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Methods

1. Introduction

2. Data sets

2.1 Health Outcomes Information Statistical Toolkit

2.2 Population data

This report brings together data from a wide range of sources. It focuses on trends, and hence uses mainly data from routine collections rather than ad hoc studies. This chapter gives a brief description of the major data sources used and the statistical methods employed in their analysis and interpretation. SAS for Windows Versions 8.02 and 9.1 (SAS, 2005) were used for all data analysis and for production of data tables and charts.

The Health Outcomes Information Statistical Toolkit (HOIST) is a SAS-based 'data warehouse' operated by the Centre for Epidemiology and Research of the NSW Department of Health. It brings together most of the data collections often used in population health surveillance in NSW, and contains all the available historical data for each collection. HOIST data are in one format - SAS datasets - and HOIST code values are, as far as possible, consistent across time and among datasets. HOIST provides a common data analysis environment across the public health network in NSW.

Population estimates as at 30 June were used for calendar years, while estimates as at 30 December were used for financial years. Age- and sex-specific estimated resident populations (ERPs) for NSW Statistical Local Areas (SLAs) at 30 June were obtained from the Australian Bureau of Statistics (ABS) for use with calendar year data. A cubic spline interpolation between mid-year ERPs was used to derive 30 December age- and sex-specific population estimates for use with financial year data. Populations of NSW area health services were derived by aggregating the appropriate SLA-level ERPs, except in the case of Sydney South West and South Eastern & Illawarra Area Health Services, the border between which transects 2 SLAs. ERPs for these SLAs were apportioned according to the proportions derived from the usual resident counts from the 2001 Census at the collection district level.

The 2001 Australian mid-year ERP, shown in Table 1, was used as the standard population for age-adjustment.

Country-of-birth (COB)-specific populations used for country of birth pages were derived from annual age-, sex- and COB-specific ERPs for all of Australia supplied by the Australian Bureau of Statistics. Equivalent populations for NSW were derived from these national populations by estimating the proportion of immigrants in each age, sex, and COB stratum who reside in NSW, based on cubic splines fitted to age-, sex-, COB- and specific State-Territory counts from the 1981, 1986, 1991, 1996 and 2001 ABS Censuses of Population and Housing, and then applying these proportions to the national age-, sex-, and COB-specific ERPs for each year.

Table 1 Australian standard population (30 June 2001)

Age	Persons	Age	Persons
0–4 yrs	1,282,357	50–54 yrs	1,300,777
5–9 yrs	1,351,664	55–59 yrs	1,008,799
10–14 yrs	1,353,177	60–64 yrs	822,024
15–19 yrs	1,352,745	65–69 yrs	682,513
20–24 yrs	1,302,412	70–74 yrs	638,380
25–29 yrs	1,407,081	75–79 yrs	519,356
30–34 yrs	1,466,615	80–84 yrs	330,050
35–39 yrs	1,492,204	85+ yrs	265,235
40–44 yrs	1,479,257		
45–49 yrs	1,358,594	All ages	19,413,240

Source: ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Department of Health.

2.3 Australian Bureau of Statistics Mortality Collection

This was done to ensure that the COB-specific populations for NSW were based on estimated residential populations; and that the non-linear, and often dramatic, changes in immigrant populations in inter-Censal periods were accurately reflected in the NSW population estimates used.

For this report, ABS mortality data for deaths of NSW residents registered anywhere in Australia were accessed via HOIST. Deaths are presented by calendar year of death.

All deaths for which a coronial inquiry is not required must be certified by a registered medical practitioner as to cause and date; the certificate is registered by the registrar of births, deaths and marriages in each state or territory. Most deaths due to accidental causes, deaths occurring under suspicious circumstances (in which foul play cannot be excluded), deaths occurring shortly after anaesthesia or surgery, and deaths of persons who had not been seen by a medical practitioner in the year preceding their death, automatically become coronial cases and are registered by a coroner at the conclusion of an inquiry into the circumstances of the death.

Most non-coronial deaths are registered with the relevant registrar of births, deaths and marriages within 4 weeks of the date of death. However, coronial inquiries can take months, and in some cases years, to conclude. Mortality data are supplied by the ABS by year of registration. Therefore, deaths occurring in the last few weeks of each calendar year (or the last few months for coronial cases) may not be registered until January in the subsequent year. Delays in registering deaths tend to be greater for some causes of death, and for people resident in rural areas.

At the time of preparation of this report, the most recent mortality data available from ABS included only those deaths registered in 2004. The 2004 numbers were adjusted to include an estimate of the number of deaths due to that cause that occurred in 2004 but were not registered until 2005. A pro rata adjustment was made, based on registrations for the preceding three years (2001 to 2003). The first step was to determine the proportion of total deaths in the preceding three years which were not registered until the following year. That proportion was used to multiply the number of deaths registered in 2004, to obtain the estimate of the number of deaths still to be registered. The estimates were calculated for each age-sex stratum. Where deaths were further categorised, for example by geographical place of residence or country of birth, the imputation procedure was carried out separately for each category.

For deaths registered during or before 1996, a single code for the principal underlying cause of death (based on the information recorded on the death certificate by a medical practitioner or coroner) was selected for each death. For deaths registered since 1997, the ABS has used computer-assisted cause-of-death coding that yields up to 20 contributing causes of death in addition to the principal underlying cause of death.

From 1999 onwards, causes of death have been classified according to the 10th revision of the International Classification of Diseases (ICD-10, World Health Organization, 1992). Deaths registered before 1999 were coded according to the 9th revision of the International Classification of Diseases (ICD-9, World Health Organization, 1977).

The ICD-10 and ICD-9 codes used for each indicator are included in the disease and procedure codes appendix.

2.4 NSW Inpatient Statistics Collection

The NSW Inpatient Statistics Collection (ISC) or Admitted Patient Data Collection is a census of all services for admitted patients provided by public hospitals, public psychiatric hospitals, public multi-purpose services, private hospitals and private day procedure centres in NSW. The ISC is a financial year collection from 1 July through to 30 June of the following year. The information it contains is provided by patients, health service providers, and the hospital's administration. The information reported includes patient demographics, source of referral to the service, service referred to on separation, diagnoses, procedures, and external causes.

The ISC includes data on hospital admissions of NSW residents which occurred in hospitals interstate. The only exception to this is that data from interstate hospitals for the year 2004-2005 are not yet available. This may affect analyses involving uncommon diagnoses or procedures, particularly in Health Area analyses, and has a greater effect on rates for areas closer to an interstate boundary. The number of interstate admissions has been estimated for 2004-05, based on admissions for the preceding three years (2001-02 to 2003-04). The first step was to determine the proportion of total admissions for NSW residents in the preceding three years which were at interstate hospitals. That proportion was used to multiply the number of admissions at hospitals in NSW, to obtain the estimate of the number of admissions expected to have occurred at interstate hospitals. The estimates were calculated for each age-sex stratum. Where hospitalisations were further categorised, for example by geographical place of residence or country of birth, this imputation procedure was carried out separately for each category, thus accounting for the uneven distribution of interstate hospital admissions.

For this report, the ISC was accessed via HOIST. From 1 July 1998, ISC data on HOIST have been for episodes of care in hospital. Episodes of care end with the discharge, transfer, or death of a patient. A new episode of care may also start when the service category for an admitted patient is altered, as a result of a change in the on-going clinical care requirements for that patient during the one episode of accommodation in a single facility. ISC data on HOIST up to 30 June 1998 were for periods of stay in hospital. A period of stay in hospital ends with the discharge, transfer, or death of a patient, and may consist of multiple episodes of care. The change from "period of stay" to "episode of care" causes a small increase in the apparent number of admissions.

From 1 July 1998, the reason for a hospital admission has been coded at the time of separation (discharge, transfer or death), according to the 10th revision of the International Classification of Diseases, Australian Modification ICD-10-AM (National Centre for Classification in Health, 2000). Prior to this, it was coded according to the 9th revision of the International Classification of Diseases, Clinical Modification (ICD-9-CM), using the Australian version (National Coding Centre, 1996) from July 1995 and the US version prior to that.

From 1 July 1998, procedures carried out during a patient's stay have been coded according to the MBS-Extended Procedure Classification, published as Volume 3 and Volume 4 of the 10th revision of the International Classification of Diseases, Australian Modification ICD-10-AM (National Centre for Classification in Health, 2002). Prior to this, procedures were coded according to the 9th revision of the International Classification of Diseases, Clinical Modification (ICD-9-CM), using the Australian version (National Coding Centre, 1996) from July 1995 and the US version prior to that.

The numbers of diagnosis and procedure codes that may be recorded, at the time of separation, have varied over time, and are currently as follows:

- principal diagnosis (the principal reason for admission);
- up to 55 other diagnoses;
- up to 50 procedures and procedure blocks;
- up to eight external cause codes for injury and poisoning.
- up to three codes for place of occurrence injury or poisoning.
- up to three codes for activity at time of injury or poisoning.

Extensive use of mapping tables between ICD-9-CM and ICD-10-AM disease codes, produced by the National Centre for Classification in Health, was made to obtain the most appropriate match for individual codes between the 2 classification systems. The ICD-10-AM and ICD-9-CM codes used for each indicator are included in the disease and procedure codes appendix.

2.5 NSW Midwives Data Collection

The New South Wales Midwives Data Collection (MDC) is a population-based collection covering all births in NSW public and private hospitals, as well as home births. It does not receive notifications of interstate births where the mother is resident in NSW.

The data collection has operated continuously since 1990. It encompasses all livebirths and stillbirths of at least 20 weeks gestation or at least 400 grams birthweight. The MDC relies on the attending midwife to complete a notification form when a birth occurs. The form includes demographic items, and items on maternal health, the pregnancy, labour, delivery, and perinatal outcomes. It has undergone 3 revisions over the years. The Midwives Data Collection database is compiled in the Information Management and Support Branch of the NSW Department of Health.

For this report, the MDC was accessed via HOIST. Data are presented for calendar years. The key indicator of perinatal deaths in the report uses data derived from the Australian Bureau of Statistics. Perinatal deaths among infants of at least 22 weeks gestation or 500 grams birthweight are reviewed by the NSW Maternal and Perinatal Committee. Both stillbirths and neonatal deaths are classified according to an obstetric cause-specific classification, Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC). Neonatal deaths are also classified by neonatal cause according to the Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC).

2.6 NSW Birth Defects Register

The NSW Birth Defects Register (BDR) was established in 1990. Legislation to mandate the notification of birth defects recognised at up to 1 year of age, has been in effect since 1 January 1998. Prior to that, the BDR operated on a voluntary reporting basis.

For this report, the BDR was accessed via HOIST. Data are presented for calendar years.

2.7 NSW Health Surveys 1997 and 1998

In 1997 and 1998, the NSW Department of Health, in conjunction with the 17 area health services at that time, conducted 2 population health surveys using computer-assisted telephone interviews (CATI) (Williamson et al., 2001). The main aims of the surveys were to provide local and statewide information to inform health service planning and policy development. The survey questions focused on the 6 NSW health priority areas: cardiovascular disease, cancer, mental health, injury, diabetes, and asthma.

The target sample for each year comprised 1000 NSW residents aged 16

years and over from each of the 17 NSW Health Areas at that time (total sample 17,000 people each year). A stratified two-stage cluster sample design was used, with simple random sampling of all potentially active telephone numbers within each NSW health area, and simple random sampling of one household resident for interview.

Interviews were conducted in 6 languages (English, Arabic, Chinese, Greek, Italian, and Vietnamese) by trained interviewers at the NSW Department of Health's CATI facility.

The total sample size was 35,027 respondents (17,531 in 1997; 17,496 in 1998). The overall response rate for both surveys was 70%.

For this report, data from the NSW Health Surveys 1997 and 1998 were accessed via HOIST.

2.8 NSW Child Health Survey 2001

In 2001, the NSW Department of Health, in conjunction with the 17 area health services at that time, conducted a survey of the health of children in NSW, using CATI.

Development of the survey instrument was overseen by a technical reference group. The final questionnaire covered topics including use of health services, nutrition, food security, asthma, oral health, parent support services, social support, sun protection, sight, hearing, speech, family functioning, social capital, smoking, sports and other organised activities, and physical activity.

The target sample comprised at least 500 NSW children aged 0-12 years from each of the then 17 NSW health areas. Households were sampled using a method similar to the 1998 NSW Health Survey (Williamson et al., 2001). One eligible child was selected from each household, using random numbers generated by the CATI system. A parent or carer of the selected child was interviewed.

Interviews were conducted in 4 languages (English, Arabic, Chinese and Vietnamese) by trained interviewers at the NSW Department of Health's CATI facility. A total of 9933 interviews were completed, while 1770 households or selected respondents refused to participate. This yielded a response rate of 84.9%.

For this report, data from the NSW Child Health Survey 2001 were accessed via HOIST.

2.9 NSW Population Health Survey

From 2002, the NSW Department of Health, in conjunction with the area health services, has conducted the NSW Population Health Survey, an ongoing survey of the health of people in NSW using computer-assisted telephone interviewing (CATI). The main aims of the New South Wales Population Health Survey are to provide detailed information on the health of the people of NSW, and to support the planning, implementation, and evaluation of health services and programs in NSW.

The target population for the NSW Population Health Survey is all NSW residents living in households with private telephones. The target sample comprised approximately 1,200 people in each area health service (total sample of 12,000). When households were contacted, one person was selected, using random numbers generated by the CATI system.

Interviews were carried out continuously between February and December each year. Trained interviewers at the NSW Health Survey facility carried out interviews. When a child under the age of 16 years was selected, the main carer, known as the 'proxy respondent', was interviewed on behalf of the child.

Most respondents were interviewed in English. The remaining interviews were conducted in Arabic, Chinese, Greek, Italian, and Vietnamese.

In 2005, 15,442 interviews were conducted, with 12,622 with people aged 16 years or over. The overall response rate was 67.6 per cent (completed interviews divided by completed interviews and refusals).

For this report, data from the NSW Health Survey were accessed via HOIST.

2.10 ABS National Health Survey

The National Health Surveys (NHS) conducted by the ABS collect information on illness and injury, health care use, and health risk factors. Data from the 1989-90, 1995 and 2001 National Health Surveys are presented in this report. Data were accessed via HOIST, were obtained as special tabulations from the ABS, or were from published reports.

2.11 School surveys

The NSW Department of Health and The Cancer Council NSW have carried out surveys of the health of secondary school students since 1984 as part of the triennial Australian School Students' Alcohol and Drug (ASSAD) survey.

In its earlier years, the ASSAD Survey questions targeted drug and alcohol use. The topics covered by the Survey have gradually extended to include other issues that are important to the health of adolescents. In 2005 the NSW School Student Health Behaviours Survey included questions on physical activity and injuries, sun protection behaviours, eating behaviours, and mental health and wellbeing, in addition to smoking, alcohol and other drug use.

The information presented in this report may differ from information presented in previous Reports of the Chief Health Officer, which used a variety of published reports to collate information on trends. These published reports used data obtained from different surveys, which were then analysed using a variety of methods. For this report all recent and historical ASSAD/NSW School Student Health Behaviours Survey data were available for analysis for the first time. ASSAD/NSW School Student Health Behaviours Survey data has been collected in a consistent way over time and is the most reliable current source of information on trends in secondary school students' health.

2.12 NSW Central Cancer Registry data

The NSW Central Cancer Registry was established by the NSW Department of Health in 1971 under the NSW Public Health Act. It was administered by the NSW Cancer Council, under contract, from 1986 until June 2004. The Registry has been managed by the Cancer Institute NSW since June 2004.

Notification of all newly-diagnosed cases of, and deaths due to, malignant neoplasm by hospitals and the Registrar of Births, Deaths and Marriages has been compulsory since the registry began. In 1991 the Act was amended to make notification by pathology laboratories compulsory as well. Notification has traditionally been via a printed notification form, although in recent years electronic notification by hospitals (but not pathology laboratories) has been introduced.

A case of cancer is the occurrence of a malignant neoplasm in one organ of a particular person. Therefore, a case of malignant melanoma in a particular person counts as one case. If the same person subsequently develops leukaemia, the leukaemia counts as a second case.

Incident cases and deaths registered before July 1999 were classified according to the 9th revision of the International Classification of Diseases (ICD-9, World Health Organization, 1977). Cases registered from July

1999 onwards have been classified according to the 2nd edition of the International Classification of Diseases for Oncology (ICD-O-2, World Health Organization, 1990). ICD-O-2 codes were translated back to ICD-10 codes by the Registry and used in this report.

For this report, cancer incidence data were accessed via HOIST. The cancer mortality data presented come from ABS mortality data.

2.13 NSW Notifiable Diseases Database

The NSW Notifiable diseases database (NDD), formerly called the NSW Infectious Diseases Surveillance system (IDSS), is a networked database used by 17 public health units (PHUs) located across NSW to register communicable disease notifications. Under authority of the NSW Public Health Act 1991, the NSW Health Department receives notifications of communicable disease via PHUs from general practitioners, hospitals, and pathology laboratories. Data are transferred weekly from PHUs to the Department, for compilation of statewide data. The Department, in turn, transfers a limited dataset to the Communicable Diseases Network of Australia and New Zealand (maintained by the Commonwealth Department of Health and Ageing).

For this report, the NDD collection was accessed via HOIST.

2.14 Australian Childhood Immunisation Register

The Australian Childhood Immunisation Register (ACIR), which is managed by the Health Insurance Commission (HIC) and commenced operation on 1 January 1996, is a register of the immunisation status of all children less than 7 years of age. A Commonwealth-State cost-shared payment is made to service providers for data. Broadly, the functions of the ACIR are: to collect immunisation information from immunisation providers, and to administer a payments system to providers for reporting information; to provide immunisation status information to parents and providers and to administer a national recall-reminder service to parents; and to provide immunisation coverage data.

ACIR supplies NSW Health with monthly coverage data that identifies children 'overdue' for immunisation, which are forwarded to Public Health Units for follow up, and quarterly coverage data by local government area. These latter data form the basis for the information presented in this report.

2.15 Prisoner health survey 2001

The overall aims of the Prisoner Health Survey were to describe the health of adult inmates, to identify factors associated with poor health, to develop indicators allowing comparisons to be made with the health of the general population, and to develop health goals and targets for the inmate population based on the findings. Special emphasis was placed on determining the health of Aboriginal and elderly inmates.

The methodology for the 2001 survey was similar to that used in 1996 to ensure consistency across the surveys. The design represented a cross-sectional random sample of inmates stratified by sex, age and Aboriginality. The sample included approximately 10% of male and 34% of female inmates in full-time custody. The survey was conducted between July and November 2001. All 29 correctional facilities in NSW were included in the survey.

According to the 2001 Inmate Census, there were 514 female and 7160 male prisoners in full-time custody on the 30th June 2001. Aboriginal people are over represented in the correctional system, comprising 16% and 25% of male and female prisoners compared with approximately 1% in the general community. Given this overrepresentation, and variations in health status between Indigenous and non-Indigenous Australians, it was decided to stratify

by Aboriginality. The sample was also stratified into three age groups: under 25 years, 25 – 40 years, and over 40 years. The stratification ensured that there were sufficient numbers of both Indigenous and non-Indigenous inmates to enable the health status of each sub-group to be described separately. The overall response rate was 85% (700 males and 154 females). The response rates were 84% for women and 85% for men; and 83% for Aboriginal people compared with 85% for non-Aboriginal people.

2.16 Emergency Department Data Collection

The NSW Emergency Department Data Collection is a database of information collected from approximately one-third of NSW Emergency Departments. It represents approximately two-thirds of all NSW emergency patients. Analyses presented in this report are based on a provisional diagnosis assigned by staff when a patient presented to the Emergency Department.

For this report, data from the Emergency Department Data Collection were accessed via HOIST.

3. Statistical methods

3.1 Crude death rates

The crude death rate is an estimate of the proportion of a population that dies in a specified period. It is calculated by dividing the number of deaths in a specified period by the number at risk during that period (typically per year). It does not take into account the age structure of the population studied, and can be misleading when long-term trends are examined - or geographic areas are compared - because age structures of populations may vary over time or among areas. Crude death rates presented in this report used ABS estimated resident populations (ERPs) as at 30 June each year, and are expressed per 100,000 population per year.

3.2 Age-adjusted rates

Age-adjustment of rates used direct age-standardisation. This method adjusts for effects of differences in the age composition of populations across time or geographic regions. The directly age-standardised rate is the weighted sum of age-specific (five-year age group) rates, where the weighting factor is the corresponding age-specific standard population. For this report, the Australian estimated residential population (persons) as at 30 June 2001 was used as the standard population (this is given in Table 1). The same population was used for males and females to allow valid comparison of age-standardised rates between the sexes.

Ninety-five per cent confidence limits around the directly standardised rates were calculated using the method described by Dobson et al. (1991). This method gives more accurate confidence limits than the usual normal approximation for rarer conditions. Where the number of events is larger, the limits are equivalent to those calculated in the conventional fashion (Armitage, Berry and Matthews, 2002).

3.3 Life expectancy at birth

Life expectancy at birth is an estimate of the average length of time (in years) a person can expect to live, assuming that the currently prevailing rates of death for each age group will remain the same for the lifetime of that person. In fact, death rates will almost certainly change over the lifetime of a person born now, owing to changes in social and economic conditions, changes in lifestyle, advances in health care, and possibly the emergence of new diseases. However, because no-one knows what the death rates for each age group and sex will be in the future, the usual practice is to use the current rates of death to calculate life expectancy.

For this report, estimates and confidence intervals for life expectancy were calculated using abridged current life tables based on five-year age groups, except for the first 5 years of life, which were split into 2 age groups 0-<1

3.4 Life expectancy at age 65

years and 1-4 years. The methods used are described in detail by Chiang (1984).

3.5 Analysis of NSW Health Surveys 1997 and 1998, NSW Child Health Survey 2001 and NSW Population Health Survey data

The average number of additional years a person who has reached the age of 65 would expect to live if current mortality trends continue to apply is based on the age-specific death rates for a given year. This measure assumes that death rates will remain constant for the next 20 to 30 years, a much more conservative assumption than the one used to calculate life expectancy at birth. For this report, life expectancy was calculated using abridged current life tables based on 5-year age groups.

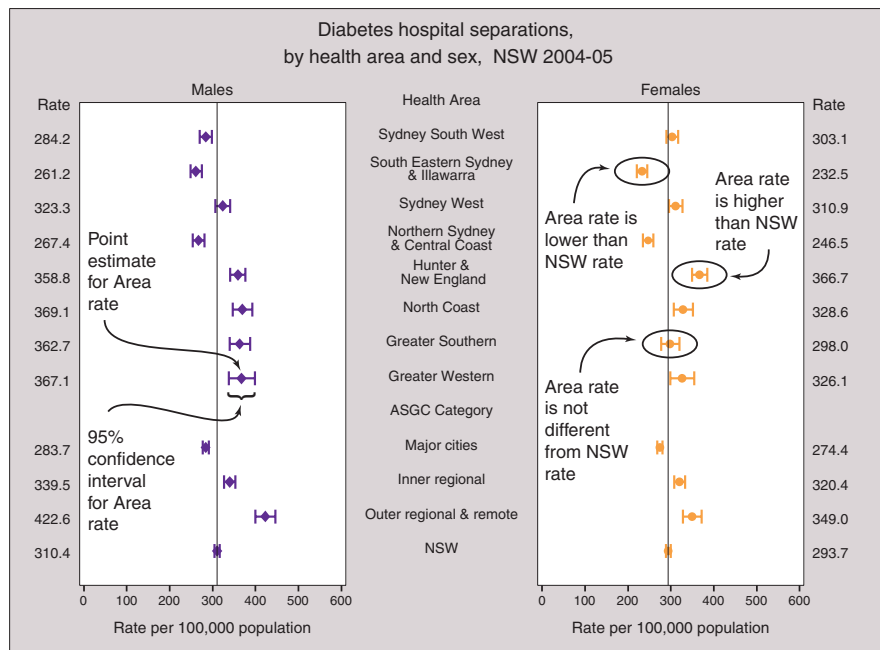
3.6 Graphical presentation

The survey samples were weighted to adjust for differences in the probabilities of selection among respondents, according to the number of eligible respondents in the household, and the number of residential telephone connections for the household (except in 1997, where telephone connection information was not collected). Post-stratification weights were used to adjust for differences between the age and sex structure of the survey samples and the relevant ABS mid-year population estimates (adjusted to exclude people resident in institutions) (Williamson et al., 2001).

The 'Surveymeans' procedure in SAS for Windows Version 8.02 was used to calculate point estimates and 95% confidence intervals. This procedure uses the Taylor expansion method to estimate sampling errors of estimators based on a stratified random sample (SAS, 2005).

Figure 1 below demonstrates the method used for graphical presentation of point estimates with their 95% confidence intervals. It shows age-adjusted hospital separations for diabetes for the year 2004-05 for each of the NSW health areas and for ASGC remoteness categories. The standardised rate for NSW as a whole is indicated by the vertical reference line. The standardised rate, with its 95% confidence limits, for each health area, is shown as a horizontal line, with a central box indicating the point estimate.

Figure 1 Sample graph demonstrating point estimates and 95% confidence intervals.



3.7 Analysis of indicators by local government area

Small area estimates of selected indicators are based on analysis at the local government area (LGA) level, and are analysed using ASGC 2004 LGA boundaries. They use Bayesian smoothing methods to stabilise the estimates, which are then displayed in the form of choropleth maps. The associated tables include both raw and smoothed estimates for each LGA, grouped according to health area of residence.

In NSW there are 175 LGAs using the 2004 ASGC boundaries. Unincorporated Far West and Lord Howe Island make up a final area, known as Unincorporated NSW. Due to the spatial isolation of Lord Howe Island, both cases and population on Lord Howe Island were omitted from analysis but Unincorporated Far West was included. The resulting 166 areas ranged in population from 840 to greater than 270,000 (based on population estimates as at June 2005). The distribution of these populations across the local government areas is shown in the Demography chapter.

There are 17 LGAs with total populations less than 3000, and of these five have populations less than 2000 (based on population estimates as at June 2005). As the standard errors of estimates of rates or ratios are inversely related to population size this means that the standard errors vary greatly in their size between different LGAs. It also means that these estimates will vary greatly in the effect that chance events will have on the rate or ratio. Those with the smallest populations are particularly vulnerable to this. An extra one or two cases in a population of 2000 gives a far greater effect than the same increase in cases in a population of 200,000.

There also may be periods of time when there are no events within particular small areas, which would result in a rate for that area of zero. Two alternatives are possible here: to increase the number of years included in the analysis, preferably to 5 or more to obtain a reasonable estimate, or to use reasonably short periods of time (2 or 3 years) but borrow strength from adjacent areas and the variability across the entire state by using Bayesian methods. It is this latter method of “statistical smoothing” that we have applied in this report. Statistical smoothing allows calculation of an estimate for all areas, even when there are no cases/events in a particular area during the observed period of time; takes into account variability among areas (variously called global, uncorrelated or non-spatial variability), and more local effects (so-called spatial or local variability) in creating the estimate for individual areas; and ‘borrows strength’ from other areas, to improve the estimate in any particular area. This is more obvious in those areas with small populations.

There are two distinct methods of Bayesian smoothing used in this report, depending upon whether the indicator involves a population-based denominator (such as most indicators involving hospital separations or deaths) or whether it is of a binary nature (for instance smoking/not smoking in pregnancy). Estimation of population-based indicators are based on the indirectly standardised ratio obtained from indirect age and sex standardisation. In comparison, this report presents directly standardised rates for these indicators when considered on a statewide or health-area basis. Indirect standardisation is used firstly, because age-specific rates required by direct standardisation can be unreliable in small areas where there are small numbers of cases; and secondly, the standardised mortality, or standardised incidence ratio (SMR or SIR) is conventionally modelled using Bayesian methods. The indirectly standardised ratio compares the number of cases in the local area with the number expected given the age-specific rates across the state and the age-specific population of the small area of interest. It is

3.7.1 Smoothing of estimates for population-based indicators

effectively an estimate of the relative risk of being in the disease group within that area compared to the state average risk, which by definition is unity (1). Indirect standardisation assumes that the pattern of age-specific rates across the entire population is appropriate for all small areas, which, although not tested, is usually a safe assumption.

The smoothing used for the population-based indicators is obtained by applying the convolution or Besag, York and Mollie (BYM) model (Lawson et al, 2003). This model incorporates both spatially correlated and uncorrelated variation. It accounts for variability across the entire state (uncorrelated variation) as well as variability amongst the local government areas immediately adjacent to the area in question (spatially correlated variation). It is a fully Bayesian model which has been used substantially for disease mapping since it was introduced by Besag, York and Mollie. Under the BYM model, the smoothed SIR/SMR (or relative risk) is implemented using Gibbs sampling within WinBUGS (www.mrc-bsu.cam.ac.uk/bugs/winbugs/contents.shtml). The sample values for the parameter of interest (q_i) obtained by running this model in WinBUGS range in value within each area. The values form a distribution, which is known as the posterior distribution of q_i , and shows the expected distribution of the SIR/SMR for each area when adjusted (smoothed) for the two types of variability mentioned above. For each area the mean of this posterior distribution was used as the best estimate of the smoothed SIR/SMR, and the proportion of the probability distribution above unity was used as an estimate of the significance of the small area estimate relative to the state average. It is to be noted that the posterior distribution is dependent upon the expected number of cases: the higher the expected number of cases the smaller will be the standard error of the distribution, and hence the distribution will be 'tighter' around its mean.

A Bayesian 95% credible interval is analogous to the more common 95% confidence interval used in frequentist-based analyses. The 95% credible interval is obtained by determining the 2.5th and 97.5th percentiles of the posterior distribution. It can be interpreted as the range in which 95% of the estimates are located. The Bayesian method of obtaining an estimate of significance was also used by determining the proportion of the sampled values in the posterior distribution that lie above (or below) unity. A two-sided alternate hypothesis was used, so that if the proportion of the posterior distribution below unity was less than 0.025, then that area was considered to have significantly increased risk at the 5% level of significance.

The tabular output has been grouped by health area. Sydney LGA has been allocated to both Sydney South West and South East Sydney and Illawarra AHS, as this LGA is split between the two health areas. The columns in the output present the smoothed number of hospitalisations or deaths per year; the stabilized estimate of the Standardised Separation or Mortality Ratio, obtained by using Bayesian smoothing; the upper and lower 95% credible interval endpoints for the smoothed estimates of SSR/SMR; and the level of significance in relation to the state average indicated as follows:

- ++ means more than 99% of the distribution is above one, which would be equivalent to being significantly higher than the state average at 1% level of significance.
- + means more than 95%, but less than 99% of the distribution is above one, which would be equivalent to being significant at 5%.

- 0 means that between 5 and 95% of the distribution is above one, indicating that the SMR/SIR for this area is not significantly different to the state average of unity.
- means less than 5% of the distribution is above one, which is equivalent to saying that the distribution is significantly lower than the state average at 5% level of significance.
- means less than 1% of the distribution is above 1, which is equivalent to saying that the distribution is significantly lower than the state average at the 1% level of significance.

3.7.2 Smoothing of estimates for binary-type indicators

These indicators do not use a population-based denominator. Usually the cases or events of interest are a subset of all cases, so the denominator is obtained from the same source as the cases of interest. Most of these indicators are binary in nature, for example smoking in pregnancy, where the mother either answers yes or no to the question 'did you smoke at all during pregnancy?', or else are made into a binary variable, for instance whether antenatal care was commenced before 20 weeks or not. Because of the binary nature of these indicators, the most appropriate model is the logistic model.

The smoothing used for these indicators is obtained by modelling the data using a binomial distribution with a logit link function (Lawson et al, 2003). The model still incorporates both spatially correlated and uncorrelated variation, however we have not included age-standardisation. Implementation occurred using Gibbs sampling within WinBUGS. The sample values for the parameter of interest (smoothed proportion) range in value within each area. The values form a distribution, which is known as the posterior distribution of the smoothed proportion. For each area the mean of this posterior distribution is used as the best estimate of the smoothed proportion.

In order to compare areas and make mapping consistent with the other indicators, a posterior distribution for the prevalence ratio was calculated for each area by dividing each sampled value of the smoothed proportion by the overall proportion for the state. The proportion of the posterior distribution of this prevalence ratio above unity was used as an estimate of the significance of the small area estimate relative to the state average. The posterior distributions are dependent upon the total number of cases: the higher the total number of cases the smaller will be the standard error of the distribution, and hence the distribution will be 'tighter' around its mean.

Ninety-five percent credible intervals for the smoothed estimates of the proportion and the prevalence ratio as well as the estimate of significance were obtained using similar methods to the population-based indicators in 3.7.1 above. The tabular output included the raw number of cases (the event of interest) (if this was less than five, it was suppressed); the smoothed percent; the smoothed estimate of the prevalence ratio (based on distribution of the ratio of smoothed proportion to the state proportion, as given after Bayesian smoothing, but is not adjusted for the different age structures in the areas); the lower and upper 95% credible interval for ratio; and the level of significance (using the same symbols as for 3.7.2).

3.7.3 Interpretation of data in maps

The smoothed standardised incidence/mortality ratio is mapped for all indicators. The intensity of the colour of an area increases as the SIR/SMR increases, and the same scale is used for all maps. The maps show which areas are significantly different from the state average (at the 5% level of significance) by using '-' or '+' to denote this. If an area does not differ

4. Methods used for specific chapters and topics

4.1 Health-related behaviours- Deaths and hospitalisations attributable to use of drugs and alcohol

4.2 Rural and remote populations

significantly from the state, no symbol is shown. Maps were produced using SAS for Windows Version 9.1.3 (SAS, 2005).

Estimates of the numbers and rates of deaths and hospitalisations attributable to the use of tobacco, alcohol, and illicit drugs used aetiologic fractions developed by Ridolfo and Stevenson (2001). These fractions represent a revision of those originally published by Holman (1990) and later revised by English et al. (1995). They were derived from meta-analysis of published scientific literature on the adverse health effects (and in a small number of instances, protective effects) of these substances to estimate the proportions of cases of specific diseases and injuries that could be attributed to each substance.

For this report, an electronic file of the aetiologic fractions developed by Ridolfo and Stevenson was obtained from the Australian Institute of Health and Welfare. The disease and injury groupings used in this file were defined using ICD-9 and ICD-9-CM. The appropriate groupings of ICD-10 and ICD-10-AM codes were developed for this report. The codes used can be found in the disease and procedure codes section of the electronic version of this report.

The chapter on rural and remote populations, and some indicators in other chapters, present a range of health indicators for NSW according to ARIA+, the new enhanced Accessibility-Remoteness Index of Australia classification. This classification differs from the ARIA classification used in the previous report in several ways. In the ARIA classification an ARIA category was allocated on the basis of an average index score from 0-12 within each statistical local area (SLA). This index score was based on the road distance from the closest service centre in each of 4 classes. Under ARIA the smallest service centre had a population of 5,000 people. Remoteness for each locality was then classified based on a score from 0 (high accessibility) to 12 (high remoteness) and grouped into five categories: 'highly accessible', 'accessible', 'moderately accessible', 'remote' and 'very remote' services (AIHW, 2004).

In ARIA+ the remoteness index value was based on distance to 5 categories of 'service centre'. Centres with populations from 1,000-4,999 were included, to reflect the impact of small centres, as localities with populations of greater than 1000 persons were considered to contain at least some basic level of services (for example health, education, or retail) (GISCA, 1999). Those 'service centres' with larger populations were assumed to contain a greater level of service provision. ASGC remoteness categories were then given to Census Collection Districts (CDs) based on the average ARIA+ score within the CD. As CDs are generally smaller than SLAs, this provides a greater level of precision of the measure of remoteness than was obtained from ARIA. SLAs under ARIA+ are then classified by the proportion of the population living in CDs by the ASGC Remoteness Area classes (AIHW, 2004). The names of the 3 classes of remoteness -metropolitan, inner regional and outer regional have changed also from those used by ARIA. The names for remote and very remote classes remain the same although they are assigned slightly differently under ARIA+. This has resulted in some change in the proportions of the population classified under the new ARIA+ categories compared to the previous ARIA categories. However, the effect on rural and remote areas appears small. It has also meant that some SLAs have been reclassified. The proportion of the population of each SLA in each ARIA+ category is shown in a separate appendix to this report.

4.3 Country of birth

Where possible, indicators for the five countries that comprise the Former Yugoslavia are presented separately. However, in many datasets these countries are not identified separately, in which case indicators are presented for the Former Yugoslavia. The five countries that comprise the Former Yugoslavia are: Croatia, Slovenia, Bosnia-Herzegovina, the Former Yugoslav Republic of Macedonia, and the Former Yugoslav Republic of Serbia and Montenegro.

4.4 Socioeconomic status

The following relates to methods used in the chapter on socioeconomic status.

4.4.1 Socioeconomic status measures

Socioeconomic (SES) groups used in this chapter were constructed using the index of relative socioeconomic disadvantage (IRSD), which is one of the socioeconomic indices for areas (SEIFA) produced by the Australian Bureau of Statistics (ABS) (ABS, 2003). Non-overlapping geographical areas covering all of NSW are assigned an IRSD score calculated from ABS census data on various socioeconomic characteristics of the people living in the areas. These characteristics relate to occupation, education, non-English speaking background, indigenous origin, and the economic resources of the household.

The ABS has released IRSD scores after the last four censuses. The methods used for calculation of the IRSD index were similar in 1986, 1991 and 1996, but changed for 2001. The IRSD score is an ordinal measure based on a standard score of 1000 and standard deviation of 100 for Australia, based on the index scores of all collector districts (CDs) in Australia. The areas can be ranked by IRSD score but other arithmetic comparisons using the score are not valid. Only ranks, and not the scores calculated using data from different censuses, can be compared. For instance, the score for NSW was 1006 using 1996 census data, which means that the SES of NSW was slightly better than Australia as a whole. The score for NSW in 1991 was 1002; however that does not mean that NSW in 1996 was better off than NSW in 1991 because the scores were calculated based on a socioeconomically different Australian population. Calculations of the IRSD scores for a local government area involves the weighting of the indexes based on the population for the particular year.

The NSW population was divided into 3 groups for the analyses in this chapter. Statistical local areas were sorted by IRSD score and assigned to quintiles, each containing as close as possible to one-fifth of the total population. The data are presented for the lowest SES population quintile, the highest SES population quintile, and a group comprising the remaining three SES quintiles, which is referred to as the 'rest' or 'balance of NSW population'.

4.4.2 Poisson regression models

Poisson regression models (Armitage et al., 2002) were used to study the effect of time and SES on death rates. For each indicator (except life expectancy and ACS hospitalisations) and each sex, the trend for SES group by time was modelled to obtain fitted values for the relative health gaps and to ascertain the significance of any observed changes in the health gaps over time. Raw ratios were used to assess changes in the relative position of the SES groups for life expectancy or the rate of hospitalisations for ACS conditions due to difficulties in fitting the Poisson model in these cases.

The models included age, SES group, and year and the interaction of year and SES group. The interaction term assessed change in death rates by SES group over time, after adjusting for age differences. The relative rate of change was determined by exponentiating the coefficient for the appropriate SES*time

4.5 Avoidable mortality

variable in the model. The significance of the change was assessed by testing the difference between the slopes of these trends using the CONTRAST option in the GENMOD procedure in SAS (SAS, 2005).

The method used to calculate avoidable mortality was based on a revision of the original set of conditions published in 2001 (Tobias and Jackson, 2001). This review, by the Public Health Information Development Unit (PHIDU) in Australia and the Ministry of Health in New Zealand, aims to develop an Australasian standard list of potentially avoidable conditions.

Avoidable deaths are those attributed to conditions that are considered preventable or otherwise avoidable through earlier intervention or action. These were further sub-categorised into 3 levels of intervention. Primary level interventions are those that can prevent the condition developing, such as promotions of lifestyle modification. Secondary level interventions are those that detect or respond to the condition early in its progression, such as cancer screening and chronic disease management. Tertiary level interventions are those that treat the condition and prevent premature death. For each condition, the number of deaths that could have been avoided at each level was calculated by applying weights to the total deaths from the condition. These data were summed to determine the rates of primary, secondary and tertiary avoidable mortality. The weights were based on the work of Tobias and Jackson (2001).

The codes used to define avoidable mortality groups, along with the weights for defining the proportion avoidable by primary, secondary and tertiary interventions can be found in the disease and procedure codes section of this report.

4.6 Ambulatory care sensitive conditions

The method used to calculate avoidable hospitalisations uses the concept of ambulatory care-sensitive (ACS) conditions. These are hospitalisations that could have been avoided through the use of preventive healthcare or early disease management given in an ambulatory setting, such as by a general practitioner or community health centre.

The categories used for the ambulatory care-sensitive conditions are based on those used by the Victorian Department of Human Services (DHS, 2001), which have been reviewed by the Public Health Information Development Unit (PHIDU). The DHS list was defined according to ICD-9-CM; appropriate groupings of ICD-10-AM codes were developed for the previous report, and have undergone review by PHIDU.

The information presented in this report differs from information presented in previous editions of *The health of the people of New South Wales*. In 2006 in NSW the coding of diabetes was changed to include diabetes in primary diagnosis only and the coding of cellulitis has been brought in line with the original PHIDU's definition.

The codes used can be found in the disease and procedure codes appendix of this report.

4.7 Diabetes-related deaths

The term 'diabetes-related death' is used in this report to refer to deaths where either diabetes was recorded as the underlying cause of death, or where diabetes was recorded as an associated cause of death and the underlying cause of death was one of a specific list of commonly recognised diabetes complications. These complications were: myocardial infarction, ischaemic heart disease, stroke or sequelae of stroke, heart failure, sudden death (cardiac arrest), peripheral vascular disease, kidney disease, hyperglycaemia, hypoglycaemia (Dixon et al, 2005).

The reason for this approach was that, more than other disorders, diabetes often causes death indirectly because it is a strong risk factor for common causes of death such as heart and kidney disease, and stroke. These complications are likely to appear as the underlying cause of death, the basis for official mortality statistics. If only cases where diabetes as the underlying cause were counted, it would lead to considerable underestimates of diabetes' contribution to death in Australia (Dixon et al, 2005).

The concept of 'diabetes-related deaths' is based on the definition of 'death related to diabetes' used in the United Kingdom Prospective Diabetes Study since 1998. The UKPDS definition has been modified by diabetes specialists on the National Diabetes Data Working Group, associated with AIHW, to include additional conditions (ischaemic heart disease, stroke and heart failure) (Dixon et al, 2005).

For the full list of codes of included conditions see the disease and procedure codes appendix of this report.

4.8 Psychological distress

The K10 (Kessler and Mroczek, 1992, 1994) was included in the 1997, 1998, 2002 and 2005 NSW Population Health Surveys as a relatively short measure of psychological distress that allowed comparison against international survey data and validation against concurrent diagnostic data in the National Survey of Mental Health and Wellbeing (NSMHW) (Andrews and Slade, 2001). The K10 (and a briefer K6 measure) were specifically designed for use in the 'core' of the annual US National Health Interview Survey (NHIS, N=50,000 aged 15+) when it was redesigned for use from 1997 onwards. The K6 has also been used in the biennial Canadian National Population Health Survey (panel survey, N>17,000 aged 12+; 1994-95; 1996-97; 1998-99; 2000-01) and has been replaced by the K10 in the Canadian Community Health Survey from September 2000 (Statistics Canada, 2002).

The K10 is currently being used in a series of surveys similar to the Australian NSMHW, in 20 countries, under the auspices of the World Health Organisation (WHO). These surveys have a total sample size of about 200,000. The WHO regions surveyed include North America (Canada and the United States), Latin America (Brazil, Colombia, Mexico and Peru), Europe (Belgium, France, Germany, Italy, The Netherlands, Spain, and The Ukraine), the Middle East (Israel), Africa (South Africa), and Asia (China, India, Indonesia, Japan, and New Zealand) (Kessler et al., 2000).

The K10 measure is a 10-item self-report questionnaire intended to yield a global measure of 'psychological distress' based on questions about the level of restlessness, anxiety, and depressive symptoms in the most recent 4-week period. It is designed to span the range from few or minimal symptoms through to extreme levels of distress, which is an essential feature of an instrument for use in population studies. Thus the K10 contains both low-threshold items, that many people may endorse, through to high-threshold items that very few will endorse. Overall, the item-response scale is designed to yield most precision around the 90th to 99th percentile of the general population.

For each item there is a 5-level response scale based on the amount of time (from none through to all) during a 4-week period when the person experienced the particular problem. In NSW use, there are also 4 follow-up questions, that aim to quantify the level of disability resulting from the feelings of distress; the health service usage resulting from the distress; and the extent to which the distress is believed to be mainly due to physical health problems.

Scoring of the raw questionnaire assigns between 1 to 5 points to each symptom in the direction of increasing problem frequency. Thus, the raw score range is from 10 (all responses to all questions are 'none of the time') through to 50 (all responses to all questions are 'all of the time'). Scoring of the raw questionnaire assigns between 1 to 5 points to each symptom in the direction of increasing problem frequency. Thus, the raw score range is from 10 (all responses to all questions are 'none of the time') through to 50 (all responses to all questions are 'all of the time'). Low scores indicate low levels of psychological distress and high scores indicate high levels of psychological distress.

The creators of the K10 have not yet published details on scoring the scale and there has been no international standard for determining cut off points for low, medium and high levels of psychological distress. Various interpretations of scoring were used in the past in Australia and worldwide. Recently, and following the advice of the K10 originators, NSW adopted a four level approach to illustrate prevalence and severity. The four levels are given in Table 2.

Table 2 K10 score and level of psychological distress

K10 score	Level of psychological distress
10–15	Low
16–21	Moderate
22–29	High
30–50	Very high

These cut-off scores were previously used in the 2000 Health and Wellbeing Survey (conducted in Western Australia) and the ABS 2001 National Health Survey Summary of Results Publication (ABS, 2003). The adoption of the above scores in NSW ensures comparability of the NSW results with national and, increasingly, international data.

5. Area Health Service boundaries

In July 2004, the Minister for Health announced a new area health structure. The restructure is largely a merger of the 17 Area Health Services into 8 new Area Health Services. The new administrative structure was in place by January 1, 2005. A list of the mergers is given in Table 3. Some localities within the Statistical Local Areas of Greater Taree, Greater Lakes, Gloucester and Lithgow moved to the new Area Health Services independently of the main mergers.

In this report, the 2005 Area Health Services boundaries have been used. A list of local government areas by 2005 Health Area is given elsewhere in this appendix.

Table 3 1996 and 2005 Area Health Services

1996 Area Health Service names	2005 Area Health Service names
Central Sydney	Sydney South West
South Western Sydney	
South Eastern Sydney	South Eastern Sydney & Illawarra
Illawarra	
Wentworth	Sydney West
Western Sydney	
Northern Sydney	Northern Sydney & Central Coast
Central Coast	
Hunter	Hunter & New England
New England	
Mid North Coast	North Coast
Northern Rivers	
Greater Murray	Greater Southern
Southern	
Far West	Greater Western
Macquarie	
Mid Western	

Note: Some localities within the Statistical Local Areas of Greater Taree, Greater Lakes, Gloucester and Lithgow moved to the new Area Health Services independently of the main mergers.

6. Quality assurance process

The preparation of this report involved a great deal of complex data processing and manipulation. The following steps were taken to minimise errors:

- most analyses used a single, shared suite of datasets, contained on the HOIST system. The datasets on HOIST are carefully checked against the original source data to ensure their fidelity. Sources for all data used are described in the footnotes;
- all graphs and tables were produced using SAS programs that can be audited, rather than using interactive data manipulation facilities such as spreadsheets that are much more difficult to check;
- the SAS programs directly created the Web pages for the online version of the report as well as tables and graphs, which were directly imported into Adobe InDesign for typesetting the printed version. This minimised the possibility of transcription and typographical errors;
- every SAS program used in the production of this report was checked by someone other than the person who originally wrote it. Items such as the correct specification of ICD codes and correct selection of numerator and denominator data were systematically checked as part of this audit process;
- complex parts of the SAS programs were abstracted as a common, shared set of SAS ‘macros’ (callable subroutines). These macros – which were employed for operations such as imputation, direct standardisation and production of custom graph formats – were subject to rigorous testing before they were used;
- all results were checked against other, comparable sources wherever possible.

Disease and procedure codes

This appendix details the codes from the International Statistical Classification of Diseases (ICD) used to prepare some of the data included in this report.

The 10th Revision of the ICD (ICD-10) was generally implemented in Australia from 1998 onwards. It was a major update of the 9th Revision (ICD-9). For some diseases or disease groups, it is not possible to construct a one-to-one mapping between the 2 revisions, and as a result there may be a small distortion of trend lines. Where there was a major change in the cases that would be selected, no trends have been shown.

For some disease groupings, codes differ between the modifications of ICD-9 used for the various data sources. These differences are shown in the table.

Disease codes

ICD codes used for diseases or disease groups in this report are shown in Table 1.

ABS Deaths Register

Causes of deaths registered before 1999 were coded according to the 9th Revision of the International Classification of Diseases (ICD-9). From 1 January 1999 onwards, causes of death have been classified according to the 10th Revision of the International Classification of Diseases (ICD-10).

Inpatient Statistics Collection

The reasons for admission to hospital were coded according to the 9th Revision of the International Classification of Diseases, Clinical Modification (ICD-9-CM) for years up to and including 1997–98. From 1 July 1998, the reasons for admission have been coded according to the 10th Revision of the International Classification of Diseases, Australian Modification (ICD-10-AM).

Central Cancer Registry

Cases of cancer registered before July 1999 were classified according to ICD-9. Cases registered from 1 July 1999 onwards have been classified according to the 2nd edition of the International Classification of Diseases for Oncology (ICD-O-2). ICD-O-2 codes were translated by the Registry to ICD-10 codes, which were used to prepare this report.

Procedure codes

ICD codes used for procedures or procedure groups in this report are shown in Table 2.

Inpatient Statistics Collection

Procedures carried out while patients were admitted to hospital were coded according to the 9th Revision of the International Classification of Diseases, Clinical Modification (ICD-9-CM) for years up to and including 1997–98. From 1 July 1998, the procedures have been coded according the MBS–Extended procedure classifications in ICD-10-AM. These codes are based on the Commonwealth Medicare Benefits scheme (MBS) and are relevant to Australian data only.

Potentially avoidable mortality

ICD codes for diseases and disease groups used to calculate potentially avoidable mortality are shown in Table 3. Tobias and Jackson (2001) defined conditions using ICD-9 codes only. The appropriate groupings of ICD-10 codes were developed for this report.

Ambulatory care sensitive conditions

ICD codes for diseases and disease groups used to calculate ambulatory care sensitive (ACS) conditions, i.e. potentially avoidable hospitalisation, are shown in Table 4. The categories used for ACS are based on those used by the Victorian Department of Human Services (VDHS, 2001), which were defined according to ICD-9-CM codes. The appropriate groupings of ICD-10-AM codes were developed for this report.

Table 1 Disease and disease group codes

Group	ICD-9 and ICD-9-CM	ICD-10 and ICD-10-AM
Acute respiratory infection	460-466, 480-487	J00-J22
Adverse event after immunisation	E948,E949.0-E949.7	Y58,Y59.0-Y59.2
Air transport injury	E840-E845	V95-V97
Ambulatory care sensitive conditions	see disease codes for ambulatory care sensitive conditions table	see disease codes for ambulatory care sensitive conditions table
Anthrax	022,484.50	A22
Aortic aneurysm	441	I71
Aortic aneurysm: Abdominal	441.3,441.4	I71.3,I71.4
Arboviral infection-Ross River	no separate code	B33.1
Arboviral infection-other/not specified	061-064,066	A83,A84,A85.2,A90,A92-A94
Asbestosis	501	J61
Asthma	493	J45,J46
Back pain	Not used in this report	M54
Benzodiazepine deaths	Not used in this report	underlying cause any of F13, F19, X41, X44 in combination with associated cause T42.4.
Blood and immune diseases	Not used in this report	D50-D89
Botulism	005.1	A05.1
Brucellosis	023	A23
Burns and scalds	E890-E899, E924.0, E924.2, E924.8, E924.9	X00-X19
Cancer (all)	140-208	C00-C97
Cancer: breast	174	C50
Cancer: cervical cancer	180	C53
Cancer: colorectal	153-154	C18-C21
Cancer: kidney	Not used in this report	C64-C66, C68
Cancer: liver	Not used in this report	C22
Cancer: lung	162	C33-C34
Cancer: melanoma	172	C43
Cancer: Non-Hodgkin Lymphoma	Not used in this report	C82-C85
Cancer: oral	141-145	C01-C08
Cancer: pancreas	Not used in this report	C25
Cancer: prostate	185	C61
Cancer: unknown primary	Not used in this report	C26,C39,C48,C76,C80
Cardiovascular diseases	Not used in this report	I00-I99
Cardiovascular disease (all)	390-459	I00-I99, G45, G46
Chancroid	099.0	A57
Chickenpox	052	B01
Chickenpox complications	Not used in this report	Meningitis: B01.0; Encephalitis: B01.1; Pneumonia: B01.2; Other: B01.8; None: B01.9
Chlamydia trachomatis-congenital pneumonia	no separate code	P23.1
Chlamydia trachomatis-lymphogranuloma venereum	099.1	A55
Chlamydia trachomatis-other sexually transmitted	ICD9: no separate code ICD9CM 099.41, 099.5	A56, A74.8, K67.0, N74.4
Cholera	001	A00
Chronic obstructive pulmonary disease	491-492, 496	J41-J44
Chronic respiratory disease	491, 492, 493, 496	J41-J46
Coronary heart disease	410-414	I20-I25
Cryptosporidiosis	ICD9: no separate code ICD9CM: 007.4	A07.2
Cutting or piercing injury (unintentional)	E920	W25-W29,W45
Dementia	Not used in this report	F00-F03 in diagnosis fields 1-10
Diabetes	250, 648.0, 648.8	E10-E14, O24

Table 1 Disease and disease group codes (continued)

Group	ICD-9 and ICD-9-CM	ICD-10 and ICD-10-AM
Diabetes: Type 1	Not used in this report	E10, O24.0
Diabetes: Type 2	Not used in this report	E11, O24.1
Diabetes: Gestational	Not used in this report	O24.4
Diabetes: Other	Not used in this report	E12, E13, E14, E12, O24.2, O24.3, O24.9
Diabetes complications	250, 648.0, 648.8 in diagnosis fields 2-5	E10-E14, O24 in diagnosis fields 2-5
Diabetes complication types	Not used in this report	Hyperosmolarity (Type 2 only): E11.0, E13.0, E14.0, E12.0; Acidosis: E10.1, E11.1, E13.1, E14.1, E12.1; Renal: E10.2, E11.2, E13.2, E14.2, E12.2; Ophthalmic: E10.3, E11.3, E13.3, E14.3, E12.3; Neurological: E10.4, E11.4, E13.4, E14.4, E12.4; Circulatory: E10.5, E11.5, E13.5, E14.5, E12.5; Other specified: E10.6, E11.6, E13.6, E14.6, E12.6; Multiple: E10.7, E11.7, E13.7, E14.7, E12.7; Not specified: E10.8, E11.8, E13.8, E14.8, E12.8; No complications: E10.9, E11.9, E13.9, E14.9, E12.9; Other: any other codes
Diabetes: Acute complications	Not used in this report	E10.1, E11.0, E11.1, E13.0, E13.1, E14.0, E14.1, E12.0, E12.1
Diabetes: Chronic complications	Not used in this report	E10.2, E11.2, E13.2, E14.2, E12.2, E10.3, E11.3, E13.3, E14.3, E12.3, E10.4, E11.4, E13.4, E14.4, E12.4, E10.5, E11.5, E13.5, E14.5, E12.5, E10.6, E11.6, E13.6, E14.6, E12.6, E10.7, E11.7, E13.7, E14.7, E12.7
Diabetes: Complications, not specified	Not used in this report	E10.8, E11.8, E13.8, E14.8, E12.8
Diabetes: ophthalmic complications	Not used in this report	E10.3, E11.3, E12.3, E13.3, E14.3 in diagnosis fields 1-10
Diabetes deaths	Not used in this report	E10-E14 Diabetes-related deaths: Underlying cause E10-E14, or associated cause E10-E14 with underlying cause E16.1-E16.2, I20-I22, I24-I25, I46, I50, I60-I64, I69.0-I69.4, I70-I74, N01-N28, R73
Digestive system diseases	Not used in this report	K00-K93
Diphtheria	032	A36
Drowning	E910, E830, E832	W65-W74, V90, V92
Endocrine diseases	Not used in this report	E00-E89
Escherichia coli (E. coli)-enterohaemorrhagic	ICD9: no separate code ICD9CM: 008.04	A04.3
Exposure to unspecified factors injury	Not used in this report	X59
Factors influencing health	Not used in this report	Z00-Z99
Falls	E880-E886, E888, E929.3	W00-W19
Firearm injury (unintentional)	E922	W32-W34
Firearm injury	E922, E955.0-E955.4, E955.9, E965.0-E965.4, E970, E985.0-E985.4	W32-W34, X72-X74, X93-X95, Y35.0, Y22-Y24
Gastrointestinal infections	001-009	A00-A09
Genitourinary diseases	Not used in this report	N00-N99
Giardiasis	007.1	A07.1
Gonorrhoea	098, 647.1	A54, K67.1, M73.0, N74.3, O98.2
Granuloma inguinale (Donovanosis)	099.2	A58
Haemolytic uraemic syndrome	ICD9: no separate code ICD9CM: 283.11	D59.3
Haemophilus influenzae meningitis	320	G00.0
Heart failure	428	I50
Hepatitis A	070.0, 070.1	B15
Hepatitis B	Not used in this report	B16.2, B16.9, B18.1
Hepatitis B (including Hepatitis D)	070.2, 070.3	B16, B17.0, B18.0, B18.1
Hepatitis C	ICD9: no separate code ICD9CM: 070.41, 070.44, 070.51, 070.54	B17.1, B18.2

Table 1 Disease and disease group codes (continued)

Group	ICD-9 and ICD-9-CM	ICD-10 and ICD-10-AM
Hepatitis D	ICD9: no separate code ICD9CM: 070.2, 070.23, 070.31, 070.33, 070.42, 070.52	B16.0,B16.1,B17.0,B18.0
Hepatitis E	ICD9: no separate code ICD9CM: 070.43, 070.53	B17.2
Hepatitis-viral, type not specified	ICD9: 070.4, 070.5, 070.6, 070.9 ICD9CM: 070.49, 070.59, 070.6, 070.9	B17.8, B18.8, B18.9, B19.0, B19.9, B94.2, O98.4, P35.3
Hip fractures	Not used in this report	S72.0-S72.2
HIV-Acquired immune deficiency syndrome (AIDS)	042	B20-B24
Infectious diseases	Not used in this report	A00-B99
Influenza	487	J10, J11
Influenza and pneumonia	480-487	J10-J18
Influenza and pneumonia (presentations at Emergency Departments)	480-487	not used in this report
Injury and poisoning	E800-E869, E880-E929, E950-E999	V00-X99, Y00-Y39, Y85-Y87, Y89
Injury and poisoning: principal diagnosis codes	800-908,909 with no additional characters,909.0-909.2,909.4-909.9,910-994,995.5,995.81	S00-T77,T79,T89-T97,T98 with no additional characters,T98.0,T98.1,T98.2
Injury and poisoning (all external cause codes)	Not used in this report	V00-Y89
Interpersonal violence	E960-E969	X85-Y09, Y87.1
Interpersonal violence (children)	E960-E969, E980-E989, V61.21	X85-Y09, Y10-Y34, Y87.1, Z61.6
Legionnaires disease	no separate code	A48.1, A48.2
Leprosy	030	A30, B92
Leptospirosis	100	A27
Listeriosis	027	A32, P37.2
Machinery injury	E919	W24, W30. W31
Malaria	084, 647.4	B50-B54, P37.3, P37.4
Maternal, neonatal and congenital causes	Not used in this report	O00-Q99
Measles	ICD9: 055, 484.0 ICD9CM: 055	B05
Mental disorders	Not used in this report	F00-F99
Meningococcal disease	036, 320.5	A39, M01.0, M03.0
Mesothelioma	no separate diagnosis code	C45
Motor vehicle crash injury	E810-E825, E929.0	V02-V04, V09.0, V09.2, V12-V14, V19.0-V19.6,V20-V79, V80.3-V80.5, V81.0, V81.1, V82.0, V82.1, V83,V84-V86,V87.0-V87.5,V87.7-V87.8, V88.0-V88.5,V88.7-V88.8, V89.0, V89.2,Y85
Motor vehicle crash injury: road user type subgroups	Not used in this report	Motor vehicle occupant: V30-V79, V83-V86 Motor cyclist V20-V29 Pedal cyclist: V12-V14, V19.0-V19.2, V19.4-V19.6 Pedestrian: V02-V04, V09.0, V09.2
Musculoskeletal	Not used in this report	M00-M99
Mumps	ICD9: 072, 321.5 ICD9CM: 072	B26
Natural/environmental factors injury	E900-E909, E928.0-E928.2	W42-43, W53-64, W92-99, X20-X39, X51-57
Neoplasms - malignant	Not used in this report	C00-C99
Neoplasms - other than malignant	Not used in this report	D00-D48
Nervous and sense disorders	Not used in this report	G00-H95
Opiate deaths	304.0, 304.7, 305.5, E850.0	Underlying or associated cause F11, underlying cause any of F19, X42, X44 combined with associated cause any of T40.0-T40.4,T40.6
Osteoarthritis	Not used in this report	M15-M19
Osteoporosis	Not used in this report	M80-M82
Otitis media	Not used in this report	H65, H66, H67.0, H67.8

Table 1 Disease and disease group codes (continued)

Group	ICD-9 and ICD-9-CM	ICD-10 and ICD-10-AM
Overexertion or repetitive movement injury	E927	X50
Pedestrian injury	E810-E825 with fifth digit = 7	V02-V04, V09 with fourth digit not 9
Peripheral vascular disease	440-444	I70-I74
Pertussis (whooping cough)	033	A37
Pneumococcal infection	ICD9: 038.2, 041.2, 320.1, 481, 567.1 ICD9CM: 038.2, 041.06(from July 1995), 041.2(to June 1995), 320.1, 481, 567.1	A40.3,B95.3,G00.1,J13,M00.1
Poliomyelitis	045, 138, 323.2, 730.7	A80, B91, M89.6
Poisoning (unintentional)	E850-E869	X40-X49
Potentially avoidable deaths	see disease codes for potentially avoidable deaths table	see disease codes for potentially avoidable deaths table
Psittacosis	073	A70
Psychostimulant deaths	Not used in this report	F14, underlying cause any of F15, F19, X41, X42, X44 in combination with associated cause any of T40.5,T43.6
Q fever	083	A78
Rabies, lyssavirus	071	A82
Rail transport injury	E800-E807	V05, V15, V80.6, V81.2-V81.9
Respiratory diseases	460-519	J00-J99
Rheumatoid arthritis	Not used in this report	M05-M06
Rubella-congenital	771	P35.0
Rubella-other	056, 647.5	B06, M01.4
Salmonella infection (non-typhoid)	003	A02
Shigellosis	004	A03
Skin diseases	Not used in this report	L00-L99
Skin infections	680-686	L00-L08
Sports injury	no equivalent	1999-00: (in any external cause code) V00- V99 with fifth character = 0 2000 on: (in any activity code or diagnosis code) Y93.0, U50-U72
Stroke	430-438	I60-I69, G45,G46
Struck by/against injury	E916-E917	W20-W22, W50-W52
Syphilis-congenital	090	A50
Syphilis-infectious	Not used in this report	A51
Syphilis-other	Not used in this report	A52-A53, I98.0, K67.2, M03.1, M73.1, N74.2, O98.1
Suicide	E950-E959	X60-X84, Y87.0
Symptoms and other ill defined conditions	Not used in this report	R00-R99
Tetanus	037, 771.3	A33-A35
Threats to breathing injury (unintentional)	E911-E913.9	W75-W84
Tuberculosis	ICD9: 010-018, 137, 320.4, 647.3, 730.4, 730.5, 730.6 ICD9CM: 010-018, 137, 647.3	A15-A19, B90, J65, K23.0, K67.3, K93.0, M01.1, M49.0, M90.0, N33.0, N74.0, N74.1, 098.0, P37.0
Typhoid and paratyphoid	002	A01
Typhus(epidemic)	080	A75.0
Unintentional injury	Not used in this report	V00-X59,Y10-Y39, Y85-Y86, Y89
Viral haemorrhagic fevers	065, 078.6, 078.7	A91, A96, A98, A99
Water transport injury	E831, E833-E838	V91, V93, V94
Workplace injury	no equivalent	financial status=Workers compensation, or 1998-99: V00-Y99 and fifth character =2 (in principal external cause code) 2000 on: Z04.2 (in any diagnosis code) or Z57(in any diagnosis code) or Y93.2 (in any external cause activity code) or Y96 (in any external cause code) or 2002 on: as for 2000, plus U73.0 (in any external cause activity code)
Yellow fever	060	A95

Table 2 Procedure and procedure group codes

Procedure	icd-9 and ICD-9-CM	ICD-10 and ICD-10-AM
Carotid endarterectomy	38.12 in procedure codes 1-5	33500-00 in procedure codes 1-5
Coronary artery bypass graft	36.1	38497, 38500, 38503, 90201
Coronary artery bypass angioplasty/stent	36.01, 36.02, 36.05, 36.06, 36.07	35310, 35304-00, 30305-00
CT scan of the brain	87.03 in procedure codes 1-5 with 430-438 in diagnosis codes 1-11	56001-00, 56007-00, 56010-02, 56010-03 in procedure codes 1-5 with I60-I69 in diagnosis codes 1-11
Dental: Removal or restoration of teeth (procedures)	23	97311-97327, 97411-97679, 97386-00, 97387-00, 97388-00 or procedure block 457-458, 462-473
Hip replacement	Not used in this report	Procedure block 1489 or 1492 in any procedure code
Knee replacment	Not used in this report	Procedure block 1518 or 1519 in any procedure code
Lower limb amputation with diabetes as co-morbidity	84.1 with 250 in diagnosis codes 1-5	44370-00, 44367-00, 44367-02, 44361-00, 44361-01, 44358-00, 44364-00, 44364-01, 44338-00 with E10-E14 in diagnosis codes 1-5
Revascularisation procedures	36.01, 36.02, 36.05, 36.06, 36.07, 36.1	38497, 38500, 38503, 90201, 35310, 35304-00, 30305-00

Table 3 Codes for disease groups used to calculate potentially avoidable mortality

Group	Conditions included	ICD-9	ICD-10	Primary avoidable mortality	Secondary avoidable mortality	Tertiary avoidable mortality
Enteritis and other diarrhoeal diseases	Diarrhoeal diseases	001-009	A00-A09	0.7	0.1	0.2
Infection	Tuberculosis	010-018,137	A15-A19, B90	0.6	0.35	0.05
Childhood vaccine-preventable disease	Diphtheria, whooping cough, tetanus, polio, Hib, measles, rubella	032-033, 036.0, 037, 041.2, 041.5, 045, 052, 055-056	A35-A37, A49.1, A49.2, A80, B01, B05-B06, J11	0.9	0.05	0.05
Infection	Selected Invasive Bacterial and Protozoal infection	034-035, 038, 084, 320, 481-482, 485, 681-682	A38-A41, A46, A48.1, B50-B54, G00, G03, J13-J15, J18, L03	0.3	0.4	0.3
Sexually transmitted diseases except HIV/AIDS		090-099, 614.0-614.5, 614.7-616.9, 633	A50-A64, M02.3, N34.1, N70-N73, N75.0, N75.1, N76.4, N76.6, O00	0.8	0.1	0.1
Infection	HIV/AIDS	042, 279.10	B20-B24	0.9	0.05	0.05
Infection	Hepatitis	070	B15-B19	0.7	0.1	0.2
Infection	Viral Pneumonia and Influenza	480, 487	J10, J12, J17.1, J21	0.4	0.5	0.1
Neoplasms	Lip, Oral Cavity and Pharynx	140-149	C00-C14	0.8	0.1	0.1
Neoplasms	Oesophagus	150	C15	0.95	0	0.05
Neoplasms	Stomach	151	C16	0.4	0.2	0.4
Neoplasms	Colorectal	153, 154	C18-C21	0.4	0.5	0.1
Neoplasms	Liver	155	C22	0.7	0.1	0.2
Neoplasms	Lung	162	C33-C34	0.95	0	0.05
Neoplasms	Melanoma of skin	172	C43	0.6	0.1	0.3
Neoplasms	Nonmelanotic skin	173	C44	0.6	0.1	0.3
Neoplasms	Breast (Females only)	174	C50	0.15	0.35	0.5
Neoplasms	Uterus	179, 182	C54-C55	0.1	0.4	0.5
Neoplasms	Cervix	180	C53	0.3	0.5	0.2
Neoplasms	Bladder	188	C67	0.5	0.25	0.25
Cancer of testis	Cancer of testis	186	C62	0	0.3	0.7
Eye cancer	Eye cancer	190	C69	0	0	1
Neoplasms	Thyroid	193	C73	0.1	0.2	0.7
Neoplasms	Hodgkins disease	201	C81	0	0.1	0.9
Neoplasms	Leukemia (Age < 44 only)	204-208	C91.0, C91.1	0.05	0.05	0.9
Neoplasms	Benign	210-229	D10-D36	0	0	1
Nutritional deficiency anaemia		280-281	D50-D53	1	0	0
Nutritional, endocrine and metabolic	Thyroid disorders	240-246	E00-E07	0.1	0.7	0.2
Nutritional, endocrine and metabolic	Diabetes	250	E10-E14	0.3	0.6	0.1
Adrenal disorders		255.0, 255.4	E24, E27			
Newborn screening conditions	Congenital hypothyroidism, CAH, PKU, galatosaemia	255.2, 270.1, 271.1	E25, E70.0, E74.2	0	0.8	0.2

Table 3 Codes for disease groups used to calculate potentially avoidable mortality (continued)

Group	Conditions included	ICD-9	ICD-10	Primary avoidable mortality	Secondary avoidable mortality	Tertiary avoidable mortality
Drug use disorders	Alcohol related disease	291, 303, 305.0, 425.5, 535.3, 571.0-571.3	F10, I42.6, K29.2, K70	0.9	0	0.1
Drug use disorders	Illicit drug use disorders	292, 304, 305.2-305.9	F11-F16, F18-F19	0.9	0	0.1
Neurological disorders	Epilepsy	345	G40-G41	0	0.9	0.1
Cardiovascular diseases	Rheumatic and other valvular heart disease	390-398	I01-I09	0.3	0.6	0.1
Cardiovascular diseases	Hypertensive heart disease	402	I11	0.3	0.65	0.05
Cardiovascular diseases	Ischaemic heart disease	410-414	I20-I25	0.5	0.25	0.25
Cardiovascular diseases	Cerebrovascular diseases	430-438	I60-I69	0.3	0.5	0.2
Cardiovascular diseases	Aortic aneurysm	441	I71	0.3	0.3	0.3
Genitourinary Disorders	Nephritis and Nephrosis	403, 580-589, 591	I12-I13, N00-N09, N17-N19	0.1	0.2	0.7
Genitourinary Disorders	Obstructive uropathy & Prostatic Hyperplasia	592, 593.7, 594, 598, 599.6, 600	N13, N20-N21, N35, N40, N99.1	0.3	0.3	0.3
Respiratory diseases	DVT with pulmonary embolism	415.1, 451.1	I26, I80.2	0.3	0.3	0.3
Respiratory diseases	COPD	490-492, 496	J40-J44	0.8	0.1	0.1
Respiratory diseases	Asthma	493	J45-J46	0.1	0.7	0.2
Upper respiratory tract infection		382-383, 460-465	J00-J06, H66, H70	0.4	0.5	0.1
Digestive disorders	Peptic ulcer disease	531-534	K25-K28	0.05	0.75	0.2
Digestive disorders	Acute abdomen, appendicitis, intestinal obstruction, cholecystitis / lithiasis, pancreatitis, hernia	540-543, 550-553, 574-577	K35-K38, K40-K46, K80-K83, K85-K86, K91.5	0	0	1
Digestive disorders	Chronic liver disease (excluding alcohol related disease)	571.4-571.9	K73, K74	0.7	0.1	0.2
Osteomyelitis and other osteopathies of bone	Skin, bone and joint infections	730	M86, M89-M90	0.2	0.5	0.3
Maternal & infant	Birth defect	237.70, 740-760	H31.1, P00, P04, Q00-Q99	0.1	0.2	0.7
Complication of pregnancy, labor or the puerperium,	Complications of pregnancy	630-632, 634-676	O01-O99	0.2	0.5	0.3
Maternal & infant	Complications of perinatal period	764-779	P03, P05-P95	0.3	0.2	0.5
Sudden infant death syndrome	SIDS	798	R95	1	0	0
Unintentional injuries	Road traffic injuries, other transport injuries	E810-E819	V01-V04, V06, V09-V80, V87, V89, V99	0.6	0	0.4

Table 3 Codes for disease groups used to calculate potentially avoidable mortality (continued)

Group	Conditions included	ICD-9	ICD-10	Primary avoidable mortality	Secondary avoidable mortality	Tertiary avoidable mortality
Unintentional injuries	Accidental Poisonings	E850-E869	X40-X49	0.6	0	0.4
Unintentional injuries	Falls	E880-E886, E888	W00-W19	0.6	0	0.4
Unintentional injuries	Fires, burns	E890-E899	X00-X09	0.8	0	0.2
Unintentional injuries	Drownings (Swimming)	E910	W65-W74	0.8	0	0.2
Intentional injuries	Suicide and self inflicted injuries	E950-E959, E980-E989	X60-X84, Y87.0, Y10-Y34	0.6	0.3	0.1
Intentional injuries	Violence	E960-E969	X85-Y09, Y87.1	1	0	0
War		E990-E999	Y36	1	0	0
Iatrogenic conditions	Complications of treatment	E870 - E879	Y60-Y84	0	0.2	0.8

Table 4 Codes for disease groups used to calculate ambulatory care sensitive (ACS) hospitalisations

Group	ICD-9-CM codes (NSW Health)	ICD-10-AM codes (NSW Health)	Further selection information
Vaccine-preventable			
Influenza and pneumonia	481, 482.2, 482.3, 482.9, 483, 487.0, 487.1, 487.8	J10, J11, J13, J14, J15.3, J15.4, J15.7, J15.9, J16.8, J18.1, J18.8	In any diagnosis field; exclude people under 2 months; ICD-9-CM: exclude cases with second diagnosis of 282.6; ICD-10-AM: exclude cases with second diagnosis of D57
Other vaccine preventable	032, 033.0, 033.1, 033.8, 033.9, 037, 045, 055, 056, 070.3, 072, 320.0	A35, A36, A37, A80, B05, B06, B16.1, B16.9, B18.0, B18.1, B26, G00.0, M01.4	In any diagnosis field
Chronic			
Diabetes complications	250.1-250.9	E10.0-E10.8, E11.0-E11.8, E12.0- E12.8, E13.0-E13.8, E14.0-E14.8	Principal diagnosis only
Nutritional deficiencies	260, 261, 262, 268.0, 268.1	E40-E43, E55.0, E64.3	Principal diagnosis only
Iron deficiency anaemia	280.1, 280.8, 280.9	D50.1-D50.9	Principal diagnosis only
Hypertension	401.0, 401.9, 402.00, 402.10, 402.90	I10, I11.9	Principal diagnosis only; ICD-9-CM: exclude cases with procedure code of 35, 36, 37.5, 37.6, 37.7, 37.8; ICD-10-AM: exclude cases with procedures in blocks 600-693, 705-707, 717 and procedure codes 38721-00, 38721-01, 90226-00
Congestive heart failure	402.01, 402.11, 402.91, 428, 518.4	I11.0, I50, J81	Principal diagnosis only; ICD-9-CM: exclude cases with procedure code of 35, 36, 37.5, 37.6, 37.7, 37.8; ICD-10-AM: exclude cases with procedures in blocks 600-693, 705-707, 717 and procedure codes 38721-00, 38721-01, 90226-00
Angina	411.1, 411.8, 413	I20, I24.0, I24.8, I24.9	Principal diagnosis only; ICD-9-CM: exclude cases with procedure codes 01 to 86.99; ICD-10-AM: exclude cases with procedure codes in blocks 1-1779
Chronic obstructive pulmonary disease	491, 492, 494, 496, (466.0)J41-J44, J47, (J20)		Principal diagnosis only; ICD-9-CM: 466.0 only with second diagnosis of 491, 492, 494, 496; ICD-10-AM: J20 only with secondary diagnosis of J41, J42, J43, J44, J47
Asthma	493	J45, J46	Principal diagnosis only
Acute			
Dehydration and gastroenteritis	276.5, 558.9	E86, K52.2, K52.8, K52.9	Principal diagnosis only
Convulsions and epilepsy	345, 642.6, 780.3	G40, G41, O15, R56	Principal diagnosis only
Ear, nose and throat infections	382, 462, 463, 465, 472.1	H66, H67, J02, J03, J06, J31.2	Principal diagnosis only
Dental conditions	521, 522, 523, 525, 528	A69.0, K02-K06, K08, K09.8, K09.9, K12, K13	Principal diagnosis only
Perforated/bleeding ulcer	531.0-531.2, 531.4-531.6, 532.0-532.2, 532.4-532.6, 533.0-533.2, 533.4-533.6, 534.0-534.2, 534.4-534.6	K25.0- K25.2, K25.4-K25.6, K26.0-K26.2, K26.4-K26.6, K27.0-K27.2, K27.4-K27.6, K28.0-K28.2, K28.4-K28.6	Principal diagnosis only
Ruptured appendix	540	K35.0	In any diagnosis field
Pyelonephritis	590.0, 590.1, 590.8	N10, N11, N12, N13.6	Principal diagnosis only
Pelvic inflammatory disease	614	N70.0, N70.1, N70.9, N73, N74.0-N74.1, N74.2-N74.8	Principal diagnosis only
Cellulitis	681, 682, 683, 686	L03, L04, L08.0, L08.8, L08.9, L88, L98.0, L98.3	Principal diagnosis only; ICD-9-CM: exclude cases with procedure codes 01 to 86.99 except 86.0 where it is the only listed procedure; ICD-10-AM: exclude cases when any procedure performed from blocks 1-1779 except when the following procedures done as the only ones: blocks: 1604-1606, 1608 and procedures: 90660-00, 30207-00, 30676-00, 30679-00, 34530-01 and 47912-00.
Gangrene	785.4	R02	In any diagnosis field

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Glossary

Admission	The formal process, using registration procedures, under which a person is accepted by a hospital or an area or district health service facility as an inpatient.
Aetiologic fraction	A measure of the amount of disease associated with an exposure within a population. In a situation in which exposure to a given factor is believed to be a cause of a given disease, the population attributable fraction (or population aetiologic fraction) is the proportion of the disease in the total population that can be attributed to exposure to the factor.
Age-adjusted rate	Rate adjusted to take account of differences in age composition when rates for different populations are compared.
Age-specific rate	Rate for a specified age group. Both numerator and denominator refer to the same age group.
Ambulance attendance	A response by the ambulance staff to a particular request for provision of care. Attendances are classified in several categories such as: cardiac, medical, surgical, trauma and routine attendance. Ambulance services mean services relating to the work of rendering first aid to, and the transport of, sick and injured persons.
Ambulatory care sensitive conditions	Those for which hospitalisation is considered potentially avoidable through preventive care and early disease management, usually delivered through primary health care.
Associated cause of death	See UNDERLYING cause of death.
Contact	A person who has been in association with an infected person or a contaminated environment that may provide an opportunity to acquire the infection.
Confidence interval	The computed interval with a given probability (for example, 95 per cent) that the true value of a variable such as a rate, mean or proportion, is contained within the interval.
Crude death rate	An estimate of the proportion of a population that dies in a specified period. It is calculated by dividing the number of deaths in a specified period by the number at risk during that period (typically per year).
Day-only admission	A person who is admitted to hospital and leaves on the same calendar day.
Employed persons	All civilians aged 15 years and over who worked for pay or profit or worked without pay in a family business or farm.
Fertility rate	Number of live births in an area during a year divided by the mid-year female population aged 15-44 in the same area in the same year.
Fetal death	Delivery of a child who did not, at any time after delivery, breathe or show any other evidence of life, such as a heartbeat.
Hospital separation	or Hospitalisation - see SEPARATION
Illicit drugs	The following drugs used for non-medicinal purposes: speed, cocaine, sleeping pills or tranquilisers, marijuana, analgesics, heroin, petrol sniffing, other inhalants, hallucinogens, designer drugs, and injecting of any illegal drug.
Incidence	The rate at which new cases of a disorder occur in the population: that is, the number of new cases in a specified period, divided by the population at risk of the disorder in that period.

Infant death	The death of a child before its first birthday.
Labour force	All persons aged 15 years and over who are employed and unemployed.
Participation rate	The labour force expressed as a percentage of the civilian population aged 15 years and over.
Life expectancy	The average number of years of life remaining to a person at a particular age.
Live birth	The birth of a child who after delivery, breathes or shows any other evidence of life, such as heartbeat. For calculation of perinatal death rates, includes only infants weighing at least 400 grams at birth or, where birth-weight is unknown, of at least 20 weeks gestation.
Neonatal death	Death within 28 days of birth of any child who after delivery, breathed or showed any other evidence of life, such as a heartbeat.
Notification	Certification in an approved form of a disease listed in the Schedule 3 of Notifiable Diseases of the NSW Public Health Act 1991. In this report, notifications concern cases of communicable diseases reported by general practitioners, hospitals and pathology laboratories to the Director General of the NSW Department of Health.
Patient presentation at emergency department	Occurs following the arrival of the patient at the emergency department and is the earliest occasion of the patient being registered clerically or triaged. The patient may be subsequently provided with a service by a treating medical officer or nurse, and a provisional diagnosis is recorded. A 'presentation' is equal to a 'visit' or an 'attendance' at the emergency department.
Perinatal death	A fetal or neonatal death.
Prevalence	The number of people with a disease at a given time (point prevalence) or in a specified period (period prevalence), divided by the number of people at risk from that disease.
Principal diagnosis	The first ICD-9 or ICD-10 coding variable reported on the hospital separation form. It means the final diagnosis that best accounts for inpatient care.
Rate ratio	The ratio of two rates: for example, the rate of disease in one population group divided by the rate in another population group.
Scheduled medical condition	Medical conditions to be notified under the provisions of the NSW Public Health Act 1991.
Separation	The formal process whereby an inpatient leaves a hospital or other area health service facility after completing an episode of care. For example, a discharge to home, discharge to another hospital or nursing home, or death.
Standardised rate	see AGE-ADJUSTED RATE
Underlying cause of death	The primary disease or injury causing the death. It is listed on a death certificate together with other diseases or injuries, which are classified as associated causes. These are all other conditions, diseases or injuries that were considered to have contributed to the death.
Unemployed	Persons aged 15 years and over who were not employed and who were actively seeking work, or waiting to be called back to a job from which they had been stood down.
Unemployment rate	The number of unemployed expressed as a percentage of the labour force (that is, employed and unemployed).

NSW local government areas by health area

Sydney South West Area Health Service

Ashfield	Campbelltown	Leichhardt	Sydney (part)
Bankstown	Canterbury	Liverpool	Wingecarribee
Burwood	Canada Bay	Marrickville	Wollondilly
Camden	Fairfield	Strathfield	

South Eastern Sydney & Illawarra Area Health Service

Botany Bay	Randwick	Sutherland	Woolahra
Hurstville	Rockdale	Sydney (part)	
Kiama	Shellharbour	Waverley	
Kogarah	Shoalhaven	Wollongong	

Sydney West Area Health Service

Auburn	Blue Mountains	Lithgow	
Baulkham Hills	Hawkesbury	Parramatta	
Blacktown	Holroyd	Penrith	

Northern Sydney & Central Coast Area Health Service

Gosford	Lane Cove	Pittwater	Wyong
Hornsby	Manly	Ryde	
Hunters Hill	Mosman	Warringah	
Ku-Ring-Gai	North Sydney	Willoughby	

Hunter & New England Area Health Service

Armidale Dumaresq	Guyra	Muswellbrook	Tamworth Regional
Cessnock	Gwydir	Narrabri	Greater Taree
Dungog	Inverell	Newcastle	Tenterfield
Glen Innes	Lake Macquarie	Port Stephens	Upper Hunter
Gloucester	Liverpool Plains	Scone	Uralla
Great Lakes	Maitland	Severn	Walcha
Gunnedah	Moree Plains	Singleton	

North Coast Area Health Service

Ballina	Clarence Valley	Kempsey	Nambucca
Bellingen	Coffs Harbour	Kyogle	Richmond Valley
Byron	Hastings	Lismore	Tweed

Greater Southern Area Health Service

Albury	Cootamundra	Harden	Temora
Bega Valley	Corowa	Hay	Tumbarumba
Berrigan	Deniliquin	Jerilderie	Tumut
Bland	Eastern Capital City	Junee	Upper Lachlan
Bombala	Eurobodalla	Leeton	Urana
Boorowa	Greater Argyle	Lockhart	Wagga Wagga
Carrathool	Greater Hume	Mulwaree	Wakool
Conargo	Greater Queanbeyan	Murrumbidgee	
Coolamon	Griffith	Narrandera	
Cooma-Monaro	Gundagai	Snowy River	

Greater Western Area Health Service

Balranald	Central Darling	Lachlan	Warren
Bathurst Regional	Cobar	Mid-Western Regional	Warrumbungle
Blayney	Coolah	Narromine	Weddin
Bogan	Coonamble	Oberon	Wellington
Bourke	Cowra	Orange	Wentworth
Brewarrina	Dubbo	Parkes	
Broken Hill	Forbes	Unincorporated Far West	
Cabonne	Gilgandra	Walgett	

NSW local government areas by ARIA+ score

LGA	% of population in ARIA+ category					LGA	% of population in ARIA+ category				
	Metropolitan	Inner regional	Outer regional	Remote	Very remote		Metropolitan	Inner regional	Outer regional	Remote	Very remote
Ashfield	100	.	.	.	.	Junee	.	88.16	11.84	.	.
Auburn	100	.	.	.	.	Harden	.	87.74	12.26	.	.
Bankstown	100	.	.	.	.	Culcairn	.	87.45	12.55	.	.
Blacktown	100	.	.	.	.	Blayney	.	87.31	12.69	.	.
Botany Bay	100	.	.	.	.	Evans	.	83.72	16.28	.	.
Burwood	100	.	.	.	.	Cooma-Monaro	.	82.77	17.23	.	.
Canterbury	100	.	.	.	.	Cowra	.	80.37	19.63	.	.
Concord	100	.	.	.	.	Parry	.	78.9	21.1	.	.
Drummoyne	100	.	.	.	.	Young	.	76.38	23.62	.	.
Fairfield	100	.	.	.	.	Scone	.	72.9	27.1	.	.
Holroyd	100	.	.	.	.	Kyogle	.	71.26	28.74	.	.
Hunters Hill	100	.	.	.	.	Crookwell	.	68.43	31.57	.	.
Hurstville	100	.	.	.	.	Murray	.	68.04	31.96	.	.
Kogarah	100	.	.	.	.	Eurobodalla	.	65.67	34.33	.	.
Ku-ring-gai	100	.	.	.	.	Holbrook	.	64.7	35.3	.	.
Lane Cove	100	.	.	.	.	Gundagai	.	63.02	36.98	.	.
Leichhardt	100	.	.	.	.	Boorowa	.	58.47	41.53	.	.
Manly	100	.	.	.	.	Cabonne	.	57.21	42.79	.	.
Marrickville	100	.	.	.	.	Gloucester	.	52.66	47.34	.	.
Mosman	100	.	.	.	.	Mudgee	.	51.16	48.84	.	.
Newcastle	100	.	.	.	.	Coolamon	.	50.04	49.96	.	.
North Sydney	100	.	.	.	.	Kempsey	.	43.82	56.18	.	.
Parramatta	100	.	.	.	.	Berrigan	.	42.02	57.98	.	.
Queanbeyan	100	.	.	.	.	Copmanhurst	.	41.69	58.31	.	.
Randwick	100	.	.	.	.	Uralla	.	40.18	59.82	.	.
Rockdale	100	.	.	.	.	Rylstone	.	39.85	60.15	.	.
Ryde	100	.	.	.	.	Lockhart	.	25.67	74.33	.	.
South Sydney	100	.	.	.	.	Macleay	.	20.13	79.87	.	.
Strathfield	100	.	.	.	.	Pristine Waters	.	17.13	82.87	.	.
Sydney	100	.	.	.	.	Snowy River	.	8.38	91.62	.	.
Warringah	100	.	.	.	.	Tallaganda	.	5.92	94.08	.	.
Waverley	100	.	.	.	.	Barraba	.	.	100	.	.
Willoughby	100	.	.	.	.	Bellingen	.	.	100	.	.
Woollahra	100	.	.	.	.	Bingara	.	.	100	.	.
Campbelltown	99.8	0.2	.	.	.	Bombala	.	.	100	.	.
Pittwater	99.35	0.65	.	.	.	Broken Hill	.	.	100	.	.
Shellharbour	98.58	1.42	.	.	.	Conargo	.	.	100	.	.
Sutherland Shire	98.48	1.52	.	.	.	Coolah	.	.	100	.	.
Liverpool	96.63	3.37	.	.	.	Forbes	.	.	100	.	.
Wollongong	95.94	4.06	.	.	.	Glen Innes	.	.	100	.	.
Hornsby	95.86	4.14	.	.	.	Griffith	.	.	100	.	.
Camden	95.65	4.35	.	.	.	Gunnedah	.	.	100	.	.
Penrith	95.61	4.39	.	.	.	Guyra	.	.	100	.	.
Gosford	94.82	5.18	.	.	.	Jerilderie	.	.	100	.	.
Maitland	94.67	5.33	.	.	.	Leeton	.	.	100	.	.
Baulkham Hills	92.42	7.58	.	.	.	Manilla	.	.	100	.	.
Lake Macquarie	90.28	9.72	.	.	.	Merrima	.	.	100	.	.
Wyong	88.88	11.12	.	.	.	Murrurundi	.	.	100	.	.
Blue Mountains	67.17	32.83	.	.	.	Nambucca	.	.	100	.	.
Tweed	65.45	34.55	.	.	.	Narrandera	.	.	100	.	.
Hawkesbury	56.21	42.71	1.08	.	.	Narromine	.	.	100	.	.
Cessnock	30.33	69.22	0.45	.	.	Nundle	.	.	100	.	.

NSW local government areas by ARIA+ score

LGA	% of population in ARIA+ category					LGA	% of population in ARIA+ category				
	Metropolitan	Inner regional	Outer regional	Remote	Very remote		Metropolitan	Inner regional	Outer regional	Remote	Very remote
Port Stephens	24.36	75.64	.	.	.	Quirindi	.	.	100	.	.
Yarrowlumla	10.12	89.88	.	.	.	Severn	.	.	100	.	.
Wollondilly	0.84	99.16	.	.	.	Temora	.	.	100	.	.
Albury	.	100	.	.	.	Tenterfield	.	.	100	.	.
Ballina	.	100	.	.	.	Tumbarumba	.	.	100	.	.
Bathurst	.	100	.	.	.	Urana	.	.	100	.	.
Byron	.	100	.	.	.	Wakool	.	.	100	.	.
Deniliquin	.	100	.	.	.	Walcha	.	.	100	.	.
Goulburn	.	100	.	.	.	Weddin	.	.	100	.	.
Grafton	.	100	.	.	.	Wellington	.	.	100	.	.
Hume	.	100	.	.	.	Windouran	.	.	100	.	.
Kiama	.	100	.	.	.	Bega Valley	.	.	98.38	1.62	.
Lismore	.	100	.	.	.	Parkes	.	.	98.38	1.62	.
Orange	.	100	.	.	.	Gilgandra	.	.	96.88	3.12	.
Tamworth	.	100	.	.	.	Inverell	.	.	96.66	3.34	.
Wingecarribee	.	100	.	.	.	Murrumbidgee	.	.	96.39	3.61	.
Greater Lithgow	.	99.22	0.78	.	.	Yallaroi	.	.	95.33	4.67	.
Singleton	.	98.9	1.1	.	.	Bland	.	.	94.3	5.7	.
Shoalhaven	.	98.83	1.17	.	.	Wentworth	.	.	91.14	8.86	.
Richmond Valley	.	98.33	1.67	.	.	Narrabri	.	.	90.9	9.1	.
Wagga Wagga	.	97.86	2.14	.	.	Balranald	.	.	83.86	16.14	.
Gunning	.	96.36	3.64	.	.	Coonabarabran	.	.	81.97	18.03	.
Muswellbrook	.	95.85	4.15	.	.	Moree Plains	.	.	81.82	18.18	.
Coffs Harbour	.	95.85	4.15	.	.	Hay	.	.	78.88	21.12	.
Corowa	.	95.52	4.48	.	.	Warren	.	.	70.24	29.76	.
Dungog	.	95.52	4.48	.	.	Lachlan	.	.	51.95	48.05	.
Cootamundra	.	94.53	5.47	.	.	Carrathool	.	.	33.16	66.84	.
Hastings	.	94.09	5.91	.	.	Unincorporated NSW	.	.	15.85	18.92	65.23
Mulwaree	.	92.98	7.02	.	.	Bogan	.	.	.	100	.
Armidale Dumaresq	.	91.98	8.02	.	.	Coonamble	.	.	.	100	.
Yass	.	91.91	8.09	.	.	Walgett	.	.	.	95.26	4.74
Tumut	.	90.8	9.2	.	.	Cobar	.	.	.	91.01	8.99
Greater Taree	.	90.22	9.78	.	.	Brewarrina	.	.	.	58.3	41.7
Oberon	.	89.46	10.54	.	.	Central Darling	.	.	.	32.01	67.99
Dubbo	.	88.72	11.28	.	.	Bourke	100
Great Lakes	.	88.36	11.64	.	.						

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