cancer increased, with the lifetime risk of a prostate cancer diagnosis also increasing from one in 11 to one in 9 over the same period. Nationally in 2001, there were 11,191 new cases of prostate cancer reported. The fall in lifetime risk for prostate cancer diagnosis among Australian males has followed a similar pattern to that of males in WA.

The dramatic increase in reported prostate cancer incidence in Australia and WA in the early 1990s was primarily due to improved screening methods and the introduction of the prostate specific antigen (PSA) test. The decrease in incidence after 1994 was due to the majority of previously undetected cases having been diagnosed and a decline in the number of PSA tests (de Looper & Bhatia, 2001).

In WA over the period 1994-1997, and in Australia over the period 1992-1997, the five-year relative survival rate for prostate cancer was 83% (AIHW & AACR, 2001). In Australia in 2000, prostate cancer was the most frequently reported male cancer, with only lung cancer responsible for a greater number of cancer-related deaths among males (AIHW & AACR, 2003).

In 2003, prostate cancer accounted for the deaths of 198 Western Australian males (11% of all male cancer deaths) and 2,746 Australian males (14% of all male cancer deaths). In WA between 1982 and 1995, there was a steady increase in prostate cancer mortality rates; however, from 1996 to 2002, these rates decreased. Similar trends in prostate cancer mortality were recorded in Australia. Overall, between 1991 and 2002, mortality rates for prostate cancer fell by an average of 3.5% in WA per year and 2.2% per year in Australia. The lifetime risk of dying as a result of prostate cancer has fallen, with a 1 in 112 chance in WA and 1 in 83 in Australia. The person years of life lost per death for prostate cancer was relatively low compared to other cancers, indicating the older age at death among those who died as a result of the disease.
References
Figure 87: Incidence rate, prostate cancer

- From 1982 to 2003, prostate cancer incidence among WA males increased by an average of 3.2% per year, from 73 to 146 new cases per 100,000 persons.
- Between 1983 and 2001, Australian males recorded an average annual increase in prostate cancer incidence of 4.3%, from 79 to 128 new cases per 100,000 persons. Over this period, WA males recorded an average annual increase in incidence of 3.8%.
- In the mid-1990s, a sharp increase in the incidence of prostate cancer was recorded in both WA and Australia. This was primarily due to improved screening methods and detection rates, together with the introduction of the prostate specific antigen (PSA) test. The decline in incidence noted after 1994 resulted from the removal of previously undetected cases and a reduction in the number of PSA tests (de Looper & Bhatia, 2001).
Mortality rates for prostate cancer in WA increased steadily between 1982 and the mid-1990s, when rates began to fall. Between 1982 and 1995, prostate cancer mortality in WA increased from 27 to 40 deaths per 100,000 persons at an average of 2.7% per year. From 1996 onwards, mortality rates declined by an average of 4.6% annually, falling to 28 deaths per 100,000 persons by 2003.

Prostate cancer mortality throughout Australia followed a similar pattern to WA, increasing until 1993, before falling steadily for the remainder of the decade. Overall, between 1991 and 2003, mortality rates for prostate cancer in Australia fell by an average of 2.2% annually, from 40 to 34 deaths per 100,000 persons.

Over this period, mortality rates for prostate cancer in WA fell by an average of 3.5% annually, from 37 to 28 deaths per 100,000 persons.
CARDIOVASCULAR DISEASES

Cardiovascular diseases

Generally used to describe diseases of the heart and blood vessels, cardiovascular disease (CVD) includes such diseases as coronary heart disease, acute myocardial infarction and stroke. CVD is primarily associated with the consumption of foods high in fats such as those obtained from domestic animals (fatty meats), milk, cheese and food that has been fried in fats (Lawson, 1998).

One of the most important changes in the health status of the Australian population in the twentieth century was the marked increase in mortality associated with CVD throughout the first half of the twentieth century, with rates peaking towards the latter part of the 1960s and early 1970s. Since this time however, CVD mortality rates have fallen to levels not seen since the early part of the century. This is primarily because of the reduction of some risk factors and major advances in treatment (AIHW, 2004).

In 2003, CVD was the leading cause of death in Australia and WA. Coronary heart disease alone accounted for around 18% of all deaths in WA, while stroke accounted for an additional 6% of male deaths and 10% of female deaths.

Among the major disease groupings, cardiovascular diseases were ranked second only to cancer as a leading cause of disease burden in Western Australia. Cardiovascular disease accounted for 17% of the total disease burden as measured by DALYs in 2000, with the majority of the burden caused by mortality. The burden of cardiovascular disease was experienced mainly among people aged 55 years and older (Somerford, 2004).

References


Figure 89: Person years of life lost\(^{(a)}\) per death, specific cardiovascular diseases, persons aged 0-74 years, 2003

- Of the major causes of cardiovascular mortality in WA in 2003, coronary heart disease accounted for the greatest number of PYLL per death among males (11.0 years), followed by acute myocardial infarction (10.9 years) and stroke (8.9 years). Among females, stroke was responsible for the greatest number of PYLL (12.1 years), followed by coronary heart disease (8.9 years) and acute myocardial infarction (8.8 years).

- Nationally in 2003, coronary heart disease and myocardial infarction accounted for the greatest number of PYLL per death for males (11.1 years respectively). Among females, stroke was responsible for the greatest number of PYLL (12.0 years), followed by coronary heart disease (8.6 years) and acute myocardial infarction (8.2 years).

\[(a)\] Age-standardised.

Sources: ABS mortality data.

<table>
<thead>
<tr>
<th></th>
<th>Australia - males</th>
<th>Australia - females</th>
<th>WA - males</th>
<th>WA - females</th>
</tr>
</thead>
<tbody>
<tr>
<td>All CVD (I00–I99)</td>
<td>11.5</td>
<td>10.6</td>
<td>11.1</td>
<td>10.2</td>
</tr>
<tr>
<td>Coronary heart disease (I20–I25)</td>
<td>11.1</td>
<td>9.0</td>
<td>11.0</td>
<td>8.9</td>
</tr>
<tr>
<td>Acute myocardial infarction (I21)</td>
<td>11.1</td>
<td>9.0</td>
<td>10.9</td>
<td>8.8</td>
</tr>
<tr>
<td>Stroke (I60–I69, G45)</td>
<td>8.8</td>
<td>12.0</td>
<td>8.9</td>
<td>12.1</td>
</tr>
</tbody>
</table>

[Note: The table and chart are not accurately transcribed into the text format due to the limitations of the system. The table data and chart are meant to visually represent the data compared to the text description.]
Coronary heart disease

Coronary heart disease, also known as ischaemic heart disease, is one type of CVD, consisting primarily of acute myocardial infarction (heart attack) and angina. A heart attack occurs when a vessel supplying blood to the heart becomes blocked, and angina is a temporary chest pain that results from reduced blood supply to the heart muscle.

Coronary heart disease occurs when blockages form in the coronary arteries. The coronary arteries supply blood to the heart, and over time they may progressively narrow and harden in a process known as atherosclerosis. This is when pasty fat deposits, cellular wastes, calcium and fibrin become attached to the walls of the arteries. The accumulation of these substances is referred to as plaque. In addition to obstructing the flow of blood through the arteries, the accumulation of plaque can lead to bleeding at the site of a blockage or the formation of a blood clot on the surface of the blockage. Either of these conditions may result in a heart attack or stroke (Arnold, 1990).

In 2002, coronary heart disease was the leading cause of premature death in WA and Australia, accounting for 18.1% of all deaths throughout the State (2,010 deaths) and 19.5% of all deaths (26,063 deaths) in Australia. In 1998/99, the total cost per admission for heart attack, including overheads and admission costs was almost $6,000 (AIHW, 2001).

Risk factors

The primary risk factors for heart disease are high blood pressure, elevated blood cholesterol and cigarette smoking. Other factors that may contribute to a lesser extent include obesity, diabetes, physical inactivity and stress (Arnold, 1990).

Population groups at greater risk of developing coronary heart disease include males, older Australians, Aboriginal people, and those from lower socioeconomic backgrounds (AIHW, 2001). In 1998-2000, mortality rates for coronary heart disease among males aged 25-64 years were more than two and a half times higher than their female counterparts, while males living in disadvantaged areas had mortality rates for coronary heart disease around twice as high as those of their counterparts from the least disadvantaged areas. Similarly, females aged 25-64 years from the most disadvantaged areas experienced mortality rates for coronary heart disease more than one and a half times higher than females from the least disadvantaged areas (Draper et al. 2004).

Prevention

Primary prevention measures for coronary heart disease will generally encourage changes to behavioural risk factors such as the reduction of smoking, making healthier food choices, increasing aerobic exercise and drinking moderately.

Tobacco smoking not only increases the risk for developing coronary heart disease, it also increases the risk of recurrence after myocardial infarction or coronary artery bypass graft surgery (Tunstal-Pedoe, 1997). The reduction of smoking is thus important in both primary and secondary prevention programs.

As a risk factor, hypertension is not as easily identifiable as smoking, as those at risk need to be diagnosed by a doctor. For this reason, regular blood pressure checks should be encouraged among people aged 40 years and older. Apart from the use of medications, interventions aimed at changing lifestyle-related risk factors, such as obesity, lack of exercise, smoking, alcohol and salt consumption at a population level will reduce the prevalence of these risk factors, and ultimately lead to a decrease in the proportion of the population with high blood pressure (Tunstal-Pedoe, 1997).

Of the major risk factors for coronary heart disease, blood cholesterol provides the greatest opportunity for reversible risk. However, although the case for cholesterol screening at a population level is generally not accepted, giving dietary advice to populations and treating high cholesterol in the presence of other risk factors, or when there is a family history of high cholesterol, has gained consensus (Tunstal-Pedoe, 1997).

Treatment

There are two principal coronary revascularisation procedures used to overcome blockages of the coronary arteries, by either reducing or bypassing the blockage. These procedures are coronary artery bypass grafting (CABG) and percutaneous revascularisation.

CABG involves joining a section of blood vessel to the coronary artery at either side of the blockage, in effect bypassing the blockage. Generally, the grafted vessel is removed from either the internal mammary artery in the chest or the major vein in the leg (Davies, 2003).

Percutaneous revascularisation encompasses a number of procedures, which aim to either widen the artery or remove the blockage. In recent years, the term percutaneous coronary intervention (PCI) has
been used to encompass all forms of percutaneous revascularisation. This includes percutaneous transluminal coronary angioplasty (PTCA), stenting and atherectomy.

In PTCA, a catheter carrying a balloon near its tip is inserted into one of the major arteries via the skin until it reaches the blockage in the coronary arteries. Once in position, the balloon is inflated against the blockage, thus widening the artery and increasing blood flow. While initial success rates for PTCA are high, recurrence rates are also high and there is a risk of early acute closure within the coronary artery.

Due to the potential for acute closure or recurrence, other catheter-based techniques have been introduced. One such procedure is the use of a stent in which a metal tubular supporting structure is placed at the site of the obstruction. Less common is atherectomy, which involves cutting or grinding the obstruction (Davies, 2003).

Since the mid-1990s, the rate of CABG procedures performed in WA has fallen by an average of 7.1% per year, from a high of 726 procedures per million persons (crude rate) in 1993, to 425 procedures per million persons in 2003. However, the rate of PCI in WA has increased steadily since the early 1980s, and by 1996 was more common than CABG procedures. In 2003, the crude rate for PCI in WA was 1,254 procedures per million persons.

Nationally, there was also a decline in the crude rate of CABG procedures (although it began later, and was less dramatic than in WA), and an increase in the crude rate of PCI procedures. In 2000, there were 1,125 PCI procedures per million Australians.

Epidemiology
Coronary heart disease was not recognised as a specific cause of death until the eighth revision of the ICD was released in 1968, thus long-term trend data are unavailable. However, estimates based on Australian data from 1950 onwards indicate that mortality rates for coronary heart disease increased steadily until 1968, peaking at around 467 and 321 deaths per 100,000 persons for males and females respectively. Since 1968, mortality rates for coronary heart disease have fallen by an average of 3.6% per year for males and 3.0% for females respectively (Dunn et al. 2002).

Incidence
Among Australians aged 40-90 years in 2000-01, there were approximately 48,700 coronary heart disease events, of which males experienced 61%.

Around 46% (22,400 cases) were fatal, with 86% of these deaths occurring outside hospital (AIHW, 2004).

Mortality
Between 1983 and 2003 in WA, mortality rates for coronary heart disease fell from 352 to 142 deaths per 100,000 persons for males (an average annual decline of 4.8%), and from 188 to 86 deaths per 100,000 persons for females (an average annual decline of 4.7%).

Nationally, between 1991 and 2003, mortality rates for coronary heart disease fell from 284 to 160 deaths per 100,000 persons for males (an average annual decline of 5.2%), and 161 to 93 deaths per 100,000 persons for females (an average annual decline of 4.1%).

In both WA and Australia, coronary heart disease accounted for a higher proportion of all CVD deaths among males than females. In 2003, coronary heart disease accounted for around 57% of all male and 47% of all female CVD deaths in Western Australia.

References


Figure 90: Procedures, coronary artery bypass grafting (CABG) & percutaneous coronary intervention (PCI)

- In 2003, there was a total of 3,274 coronary revascularisation procedures conducted in WA.
- In WA, CABG procedures increased from 567 to 794 procedures per million persons between 1989 and 1993, an average annual increase of 8.1%. From 1994 onwards, CABG procedures decreased by an average of 7.1% per year, from 728 to 425 procedures per million persons by 2003.
- Nationally, trends for CABG procedures were similar to those observed in WA. However, the decrease that began around 1994 in WA did not occur nationwide until around 1997.
- PCI procedures were more common in WA than Australia until 1998 when they became more common in Australia.
- In WA between 1989 and 2003, PCI procedures increased by an average of 5.9% per year, from 395 to 1,254 procedures per million persons.
Figure 91: Mortality rate, coronary heart disease

- Mortality rates for coronary heart disease were slightly higher in Australia than WA throughout the past decade.
- In 2003, males in Australia recorded mortality rates for coronary heart disease 11% higher than those in WA, while Australian females recorded rates around 9% higher than WA females.
- In WA between 1983 and 2003, mortality rates for coronary heart disease decreased steadily, from 345 to 142 deaths per 100,000 persons for males and from 186 to 84 deaths per 100,000 persons for females. This was an average annual decline of 4.8% and 4.1% respectively.
- Nationally between 1991 and 2003, mortality rates for coronary heart disease also decreased steadily from 284 to 160 deaths per 100,000 persons for males and from 161 to 93 deaths per 100,000 persons for females. This was an average annual decrease of 5.2% and 4.7% respectively. Over this period, mortality rates in WA fell by 5.8% for males and 5.1% for females.
Stroke

Stroke refers to cerebrovascular disease, and includes ischaemic stroke, haemorrhagic stroke, transient ischaemic attack and other cerebrovascular diseases. It is one of the leading causes of deaths and disability in Australia.

Ischaemic stroke can occur when an artery that supplies blood to the brain becomes blocked, while a haemorrhagic stroke is the result of an artery that supplies blood to the brain suddenly bleeding. Both of these events can cause damage to parts of the brain, which may in turn lead to impaired body functions (AIHW, 2001).

In 2002, stroke was the third most common cause of death among males and the second most common cause among females in WA. Nationally, stroke was the second most common cause of death for both males and females in 2002 (AIHW, 2004).

Ischaemic stroke is more common than haemorrhagic stroke, occurring around five times as often (AIHW, 2001). Around 85% of acute strokes are due to blockages within a cerebral artery by a solid blood clot. The remaining 15% are due to cerebral haemorrhage from small intracerebral arteries (Hildick-Smith, 2000).

Haemorrhagic stroke includes intracerebral and subarachnoid haemorrhage. Although subarachnoid haemorrhage accounts for only 4% of all strokes, it tends to affect younger adults who are in good health and has a high mortality rate, thus its impact can be considerable (ACROSS, 2000).

Stroke can have a devastating impact on those affected, with around one-third of patients dying after six months, while a further third will permanently depend on help from others (Bath & Lees, 2000). People who become permanently disabled may experience some degree of paralysis to one side of their body, difficulty in communicating, or other problems affecting their quality of life and ability to function within society (AIHW, 2001).

The Perth Community Stroke Study found that among those who survive 30 days after their first-ever stroke event, around half will survive five years. Of survivors, one in three will remain disabled, while a further one in seven will end up in permanent institutional care (Hankey et al. 2002).

In Australia in 1998/99, the average total expenditure per admission (including overheads and administrative costs) for ischaemic stroke was $6,250, and $2,255 for transient ischaemic attack (AIHW, 2001).

Risk factors

Recognised risk factors for stroke include high blood pressure, tobacco smoking, alcohol consumption, sedentary behaviour and being overweight or obese. Age is also highly associated with the onset of stroke, with the overall risk doubling with each decade after the age of 45 years. While subarachnoid haemorrhage occurs in younger people as well as older persons, stroke is uncommon in people aged less than 45 years, and around two-thirds of cases occur in those aged 75 years or over (Hildick-Smith, 2000). An increased risk of stroke may be associated with a paternal or maternal history of stroke (Goldstein et al. 2001).

Blood pressure

High blood pressure (hypertension) is a direct risk factor for stroke, with incidence increasing proportionately to both systolic and diastolic blood pressures (Goldstein et al. 2001). However, as a preventable risk factor, it offers the greatest potential for reducing risk (Roman, 1997).

Cigarette smoking

Smoking has long been recognised as a major risk factor for stroke. The effects of smoking are multifactorial and among other things, lead to increased arterial wall stiffness, thus reducing blood vessel distensibility and compliance. The attributable risk associated with smoking is high, with around half of all stroke events related to exposure to cigarette smoke. This figure includes current smokers, ex-smokers and exposure to environmental tobacco smoke (Goldstein et al. 2001).

Diabetes

Diabetes mellitus doubles the risk of stroke, independent of other factors such as smoking, lipids and hypertension (Roman, 1997), and a history of stroke is 2.5 to 4 times more common among diabetics than non-diabetics (Goldstein et al. 2001). In addition, insulin-dependent diabetics have an increased susceptibility to risk factors for stroke such as atherosclerosis, hypertension, obesity and abnormal blood lipids.

Alcohol

There is a direct relationship between alcohol and stroke, with the risk increasing with moderate to heavy alcohol consumption (Roman, 1997). A prospective cohort study of Scottish men found a strong positive relationship between alcohol consumption and mortality from stroke, even after adjustment. An unfavourable relationship was found for men who drank 22 or more standard drinks per
week, and those drinking 35 standard drinks or more had twice the risk of stroke death than non-drinkers (Hart et al. 1999).

**Prevention**

Many of the recognised and common risk factors for stroke remain undiagnosed, and thus untreated within the general population. These include hypertension, diabetes mellitus, excessive alcohol consumption and transient ischaemic attacks (Roman, 1997).

The attributable risk of hypertension for stroke has been cited as 75%; consequently, the treatment of mild to severe hypertension could significantly reduce the risk of stroke. Campaigns to encourage people to check their blood pressure would enable early and effective treatment and thus be a cost-effective way of reducing the overall risk of stroke in the community (Roman, 1997).

Health promotion programs aimed at reducing hypertension through reductions in dietary salt and fat, and the early detection of glucose intolerance or diabetes mellitus are also important for the primary prevention of stroke. Similarly, programs aiming at reducing cigarette smoking and excessive alcohol consumption have the added advantage of reducing the overall risk of stroke in the community (Roman, 1997).

Secondary prevention for persons who have experienced a stroke should start shortly after admission. Apart from blood pressure control, patients should be offered guidance on how to reduce lifestyle risk factors such as smoking cessation, the reduction of dietary saturated fats and salt, moderate alcohol consumption, weight loss and sufficient exercise (Hart et al. 1999).

**Epidemiology**

Stroke mortality is more common among females than males. This is probably due to there being more females in older age groups, which constitute the majority of stroke deaths. However, age-standardised mortality rates for stroke among males are higher than females. In 1998-2000, Australian males aged 25-64 years had a mortality rate for stroke around 34% higher than their female counterparts (Draper et al. 2004).

The burden of stroke is also higher among socioeconomically disadvantaged groups. In 1998-2000, Australian males and females aged 25-64 years from disadvantaged areas experienced mortality rates for stroke around 93% and 84% higher than their counterparts from the least disadvantaged areas of the country (Draper et al. 2004).

**Incidence**

Around 40,000 Australians have an ischaemic or haemorrhagic stroke each year, with three-quarters of these being first-ever strokes. In 1995, it was estimated that 116,500 Australians (0.6% of the population) had at some time had a stroke (AIHW, 2001).

In 2002/03, there were 4,015 hospitalisations for stroke in WA (52% male) and 53,082 in Australia (51% male). Between 1988/89 and 2003/04, separation rates for stroke in WA fell by an average of 2.3% per year for males and 1.5% for females.

In WA in 1998, there were 1,271 first-ever stroke hospitalisations among males and 1,200 among females. The age-adjusted rates for first-ever stroke hospitalisations in the metropolitan area were 172 per 100,000 persons for males and 120 for females. In non-metropolitan areas the rates were 234 and 181 per 100,000 persons respectively (Somerford & Gawthorne, 2002).

In 1989-1990, the Perth Community Stroke Study estimated the crude annual incidence of acute stroke at 1.89 per 1,000 persons for males and 1.66 for females (Anderson et al. 1993). Over the period 1989/90 to 1995/96, there were significant decreases in the incidence, attack and mortality for stroke nonetheless, there was no change in case fatalities at 28 days after stroke onset (Jamrozik et al. 1999).

**Mortality**

In 2003, there were 898 stroke deaths in WA (59% female) and 11,816 stroke deaths in Australia (61% female). In both WA and Australia, 93% of these deaths occurred among people aged 65 years and over, and 83% in those aged 75 years and over.

Between 1983 and 2003, mortality rates for stroke fell steadily in WA, by an average of 3.5% and 3.2% per year for males and females respectively. In 2003, the age-standardised mortality rates for stroke in WA were 53.4 deaths per 100,000 persons for males and 48.0 deaths per 100,000 for females.

Between 1991 and 2003, stroke mortality in Australia fell by an average of 3.9% per year for males and 3.4% per year for females. Over this same period in WA, stroke mortality fell by an average of 4.6% and 4.0% for males and females respectively. Nationally in 2003, mortality rates for stroke were 60.6 and 57.1 deaths per 100,000 persons for males and females respectively.
Stroke was responsible for a larger proportion of CVD deaths among females than males in both WA and Australia. In WA in 2003, stroke accounted for around 29% of all female CVD deaths and 21% of all male CVD deaths. In WA, the proportion of CVD deaths attributed to stroke fluctuated between 1983 and 2003, although the general trend was an increase in stroke deaths as a proportion of all CVD deaths among both males and females. Nationally between 1991 and 2003, the proportion of CVD deaths attributable to stroke increased from 18% to 21% for males and from 27% to 29% for females.

The risk of dying as a result of stroke before 75 years of age is higher for males than females. In WA in 2003, males had a 1 in 82 chance of dying of stroke before the age of 75, while the lifetime risk for females was 1 in 119. Nationally, the lifetime risk of stroke death was 1 in 63 for males, and 1 in 89 for females. The relatively low PYLL per 1,000 persons for stroke among WA males and females (0.9 years respectively) indicates that stroke affects older people at a greater rate than younger age groups.

References
Figure 92: Mortality rate, stroke

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - males</td>
<td>89.5</td>
<td>88.0</td>
<td>88.6</td>
<td>87.6</td>
<td>86.9</td>
<td>82.0</td>
<td>78.2</td>
<td>74.2</td>
<td>71.4</td>
<td>68.4</td>
<td>66.0</td>
<td>62.2</td>
<td>60.6</td>
<td></td>
</tr>
<tr>
<td>Australia - females</td>
<td>83.5</td>
<td>82.7</td>
<td>81.8</td>
<td>80.4</td>
<td>78.6</td>
<td>75.1</td>
<td>71.7</td>
<td>68.5</td>
<td>66.1</td>
<td>63.4</td>
<td>61.3</td>
<td>58.3</td>
<td>57.2</td>
<td></td>
</tr>
<tr>
<td>WA - males</td>
<td>83.7</td>
<td>81.3</td>
<td>83.3</td>
<td>87.4</td>
<td>86.6</td>
<td>83.6</td>
<td>78.6</td>
<td>74.0</td>
<td>71.3</td>
<td>67.2</td>
<td>62.4</td>
<td>57.6</td>
<td>54.4</td>
<td>53.4</td>
</tr>
<tr>
<td>WA - females</td>
<td>79.0</td>
<td>76.9</td>
<td>74.6</td>
<td>75.9</td>
<td>72.8</td>
<td>73.4</td>
<td>70.4</td>
<td>68.7</td>
<td>64.2</td>
<td>60.1</td>
<td>56.2</td>
<td>52.0</td>
<td>49.5</td>
<td>48.0</td>
</tr>
</tbody>
</table>

Note: ICD-9: 430–438; ICD-10: I60–I69, G45; rates based on rolling averages.
Sources: ABS mortality data.

- In 2003, there were 898 deaths in WA where stroke was the primary cause of death. Of these, 93% occurred in persons aged 65 years of over, while 82% occurred in persons aged 75 years and over.
- Between 1983 and 2003 in WA, mortality rates for stroke among males fell by an average of 3.5% per year, from 105 to 53 deaths per 100,000 persons, while female mortality rates fell by an average of 3.1% per year, from 92 to 48 deaths per 100,000 persons.
- In Australia between 1991 and 2003, stroke deaths in males fell by an average of 3.8% per year, from 90 to 61 deaths per 100,000 persons, while female mortality rates fell by an average of 3.3% from 84 to 57 deaths per 100,000 persons. Over this period, stroke deaths among males and females in WA fell by an average of 4.6% and 4.0% per year respectively.
Figure 93: Hospital separation rate, stroke

<table>
<thead>
<tr>
<th>90/91</th>
<th>91/92</th>
<th>92/93</th>
<th>93/94</th>
<th>94/95</th>
<th>95/96</th>
<th>96/97</th>
<th>97/98</th>
<th>98/99</th>
<th>99/00</th>
<th>00/01</th>
<th>01/02</th>
<th>02/03</th>
<th>03/04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - males</td>
<td>363.3</td>
<td>366.0</td>
<td>373.5</td>
<td>372.8</td>
<td>360.4</td>
<td>352.0</td>
<td>347.2</td>
<td>335.3</td>
<td>322.4</td>
<td>311.6</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Australia - females</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>275.5</td>
<td>279.5</td>
<td>285.8</td>
<td>287.0</td>
<td>280.3</td>
<td>271.8</td>
<td>269.2</td>
<td>261.6</td>
<td>254.3</td>
<td>227.2</td>
</tr>
<tr>
<td>WA - males</td>
<td>358.3</td>
<td>354.9</td>
<td>353.5</td>
<td>364.1</td>
<td>340.6</td>
<td>331.8</td>
<td>367.5</td>
<td>345.2</td>
<td>331.2</td>
<td>312.0</td>
<td>281.5</td>
<td>287.0</td>
<td>269.8</td>
</tr>
<tr>
<td>WA - females</td>
<td>239.7</td>
<td>235.6</td>
<td>248.4</td>
<td>234.1</td>
<td>248.9</td>
<td>234.6</td>
<td>227.7</td>
<td>223.2</td>
<td>213.5</td>
<td>216.2</td>
<td>209.9</td>
<td>200.7</td>
<td>192.4</td>
</tr>
</tbody>
</table>

Note: ICD-9: 430–438; ICD-10: I60–I69, G45.
Source: WA Hospital morbidity data system

- In WA between 1988/89 and 2003/04, hospital separations for stroke among males fell by an average of 1.8% per year, from 343 to 256 separations per 100,000 persons, and female separations for stroke fell by an average of 1.4% per year, from 233 to 199 separations per 100,000 persons.
- Nationally between 1993/94 and 2002/03, separations for stroke among males fell by an average of 1.6% per year, from 363 to 312 separations per 100,000 persons, and female separations for stroke fell by an average of 0.9% per year, from 276 to 227 separations per 100,000 persons.
- Over this period, stroke separations for males and females in WA fell by an average of 3.1% and 2.2% per year.
Communicable diseases

A communicable or infectious disease is caused by a specific infectious agent or its toxic products and arises through transmission of that agent or its products from an infected person, animal or inanimate reservoir (e.g. from a food source or contaminated water) to a susceptible host (Heymann, 2004).

In the nineteenth and twentieth centuries, the incidence and impact of communicable diseases was considerably reduced by improvements in sanitation, the introduction of antibiotics and mass immunisation. While it was once thought that it would be possible to virtually eliminate communicable diseases in industrialised countries, this view has changed with the re-emergence of diseases thought to be controlled (e.g. tuberculosis), the emergence of new diseases (e.g. HIV/AIDS and Severe Acute Respiratory Syndrome [SARS]), increasing antibiotic resistance in common pathogens, and the threat of bioterrorism. Transmission of disease is facilitated by many factors, including global travel, personal behaviours, climate, and human impact on the environment.

Communicable diseases remain a global problem, accounting for over a quarter of all deaths worldwide, the majority of which are in developing countries (WHO, 2004). In WA, infectious and parasitic diseases accounted for 127 deaths (1.2% of all deaths), and 4,854 hospitalisations (0.8%) in 2003. If pneumonia and influenza are included, infectious diseases accounted for 398 (13.8%) deaths and 10,817 (1.8%) hospitalisations. Nationally, infectious and parasitic diseases accounted for 1,754 deaths (1.3% of all deaths) and 92,810 (1.4%) hospital admissions in the year 2002/03 (ABS, 2005). If pneumonia, influenza and acute respiratory tract infections are included, there were 5,310 deaths (4.0%) and 221,225 (3.3%) hospital admissions nationally in 2002/03. In Australia, the mortality rate from communicable diseases was higher in males than females in almost all age groups (overall, 11 deaths per 100,000 persons among males and 7 deaths per 100,000 persons among females) (AIHW, 2004).

Indicators such as disease notifications, hospital separations and cause of death data are used to monitor communicable diseases; however, these data sources tend to underestimate the true burden of disease in the community, as many persons with infections do not seek medical attention, only a sub-group of infectious agents are notifiable, and only a very small proportion of cases of most infections lead to hospitalisation or death.

In Australia, over 60 notifiable infectious diseases with standardised case definitions (CDNA, 2004) are reported to the National Notifiable Diseases Surveillance System (NNDSS) by State and Territory health authorities. The NNDSS is managed by the Australian Government under the auspices of the Communicable Diseases Network Australia. Additional diseases are notifiable only in some States and Territories (CDNA, 2004). Notifiable diseases have significance in a public health context and are required by law to be reported to the Department of Health. Prompt notification of cases is important as it facilitates control measures to prevent further transmission (e.g. vaccination or treatment of contacts), helps to identify outbreaks requiring investigation and control, and enables planning and monitoring of these actions (Kim-Farley, 1997).

Notifiable diseases are generally categorised according to the major modes of transmission, e.g. enteric diseases, blood-borne diseases, vector-borne diseases and sexually transmitted infections. This chapter presents an overview of some common and/or important notifiable disease categories and specific diseases in WA and Australia. In addition, trends over the last decade or more of individual diseases in selected disease categories are described.

In 2004, there were over 110,000 notifications to the NNDSS, of which over 15,000 (14%) were from WA (CDNA, 2005). Sexually transmitted and enteric infections were the most commonly notified disease categories, comprising two-thirds of all notifications in both WA and Australia (Table 4). The proportion of vaccine-preventable diseases in WA was relatively high in comparison to the national proportion, reflecting a large epidemic of pertussis (whooping cough) that year.

Of the sexually transmissible infections (STI), chlamydia was the most commonly notified infection in WA and Australia in 2004, comprising 73% and 79% of total STI notifications respectively (Table 5). Similarly, campylobacteriosis was the most common enteric disease, comprising 51% of cases in WA and 59% of cases in Australia. Pertussis was the second most notified disease overall in WA in 2004, accounting for 84% of all vaccine-preventable diseases notified.

The infectious and parasitic diseases chapter doesn’t include respiratory diseases, such as pneumonia.
### Table 4: Number and proportion of notifications by disease category in WA and Australia, 2004.

<table>
<thead>
<tr>
<th>Disease Category</th>
<th>WA</th>
<th></th>
<th>Australia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>Sexually transmissible infections</td>
<td>5,954</td>
<td>38.6</td>
<td>45,566</td>
<td>40.3</td>
</tr>
<tr>
<td>Enteric diseases</td>
<td>3,818</td>
<td>24.7</td>
<td>25,957</td>
<td>23.0</td>
</tr>
<tr>
<td>Vaccine-preventable diseases</td>
<td>2,492</td>
<td>16.1</td>
<td>13,359</td>
<td>11.8</td>
</tr>
<tr>
<td>Blood-borne viral diseases</td>
<td>1,646</td>
<td>10.7</td>
<td>19,525</td>
<td>17.3</td>
</tr>
<tr>
<td>Vector-borne diseases</td>
<td>1,312</td>
<td>8.5</td>
<td>6,288</td>
<td>5.6</td>
</tr>
<tr>
<td>Other (a)</td>
<td>217</td>
<td>1.4</td>
<td>2,270</td>
<td>2.0</td>
</tr>
<tr>
<td>Total</td>
<td>15,439</td>
<td>100</td>
<td>112,965</td>
<td>100</td>
</tr>
</tbody>
</table>

(a) Other diseases include Zoonotic and Quarantinable diseases.

Sources: National Notifiable Diseases Surveillance System, Australian Government; WA Notifiable Infectious Diseases Database.

### Table 5: Number and proportion of the 12 most commonly notified diseases in WA and Australia, 2004.

<table>
<thead>
<tr>
<th>Disease Category</th>
<th>WA</th>
<th></th>
<th>Australia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>% of all notifications</td>
<td>Number</td>
<td>% of all notifications</td>
</tr>
<tr>
<td>Chlamydia (genital)</td>
<td>4,325</td>
<td>28.0</td>
<td>36,063</td>
<td>31.9</td>
</tr>
<tr>
<td>Pertussis</td>
<td>2,089</td>
<td>13.5</td>
<td>8,667</td>
<td>7.7</td>
</tr>
<tr>
<td>Campylobacteriosis</td>
<td>1,837</td>
<td>12.5</td>
<td>15,442</td>
<td>13.7</td>
</tr>
<tr>
<td>Gonorrhoea</td>
<td>1,420</td>
<td>9.2</td>
<td>7,168</td>
<td>6.3</td>
</tr>
<tr>
<td>Hepatitis C (a)</td>
<td>1,212</td>
<td>7.9</td>
<td>13,338</td>
<td>11.8</td>
</tr>
<tr>
<td>Ross River virus infection</td>
<td>1,099</td>
<td>7.1</td>
<td>4,206</td>
<td>3.7</td>
</tr>
<tr>
<td>Giardiasis</td>
<td>926</td>
<td>6.0</td>
<td>NN</td>
<td>—</td>
</tr>
<tr>
<td>Salmonellosis</td>
<td>620</td>
<td>4.0</td>
<td>7,804</td>
<td>6.9</td>
</tr>
<tr>
<td>Hepatitis B (b)</td>
<td>434</td>
<td>2.8</td>
<td>5,886</td>
<td>5.5</td>
</tr>
<tr>
<td>Syphilis (b)</td>
<td>207</td>
<td>1.3</td>
<td>1,575</td>
<td>1.9</td>
</tr>
<tr>
<td>Pneumococcal infection</td>
<td>195</td>
<td>1.3</td>
<td>2,357</td>
<td>2.1</td>
</tr>
<tr>
<td>Influenza</td>
<td>186</td>
<td>1.2</td>
<td>2,134</td>
<td>1.9</td>
</tr>
</tbody>
</table>

NN = not notifiable.

(a) Hepatitis B and hepatitis C figures include both newly acquired and duration unspecified cases.

(b) Syphilis figures include cases notified as “infectious” and “more than 2 years or unknown duration”.

Sources: National Notifiable Diseases Surveillance System, Australian Government; WA Notifiable Infectious Diseases Database.
Enteric diseases
The risk of infection with micro-organisms that cause gastro-intestinal illness is influenced by a variety of factors, including personal hygiene, contact with pets and other animals, food safety practice both in households and commercial premises, water supply quality, climatic conditions and international travel.

The major risk factors associated with infection from enteric diseases include age (young children and the elderly), institutional residence or day care attendance, travel and immunodeficiency status. Primary prevention strategies involve provision of high-quality drinking water, adequate sewerage systems, promotion of personal hygiene and the monitoring of safe food-handling practices (Logan et al., 1997).

The pattern of enteric diseases has changed considerably since the nineteenth century, with improved sanitation and water supplies, changes in food consumption patterns, recognition of novel micro-organisms (e.g. enterohaemorrhagic Escherichia coli), more widespread outbreaks and greater public awareness of food-borne disease (Kirk et al., 2002). In addition, of concern is the development of antibiotic resistance among some pathogens, possibly because of antibiotic additives in animal feeds, as well as over-prescribing practices by doctors (Hall et al., 2002; Schlundt, 2001).

Notification rates amongst individuals with enteric infections are influenced by a variety of factors including whether those affected seek medical attention, whether a faecal sample is submitted for examination, and whether the case is notified to the Department of Health if an organism is identified. Commonly notified enteric diseases in WA and Australia include campylobacteriosis, salmonellosis and cryptosporidiosis. In WA, Giardia infection is also a commonly notified enteric disease; however, it is not notifiable nationally.

Enteric diseases (including food-borne infections) are a major cause of disease in Australia. In 2004, there were 3,818 and 25,957 notified cases of enteric disease in WA and Australia respectively (accounting for 25% and 23% of total notifications). Campylobacter infection accounted for over half of all enteric disease notifications in both WA and Australia, while salmonellosis accounted for 16% of enteric notifications in WA, compared to 30% nationally.

The incidence of enteric diseases is considerably underestimated in notification data, as only a proportion of cases come to the attention of doctors. A study of the prevalence of diarrhoea in the community showed that 6% of people had experienced gastroenteritis in the last month, representing a huge burden of illness in the community (Scallan et al., 2005). It has been estimated that about four million cases of food-borne infectious disease occur annually in Australia (Hall et al., 2002).

Sexually transmissible infections
A sexually transmissible infection (STI) is any infection that is transmitted from one person to another during sexual activity (oral, anal or vaginal). There are more than 20 organisms that are primarily transmissible through sexual contact. These include the ‘classical’ STIs’ gonorrhoea and syphilis, in addition to chlamydia, donovanosis, chancroid, genital warts, genital herpes and human immunodeficiency virus (HIV) infection. Many are curable with appropriate antimicrobial therapy. Despite this, STIs are a major public health concern worldwide. In 1999, 340 million new cases of curable STIs were reported globally, with the majority occurring in developing countries (WHO, 2001).

For many STIs, more male cases than female cases are reported. This may not reflect the true situation as infected women are more often asymptomatic than men, resulting in under-diagnosis in women (Bowden et al., 2002). This has important personal and public health implications as asymptomatic infections are transmissible and can potentially cause serious complications. The long-term carriage of asymptomatic and undiagnosed infection contributes significantly to the burden of disease caused by STIs. If diagnosed early, most STIs can be effectively treated, but untreated, they can result in significant morbidity and in some cases death may result, especially among women. The cost of treating these long-term complications, including pelvic inflammatory disease, infertility, cervical cancer, ectopic pregnancy, perinatal morbidity and mortality and AIDS, far exceeds the cost of effective prevention programs and early diagnosis and treatment (Eng & Butler, 1997).

The two most common STIs in Australia are believed to be human papillomavirus infection and genital herpes (both of which are chronic viral infections); however, their occurrence is difficult to monitor as they are not notifiable diseases (AIHW, 2002). Notifiable STIs in Australia are chlamydia, gonorrhoea, donovanosis, syphilis and HIV infection. In some jurisdictions, lymphogranuloma venereum and chancroid are also notifiable. The number of STIs notified is influenced by a variety of factors, including notification procedures, completeness of
Genital chlamydia is the most commonly notified STI in Australia and WA, followed by gonorrhoea. More females than males are notified with chlamydia, (Miller et al., 2005) which may reflect its detection during Pap smear screening. Nonetheless, it often remains undiagnosed and untreated, as it is asymptomatic in up to 50% of males and 75% of females. Notification rates for genital chlamydia and gonorrhoea are highest in older teenagers and young adults.

Human Immunodeficiency Virus (HIV)
Acquired immunodeficiency syndrome (AIDS) was first recognised among homosexual men in 1981. It is the late clinical stage of infection caused by the human immunodeficiency virus (HIV). HIV can be transmitted from person to person via sexual contact, sharing of injecting equipment, blood transfusions, other causes of blood-to-blood contact, and from mother to child. In Australia, transmission of HIV is mainly through sexual contact between men (77%), while heterosexual contact accounts for 11% of cases, and intravenous drug use accounts for 4% of diagnosed infections. Mother to child transmission of HIV infection remains rare in Australia (NCHECR, 2004). Since 1985, infection by transfusion of blood or blood products, donated semen, organs and tissue has become rare due to the routine testing for HIV antibodies of all donors (AIHW, 1998).

From 1981 to the end of 2004, an estimated 24,245 Australians were diagnosed with HIV (92% were males), 9,500 were diagnosed with AIDS, while 6,509 persons with HIV infection have died (McDonald, 2005). In 2004, there were 884 new HIV diagnoses and 160 new AIDS cases reported in Australia (pers. comm. Ann McDonald, NCHECR). This represents a substantial decrease from the peak annual incidence of over 2,500 new HIV diagnoses in 1984 (AIHW, 2002). The first AIDS case in WA was reported in 1983. From then until the end of 2004, 1,161 people have been diagnosed with HIV, 488 diagnosed with AIDS, and 384 deaths in persons with HIV infection have been reported. In 2004, there were 48 HIV diagnoses, 10 new AIDS cases and 11 deaths in persons with HIV infection notified in WA.

The AIDS epidemic initiated a vigorous campaign to promote safe sexual practices in Australia in the early 1980s, and the decline in HIV diagnoses since the late 1980s reflected the success of this and related prevention strategies. The widespread use of effective combination antiretroviral therapy since the 1990s has been associated with a significant decline in the incidence of AIDS and in deaths in persons infected with HIV.

More recently, Australian studies have found evidence that an increasing proportion of homosexually active men are engaging in unprotected anal intercourse (Van de Ven et al., 2002), and rates of sexually transmitted infections are increasing in this population. In addition, high rates of hepatitis C among intravenous drug users, and widespread bacterial STIs in some Aboriginal communities highlight the importance of sustaining and enhancing prevention strategies for HIV.

Blood-borne viral diseases
Blood-borne viral diseases are those that are primarily transmitted via blood-to-blood contact with an infected individual. Although blood is an important vehicle for transmission, blood products and other body fluids can also transmit these infections. The notifiable blood-borne diseases include hepatitis B virus, hepatitis C virus and human immunodeficiency virus (HIV), although the latter is more appropriately considered as an STI in Australia, as this is the major route for its transmission.

Hepatitis C is the most common viral cause of hepatitis, with over 200,000 cases notified Australia-wide since 1993. It has become a major public health issue, with the majority (93%) of newly acquired hepatitis C cases in Australia related to injecting drug use (Robotin et al., 2004). Transmission can also occur by sharing of drug injecting equipment, tattooing, body piercing and percutaneous needlestick injury. Complications of hepatitis C infection include cirrhosis and liver cancer, with hepatitis C now the major indication for liver transplantation in Australia.

Vector-borne diseases
Vector-borne diseases are those that are transmitted by insects such as mosquitoes, and depending on the disease, transmission may occur when the vector species transfers the infectious agent from one person to another (e.g. malaria) or from an animal host to a human (e.g. Ross River virus infection). The main mosquito-borne diseases of concern in Australia are Murray Valley encephalitis and Kunjin viruses, Barmah Forest and Ross River viruses, dengue virus and malaria. The latter two infectious agents are not transmitted in Western Australia; however, the diseases occur in West Australians who have travelled overseas or in visitors and migrants to WA. Dengue virus does occur in periodic outbreaks in Far North Queensland (Miller et al., 2005).
Drivers of vector-borne diseases, such as seasonal weather variations, vector control programs, animal host population numbers, and environmental and climate changes influence vector-borne disease epidemiology. It is widely recognised that the weather is important in the genesis of human outbreaks of arboviral disease in Australia (Githeko et al., 2000). Climatic changes are expected to increase the activity of arboviruses and other viruses by extending the habitats of their mosquito vectors (Newton, 2001).

Ross River virus (RRV) disease is the most widespread arboviral disease and most frequently notified vector-borne disease in Australia, with thousands of cases occurring in some epidemics. In WA, it accounted for 80% of all vector-borne disease notifications between 1995 and 2004. An epidemic of RRV in the latter part of 2003 and early 2004 resulted in 1,523 cases, compared with 128 cases in 2002. This was the largest recorded outbreak in South-West WA (Lindsay et al., 2005). Major outbreaks occur every 3-4 years and are largely dependent on environmental conditions favouring transmission of RRV, as well as levels of immunity in amplifying host animal species, such as kangaroos.

Murray Valley Encephalitis (MVE) is notified rarely in Australia, but because of its serious sequelae, including permanent neurological damage and death, WA and some other jurisdictions invest considerable resources in monitoring MVE virus activity and in associated mosquito control programs and public warnings. MVE virus is endemic in the Kimberley region of WA, and the major risk of infection occurs in non-immune travellers to this area, or in years of unseasonable rainfall, when virus activity extends to more southerly regions. In 2000, when virus activity extended into the Midwest and Murchison regions for the first time, nine cases of MVE encephalitis were notified in WA (Cordova et al., 2000).

Vaccine-preventable diseases and immunisation coverage

Vaccination against diseases is an integral part of communicable disease control worldwide. High immunisation coverage impedes the transmission of many vaccine-preventable diseases (VPDs). The worldwide eradication of smallpox and the near eradication of polio in most parts of the world are examples of the role of immunisation in disease control.

In Australia, the current National Health and Medical Research Council Standard Childhood Vaccination Schedule is designed to protect children from pertussis (whooping cough), diphtheria, tetanus, poliomyelitis, measles, mumps, rubella, hepatitis B, Haemophilus influenza type b (Hib) infection, and pneumococcal and meningococcal disease (NHMRC, 2003). Previously common childhood diseases, including diphtheria, tetanus, polio, measles, rubella, mumps and invasive Hib infection (a cause of bacterial meningitis) have either been eliminated or virtually eliminated in WA and Australia as a result of successful immunisation programs.

Nationally, there were 13,359 notifications of VPDs in 2004, equating to 11.8% of all notifications to the NNDSS. Pertussis was the most commonly notified VPD with 8,667 notifications, representing 7.7% of all notifications. In WA, VPDs comprised 16.1% of all notifications in 2004, almost entirely attributable to the largest outbreak of pertussis ever recorded. Pertussis outbreaks occur approximately every 3-4 years in developed countries. This is associated with the fact that immunity following pertussis vaccination declines after five to ten years.

The importance of continually monitoring immunisation coverage is highlighted by studies that have reported a link between decreasing uptake rates, and increasing notifications of vaccine preventable diseases (Alberman & Pharoah, 1997). In general, vaccine coverage needs to exceed 90% in order to achieve and maintain the level of herd (or community) immunity necessary to interrupt the ongoing transmission of vaccine-preventable diseases (Lister et al., 1999).

Vaccination coverage in Australia is monitored through the Australian Childhood Immunisation Register (ACIR), which began recording vaccination data for children aged less than seven years in January 1996 (AIHW, 2002). The ACIR functions not only as a means of monitoring vaccine coverage, but also to provide a recall system so that parents and health care workers are reminded when a particular child’s immunisations are overdue (NHMRC, 2003).

Vaccination coverage for all vaccines due by 2 years of age for the cohort of children aged 24-27 months as of December 2004, was 92% nationally, and 91% in WA. The highest proportion of vaccination was for hepatitis B (Australia 96%; WA 95%) and the lowest was for Hib (Australia 93%; WA 92%). Vaccination coverage for most vaccines, and at each age reported by ACIR, is marginally lower in WA than in other States and Territories. The reasons for this are not clear, but it is thought that reporting to ACIR by doctors may be lower in WA than other jurisdictions.
**Tuberculosis**

Tuberculosis (TB) is an infectious disease that is transmitted from person-to-person primarily by inhalation of aerosols produced by infected persons during coughing and sneezing. It can affect any part of the body, but most commonly affects the lungs. It is not easy to become infected with TB, as it can only be transmitted when the disease is active and only about 10% of infected people develop active TB disease. The most common way of acquiring TB is having close long-term contact with a person who has active disease (Heymann, 2004).

TB represents one of the most significant public health threats to the global population, particularly in Africa where its transmission is facilitated by AIDS. Western Australia has one of the lowest incidence rates of TB in the world, with the disease primarily being a public health problem for recent migrants and Aboriginal people. Nationally in 2003, 947 TB cases were reported to the NNSS, of which 80% were born overseas and 4% were Aboriginal (Li et al., 2004). In WA in 2004, 78 TB cases were notified, of whom two were Aboriginal people, nine were Australian-born non-Aboriginal people, while the remaining 67 were born overseas.

Risk factors for TB in the Aboriginal population include poor socioeconomic status (reflected in overcrowding), co-morbidities (e.g. diabetes and renal disease), smoking, alcohol abuse and poor nutrition (Plant et al., 1995). Reasons for the high rate of TB notifications in people born overseas are that people from high TB incidence countries are at much greater risk of exposure to TB in their country of birth and hence, they may have latent TB infection prior to arrival in Australia. Migration stress, co-morbidities and poor nutrition may also contribute to the rate of notification among people born overseas, through the progression of latent TB to active TB (MacIntyre & Plant, 1999).

Industrialised countries have achieved reductions in the rate of tuberculosis infection over the last century, primarily by reducing poverty and improving living conditions. Vaccines, chemotherapy and health services for screening, surveillance and treatment of contacts have contributed to the decline in tuberculosis more recently (Hedley & Lam, 1997). However, the need for effective tuberculosis surveillance and control in Australia remains due to the presence of high rates of infection among migrant groups, including the potential for high rates of HIV co-infection and multi-drug resistant strains, as found in other countries (AIHW, 1998).

**References**


MAJOR CONDITIONS

COMMUNICABLE DISEASES


In 2004, as in previous years, campylobacteriosis was the most frequently notified enteric pathogen, comprising 51% and 60% of all enteric diseases notified in WA and nationally, respectively.

The national rate of notified campylobacter infection remained fairly stable, fluctuating between 84 and 122 cases per 100,000 persons annually. WA rates also fluctuated but remained consistently lower than national rates until 1999.

After a decrease in the national rate of notified campylobacter infection in 1999, there was a gradual increase in rates, from 88 cases per 100,000 persons in 1999, to 117 per 100,000 persons in 2004. In WA, the increase was much more significant; from 76 per 100,000 persons in 1999, to 135 cases per 100,000 persons in 2001. In contrast to Australia, from 2001 rates in WA decreased.

The increased notification rates in WA, in 2000 and 2001 are in large part an artefact, associated with increased ascertainment following the inclusion for the first time of cases notified directly from pathology laboratories. The decline thereafter may be partly attributable to reduced overseas travel, particularly to South-East Asia, following the Bali bombing and other terrorist activity, but is also likely to represent a real reduction in local infections.
Figure 95: Salmonella notification rate

- Notification rates for salmonellosis have fluctuated over time both in WA and nationally, with little apparent correlation between State and National trends.

- From 2000 to 2004, National salmonella rates increased from 32 to 40 cases per 100,000 persons, respectively. In contrast, rates in WA decreased, from a high in 2000 of 50 cases per 100,000 persons, to a historically low rate of 31 cases per 100,000 persons in 2004.

- The increase in the WA rate in 2000 was in large part attributable to the inclusion, for the first time, of notifications direct from pathology laboratories; the decrease thereafter appears to be attributable to reduced local infection rates, with an additional contribution from reduced overseas-acquired infections as a result of a reduction in overseas travel, particularly to South-East Asia, following the Bali bombing in 2002, and other terrorist activity.
• Gonorrhoea is the second most commonly reported sexually transmissible infection in WA and Australia.

• There has been a general upward trend in gonorrhoea notification rates in both WA and Australia since 1991, with a relative stabilisation of rates since 2000. With the exception of 1999, rates in WA have been consistently two to three times higher than national rates. Between 1995 and 2004, gonorrhoea rates in WA increased by 1.2 times, while national rates doubled.

• In 2004, 7,449 gonorrhoea cases were reported nationally, with a rate of 37.2 notifications per 100,000 persons. In WA, 1,435 cases were reported, with a rate of 72.7 notifications per 100,000 persons: 54% of notifications were in young people aged 15-24 years.

• Gonorrhoea notification rates in WA are particularly high in the northern part of the state, reflecting the high incidence in Aboriginal people. Statewide, the notification ratio for Aboriginal : non-Aboriginal people was 68:1 in 2004 (Atthowe, 2005).
Figure 97: Genital Chlamydia notification rate

- Genital chlamydia is the most commonly notified STI in WA and Australia. In 2004, almost a third of all disease notifications in Australia (36,060 cases; 31%) and over a quarter of all disease notifications in WA (4,325; 28%) were for genital chlamydia. In WA, 63% of infections were reported in young people aged 15-24 years.

- Since 1993, when genital chlamydia became notifiable, the number and rate of notifications has increased steadily. In 2004, the number of notifications in both WA and Australia was 5.5 times higher than that reported in 1993. Notification rates in WA were consistently around 1.5 times higher than Australian rates.

- Increases around 1996, both nationally and in WA, were partly attributed to the introduction of more sensitive nucleic acid amplification tests, and in WA, the increase in 2000 is partially attributed to increased ascertainment associated with laboratory reporting.

Note: Crude rates.
Sources: National Notifiable Diseases Surveillance System; WA Notifiable Infectious Diseases Database.
Figure 98: Newly diagnosed HIV infection

- From early in the epidemic in 1986, to 2004, the rate of newly diagnosed HIV infection among males in WA was consistently about half that of the national male rate; however the rate among females in WA was similar to that of Australian females.

- The rate of newly diagnosed HIV infection among males in WA decreased significantly, from around 12 notifications per 100,000 persons in 1986 to 3 notifications per 100,000 persons in 1999. Thereafter, the notification rate increased gradually to 4.5 per 100,000 persons in 2004. In Australia, the rate among males also increased marginally from 1999 onwards, when the lowest national rate was reported (6.8 notifications per 100,000 persons).

- The rate of newly diagnosed HIV infection among females in WA fluctuated but remained low (0.2 to 1.6 per 100,000 persons), compared to the male rate over the same period. National female HIV notification rates were stable and similarly low (0.8 cases per 100,000 persons), although, from 2003 to 2004, there was a 50% increase in the notification rate to 1.2 cases per 100,000 persons.
AIDS notification rates for WA and Australia peaked in the early 1990s and then decreased significantly, particularly after the introduction of highly active antiretroviral therapy in 1996. Notification rates for AIDS in WA peaked in 1991 (2.9 per 100,000 persons) and Nationally, the rate peaked in 1994 (5.3 per 100,000 persons).

Between 1986 and 1997, the AIDS notification rate for Australia was consistently around twice that of WA. Since 1999, the difference has decreased, with Australian rates about 1.3 times higher than WA.

Female rates were consistently lower than male rates for both WA and Australia, and the Western Australian female rate was generally lower than that for Australian females.
Hepatitis C virus (HCV) is the most commonly notified blood-borne infection in Australia. It became a notifiable disease in 1993. From 1993 to 2004, there were over 220,000 HCV cases notified nationally.

Notified cases are a mixture of new infections and old infections, many of several years duration, usually detected through screening of people with recognised risk factors for HCV infection, such as injecting drug use or blood transfusion in the era before routine screening of donated blood commenced in 1990.

Australian HCV notification rates were consistently higher than WA rates. In Australia, notification rates generally increased until 1999, after which they decreased, so that in 2004 the rate (73 per 100,000 persons) was similar to that of 1993 (66 per 100,000 persons). During this period, the number of notifications increased from 12,761 (1993) to 25,549 (1999) per year, falling to 14,573 (2004).

In WA, the notification rate remained stable with around 1,200 cases a year, apart from an increase in 2000 (1,625 cases) and 2001 (1,426 cases) following the inclusion of laboratory notified cases. This suggests that there had previously been under-notification by medical practitioners.
Ross River Virus (RRV) infection is the most commonly notified vector-borne disease in both WA and Australia.

From 1995 to 2004, the RRV notification rate in WA was on average higher than national levels. Rates varied considerably from year to year, depending on the occurrence of epidemics (WA: 7 cases per 100,000 persons in 2002 compared to 84 cases per 100,000 persons in 1996; Australia: 7 cases per 100,000 persons in 2002 compared to 48 cases per 100,000 persons in 1997).

Large epidemics of RRV infection occur around every four years in south-west WA, associated with factors such as high summer rainfall, high tides and inundation of salt-marsh mosquito breeding areas, and varying levels of immunity in amplifying vertebrate host species, such as kangaroos.

In 1996, 2000 and 2004, WA reported notification rates that were two to three times higher than the national rates. National rates are less likely to show clear epidemic peaks because of an averaging effect reflecting the fact that epidemics in different parts of the country are not synchronous.
Figure 102: Tuberculosis notification rate (new and reactivated cases)

<table>
<thead>
<tr>
<th>Year</th>
<th>WA</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>4.3</td>
<td>6.1</td>
</tr>
<tr>
<td>1996</td>
<td>4.5</td>
<td>5.4</td>
</tr>
<tr>
<td>1997</td>
<td>3.6</td>
<td>6.8</td>
</tr>
<tr>
<td>1998</td>
<td>4.2</td>
<td>4.7</td>
</tr>
<tr>
<td>1999</td>
<td>4.4</td>
<td>10.1</td>
</tr>
<tr>
<td>2000</td>
<td>4.6</td>
<td>5.3</td>
</tr>
<tr>
<td>2001</td>
<td>3.4</td>
<td>5.0</td>
</tr>
<tr>
<td>2002</td>
<td>3.2</td>
<td>5.2</td>
</tr>
<tr>
<td>2003</td>
<td>3.3</td>
<td>4.9</td>
</tr>
<tr>
<td>2004</td>
<td>4.1</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Note: Crude rates; includes new and reactivated cases.
Sources: National Notifiable Diseases Surveillance System; WA Notifiable Infectious Diseases Database.

- The national notification rate for tuberculosis (TB) has remained relatively stable since 1991, except for an increase in 1999 associated with a large number of TB cases identified in the East Timorese population evacuated to Darwin in the Northern Territory (Li et al., 2004).

- Since 1995, about 1,000 cases per year were notified in Australia with an average rate of 5.5 per 100,000 persons. In 2004, the number and rate declined to 650 cases and 3.2 cases per 100,000 persons - the lowest rate in 15 years. However, there remain two sub-populations within Australia with high rates of TB: Australian residents born overseas (19.9 cases per 100,000 persons) and Aboriginal Australians (8.7 cases per 100,000). In contrast, the incidence rate among the non-Aboriginal Australian-born population was only 0.9 case per 100,000 persons. This pattern of TB incidence has been observed for over 10 years (Li et al., 2004).

- In WA, about 70 cases per year are notified, with an average rate of 4 cases per 100,000 persons. Since 1991, the rate of TB notifications in WA has remained stable and consistently lower than National rates, with the exception of 2004. The TB notification rate in WA is one of the lowest in the developed world.
• Pertussis (whooping cough) is the most commonly notified vaccine-preventable disease in Australia, with epidemics occurring periodically every 3-4 years. Epidemic activity tends to vary from state to state, but in national data, epidemic peaks occurred in 1994, 1997, 2001 and 2004. Pertussis vaccines do not produce long-lasting immunity, making periodic epidemics inevitable.

• Pertussis notification rates were relatively low in WA, compared to other Australian jurisdictions, since the last large pertussis epidemic in 1997. Notably, WA did not experience epidemic activity in 2001. However, in 2004, there was a large pertussis epidemic in WA; 1,978 cases were reported with a notification rate of 100 cases per 100,000 persons.
In both WA and Australia, there has been a marked reduction in the measles notification rate since 1994, with similar low rates being reported over the past five years.

In 2004, 82 measles cases were reported nationally, with nine cases reported in WA. No cases were reported in WA in 2003. There has been no endemic measles virus circulating in WA since 1998. Forty-four of 50 confirmed measles cases in the period March 1999 to the end of 2004 occurred in either overseas visitors, in WA residents returning from overseas, or in small clusters linked directly to cases imported from overseas. One cluster of six cases in late 2004 could not be linked to an identified imported case.

The successful elimination of measles and rubella virus circulation in WA followed a comprehensive vaccination program in primary school-aged children in 1998, sustained high levels of vaccine coverage in young children, targeted vaccination of young adults, and intensified efforts to detect all cases and prevent further transmission.
Table 6: Vaccine Coverage by State and Territory, children aged less than 75 months

<table>
<thead>
<tr>
<th>State</th>
<th>DTP (^{(a)})</th>
<th>Polio (^{(b)})</th>
<th>Hib (^{(c)})</th>
<th>Hep B</th>
<th>MMR (^{(d)})</th>
<th>Fully</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>93</td>
<td>93</td>
<td>96</td>
<td>95</td>
<td>0</td>
<td>93</td>
</tr>
<tr>
<td>NSW</td>
<td>92</td>
<td>92</td>
<td>94</td>
<td>95</td>
<td>0</td>
<td>91</td>
</tr>
<tr>
<td>VIC</td>
<td>93</td>
<td>93</td>
<td>94</td>
<td>94</td>
<td>0</td>
<td>91</td>
</tr>
<tr>
<td>QLD</td>
<td>92</td>
<td>92</td>
<td>94</td>
<td>95</td>
<td>0</td>
<td>91</td>
</tr>
<tr>
<td>SA</td>
<td>92</td>
<td>92</td>
<td>95</td>
<td>95</td>
<td>0</td>
<td>91</td>
</tr>
<tr>
<td>WA</td>
<td>90</td>
<td>90</td>
<td>94</td>
<td>94</td>
<td>0</td>
<td>89</td>
</tr>
<tr>
<td>Tas</td>
<td>95</td>
<td>94</td>
<td>96</td>
<td>95</td>
<td>0</td>
<td>93</td>
</tr>
<tr>
<td>NT</td>
<td>93</td>
<td>92</td>
<td>97</td>
<td>97</td>
<td>0</td>
<td>92</td>
</tr>
<tr>
<td>Aust</td>
<td>92</td>
<td>92</td>
<td>94</td>
<td>95</td>
<td>0</td>
<td>91</td>
</tr>
</tbody>
</table>

12 months to less than 15 months

<table>
<thead>
<tr>
<th>State</th>
<th>DTP (^{(a)})</th>
<th>Polio (^{(b)})</th>
<th>Hib (^{(c)})</th>
<th>Hep B</th>
<th>MMR (^{(d)})</th>
<th>Fully</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>96</td>
<td>96</td>
<td>95</td>
<td>97</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td>NSW</td>
<td>95</td>
<td>94</td>
<td>93</td>
<td>95</td>
<td>93</td>
<td>91</td>
</tr>
<tr>
<td>VIC</td>
<td>95</td>
<td>95</td>
<td>94</td>
<td>96</td>
<td>94</td>
<td>92</td>
</tr>
<tr>
<td>QLD</td>
<td>95</td>
<td>95</td>
<td>94</td>
<td>96</td>
<td>94</td>
<td>93</td>
</tr>
<tr>
<td>SA</td>
<td>95</td>
<td>95</td>
<td>94</td>
<td>96</td>
<td>94</td>
<td>93</td>
</tr>
<tr>
<td>WA</td>
<td>94</td>
<td>94</td>
<td>92</td>
<td>95</td>
<td>92</td>
<td>91</td>
</tr>
<tr>
<td>Tas</td>
<td>96</td>
<td>96</td>
<td>95</td>
<td>97</td>
<td>95</td>
<td>94</td>
</tr>
<tr>
<td>NT</td>
<td>97</td>
<td>97</td>
<td>96</td>
<td>98</td>
<td>96</td>
<td>95</td>
</tr>
<tr>
<td>Aust</td>
<td>95</td>
<td>95</td>
<td>93</td>
<td>96</td>
<td>93</td>
<td>92</td>
</tr>
</tbody>
</table>

24 months to less than 27 months

12 months to less than 15 months

<table>
<thead>
<tr>
<th>State</th>
<th>DTP (^{(a)})</th>
<th>Polio (^{(b)})</th>
<th>Hib (^{(c)})</th>
<th>Hep B</th>
<th>MMR (^{(d)})</th>
<th>Fully</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>91</td>
<td>91</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>90</td>
</tr>
<tr>
<td>NSW</td>
<td>85</td>
<td>85</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>85</td>
</tr>
<tr>
<td>VIC</td>
<td>87</td>
<td>87</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>87</td>
</tr>
<tr>
<td>QLD</td>
<td>82</td>
<td>82</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>82</td>
</tr>
<tr>
<td>SA</td>
<td>84</td>
<td>84</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>84</td>
</tr>
<tr>
<td>WA</td>
<td>82</td>
<td>82</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>82</td>
</tr>
<tr>
<td>Tas</td>
<td>86</td>
<td>87</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>86</td>
</tr>
<tr>
<td>NT</td>
<td>85</td>
<td>88</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>88</td>
</tr>
<tr>
<td>Aust</td>
<td>85</td>
<td>85</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>85</td>
</tr>
</tbody>
</table>

Note: State Summary by age group (Age calculated as at 31DEC04), Date of processing <= 31MAR05.
(a) Diphtheria, tetanus, pertussis.
(b) Poliomyelitis.
(c) Haemophilus influenzae type b.
(d) Measles, mumps, rubella.
Source: Australian Childhood Immunisation Register - Coverage Report.

- Around 91% of Australian, and 89% of West Australian children aged 12 months to less than 15 months were fully immunised, as at December 2004.
- While WA recorded lower immunisation coverage rates than the other Australian jurisdictions for most vaccines in each age category, these differences were generally small. The proportion of children aged 12 months to less than 15 months who were fully immunised ranged from 89% in WA to 93% in the ACT and Tasmania. For children aged from 24 months to less than 27 months, the proportion ranged from 91% (WA) to 95% (NT). However, in the group aged 72 months to less than 75 months, there was a 10% difference between WA (80%) and the ACT (90%).
Figure 105: Influenza vaccination coverage, persons aged 65 years or older by State and Territory, 2004.

<table>
<thead>
<tr>
<th>State</th>
<th>Coverage (Per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>78.9</td>
</tr>
<tr>
<td>Vic</td>
<td>81.6</td>
</tr>
<tr>
<td>Qld</td>
<td>75.8</td>
</tr>
<tr>
<td>SA</td>
<td>81.4</td>
</tr>
<tr>
<td>Tas</td>
<td>77.3</td>
</tr>
<tr>
<td>ACT</td>
<td>80</td>
</tr>
<tr>
<td>NT</td>
<td>67.5</td>
</tr>
<tr>
<td>WA</td>
<td>78.7</td>
</tr>
<tr>
<td>Aust</td>
<td>79.1</td>
</tr>
</tbody>
</table>

Source: AIHW, 2005.

• Free influenza vaccine is provided for all Australians aged 65 years and above. An annual survey is used to estimate coverage of the target age group. In 2004, estimated influenza vaccination coverage in elderly Western Australians was 78.7% compared to 79.1% nationally.
Diabetes

The level of glucose in the blood is regulated with the help of insulin, a hormone produced by the pancreas. Diabetes is a chronic condition where there is too much glucose in the blood (hyperglycaemia), either because the body produces little or no insulin or because it cannot use insulin properly (AIHW, 2002).

Types of diabetes

There are several types of diabetes with different causal mechanisms. The most common is Type 2 diabetes (also called adult-onset or non-insulin-dependent diabetes mellitus), followed by Type 1 diabetes (also called juvenile-onset or insulin-dependent diabetes mellitus), and gestational diabetes.

Type 1 diabetes results from autoimmune destruction of the pancreatic beta cells, the cells that produce insulin. In this form of diabetes, daily insulin therapy is necessary for survival. Type 1 diabetes accounts for 10% of all cases of diabetes in Australia. It is more common in children and young adults, although it can appear at any age (Dunstan et al. 2001). Genetic and environmental factors are thought to contribute to the development of Type 1 diabetes, but their specific role is not yet known (AIHW, 2002).

Type 2 diabetes, which is characterised by resistance to insulin's action and/or impaired insulin production by the pancreas, accounts for 85% of all cases of diabetes in Australia. It has a strong genetic propensity, which is unmasked by lifestyle factors such as obesity and lack of exercise. The prevalence of Type 2 diabetes increases with age and generally does not become apparent until middle age. Consequently, it may go undiagnosed for many years, during which time complications often develop (Dunstan et al. 2001).

During pregnancy, two to three times more insulin than usual is needed. Gestational diabetes develops in 3-8% of all pregnancies. This results when a pregnant woman cannot produce the amount of insulin needed (International Diabetes Center, 2004). Women with gestational diabetes have a higher risk of obstetric complications, including a two-fold increase in perinatal mortality and neonatal morbidity from respiratory distress syndrome and hypoglycaemia. There is also an increased rate of macrosomia (big babies), which can cause delivery problems (Health Department of WA, 1999). Gestational diabetes usually disappears when the pregnancy is over, but results in an increased lifetime risk for the onset of Type 2 diabetes (AIHW, 2002).

Risk factors for diabetes

In addition to genetic factors, lifestyle-related risk factors such as obesity and physical inactivity play a significant role in the development and progression of diabetes. About three-quarters of people with Type 2 diabetes who are aged 30 years and over are overweight or obese. The risk of developing Type 2 diabetes increases with increasing obesity and is five to ten times higher in those classified as obese than in those of an acceptable weight. Lack of physical activity is also associated with diabetes, and people who exercise regularly have a 30-60% lower risk of developing diabetes than those who do not (Commonwealth Department of Health and Aged Care & AIHW, 1999).

Age is an additional factor contributing to the development of diabetes. Glucose tolerance deteriorates with age due to a combination of decreasing insulin secretion and increasing resistance to insulin. As a result, improvements in life expectancy have contributed to the increase in prevalence of Type 2 diabetes in many developed countries (O’Dea, 1992). Studies have also linked low birthweight with an increased lifetime risk for Type 2 diabetes (Commonwealth Department of Health and Aged Care & AIHW, 1999).

Type 2 diabetes is more common among certain population groups including Aboriginal people and people of Chinese, Vietnamese, Indian and Arabian origin, whereas Type 1 diabetes is more common in people with European origins (AIHW, 2002; AIHW, 2003).

Aboriginal people have a higher prevalence of diabetes than non-Aboriginals and one of the highest rates in the world. This has been attributed, at least in part, to lifestyle changes associated with the transition from a traditional to a Western diet (O’Dea, 1991). The 2001 National Health Survey found that Aboriginal people were more than three times as likely as the non-Aboriginal population to report having diabetes. The prevalence of diabetes among Aboriginal people living in remote areas was 16%, compared to 9% for those living in non-remote areas (ABS, 2002a). The prevalence of gestational diabetes may be as high as 20% in Aboriginal women (AIHW, 2002).

The consequences of diabetes

In both human and economic terms, diabetes is one of Australia’s most costly diseases, contributing to significant illness, disability, reduced quality of life and premature mortality. Diabetes shortens life expectancy by up to 15 years and is the sixth leading cause of death in Australia. It also costs the nation in excess of
$1.2 billion annually (Dunstan et al. 2001). In WA in 2000, diabetes was in the top ten specific causes of disease burden for both sexes, accounting for 3.5% of total burden for males and 3.2% for females.

Diabetes affects almost every system in the body, due to the metabolic nature of the disease, and is a major risk factor for heart disease, stroke, blindness, kidney failure, neurological problems, amputations and birth defects (Department of Health WA, 2002). This makes it difficult to quantify the true impact of diabetes on mortality and morbidity. In 2001, diabetes was listed as a cause of death on 495 death certificates, or 4.5% of all deaths, in WA. However, it was listed as the underlying (or main) cause of death for only 154 or 31% of these. On the other 341 death certificates it was listed as an associated cause of death, 40% of which had ischaemic heart disease as the underlying cause.

An analysis of hospital separations in WA for 2003/04 found that diabetes was mentioned (in any of the diagnosis fields) in 46,244 cases, or 7.2% of all hospital separations. However, diabetes was reported as the principal diagnosis in only 6,110 or 13% of these (1.0% of all hospital separations). This is because the condition responsible for the hospitalisation is recorded as the principal diagnosis even when it is a complication of diabetes. Of the hospital separations where diabetes was mentioned as an extra diagnosis (40,134), in 12,989 (32%) cases the principal diagnosis was dialysis, and in 5,487 (14%) cases the principal diagnosis was related to diseases of the circulatory system (ICD-10 I00-I99) of which, nearly half (2,545 cases) were ischaemic heart disease.

In 2003/04, WA males recorded higher separation rates than WA females for diabetes (based on principal diagnosis) at 370 and 298 separations per 100,000 persons respectively. This was a significant increase on previous years owing to changes in coding practices. In 2002/03, WA males aged 0-14 years recorded higher separation rates for diabetes (65.7 separations per 100,000 persons) than Australian males (53.2 separations per 100,000 persons). WA and Australian females recorded similar rates of 58.8 and 58.3 separations per 100,000 persons respectively.

In recognition of the impact that diabetes has on the Australian community, and the potential to reduce its impact through lifestyle modification, the Australian Health Ministers agreed to make it the fifth National Health Priority Area in July 1996. As a consequence, diabetes has a higher profile within the health system, and in 1999 both the Commonwealth and State governments produced diabetes strategy reports (Commonwealth Department of Health and Aged Care, 1999; Health Department of WA, 1999).

**Prevalence of diabetes**

There has been a dramatic worldwide increase in the prevalence of diabetes in recent years. In 2000, there were an estimated 160 million diabetics in the world, and this is predicted to rise to over 280 million by the year 2025. The prevalence of diabetes in Australia is very high by world standards, and is increasing. The number of Australians with diabetes has trebled since 1981 and it has been predicted that by 2010 1.23 million Australians will have diabetes (Dunstan et al. 2001).

The rising trend in diabetes prevalence is, in part, due to the ageing population and its changing ethnic composition (Commonwealth Department of Health and Aged Care, 1999), but it is also due to an increase in risk factors such as obesity, lack of exercise and poor dietary habits.

The AusDiab study in 1999/2000 estimated, based on blood tests, that 938,700 Australians aged 25 years and above had diabetes. This is 7.5% of the population (males 8%; females 7%). The prevalence increased from 0.3% among people aged 25-34 years to 24% among those aged 75 years and over. This increase in prevalence occurred faster and earlier among males than females. In the same study the WA component of the survey was sampled from residents of outer Perth Metropolitan areas, which may not be representative of the State population. For WA the survey found that the prevalence pattern was similar in WA: below 1.0% for males and females aged 25-34 years and increasing to 25% in males and 17% in females aged 75 years and over. The male rate was higher than the female rate for all age groups except those aged 65-74 years. Only about half the people found to have diabetes in Australia were aware that they had the condition, implying that the real prevalence of diabetes is double that of the self-reported prevalence (Dunstan et al. 2001).

This is borne out by the results of the 2004 WAHWSS, which found that only around 6% of male and 5% of female Western Australians had been diagnosed with diabetes and considered themselves to still have the condition. This had increased from approximately 3% of males and females respectively in 1995. Of the Australian population who reported that they had been diagnosed with diabetes in 2001, the majority of people (78%) reported that they had Type 2 diabetes, 17% reported they had Type 1, and 5% did not specify a type (ABS, 2002b).
Reducing the impact of diabetes

The burden of diabetes can be reduced by an integrated approach that promotes healthy lifestyle practices, leads to early diagnosis of diabetes and effectively manages its complications (Health Department of WA, 1999).

Although Type 1 diabetes cannot be prevented at present, primary prevention programs aimed at long-term weight control and lifestyle modifications are likely to prevent or delay the onset of Type 2 diabetes. Weight loss has been shown to normalise insulin sensitivity in obese patients (Rosenberg & Lawrence, 2000), and high-fibre diets are associated with a lower incidence of Type 2 diabetes, with vegetarians having a lower risk than non-vegetarians (Shetty & James, 1997). Primary prevention programs which target everybody in the community, rather than just the high-risk group, have proved to be the most effective in the prevention of Type 2 diabetes (Department of Health WA, 2002; Rosenberg & Lawrence, 2000).

The earlier a person with diabetes is diagnosed, the sooner treatment can be started to control blood glucose levels and delay the onset and progression of many diabetes-related complications. Often complications can progress to an advanced stage before the disease is detected, and only regular medical screening can detect the complications at the earlier treatable stages. Raising awareness about undiagnosed diabetes among health professionals and improving screening and detection skills are important in increasing rates of early detection. Following diagnosis, effective management of the disease by strict control of blood glucose levels is essential to reduce the morbidity and mortality resulting from the complications of diabetes (Commonwealth Department of Health and Aged Care & AIHW, 1999).

References


Rosenberg M, Lawrence A (2000). Review of primary prevention of Type 2 diabetes in WA. Perth: University of WA.

**Figure 106: Self-reported diabetes prevalence, persons aged 18 years and over, WA**

<table>
<thead>
<tr>
<th></th>
<th>1995</th>
<th>2000</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td>3.2</td>
<td>4.6</td>
<td>5.7</td>
<td>5.6</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>3.3</td>
<td>5.1</td>
<td>5.2</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Note: Age-standardised prevalence.
Sources: 1995 WA Health Survey; WA Collaborative Health and Wellbeing Survey; WA Health and Wellbeing Surveillance System.

- Only about half the people found to have diabetes in Australia were aware that they had the condition, implying that the real prevalence of diabetes is double that of the self-reported prevalence (Dunstan et al. 2001).
- The self-reported prevalence of diabetes has increased since 1995 among males from 3.2% to 5.6% in 2004 and among females from 3.3% to 5.2%.
- The self-reported prevalence of diabetes among males was lower than that reported by females from 1995 to 2000. In 2003 and 2004 the male self-reported prevalence was higher than females.
Figure 107: Mortality rate, diabetes

- There was a general increase in the mortality rate for diabetes among males in WA between 1983 and 1996, followed by a slight decline for the next three years when rates increased once more. As of 2003, the trend has again reversed with rates currently at 19.3 deaths per 100,000 persons. This was slightly lower than the National rate at 20.5 deaths per 100,000 persons.

- The mortality rate for diabetes among WA females followed a similar pattern to the rate recorded by WA males, increasing slightly from 1983 to 1997; however, since 1998 female rates have continued to fall reaching 13.7 deaths per 100,000 persons by 2003. This was slightly higher than the figure recorded by Australian females (12.7 deaths per 100,000 persons).

- Between 1991 and 2003, the mortality rate for diabetes among Australian males was generally similar to that of WA males; however, the rate for Australian females was generally lower than the WA female rate.

- Male mortality rates for diabetes were higher than female rates in both WA and Australia.
Injury and poisoning

Injury and poisoning constitute physical harm to the body due to contact with environmental hazards or people. This harm may be intentional or unintentional. If intentional, it may be self-inflicted or inflicted by someone else. The harm sustained may be superficial (e.g. bruises and scratches) or more severe (e.g. extensive brain damage or amputation).

Injury and poisoning are major contributors to premature mortality, morbidity and permanent disability in WA. As the health care and rehabilitation required for their treatment is a burden on the health system, and a number of preventative measures can help reduce the frequency and severity of the outcome of injury and poisoning, it has been recognised as one of Australia’s National Health Priority Areas (NHPA) (CDHFS & AIHW, 1998; Pointer et al. 2003).

Major causes

The causes of injury and poisoning are numerous. In addition to the more obvious types of bodily harm, such as fractures, open wounds, sprains and strains, dislocations, and nerve and tissue damage, injury and poisoning also includes harm associated with drowning or asphyxia, burns and scalds, damage from excessive exposure to heat or cold, effects of electrocution, venomous bites, and toxic effects of drugs and poisonous substances.

In WA, leading causes of injury and poisoning include intentional harm (e.g. violence-related and self-inflicted), transport injuries (especially road trauma), falls, accidental poisoning, drowning, and burns, scalds and other injuries related to fire and hot objects/substances (Gillam et al. 2003).

The significance of each cause is dependent upon a number of criteria. For example, in WA, self-inflicted injuries (e.g. suicide) and transport injuries accounted for the greatest proportion of deaths due to injury and poisoning between 1995 and 2000 (31% and 30%, respectively), whereas falls (32%) and transport injuries (16%) were the most common causes of injury-related hospitalisations in WA. Other leading causes mentioned are fewer in number, but have a great impact on young people, thus representing a heavy burden in terms of potential years of life lost and long-term disability.

Risk factors

Risk factors associated with injury and poisoning may be environmental (e.g. poor road and product designs, slippery floor surfaces, unrestricted access to dangerous areas or substances), behavioural (e.g. excess speed, poor supervision, use of illicit drugs), physiological (e.g. fatigue, poor eyesight, pre-existing medical condition) or of some other nature (e.g. fear of falling, lack of training, exposure to stressful life events) (Arena et al. 2002).

Some risk factors are related to specific injury causes, but alcohol can be a factor in a broad range of causes. Consequently, prevention of alcohol-related injuries has been identified as a priority in Australia’s national injury prevention plan for 2004 and beyond (Pointer et al. 2003). In WA, it has been estimated that 3,203 injury deaths were attributed to alcohol in the period 1983-2001, an average of 169 deaths per year. In 2001 alone, 4,093 hospitalisations and 22,507 bed days were associated with alcohol-related injuries in WA (Unwin et al. 2004). Additionally, in 2000, alcohol-related injuries accounted for about 1.9% of the total disease burden in WA (Somerford et al. 2004a).

Socio-demographic characteristics are also relevant in the identification of injury risks. Population groups at high risk of sustaining an injury include children (0-14 years), youth (15-24 years), the elderly (75+ years), Aboriginal people and residents of rural and remote areas. These population groups were also identified as priorities in the national injury prevention plan (Pointer et al. 2003).

Prevention

A major focus of injury prevention initiatives is the elimination of exposure to hazardous conditions and potential risks, or ‘primary prevention’.

Multiple primary prevention strategies have been employed in WA in relation to road transport injuries. For example, improvements in road designs to minimise potential hazards have addressed some of the environmental factors associated with road trauma (Bureau of Transport Economics, 2001). Legislation to lower permissible blood alcohol content while driving a vehicle, law enforcement related to speed cameras and random breath testing, and campaigns to raise awareness of dangerous driving behaviours are examples of preventive measures dealing with behavioural risk factors for road transport injuries (Arena et al. 2002). Licensing restrictions for people with medical conditions address some of the physiological risk factors associated with road trauma (Charlton et al. 2004).

Similar primary prevention strategies are employed over the broad spectrum of injury causes. An example of the strategies includes the implementation of alcohol accords in regional Australia that promote the responsible sale and consumption of alcoholic beverages (CDHFS & AIHW, 1998), modification of
product designs to improve their safety, provision of information about potential hazards for children around the home, and education of older people about the appropriate use of medicines (Arena et al. 2002).

Secondary prevention focuses on reducing the severity of injury when a potential hazard is encountered. Examples include airbags and other vehicle design features which reduce the impact of motor vehicle collisions (Morris et al. 2001), enforcement of the mandatory wearing of seat belts (Dinh-Zarr et al. 2001) and bicycle helmets (Hendrie et al. 1999), legislation for the compulsory installation of smoke detectors, and hip protectors designed to prevent serious hip fractures among elderly people in the event of a fall (Arena et al. 2002).

However, it is impossible to eliminate all injuries through primary and secondary prevention. Thus, tertiary prevention endeavours to minimise the adverse consequences of injury through medical care and rehabilitation. Early and accurate diagnosis, timely resuscitation, and prompt definitive care all contribute to favourable outcomes from serious injury (Dobson et al. 1994). Starting the rehabilitation process at the time of emergency care also encourages favourable outcomes, promoting a better quality of life in patients experiencing long-term disability (Kraus et al. 1997).

Intersectoral collaboration between the health sector and other agencies has proven to be an effective means of optimising injury prevention measures. Road safety initiatives involving several government and non-government agencies, have contributed to the 34% decrease in WA’s transport injury death rates between 1989 and 2000. Similar patterns are starting to emerge through inter-agency partnerships to address the prevention of injuries due to falls in the elderly (Gillam et al. 2003).

Treatment
Once an injury or poisoning event occurs, the focus changes from prevention of injury occurrence to minimisation of unfavourable outcomes. The First Report on National Health Priority Areas, 1996 (AIHW & CDHFS, 1997) identified ‘access of injured patients to optimal trauma care’ and ‘access of people with trauma injuries to comprehensive rehabilitation programs and appropriate long-term care and community support’ as priority indicators for injury prevention and control.

Some trauma care developments have taken place in WA, primarily through the collaborative efforts of the State Trauma Advisory Committee. Initiatives of this committee include a State strategic plan for trauma, early trauma and burns management training for clinical staff throughout the State, neurotrauma research, disaster planning, expansion of hospital-based trauma registries to inform future developments, and others (AIHW & CDHFS, 1997; Road Safety Council, 2004).

Unfortunately, WA’s small population size and large geographical area are major obstacles to access to adequate trauma services for the whole population. Economic constraints limit the ability to increase staff levels in rural hospitals, and impose restrictions on the development of a centre of excellence in trauma management in WA (AIHW & CDHFS, 1997). Recently proposed infrastructure changes within the health system and improvements in associated transport networks in WA aim to address these issues.

Epidemiology
As a NHPA, special attention has been paid to the epidemiology of injury and poisoning in recent years, in an attempt to monitor the effect of prevention initiatives on their heavy burden. Injury and poisoning not only impose a considerable load on the health system in terms of service utilisation and cost, they are also responsible for a substantial proportion of disability and potential years of life lost in the population.

Prevalence
In WA, it is estimated that about a quarter of the population sustain an injury requiring medical treatment every year. In 2003, this represented nearly 450,000 Western Australians. Males are significantly more likely to be injured than females. In WA in 2003, 27% of males were reported to have sustained an injury requiring treatment compared to 19% of females.

Based on the 2001 National Health Survey (ABS, 2002), more than 2.2 million Australians (12% of the population) sustain an injury that requires medical attention every month. The most common injuries include low falls, hitting or being hit by something, and bites/stings. Among those surveyed, a slightly higher proportion of males than females had had a recent injury (13% compared to 11%). The proportion decreased with age, from a peak of 19% in 5-14 year olds to 5% in people aged 65-74 years, but increased slightly to 7% in people aged 75 years and above.

Mortality
In WA, injury and poisoning accounted for an average of 504 male and 222 female deaths per year between 1983 and 2003. For both males and females, injury mortality rates were fairly low in childhood, increased
among teenagers and young adults, stabilised in later adulthood, and then rose sharply among the elderly. From 2001 to 2003, age-specific mortality rates for injury and poisoning among boys and girls aged 5-9 years were 5.8 and 6.2 deaths per 100,000 persons respectively. Among older Western Australians aged 85 years and over mortality rates were 428.5 deaths per 100,000 persons for males and 355.5 deaths per 100,000 persons among females.

The risk of injury death is estimated to be almost four times higher for Aboriginal Western Australians compared to non-Aboriginal people, and 1.5 times higher for people living in rural WA compared to Perth metropolitan residents (Gillam et al. 2003).

Nationally, an average of 7,620 people per year died from injury and poisoning over the period 1991 to 2003. Of these, 70% were male. Australian injury mortality rates vary with age and sex, following a similar pattern to WA. In Australia, injury accounts for about half of all deaths in males aged 1-39 years, and is the leading cause of death among males aged 20-29 years. Injury death rates are higher in rural/remote areas of Australia and among Aboriginal people (d e Looper & Bhatia, 2001).

Hospitalisation
The high rate of injury imposes a substantial load on the health system. There are about 41,000 hospital admissions due to injury and poisoning in WA each year. The rate of hospitalisation for injury rises steeply among elderly people, especially from the age of 75 years. Among those aged 85 years or over, the injury hospitalisation rate was 10,608 per 100,000 for the period 1995 to 2000, compared to 2,274 per 100,000 for the total population of WA (Gillam et al. 2003).

Over the past 15 years, males in both WA and Australia have consistently recorded higher separation rates for injuries and poisoning than females. In 2003/04, males recorded separation rates of 2,576 separations per 100,000 persons compared to females (1,841 separations per 100,000 persons).

In 2000, Aboriginal people had a much higher hospital separation rate for injury and poisoning than non-Aboriginal people (7,918 and 1,887 per 100,000 respectively), and rural residents had a higher rate than their metropolitan counterparts (3,282 and 1,927 per 100,000 respectively) (Gillam et al. 2003).

Nationally, there were 436,513 injury-related hospital separations in the financial year 2001/02, accounting for 7% of all separations (AIHW, 2004a). Associated age-standardised rates for males were 1.5 times higher than for females (2,642 and 1,819 per 100,000 persons respectively) and increased exponentially for both genders from the age of 65 years.

Other morbidity
In WA during 2003, approximately 80,000 emergency department (ED) presentations in public metropolitan hospitals were due to injury or poisoning. This represented 30% of the ED load in these hospitals. Assuming a similar proportion of injury-related ED presentations occur in other WA hospitals with ED facilities, there may be a further 80,000-90,000 ED presentations in WA for injury and poisoning. This translates to approximately 8,500 presentations per 100,000 persons each year. Additionally, community health services in WA give more than 40,000 consultations every year for the treatment of minor injuries.

It is difficult to determine the number of GP consultations that take place each year due to injury and poisoning, but estimates suggest that nationally at least 5% of problems treated by GPs are injury-related (Britt et al. 2003). These include back complaints, sprains/strains, fractures, other musculoskeletal injuries, and injuries to the skin such as lacerations and cuts.

Disease burden and cost
In WA, it is estimated that more than 20,000 people have a disability related to injury, poisoning or other external causes (ABS, 1999a). In 2000, injury and poisoning contributed 12,199 years of life lost due to premature mortality among Western Australian males and 4,629 among females (Katzenellenbogen et al. 2003). Additionally, injury-related events in 2000 were responsible for 2,979 years of life lost due to disability among males and 1,696 among females in WA.

In WA in 2000, injury and poisoning accounted for 21,503 (10%) of the disability-adjusted life years lost due to health conditions, and were the fifth leading cause of years of life lost (i.e. disability-adjusted life years). Suicide/self-inflicted injuries and road traffic accidents were the main injury causes contributing to this burden (Somerford et al. 2004b).

Nationally, over 245,000 people have a disability related to injury, poisoning or other external causes, of which three-quarters are the direct result of an accident or injury (ABS, 1999b). It is estimated that injury and poisoning events in a given year are responsible for 152,283 years of life lost due to premature mortality and an additional 57,627 years of disability.
life lost due to disability. Consequently, injury and poisoning account for more than 8% of the Australian burden of disease and were the fifth leading cause of years of life lost (Mathers et al. 1999).

In terms of health system costs, injury and poisoning are the fourth leading cause of annual health expenditure in Australia, after cardiovascular diseases (11%), nervous system disorders (10%) and musculoskeletal disorders (10%). In 2000/01 they accounted for $4.1 billion, or 8.3% of the total annual health system expenditure. Accidental falls (37%), adverse effects of medical treatment (12%) and road traffic accidents (10%) accounted for the greatest proportions of the total injury health costs (AIHW, 2004b).

References


Mortality rates due to injury and poisoning were around 2.5 times higher for males than females in WA and Australia in 2003.

WA mortality rates for injury and poisoning were similar to Australian rates for both males and females between 1991 and 2003.

In 2003, the male mortality rate for injury and poisoning was 54.4 deaths per 100,000 persons in WA and 53.8 deaths per 100,000 persons in Australia, while the female rates were 25.8 and 22.0 deaths per 100,000 persons respectively.

Despite minor fluctuations in mortality rates between 1983 and 2003, both WA and Australian males recorded significant falls in mortality over time. In WA between 1983 and 2003, male rates declined by 0.6% per year, from 68.6 to 54.4 deaths per 100,000 persons. Over the period 1991 to 2003, the Australian male rate decreased by 1.0% per year, from 64.3 to 53.8 deaths per 100,000 persons.

There was no significant change recorded in the WA female mortality rate for injury and poisoning between 1983 and 2003; however, the rate among Australian females fell by 0.5% per year between 1991 and 2002, from 25.7 to 20.0 deaths per 100,000 persons.
Figure 109: Hospital separation rate, injury and poisoning

- Injury and poisoning hospital separation rates were about 40% higher for males than females in both WA and Australia.

- Injury separation rates in WA were higher than Australian rates throughout the 1990s. However, in 2001/02, both the WA male rate (2,579 separations per 100,000 persons) and WA female rate (1,812 separations per 100,000 persons) were lower than the corresponding Australian rates (2,646 and 1,819 separations per 100,000 persons respectively).

- Male and female separation rates for injury and poisoning in WA increased steadily from 2,430 and 1,715 separations per 100,000 persons in 1990/91, to 2,784 and 2,020 separations per 100,000 persons respectively in 1998/99. The separation rate then declined to 2,576 and 1,841 separations per 100,000 persons in 2003/04. Over the period 1988/89 to 2003/04, there was a significant average annual increase of 0.1% recorded for males and 0.5% for females.

- Australian rates for males and females increased gradually from 2,478 and 1,688 separations per 100,000 persons respectively in 1993/94, to 2,626 and 1,816 separations per 100,000 persons in 2002/03. This represented an average annual increase of 0.5% for males and 0.7% for females.
### Figure 110: Hospital separations, WA compared to Australia, injury and poisoning, 1999/00

<table>
<thead>
<tr>
<th>Injury Cause/Population Subgroup</th>
<th>Observed</th>
<th>Expected</th>
<th>Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>All injury and poisoning (Males)</td>
<td>24,086</td>
<td>23,520</td>
<td>1.02</td>
<td>(1.01 - 1.04)</td>
</tr>
<tr>
<td>All injury and poisoning (Females)</td>
<td>17,549</td>
<td>16,394</td>
<td>1.07</td>
<td>(1.05 - 1.09)</td>
</tr>
<tr>
<td>Transport-related injuries (Persons)</td>
<td>4,899</td>
<td>5,088</td>
<td>0.96</td>
<td>(0.94 - 0.99)</td>
</tr>
<tr>
<td>Near-drowning (Children 0-4 yrs)</td>
<td>58</td>
<td>30</td>
<td>1.93</td>
<td>(1.47 - 2.50)</td>
</tr>
<tr>
<td>Accidental falls (Children 0-4 yrs)</td>
<td>887</td>
<td>751</td>
<td>1.18</td>
<td>(1.10 - 1.26)</td>
</tr>
<tr>
<td>Accidental falls (Children 5-9 yrs)</td>
<td>945</td>
<td>1,043</td>
<td>0.91</td>
<td>(0.85 - 0.97)</td>
</tr>
<tr>
<td>Accidental falls (Males 65+ yrs)</td>
<td>1,220</td>
<td>1,271</td>
<td>0.96</td>
<td>(0.91 - 1.02)</td>
</tr>
<tr>
<td>Accidental falls (Females 65+ yrs)</td>
<td>3,244</td>
<td>3,387</td>
<td>0.96</td>
<td>(0.93 - 0.99)</td>
</tr>
<tr>
<td>Accidental poisoning (Children 0-4 yrs)</td>
<td>362</td>
<td>318</td>
<td>1.14</td>
<td>(1.02 - 1.26)</td>
</tr>
<tr>
<td>Fire/burns/scalds (Males 0-4 yrs)</td>
<td>136</td>
<td>101</td>
<td>1.35</td>
<td>(1.13 - 1.59)</td>
</tr>
<tr>
<td>Fire/burns/scalds (Females 0-4 yrs)</td>
<td>81</td>
<td>66</td>
<td>1.23</td>
<td>(0.97 - 1.53)</td>
</tr>
</tbody>
</table>

Note: Indirect standardisation based on Australian rates for 1999/00 and Western Australian population for 1999.
Sources: WA Hospital Morbidity Data System; Helps, Cripps & Harrison (2002).

- In 1999/00, injury and poisoning hospitalisation rates for males and females in WA were slightly higher than Australian rates. Compared to Australian males, WA males reported 566 excess separations (2% higher than Australia), while WA females reported an excess of 1,155 injury separations (7% higher).
- Hospital separation rates were higher among children aged 0-4 years in WA than among Australian children of the same age for the following injuries: near-drowning (93%), accidental falls (18%), accidental poisoning (14%), and fire/burns/ scalds (males 35%; females 23%). Although the near-drowning rate ratio was high, the number of near-drowning separations was relatively low.
Figure 111: Mortality rate, transport-related injuries

- Mortality rates for transport-related injuries were around three times higher for males aged 15-24 years than for the total population, in both WA and Australia.

- For the past decade, mortality rates for transport-related injuries among WA males aged 15-24 years have been around 20% higher than corresponding Australian rates, while mortality rates for the total population were similar to those recorded by their Australian counterparts.

- Between 1983 and 2003, mortality rates for transport-related injuries among WA males aged 15-24 years decreased significantly by an average of 2.6% per year, from 53.6 to 29.6 deaths per 100,000 persons. Australian rates for 15-24 year old males also declined significantly, from 37.4 deaths per 100,000 persons in 1991 to 25.0 deaths per 100,000 persons in 2003 (3.0% per year).

- Mortality rates for transport-related injuries among the total population also decreased significantly, by 2.5% per year in WA between 1983 and 2003 and by 3.2% per year between 1991 and 2003 across Australia.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>13.6</td>
<td>13.2</td>
<td>12.6</td>
<td>12.4</td>
<td>12.3</td>
<td>11.7</td>
<td>11.1</td>
<td>10.6</td>
<td>10.6</td>
<td>10.5</td>
<td>10.2</td>
<td>9.4</td>
<td>9.0</td>
</tr>
<tr>
<td>Australia - males 15–24</td>
<td>37.4</td>
<td>37.2</td>
<td>34.9</td>
<td>34.9</td>
<td>34.3</td>
<td>33.5</td>
<td>31.9</td>
<td>30.4</td>
<td>29.9</td>
<td>30.2</td>
<td>28.9</td>
<td>27.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Western Australia</td>
<td>12.8</td>
<td>13.1</td>
<td>13.2</td>
<td>12.9</td>
<td>13.2</td>
<td>13.0</td>
<td>13.4</td>
<td>12.6</td>
<td>12.5</td>
<td>11.7</td>
<td>10.6</td>
<td>10.1</td>
<td>9.9</td>
</tr>
<tr>
<td>WA - males 15–24</td>
<td>43.2</td>
<td>44.2</td>
<td>42.6</td>
<td>39.3</td>
<td>39.4</td>
<td>39.6</td>
<td>40.2</td>
<td>38.7</td>
<td>38.4</td>
<td>40.3</td>
<td>35.4</td>
<td>33.2</td>
<td>29.6</td>
</tr>
</tbody>
</table>

Note: ICD-9: E800–E848; ICD-10: V01–V99; rates based on rolling averages.
Source: ABS Mortality Data.
Figure 112: Hospital separation rate, transport-related injuries

- In WA, male hospital separation rates for transport-related injuries have fluctuated since 1988/89, reaching a low of 337 separations per 100,000 persons in 1990/91 before peaking at 389 separations per 100,000 persons in 1998/99. The rate has since declined reaching a rate of 373 separations per 100,000 persons in 2003/04.

- In WA, the female hospital separation rate for transport-related injuries has fallen since 1988/89, from 200 separations per 100,000 persons, to 153 separations per 100,000 persons in 2003/04. A slight increase was recorded in 1993/94, when the rate rose to 208 separations per 100,000 persons.

- Male separation rates for transport-related injuries in WA were almost double the rate recorded by females throughout the period 1988/89-2003/04.

- In 1999/00, Australian hospital separation rates for transport-related injuries were higher than those recorded in WA.
The mortality rate for drowning in WA was similar to the Australian rate between 1991 and 2003. Between 1983 and 2003 in WA, mortality rates decreased by 1.3% per year, from 1.8 to 1.3 deaths per 100,000 persons. Between 1991 and 2003, the Australian rate fell by an average of 3.0% per year, from 1.6 to 1.0 deaths per 100,000 persons.

The drowning rate among Western Australians aged 0-4 years was around 3-4 times higher than the rate recorded by the total population. Nationally, the rate among children aged 0-4 years was around 3 times higher than the rate recorded by the total population.

The mortality rate among children age 0-4 years was consistently lower in Australia than the rate recorded by their WA counterparts between 1991 and 2003.

Due to the relatively low number of drowning deaths reported among children aged 0-4 years each year in WA, mortality rates tend to fluctuate. As a result no significant trends were recorded between 1991 and 2003. However, mortality rates for drowning among children aged 0-4 years in Australia fell by an average of 3.0% per year between 1991 and 2003, from 5.1 to 3.0 deaths per 100,000 persons.
Health Measures 2005 A report on the health of the people of Western Australia

Figure 114: Hospital separation rate, near-drowning, children aged 0-4 years

- Hospital separation rates for near-drowning among WA males aged 0-4 years were higher than the rates recorded by their female counterparts between 1988/89 and 2003/04.
- The separation rate for near-drowning among 0-4 year old males in WA ranged between 42 and 26 separations per 100,000 persons over the period 1988/89-2003/04, with the rate peaking at 42 separations per 100,000 persons in 1995/96.
- Among WA females aged 0-4 years, the separation rate for near-drowning ranged between 31 and 15 separations per 100,000 persons between 1988/89 and 2003/04. In 2000/01 the separation rate peaked at 31 per separations per 100,000 persons. This was slightly lower than the corresponding male rate.
- Nationally in 1999/00, the hospital separation rate for near-drowning among 0-4 year olds (23.8 separations per 100,000 persons) was around 27% lower than the rate recorded among 0-4 year olds in WA (32.6 separations per 100,000 persons). However, the Australian rate recorded in 1999/00, was similar to the rates recorded in WA in 1997/98 and 2001/02.
• In WA, mortality rates for injuries related to interpersonal violence fluctuated over time due to the relatively low number of deaths. Consequently, no significant change in mortality rates was recorded between 1983 and 2003.

• Over the past two decades, mortality rates among males resulting from interpersonal violence were generally higher than corresponding female rates except for the period 1990-1992.

• Throughout the 1990s, Australian mortality rates for interpersonal violence remained relatively stable at around 2.3 deaths per 100,000 persons. However, the rate fell slight from 1998 onwards with the rate reaching 1.8 deaths per 100,000 persons in 2003.

• Over the period 1991 to 2003, mortality rates for interpersonal violence in Australia declined significantly, by 1.6% per year for males and 4.0% per year for females. The mortality rate among Australian males was around twice the female rate throughout this period. Male mortality rates for injuries related to interpersonal violence were lower in WA than Australia for the majority of the last decade, whereas female rates were slightly higher in WA than Australia in the early 1990s, but have been similar since.
Figure 116: Hospital separation rate, accidental falls, children aged 0-4 and 5-9 years

- In WA between 1988/89 and 2003/04, hospital separation rates for accidental falls among 0-4 year olds increased significantly by around 3.0% per year, from 410 separations per 100,000 persons to 617 per 100,000 persons. There was no significant change in separation rates for accidental falls recorded among Western Australians aged 5-9 years throughout this period.

- Hospital separation rates among Australian children aged 0-4 years increased significantly by an average of 2.0% per year, from 535 separations per 100,000 persons in 1988/89, to 587 separations per 100,000 persons in 2003/04. Among 5-9 year old Australians, separation rates increased significantly (0.5% per year) from 749 separations per 100,000 persons in 1993/94, to 776 separations per 100,000 persons in 1999/00.

- In WA, hospital separation rates for accidental falls among children aged 5-9 years remained higher than the corresponding rates for 0-4 year olds from 1988/89 onwards, except for 2001/02 & 2002/03. Nationally, the separation rates for accidental falls among children aged 5-9 years were around 40% higher than those for 0-4 year olds between 1993/94 and 1999/00.
In WA, male and female mortality rates for accidental falls among people aged 65 years and over fluctuated over the period 1983 to 2002; however, an overall increase of 1.7% per year for males and 1.2% per year for females was recorded.

In Australia between 1991 and 2002, male and female mortality rates for accidental falls among people aged 65 years and over also fluctuated. Overall, there was no significant change for males; however, the female rate increased significantly by 1.2% per year.

Since 1989, male mortality rates for accidental falls were generally higher than female rates in WA. Similarly, in Australia between 1991 and 2002, male mortality rates for accidental falls were 15 to 20% higher than female rates.

From 1991 to 1994, WA male and female rates were lower than corresponding Australian rates. Since then however, male rates in WA fluctuated and were slightly higher or lower than the Australian male rate, while the WA female rate remained higher than the respective Australian female rate.
In WA, hospital separation rates for accidental falls among people aged 65 years and over increased significantly between 1988/89 and 2003/04. Among males, separation rates rose by an average of 2.2% per year, from 1,005 to 1,631 separations per 100,000 persons, while among WA females the separation rate increased by an average of 1.0% per year, from 2,562 to 3,113 separations per 100,000 persons.

Separation rates for accidental falls among WA females aged 65 years and over were around twice those recorded by WA males during most of the period 1988/99-2003/04.

In Australia, hospital separation rates for accidental falls among females aged 65 years and over were 1.7 times higher than male separation rates in 1999/00 (2,938 and 1,703 separations per 100,000 persons respectively).

In 1999/00, male and female hospital separation rates for accidental falls among Western Australians aged 65 years and over were lower than corresponding Australian rates.
In WA, hospital separation rates for accidental poisoning among boys aged 0-4 years fluctuated between 1988/89 and the mid-1990s, peaking at 394 separations per 100,000 persons in 1996/97. Since then however, the rate has decreased reaching 247 separations per 100,000 persons in 2003/04. Overall, no significant trend was recorded over time.

The trend was similar for WA girls, with rates peaking in the same year as males, 1996/97, at 316 separations per 100,000 persons and decreasing to 205 separations per 100,000 persons by 2003/04.

Hospital separation rates for accidental poisoning for WA children aged 0-4 years were higher among boys than girls throughout the period 1988/89-2003/04.

In 1999/00, the separation rate for accidental poisoning among Australian children aged 0-4 years was 248 separations per 100,000 persons. This was more than 20% lower than the Western Australian rate (315 separations per 100,000 persons).
Figure 120: Hospital separation rate, fire, burns and scalds, children aged 0-4 years

<table>
<thead>
<tr>
<th></th>
<th>90/91</th>
<th>91/92</th>
<th>92/93</th>
<th>93/94</th>
<th>94/95</th>
<th>95/96</th>
<th>96/97</th>
<th>97/98</th>
<th>98/99</th>
<th>99/00</th>
<th>00/01</th>
<th>01/02</th>
<th>02/03</th>
<th>03/04</th>
</tr>
</thead>
<tbody>
<tr>
<td>WA - males</td>
<td>195</td>
<td>202</td>
<td>199</td>
<td>198</td>
<td>202</td>
<td>220</td>
<td>214</td>
<td>203</td>
<td>193</td>
<td>190</td>
<td>179</td>
<td>159</td>
<td>148</td>
<td>141</td>
</tr>
<tr>
<td>WA - females</td>
<td>162</td>
<td>153</td>
<td>150</td>
<td>148</td>
<td>154</td>
<td>156</td>
<td>161</td>
<td>170</td>
<td>157</td>
<td>149</td>
<td>131</td>
<td>125</td>
<td>119</td>
<td>115</td>
</tr>
</tbody>
</table>

Note: ICD-9: Chapter 17 and first external cause E890–E899, E924.0,.2,.8,.9; ICD-10: Chapter XIX and first external cause X00–X19; rates based on rolling averages.
Sources: Help, Cripps & Harrison (2002); WA Hospital Morbidity Data System.

- In WA, hospital separation rates for fire, burns and scalds among children aged 0-4 years fluctuated over the period 1988/89 to 2003/04. The male rate peaked at 220 separations per 100,000 persons in 1995/96 before declining to 141 separations per 100,000 persons in 2003/04. By comparison, female rates peaked at 170 separations per 100,000 persons in 1997/98, and fell to 115 separations per 100,000 persons in 2003/04. Despite these recent decreases, there were no statistically significant changes recorded between 1988/89 and 2003/04.
- WA male separation rates for fire, burns and scalds were higher than female rates throughout the past decade.
- In Australia in 1999/00, male hospital separation rates for fire, burns and scalds among children aged 0-4 years were 1.4 times higher than female rates (153 and 107 separations per 100,000 persons, respectively). These rates were lower than corresponding WA rates.
Figure 121: Mortality rate, fire, burns and scalds, persons aged 55 years and over

- In WA between 1983 and 2003, mortality rates for injuries due to fire, burns and scalds among people aged 55 years and over fluctuated due to the relatively low number of deaths recorded each year. WA male rates were higher than female rates throughout most of the past decade.

- Nationally between 1991 and 2003, male mortality rates for injuries due to fire, burns and scalds among people aged 55 years and over were higher than the rate recorded by their female counterparts. Mortality rates decreased significantly among both Australian males (6%) and females (7%) throughout this period.

- WA rates for males and females were similar to those recorded nationally between 1991 and 2003. In 2003, WA male and female mortality rates were 3.5 and 0.6 deaths per 100,000 persons compared to 1.7 and 0.8 deaths per 100,000 persons nationally.
Dental health

Oral health refers to the health of tissues in the mouth, including mucous membranes, connective tissue, muscles, bone, teeth and gums. It may also refer to immunological, physiological, sensory and digestive system functioning, but is most often used to refer to the teeth and gums (Al-Yaman et al. 2002).

Oral health outcomes are usually measured in terms of dental decay experience, which is measured in terms of the number of decayed, missing or filled teeth for both baby or deciduous teeth (the dmft score) and adult or permanent teeth (the DMFT score). A measure of good oral health is the proportion of individuals with no tooth decay.

Decayed teeth are the cause of considerable illness and pain, and the loss of permanent teeth has consequences that remain for life such as difficulties chewing, speech impediment, facial disfigurement and pain.

Preventive strategies

Differences in susceptibility to dental caries observed in populations appear to be related to environmental and social factors and are partly explained by variations in the amount of sugar ingested. Trace elements in food and water also contribute to the variation in caries prevalence (Greene, 1997).

Early preventive strategies include water fluoridation, improved oral hygiene practices, and better diet. When combined with professional dental care these strategies are effective in maintaining the health of teeth and gums and preventing and controlling caries.

Water fluoridation began in Australian capital cities in 1964. Today Australia is one of the most extensively fluoridated countries in the world, with two-thirds of the population receiving fluoridated wateriv (Kent, 1997). In comparison, the UK fluoridates only 10% of its water supplies.

In the USA, 60% of the population receive fluoridated water and in some areas dental caries has diminished to a point where the need for continuing water fluoridation is being questioned. However, dental caries has been shown to be directly related to low socioeconomic status and water fluoridation has been found to be the most effective and practical method of reducing these socioeconomic disparities in the burden of dental caries (Burt, 2002).

A direct relationship between community-based oral hygiene programs and reduced incidence of caries has been difficult to demonstrate. However, lifelong daily brushing with a fluoride toothpaste and flossing, beginning in infancy, is recommended for primary prevention of caries (Greene, 1997).

The timing and frequencies of meals and snacks containing sugar is important in caries development as the length of time sugar and fermentable carbohydrates remain in the oral cavity is a major determinant of caries. However, caries development may be reduced by a diet of fibrous foods with adequate levels of calcium, phosphorus, fluoride, vitamin D and protein (Greene, 1997).

Dental health services in WA

Good oral health throughout infancy and early childhood contributes to better dental health in adulthood, resulting in less decay and reduced loss of natural teeth. Following the introduction of the School Dental Scheme in 1977, there have been great improvements in the oral health of Australian children (Al-Yaman et al. 2002).

In WA, the School Dental Service provides free preventive dental care for all school children aged 5-16 years and 17 year olds in remote areas (Department of Health WA, 2003). Other services and programs provided by the Dental Health Services in WA are:

- subsidised general dental care programs via public dental clinics and private practitioners;
- general dental services to geographically isolated communities including Aboriginal communities;
- specialised subsidised dental care through participating private practitioners;
- provision of oral health services to residents of aged care facilities;
- oral health education.

Edentulism

The prevalence of edentulism (total tooth loss) is a measure of oral hygiene and the management of caries, and increases with age.

Most of the adult population of WA did not receive the benefit of the dental public health and preventive dentistry practised on today’s children. Also, historically, high percentages of older adults were edentulous (had lost their natural teeth). However, complete tooth loss has declined radically over recent decades. Among Australian adults aged 65 years and over, the edentulous percentage has decreased from 66% in 1979 (AIHW, 2002) to 34% in 2002 (AIHW, 2004).

ivAt the time of writing, Brisbane was the only Australian capital city without fluoridated water.
In addition to dental caries, gum disease is a major cause of tooth loss in adults. Periodontitis is a chronic inflammatory disease of the gums and the bone and ligaments that support the teeth. It is usually preceded by gingivitis, an inflammation of the gums that can cause them to swell and bleed. Without treatment, gingivitis often progresses insidiously to periodontitis, which can result in the loss of tissue and bone. About 10% of Australians have no gum problems, 80% have a small or moderate amount of disease, and 10% have advanced or more severe disease (Brighton Dental Group, 2003).

The prevalence of periodontitis increases with age from adolescence and is often not noticed as it progresses to a stage that threatens the retention of all teeth. The major risk factor for periodontitis is poor oral hygiene, as it is rarely seen in the absence of plaque. The association with age may reflect the length of time the periodontium has been exposed to bacterial plaque (Greene, 1997).

Two other risk factors, which markedly affect the initiation and progression of periodontitis, are diabetes mellitus and smoking (Genco, 1996). Smokers have a 2.5 to 6 times higher risk of periodontal disease compared to non-smokers (Brighton Dental Group, 2003) and about half of periodontitis cases have been attributed to either current or former smoking (Johnson & Slach, 2001). Background determinants associated with periodontal disease include gender (males have more disease), age (more disease is seen in the elderly) and hereditary factors (Genco, 1996).

Periodontitis has been found to be a significant risk factor for strokes, in particular ischaemic stroke (Wu et al. 2000), and coronary artery disease (Abou-Raya et al. 2002).

Although improvement in adult dental health may be achieved over time through improvements in the dental health of children, at present maintenance and repair of damaged teeth remains the leading preventive measure to increase adult tooth retention (Spencer et al. 1994). However, restorative dental care and maintenance is costly and may be inaccessible to some in the community.

Dental attendance
In 1999, over two-thirds of Australian children aged 6-12 years had visited dental services in the last year, whereas just over half of dentate Australian adults (i.e. persons with at least one natural tooth) made a dental visit in the previous year. This is not surprising as children have access to school dental services, whereas access to publicly-funded dental care for adults is limited to financially and geographically disadvantaged people (AIHW, 2002).

In the majority of cases the last visit to a dentist for adults was in response to a problem or for relief of pain. The most obvious difference between low and higher income groups was the dominance of visits for relief of pain and problems among those with the lowest annual household income (AIHW, 2002).

The level of access to dental health services in terms of availability and affordability is an important determinant of dental health (Al-Yaman et al. 2002). Data from the National Dental Telephone Interview Surveys (NDTIS) found that a third of ‘deprived’ respondents had delayed making a dental visit because of the cost, compared to only 14% of ‘privileged’ respondents. In addition, there was a wide gulf between the two groups’ reported ability to pay a $100 dental bill, with 37% of the ‘deprived’ group saying they would have a lot of difficulty, compared to only 3.6% of the ‘privileged’ group (AIHW Dental Statistics and Research Unit, 2001).

In 1998/99, 64% of dental health expenditure was funded by individuals, 20% by health insurance funds, and 16% by public funds. There were substantial differences between insured and uninsured people with respect to access to dental care (AIHW Dental Statistics and Research Unit, 2002). Publicly-funded dental care in Australia has been shown to provide more emergency treatment than private practice. Extractions are also more common for patients under publicly-funded dental care than patients being treated in private practice (Brennan et al. 1997).

Oral health care in rural communities shares many of the problems faced by general medicine in providing services to large geographical areas with dispersed populations. In WA, the vast majority of dentists work in metropolitan Perth or the major urban centres, with many regions being without a dentist (Steele et al. 1997). The hospitalisation rate for oral health conditions among children in the Kimberley, Pilbara,
Northern Goldfields, and Wanneroo regions has been found to be significantly lower than the State total. This reflects the lack of oral health care available to residents of these regions, particularly in the north west of WA, rather than a diminished burden of disease (Tennant et al. 2000).

References
AIHW Dental Statistics and Research Unit (2002). Dental insurance and access to dental care. AIHW Catalogue No. DEN 105. Canberra: AIHW.
In 2002, the percentage of people with edentulism was lower in WA than Australia for all age groups except 18-24. There was some edentulism experienced by those aged 18-24 years but the estimates were too small to draw comparisons.
The prevalence of edentulism among people aged 65 years and over decreased by 37% in WA, from 54% in 1987-88 to 34% in 1999. Nationally, the prevalence of edentulism among people aged 65 years and over decreased by 33% from 50% to 33% in the same period. (These estimates were drawn from different survey methodologies but are broadly consistent.)

The prevalence of edentulism among people aged 65 years and over in WA was higher than the Australian prevalence in 1987-88 and 1994, slightly lower in 1995 and 1996, and similar in 1999.
Figure 124: Mean number of missing teeth, persons aged 18 years and over

<table>
<thead>
<tr>
<th></th>
<th>18-24 years</th>
<th>25-44 years</th>
<th>45-64 years</th>
<th>65+ years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - 1999</td>
<td>1.9</td>
<td>3.4</td>
<td>7.0</td>
<td>11.6</td>
</tr>
<tr>
<td>WA - 1999</td>
<td>3.0*</td>
<td>3.2</td>
<td>7.5</td>
<td>14.1</td>
</tr>
<tr>
<td>Australia - 2002</td>
<td>2.0</td>
<td>3.0</td>
<td>6.7</td>
<td>12.4</td>
</tr>
<tr>
<td>WA - 2002</td>
<td>2.5</td>
<td>2.6</td>
<td>5.8</td>
<td>12.2</td>
</tr>
</tbody>
</table>

* Estimate has a relative standard error greater than 25%.

• In 1999 and 2002, the mean number of missing teeth for dentate persons aged 18 years and over increased with age in both WA and Australia.

• The mean number of missing teeth in WA among those aged 45 years and over was slightly higher than Australia in 1999 but slightly lower in 2002.

• The mean number of missing teeth in WA among those aged 18-24 years was slightly higher than Australia in both 1999 and 2002.

• The mean number of missing teeth in WA among those aged 25-44 years was slightly lower than Australia in both 1999 and 2002.
Figure 125: Time since last dental visit, persons aged 18 years and over

- Just over half of dentate persons aged 18 years and over attended a dentist within the previous 12 months. In 1999, the percentage was higher for WA (59.6%) than Australia (56.3%), but in 2002 it was lower (WA 55.6%; Australia 57.6%), as the proportions decreased for WA and increased for Australia.

- Around 10% of dentate persons aged 18 years and over last visited a dentist five or more years prior to the survey in both 1999 and 2002.

Figure 126: Frequency of dental visits, persons aged 18 years and over

- Just over half of dentate persons aged 18 years or more visited the dentist once a year or less than once every two years. Around 25% visited the dentist two or more times a year and less than 20% visited the dentist once every two years.
Mental health

Mental health conditions can range from short-term conditions such as anxiety and depression to conditions that may be longer term, such as chronic depression and schizophrenia (AIHW, 2004). According to the most recent national survey on mental health conducted in 1997, around one in five Australian adults will experience a mental illness at some point in their life (AIHW, 2004), while the World Bank and WHO estimated that among developed countries such as Australia, mental disorders account for as much as 22% of disability-adjusted life years lost (Murray & Lopez, 1996). This figure is even higher among those aged 15-24 years, with mental disorders accounting for around 55% of the total disease burden (Commonwealth Department of Health and Ageing, 2004). In recognition of the substantial economic, social and personal costs associated with mental illness, it was designated as one of seven National Health Priority Areas.

Cognitive disorders

Cognitive disorders are the result of dysfunctions in the anatomy or physiology of the brain, which can cause marked changes in intellectual functioning, judgment and memory. They may also lead to psychosis, which is a severe disruption in mental status and the most serious form of mental disorder. Psychosis includes delirium and dementia and involves a person temporarily losing contact with reality (Barry, 1998).

Substance-related disorders

Substance-related disorders refer to states that occur when a person's mental status is affected by alcohol, drugs, tobacco or caffeinated beverages. This term also includes changes to a person's mental status resulting from the side effects of medically prescribed drugs taken as medically indicated (Barry, 1998).

Mood disorders

Affective mental disorders include conditions that result in the change of an individual's mood or emotional state. These changes are generally for a prolonged period and may include depression, elation, or a combination of the two occurring alternately in cycles. These conditions are not caused by another physical or mental disorder and include mood episodes, depressive disorders and bipolar disorders (Barry, 1998).

Anxiety and somatoform disorders

Anxiety is one of the most common dysphoric emotions and results in an unpleasant feeling caused by psychological distress or conflict. It has been described as a 'vague, uneasy feeling, the source of which is often unspecific or unknown to the individual' (Barry, 1998).

Depression

Depression is becoming an increasingly serious problem both in Australia and the rest of the world, and it has been estimated that by 2020 depression will be the second largest cause of life lost due to disability and mortality (Commonwealth Department of Health and Ageing, 2001). Clinical depression describes a group of illnesses that are characterised by an excessive and long-term lowering of mood that together with a number of other symptoms may affect an individual's lifestyle and ability to manage their life (Commonwealth Department of Health and Ageing, 2001).

In Australia, depression is a leading cause of illness and disability, with an estimated 800,000 adults experiencing a depressive illness at any one time. The 1997 Mental Health and Wellbeing Survey indicated that around 2.4 million Australian adults had experienced some form of mental illness in the previous year, while 6% had experienced a depressive disorder. Around twice as many females as males reported depression, while only half of those who experienced depression sought assistance from medical services (Commonwealth Department of Health and Ageing, 2001).

Treatment

Mental disorders are usually the result of ineffective coping and many individuals are admitted to care to provide them with an environment that supports effective coping (Barry, 1998). Disorders such as depression require appropriate treatment, which can include medication, counselling and specific interventions such as cognitive behavioural therapy (Commonwealth Department of Health and Ageing, 2001).

Costs

Based on one-month prevalence figures for psychosis among persons aged 18-64 years of age of 4.7 per 1,000 persons, psychosis costs the Australian government at least $1.45 billion per year. In addition, social costs are estimated at around $2.25 billion per annum (Carr et al. 2002).

Of the Australian States and Territories, WA spent the most per capita on mental health in 1999/2000 - WA spent $179.3 million or $95.87 per capita (compared to $81.76 for the national average). This is an increase of $67 million spent on mental health services from...
1992/1993, equating to a per capita increase of 43% over this period (Commonwealth Department of Health and Ageing, 2002).

Epidemiology

Incidence

According to the 1997 National Mental Health and Wellbeing Survey, nearly one in five (18%) Australians reported having a mental disorder of some type in the previous 12 months (ABS, 1999a). The prevalence of mental disorders is more common in younger people, with many disorders beginning during this time. The incidence of most mental disorders peaks among those aged 18-24 years (27%) and decreases with age. For persons aged 65 years and over, only 6% had experienced a mental disorder (ABS, 1999b; Commonwealth Department of Health and Ageing, 2004).

Among Australian children aged 4-17 years, 14% had some form of mental health problem, and the proportion was higher among those living in low-income households, or from step/blended/sole-parent families (Sawyer et al. 2000).

Like Australia, around 19% of people in WA experienced a mental disorder in the past 12 months, with the prevalence being highest among those aged 18-24 years and decreasing with age. Six per cent of Western Australians aged 65 years and over reported some form of mental disorder (ABS, 1999a).

Overall, males and females in WA recorded similar prevalence rates for mental health conditions (19% and 20% respectively). However, the prevalence of anxiety disorders among females was almost twice that of males, while males recorded a much higher prevalence for substance use disorders than females (13% and 5% respectively) (ABS, 1999a).

The prevalence of high or very high psychological distress in WA was 9.2% in 2004, with women reporting the highest levels, particularly those aged between 35 and 39 years. The prevalence of low or no psychological distress was lower in WA than in SA, whilst the prevalence of very high psychological distress was similar to that in SA and the NT.

Aboriginal health

Aboriginal people reported a substantially higher burden of emotional distress and mental illness than that suffered by the wider community, including higher rates of self-harm, child abuse and neglect, substance misuse and incarceration (Commonwealth Department of Health and Ageing, 2004). Overall, Aboriginal people are more likely to be hospitalised as a result of mental and behavioural disorders than their non-Aboriginal counterparts, and in 1997/98, Aboriginal mortality rates resulting from these disorders were twice those of non-Aboriginal Australians.

Suicide

Persons suffering depression or other mental health problems may be at greater risk of suicide or self-harm. A study on the mental health of young people in Australia found that among adolescents who reported a very high level of emotional and behavioural problems, 42% had seriously considered suicide. This compares to only 2% of adolescents who reported a low level of problems (Sawyer et al. 2000).

Substance abuse is a major risk factor for suicide; however, due to its wider use, alcohol is likely to have a greater impact. Studies have also shown that unemployment is a risk factor for suicide (Australian Institute for Suicide Research and Prevention, 2003).

In 2001 there were 259 suicides in WA and 2,455 in Australia. This equated to an age-standardised rate of 13.6 suicides per 100,000 persons in WA and 12.6 in Australia. Nearly four out of five suicides in both WA and Australia were males.

In Australia in 1998, hanging was the most common means of suicide for both males and females. The second most common method of suicide was motor vehicle exhaust gassing for males and poisoning by solid or liquid substances for females. Suicide by firearms was the method used by around 10% of males and less than 5% of females (Steenkamp & Harrison, 2000).

Trends in suicide

In recent years, suicide rates in both WA and Australia have been relatively stable. However, between 1964 and 1997, rates for Australian males aged less than 35 years increased substantially. This included a threefold increase in suicide mortality among males aged 15-24 years and a 50% increase for males aged 25-34 years. Among females aged 15-24 years, suicide rates remained stable. However, in all other age groups, significant declines were recorded (Australian Institute for Suicide Research and Prevention, 2003).

References


Figure 127: Suicide rate

- Male suicide rates were around four times higher than female rates in both WA and Australia. In 2003, the male rates were 17.8 per 100,000 persons in WA and 17.5 nationally, while the female rates were 5.6 per 100,000 persons in WA and 4.7 nationally.

- Between 1991 and 2003, male and female suicide rates in WA were similar to their Australian counterparts.

- Suicide rates fluctuated slightly but there were no significant trends over time in either WA or Australia.
Figure 128: High or very high levels of psychological distress (Kessler 10 scale), WA, 2004

- Females were more likely to have experienced high or very high levels of psychological distress in the past four weeks than males, with those aged 35-39 years recording the highest prevalence rates. Males within this age group were also the most likely to report high or very high levels of psychological distress.

- From 35-39 years of age, the proportion of males and females experiencing psychological distress at high or very high levels decreased, with age before increasing again at around 70-74 years of age.
Figure 129: Psychological distress\((a)\)\((b)\), persons aged 18 years and over by State, 2000

- The prevalence of low or no psychological distress was lowest in WA, with the WA prevalence significantly lower than that for SA.
- In WA, the prevalence of very high psychological distress indicates that 2.5 % of the population require professional intervention. The level of very high psychological distress was similar to that of SA and the NT.

---

\(a\) See methods for further details.
\(b\) Age and sex standardised to the 1991 Australian population.

Source: Collaborative health and wellbeing survey 2000.
Service Utilisation

Expenditure

In the 2002/03 financial year, health expenditure in Australia averaged $3,652 per person, equating to around $71.6 billion. In WA, health expenditure in 2002/03 was estimated at $3,800 per person, equating to a total of $7.3 billion. The average health expenditure per person in WA increased by more than $1,500 (current prices) between 1996/97 and 2002/03, while the average annual growth rate in total health expenditure was estimated at 6.2% between 1996/97 and 2002/03. This was higher than the national average (3.6%) and higher than any other State or Territory (AIHW, 2004).

The greatest proportion of recurrent funding for health goods and services by State, Territory and Local governments in Australia is directed towards public hospitals (61%), followed by community health and other services (21%) and public health measures (4.2%). In 2000/01, WA State and Local government expenditure on hospitals per person was $404. This was second only to the ACT ($470) and the NT ($546) (AIHW, 2004).

Hospitalisations

Hospitalisation data provide information about the number and pattern of acute care hospital admissions and beddays, but exclude information about people who have accessed other health services, such as GPs, community health clinics, and those who have not accessed health care at all. Therefore, they are limited to information about the conditions for which people are admitted to hospital and do not provide an accurate measure of the health of the total community (Trewin & Madden, 2003).

The number and pattern of hospital admissions can also be affected by variation in admitting practises. Many patients are treated as non-admitted patients and this information is not routinely reported. Other factors, such as the availability of, and access to other medical services, may influence hospital utilisation. A rising rate of hospitalisation, for example, could mean that health status is deteriorating or that access to hospitals has improved, or both (Trewin & Madden, 2003). However, the range of conditions and the number of hospitalisations for specific conditions are important elements of the burden of disease within a community.

There are several different kinds of hospital in WA - public acute hospitals, public psychiatric hospitals, private free-standing day hospital facilities, and other private hospitals.

In the 2001/02 financial year, the cost of operating public acute-care hospitals in Australia was $16.7 billion (25% of the total health expenditure), making acute public hospital health care the most expensive area of health services funding. The expenditure on private hospitals was $5.1 billion or 7.7% of the total expenditure on health (AIHW, 2004).

Hospital separations

In 2001/02, there were 617,891 hospital separations in WA, a rate of 334 separations per 1,000 persons. This represented 9.7% of all hospital separations in Australia for this year (AIHW, 2003). Nationally in 2001/02, there were 6.39 million hospital separations at a rate of 328 per 1,000 persons. Females accounted for 53% of these separations and had a higher overall separation rate (348 per 1,000 persons) compared to males (307 per 1,000 persons). However, female separation rates were only higher in the 15-54 year age groups, due to reproductive health care (AIHW, 2003).

In WA, dialysis was the most common cause of hospital admission in 2002, accounting for 64,451 separations, or 13.5% of all male and 8.7% of all female separations. Other conditions or treatments with a significant number of separations included chemotherapy (32,768 separations) and arthropathies and related disorders (17,286 separations).

In 2002, Western Australians were admitted to hospital 590,762 times, accounting for around 925,794 beddays and costing approximately $1.3 billion.

Same-day separations

A same-day separation occurs when a patient is admitted, treated and discharged on the same calendar day. Improvements in medical technology, for example anaesthetics and microsurgery, have enabled a wider range of procedures to be performed on a same-day basis (Duckett, 2002).

Shorter hospital stays cost less and the demand for increasing productivity and efficiency within hospitals has driven an increase in same-day separations. Nationally in 1993/94, 37% of all separations were same-day; however, by 2001/02 this had increased to more than half (52%). Between 2000/01 and 2001/02 there were increases in the proportion of same-day separations of 5.6% in public hospitals and 9.3% in private hospitals (AIHW, 2003). The increasing
number of freestanding day hospital facilities in the private sector may also influence same-day separation numbers, and differential access to these facilities may explain the lower proportion of same-day separations in WA compared with Australia in the mid-1990s (Ridolfo et al. 2000). However, while females in WA continue to have fewer same-day separations than their Australian counterparts, from 1999/2000 males in WA and Australia had a similar proportion of same-day cases.

In WA in 2003/04, there were a total of 342,375 same-day separations, accounting for 53% of all separations. In 1988/89, only 20% of separations were same day. Nationally, 48% of separations in public acute hospitals were same-day cases compared with 56% in private hospitals (AIHW, 2003).

**Average length of stay**

In 2003/04, there were a total of 2.2 million hospital beddays recorded in WA, 1.4 million in public acute hospitals and 0.8 million in private hospitals. In 2001/02 in Australia, there were 23.2 million beddays, 15.1 million of which were in public acute hospitals and 7.0 million in private hospitals (AIHW, 2003).

Nationally, the overall average length of stay decreased between 1993/94 and 2001/02, from 4.6 days to 3.6 days. In 2001/02, private hospital stays averaged 2.9 days compared with 3.8 days for public acute hospitals. When same-day patients were removed, the average lengths of stay increased to 6.5 days overall, 6.4 days for public acute hospitals and 5.7 days for private hospitals (AIHW, 2003).

Although the increasing proportion of same-day separations is a major reason for the shortening of acute hospital stays in Australia, improved drug treatments and efforts to increase hospital productivity have also resulted in decreased lengths of stay (AIHW, 2002).

**Private health insurance**

At the time Medicare was introduced in 1984, just over half of all Australians had private health insurance. From then until the end of 1998, private health insurance coverage gradually decreased to 30% of the population. The downward trend was reversed when ‘lifetime health cover’ was introduced on 1 July 2000. This resulted in many people aged 30 years or over taking out private health insurance, with numbers peaking towards the end of September 2000 when 8.8 million (46%) of Australians were covered (AIHW, 2002).

The 2001 National Health Survey reported that the age group with the highest proportion of people with any private health insurance was those aged 45-54 years (65%). The main reason people cited for taking out private health insurance was ‘security/protection peace of mind’ (41%). The main reason for people not taking out private health insurance was ‘can’t afford it/too expensive’ (59%) (ABS, 2002).

**Private/public hospital trends**

In the past, private hospitals tended to provide less complex, non-emergency care, such as simple elective surgery. However, they are increasingly providing complex, high-technology services (ABS, 2003). Some procedures that are being increasingly undertaken in the private sector include the high volume procedures of chemotherapy and haemodialysis (AIHW, 2003).

Since 1997/98 there has been a 2% reduction per year in the number of available public hospital beds, and an increase of 2.9% per year in the number of private hospital beds. The biggest increase has been in the number of private freestanding day hospital facilities. In 1997/98 there were 175 such facilities in Australia, and by 2001/02 there were 246, an increase of 41% (AIHW, 2003).

Between 1993/94 and 2001/02, both public acute hospitals and private hospitals showed an increase in both the number and age-standardised rate of hospital separations, although the increase was more pronounced for private hospitals. Over the same period, the number and rate of beddays in public acute hospitals decreased while the number in private hospitals increased (AIHW, 2003).

In 1996/97, 68% of separations and 72% of beddays in acute care hospitals were in the public sector. By 2001/02, these percentages had fallen to 62% and 68% respectively, reflecting the trend towards private acute hospital care during this period.

**References**


### Table 7: Average health expenditure per person, current prices

<table>
<thead>
<tr>
<th>Year</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>NT</th>
<th>WA</th>
<th>Aust(b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996–97</td>
<td>2,511</td>
<td>2,469</td>
<td>2,447</td>
<td>2,402</td>
<td>2,758</td>
<td>2,473</td>
<td>2,603</td>
<td>2,225</td>
<td>2,459</td>
</tr>
<tr>
<td>1997–98</td>
<td>2,623</td>
<td>2,594</td>
<td>2,578</td>
<td>2,518</td>
<td>2,672</td>
<td>2,680</td>
<td>2,811</td>
<td>2,522</td>
<td>2,583</td>
</tr>
<tr>
<td>1998–99</td>
<td>2,777</td>
<td>2,765</td>
<td>2,763</td>
<td>2,626</td>
<td>2,800</td>
<td>2,934</td>
<td>3,036</td>
<td>2,912</td>
<td>2,748</td>
</tr>
<tr>
<td>1999–00</td>
<td>2,917</td>
<td>2,878</td>
<td>2,983</td>
<td>2,943</td>
<td>3,036</td>
<td>3,202</td>
<td>3,202</td>
<td>2,755</td>
<td>2,910</td>
</tr>
<tr>
<td>2002–03(a)</td>
<td>3,654</td>
<td>3,706</td>
<td>3,392</td>
<td>3,701</td>
<td>4,049</td>
<td>4,126</td>
<td>4,126</td>
<td>3,800</td>
<td>3,652</td>
</tr>
</tbody>
</table>

(a) Based on preliminary AIHW and ABS estimates.
(b) Based on annual mean resident population.
Source: AIHW 2004 (Health expenditure Australia).

- Between 1996/97 and 2002/03, the average health expenditure in WA increased 71% from $2,225 to $3,800 per person. A similar increase was seen across Australia with average health expenditure rising 49% from $2,459 to $3,652 per person.
- Of the States and Territories in 2002/03, only the Northern Territory ($4,126), and Tasmania ($4,049) recorded higher per person average health expenditures than Western Australia ($3,800).
Table 8: State and local government expenditure on hospitals per person

<table>
<thead>
<tr>
<th>Year</th>
<th>NSW</th>
<th>VIC</th>
<th>QLD</th>
<th>WA</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996–97</td>
<td>380</td>
<td>298</td>
<td>293</td>
<td>298</td>
<td>242</td>
<td>228</td>
<td>411</td>
<td>305</td>
</tr>
<tr>
<td>1997–98</td>
<td>420</td>
<td>309</td>
<td>301</td>
<td>368</td>
<td>283</td>
<td>182</td>
<td>452</td>
<td>305</td>
</tr>
<tr>
<td>1998–99</td>
<td>440</td>
<td>282</td>
<td>293</td>
<td>361</td>
<td>350</td>
<td>259</td>
<td>538</td>
<td>379</td>
</tr>
<tr>
<td>1999–00</td>
<td>389</td>
<td>316</td>
<td>311</td>
<td>394</td>
<td>369</td>
<td>369</td>
<td>460</td>
<td>542</td>
</tr>
<tr>
<td>2000–01</td>
<td>390</td>
<td>390</td>
<td>320</td>
<td>404</td>
<td>383</td>
<td>343</td>
<td>470</td>
<td>546</td>
</tr>
</tbody>
</table>

Note: Population figures based on calendar year.
Source: AIHW 2003 (Health expenditure Australia).

- Over the period 1996/97 to 2000/01, per capita health expenditure on hospitals in WA increased steadily by 36%, from $298 to $404 per person.
- Between 1996/97 and 2000/01, the NT recorded the highest increase (79%) in per capita health expenditure on hospitals.
- In 2000/01, the NT also had the highest expenditure per person on hospitals ($546). The ACT had the next highest expenditure ($470), followed by WA ($404).
### Table 9: Total health expenditure, constant prices(a) all sources of funding and annual growth rate

<table>
<thead>
<tr>
<th>Period</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>NT</th>
<th>WA</th>
<th>Aust(^{a})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996–97 to 1997–98</td>
<td>1.2</td>
<td>2.7</td>
<td>2.6</td>
<td>2.8</td>
<td>-4.5</td>
<td>4.6</td>
<td>8.2</td>
<td><strong>9.7</strong></td>
<td>2.7</td>
</tr>
<tr>
<td>1997–98 to 1998–99</td>
<td>3.6</td>
<td>4.0</td>
<td>5.8</td>
<td>2.7</td>
<td>1.2</td>
<td>5.0</td>
<td>1.0</td>
<td><strong>1.6</strong></td>
<td>3.8</td>
</tr>
<tr>
<td>1998–99 to 1999–00</td>
<td>2.3</td>
<td>1.6</td>
<td>5.8</td>
<td>10.0</td>
<td>2.8</td>
<td>3.7</td>
<td>7.5</td>
<td><strong>2.6</strong></td>
<td>3.4</td>
</tr>
<tr>
<td>1999–00 to 2000–01</td>
<td>4.6</td>
<td>8.5</td>
<td>2.5</td>
<td>7.3</td>
<td>12.0</td>
<td>5.4</td>
<td>0.4</td>
<td><strong>9.9</strong></td>
<td>5.6</td>
</tr>
<tr>
<td>2000–01 to 2001–02</td>
<td>2.8</td>
<td>3.1</td>
<td>-1.7</td>
<td>3.3</td>
<td>2.5</td>
<td>5.9</td>
<td>8.1</td>
<td><strong>10.4</strong></td>
<td>3.0</td>
</tr>
<tr>
<td>2001–02 to 2002–03(^{b})</td>
<td>4.6</td>
<td>1.7</td>
<td>0.7</td>
<td>2.8</td>
<td>8.8</td>
<td>3.0</td>
<td>8.1</td>
<td><strong>3.4</strong></td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Average annual growth rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996–97 to 2002–03(^{b})</td>
<td>3.2</td>
<td>3.6</td>
<td>2.6</td>
<td>4.8</td>
<td>3.7</td>
<td>4.6</td>
<td>5.5</td>
<td><strong>6.2</strong></td>
<td>3.6</td>
</tr>
<tr>
<td>1997–98 to 2002–03(^{b})</td>
<td>3.6</td>
<td>3.7</td>
<td>2.6</td>
<td>5.2</td>
<td>5.4</td>
<td>4.6</td>
<td>5.0</td>
<td><strong>5.5</strong></td>
<td>3.8</td>
</tr>
</tbody>
</table>

(a) Constant prices health expenditure for 1996–97 to 2001–02 is expressed in chain volume measures, referenced to the year 2000–01.
(b) Based on preliminary AIHW and ABS estimates.
(c) AHCA period.
(d) Based on annual mean resident population.

Source: AIHW 2003 (Health expenditure Australia).

- From 1996/97 to 2002/03, the average annual growth rate in total health expenditure in WA was 6.2%. This was higher than the national average, where the average annual growth rate over this period was 3.6%.
- Of the States and Territories, WA recorded the highest annual growth rate for total health expenditure over the period 1996-97 to 2002-03.
Figure 130: Hospital separation rate

- Between 1988/89 and 2003/04, hospital separation rates in WA increased from 233 to 334 separations per 1,000 persons for males and from 270 to 352 separations per 1,000 persons for females. This represented an increase of 43% (2.5% annually) and 30% (2.0% annually) respectively.

- Australian hospital separation rates increased at a similar rate to WA, with male separations increasing by 25% and female separations by 21% between 1993/94 and 2002/03. Over this period WA separations increased by 23% and 20% respectively.

- In 2002/03, females in WA had a separation rate around 6% higher than Western Australian males. Nationally, the female separation rate was around 8% higher than that for males.
• In 2001/02, the conditions with the highest hospital separation rates in both WA and Australia were coded to the ICD-10 chapter 'other factors'. This chapter includes examinations, dialysis and chemotherapy, hence the high proportion of separations compared to other chapters. The rate of separations coded to this chapter in WA was 82 separations per 1,000 persons for males and 72 for females. In Australia, the separation rate for males and females was 76 and 66 separations per 1,000 persons respectively. The higher rate in WA was due to a higher rate of health service encounters for specific procedures and health care, and encounters for examination and investigation.

• Separation rates in WA were also significantly higher than Australia for mental and behavioural disorders and musculoskeletal diseases. The higher rate of mental and behavioural disorders in WA was due to higher rates of mood affect disorder in males and females, together with higher rates of neurotic, stress-related and somatoform disorders in females. The higher rate of musculoskeletal diseases in WA was due to higher rates of arthropathies in males and females, as well as soft tissue disorders in males. However, while separation rates for some ICD chapters were higher in WA than Australia, this does not necessarily indicate a higher incidence.
**Figure 132: Same-day separations, proportion of all separations**

<table>
<thead>
<tr>
<th></th>
<th>90/91</th>
<th>91/92</th>
<th>92/93</th>
<th>93/94</th>
<th>94/95</th>
<th>95/96</th>
<th>96/97</th>
<th>97/98</th>
<th>98/99</th>
<th>99/00</th>
<th>00/01</th>
<th>01/02</th>
<th>02/03</th>
<th>03/04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - males</td>
<td>—</td>
<td>—</td>
<td>35.7</td>
<td>38.9</td>
<td>41.0</td>
<td>43.3</td>
<td>44.9</td>
<td>46.5</td>
<td>47.7</td>
<td>49.4</td>
<td>50.8</td>
<td>52.4</td>
<td>54.3</td>
<td>55.1</td>
</tr>
<tr>
<td>Australia - females</td>
<td>—</td>
<td>—</td>
<td>38.1</td>
<td>41.9</td>
<td>44.1</td>
<td>46.3</td>
<td>48.0</td>
<td>49.6</td>
<td>51.0</td>
<td>52.5</td>
<td>54.0</td>
<td>55.4</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>WA - males</td>
<td>29.6</td>
<td>32.5</td>
<td>33.5</td>
<td>35.2</td>
<td>37.8</td>
<td>41.4</td>
<td>45.2</td>
<td>47.7</td>
<td>49.4</td>
<td>50.8</td>
<td>52.4</td>
<td>54.3</td>
<td>55.1</td>
<td>55.6</td>
</tr>
<tr>
<td>WA - females</td>
<td>24.1</td>
<td>28.1</td>
<td>28.7</td>
<td>31.7</td>
<td>34.6</td>
<td>37.3</td>
<td>40.9</td>
<td>42.9</td>
<td>44.6</td>
<td>45.9</td>
<td>47.3</td>
<td>49.3</td>
<td>50.4</td>
<td>50.7</td>
</tr>
</tbody>
</table>

Sources: AIHW data cubes; WA Hospital Morbidity Data System.

- In WA between 1988/89 and 2003/04, the proportion of same-day cases for males increased by 149%, while the proportion for females increased by 183%.
- Nationally between 1993/94 and 2002/03, both male and female same-day cases increased by around 45%. By comparison, same-day cases in WA rose by around 58% for males and females over this period.
In WA over the period 1988/89 to 2003/04, the average length of stay in hospital declined from 5.2 to 3.3 days (37%) for males and from 5.5 to 3.5 days (36%) for females.

Nationally between 1993/94 and 2002/03, the average length of stay in hospital fell from 4.4 to 3.5 days for males and 4.7 to 3.6 days for females.

In 2002/03, males and females in both WA and Australia recorded similar lengths of stay.
The proportion of publicly-funded hospital separations in WA increased steadily throughout the 1990s, peaking at around 62% in 1998/99 and 1999/00. However, since then the proportion has fallen and was 59% in 2003/04.

Nationally, the proportion of publicly-funded hospital separations between 2000/01 and 2002/03 was slightly higher than WA.
Figure 135: Average length of stay by payment type

<table>
<thead>
<tr>
<th>Payment type</th>
<th>90/91</th>
<th>91/92</th>
<th>92/93</th>
<th>93/94</th>
<th>94/95</th>
<th>95/96</th>
<th>96/97</th>
<th>97/98</th>
<th>98/99</th>
<th>99/00</th>
<th>00/01</th>
<th>01/02</th>
<th>02/03</th>
<th>03/04</th>
</tr>
</thead>
<tbody>
<tr>
<td>WA - public</td>
<td>5.2</td>
<td>4.9</td>
<td>4.7</td>
<td>4.5</td>
<td>4.2</td>
<td>4.0</td>
<td>3.8</td>
<td>3.7</td>
<td>3.5</td>
<td>3.7</td>
<td>3.7</td>
<td>3.7</td>
<td>3.7</td>
<td>3.6</td>
</tr>
<tr>
<td>WA - private</td>
<td>4.5</td>
<td>4.3</td>
<td>4.2</td>
<td>4.1</td>
<td>4.0</td>
<td>3.9</td>
<td>3.6</td>
<td>3.4</td>
<td>3.3</td>
<td>3.3</td>
<td>3.2</td>
<td>3.1</td>
<td>3.1</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Sources: WA Hospital Morbidity Data System.

- The average length of stay in WA hospitals fell steadily for much of the past decade for both public and private patients. However, public patients recorded a slight increase from 1999/00.
- Between 1990/91 and 2003/04, the average length of stay for public patients in WA fell from 5.2 to 3.6 days.
- A similar decline was recorded for private patients with the average length of stay falling from 4.5 to 3.1 days.
Data issues and methods

Data sources

The majority of the indicators reported throughout this report were derived from administrative data sets, disease registries or health surveys. Generally, these sources were available from within the Department of Health Western Australia and from national data sets maintained by either the ABS or the AIHW. A number of indicators were derived from ad hoc research studies, with the sources of these studies cited in the reference list at the end of this chapter.

Population estimates

Population estimates for each of the years used as denominators in the analyses were based on the mid-year population of each given year and were provided by the Australian Bureau of Statistics (ABS). For data based on financial years, population denominators were derived from the mid-year population for the start of each financial year.

The ABS calculates estimated residential populations (ERP) at the Collection District (CD) boundary level. These CDs are grouped together to form Statistical Local Areas (SLA), which in turn are aggregated to define health boundaries (Health Districts and Area Health Services). Health data are often collected at the postcode level, which do not match SLAs. For each postcode, the CDs are used to determine in which SLA the majority of the population resides and are therefore allocated to that SLA accordingly. The populations of each Area Health Service are then based on ERPs of the SLAs defining that Area Health Service.

For age-adjustment using the direct standardisation method, the 2001 Australian estimated resident population was used. When the indirect standardisation method was used, the WA estimated resident populations for the corresponding years were used as the reference population.

Mortality

National deaths registrations were provided by the ABS, which compile mortality statistics from information made available by the Registrars of Births, Deaths and Marriages in each State and Territory. Information about the cause of death is recorded by medical practitioners and coroners, from which the ABS determines the causes of death. Prior to 1997, a single cause of death was coded manually from the information contained in the death certificate. From 1997 onwards, the ABS has used automated software to code the underlying cause of death and up to 20 contributing causes of death.

In this report, cause of death-coding was based on the 10th revision of the International Classification of Diseases (World Health Organisation, 1992) for deaths registered from 1997. For deaths registered prior to 1997, coding was based on the 9th revision of the International Classification of Diseases (World Health Organisation, 1977).

Mortality statistics reported throughout this publication relate to the year of occurrence, rather than year of registration. Some deaths require a coronial inquiry into the circumstances of death and may not be registered in the same year as the occurrence due to the length of the inquiry. As deaths registered in 2003 were the latest released from the ABS, the death data reported for 2003 are preliminary as some deaths occurring in 2003 and requiring coronial inquiries were not registered until 2004.

Mortality information reported for WA describes the deaths of Western Australian residents that were registered in WA. Hence, interstate and persons from overseas were excluded from the analysis.

WA Hospital Morbidity Data System (WAHMDS)
The WAHMDS includes all inpatient episodes for defined admitted patients to public, private, psychiatric and freestanding day hospitals in WA, and currently receives information from over 600,000 inpatient episodes per year. Annual collections are maintained by financial year.

The following records were removed from the WAHMDS prior to analysis: unqualified newborns, borders, posthumous donors and hospitalisations involving provision of services by one hospital on behalf of another (contracted services). The exclusion of these records was necessary for comparison with the National Hospital Morbidity Database. Data from the National Hospital Morbidity Database was accessed through the interactive data cubes available through the AIHW website and is accessible by principal diagnosis, major procedure or DRG. Only data from specific studies were available for comparative analyses based on external causes (injury and poisoning), as the criteria for reporting separations involving an external cause were modified by the AIHW for hospital separations from 1996/97 onwards.

The diagnoses, procedures and external causes of injury and poisoning recorded on each hospitalisation were coded according to the Australian version of the International Classification of Diseases, 9th revision, Clinical Modification (National Centre for Classification,
1996) for the financial years 1988/89 to 1998/99. From financial year 1999/00 onwards, the fields recording clinical information have been coded according to the 10th revision of the International Classification of Diseases, Australian Modification (National Centre for Classification in Health, 2000). This report used the principal diagnosis (main reason for hospitalisation), major procedure or first external cause to define the conditions and procedures analysed.

**WA Cancer registry**

The WA Cancer Registry has operated since 1981 to provide population-based cancer data for use in planning of health care services and in the prevention and treatment of cancer. The Western Australian Cancer Registry reports on malignancies diagnosed in persons while resident in Western Australia.

Data on the Cancer Registry provides newly diagnosed cases (all malignancies except specific non-melanoma skin cancers) in persons while resident in WA and cancer mortality (all malignancies, and certain other tumours or tumour-like conditions) from malignant neoplasm deaths, in Western Australia, for persons resident in Western Australia at the time.

Cancer incidence and mortality for WA were derived from Cancer Registry data. Australian incidence data were derived from the National Cancer Statistics Clearing House (a central cancer data collection for the whole of Australia based at the AIHW). The ABS mortality database was used to obtain mortality data. The effect of using different sources for mortality data was minimal. Reconciliation with codes generated by the Australian Bureau of Statistics is performed on a regular basis, and a high degree of agreement found. National data was accessed by the means of the interactive data sets on the AIHW website.

**WA Notifiable Diseases Surveillance System**

The Health Act of 1911 (and subsequent amendments) provides for the notification of a variety of communicable (infectious) diseases. The Western Australian Notifiable Infectious Diseases Database (WANIDD) collects data on over 62 notifiable diseases in WA and records over 10,000 notifications each year. Medical practitioners provide most reports, with some provided by pathology laboratories.

The WANIDD provides data annually to the National Notifiable Diseases Surveillance System (NNDSS), which was established in 1990 under the auspices of the Communicable Diseases Network Australia. The NNDSS coordinates the national surveillance of more than 50 communicable diseases or disease groups reporting annually on their notifications. Under this scheme, notifications are made to the State or Territory health authority under the provisions of the public health legislation in their jurisdiction.

**WA Midwives’ Notification System**

Under the Health (Notifications by Midwives) Regulations 1994, midwives are required to provide the Department of Health with notifications of cases attended. The Midwives’ Notification System compiles information covering all live births and stillbirths of at least 20 weeks gestation or 400 grams or greater in birthweight in WA public and private hospitals, as well as home births.

Each State and Territory has a perinatal data collection in which midwives and other staff, using information obtained from mothers and from hospital or other records, complete notification forms for each birth. The National Perinatal Statistics Unit (AIHW) aggregates this information into the National Perinatal Data Collection.

**WA Birth Defects Registry**

Birth defect cases include those diagnosed among live births, stillbirths (of 20 weeks gestation or more) and pregnancies, which are terminated because of fatal malformations. The Birth Defects Registry only reports on cases of children born in Western Australia and all defects reported to the registry among children up to the age of six years are included. A defect is defined as any defect probably of prenatal origin and most minor malformations are excluded unless they are disfiguring or require treatment. Different malformations occurring in the same child are recorded as separate malformations.

Reporting of birth defects on a national basis ceased in 1997, amid concerns about data quality and comparability of registries maintained by the States and Territories (AIHW, 2004). Therefore, a National comparison with WA birth defects data was not possible in this report.

**WA Health and Wellbeing Surveillance System**

The Western Australian Health and Wellbeing Surveillance System (WAHWBSS) was established in 2002 to provide high quality, reliable, valid, representative, timely and relevant population data related to the health status of Western Australians of all ages. The aim of the system is to monitor known determinants of health and population trends in chronic diseases, so that the Department of Health can have data that will inform program and policy making, health service planning and evaluation, identify target groups for intervention and prevention programs, and assess outcomes.
The WAHWSS collects data on a monthly basis, with approximately 550 interviews being conducted per month. Monthly data collection means that the monitoring system is able to detect trends and changes that occur throughout the year, such as seasonal variations or changes due to intervention initiatives. Data collection began in March 2002 and as of September 2004, over 20,000 interviews had been conducted with Western Australia residents of all ages. Parents or carers complete interviews for people under the age of 16 years.

The survey is conducted by telephone utilising the CATI (Computer-Assisted Telephone Interviewing) system. Households from throughout WA are chosen to participate in the survey by the random selection of telephone numbers from the Electronic White Pages, which means that households must have a telephone number listed in the EWP to be eligible to participate in the survey. The survey has an excellent response rate, with around 79 per cent of those contacted agreeing to participate.

**Mental health and wellbeing**
Current indicators for mental disorders within the Western Australian population are scarce. One recommended indicator, used on the WAHWSS, is the Kessler 10 (K10) assessment of psychological distress. The K10 asks about the degree of restlessness, anxiety and depressive symptoms experienced in the past 4 weeks. The K10 score is divided into four categories of psychological distress: very high, high, medium and low. In this report psychological distress for the total WA and regional populations was defined as reporting high or very high levels of psychological distress. The reported prevalence is the proportion of the population for whom some form of help (either self-help or professional) would be recommended. In the Collaborative Health and Wellbeing Survey the very high category was reported separately indicating the proportion of the population requiring professional intervention.

**National Health Survey**
The ABS conducts the National Health Survey (NHS) to provide self-reported prevalence data on long-term medical conditions and recent injuries, health risk factors and health service utilisation. In this report, data on health conditions and risk factors have been used from the 1995 and 2001 surveys. Only where the data allowed direct comparability were results from the NHS compared to those from the WAHWSS.
Methods

Some techniques and approaches used in the analyses throughout this report were specifically adapted to suit Western Australian data and vary from those used elsewhere. For an explanation of the epidemiological terms used, please refer to the Glossary.

Age-specific rates
Age-specific rates are based on five-year age groups and are calculated by dividing the number of cases by the population of the same sex and age group.

Age-standardised rates
Health status is highly dependent on age and as such a population with a large proportion of older persons would experience higher incidence and mortality rates than a population with a younger age profile for the majority of illnesses.

In order to facilitate comparisons between populations which may have a different age structure, unless otherwise stated, all rates in this report have been directly age-standardised to the total Australian population as of 30 June 2001.

The following methods was employed:

$$SR = \frac{\sum (R1 \times P1)}{\sum P1}$$

Where

- $SR$ = the age-standardised mortality rate
- $R1$ = the age specific death rate for age group 1
- $P1$ = the standard population in age group 1.

Life expectancy

Although life expectancies for WA and Australia were sourced directly from ABS figures, the approach for calculation of regional life expectancies was based on year of occurrence, five-year age groups and death counts aggregated over a five-year period.

Person Years of Life Lost

The calculation of PYLLs was based on year of occurrence data, and were age standardised to the 2001 Australian population for comparative purposes. In this report, age-specific PYLL were summed from ages 0-74 years using the methods of Hakulinen and Teppo as presented in Holman et al. (1987). Total PYLL are then divided by the number of relevant persons (sex-specific number of persons up to 74 years of age) and multiplied by 1,000 to give PYLL per 1,000 persons.

Rolling averages

By averaging three-year population and count data, age-standardised rates were derived for each year. The data for each three-year period consisted of the counts and populations for the previous, current and following year. The methodology reduces the impact of year-to-year statistical variations where annual counts were low.

Burden of disease

Data from the Australian Burden of Disease Study were used to extrapolate the Years of Life Lost to Disability (YLD) data for WA, rather than derived directly from WA disease occurrence data. The disease-specific ratio of disability burden to mortality burden was applied to WA disease-specific mortality burden to extrapolate the WA disability burden for conditions with high mortality. For conditions with low mortality, the Australian disease-specific disability burden rates were applied to the WA population figures for 2000 in order to estimate the WA disability burden.

The disease-specific YLDs extrapolated from 1996 Australian data were added to the disease-specific Years of Life Lost (YLL) data (Katezellenbogen, et al. 2003) to provide disease-specific Disability-Adjusted Life Years (DALYs). Disaggregation of disease burden by specific condition, disease groupings, gender or age is possible because the method derives DALYs for 184 conditions separately.

Aboriginal mortality

The most accurate recording of Aboriginality in death data recorded by the ABS, and the smallest discrepancies between the 1991-based population projections and the 1996-based population estimates, were for Western Australia (WA), Northern Territory (NT) and South Australia (SA). Therefore, trends in Aboriginal mortality rates in NT and SA were compared to those in WA over the period 1991-2003.

Information on trends in Aboriginal mortality rates must be interpreted with caution as accurate rates not only depend on the adequate identification of Aboriginal deaths, they also depend on accurate Aboriginal population figures. Between the 1991 and 1996 census, there was a large increase in the number of Aboriginal people counted - more than could be explained by natural increase. The accuracy of population estimates may vary over time and this will make the monitoring of trends less meaningful.

Mortality of regional Aboriginal populations was analysed using standard mortality ratios of the observed deaths in regional areas compared to that expected if the Western Australian Aboriginal population rates applied in each region.
**Socioeconomic indicators (IRSD)**

Socioeconomic status as reported within the present report was based on the 2001 Index of Relative Social Disadvantage (IRSD), which is one of five ABS Socio-Economic Indexes for Areas (SEIFA) classifications.

The IRSD is produced by the ABS using data collected during the census and is derived from attributes such as low income, low education level, level of public housing, high unemployment and high numbers of persons working in relatively unskilled occupations.

Where available, the IRSD score was applied to each Census Collection District (CD) in WA. If the IRSD score was not available for a CD then the IRSD score for the corresponding SLA was applied. Each CD was then allocated to quintiles within the distribution of values for disadvantage derived by the ABS.
Glossary

Unless otherwise stated, medical and epidemiological terms included in this Glossary have been derived largely from Dorland’s Illustrated Medical Dictionary (Saunders 1985), the Concise Medical Dictionary (1980) and A Dictionary of Epidemiology (Last, 1983).

Aboriginal or Torres Strait Islander:
A person of Aboriginal or Torres Strait Islander descent who identifies as an Aboriginal person or Torres Strait Islander and is accepted as such by the community in which he (she) lives.

acute hospitals:
See hospitals.

admission:
Admission to hospital. In this report, the number of separations has been taken as the number of admissions.

age-adjusted:
Weighted average of age-specific rates according to a standard distribution of age for a specified age range, rather than for the whole population. See age-standardised.

aged dependency ratio:
See dependency ratio.

age-specific death rate:
Number of deaths of persons of a specific age group in one year per 1,000 persons of the same age group.

age-specific rate:
Age-specific rates are based on five-year age groups and are calculated by dividing the number of cases by the population of the same sex and age group.

age-standardised:
Weighted average of age-specific rates according to a standard distribution of age to eliminate the effect of different age distributions and thus facilitate valid comparison of groups with differing age compositions. In this report the 2001 Australia population has been used as the standard.

average length of stay:
The average of the lengths of stay for all hospital episodes of care.

blood cholesterol:
Fatty substance carried in the blood which is a constituent of cell membranes and precursors of steroids and bile salts.

body mass index:
Measure of body weight calculated by dividing weight in kilograms by the square of height in metres (kg/m²).

Categories of BMI are based on an association with illness and mortality. A BMI >= 25 and < 30 is classified as overweight, while a BMI > 30 is classified as obese.

cause of death:
Based on information reported on the death certificate, each death prior to 1997 is classified to the underlying cause of death according to rules and conventions of the ninth revision of the International Classification of Diseases (ICD-9) (World Health Organisation 1977). From 1997 the cause of death is coded according to the tenth revision of the International Classification of Diseases (World Health Organisation, 1992). The underlying cause is defined as the disease or injury which initiated the train of events leading directly to death. Deaths due to injury and poisoning are classified according to the external cause - the circumstances which produced the fatal injury, rather than to the nature of the injury.

child dependency ratio:
See dependency ratio.

chronic:
 Persisting over a long period.

co-morbidity:
The occurrence of two or more diseases or health problems at the same time.

congenital:
A condition that is recognised at birth, or that it is believed to have been present since birth - includes conditions which are inherited or caused by an environmental factor.

cohort:
Group of individuals sharing a statistical characteristic (for example, date of birth) who are used in epidemiological or other statistical studies.

crude birth rate:
The number of live births per 1,000 of total population.

dependency ratio:
The dependency ratio indicates the proportion of people of non-working age in the community who are dependent on the number of people of working age (15-64 years). The ratio is broken down into two components of dependence. The child dependency ratio is a ratio of children younger than 15 years dependent on the population of working age. The aged dependency ratio is the ratio of people older than 65 years dependent on the population of working age.
disability: The restriction or lack of ability of a person to perform normal functions or activities.

disability-adjusted life year: A summary health measure used to quantify the burden of disease in a population. Disability-adjusted life years are the sum of the years of life lost and years lost to disability. One disability-adjusted life year is equivalent to one year of healthy life lost to death or disability.

diastolic blood pressure: The pressure of the blood vessels when the ventricles are relaxing and filling.

DMFT score: The number of decayed, missing or filled primary (deciduous) teeth of a child.

employment status: Employed persons are those aged 15 years and over who, during the reference week: worked for one hour or more for pay; worked for one hour or more without pay in a family business; or who had a job but were not at work because of leave or other reasons. Unemployed persons are those aged 15 years and over who were not employed in the reference week and: had actively looked for work; were available for work; or were waiting to start a new job or be called back to a job from which they had been stood down for less than 4 weeks. The labourforce comprises employed and unemployed persons; others are described as not in the labourforce (ABS, 1997).

epidemiology: The study of the distribution and determinants of health-related states and events in populations, and the application of this study to the control of health problems.

episode of care: The time between the formal admission to hospital and discharge, transfer to another health institution or death. If a patient is re-admitted for further treatment (even for the same condition), a second episode of care occurs. If a patient receives treatment at one hospital and is transferred to another hospital, a second episode of care begins at the time of transfer.

expectation of life: Predicted number of years of life remaining to a person if the present pattern of mortality does not change. It is a statistical abstraction based on current age-specific death rates. Life expectancy is a measure of current mortality rather than a predictor of future lifespan since age-specific death rates can change over time.

external cause: Environmental events, circumstances or conditions that are the cause of injury and poisoning or other adverse effects.

extremely low birthweight: Birth of a baby weighing less than 1,000 grams.

handicap: Inability to perform social, occupational or other activities as the consequence of being disadvantaged by a disability.

health expectancy: Health expectancy indices combine information on population mortality and prevalence of disability and handicap into a single composite indicator. This divides total life expectancy into years, lived with and without the health condition.

hospitals: acute hospitals: Establishments which provide at least minimal medical, surgical or obstetrical services for inpatient treatment and/or care and which provide round-the-clock comprehensive qualified nursing services as well as other necessary professional services. They must be licensed by their State or Territory health authority or controlled by another government agency. Most of the patients have acute conditions or temporary ailments and the average stay per admission is relatively short.

private hospitals: Privately owned and operated institutions approved by the Department of Health Housing and Community Services. Private hospitals cater only for private patients who are treated by a doctor of their own choice and are charged fees for accommodation and medical services. Private hospitals can be classified as acute or psychiatric on the basis of the proportion of acute inpatient services provided.

psychiatric hospitals: Establishments devoted primarily to the treatment and care of inpatients with psychiatric, mental or behavioural disorders.

public hospitals: As determined by the State or Territory health authority, and includes both recognised and non-recognised hospitals. Recognised hospitals are those nominated by States and Territories and accepted by the Commonwealth and appearing in schedules to each State/Territory Medicare Agreement (Schedule B in the current Medicare Agreements). They provide free shared-ward
accommodation for all who require it and free
treatment by a hospital-appointed doctor. In
addition, they provide, to those who are prepared
to pay for it (for example, through private
insurance), private ward accommodation and the
doctor of choice. Thus, public hospitals may
service private medical practice as well as public.

hypertension:
Elevated blood pressure, defined as a diastolic blood
pressure (DBP) of 95 mmHg or more and/or a systolic
blood pressure (SBP) of 160 mmHg or more.

immunisation:
The production of immunity by artificial means.
Passive immunity, as produced by antisera, is
temporary; active immunity involves production by
the body of its own antibodies - see vaccination.

incidence:
The number of instances of illness commencing, or of
persons falling ill, during a given period in a specified
population. Sometimes used to denote incidence
rate.

incidence rate:
The number of instances of illness commencing, or of
persons falling ill, during a given period in a specified
population divided by the population at risk.

infant death:
Death of an infant within a year of birth.

infant mortality rate:
Number of infant deaths per 1,000 live births.

inpatient:
Any person formally admitted by a hospital. Healthy
newborn infants are excluded unless they have a stay
of more than 10 days, or are the second or
subsequent birth in multiple births.

International Classification of Disease (ICD):
WHO’s internationally accepted classification of
death and disease - the ninth revision (ICD-9) is
currently in use for coding death records (World
Health Organisation 1977). Since 1988, the WAHD
has been coding hospital separation records by the
clinical modification of the ninth revision (ICD9-CM).

length of stay:
The difference, in completed days, between the dates
of admission and separation. Where a patient is
admitted and discharged on the same day, the length
of stay is taken as one day.

life expectancy:
See expectation of life.

lifetime risk:
Lifetime risk is a measure which approximates the
risk of contracting a disease in a lifetime (up to 74
years), if the risk at the time of estimation remained
throughout life. No account has been taken of
exposure to specific risk factors or the impact of
screening. This is derived from the relevant
cumulative incidence/mortality figure obtained by
summing age-specific rates, and is calculated for
ages 0-74 years. In this report, lifetime risk is
expressed as a ‘one in n chance’ of diagnosis or
death. For some indicators lifetime risk is restricted to
a specific age group (e.g. 50 to 74 years).

live birth:
The complete expulsion or extraction from its mother
of a product of conception, irrespective of duration of
pregnancy, which after separation shows signs of life.

low birthweight:
Birth of a baby weighing less than 2,500 grams.

mammography:
The making of X-ray or infra-red ray photographs of
the breast to be used for the early detection of
abnormal growths.

maternal mortality:
Deaths resulting from either obstetric complications
of the pregnant state (direct), pre-existing disease or
disease that developed during pregnancy, but not due
to direct obstetric causes (indirect) or conditions
occurring during pregnancy, where the pregnancy is
unlikely to have contributed significantly to the death
(incidental).

median:
The middle value of a set of measurements arranged
from the lowest to the highest.

morbidity:
Any departure, subjective or objective, from a state of
physiological or psychological wellbeing.

mortality:
Death.

neonatal death:
Death within 28 days of birth of an infant weighing
400 grams or more at birth or of at least 20 weeks
gestation.

neonatal mortality rate:
Number of neonatal deaths per 1,000 live births.

Pap smear:
Papanicolaou smear - a procedure for the detection or
diagnosis of malignant and pre-malignant conditions
of the female genital tract.
**perinatal:**
Pertaining to or occurring in the period shortly before or after birth.

**perinatal death:**
Deaths occurring in the perinatal period and calculated as the sum of stillbirths and neonatal deaths.

**perinatal mortality rate:**
Number of perinatal deaths per 1,000 total births (stillbirths plus live births).

**person years of life lost (PYLL):**
A measure of premature death by estimating the number of years of potential life lost due to specific causes of death.

**physical inactivity:**
less than 150 minutes per week of moderate intensity physical activity such as brisk walking, swimming or cycling.

**postpartum:**
Relating to the period a few days immediately after pregnancy.

**prevalence:**
The number of instances of a given disease or other condition in a given population at a designated time.

**private health insurance:**
Insurance which can be purchased to cover charges in private hospitals and for private status in public hospitals. Registered health benefit funds also sell ancillary insurance for services not covered by Medicare, notably private dentistry, physiotherapy, chiropractic and appliances, and for prescribed medicines not covered by pharmaceutical benefits.

**private hospital:**
See hospitals.

**psychiatric hospital:**
See hospitals.

**public hospital:**
See hospitals.

**PYLL:**
See person years of life lost.

**quintile:**
One of five groups containing equal numbers of measurements in a set of measurements that are ranked from lowest to highest value. The lower quintile is that value that has at most 20% of the measurements below it and at most 80% above it.

**rate ratio:**
The ratio of two rates - used to indicate the relative differential between two populations for a particular disease or condition.

**relative risk:**
The ratio of the risk of the disease or death among the exposed to the risk among the unexposed.

**risk factor:**
An attribute or exposure that is associated with an increased probability of a specified outcome, such as the occurrence of a disease. Not necessarily a causal factor.

**same-day separation:**
Episode of care in hospital where patient is admitted and discharged on the same day.

**self-reported:**
The method of obtaining data from respondents in a survey questionnaire when the respondent is asked to report on health conditions, lifestyle behaviours and socio-demographic details about themselves.

**separation (or discharge):**
Separation is the term used for the completion process at the end of a patient’s episode of care, be it a discharge home, death, transfer to another hospital or change of type of care. See admission.

**separation rate:**
The number of hospital separations per 1,000 in the population.

**sex ratio:**
Number of events occurring to males in the population divided by the number of similar events occurring to females in the same population.

**standardised mortality ratio (SMR):**
The ratio of the number of deaths occurring to residents of a geographic area to the expected number of deaths based on the age-specific mortality rates of a standard population. A ratio of 1 means that the rate is the same as the standard’s, and a value of 2 indicates a rate twice that of the standard.

**stillbirth:**
Birth of a foetus weighing at least 400 grams (or where birthweight is unavailable, of at least 20 weeks gestation), which shows no signs of life.

**stillbirth rate:**
Number of foetal deaths per 1,000 total births (stillbirths plus live births).

**systolic blood pressure:**
Pressure of the blood vessels when the ventricles are contracting.
**DATA ISSUES AND METHODS**

**total fertility rate:**
The number of live births a woman would have if, throughout her reproductive years, she had children at the rates prevailing in the reference calendar year. It is the sum of the age-specific fertility rates for that calendar year.

**unemployed person:**
See employment status.

**vaccination:**
The production of active immunity by the use of treated antigen to stimulate the body to produce its own antibodies. See also immunisation.

**years of life lost to disability:**
(YLD) The disability component of the Disability-adjusted Life Years burden of disease measurement, indicating the sum of years of healthy life lost to disability.

**years of life lost:**
The mortality component of the Disability-adjusted Life Years burden of disease measurement, indicating the sum of the potential years of life lost for each death.

**Abbreviations**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome.</td>
</tr>
<tr>
<td>AIHW</td>
<td>Australian Institute of Health and Welfare</td>
</tr>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>ACIR</td>
<td>Australian Childhood Immunisation Register</td>
</tr>
<tr>
<td>BMD</td>
<td>Bone Mineral Density</td>
</tr>
<tr>
<td>Cat</td>
<td>Catalogue</td>
</tr>
<tr>
<td>CCR</td>
<td>Cervical Cytology Register</td>
</tr>
<tr>
<td>CHD</td>
<td>Coronary heart disease.</td>
</tr>
<tr>
<td>DoHA</td>
<td>Department of Health and Ageing</td>
</tr>
<tr>
<td>DMFT</td>
<td>Deciduous Decayed, Missing and Filled Teeth</td>
</tr>
<tr>
<td>DHAC</td>
<td>Department of Health and Aged Care</td>
</tr>
<tr>
<td>DOH</td>
<td>Department of Health (Western Australia)</td>
</tr>
<tr>
<td>ETS</td>
<td>Environmental tobacco smoke</td>
</tr>
<tr>
<td>HDWA</td>
<td>Health Department of Western Australia</td>
</tr>
<tr>
<td>HIC</td>
<td>Health Insurance Commission</td>
</tr>
<tr>
<td>HIV</td>
<td>Human immunodeficiency virus, the virus responsible for AIDS.</td>
</tr>
<tr>
<td>ICD</td>
<td>See International Classification of Disease.</td>
</tr>
<tr>
<td>IRSD</td>
<td>Index of Relative Social Disadvantage</td>
</tr>
<tr>
<td>IUGR</td>
<td>Intra Uterine Growth Retardation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDTIS</td>
<td>National Dental Telephone Interview Surveys</td>
</tr>
<tr>
<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>NHPAs</td>
<td>National Health Priority Areas</td>
</tr>
<tr>
<td>PSA</td>
<td>Prostate Specific Antigen</td>
</tr>
<tr>
<td>SF-36</td>
<td>(Short Form 36) Questionnaire used widely to measure general health and wellbeing.</td>
</tr>
<tr>
<td>SIDS</td>
<td>Sudden Infant Death Syndrome</td>
</tr>
<tr>
<td>SEP</td>
<td>Socio-economic position</td>
</tr>
<tr>
<td>SEIFA</td>
<td>Socio-economic Indexes for Areas</td>
</tr>
<tr>
<td>STI</td>
<td>Sexually transmitted infection.</td>
</tr>
<tr>
<td>-</td>
<td>Not reported/unavailable/to few cases to reliably report</td>
</tr>
</tbody>
</table>

**References**


References & sources


Australian Bureau of Statistics (ABS) (various years). Deaths, Australia. ABS Catalogue No. 3311.5. Canberra: ABS.


Australian Bureau of Statistics (ABS) (various years). Deaths, Australia. ABS Catalogue No. 3302.0. Canberra: ABS.

Australian Childhood Immunisation Register.

Australian Institute of Health and Welfare (AIHW) (Various Series No. 20). (Health Services Series No. 20). AIHW Catalogue No. HSE 25. Canberra: AIHW.


Australian Institute of Health and Welfare (AIHW) interactive data cubes.


Department of Land Information (DLI)


