



FAMILY PLANNING NSW

The background of the cover is a dark blue gradient with a subtle, repeating pattern of small, light-colored dots. Overlaid on this are several abstract line graphs in various colors (green, yellow, light blue, dark blue, orange, and light green). Each line graph consists of several data points connected by straight lines, creating a complex, overlapping pattern that suggests trends and data analysis.

Reproductive and Sexual Health in New South Wales and Australia

Differentials, Trends and
Assessment of Data Sources



FAMILY PLANNING NSW

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Executive Summary

The purpose of this report is to provide a comprehensive review of the reproductive and sexual health in New South Wales (NSW) and in Australia. Reproductive and sexual health is a broad state of physical, mental and social wellbeing encompassing reproduction and the health of the reproductive tract, and incorporating several overlapping social and policy areas. Indicators relevant to the assessment and monitoring of reproductive and sexual health include: fertility; infertility; perinatal, infant and maternal mortality; contraception; induced abortion; sexually transmissible infections (STIs); and cancers of the reproductive tract and cervical screening. Analysis of available reproductive and sexual health data assists in the identification of research areas, policy review, health care and health promotion services and education required to address unmet needs.

The process of assessment of reproductive and sexual health for NSW reveals important data gaps at a state and sometimes national level. While the focus of this report is on NSW, comparative Australian data are reported as a benchmark. Australian data are reported when there are no NSW data. Where there are no routinely collected data, information from surveys and publications in peer reviewed journals is reported.

Fertility

Comparatively complete data on fertility are collected at a state level and compiled nationally through birth registrations and perinatal data collections. Although the methods of collection differ the resulting discrepancies are well characterised.

In NSW, the total fertility rate (TFR) has gradually increased from 1.8 births per woman in 1998 to 1.9 in 2008, and was lower in major cities (1.9 births per woman), with inner regional (2.1) and remote (2.3) areas having higher TFRs. This is consistent with the overall Australian TFR, which increased from 1.76 births per woman in 1998 to 1.97 births in 2008. Fertility has been below the replacement rate (2.1 births per woman) since the mid-1970s and, although increasing gradually since 2001, there remains considerable debate about the need for policy to address the fertility rate in Australia.

The NSW crude fertility rate declined from 13.5 per 1,000 population in 1998 to 12.8 from 2004 to 2006, then rose steeply to 13.6 by 2008. The crude fertility rate in Australia in 2008 was 13.8 births per 1,000 population, and this was consistent in all states and territories except the Northern Territory, where crude fertility was approximately 18 births per 1,000 population. Compared to Australia overall, the NSW crude fertility trend was similar but higher until 2006 and then lower thereafter.

Age patterns in fertility in NSW largely reflected national patterns. In NSW, the proportion of births to women aged 30 to 39 years increased from 42% to 52% of all births over the period 1996 to 2007, while the proportion of

births to women aged 20 to 29 years decreased from 51% to 41%. The teenage birth rate for Australia, despite the overall decline from 1998 to 2008, increased slightly from 2006. In NSW, the birth rate in women aged 15 to 19 continued to decrease from 2006 to 2007 but has subsequently increased. Teenage pregnancy rates are higher in rural and remote regions, and in Aboriginal and Torres Strait Islander communities.

In NSW the majority of births in 2007 (70%) were to women born in Australia. However, this has declined from 74% in 1998, with a concomitant rise in the proportion of births to women born in Southern and Central Asia (3% of births in 2007).

Age-specific fertility rates for NSW Aboriginal and Torres Strait Islander women reflect the national comparison of Aboriginal and Torres Strait Islander and all women: fertility rates in 15 to 29 year-olds was substantially higher for Aboriginal and Torres Strait Islander women, and lower in the older age groups. Fertility rates for Aboriginal and Torres Strait Islander women aged 15 to 19 years was 56.9 per 1,000 compared to 14.0 for NSW overall. The rate was also higher for Aboriginal and Torres Strait Islander women aged 20 to 24 years at 120.6 per 1,000 compared to 52.8 for NSW overall.

Infertility and Assisted Reproductive Technology

Infertility is indicated for clinical management, for example using Assisted Reproductive Technologies (ART), following the inability of a couple to conceive after 12 months of regular unprotected sex. Data on ART captured by the Australian and New Zealand Assisted Reproduction Database (ANZARD) and Medicare Australia are largely complete but have several limitations. These include the counting of cycles rather than women, the lack of demographic and socio-economic data and in Medicare the lack of outcome data.

In NSW, claims for ART-related Medicare items nearly doubled from approximately 45,000 in 2003 to 81,500 in 2008. The major increase related to women aged over 35, which more than doubled from 22,000 to approximately 48,000 claims. This increase was reflected in the ANZARD database, which for NSW from 2002 to 2006 showed an increase in oocyte pick-up cycles from approximately 3,000 to 5,000. Subsequent clinical pregnancies and live deliveries resulting from ART increased by 63% and 67% respectively over the same period.

In Australia in 2008 approximately 3% of births were achieved using ART. This was a doubling of the proportion of births through ART over the period 1998 to 2008, reflecting both the increasing success rates of ART and the growing need and acceptance of ART and infertility services. Nearly 57,000 ART treatment cycles were reported

in Australia in 2008, representing approximately 13 cycles per 1,000 women of reproductive age. In 2008, 23% of ART cycles resulted in a clinical pregnancy and 17% in a live birth. Women having live deliveries following ART in Australia and New Zealand were on average 35 years old, but the proportion of live deliveries per initiated cycle declined after age 35.

Public awareness of the increasing success of ART combined with a lack of knowledge of the effects of age on fertility may have resulted in a biased perception and overestimation of the effectiveness of ART in treating infertility. In particular, women may not be aware of the declining efficacy of ART with age. Research is required to assess the wider population knowledge about ART, and to identify gaps or misconceptions that may need to be addressed to ensure that women are fully aware of the strengths and limitations of infertility treatment when they choose to delay childbirth.

Infant Mortality and Morbidity, and Maternal Mortality

Data on infant and maternal mortality are managed by the Australian Bureau of Statistics (ABS), the Australian Institute of Health and Welfare and in NSW by NSW Health through the Perinatal Data Collection. These collections are comparatively complete but have slightly different collecting frameworks and timelines.

In NSW, as in Australia, perinatal and infant mortality rates are comparatively low. In 2008, the perinatal mortality rate for NSW (8.2 deaths per 1,000 births) was similar to Australia overall (8.4 deaths per 1,000 births). Conservative estimates for 2008 indicated a substantially higher rate of perinatal mortality in Aboriginal and Torres Strait Islanders in NSW, with 15.3 deaths per 1,000 births compared to 8.5 deaths per 1,000 non-Aboriginal births. Similarly, mothers whose countries of birth were Oceania, the Middle East and Africa or Southern Asia had higher rates of perinatal mortality (greater than 10 deaths per 1,000 births).

In Australia in 2008, using ABS estimates, the fetal mortality rate was 5.5 deaths per 1,000 births and neonatal mortality 2.9 deaths per 1,000 live births. In NSW, using the NSW Health Perinatal Data Collection estimates, the fetal and neonatal mortality rates were 6.1 per 1000 births and 2.7 per 1000 births in 2008, respectively.

Contraception

Effective, safe and affordable contraception provides fertility control and the choice when and if to have children, managing the number and spacing of children. There are little current or complete Australian data on the use of contraception. Medicare data are limited to products listed on the Pharmaceutical Benefits Scheme (PBS) or Medicare

Benefits Schedule (MBS) for contraceptive methods requiring a reimbursable procedure, and this excludes several new oral contraceptive pill formulations and long-acting products such as the vaginal ring. Moreover, counts from the PBS reflect prescriptions filled and not the numbers of users. An alternative source of information on contraceptive use and choices is survey data. However, there are no recent surveys that allow assessment of current usage patterns or provide information on the uptake of new oral contraceptive products and long-acting reversible products such as intrauterine systems or vaginal rings. Questions remain around whether newer long-acting reversible methods are being effectively integrated into women's contraceptive choices.

Contraception is widely used and accepted in Australia and survey data suggest that 65% to 70% of women will be using some form of contraception at any given time, and as high as 90% may ever use some form of contraception. The oral contraceptive pill and the condom are the two most widely applied methods, although other forms of contraception, including several long-acting reversible methods are available.

Contraceptive use in NSW largely reflected national patterns. For example, the 2001 ABS National Health Survey reported 63.3% of NSW women using some form of contraception at the time of the survey. The oral contraceptive pill was the most common method reported in women aged 18 to 29 years, followed by condoms. Tubal ligation was the least common method in this age group. The most commonly used contraceptive methods used by women aged 30 to 39 years were condoms and oral contraceptives, and in 40 to 49 year old women permanent sterilisation methods were most common.

Contraceptive use in Australia has been shown to be related to several socio-demographic factors, with age, household income, education and country of birth indicated as predictors for contraceptive usage and choices. Uptake of long-acting reversible methods such as the hormonal implant and contraceptive injection may be greater in Aboriginal and Torres Strait Islander women, in particular in young women as a means to prevent teenage pregnancy in settings where access to the pill or consistent use may be compromised.

Induced Abortion

Australian data and the ability to provide current information on abortion is sub-optimal. Data unambiguously delineating induced abortion are difficult to obtain, and estimates have relied on data derived from several sources with assumptions used to correct for known limitations and omissions in the captured data. Abortion notification requirements differ by state and territory, with some reporting abortion in out-of-hospital and in-hospital facilities, and others from in-hospital facilities

only. Moreover legislation on abortion differs by state and territory and notification is mandatory only in South Australia, the Northern Territory and Western Australia. It is currently not possible in Australia to reliably estimate the extent of induced abortions overall or among population sub-groups, to assess the socio-demographic characteristics of women having abortions or information about the use of contraception at the time of conception, or the reasons for the abortion.

Approximately 1 in 5 Australian women will have an abortion in their lifetimes and approximately 80,000 induced abortions are performed annually in Australia. NSW has a higher estimated abortion rate than other Australian states and territories. The majority of abortions in NSW are performed in non-hospital facilities, most of which are claimed through Medicare.

Effective, evidence-based service delivery for abortion in Australia requires the development of national recording standards for improved reporting and analysis of pregnancy terminations and more detailed information regarding the socio-demographic and other factors for women seeking abortion.

Sexually Transmissible Infections

Sexually transmissible infections (STIs) are a significant cause of morbidity in Australia, and all significant STIs are notifiable upon diagnosis by law. This ensures the effective tracking of disease patterns and outbreaks at both national and state level, and the ability to respond effectively with targeted treatment and safe-sex campaigns. As a result, chlamydia, gonorrhoea, syphilis, HIV and hepatitis B are comparatively well controlled in Australia. However, notification data may be biased by screening and testing programs, which may artificially inflate estimates of the incidence of these diseases relative to the general Australian population. Notification data lack relevant socio-economic information, and in particular the identification of Aboriginality remains incomplete, although improving.

Chlamydia

Chlamydia is the most commonly notified STI in Australia and most developed countries, with the majority of the disease burden in young people (aged 15 to 29) and the majority of reporting in young women. The excess rates in younger women may reflect both symptomatic presentation and testing undertaken with cervical screening. In Australia in 2008 over 58,000 new cases of chlamydia were notified yielding a rate of 278 per 100,000 population. In women aged 15 to 19 the notification rate was approximately 1,500 per 100,000 population and in women aged 20 to 24 the rate was nearly 1,800 per 100,000 population.

Similarly, the increasing rate of chlamydia in NSW (from 54 per 100,000 in 2000 to 184 per 100,000 in 2007) is also partially attributable to targeted screening of Aboriginal and Torres Strait Islanders, men who have sex with men and young people, and the availability of subsidized urine-testing for chlamydia. It is important to note that whilst the increase in the rate may be an artefact of increased testing, the rates may still not be accurate estimates of the true population prevalence and incidence of disease, and may still be underestimates, particularly in high-risk population sub-groups.

Gonorrhoea

Infection with gonorrhoea is comparatively rare in Australia and in 2008 the rate was 37 per 100,000 population. Gonorrhoea is traditionally a disease associated with socio-economic disadvantage, and in Australia the largest burden of the disease rests with Aboriginal and Torres Strait Islanders. For example, the Northern Territory, with a large Aboriginal and Torres Strait Islander population, reported a rate of 731 per 100,000 in 2008.

Most cases of gonorrhoea are reported in men and in NSW this reflects transmission in the men who have sex with men (MSM) community. In contrast, in the Northern Territory high rates of gonorrhoea are reported in both males and females, reflecting transmission in the Aboriginal and Torres Strait Island heterosexual community.

Infectious syphilis

Syphilis is rare in Australia with less than 10 cases per 100,000 population in all states and territories in 2008 with the exception of the Northern Territory, where rates remain higher. The higher rate in the Northern Territory is largely determined by infection in Aboriginal and Torres Strait Islander communities.

NSW Health reported an increasing trend in notifications of infectious syphilis in New South Wales over 1998 to 2008, with the majority of this increase in men. From 2002 to 2008 the number of notifications increased from 126 to 431.

In other states and territories infection is primarily in MSM and the majority of disease therefore is in males. In 2008 there were 11 cases per 100,000 in men compared to 1 per 100,000 women.

Hepatitis B

In Australia, there were 256 newly acquired hepatitis B notifications in 2008 and a rate of 1.1 per 100,000 population. The highest notification rates were in the Northern Territory (3.7 per 100,000) reflecting notification in Aboriginal and Torres Strait Islanders. Hepatitis B is more common in men, with over 2 male notifications for every

female notification. However, the majority of notifications for hepatitis B remain for unspecified cases with 30 notifications per 100,000 population in 2008. This is largely attributed to immigration from countries with high endemic HBV rates and to transmission within high-risk groups such as intravenous drug users and MSM.

Hepatitis B notifications reported to NSW Health (which include both newly acquired and unspecified cases) peaked in 2001, however this may have been the result of enhanced testing around the introduction of HBV vaccination. Subsequently the rates have remained stable at around 40 cases per 100,000 population with rates higher in males.

The introduction of postnatal Hepatitis B Virus (HBV) vaccination in 2000 and a school-based catch-up program is expected to reduce the rates of hepatitis B in Australia. From 2002 to 2005 the rates of notifications in both men and women aged 15 to 29 years did indeed decline, in men, for example, from 7.3 to 3.0 per 100,000 population.

HIV and AIDS

Australia has maintained control of the HIV epidemic and the notification rate in 2008 was less than 5 cases per 100,000 population. There are approximately 1,000 HIV notifications annually, with the majority of cases (more than 85%) in men and nearly 70% of cases transmitted through male to male sexual contact. Nevertheless, the rate of heterosexual transmission has been rising and in 2008 represented nearly a third of new cases in Australia.

The majority of newly reported HIV cases are in NSW, although the distribution of disease is changing. NSW in 2008 reported 37% of cases whereas in 1999 NSW was the source of 59% of cases.

AIDS is similarly well controlled in Australia, primarily owing to the availability of effective anti-retroviral therapy. In 2007 there were 161 new AIDS diagnoses and 53 AIDS-related deaths.

Genital warts and genital herpes

Infection with Human Papilloma Virus (HPV) causing genital warts is declining concomitant with the introduction of HPV vaccination primarily aimed at oncogenic HPV variants. However the prevalence of infection is difficult to ascertain and estimates range from 1% to 14% with rates highest in young adults.

Genital herpes is most commonly caused by Herpes Simplex Virus-2 (HSV-2), and seroprevalence suggests infection in approximately 12% of the population, with a higher prevalence in females (16%) than males (8%). HSV-1 is the primary cause of oral cold sores and infection is widespread

with seroprevalence in more than 75% of the population. There is a growing proportion of genital HSV-1 infection resulting from oro-genital sex.

Cancers of the Reproductive Tract

Cancer data are comparatively well collected and reported. National and state-based cancer and cancer screening registers report routinely, although there is always a delay as data are compiled and processed from different sources. The availability of some data online at state level in NSW represents a growing recognition of the importance of cancer data as a publicly available resource, but the reporting and variables available remain limited.

Cancers of the reproductive tract remain significant causes of morbidity and mortality in women in Australia. Since the introduction of cervical screening cervical cancer incidence and mortality has fallen dramatically. In contrast, ovarian cancer continues to represent the greatest cause of mortality from reproductive tract cancers. Uterine cancer, although having the highest incidence of the reproductive tract cancers, causes relatively less mortality.

Cervical cancer

In NSW, cervical cancer ranked sixteenth in cancer incidence at 6.7 per 100,000 women in 2008, with a mortality rate of 3 per 100,000 women. In 2007, the incidence for cervical cancer in Australia was 6.8 cancers per 100,000 women and the mortality rate was 1.8 deaths per 100,000 women. However, some sub-populations in Australia are not accessing the screening program effectively and thus the resultant incidence and mortality reduction is not being universally realised. For example, the incidence of cervical cancer in Aboriginal and Torres Strait Islander women in 2007 was 18.3 per 100,000 compared with 6.6 per 100,000 for non-Aboriginal women. This translated into 10 deaths per 100,000 Aboriginal and Torres Strait Islander women compared to 2 per 100,000 non-Aboriginal women.

Higher incidence rates were similarly observed for women in rural and remote settings, which may reflect both access to cervical screening and larger proportions of Aboriginal and Torres Strait Islander women.

Cervical cancer screening

In NSW, biennial participation rates for women aged 20 to 69 years have approached but not quite achieved 60%. Women aged 20 to 49 account for more than 70% of screening participants, but rates have increased in women aged 50 to 69 years from 51% in 1996–1997 to 60% in 2007–2008. Participation was related to area of residence:

women from cities and inner regional NSW had screening rates of 58% and 60% respectively, whereas women in remote and very remote areas were screened at rates of 53% and 47%.

In Australia, biennial participation for women 20 to 69 years has been stable at approximately 61% since 1999–2000; the highest participation rate achieved was 63% in 1998–1999 and in 2007–2008 the participation rate was 61%. In 2007 to 2008, participation by geographic region was 61% in major cities, 61% in inner regional, 62% in outer regional, 55% in remote, and 59% in very remote areas. These differences reflect, in part, greater difficulty in access to or provision of screening to women in remote and very remote areas

Ovarian cancer

The incidence of ovarian cancer in NSW showed a downward trend from the 1970s (12.1 per 100,000 women) to 10.7 per 100,000 in 2008, and in 2008 the mortality rate was 6.8 per 100,000 women. This is consistent with the Australian ovarian cancer incidence rate in 2007 of 10.8 per 100,000 women in Australia and mortality of 6.7 per 100,000. In contrast to cervical cancer, ovarian cancer incidence and mortality in Aboriginal and Torres Strait Islander women was not significantly greater than for non-Aboriginal women.

Uterine cancer

In NSW the incidence of uterine cancer in 2008 was 15.6 per 100,000 women and mortality has been stable at approximately 3 deaths per 100,000 women annually from 1990. Cancer of the body of the uterus is now the most common gynaecological cancer of women in Australia and increased from 13.2 per 100,000 women in 1998 to 16.5 per 100,000 in 2007 with 2.7 deaths per 100,000 women in 2007. Six uterine cancers were diagnosed for every death, whereas for cervical cancer 3 cancers were diagnosed for every death.

Chapter 1 : Introduction

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1.1 Family Planning NSW

Family Planning New South Wales (FPNSW) is the peak non-government organisation providing reproductive and sexual health services in New South Wales, and is committed to the provision of evidence-based best practice for training and clinical services. Data are required on the key domains within reproductive and sexual health that underpin FPNSW operations, and that are more widely relevant in clinical practice and policy.

The data summarised in this report fundamentally drive FPNSW planning and activities, but are intended to be more widely accessed by clinicians, educators, researchers and policy-makers to identify where further work to enhance the reproductive and sexual health and well-being of the people of NSW is required. In particular, attention is drawn to population sub-groups that have often already been identified as needing specialised services, education, health promotion, and further research. Such groups include:

- Aboriginal and Torres Strait Islanders
- Young people (i.e. aged less than 25)
- People living in rural and remote settings
- People from culturally and linguistically diverse backgrounds
- Same-sex attracted people

Another group is people with a disability, however there are very little data available on the reproductive and sexual health of people with a disability.

1.2 Reproductive and Sexual Health

Reproductive and sexual health encompasses the health and wellbeing of individuals and populations in the areas related to reproduction and the reproductive tract. It includes a broad suite of physical and psychological health disciplines addressing, for example, fertility, infant mortality, contraception and diseases of the reproductive tract. This further extends into several social, political and policy areas that directly and indirectly affect reproductive and sexual health services and outcomes. The 1994 Cairo International Conference on Population and Development^{1,2} provided a global reference point for reproductive and sexual health, outlining aims for all people to have the freedom to decide if and when to reproduce in the context of:

- safe, affordable and effective family planning methods, such as contraception, and lawful access to safe and affordable alternatives such as abortion
- safe and affordable health services for pregnancy and childbirth
- a sex life that is satisfying and safe, grounded in elements of respect and choice

The combination of these freedoms, services and protections aims to provide, at an individual and population level, optimal reproductive and sexual health: an overarching state of physical and mental health, social wellbeing, and safety and fulfilment in the areas of life related to reproduction, sexuality and the biology of the reproductive system.^{3,4} These goals are the foundations

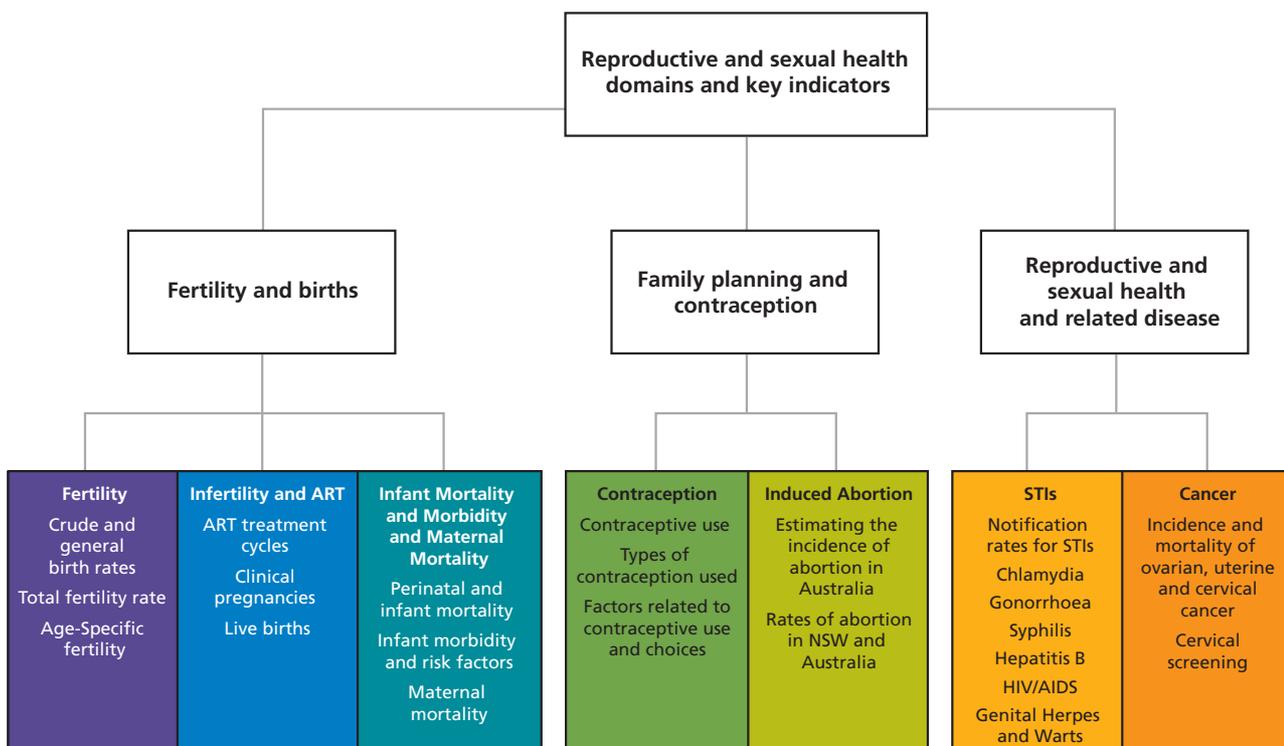
for policy, services and research in reproductive and sexual health and have been incorporated into the United Nations Millennium Development Goals (MDGs). Initially reproductive and sexual health was addressed in the MDGs in the narrower sense of infant mortality, maternal health and control of HIV/AIDS, but this was subsequently broadened under MDG 5b with “universal access to reproductive health” including elements on contraception, teenage births and family planning.⁴⁻⁶

The Cairo approach and subsequent developments are limited in that they focus on the reproductive and sexual health of women and their children largely to the exclusion of men. This is intrinsically valid, as women bear the primary responsibility and outcomes of fertility and are most vulnerable to the effects of poor services and safety related to reproductive and sexual health. Nevertheless, there is a growing recognition that to achieve the wider social and human rights goals of the Cairo Conference and the MDGs the inclusion of men and the development of policy that encompasses and addresses reproductive and sexual health more widely is required. Moreover, this is a necessity if only because globally in many societies the balance of social and political power remains with men, and therefore positive change demands the inclusion of women, men and their children.

Reproductive and sexual health can be understood in terms of: fertility and births, family planning and contraception, and reproductive and sexual health related disease.

These broad areas can be seen in terms of seven domains, each with their own key indicators. These domains are represented in Figure 1.1. Monitoring and assessment of national, state and sub-population performance within these domains provides the basis for the assessment of the reproductive and sexual health of Australia and NSW, and where unmet needs require research, policy review, services and education.

Figure 1.1: Reproductive and sexual health domains and key indicators



1.3 Report Content

Fertility and Births

Fertility: Fertility represents the capacity and freedom to reproduce and the choice to do so if, when and how often. Assessment of fertility as a reproductive and sexual health indicator, then, includes the population measurement and monitoring of fertility or birth rates, changes in these rates over time and heterogeneity in these rates within a population. It further extends to the measurement of factors such as the age at which women have their first child and the number of children had.

Chapter 2 provides information on trends in fertility and births in New South Wales and Australia, including crude, general and total fertility, age-specific fertility and teenage pregnancy.

Infertility: Infertility is the inability of women and couples to have children and as a reproductive and sexual health indicator is comparatively difficult to measure. However, treatment for infertility can be assessed in Australia through the rates of use and success of assisted reproductive technologies.

Chapter 3 provides information on the trends in the use of Assisted Reproductive Technologies (ART) in Australia/New Zealand including the number of claims for ART treatment in New South Wales, the number of oocyte pick up cycles and retrieval, clinical pregnancies resulting from embryo transfer cycles and live deliveries per embryo transfer cycle.

Infant mortality and morbidity, and maternal

mortality: The deaths of infants or their mothers represent fundamental indicators of the health and development of a population and society. Measurement of the rates of stillbirths and infant deaths up to one year of age, of infant morbidity factors such as low birth weight and of maternal mortality provide direct evidence to support policy and healthcare services.

Chapter 4 provides information on infant mortality and morbidity including risk factors such as smoking in pregnancy, early access to antenatal care, and outcomes including prematurity and low birth weight. The chapter also presents data on maternal mortality.

Family Planning and Contraception

Contraception: When accessible, effective and affordable, contraception offers women and society more generally choices about fertility and family planning. Measurement of overall rates of contraceptive use, the effective use of different contraceptive methods and types, and the reasons for these choices directly informs service provision and policy governing the products available and their costs.

Chapter 5 provides information on contraceptive use, including levels and patterns of the use of condoms, oral contraceptive pills, long-acting reversible methods such as intrauterine methods, implants and injections, sterilisation and the use of emergency contraception.

Abortion: The right of women to have access to affordable methods to terminate a pregnancy, in conditions of physical and psychological safety and wellbeing, supports the overall aim of providing women with choices regarding their fertility. The abortion rate, in women of different ages and from different areas and socio-economic circumstances, provides key information on the reproductive and sexual health of a population. Measures of the abortion rate in a society and the factors underlying that rate speak directly to the effectiveness of policy on contraception and the wider position of women's health and status in society.

Chapter 6 provides information on incidence and the rate of induced abortion, and examines trends in claims for induced abortion in Australia and NSW.

Reproductive and Sexual Health Related Disease

Sexually transmissible infections: The incidence and prevalence of sexually transmissible infections (STIs) are indicators of safe-sex behaviour and the need for services and education to encourage individuals to engage in sex safely. STIs can cause significant population morbidity and mortality, and the rates of infection and patterns of that infection geographically and in sub-populations can direct healthcare and preventive services and interventions to manage and control disease and minimise harm and death.

Chapter 7 provides information on rates for notifiable sexually transmissible infections in Australia and NSW, specifically chlamydia, gonococcal infection, syphilis, hepatitis B, and HIV, and information on genital warts and herpes in Australia and NSW.

Cancers of the reproductive tract: The incidence of cancers of the reproductive tract in women and resulting mortality are further indicators of the reproductive and sexual health of a population. The major cause of cervical cancer (human papilloma virus, HPV) has now been identified and vaccination programs initiated in Australia. Monitoring of cervical cancer mortality, participation in preventive screening programs and the uptake of vaccination will continue to direct government expenditure and the balance between Pap test screening, the use of new technologies such as HPV-DNA testing and vaccination programs. Ovarian and uterine cancers are less well understood or controlled, and monitoring of these diseases contributes to the wider picture of cancer morbidity and mortality for women, as well as providing the epidemiological foundation for understanding disease patterns in the population.

Chapter 8 provides incidence and mortality rates for cancers of the reproductive tract, specifically cervical, ovarian and uterine cancer. The chapter also summarises cervical screening rates in New South Wales, reporting screening participation rates, measures of screening undertaken by practice nurses and the quality of screening Pap smears.

1.4 Chapter Format

Each chapter includes an overview of content, key reproductive and sexual health indicators, primary data sources and a discussion of the limitations of these data and the opportunities for improved data on reproductive and sexual health. Where data are available or applicable, the reproductive and sexual health domains are reported as follows:

International

Australia's place in the international context is a key overall indicator of the reproductive and sexual health of Australians. Australia generally performs highly in comparison to similar developed countries, however this is not universally so. Moreover, overall measures of reproductive and sexual health used in comparison to other countries may mask important variation within Australia that requires attention to ensure that all Australians enjoy high quality reproductive and sexual health.

National

Australia's progress in reproductive and sexual health can be measured by assessing national rates and trends for key sexual and reproductive health indicators over time. Where possible these indicators are provided for states and territories, and salient variation in relation to socio-demographic factors and population sub-groups including gender, age, geographic location, measures of advantage and disadvantage, culturally and linguistically diverse communities and for Aboriginal and Torres Strait Islander communities is examined.

New South Wales

Further detail is provided for reproductive and sexual health indicators in New South Wales, similarly where possible assessing these indicators in relation to socio-demographic factors and population sub-groups. In addition, breakdowns are provided where available for NSW Area Health Services (Table 1.1). The eight Area Health Services represent the geographical subdivision of the State for the provision of health at the time of the data reported. Within each Area Health Service there is variation in population composition and socio-economic status for example, but nevertheless the comparison of Area Health Services is critical for the identification of the need for further research, targeted health interventions, health services or education. Differences among Area Health Services most often reflect underlying heterogeneity in populations, sub-populations, socio-economic or remoteness factors and are not necessarily interpreted as reflecting variation in the quality or scale of health care provision. Whilst NSW has recently seen a restructure and the changing of boundaries around the administration of health services, the data presented in this report remain relevant to the identification of geographical and socio-economic variation within the state.

Table 1.1: NSW Area Health Services

AREA HEALTH SERVICE	POPULATION
North Sydney and Central Coast*	1,124,622
South Eastern Sydney and Illawarra*	1,200,781
Sydney South West*	1,382,235
Sydney West*	1,136,555
Greater Southern	481,856
Greater Western	302,285
Hunter and New England	862,299
North Coast	493,539
NSW	6,984,172

Note. * = Metropolitan Area Health Services. Population = estimated resident population 2007.

Source: NSW Health Services Comparison Data Book 2008/2009. NSW Health, 2010.

1.5 Data Sources and Method

The report is compiled primarily from existing and secondary data taken from government reports, peer-reviewed journal articles and data available publicly through online access systems. The primary data in this report has been accessed from several key data custodians including:

- Australian Bureau of Statistics
- Australian Institute of Health and Welfare
- Commonwealth Department of Health and Ageing, Health Insurance Commission (Medicare data)
- New South Wales Department of Health
- Cancer Institute NSW
- World Health Organisation

Specific data collections and more detailed data have been accessed from the data custodians through requests for data held but not available for general public access. The support and assistance of these agencies and their staff in providing these data is gratefully acknowledged. In particular, de-identified records from The NSW Midwives Data Collection 2007 (now the Perinatal Data Collection) was made available by the NSW Department of Health, and is used extensively in reporting trends in fertility, births and infant mortality. Similarly, data subsets were provided from the ANZARD collection of ART data by the National Perinatal Statistics Unit (now the National Perinatal Epidemiology and Statistics Unit, NPESU) for the analysis of trends in assisted reproductive technology use in NSW.

Detailed data tables have not been included in this report, however are available from the source data identified. Information on statistical methods used (e.g. for generating confidence intervals or geographic and socio-economic classifications) is available on request.

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Chapter 2 : Fertility

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Key Indicators

- Total fertility rate: cumulated number of births per woman over reproductive ages 15 to 49 years
- Number of births for women aged 15 to 49 years
- General fertility rate: number of births per 1,000 women aged 15 to 49 years
- Age-specific fertility rates per 1,000 women aged 15 to 49 years (in 5-yr age groups)
- Crude fertility rate: number of births per 1,000 total population
- Number of births per 1,000 women aged 15 to 19 years

Primary Data Sources

National Perinatal Data Collection, National Perinatal Epidemiology and Statistics Unit, Australian Institute of Health and Welfare and UNSW

Australian Bureau of Statistics, Births, catalogue number 3301.0

NSW Perinatal Data Collection (formerly the NSW Midwives Data Collection), NSW Department of Health

World Population prospects: The 2008 revision population databases Population Division of the Department of Economic and Social Affairs, United Nations

Introduction

The determinants of fertility in a population are complex and inter-related. Developing countries generally have higher fertility rates than developed countries, and this may be related to cultural and social norms for large families, lack of adequate contraception, and higher fertility counterbalancing high perinatal and infant mortality rates.

This chapter reviews fertility trends in Australia and New South Wales, drawing on data from the Australian Bureau of Statistics (ABS), the Australian Institute of Health and Welfare (AIHW) and the NSW Department of Health NSW Perinatal Data Collection (formerly the Midwives Data Collection).

In developed countries, prevailing macroeconomic factors (i.e. the large-scale economic setting, at its extremes either economic growth and prosperity or depression) can have significant effects on fertility. The clearest examples of these come from the Great Depression (approximately 1929 to 1940), when economic collapse was matched with national declines in fertility globally.¹ In Australia the total fertility rate, the number of babies a woman could expect to have in her lifetime, fell from over 3 to nearly 2 babies per woman.² Low fertility continued during the Second World War (1939 to 1945), but was followed by a period of economic growth and prosperity, and concomitantly fertility increased. In Australia total fertility reached highs of 3.5 babies per woman in the 1960s in this period popularly known as the post-war baby boom.^{1,3-5} This then declined, and in Australia questions are now being raised about how the fertility rate will progress in the 21st century.^{2,3}

Government policies can directly influence rates of childbirth and have been associated with attempts to increase birth rates through maternity funding or to restrict birth rates, such as China's one-child policy.⁶⁻⁸ Equally important are the social and policy factors affecting access to contraception, levels of education, gender equity, women's roles in the workforce, government financial support for maternity, and personal choices about fertility.⁹ Macroeconomic, social and policy factors form a complex matrix that drives the fertility of a population.¹⁰ Again in more developed countries, the availability of effective and affordable contraception has increased the capacity of women to exercise fertility choices and thereby influence fertility rates. This has resulted in the delaying of childbearing as women have also increased their scope and roles in the workforce.¹¹ Increased female labour participation has contributed to decreased and delayed fertility⁹ and lower birth rates are associated with higher levels of education in women^{12,13} both in developed and developing countries.

The explanations for why women's increased education and workforce participation reduces fertility may be more complex than simply delayed childbearing and reduced partnering opportunities. An underlying disconnect can be created between career achievement and having children, when children cause career delays, reduced opportunities and financial loss.¹⁴ As a result, women who are educated and engaged in a career may choose to restrict childbearing or indeed omit it, and ironically, the women who can probably most afford to have children are least likely to do so.¹⁵ Despite apparent gender equality, a stable career increases the likelihood of childlessness in women but decreases it in men.¹³

In Australia and elsewhere, the decline in fertility after the post-war baby boom and the potential social and economic consequences of fertility below the replacement rate has entered the arena of public debate and policy.¹⁶ Warnings suggest that continued low fertility will result in economic stresses as populations decline, productivity drops and fewer working people support larger numbers of the aged.^{5,17-19} Alternatively, in Australia a new equilibrium may be reached with lower fertility supported by immigration to maintain a vigorous and age-balanced population.^{2,3,7}

Nevertheless, Australia's low fertility led the Federal government in 2002 to enhance the maternity allowance, which was again increased in 2008 and became popularly known as the baby bonus, aiming to address Australia's fertility as it climbed but continued below the replacement rate.^{6,20} The extent to which this baby bonus has been successful remains to be seen, however initial reports and data assessments suggest that the effect has been minimal within the context of an already rising fertility rate that reflects generally positive social and economic conditions.² Alternatively, some assessments have concluded that the baby bonus has indeed increased fertility at least in the short term, and that this has already impacted on maternity services.^{21,22}

Fertility Indicators

Several measures of fertility are used to characterise births in a population. The most common are the crude, general, age-specific and total fertility rates.^{2,23-25}

Crude Fertility Rate (CFR): the number of live births registered each year per 1,000 resident population.

General Fertility Rate: the number of live births per 1,000 women of reproductive age, usually taken to be 15 to 49 years.

Age-Specific Fertility Rate (ASFR): the number of live births per 1,000 females in each maternal age group. Teenage fertility refers to females aged 15 to 19 years, although the Australian Bureau of Statistics (ABS) also includes fertility in females aged less than 15 years in their fertility calculations.

Total Fertility Rate (TFR): the number of live births that a female could expect to have in her lifetime, assuming the current age-specific fertility rate persists. The TFR is calculated from cumulative age-specific birth rates over single years through the reproductive age range.

Data Sources and Limitations

Data sources

In Australia several organisations collect and report information on births and fertility, including the Australian Bureau of Statistics (ABS), the Australian Institute of Health and Welfare (AIHW) and its National Perinatal Epidemiology and Statistics Unit (NPESU, formerly the National Perinatal Statistics Unit), and state and territory health departments. Differences in the source of data, scope and population coverage of these collections and analysis of the data accounts for some variability in fertility indicators.^{2,26} The ABS collects information on population statistics including births and deaths. Registration of births is compulsory in Australia and supplied by state and territory registrations of births, deaths and marriages. Apart from some delays in notification, compliance is generally complete. ABS births information is primarily used to produce population estimates and measures of fertility.

The NPESU provides epidemiological information on pregnancy and childbirth outcomes, including live births, stillbirths and birth defects, using the National Perinatal Data Collection (NPDC). While the ABS assembles birth

statistics based on the number of registered live births (recorded by year of registration), the NPDC collects birth data from midwives and other health professionals who attend births, and these data are recorded by year of birth.^{26,27}

Discrepancies between the two data collections also reflect delays in birth registration, especially in the Aboriginal and Torres Strait Islander population.² The ABS data also provide information on place of usual residence of the mother, while the NPDC collection only provides information on the state or territory in which the birth took place. For example, the Australian Capital Territory (ACT) data contain a high proportion of New South Wales (NSW) residents who gave birth in the ACT.²⁸ The NPDC also includes babies that are not resident in Australia as a consequence of recording births by state of occurrence rather than state, or country, of residence of mother. This contributes to differences in state and territory or region-based statistics from the two sources.

NSW data are largely reported from the NSW Perinatal Data Collection (formerly the Midwives Data Collection). In contrast to the NPDC, NSW data do include the mother's usual residence and hence can be analysed by the mother's residence to postcode or Statistical Local Area (SLA) level.

Data limitations and data quality

The NPDC is limited in the ascertainment of several indicators owing mainly to state and territory differences in data collection and recording. Key data on socio-demographics, pregnancy outcomes and risk behaviours are not collected uniformly, and in some cases not at all. Several further sources of potential bias affect fertility rate estimates.^{2,3,29}

Under-registration of births

Under-registration leads to disparity between the number of births reported in ABS data and the NPDC. The NPDC has reported a higher number of births than the ABS each year since 1994, partly owing to the NPDC inclusion of births from non-Australian residents, and partly to failure to immediately register births with the ABS. In particular, there has been a substantial under-registration of Aboriginal and Torres Strait Islander births leading to underestimates of Aboriginal and Torres Strait Islander fertility. Despite improvements in the registration of Aboriginal and Torres Strait Islander births since 1991, interpretation of trends needs to be treated with caution, as variation in identification as Aboriginal or Torres Strait Islander and delays in registration continue to affect reporting.^{26,30}

Delayed registration

Delayed registration is not uncommon in Australia, with around 12% of Australian births registered in 2006 being for births which occurred in a previous year.² Improved registration methods have narrowed delay intervals and this has affected total fertility rate (TFR) estimates. For example, in New South Wales the increase in the Total Fertility Rate in 2005 was an artefact of improved reporting in 2004.²

Intercensal errors

The general fertility and crude birth rates are measured as a proportion of the population and so depend on the accuracy of the population estimate. If the population is underestimated then estimates of general fertility or crude birth rates will exceed their true values. These errors are more likely to occur in intercensal periods, when population estimates are used in lieu of census data. The error may be greater for years following a census but prior to the next census where population projections rather than interpolations are used.

Ascertainment of Aboriginal and Torres Strait Islander status

The ABS relies on birth registration information to the Registry of Births, Deaths and Marriages completed by the parents, whereas the NPDC is completed by midwives and doctors. In the ABS birth registration process both mother and father have been able to report their Aboriginality, whereas in the NPDC (at least for the Perinatal Data collection in NSW) the Aboriginal status of the baby has been based only on the Aboriginality of the mother. In 2007, enumeration of Aboriginal and Torres Strait Islander births in NSW in the PDC was estimated to be 68% of those identified using the Registry of Births, Deaths and Marriages based on maternal Aboriginality alone. When babies were identified based on maternal and paternal Aboriginality, the PDC counted only 46% of babies identified in the Registry of Births, Death and Marriages.²⁴

2.1 Total Fertility Rate

2.1.1 Total fertility rate: international comparisons

The United Nations (UN) projected the average global TFR for 2005 to 2010 to be 2.5 babies per female, a substantial decrease from the 1960's rate of three to five births per female.³¹ Regional differences in TFRs are attributable to a combination of varying economic and social development, levels of contraceptive use, infant and child mortality rates and cultural factors. In the period 2005 to 2010 the UN estimated the TFR for developed regions (Europe, Northern America, Australia/New Zealand and Japan) at 1.7 births per woman, whereas less developed regions (e.g. Africa, Asia excluding Japan and Latin America) had a TFR of 2.7. The least developed countries (48 countries, the majority in Africa and Asia) had a TFR of 4.4 births per woman.

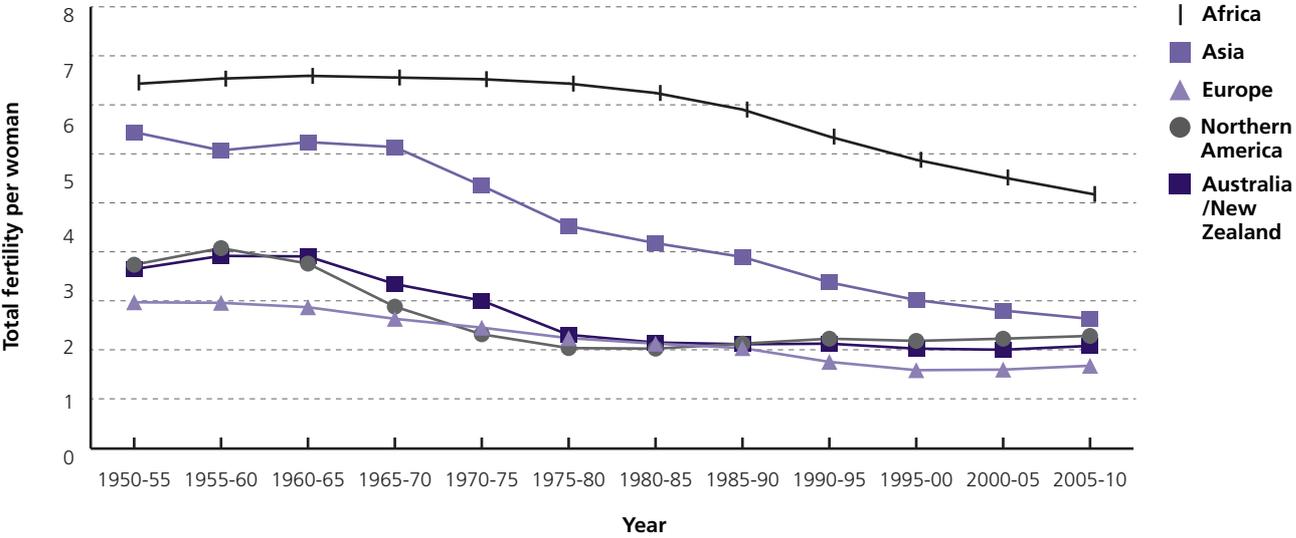
Australia's 2007 TFR of 1.92 and 2008 TFR of 1.97 babies per female were well below the replacement rate of approximately 2.1,^{3,25} but well above the OECD average of 1.63 babies per female.² The replacement rate is the number of births women would on average need to have to ensure the population is stable. The TFR for Asia and Africa continues to decrease, whereas rates in Australia, New Zealand, North America and to a lesser extent Europe, increased slightly from 2000 to 2010 (Figure 2.1).

2.1.2 Live births and total fertility rate: Australia

The number of live births in Australia was comparatively stable from 1998 to 2002 at approximately 250,000 births per year. From 2003 the number of live births increased steadily to over 296,000 in 2008.

Australia's TFR trend declined to 1.73 babies per woman in 2001, the lowest recorded, but increased to 1.97 by 2008, the highest rate since 1981 (Figure 2.2).²⁵ The TFR had exceeded the replacement rate (approximately 2.1) for much of the 20th Century, but has been below the replacement rate since the mid-1970s.

Figure 2.1: Regional total fertility rates, selected regions in five-year periods, 1950 to 2010



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2009). World Population Prospects: The 2008 Revision. New York: United Nations.

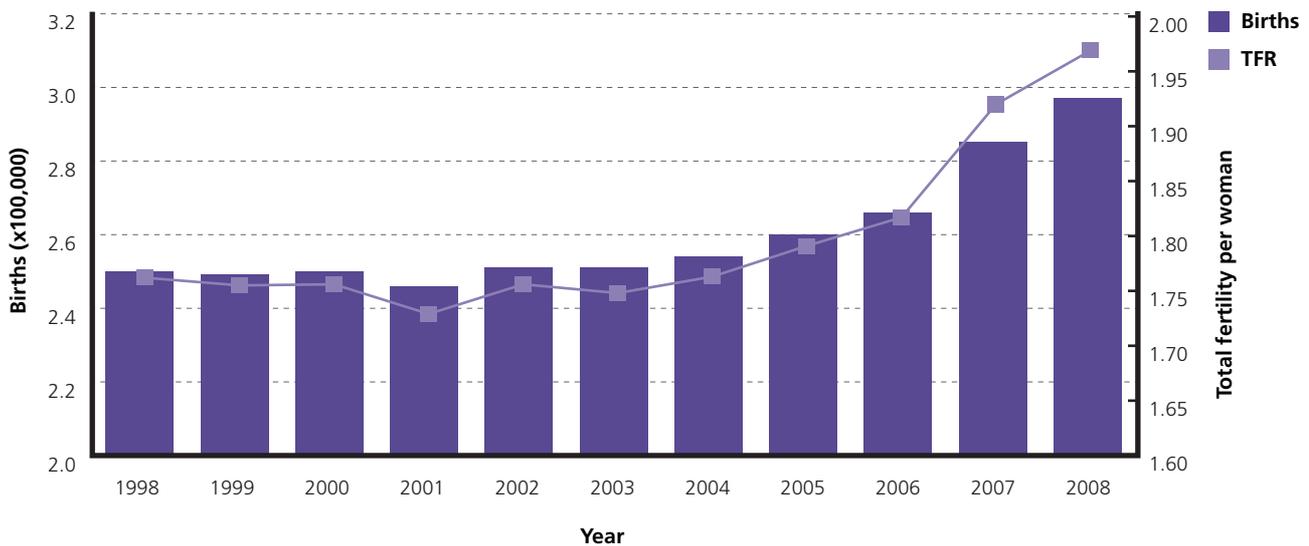
Total fertility trends in most states and territories have shown an increase from 2004 to 2008 (Figure 2.3). From 1998 to 2007 the Northern Territory had the highest TFR of Australian states and territories, exceeding the replacement rate of 2.15. In Tasmania, after 2004 the TFR increased such that it too exceeded the replacement rate (in 2007), and by 2008 Tasmania had exceeded the TFR of the Northern Territory.

In contrast, the ACT has had the lowest TFR over 1998 to 2008, declining to 1.52 in 2001, with a subsequent increase from 1.60 in 2005 to 1.76 by 2008. The Queensland TFR increased sharply from 1.82 in 2006 to 2.1 by 2008, while

the Western Australian TFR has shown a longer term and more consistent increase, from 1.70 in 2002 to 2.11 by 2008. Over this period the TFR for Western Australia increased from the third lowest in Australia to the third highest. Victorian and South Australian TFR trends have kept below the national average, while the NSW TFR trend was above the national average until 2005, but then declined below it, reflecting the shallowest post 2004/2005 increase of all the states and territories.

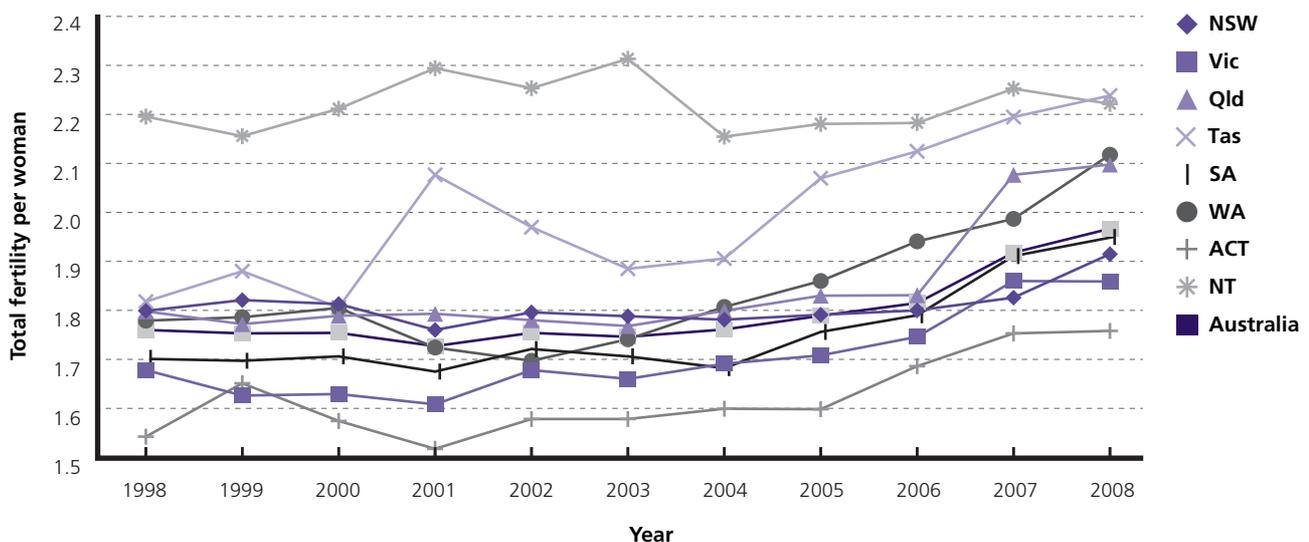
Some of the increases in TFR after 2004 may reflect the 'baby bonus', in which the Federal government granted *ex gratia* payments to mothers or parents for each baby born.²

Figure 2.2: Registered births and total fertility rate (TFR), Australia, 1998 to 2008



Note: Births plotted as bars against primary y-axis, TFR plotted as line against secondary y-axis. TFR = babies per woman.
 Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

Figure 2.3: Total fertility rates – Australian states and territories, 1998 to 2008



Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

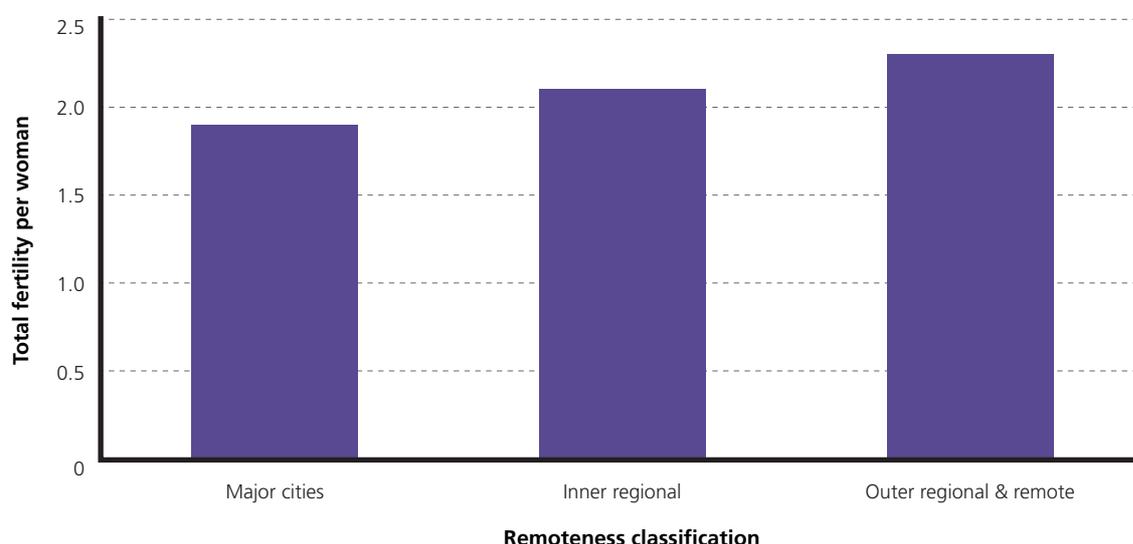
2.1.3 Total fertility trends: New South Wales

The New South Wales TFR has gradually increased from 1.8 births per woman in 1998 to 1.9 in 2008 (Figure 2.3),²⁵ and was lower in major cities (1.9 births), with inner regional and remote areas having higher TFRs (2.1 and 2.3 births per woman respectively, Figure 2.4).

2.1.4 Total fertility rate: New South Wales Area Health Services

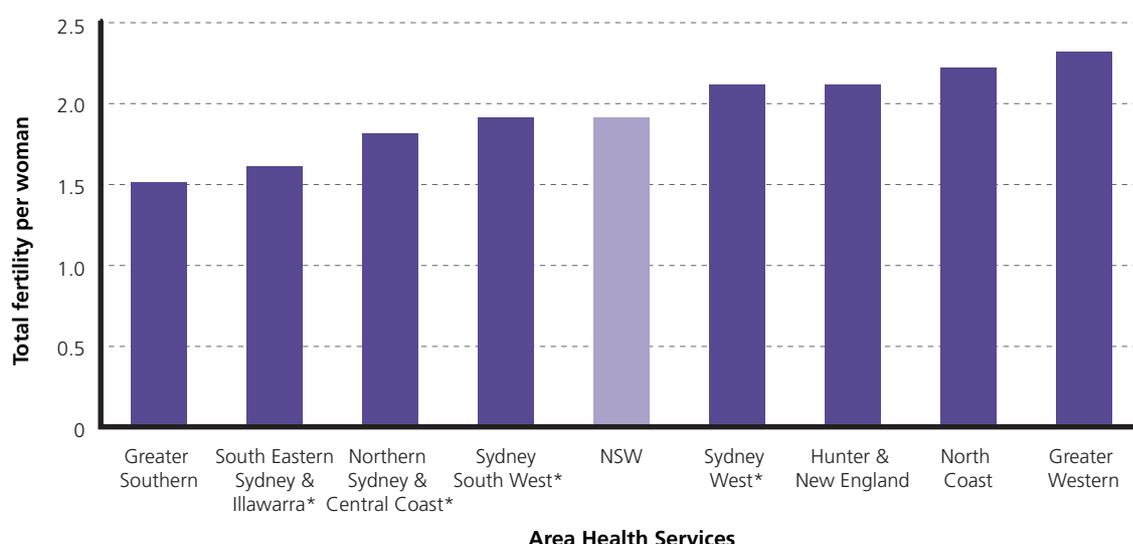
In 2006 the Greater Western Area Health Service had the highest TFR (2.3 births per woman), and Greater Southern the lowest with 1.5 births per woman (Figure 2.5). NSW residents who give birth out of NSW are not captured by the NSW Perinatal Data Collection, therefore TFR estimates for areas bordering other states or territories, for example Greater Southern, may be underestimated owing to women giving birth in hospitals in adjacent states.³²

Figure 2.4: Total fertility rates by remoteness, NSW, 2006



Source: NSW Perinatal Data Collection, Centre for Epidemiology and Research, Chief Health Officer's Report 2008, NSW Department of Health.

Figure 2.5: Total fertility rates, NSW Area Health Services, 2006



Note. * = Metropolitan Area Health Services.

Source: NSW Perinatal Data Collection, Centre for Epidemiology and Research, Chief Health Officer's Report 2008, NSW Department of Health.

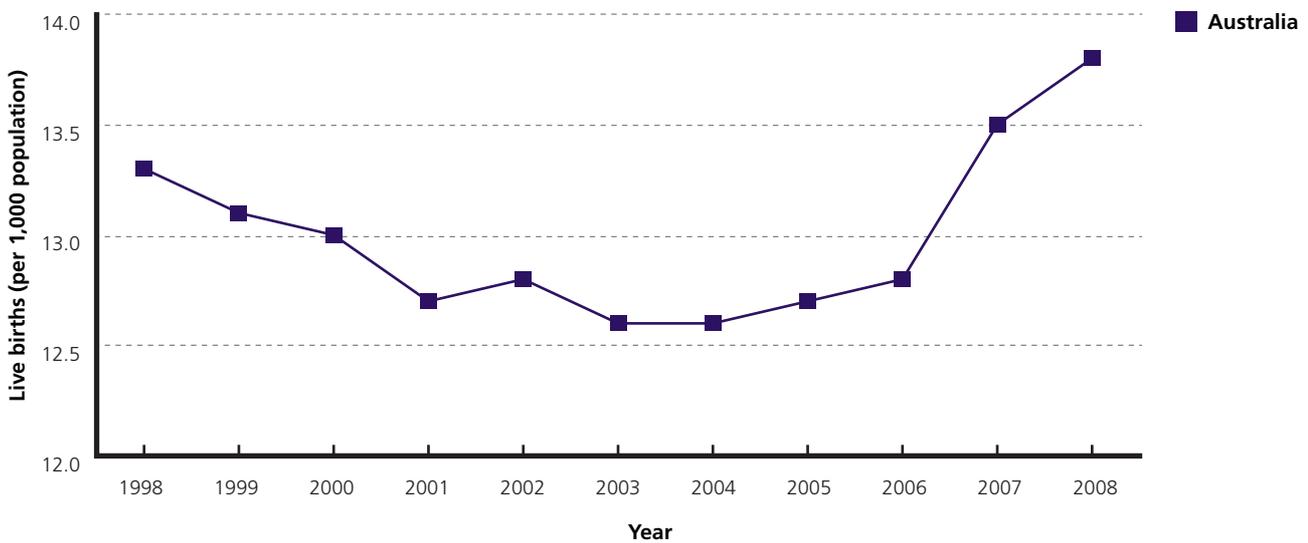
2.2 Crude Fertility Rate

2.2.1 Crude fertility rate: Australia

The ABS registered 296,621 live births in Australia in 2008, which represented a crude fertility rate of 13.8 births per 1,000 population,²⁶ an increase from the crude rate of 12.6 births per 1,000 population in 2003 and 2004 (Figure 2.6). Despite this increase, the 2008 rate was lower than previously recorded rates: for example, in 1989 the crude fertility rate was 14.9 births per 1,000 population.²⁶

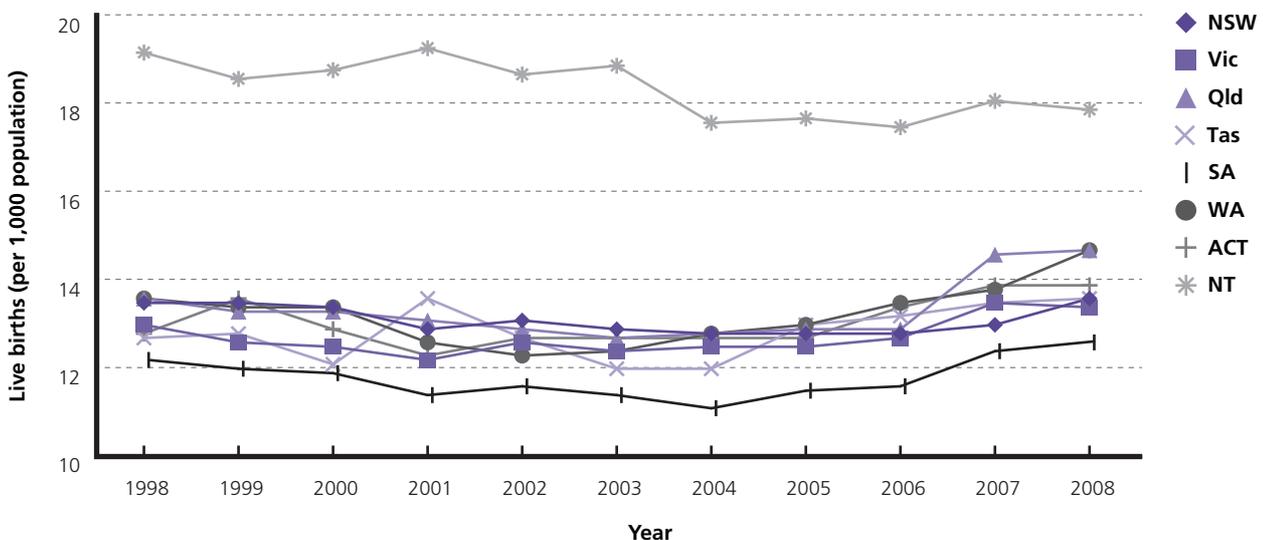
Crude fertility rates were comparable across Australian states and territories, except for the higher rate in the Northern Territory and lower rate in South Australia (Figure 2.7). In 2008, the Northern Territory recorded a crude fertility rate of 17.9 births per 1,000 population and South Australia 12.6 births per 1,000 population. The remaining states and territories had rates between 13.4 and 14.7 births per 1,000 population.

Figure 2.6: Crude fertility rate, Australia, 1998 to 2008



Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

Figure 2.7: Crude fertility rate, Australian states and territories, 1998 to 2008



Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

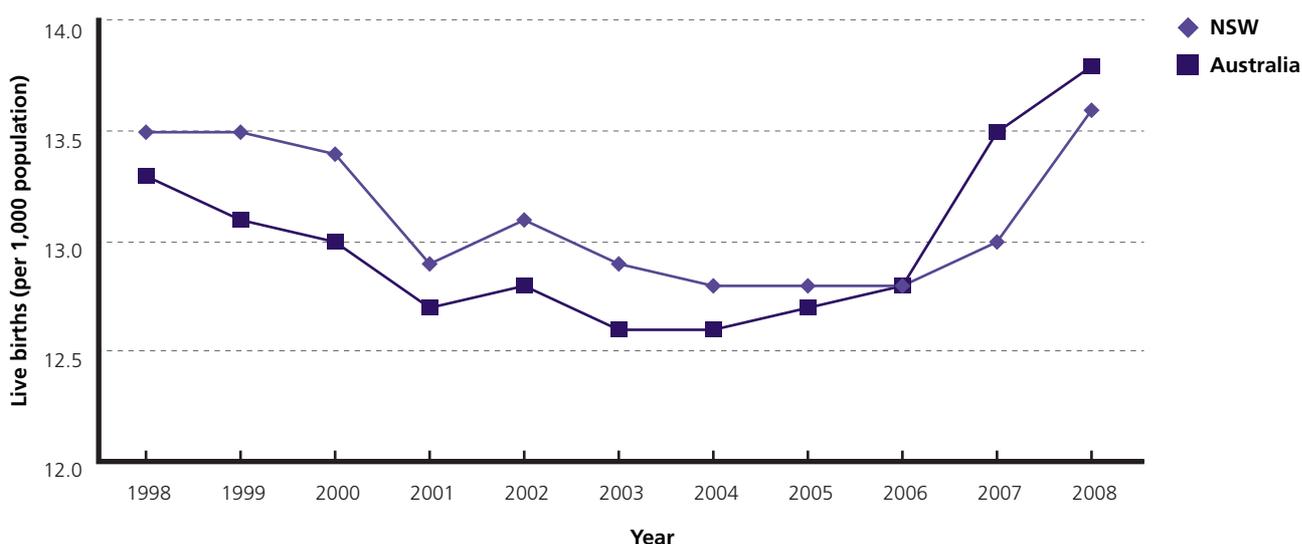
2.2.2 Crude fertility trends: New South Wales

The NSW crude fertility rate declined from 13.5 per 1,000 population in 1998 to 12.8 from 2004 to 2006, then rose steeply to 13.6 by 2008 (Figure 2.8).²⁵ Compared to Australia overall, the NSW crude fertility trend was similar but higher until 2006 and then lower thereafter.

2.2.3 Crude fertility rate: New South Wales Area Health Services

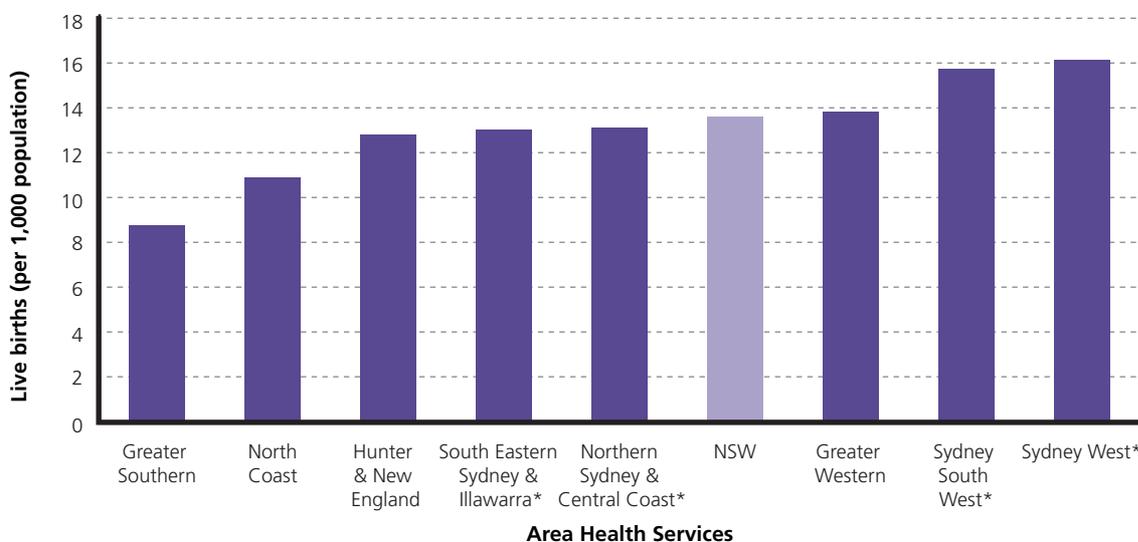
In 2006 the Area Health Service with the highest crude fertility rate was Sydney West at 15.9 births per 1,000 population and the lowest was Greater Southern at 8.7 births per 1,000 population (Figure 2.9).³²

Figure 2.8: Crude fertility rate, NSW, 1998 to 2008



Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

Figure 2.9: Crude fertility rates, NSW Area Health Services, 2006



Note. * = Metropolitan Area Health Services.

Source: NSW Perinatal Data Collection, Centre for Epidemiology and Research, Chief Health Officer's Report 2009, NSW Department of Health.

2.3 General and Age-Specific Fertility Rates

2.3.1 General fertility: Australia

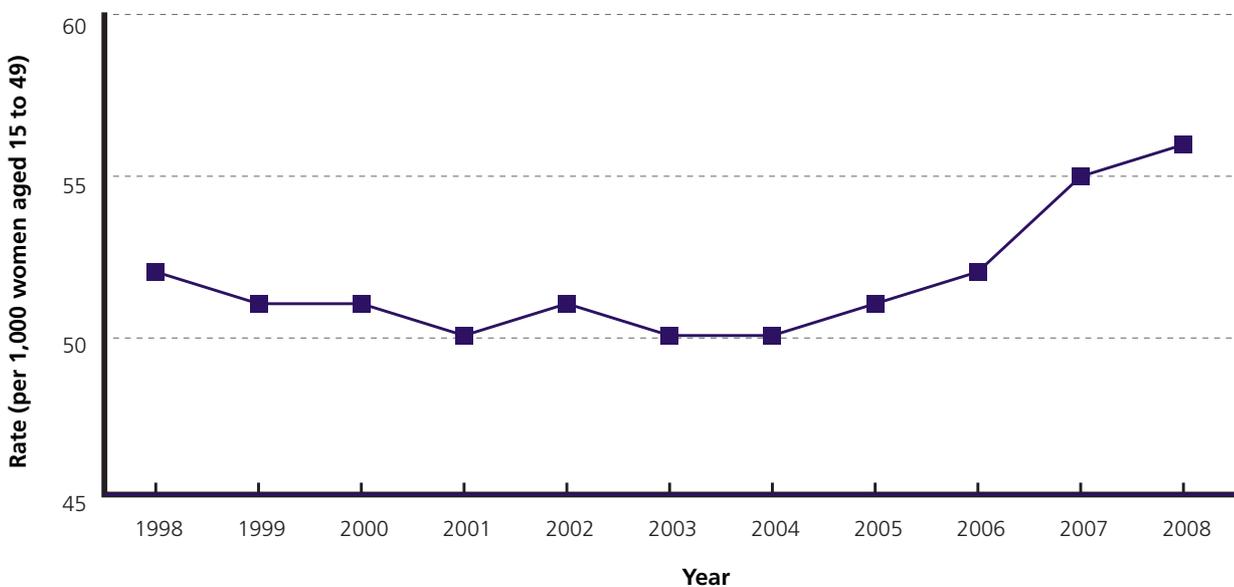
The general fertility rate (GFR), the number of births per 1,000 women of reproductive age, fluctuated around 52 births per 1,000 women aged 15 to 49 from 1998 to 2004, but was followed by an increase to 56 births per 1,000 women aged 15 to 49 by 2008 (Figure 2.10).

2.3.2 Age-specific fertility: Australia

The average age at childbirth for all mothers in Australia increased between 1998 and 2008 from 28.9 to 29.9 years and in 2008 one-third of mothers (32%) were aged 30 to 34 years.²⁷ The median age for women giving birth in Australia was 30.7 years in 2008 and in NSW was 31.0 years.²⁵

Fertility rates in 15 to 19 year-old Australian women decreased from 18.9 per 1,000 in 1998 to 14.0 in 2008 (Figure 2.11), with a slight increase after 2006. A similar trend was seen in women aged 20 to 24 and 25 to 29. By contrast, since 1998 fertility rates have increased in women aged 30 years and above, with the greatest absolute increase in women aged 35 to 39 years (from 46.5 per 1,000 in 1998 to 72.6 per 1,000 in 2008). The largest proportional increase was in women aged 40 to 49 years (approximately 9.0 to 15.5 per 1,000 population).

Figure 2.10: General fertility rates, Australia, 1998 to 2008

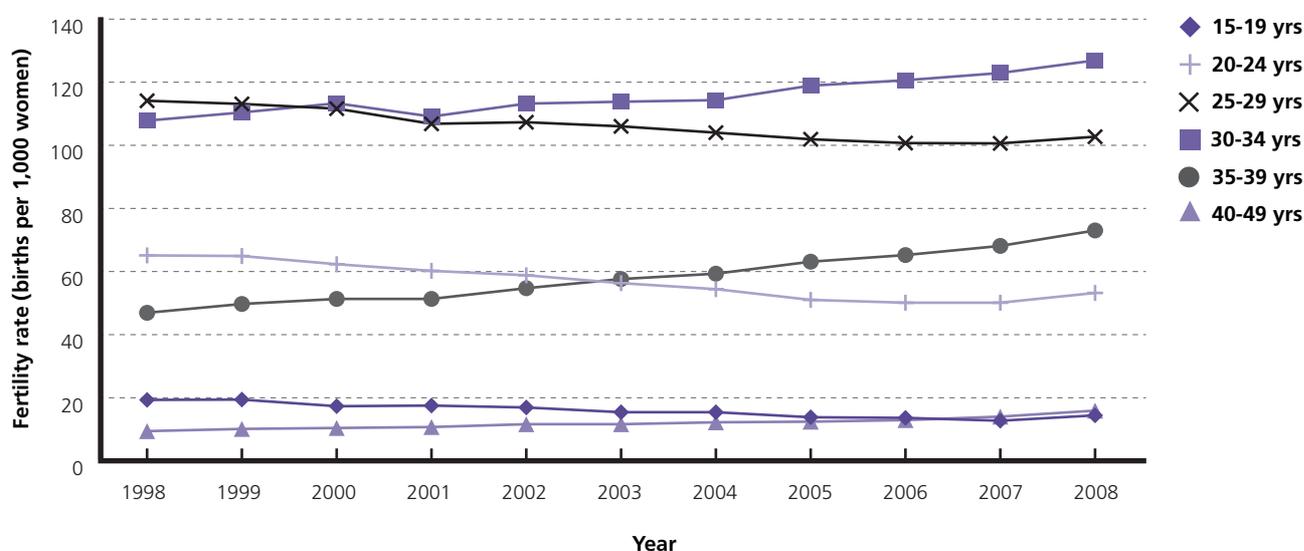


Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

In 2008, the Northern Territory had the highest teenage fertility rate (52.2 births per 1,000 women aged 15 to 19) and Victoria and the ACT the lowest (10.7 and 8.0 births per 1,000 women respectively, Table 2.1). In contrast, Victoria and the ACT had the highest fertility rates for women aged 35 to 39 years (77.9 and 77.5 births per

1,000 women respectively), and the Northern Territory the lowest (57.7). For women aged 40 years and older, Victoria and the ACT had the highest fertility rates (over 15 births per 1,000 women) and Tasmania the lowest (11.9 births per 1,000 women aged 40 to 44 years).

Figure 2.11: Age-specific fertility rates, Australia, 1998 to 2008



Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

Table 2.1: Age-specific fertility rates, Australian states and territories, 2008

AGE GROUP (YEARS)	RATES PER 1,000 WOMEN								
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	AUSTRALIA
15-19 years	14.0	10.7	24.7	18.3	22.8	27.6	52.2	8.0	17.3
20-24 years	52.8	42.2	73.8	57.9	66.9	88.1	105.3	35.3	57.1
25-29 years	102.3	93.1	119.8	110.6	117.2	133.0	111.1	84.3	105.8
30-34 years	126.5	131.5	124.7	127.1	132.0	127.8	105.4	130.6	127.8
35-39 years	72.6	77.9	63.7	62.3	71.1	58.1	57.7	77.5	70.9
40-44 years	14.9	15.9	12.3	12.2	13.1	11.9	12.5	15.5	14.1
45-49 years	0.6	0.8	0.6	0.8	0.5	0.4	0.3	0.5	0.7

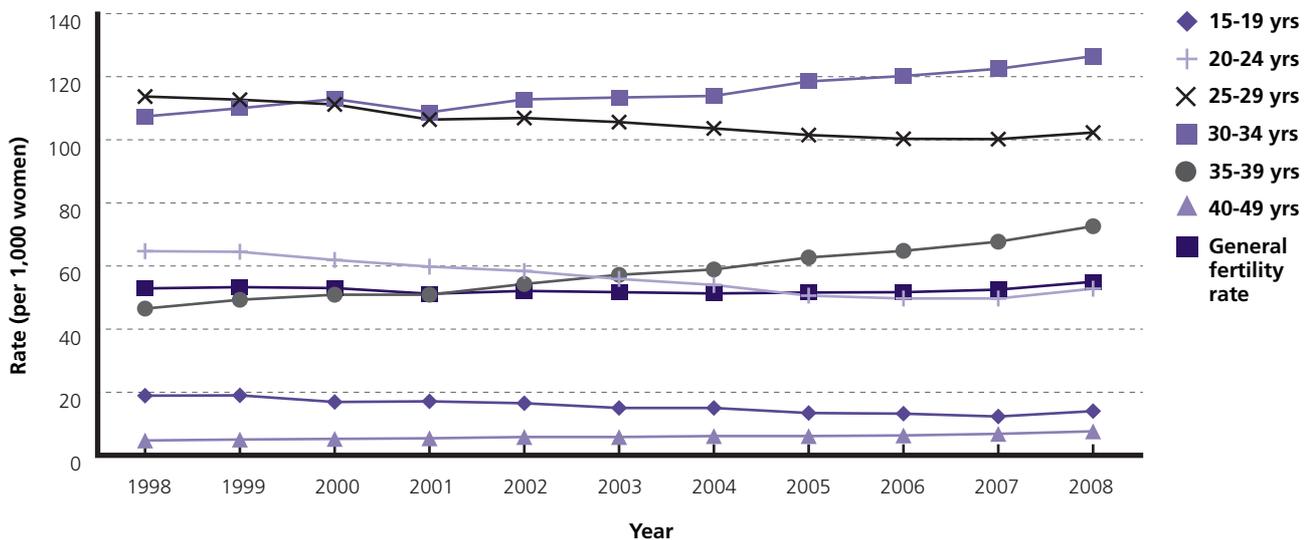
Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

2.3.3 General and age-specific fertility trends: New South Wales

The NSW PDC recorded a steady increase in the overall numbers of live births in NSW from 85,164 in 1996 to 94,864 in 2008.²⁴ Using ABS estimates of births and population, the NSW general fertility rate (GFR) has similarly increased but only slightly from 52.9 births per 1,000 women aged 15 to 49 years in 1998 to 55.0 in 2008 (Figure 2.12).²⁶

Age-specific fertility trends in NSW are similar to Australia overall. Since 1998 fertility rates have increased in women aged 30 to 44 years, and fertility in 30 to 34 year-old women has exceeded all other age groups since 2000 (Figure 2.12). The trend of decreasing fertility in younger women (aged 15 to 29 years) was reversed slightly in 2008, but has remained below that of 1998. The relatively flat GFR trend reflects the cancelling out of the opposing age-specific trends in younger versus older women.

Figure 2.12: Age-specific and general fertility rates, NSW, 1998 to 2008



Note: Age groups 40 to 44 and 45 to 49 combined.

Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

2.4 Patterns of Births in New South Wales

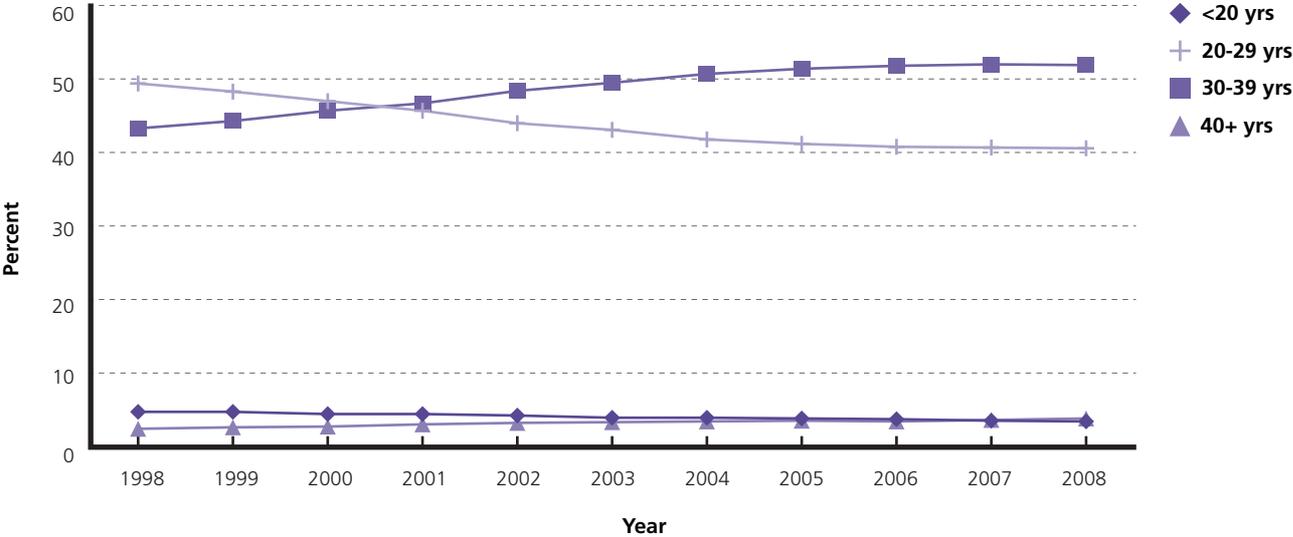
2.4.1 Births by maternal age: New South Wales

The overwhelming trend by maternal age in NSW has been an increase in the proportion of total births to women aged 30 to 39 years, from 43% in 1998 to 52% in 2008 (Figure 2.13). There has been a corresponding decrease in the proportion of births to women aged 20 to 29 years from 49% to 41%. The proportion of births to women aged less than 20 years has steadily decreased from 5% in 1998 to 3.5% in 2008, while the proportion of births to women aged 40 years or older has steadily increased from 2.5% in 1998 to 3.9% in the same period. In 2007 the proportion of births to NSW women aged 40 years or older exceeded that of women less than 20 years old for the first time (3.7 versus 3.6%).

2.4.2 Births by maternal country of birth: New South Wales

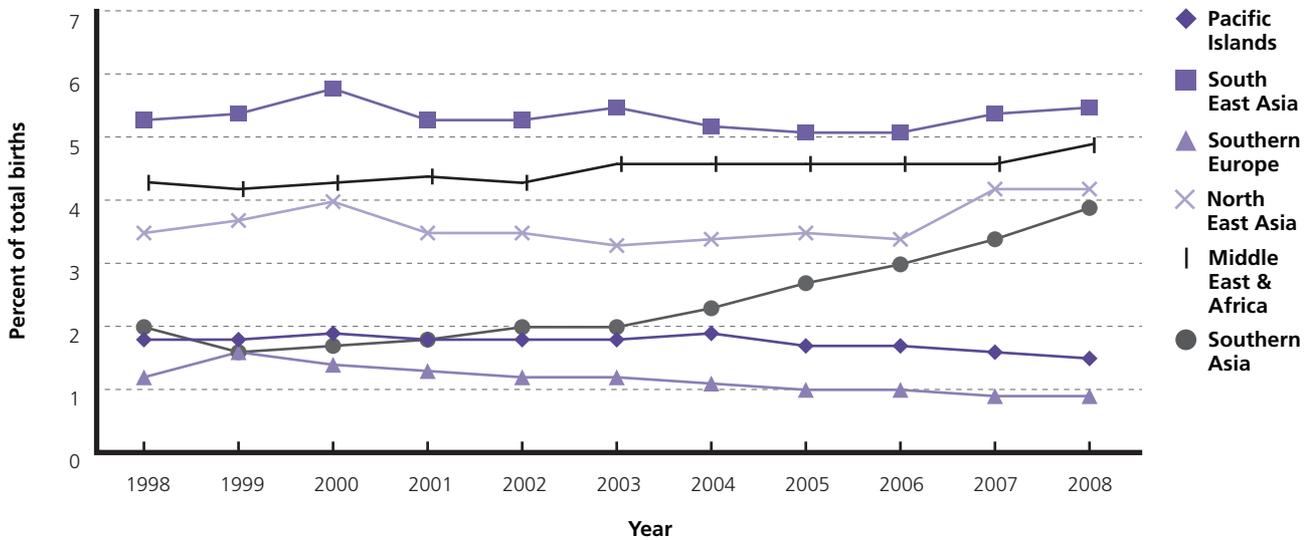
The proportion of births to women born in English-speaking countries in NSW hospitals declined from 80% in 1998 to 76% in 2008. Births from women born in Southern and Central Asia increased from 2% of total NSW births in 1998 to 4% in 2008 (Figure 2.14). Births to mothers born in the Middle East and Africa similarly increased, from 4% in 1998 to 5% in 2008. Births to women born in Southern Europe declined from a peak in 1999 of nearly 2% to 1% of births in 2008, and there was also a slight decline in the percent of births to women from Melanesia, Micronesia & Polynesia from 2% to 1.5%.

Figure 2.13: Percent of births by maternal age group, NSW, 1998 to 2008



Source: NSW Department of Health. New South Wales Mothers and Babies 2002, 2003, 2008. NSW Public Health Bull 2003, 2004 and 2010.

Figure 2.14: Percent of total births to women born outside of Australia, NSW, 1998 to 2008



Notes: Central and South America, Western and Northern Europe, Eastern Europe, Russia, Central Asian and Baltic States not shown as values less than 1% for each region. Pacific Islands = Melanesia, Micronesia & Polynesia.

Source: NSW Department of Health. New South Wales Mothers and Babies 2002, 2003, 2008. *NSW Public Health Bull* 2003, 2004 and 2010.

2.5 Teenage Fertility

Teenage pregnancy rates are an important reproductive health indicator, as teenage mothers experience higher rates of anaemia, gestational hypertension, and low birth weight/pre-term babies and stillbirths.^{33,34} Some of these elevated risks reflect the youth of the mother, whereas others are attributable to lifestyle factors such as higher smoking rates in teenage mothers. In addition to these medical risks, teenage motherhood is more likely to incorporate social and financial disadvantages for both mother and child.^{35,36}

2.5.1 International trends in teenage births and fertility

The United Nations (UN) estimated an overall global decline in the number of births to teenagers (aged 15 to 19 years) from approximately 89 million in the period 1995–2000 to 82 million in 2005–2010.³¹ However, the majority of births to younger women were in less developed regions (e.g. Africa, Asia excluding Japan and Latin America), which in the period 2005 to 2010 saw 77.8 million of the 82.4 million births to teenaged women (94%). In contrast, more developed regions (Europe, Northern America, Australia/New Zealand and Japan) accounted for approximately 4.6 million teenage births (6%) in the same period.

The decrease in births to teenage mothers over the period 1995 to 2010 was more pronounced in developed regions (a 19% decline from 5.6 to 4.6 million births) than in less developed regions (a 7% decline from 83 million to 78 million). However, in the least developed countries (48 countries, 33 in Africa, 9 in Asia, 5 in Oceania, 1 in Latin America), the number of births to teenage mothers was comparatively constant at approximately 22 million births per five-year period.³¹

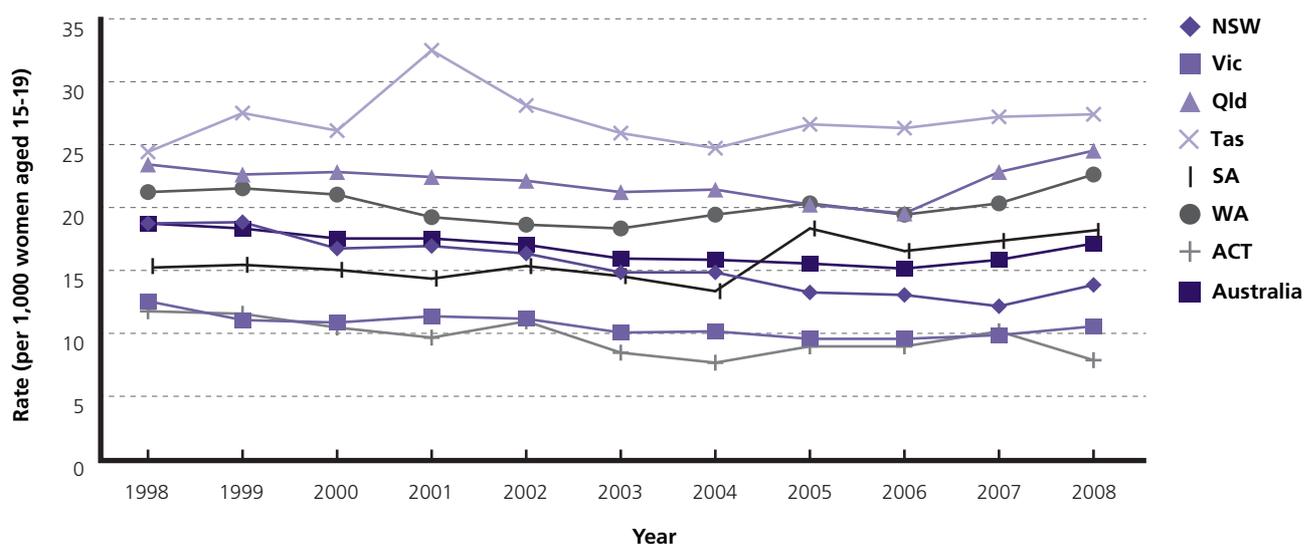
Whilst Australia's teenage fertility rate is comparable to that of Canada (14 births per 1,000 women) and lower than the US and the UK (41 and 30 births per 1,000 women respectively), Australia's teenage fertility rate remains higher than some other comparable countries. For example, rates in Denmark and Sweden (6 births per 1,000 women), Germany (8 births per 1,000 women) and Singapore (5 births per 1,000 women) are markedly lower³¹ and reflect social and economic factors as well as access to contraception and sex education.

2.5.2 Teenage births and fertility: Australia

The rate of teenage fertility has declined in Australia from 1998 to 2008, dropping from 18.9 births per 1,000 women aged 15 to 19 in 1998 to a low of 15.3 in 2006, and rising to 17.3 births per 1,000 women in 2008 (Figure 2.15).²⁵ This decline has been driven by a substantial reduction in the teen birth rate for the Northern Territory, although teenage fertility rates in NSW and to a lesser extent Victoria have also declined. Overall the teen birth rate in the Northern Territory remains substantially higher than the rest of Australia (in 2008, 52.2 births per 1,000 woman aged 15 to 19). However, this represents a decline from rates of 68.3 per 1,000 women in 1998 and a peak of 71.0 in 2001 (Figure 2.16).

The teenage birth rate for Australia, despite the overall decline from 1998 to 2008, increased slightly from 2006, concomitant with increases in all jurisdictions except the Northern and Australian Capital Territories (Figure 2.15). This increase was most notable in Queensland, where birth rates increased from around 20 births per 1,000 women aged 15 to 19 in 2005 and 2006 to 24.7 in 2008. The birth rate in women aged 15 to 19 continued to decrease in NSW from 2006 to 2007 but has subsequently increased. These increases will require further monitoring to determine if they are sustained and if so to assess causes and the need for intervention. In particular the effect of the Federal government baby bonus⁶ will need to be assessed for its impact on teenage fertility, although initial analyses suggest that the baby bonus has not substantially impacted teen fertility rates.²⁰

Figure 2.15: Teenage fertility rates, selected Australian states and territories, 1998 to 2008



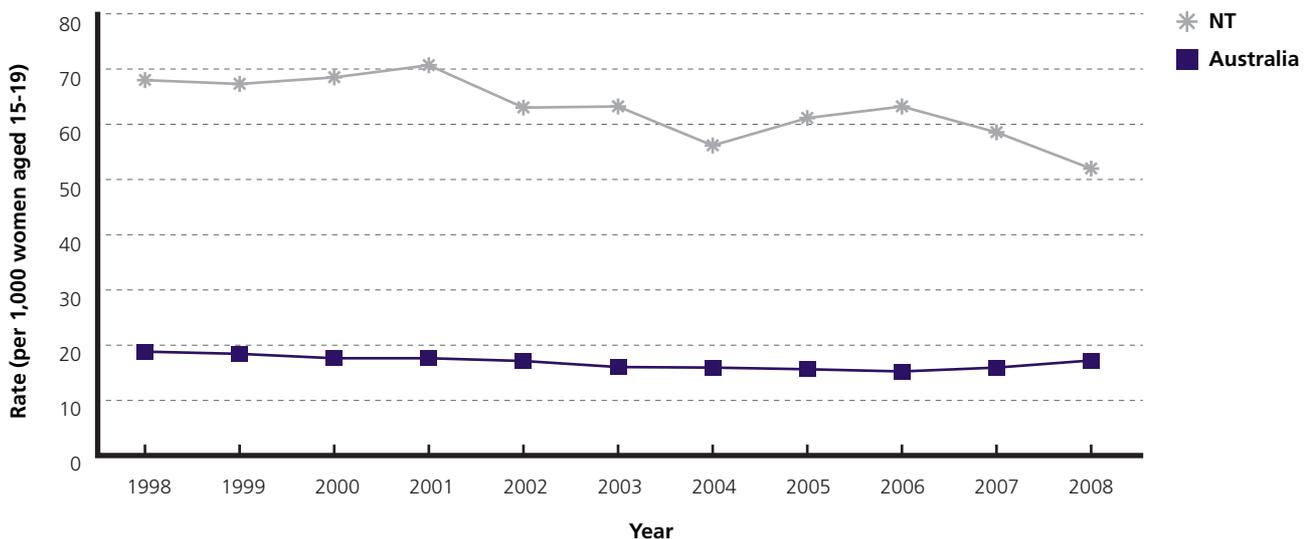
Source: Australian Bureau of Statistics, Births, Cat. no. 3301.0, 2008.

Teenage births by geographical remoteness and socio-economic status

Teenage pregnancy rates are higher in remote areas of Australia.^{37,38} A proxy comparison is provided by assessing teenage fertility rates in major urban centres with all other areas. Whilst this masks the variation outside of major centres, the disparity in teenage fertility in relation to remoteness is evident (Figure 2.17). In all states and territories the rates of teenage fertility were higher outside

of each state or territory's major city.²⁵ For example, in NSW the teenage fertility rate in Sydney in 2008 was 9.4 births per 1,000 women aged 15 to 19, whereas the rate in the rest of NSW was 19.1 births per 1,000 women. The higher rates of teenage fertility in Western Australia and the Northern Territory probably reflect the large Aboriginal and Torres Strait Islander populations in these jurisdictions. In Perth the teenage fertility rate was 16.2 births per 1,000 women, compared to 35.7 in the rest of the state, and in the Northern Territory the already high rate in Darwin (32.0 births per 1,000 women) increased nearly three-fold to 83.3 births per 1,000 women in the rest of the Territory.

Figure 2.16: Teenage fertility rates, Northern Territory and Australia, 1998 to 2008



Source: Australian Bureau of Statistics, Births, Cat. no. 3301.0, 2008.

Figure 2.17: Teenage fertility rates, primary city and rest of jurisdiction, Australia, 2008



Note: Primary cities: Sydney, Melbourne, Brisbane, Adelaide, Perth, Hobart, Darwin.

Source: Australian Bureau of Statistics, Births, Cat. no. 3301.0, Summary by statistical divisions, 2008.

Teenage pregnancy rates were similarly higher in areas of socio-economic disadvantage.^{37,38} In NSW, for example, rates of teenage births have declined in all socio-economic groups from 1991 to 2006. However, in 2006 teenage women in the lowest socio-economic group were 8.3 times more likely to have a child than teenage women in the highest group. 2.5% of teenage women in the lowest socio-economic group were mothers in 2006, compared to only 0.3% of teenage women in the highest socio-economic group.³²

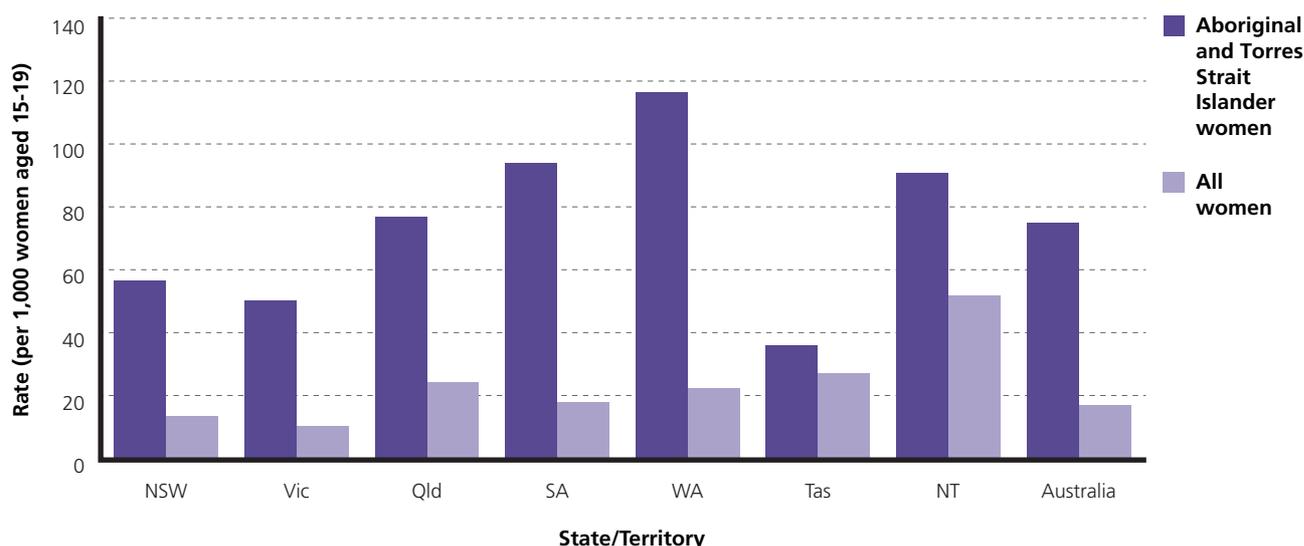
Teenage births in Aboriginal and Torres Strait Islander women

Aboriginal and Torres Strait Islander women in general in Australia have babies younger than non-Aboriginal women and the rate of teenage fertility is higher in Aboriginal and Torres Strait Islander women in all states and territories (Figure 2.18).²⁵ Teenage fertility rates in Aboriginal and Torres Strait Islander women in Australia ranged from 36.5 births per 1,000 women aged 15 to 19 in Tasmania to 116.6 births per 1,000 women in Western Australia. In contrast, teenage fertility rates for all mothers were below 30 births per 1,000 women aged 15 to 19 in all states except for the Northern Territory (52.2 births per 1,000 women).

2.5.3 Teenage births: New South Wales Area Health Services

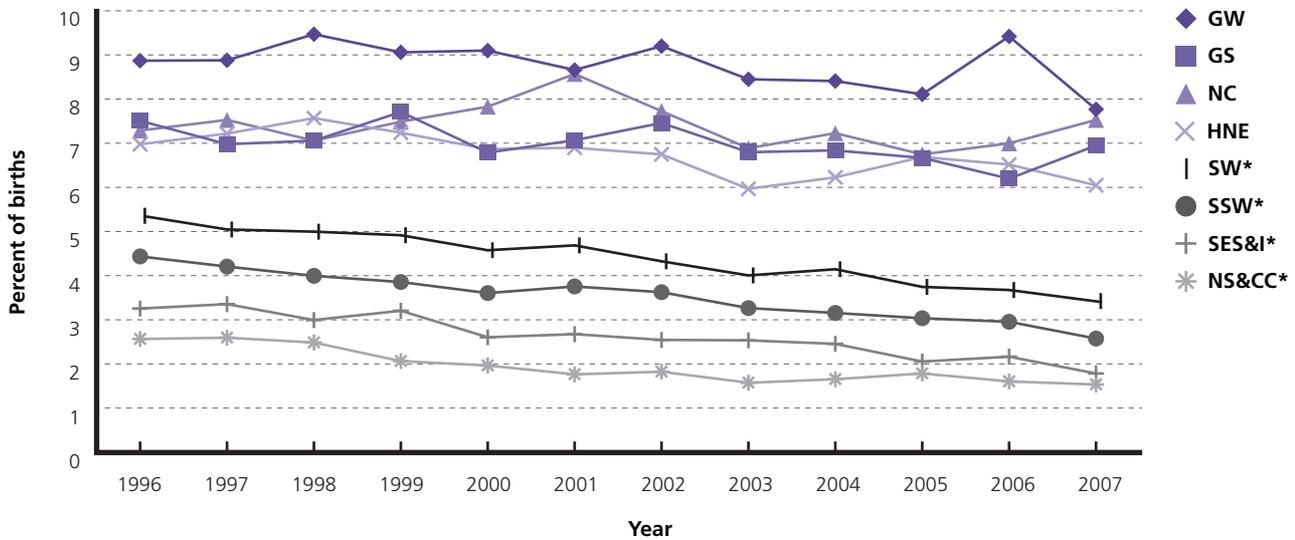
The proportion of births to teenagers was highest in rural and remote Area Health Services in NSW (Figure 2.19), and although the rate of teenage births in NSW has been decreasing overall, this decrease was more marked in metropolitan Area Health Services. The highest proportion of teenage births was in the rural and remote Greater Western Area Health Service, which declined from 8.9 to 7.8% of births from 1996 to 2007. The lowest proportion of teenage births was in the metropolitan North Sydney and Central Coast Area Health Service, where the proportion of teenage births declined from 2.6 to 1.5% of births. After 1998, the proportion of teenage births in all metropolitan Area Health Services was at or below 5%, whereas the proportion of teenage births in rural and remote Area Health Services has remained above 6%.

Figure 2.18: Teenage fertility rates, Aboriginal and Torres Strait Islander and all women, 2008



Source: Australian Bureau of Statistics, Births, Cat. no. 3301.0, 2008.

Figure 2.19: Proportion of births to teenage mothers, NSW Area Health Services, 1996 to 2007



Note: * = Metropolitan Area Health Service. Area Health Services: GW = Greater Western, GS = Greater Southern, NC = North Coast, HNE = Hunter and New England, SW = Sydney West, SSW = Sydney South West, SES&I = South Eastern Sydney and Illawarra, NS&CC = North Sydney and Central Coast.
Source: NSW Perinatal Data Collection 2008, NSW Department of Health.

2.6 Fertility in Aboriginal and Torres Strait Islanders

2.6.1 Number and proportion of Aboriginal and Torres Strait Islander births

The number of Aboriginal and Torres Strait Islander births (with either mother or father Aboriginal or Torres Strait Islander) registered in Australia has gradually increased from 9,999 in 1997 to 15,011 in 2008, with 10,950 births to Aboriginal and Torres Strait Islander mothers representing 3.7% of all births.²⁵ In 2008 the Northern Territory had a significantly higher proportion of births to Aboriginal and Torres Strait Islander mothers (around 41%) than other States and Territories, reflecting the higher proportion of Aboriginal and Torres Strait Islander women in the Northern Territory (approximately 44% of Northern Territory females aged 15 to 49 years identified as Aboriginal or Torres Strait Islander in the 2006 Census.)

2.6.2 Total Fertility Rate (TFR)

Fertility rates among Aboriginal and Torres Strait Islander women historically have been higher than in the general population although the TFR for both Aboriginal and Torres Strait Islander and all women has declined.²⁵ The TFR for Aboriginal and Torres Strait Islander women declined from estimates of 6 births per woman in the 1960s to approximately 3 births by the end of the 1970s and reached a low of 1.9 in 1996. Subsequently the Aboriginal and Torres Strait Islander TFR has increased gradually, reaching 2.5 in 2008.

In 2008 Western Australia reported the highest Aboriginal and Torres Strait Islander TFR of 3.2 births per woman, followed by South Australia (2.9 births) and Queensland (2.7 births, Table 2.2). As a reflection of the overall population composition, the Aboriginal and Torres Strait Islander TFR contributes substantially to that of the Northern Territory TFR, and less so to Western Australia, South Australia and Queensland.

The effects of the 2004 Australian Government baby bonus on Aboriginal and Torres Strait Islander fertility rates have yet to be quantified.

2.6.3 Age of mother at birth and age-specific fertility

The higher TFR overall in Aboriginal and Torres Strait Islander women reflects the higher fertility rates in younger Aboriginal and Torres Strait Islander women. In Australia in 2008, 75% of Aboriginal and Torres Strait Islander births were to women under 30 years of age, compared to 45% of births for all women.²⁵ In 2008, the median age for Aboriginal and Torres Strait Islander women registering a birth was 25 years, compared to the 31 year median for all mothers (Table 2.2).³⁹

In 2008, age-specific fertility rates for Aboriginal and Torres Strait Islander women were higher for those aged 15 to 29 years than for the population of 15 to 29 year women overall (Figure 2.20). In particular, age-specific fertility was 75.2 for Aboriginal and Torres Strait Islander women aged 15 to 19 years compared to 17.3 for Australia overall. The rate was also higher for Aboriginal and Torres Strait Islander women aged 20 to 24 years at 147.2 per 1,000 population compared to 57.1 for 20 to 24 year women overall.²⁵

Table 2.2: Total fertility rates and age of mother, Aboriginal and Torres Strait Islander and all women, 2008

MOTHER	ABORIGINALITY	STATE OR TERRITORY							
		NSW	VIC	QLD	SA	WA	TAS	NT	AUSTRALIA
TFR	Aboriginal and Torres Strait Islander	2.2	2.4	2.7	2.9	3.2	1.5	2.4	2.5
	All women	1.9	1.9	2.1	2.0	2.1	2.2	2.2	1.97
Median Age	Aboriginal and Torres Strait Islander	25	26	25	25	24	25	24	25
	All women	31	32	30	30	30	29	28	31

Note: TFR = Total fertility rate, births per woman.

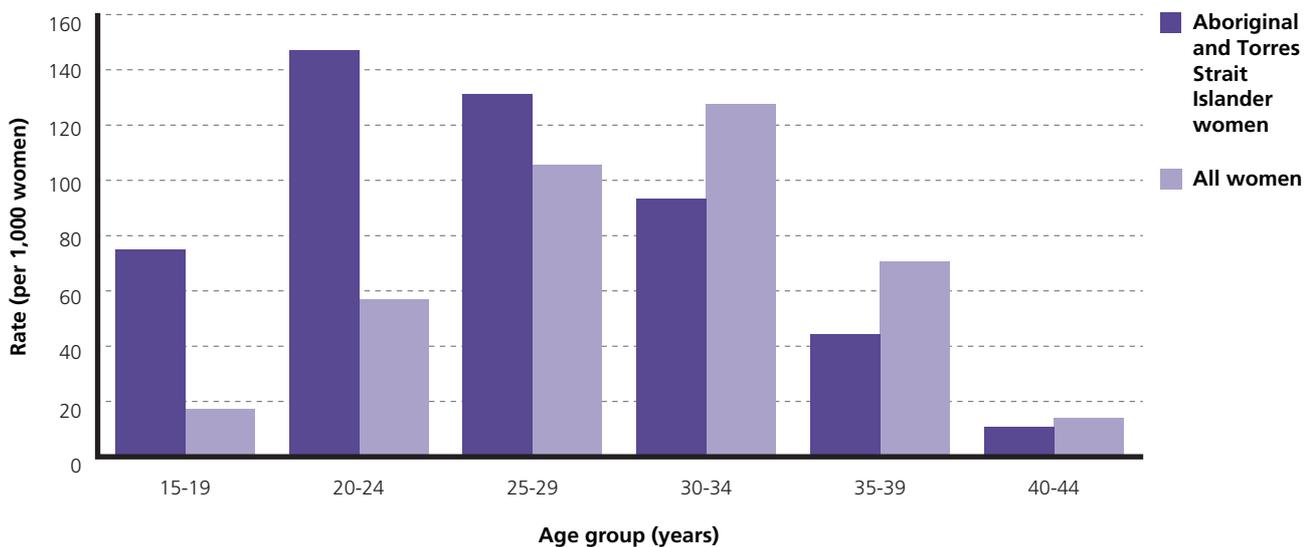
Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

2.6.4 Aboriginal and Torres Strait Islander births: New South Wales

In 2008 the NSW PDC recorded 2,976 births to Aboriginal and Torres Strait Islander women (3.1% of total NSW births),²⁴ and the ABS in 2008 registered 2,596 births to Aboriginal and Torres Strait Islander women in NSW.²⁵ Births to Aboriginal and Torres Strait Islander mothers aged 15 to 49 years accounted for 4.2% of births in 2007, although Aboriginal and Torres Strait Islander women accounted for 2.3% of the population of New South Wales.

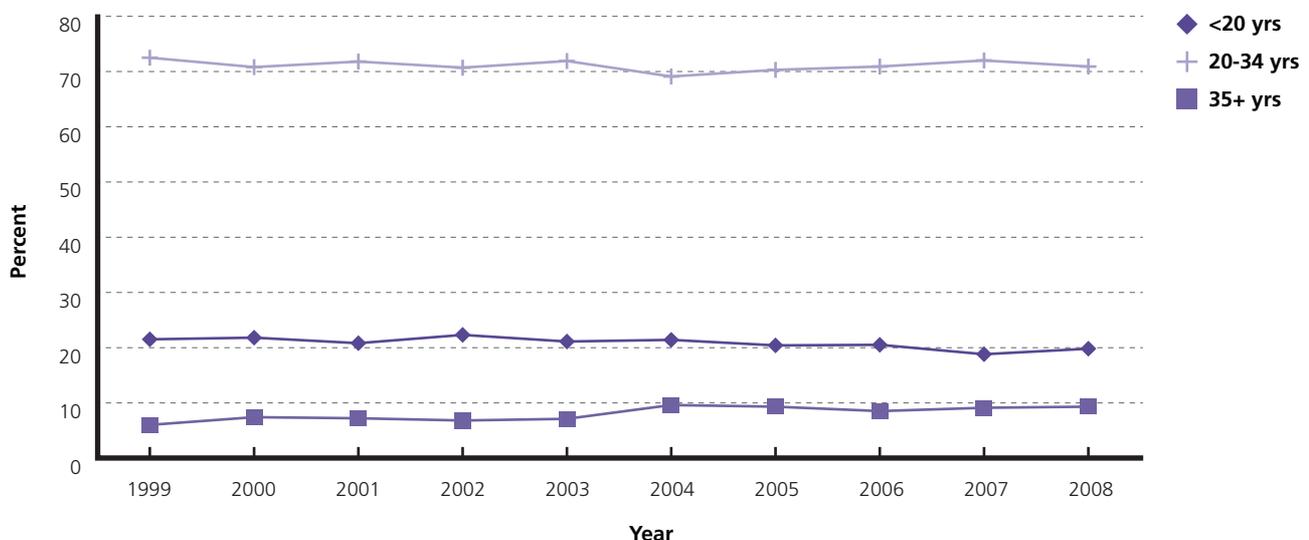
Aboriginal and Torres Strait Islander mothers aged 20 to 34 years accounted for the highest proportion of births to Aboriginal and Torres Strait Islander women in New South Wales and represented approximately 70% of births over the period 1999 to 2008 (Figure 2.21). Women aged less than 19 years contributed a higher proportion of Aboriginal and Torres Strait Islander births than women aged 35 or over (approximately 20%), although there was a slight increase in the proportion of births to women aged 35 and over which have represented approximately 9% of births to Aboriginal and Torres Strait Islander mothers from 2004.

Figure 2.20: Age-specific fertility rates, Aboriginal and Torres Strait Islander and all women, Australia, 2008



Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

Figure 2.21: Percentage of births to Aboriginal and Torres Strait Islander women by age group, NSW, 1999 to 2008



Source: Centre for Epidemiology and Research, NSW Department of Health. New South Wales Mothers and Babies 2003 and 2008. NSW Public Health Bull 2004; 15(S-5) and 2010; 21 (S-2).

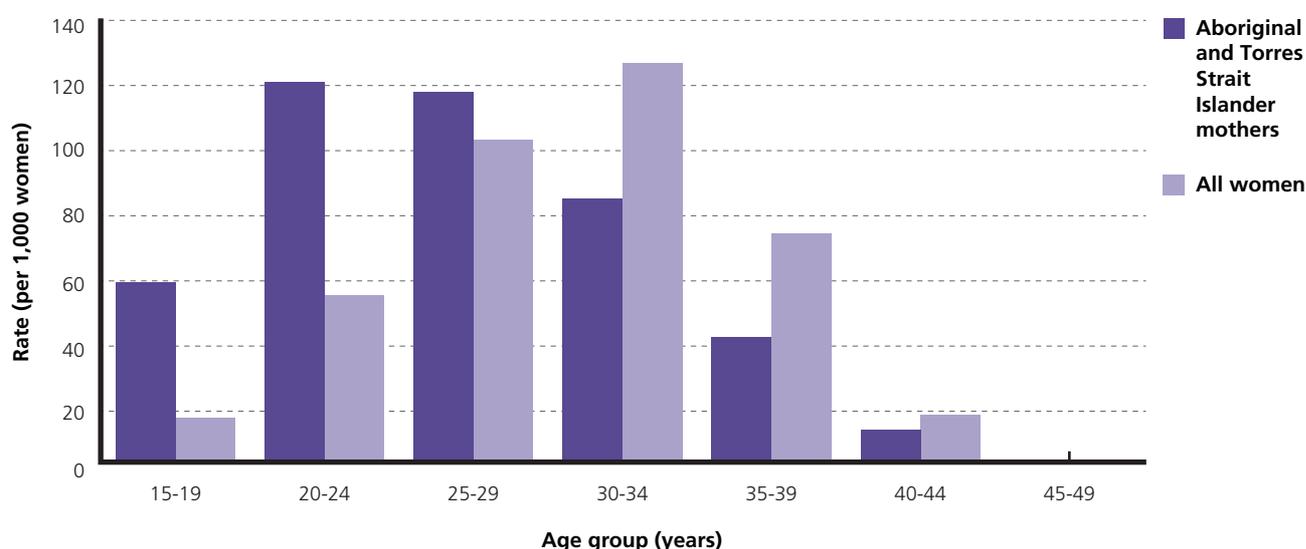
2.6.5 Age-specific Aboriginal and Torres Strait Islander fertility: New South Wales

Age-specific fertility rates for NSW Aboriginal and Torres Strait Islander women reflect the national comparison of Aboriginal and Torres Strait Islander and all women: fertility rates in 15 to 29 year-olds was substantially higher for Aboriginal and Torres Strait Islander women, and lower in the older age groups (Figure 2.22). Fertility rates for Aboriginal and Torres Strait Islander women aged 15 to 19 years was 56.9 per 1,000 compared to 14.0 for NSW overall. The rate was also higher for Aboriginal and Torres Strait Islander women aged 20 to 24 years at 120.6 per 1,000 compared to 52.8 for NSW overall.^{24,40}

2.6.6 Aboriginal and Torres Strait Islander births: New South Wales Area Health Services

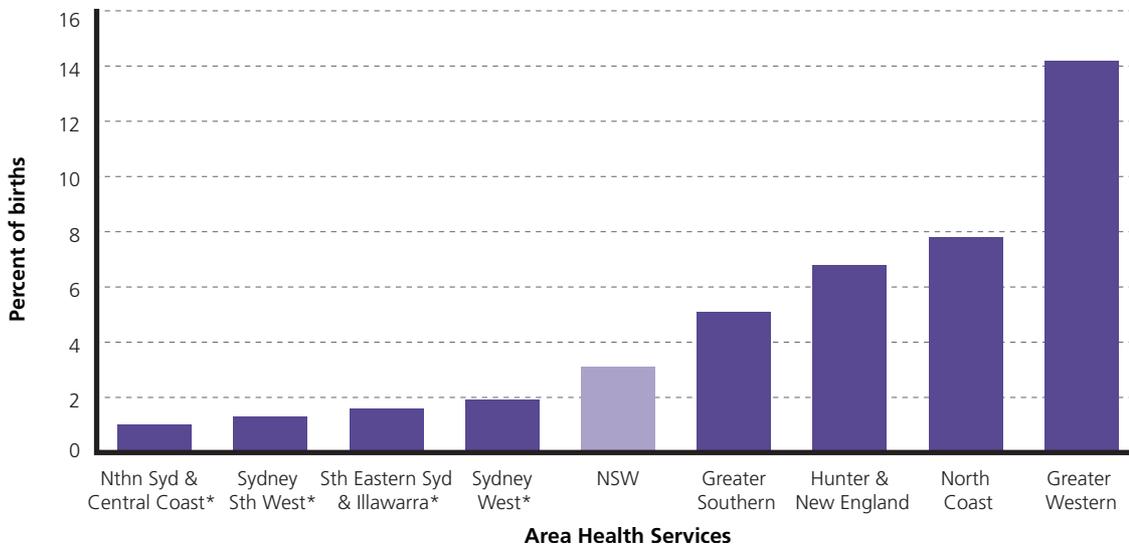
Rural, regional and remote NSW Area Health Services had higher proportions of births to Aboriginal and Torres Strait Islander mothers than metropolitan Services. However, as noted previously owing to under-reporting of Aboriginality these data must be interpreted cautiously. In 2008, the Greater Western Area Health Service had the highest proportion of births to Aboriginal and Torres Strait Islander women (14% of births, Figure 2.23). The metropolitan Area Health Services (Northern Sydney and Central Coast, Sydney South West, South Eastern Sydney and Illawarra, and Sydney West) had the lowest proportions of births to Aboriginal and Torres Strait Islander mothers with less than 2% of births in each Service to Aboriginal and Torres Strait Islander mothers.²⁴

Figure 2.22: Age-specific fertility rates, Aboriginal and Torres Strait Islander women and all women, NSW, 2008



Source: Australian Bureau of Statistics, Births 2008 Cat. no. 3301.0, 2009.

Figure 2.23: Proportion (%) of births to Aboriginal and Torres Strait Island mothers, NSW Area Health Services, 2008



Note: * = Metropolitan Area Health Services.

Source: Centre for Epidemiology and Research, NSW Department of Health. New South Wales Mothers and Babies 2008. NSW Public Health Bull 2010; 21 (S-2).

2.7 Summary

Fertility, the capacity to reproduce as individuals and as a population, is the primary element of reproductive and sexual health in a society. The ability of people to reproduce safely, if and when they choose is critical to individual and social wellbeing, and fertility choices define the size and the age distribution of that population. Moreover, fertility and the resulting population growth, stability or decline has economic and wider social implications. Fertility is most simply measured by births, however the factors that determine whether individuals choose to reproduce and that explain the fertility changes and trends in a population are complex. Economic conditions, government policy, gender equity, access to contraception and social and cultural values are important and have independent and interrelated effects on fertility.

Several measures are routinely used to assess fertility that count the number of live births in slightly different ways: the crude fertility rate is the number of live births annually per 1,000 population; the general fertility rate is the number of live births annually per 1,000 women of reproductive age; the age-specific fertility rate is the number of live births annually in maternal age groups (e.g. 15 to 19 years, 20 to 24 years, etc.); the total fertility rate (TFR) is the number of live births that a woman could expect to have in her lifetime. The TFR is the most commonly used measure, and is used to compare against the replacement rate to assess if a population is stable, growing or in decline. The replacement rate is the number of births women would on

average need to have to ensure the population is stable. In Australia the replacement rate is estimated to be 2.1 births per woman.

Comparatively complete data on fertility in Australia are collected through birth registrations and perinatal data collection, and although the methods of collection differ the resulting discrepancies are well characterised. State and territory birth registrations are collated by the Australian Bureau of Statistics (ABS) and these data are limited by failure to register births and delays in registration. The Australian Institute of Health and Welfare (AIHW) collates state and territory perinatal data collections, which are compiled by doctors, nurses and midwives at the point of birth. The identification of Aboriginality and the registration of Aboriginal births continue to cause potential underestimates of fertility in Aboriginal and Torres Strait Islanders.

In Australia in 2008 the total fertility rate (TFR) remained below the replacement rate at 1.97 births per woman. Fertility has been below the replacement rate since the mid-1970s and, although the TFR has increased gradually from 2001, there remains considerable debate about the potential long-term social and economic consequences of low fertility and the need for policy to increase the fertility rate.

In NSW the TFR increased to 1.9 births per woman in 2008. Total fertility varied in NSW by region, with outer

regional and remote areas having higher TFRs than major cities. This was generally reflected in variation among NSW Area Health Services, with the highest TFR (2.3 births per woman) in the rural and remote Greater Western Area Health Service.

The crude fertility rate in Australia in 2008 was 13.8 births per 1,000 population, and this was consistent in all states and territories except the Northern Territory, where the crude fertility rate was approximately 18 births per 1,000 population. In NSW crude fertility declined from 1999 to 2006 but has since returned to 1996 levels of approximately 13.5 births per 1,000 population.

General fertility in Australia in 2008 was 56 births per 1,000 women aged 15 to 49 years, and this represented an increase from a low of approximately 50 births per 1,000 women aged 15 to 49 from 2001 to 2003. Fertility rates in teenage women (ages 15 to 19 years) decreased from approximately 20 births per 1,000 women in 1997 to 17 births per 1,000 women in 2008. Birth rates similarly declined in women aged 20 to 24 years and 25 to 29 years. In contrast, the rate of births to older women increased. Births in women aged 35 to 39 years increased from approximately 45 to 71 per 1,000 women from 1998 to 2008, and in women aged 40 to 49 years from 3 to 7 per 1,000 women.

These age patterns were largely reflected in NSW, where the proportion of births to women aged 30 to 39 years has increased from 42% to 52% over the period 1996 to 2007, while the proportion of births to women aged 20 to 29 years has decreased from 51% to 41%. In NSW the majority of births in 2007 (70%) were to women born in Australia. However, this has declined from 74% in 1998, with a concomitant rise in the proportion of births to women born in Southern and Central Asia (3% of births in 2007). There has also been a trend of an increased proportion of births to women born in Sub-Saharan Africa, although remaining close to 1%.

Teenage fertility is an important subset of fertility monitoring, as outcomes for teenage mothers and their babies can be worse than other mothers in both medical and social terms. Globally in developed countries the rate of births to teenage mothers has been decreasing. In Australia, the fertility rate for women aged 15 to 19 years similarly declined from approximately 19 births per 1,000 women in 1998 to 17 births per 1,000 women in 2008. This rate is not the highest in comparison to other developed countries, but is certainly higher than rates of less than 10 births per 1,000 women aged 15 to 19 achieved in some Scandinavian and Western European countries.

In Australia the teenage fertility rate is significantly higher in the Northern Territory than other jurisdictions, although this has declined from approximately 68 births per 1,000 women aged 15 to 19 in 1998 to 52 births per 1,000 women in 2008. In contrast, the teenage fertility rate in

other jurisdictions including NSW has risen since 2006. This was most notable in Queensland, where the rate increased from approximately 20 to 25 births per 1,000 women, and Western Australia, where the teenage fertility rate has also climbed to over 20 births per 1,000 women. Teenage pregnancy rates are higher in rural and remote regions, and in Aboriginal and Torres Strait Islander communities.

In 2008 births to Aboriginal and Torres Strait Islander mothers represented approximately 4% of all births in Australia. The total fertility rate for Aboriginal and Torres Strait Islander women remains higher than the overall rate for Australia, and in 2008 was 2.5 births per woman. Aboriginal and Torres Strait Islander women on average have babies younger than non-Aboriginal women, and in 2008 the age-specific fertility rates for Aboriginal women aged 15 to 19 and 20 to 24 were substantially higher than for all women (for example, Aboriginal women aged 15 to 19 recorded 75 births per 1,000 women compared to 17 births per 1,000 women in this age group in Australia overall). Rates of teenage pregnancy in Aboriginal and Torres Strait Islander women were highest in Western Australia, South Australia and the Northern Territory (117, 94 and 91 births per 1,000 women aged 15 to 19 respectively).

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Chapter 3 : Infertility and Assisted Reproductive Technology

Chapter Outline

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Key Indicators

- Assisted Reproductive Technology (ART) treatment cycles per year
- Embryo transfers per year
- ART treatment cycles to embryo transfer – percent success rate of cycles to produce transferable embryos
- ART treatment cycles per 1,000 women of reproductive age
- Age distribution of women undergoing ART and mean age
- Age distribution of women achieving live deliveries
- Pregnancies and live births per ART treatment cycle
- Medicare claims for ART items: ART procedures and oocyte retrieval

Primary Data Sources

Australian and New Zealand Assisted Reproduction Database, Assisted Reproduction Technology Series, AIHW National Perinatal Epidemiology and Statistics Unit (formerly the National Perinatal Statistics Unit)
Medicare Australia

Introduction

Infertility is the diminished or impaired capacity of a person to conceive or bear offspring.¹ From a clinical perspective, infertility is the inability to conceive a pregnancy after 12 months of regular unprotected sexual intercourse.^{2,3}

Infertility may affect as many as one in six or approximately 15% of couples in Australia and worldwide.^{2,4,5} The causes of infertility are shared almost equally by men and women, with approximately 30 to 40% of cases representing fertility issues in each gender. In about 10 to 15% of cases infertility is a result of a combination of male and female factors, and in the remaining 10 to 15% of cases the cause is unknown.^{6,7}

In males, infertility results from conditions affecting sperm motility and mobility.⁸ In women the most common causes of infertility are ovulation disorders, disease of the fallopian tubes, endometriosis and oocyte aging.⁹⁻¹² Fertility declines with age in women,^{9,13-16} and ovulatory dysfunction as the main cause of infertility in younger women becomes secondary to tubal factor and unexplained infertility in women older than 35.¹⁷ Unexplained infertility may be the failure to detect subtle infertility factors particularly in women, such as endometriosis, tubal disease and prematurely aged ovaries.¹⁸ In women older than 40 the main factor may be oocyte senescence (i.e. aging leading to loss of function and death of eggs in the ovary), often clinically classified as unexplained infertility.^{19,20}

Lifestyle factors may also be important both for general fertility and for increasing the chances of success using Assisted Reproductive Technologies (ART).^{21,22} Factors such as weight and smoking have been shown to have a strong influence on reproductive performance, with stress, alcohol and caffeine consumption potentially important in lowering fertility but needing further study.²³

ART includes procedures involving the *in vitro* manipulation of oocytes and sperm or embryos to achieve a pregnancy.³ ART has been used in Australia since 1979 as treatment for irreversible damage to fallopian tubes, cervical problems, low male sperm count and other fertility related issues. ART is increasingly being used to address fertility issues encountered in women aged 35 and older who are attempting to achieve pregnancy having delayed initiating a family.²⁴ Whilst ART techniques and resulting pregnancy rates in older women have improved,¹⁴ ART cannot guarantee success, particularly when reproductive hormone levels have initiated menopausal patterns.^{24,25}

In Australia and New Zealand 11,528 babies were born in 2008 following ART.²⁶ Overall, around 3% of babies born in Australia were through ART, a doubling of the 1.5%

ART-related births reported in 1998.¹⁴ This in part reflects the increasing uptake of ART in older women, driven by increasing trends towards the postponement of childbirth to age 30 and later.

The most common ART treatments are:

In vitro methods: fertilisation occurs in the laboratory and the zygote or blastocyst is returned to the uterus.

- *In-vitro* Fertilisation (IVF) – egg and sperm are combined in the laboratory for fertilisation
- Subzonal Insemination (SUZI) – Spermatozoa are inserted into the perivitelline space between the oocyte outer layer (zona pellucida) and the oocyte membrane
- Intracytoplasmic Sperm Insertion (ICSI) – a single sperm is injected into an oocyte for fertilisation, through the zona pellucida and the oocyte membrane

In vivo method: fertilisation occurs in the body

- Gamete Intrafallopian Tube Transfer (GIFT) – egg and sperm are placed in a fallopian tube for fertilisation.

IVF is the oldest method of ART and has been the most popular form in Australia. Subzonal insemination (SUZI), the first micro-insemination technique for treating male infertility, was introduced in 1990. This was superseded in 1993 by the more successful intracytoplasmic sperm injection (ICSI). Gamete Intrafallopian Tube Transfer (GIFT), introduced in 1985, has declined and now accounts for only a small proportion of ART treatment cycles.

This chapter draws on data from the Australian and New Zealand Assisted Reproduction Database (ANZARD) and Medicare Australia to report on ART trends in Australia. There are several Medical Benefits Schedule (MBS) items for ART procedures addressing the range of techniques involved (Table 3.1).

Table 3.1: Medicare item numbers for Assisted Reproductive Technology*, 2008 to 2009

ITEM NUMBER		DESCRIPTION †
13200	Assisted reproductive technology	ASSISTED REPRODUCTIVE SERVICES rendered during 1 treatment cycle, if the duration of the treatment cycle is at least 9 days
13203		OVULATION MONITORING SERVICES, for superovulated treatment cycles of less than 9 days duration and artificial insemination, rendered during 1 treatment cycle
13206		ASSISTED REPRODUCTIVE SERVICES using unstimulated ovulation or ovulation stimulated only by clomiphene citrate, rendered during 1 treatment cycle
13209		PLANNING and MANAGEMENT by a specialist for the purpose of treatment by ART payable once only during 1 treatment cycle
13212	Gamete or embryo manipulation	OOCYTE RETRIEVAL for the purposes of ART
13215		TRANSFER of EMBRYOS or both ova and sperm to the female reproductive system
13218		PREPARATION AND TRANSFER of frozen or donated embryos or both ova and sperm, to the female reproductive system
13221		PREPARATION OF SEMEN for the purposes of ART
13251		INTRACYTOPLASMIC SPERM INJECTION for the purposes of ART
13290	Sperm retrieval	SEMEN, collection of, from a patient with spinal injuries or medically induced impotence, for the purposes of analysis, storage or ART
13292		SEMEN, collection of, from a patient with spinal injuries or medically induced impotence, under general anaesthetic

* Effective 01 November 2008 to 01 January 2010.

† See Medicare Schedule for full description.

Source: MBS-Medicare Benefits Schedule Book, Commonwealth of Australia 2008.

Data Limitations

National ART trends are primarily from the Australian and New Zealand Assisted Reproduction Database (ANZARD), which is reported routinely by the AIHW National Perinatal Epidemiology and Statistics Unit (NPESU, formerly the National Perinatal Statistics Unit, NPSU). The data relate to ART trends for Australia and New Zealand combined, which limits comparisons with Australian Medicare claims for ART-related MBS items. Data relate to treatment cycle, not an individual, and the age of the patient is the only demographic item reported. The ANZARD was introduced in 2002 and superseded the Assisted Conception Data Collection (ACDC), providing more reliable cycle estimates by including donor insemination cycles, cancelled ART cycles and unsuccessful oocyte pick-up and embryo thaws.^{27,28}

Medicare items only include services that qualify for Medicare benefits and for which claims have been processed. Similarly, Medicare data do not include services that have been provided in a hospital to public patients or services provided in outpatient departments. However, ART procedures occur infrequently in these settings in Australia,

although tertiary public hospitals are commonly co-located with ART clinics functioning as private providers (e.g. the Westmead Fertility Centre at Westmead hospital) or operate in collaboration with a private provider (e.g. the Royal Prince Alfred Hospital Fertility Unit).

Until revision of the relevant Medicare items in January of 2010, item 13200 did not differentiate between initial and subsequent ART cycles for a patient in a calendar year. The revision narrowed the definition of item 13200 to the initial cycle, and provided items 13201 for subsequent cycles and 13202 for cancelled cycles (Table 3.2). This allows, from 2010, for more reliable estimates of the number of women undergoing ART in a calendar year claiming through the Medicare system.

Table 3.2: Medicare item numbers for Assisted Reproductive Technology, 2010*

ITEM NUMBER		DESCRIPTION †
13200	Assisted reproductive technology	ASSISTED REPRODUCTIVE TECHNOLOGIES SUPEROVULATED TREATMENT CYCLE PROCEEDING TO OOCYTE RETRIEVAL rendered during 1 treatment cycle – INITIAL cycle in a single calendar year
13201		ASSISTED REPRODUCTIVE TECHNOLOGIES SUPEROVULATED TREATMENT CYCLE PROCEEDING TO OOCYTE RETRIEVAL rendered during 1 treatment cycle – each cycle SUBSEQUENT to the first in a single calendar year
13202		ASSISTED REPRODUCTIVE TECHNOLOGIES SUPEROVULATED TREATMENT CYCLE THAT IS CANCELLED BEFORE OOCYTE RETRIEVAL, rendered during 1 treatment cycle
13203		OVULATION MONITORING SERVICES, for artificial insemination
13206		ASSISTED REPRODUCTIVE TECHNOLOGIES TREATMENT CYCLE using either the natural cycle or oral medication only to induce oocyte growth and development
13209		PLANNING and MANAGEMENT of a referred patient by a specialist for the purpose of treatment by assisted reproductive technologies
13212	Gamete or embryo manipulation	OOCYTE RETRIEVAL for the purposes of assisted reproductive technologies
13215		TRANSFER of EMBRYOS or both ova and sperm to the female reproductive system
13218		PREPARATION of frozen or donated embryos or oocytes
13221		PREPARATION OF SEMEN for the purposes of artificial insemination
13251		INTRACYTOPLASMIC SPERM INJECTION for the purposes of assisted reproductive technologies
37605	Sperm retrieval	TRANSCUTANEOUS SPERM RETRIEVAL, for the purposes of INTRACYTOPLASMIC SPERM INJECTION
37606		OPEN SURGICAL SPERM RETRIEVAL, for the purposes of INTRACYTOPLASMIC SPERM INJECTION

* Based on 1 January 2010 Medicare items restructure for ART services, including In-Vitro Fertilisation (IVF).

† See Medicare Schedule for full description.

Source: MBS-Medicare Benefits Schedule Book January 2010 Medicare Benefits Schedule, Commonwealth of Australia 2010.

3.1 Use of Assisted Reproductive Technology (ART): Australia and New Zealand

This section reports on data from the AIHW *Assisted Reproduction Technology in Australia and New Zealand series*, primarily numbers 9 to 14, covering 2003 to 2008. Unless otherwise stated, data are for Australia and New Zealand combined.

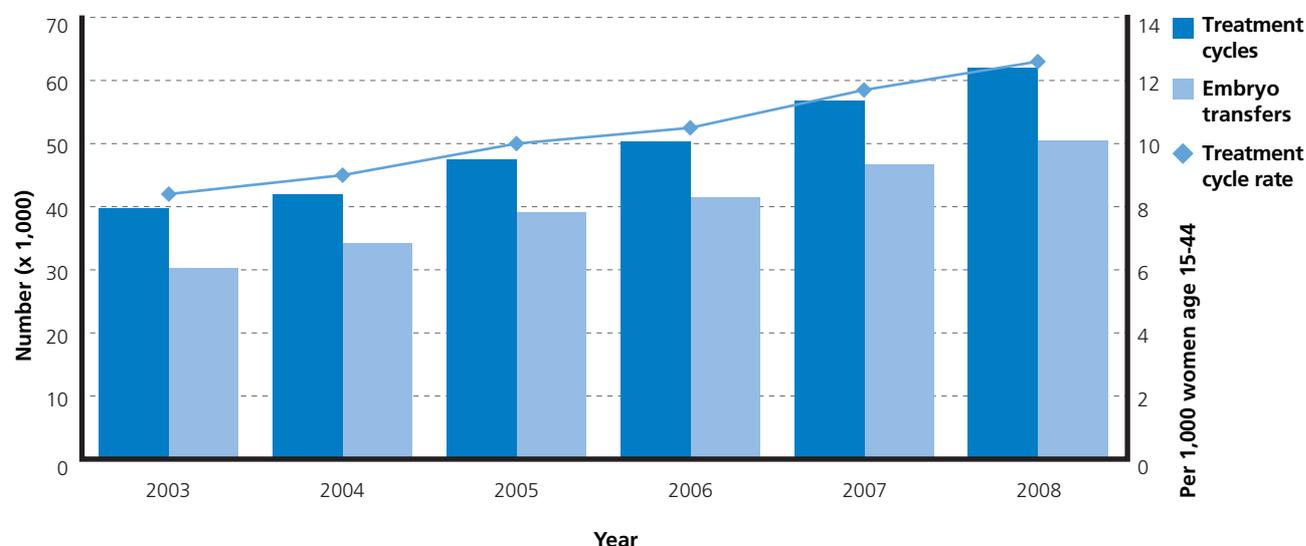
3.1.1 ART treatment cycles

In 2008, 61,929 ART treatment cycles were reported by the ANZARD. Fertility centres in Australia reported 56,913 cycles (92%) with 4,527 cycles (8%) reported by New Zealand clinics (Figure 3.1).²⁶ Both the number of treatment cycles and embryo transfers have increased since 2003. From 2003 to 2008 treatment cycles have increased from approximately 40,000 to 62,000 (56%) and embryo transfers increased by 67% from 30,000 to 50,000. These changes reflect improvements in ART techniques with fewer treatment cycles required to generate sufficient transferable embryos. In 2003 approximately 4 cycles were required for 3 embryo transfers (75% success rate), compared to approximately 6.2 cycles for 5 transfers in 2008 (81% success rate).

In Australia 12.6 cycles were undertaken per 1,000 women of reproductive age (15 to 44 years) in 2008, more than double the New Zealand rate of 5.5 cycles per 1,000 women. The rate of ART treatment cycles in Australia has steadily increased from 8.4 per 1,000 women of reproductive age in 2003 (Figure 3.1). This increase in the use of ART services will reflect the growing acceptability and accessibility of services, as well as rising infertility,³ the latter partly owing to increasing trends of delayed childbearing.¹⁶

In 2008 the majority (95%) of treatment cycles were autologous. In these cycles the woman used or intended to use her own oocytes or embryos (Table 3.3). The remaining 5% of cycles were comprised of recipient and donation cycles, where women either received oocytes or embryos from a donor (3.2%), donated their oocytes (1.6%), underwent GIFT cycles (0.2) or surrogacy cycles (0.2%).

Figure 3.1: Assisted Reproductive Technology treatment cycles and embryo transfers, Australia and New Zealand, and treatment cycles population rates Australia, 2003 to 2008



Note: Treatment cycles and embryo transfers plotted in primary y-axis; Treatment cycle rate plotted in secondary y-axis.

Source: AIHW Assisted Reproduction Technology Series nos. 9–14. Australian Institute of Health and Welfare 2006 to 2010, Canberra. Population denominator Australian Bureau of Statistics 3201.0 Population by Age and Sex.

3.1.2 Embryo transfer per transfer cycle

In early ART procedures the transfer of three or more embryos per cycle was common. For example, in 1994 approximately 50% of transfers involved three or more embryos.²⁸ However, as ART techniques have improved the transfer of multiple embryos has declined, such that from 2002 the transfer of three or more embryos per cycle has been approximately 5% of total transfers or less. In 2008, less than one percent of transfers involved three or more embryos in autologous and recipient ART cycles.²⁶ The majority of transfers were of a single embryo (68%) with two embryos transferred in the remaining third of cycles.

However, the number of double embryo transfer cycles increased with the age of the recipient (Figure 3.2). For women younger than thirty years of age, 80% of transfers in 2008 were single embryo only. However, by age 40 to 44 years the number of single embryo transfers had declined to 53%.²⁶ The majority of the corresponding increase was in double embryo transfers (from 20% to 45%), however the percentage of transfer cycles involving three or more embryos was also higher in older women, increasing from zero instances in 2008 in women aged less than 30 years to nearly 3% of cases in women aged 45 or older.

In women aged 45 or older there was also a slight increase against the general age trend in the proportion of single embryo transfers over double embryo transfers. This possibly reflects the lack of available quality embryos in some older women.

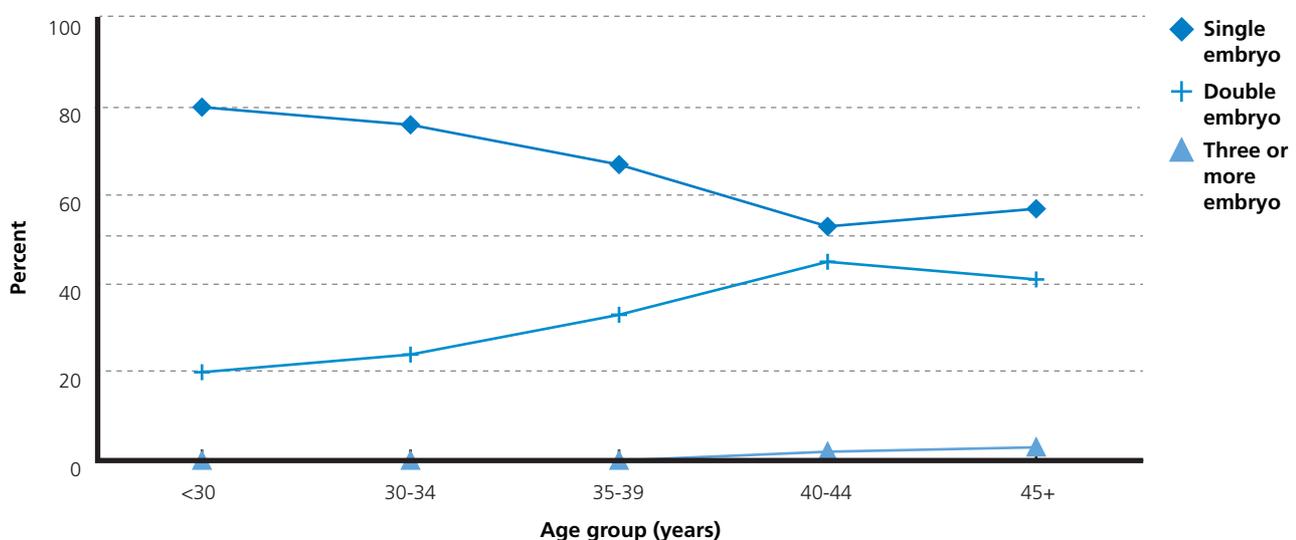
Table 3.3: Assisted Reproductive Technology treatment types, Australia and New Zealand, 2006 to 2008

TREATMENT	PERCENT		
	2006	2007	2008
Autologous	94.8	94.8	94.9
Oocyte/embryo recipient	3.6	3.4	3.2
Oocyte donation	1.6	1.7	1.6
GIFT	-	0.2	0.2
Surrogacy	-	0.1	0.2

Note: Columns do not sum to 100 owing to rounding errors. GIFT = Gamete Intrafallopian Tube Transfer.

Source: AIHW Assisted Reproduction Technology Series nos. 12-14. Australian Institute of Health and Welfare 2008 to 2010, Canberra.

Figure 3.2: Embryo transfers in autologous and recipient cycles by age group, Australia and New Zealand, 2008



Source: Wang YA, Chambers GM and Sullivan EA 2010. Assisted reproductive technology in Australia and New Zealand 2008. Assisted reproduction technology series no. 14. Cat. no. PER 49. Canberra: AIHW.

3.1.3 Age and parity of women

In Australia and New Zealand, the average age of women who underwent ART treatment in 2008 was 36 years, slightly higher than in 2003 (35 years). Women undergoing autologous cycles were on average younger than women undergoing recipient cycles (36 compared to 41 years respectively). The majority of both autologous and recipient cycles (65%) were in women aged 30–39 years. Women aged 40 to 44 years accounted for 22% of cycles, whereas women aged less than 30 or over 44 accounted for 11% and 2% of cycles respectively.

Whilst there has only been a slight increase in the proportion of ART cycles for women aged 40 to 44 since 2003 (20% to 25%), there has been a shift in the balance of ages within the 30 to 39 year group. In 2003, approximately equal proportions of cycles were in women aged 30 to 34 and 35 to 39 years (32% and 34% respectively). By 2008, the proportion of cycles occurring in women aged 30 to 34 had declined to 27%, whereas the proportion in women aged 35 to 39 years had increased to 38% (Figure 3.3). This reflects the overall increase in the proportion of ART being undertaken by women aged 35 years and older.

Overall, 75% of treatment cycles in 2008 were for nulliparous women, and 74% of autologous cycles were in nulliparous women compared to 80% of recipient cycles.

3.1.4 ART treatment outcomes

Clinical pregnancies and live births per initiated cycle

Twenty-three percent of cycles in 2008 resulted in a clinical pregnancy and 17% in a live birth. There were 11,528 live born babies from 10,633 live deliveries. The multiple delivery rate in 2008 (8%) continued the declining trend in multiple deliveries from 16% in 2004 and 10% in 2007.²⁶

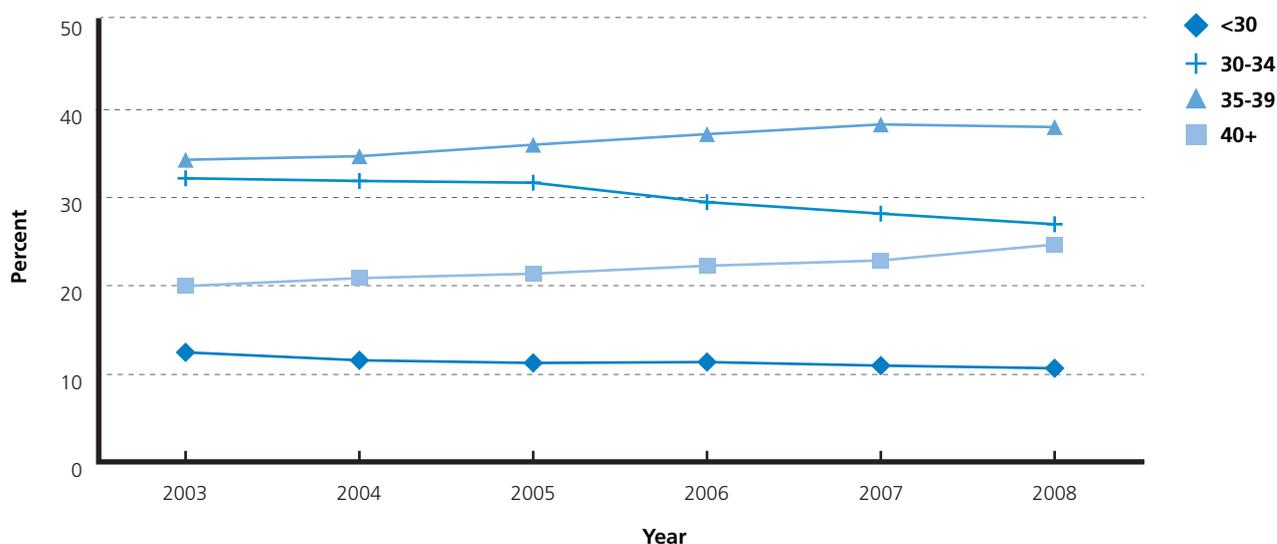
The proportion of clinical pregnancies and live deliveries per initiated cycle has varied little from 2003 (approximately 21% and 17% respectively). Similarly, there has been little change in the rate of live deliveries per clinical pregnancy, which has remained stable at approximately 76% (Figure 3.4). In contrast, improvements in ART techniques have been reflected in the proportion of clinical pregnancies resulting from single embryo transfer, which has climbed from 25 to 67%.

Live deliveries by maternal age

The average age of Australian and New Zealand women having live deliveries following ART in 2008 was 35 years, compared to 30 years for all women giving birth in Australia in 2008.²⁹

Delivery rates per initiated autologous cycle were highest in younger women (less than 30 years) and declined in women older than 30 (Figure 3.5). The pattern of declining ART success with age occurs with both autologous fresh and

Figure 3.3: Proportion of Assisted Reproductive Technology cycles by age group, Australia and New Zealand, 2003 to 2008



Source: AIHW Assisted Reproduction Technology Series nos. 9–14. Australian Institute of Health and Welfare 2006 to 2010, Canberra.

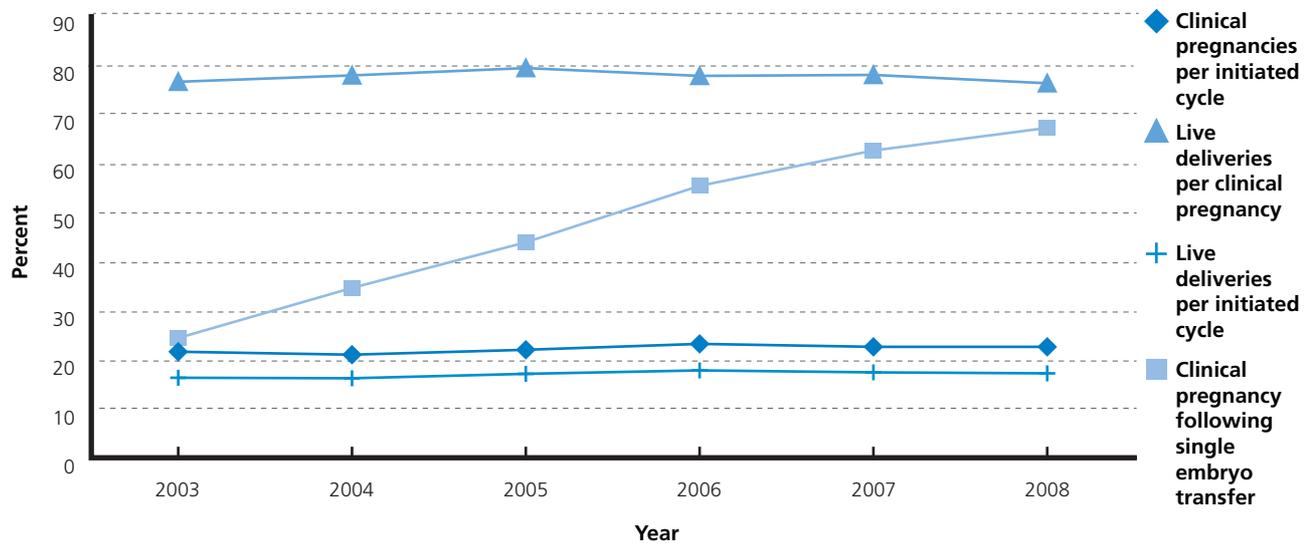
thaw cycles. In younger women (less than 40 years) fresh cycles were more likely to result in a live delivery. However, the decline in successful deliveries was sharper following fresh cycles, such that at around age 40 the live delivery rate becomes higher following the use of thawed embryos (Figure 3.5). Thawed cycle embryos are those frozen at the women's first autologous fresh cycle and are biologically younger than the woman at the time of transfer.²⁶

These trends reflect the general decline in fertility with age,^{9,12,16} and may even be accelerated compared to the normal decline in fertility with age.¹⁴ Despite the advances in ART and increasing potential for success in younger

women, ART may not provide a reliable safety net for women who choose to delay child bearing past the age of 35.^{9,30}

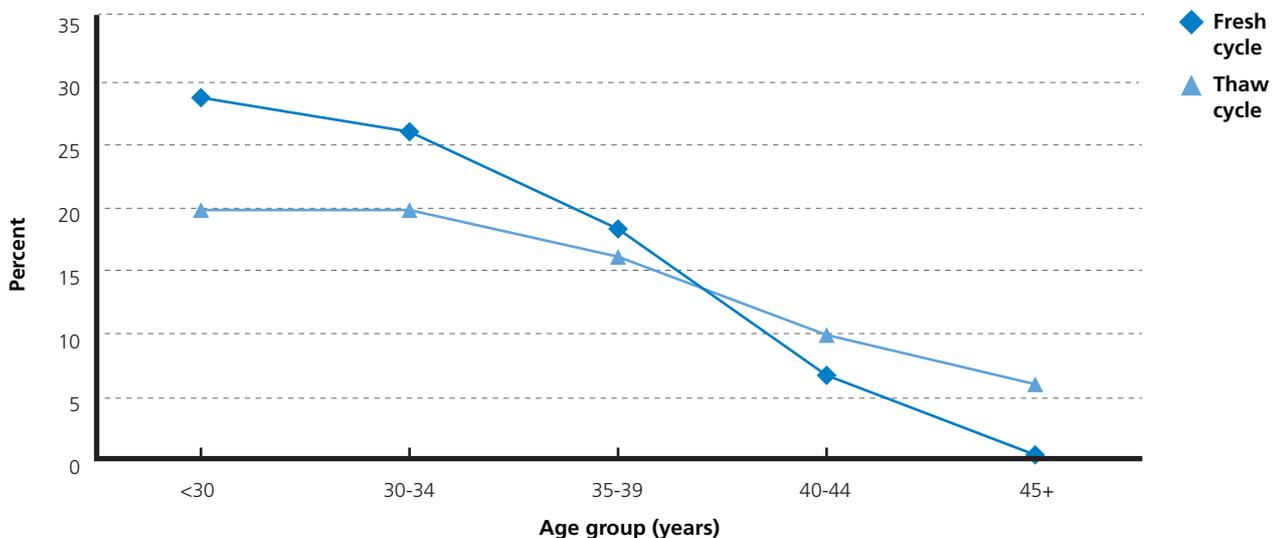
However, there is a lack of community awareness of the decline in fertility with age, and an overestimation of the chance of conceiving and bearing a child through ART.^{15,16} For women aged 45 years or older, the live delivery rate is significantly compromised, and older women and their partners require appropriate counselling on the chances of a successful pregnancy through ART.³¹

Figure 3.4: Pregnancy and birth outcomes following Assisted Reproductive Technology, Australia and New Zealand, 2003 to 2008



Source: AIHW Assisted Reproduction Technology Series nos. 9–14. Australian Institute of Health and Welfare 2006 to 2010, Canberra.

Figure 3.5: Live deliveries per initiated cycle by age group, Australia and New Zealand, 2008



Source: Wang YA, Chambers GM and Sullivan EA 2010. Assisted reproductive technology in Australia and New Zealand 2008. Assisted reproduction technology series no. 14. Cat. no. PER 49. Canberra: AIHW.

Live deliveries by cause of infertility

Couples with male factor as the sole cause of infertility have consistently had the highest live delivery rates per cycle, followed by unexplained infertility and female-only infertility (in 2008, 19.3, 18.0 and 16.2% respectively, Table 3.4). Within female factor infertility, women with endometriosis-only mediated infertility had the highest live delivery rates per initiated cycle (18.3% in 2008). The lower likelihood of live births in couples where the woman has female

factor infertility is caused firstly by the pathology of the infertility preventing fertilisation or implantation. However, this is exacerbated because the pathology may also confer a higher risk of placental complications, gestational hypertension or bleeding which can cause the pregnancy to fail.^{11,18,32,33} Female infertility factors may also affect obstetric outcomes and result in reduced gestational age and birth weight.³⁴

Table 3.4: Delivery rates following assisted reproductive technology by cause of infertility, Australia and New Zealand, 2008

INFERTILITY	LIVE DELIVERIES PER INITIATED CYCLE (PERCENT)		
	Autologous fresh cycle	Autologous thaw cycle	All
Male factor only	20.0	18.2	19.3
Female factor	16.9	15.1	16.2
Tubal disease only	16.3	14.8	15.7
Endometriosis only	19.4	16.7	18.3
Other female factor only	16.0	14.9	15.6
Combined female factor only	17.9	13.8	16.3
Combined male-female factor	17.1	15.2	16.4
Unexplained	18.2	17.6	18.0
Not stated	13.5	13.7	13.6

Source: AIHW Assisted Reproduction Technology Series nos. 12–14. Australian Institute of Health and Welfare 2008 to 2010, Canberra.

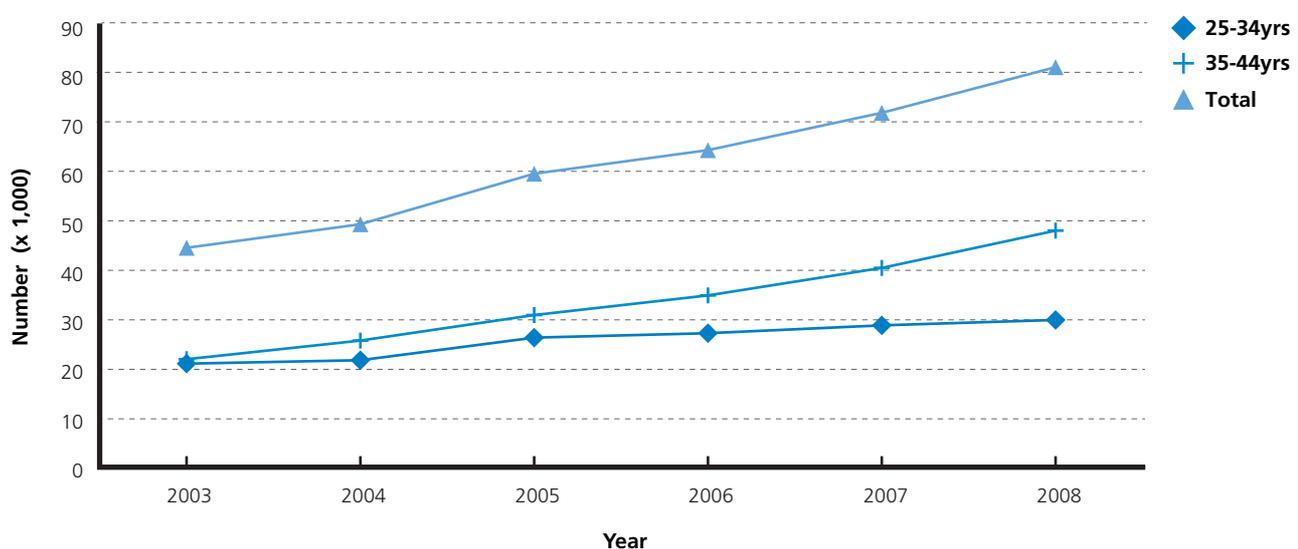
3.2 Use of Assisted Reproductive Technology (ART): New South Wales

This section reports on data from Medicare for NSW and a subset of the ANZARD data to 2006 for NSW. Note that Medicare data are not directly comparable to ART data reported in the ANZARD and should be used primarily for the assessment of overall ART trends.

3.2.1 Number of Medicare claims: ART related procedures

The number of Medicare Benefits Schedule item claims for all ART procedures, except male-only infertility factors, increased substantially from 44,705 in 2003 to 81,494 in 2008 (Figure 3.6). Increases were highest in claims for women aged 35 to 44 years, which more than doubled from approximately 22,000 in 2003 to approximately 48,000 in 2008. Claims for women aged 25 to 34 years increased by 50%, from approximately 21,100 to 30,000. Whilst the MBS data represent claims rather than individuals (i.e. an individual may have had multiple ART cycles and therefore claims), given that live births per ART cycle have been relatively static, this rise does reflect the increasing uptake of ART treatment for infertility.

Figure 3.6: Medicare claims for items for ART procedures by age group, NSW, 2003 to 2008



Note: MBS items: 13200, 13203, 13206, 13209, 13212, 13215, 13218, 13221, 13251. Claims for age groups 15 to 24 and 45 to 54 years less than 2% of total and not shown.

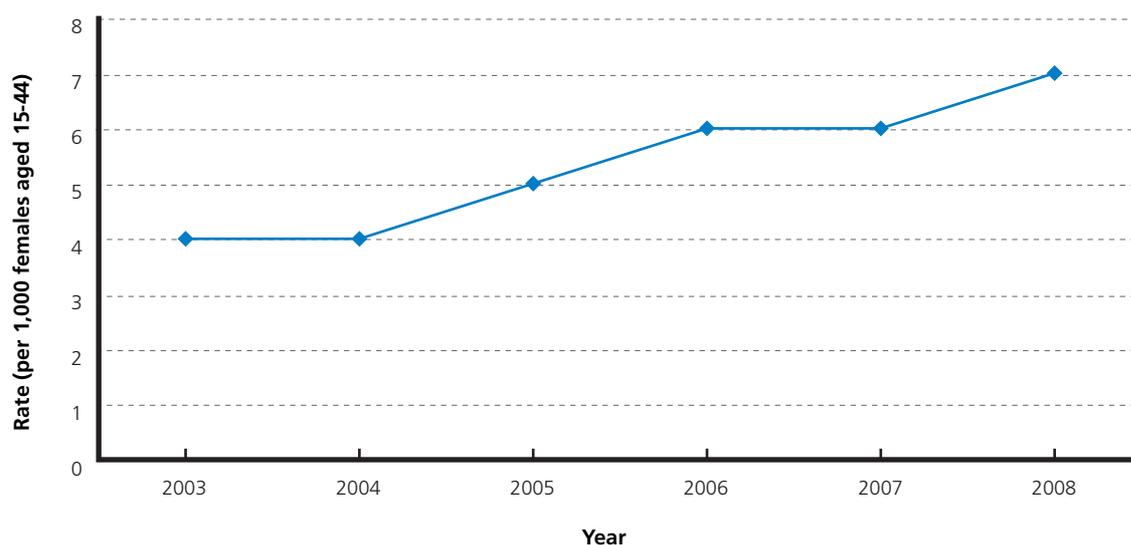
Source: Medicare Australia, 2009.

3.2.2 Medicare claims for oocyte retrieval

Medicare claims for oocyte retrieval for assisted conception (item 13212) can also be used as a proxy measure of ART which excludes cancelled cycles (where the cycle did not progress to retrieval of an oocyte). From 1994 to 2003 oocyte retrieval claims increased in NSW from 2.7 to 4.1 claims per 1,000 women aged 15 to 44 years and from 2004 to 2008 from 4.4 to 6.9 claims per 1,000 women (Figure 3.7). These increases relate to the greater uptake

of ART and may reflect the higher proportions of women postponing childbearing to an age when conception becomes more difficult and more oocyte retrieval cycles are required to achieve pregnancy. In NSW from 2003 to 2008, there was an increase in the proportion of oocyte retrievals in women aged 35 to 44 years (53% to 62%), with a concomitant decline in women aged 25 to 34 years (43% to 34%, Figure 3.8). Oocyte retrievals in women younger than 25 or older than 44 remained uncommon from 2003 to 2008, and represented less than 5% of retrieval procedures.

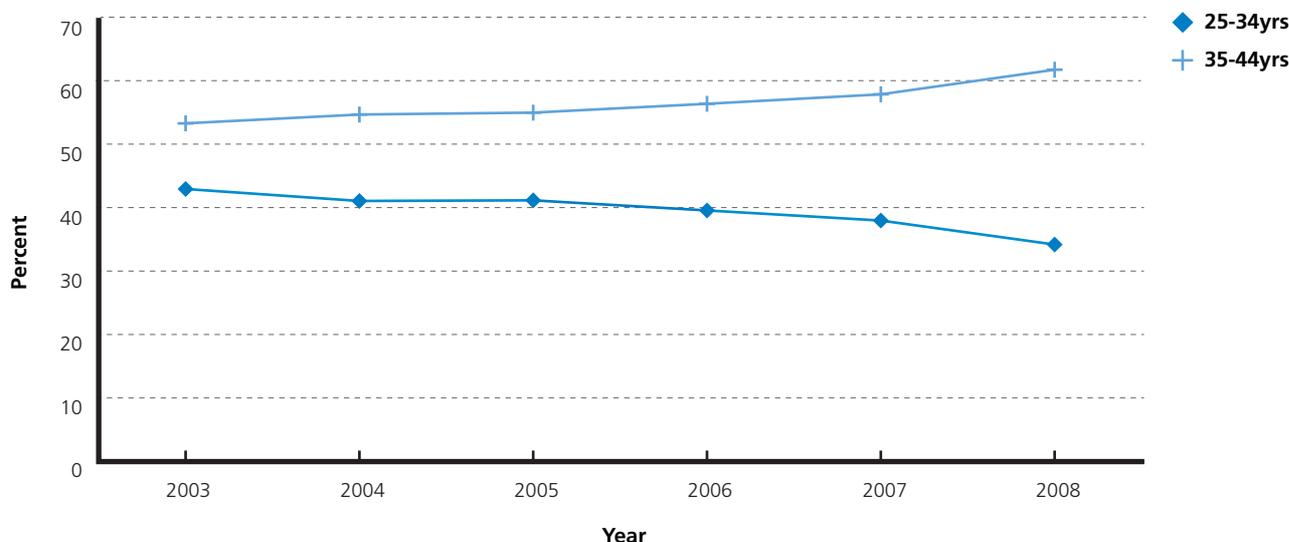
Figure 3.7: Medicare claims for oocyte retrieval, NSW, 2003 to 2008



Note: MBS item 13212.

Source: Medicare Australia, 2009.

Figure 3.8: Medicare claims for oocyte retrieval, proportion (%) of claims per age group, NSW, 2003 to 2008



Note: MBS item 13212. Claims for age groups 15 to 24 and 45 to 54 years less than 5% of total and not shown.

Source: Medicare Australia, 2009

3.2.3 Use of ART: New South Wales results from the ANZARD

A subset of ANZARD data for NSW from 2002 to 2006[†] was provided for this report (Table 3.5). The number of oocyte pick-up cycles in NSW increased most substantially

in women aged 35 and over (from 3,204 in 2002 to 5,194 in 2006, an increase of 63%). Subsequent clinical pregnancies and live deliveries increased overall by 63% and 67% respectively from 2002 to 2006. The greatest increases were seen in younger women (aged less than 25 years), although the absolute numbers were small (e.g. live deliveries in this age group increased 132% from 25 to 58).

Table 3.5: ANZARD key indicators, NSW, 2002 to 2006

MATERNAL AGE AT DELIVERY (YEARS)	2002	2003	2004	2005	2006	PERCENT CHANGE FROM 2002
Oocyte pick-up cycles						
<25	89	108	97	109	127	43%
25–29	756	718	803	927	1022	35%
30–34	1764	1888	2166	2654	2444	39%
35–39	1917	2080	2569	2910	3131	63%
40+	1287	1323	1639	1985	2063	60%
Not stated	96	137	116	226	149	55%
Total	5909	6254	7390	8811	8936	51%
Clinical pregnancies resulting from embryo transfer cycles						
<25	31	44	43	56	71	129%
25–29	329	402	426	467	550	67%
30–34	872	948	972	1340	1376	58%
35–39	806	811	929	1107	1322	64%
40+	292	308	286	402	485	66%
Total	2336	2513	2656	3372	3804	63%
Live deliveries resulting from embryo transfer cycles						
<25	25	30	35	50	58	132%
25–29	262	317	355	388	459	75%
30–34	700	717	783	1100	1140	63%
35–39	604	580	725	845	1003	66%
40+	184	180	185	252	310	68%
Total	1780	1824	2083	2635	2970	67%

Source: ANZARD, AIHW National Perinatal Epidemiology and Statistics Unit.

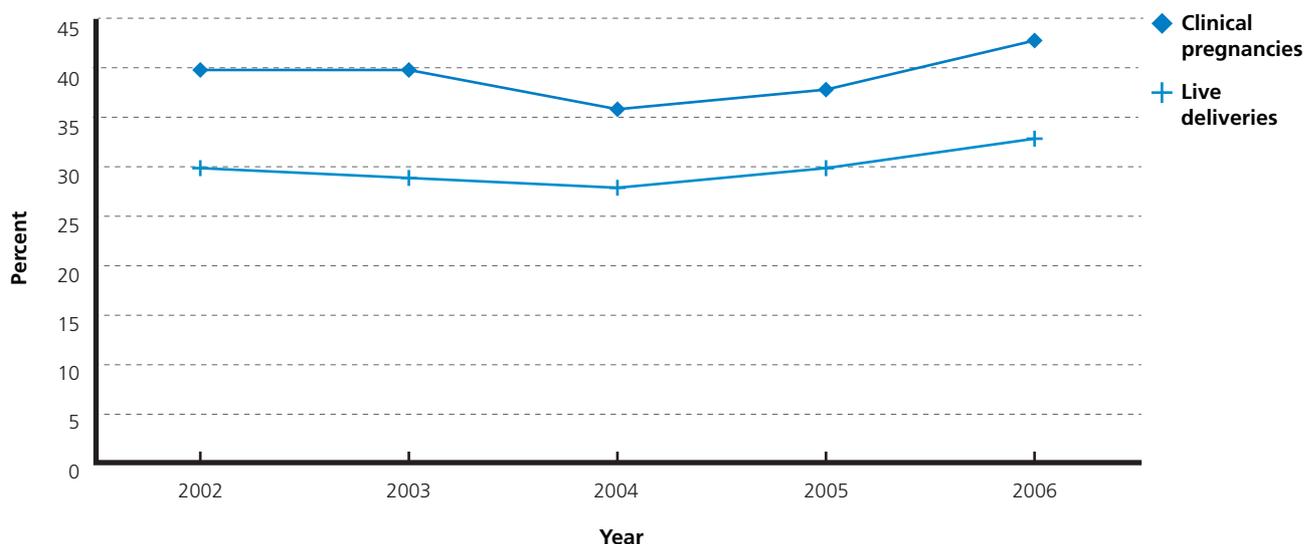
[†] Data were only requested for this time period at the initial development of this document.

3.2.4 Pregnancies and delivery outcomes per embryo pick-up cycle

Overall in NSW the proportion of oocyte pick-up cycles that resulted in clinical pregnancies or live births increased from 2002 to 2006 (Figure 3.9), although there was a decline in 2004. The proportions of oocyte pick-ups that resulted in clinical pregnancy and live delivery in 2002 were 40% and 30% respectively, and by 2006 these had increased by 3% each.

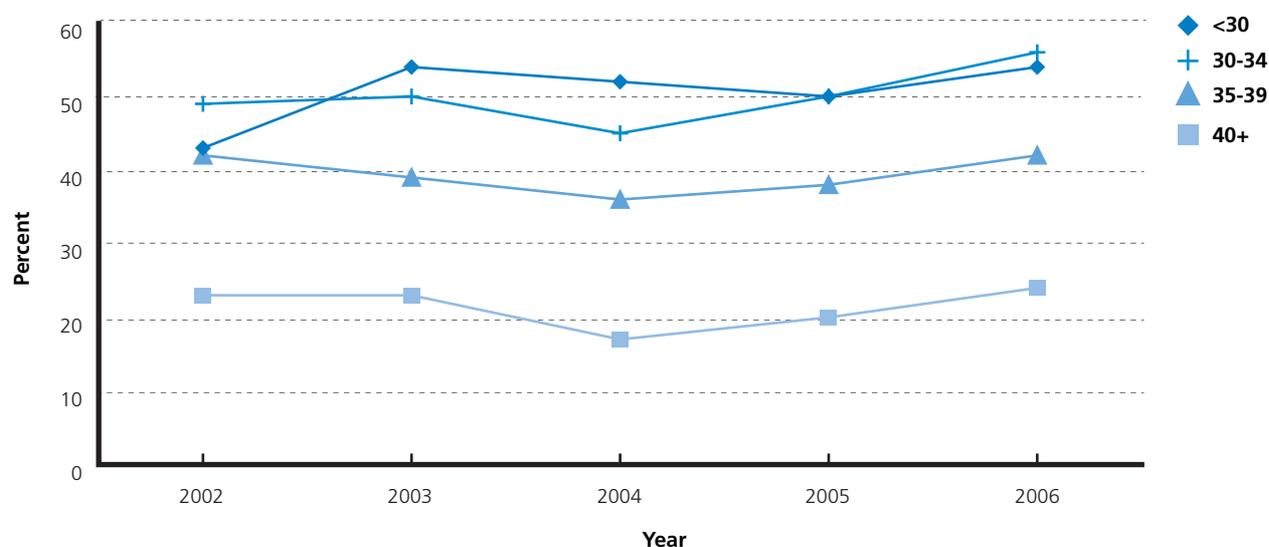
However, more substantial increases in the proportions of oocyte pick-up cycles resulting in clinical pregnancy and live delivery occurred in women younger than 30 years (Figure 3.10 and Figure 3.11). The proportion of oocyte pick-up cycles resulting in clinical pregnancy in women younger than 30 years increased from 43% in 2002 to 54% in 2006, and live deliveries from 34% to 45%. In women aged 30 to 34 years, the increases were slightly less, with clinical pregnancies per oocyte pick-up cycle increasing from 49 to 56% from 2002 to 2006 and live deliveries from 40 to 47%. In women aged 35 and older, a decline in clinical pregnancies and live deliveries to 2004 followed by an increase resulted in little overall change from 2002 to 2006.

Figure 3.9: Oocyte pick-up cycles resulting in clinical pregnancy or live delivery (%), NSW, 2002 to 2006



Source: ANZARD, AIHW National Perinatal Epidemiology and Statistics Unit.

Figure 3.10: Oocyte pickup cycles resulting in clinical pregnancy by age group (%), NSW, 2002 to 2006



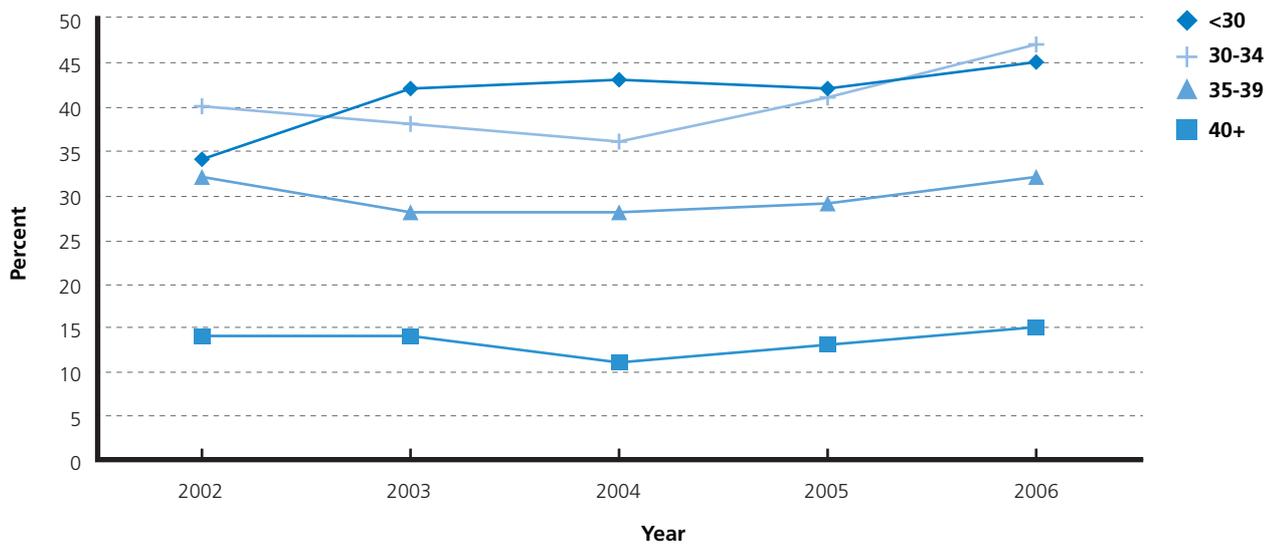
Source: ANZARD, AIHW National Perinatal Epidemiology and Statistics Unit.

3.2.5 Comparison of ANZARD and Medicare oocyte retrieval data

The number of oocyte retrieval cycles in NSW fertility clinics recorded in the ANZARD was compared to that recorded by Medicare claims for item 13212 over 2002 to 2006

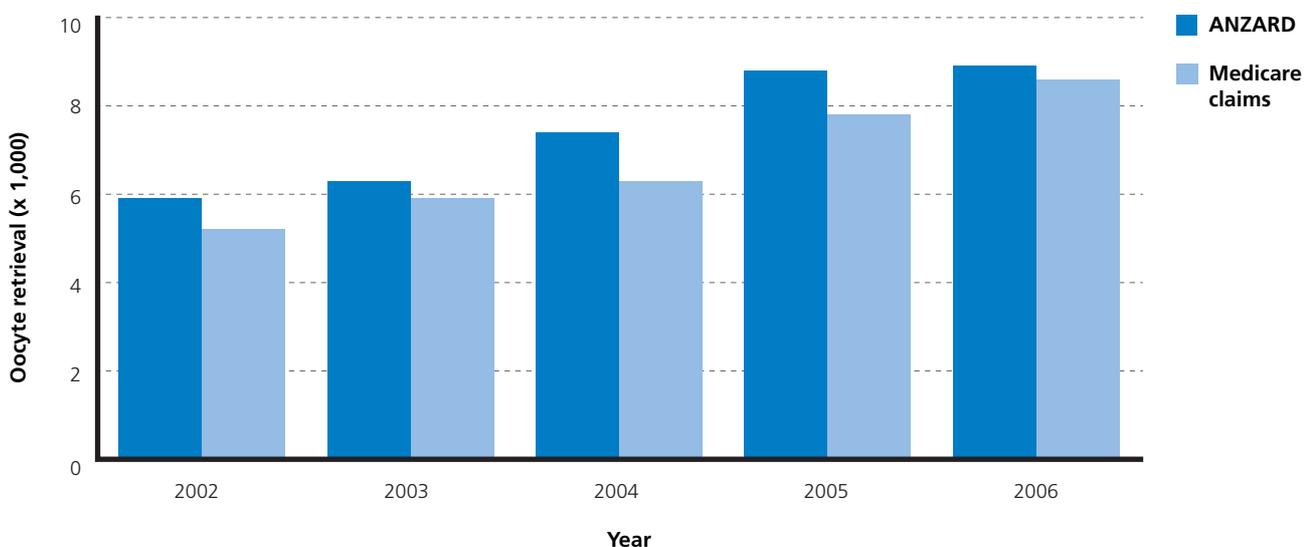
(Figure 3.12). Oocyte retrieval data in the ANZARD was largely matched by retrievals recorded by Medicare, with Medicare recorded retrievals between 4 and 14% lower than ANZARD recorded retrievals. This difference reflects procedures not claimed through Medicare.

Figure 3.11: Oocyte pickup cycles resulting in live births by age group (%), NSW, 2002 to 2006



Source: ANZARD, AIHW National Perinatal Epidemiology and Statistics Unit.

Figure 3.12: Oocyte retrievals, ANZARD and Medicare claims, NSW, 2002 to 2006



Note: ANZARD = Australian and New Zealand Assisted Reproduction Database. Medicare item 13212.

Source: ANZARD, AIHW National Perinatal Epidemiology and Statistics Unit and Medicare Australia, 2009.

3.3 Summary

Infertility is indicated for clinical management following the inability of a couple to conceive after 12 months of regular unprotected sex. There is no reliable estimate of the rate of infertility in Australia, although at least one in six couples are probably affected. Social factors, such as the increasing delay before initiating a family, are potentially resulting in an increase in the rate of infertility.

Medical treatment for the management of the infertile couple is well established in Australia using Assisted Reproductive Technologies (ART). These technologies, in particular the ability to retrieve and manipulate gametes and embryos, have advanced substantially, and ART now offers a significant possibility of achieving a sustained pregnancy for an otherwise infertile couple.

In Australia and New Zealand in 2008 approximately 11,500 babies were born following ART, and in Australia approximately 3% of births were achieved through ART. This was a doubling of the proportion of births through ART over the period 1998 to 2008, reflecting both the increasing success rates of ART and the growing need and acceptance of ART and infertility services.

Data on ART are provided through two main sources: the Australian and New Zealand Assisted Reproduction Database (ANZARD) and Medicare Australia claims for ART-related procedures. Whilst these data are largely complete, both have limitations. For example, the ANZARD compiles data for Australia and New Zealand, and these combined data are not directly comparable to the Australian-only data related to Medicare claims.

More importantly, data and counts relate to ART cycles and not individual women, i.e. a count of 1,000 cycles will reflect potentially more than one cycle per woman and does not mean that 1,000 women underwent ART treatment. Therefore, estimates of population rates are difficult to reliably ascertain and are potentially biased. This has partially been addressed by Medicare, with the introduction of an item to track an initial ART cycle in a calendar year per woman, and which will provide an estimate of the number of women beginning ART annually.

Neither the ANZARD nor Medicare collect substantial demographic or other related data that would allow more detailed epidemiological analysis of trends in ART use and success. Other than patient age, there is not the ability in Australia to address questions such as access to ART based on area of residence or socio-economic factors such as income.

Nearly 57,000 ART treatment cycles were reported in Australia in 2008, representing approximately 13 cycles per 1,000 women of reproductive age. The majority of these cycles (95%) were autologous, meaning that the woman

used or intended to use her own embryos. The average age of Australian and New Zealand women undergoing ART in 2008 was 36 years, which was slightly higher than the average of 35 years in 2003.

Since 2003 there has been a slight increase in the number of women aged 40 or over undergoing ART treatment, from 18 to 22% of cycles, and an increase in the proportion of women aged 35 to 39 years undergoing treatment from 34 to 38% of cycles.

ART technology has improved such that 81% of cycles now result in transferable embryos, and the majority (68%) of embryo transfers were of a single embryo, reflecting the confidence that transfer will result in a successful pregnancy. However, the transfer of more than one embryo increases with the age of the woman, with multiple embryo transfers more common in women over 30 years of age owing to the decreasing likelihood of a successful pregnancy in older women.

The key indicator following the initiation of ART treatment is a clinical pregnancy resulting in a live birth, and in 2008 23% of ART cycles resulted in a clinical pregnancy and 17% in a live birth. Women having live deliveries following ART in Australia and New Zealand were on average 35 years old.

Delivery rates per initiated cycle were highest in younger women (aged less than 30 years) and the proportion of live deliveries per initiated cycle declined comparatively rapidly after age 35. This reflects the general decline in fertility with age, and whilst freezing eggs from earlier cycles results in some success for older women (aged 40 to 45 years), ART does not provide a guaranteed safety net for couples who decide to begin a family after the woman is 30 and encounter fertility issues. In particular, the success rates for ART remain compromised for women over 35 and pregnancy events are rarer (10% or less per initiated cycle) for women aged over 40.

In NSW, claims for ART-related Medicare items nearly doubled from approximately 45,000 in 2003 to 81,500 in 2008. The major increase was in women aged over 35, which more than doubled from 22,000 to approximately 48,000 claims. This increase was reflected in the ANZARD database, which for NSW from 2002 to 2006 showed an increase in oocyte pick-up cycles from approximately 3,000 to 5,000. Clinical pregnancies and live deliveries resulting from ART increased by 63% and 67% respectively over the same period.

Public awareness of the increasing success of ART in treating infertility may have resulted in an incorrect perception of the general effectiveness of ART and lack of knowledge regarding the effects of age on fertility. Research is required to assess the wider population knowledge about

ART, and to identify gaps or misconceptions that may need to be addressed to ensure that women are fully aware of the strengths and weaknesses of infertility treatment when they choose to delay childbirth. This is particularly relevant in relation to emerging technology allowing for egg-freezing, whereby women can store younger, healthier eggs for later fertility.

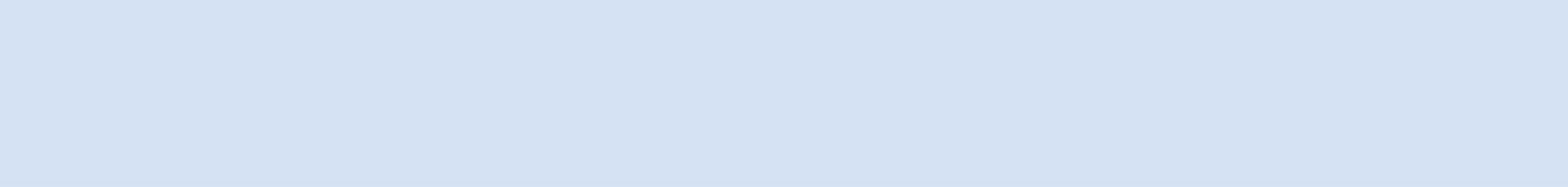
Data gaps

- Accurate estimates of ART rates are hindered by collection of cycle data rather than data per woman. Medicare data with the addition of an item for first cycle per calendar year will partially address this, but provision through the ANZARD of data summaries that reliably count the number of women undergoing treatment as well as the number of cycles would significantly add to the assessment of ART in Australia.
- Medicare data are not linked to outcome and therefore can provide only rates of treatments but no measure of the success of these treatments. Data linkage to outcome sources (e.g. ABS births, ANZARD) would further broaden the assessment of the effectiveness of ART.
- Demographic and socio-economic data related to ART services and outcomes are lacking. Routine collection with ART services or research to better understand patterns of usage related to ART and potential service gaps is necessary to provide a wider social and demographic context to ART and infertility in Australia, and assessment of unmet service or education needs.

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Chapter 4 :

Infant Mortality, Infant Morbidity and Maternal Mortality

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Key Indicators

Infant mortality

- Fetal mortality (stillbirths) per 1,000 births
- Neonatal deaths (deaths of live borns up to 28 days after birth) per 1,000 live births
- Perinatal deaths (fetal plus neonatal deaths) per 1,000 births
- Infant mortality (death of live borns up to one year of age) per 1,000 live births

Infant morbidity

- Proportion of babies born premature (less than 37 weeks of pregnancy)
- Proportion of babies born at low birth weight (less than 2.5kg)
- Proportion of mothers presenting for first antenatal visit in first 19 weeks of pregnancy
- Proportion of mothers smoking through pregnancy

Maternal mortality

- Maternal Mortality Ratio (MMR, the risk of death once pregnant) per 100,000 births
- Maternal Mortality Rate (the risk of death through pregnancy) per 100,000 women aged 15 to 45

Primary Data Sources

Australian Bureau of Statistics, Deaths, Australia cat. No. 3302.0

Australian Institute of Health and Welfare, National Perinatal Data Collection (NPDC), AIHW National Perinatal Epidemiology and Statistics Unit (NPESU)

NSW Perinatal Data Collection, (PDC) NSW Department of Health (formerly the Midwives Data Collection)

World Health Organisation (WHO), WHO Statistical Information System

Note: Spelling convention, fetus vs foetus. British English common usage is foetus, however, the preferred technical usage is fetus. This document will follow the technical usage.

Introduction

Infant and maternal mortality are key indicators of the reproductive and sexual health of a population, reflecting access to and the quality of antenatal care, as well as the broader social and economic conditions of a community. Infant and maternal mortality are defined as:

Fetal death (stillbirth): The death of a product of conception prior to the complete expulsion or extraction from its mother and that has attained at least 20 weeks gestational age or a birth weight of 400 grams.¹

Neonatal death: Deaths up to 28 days after birth.^{2,3} Neonatal deaths are reported through Australian Bureau of Statistics (ABS) birth and perinatal registration data. In NSW, neonatal mortality is recorded in the NSW Perinatal Data Collection (PDC) only when the neonatal death occurs in the hospital following the birth or when recorded by the midwife at a homebirth. The neonatal mortality rate (NMR) is measured as the number of deaths up to 28 days after birth per 1,000 live births.

Perinatal mortality: The sum of fetal mortality and neonatal mortality. Perinatal mortality in the NSW Health Mothers and Babies series⁴⁻⁷ are stillbirths or neonatal deaths as recorded in the NSW PDC up to the time of hospital discharge and are used for reporting NSW perinatal mortality in this chapter. The perinatal mortality rate (PMR) is the annual number of perinatal deaths per 1,000 births including live and stillbirths.⁸

Infant mortality: The death of a live-born child before his or her first birthday (i.e. under one year of age). The Infant Mortality Rate (IMR) is the number of deaths of infants under one year of age in a given year per 1,000 live births in the same year. Infant mortality is reported to the ABS through birth and perinatal death registration, and consequently the ABS data provide the most complete ascertainment of infant deaths for the calculation of infant mortality rates.⁸

Maternal mortality: National maternal mortality is reported by the Australian Institute of Health and Welfare (AIHW) and NSW maternal mortality in the NSW Health Mothers and Babies report using the ICD-10 definition: death while pregnant or within 42 days of the completion or termination of the pregnancy, from any cause related to or aggravated by the pregnancy but excluding accidental or incidental causes.⁹ Maternal mortality includes deaths directly attributable to the pregnancy or its management, or, indirectly, as a result of pre-existing disease or disease which developed during pregnancy, but which may have been aggravated by the physiological effects of pregnancy.

Australia has experienced a substantial decline in infant mortality over the last 100 years. Rates of approximately 100 infant deaths per 1,000 live births in the early 1900s

declined towards 50 per 1,000 in the 1920s and by the 1980s were below 10 deaths per 1,000 live births.^{10,11} Currently, Australia reports rates of less than 5 infant deaths per 1,000 live births.¹² This decline has largely been attributed to improved public sanitation, mass vaccinations and the use of antibiotics. A further decline over recent years has been attributed to improvements in neonatal and intensive care and a major reduction in the number of deaths from Sudden Infant Death Syndrome (SIDS).^{13,14} Decreasing infant mortality in Aboriginal and Torres Strait Islander children, which nonetheless remains higher than in non-Aboriginal children, has also contributed to the overall decline.

Infant morbidity is similarly an important indicator of reproductive health in a population. Major infant morbidity outcomes are prematurity, low birth weight, birth defects, and developmental delay or disability. Maternal risk factors for infant morbidity include smoking during pregnancy, late or no access to antenatal care, alcohol and other drug consumption during pregnancy, and existing medical conditions and general health during pregnancy.¹⁵ There is also an association between paternal factors and pregnancy outcomes, particularly the father's smoking patterns.¹⁶ The mother's smoking status during pregnancy, existing medical conditions, and use of antenatal care are recorded in the NSW PDC.

Maternal mortality in Australia is uncommon. From 2003 to 2005, 65 maternal deaths were recorded.⁹ However, higher rates of maternal mortality continue to be seen in Aboriginal and Torres Strait Islander mothers.

The two most commonly used measures of maternal mortality are the maternal mortality ratio (MMR) and the maternal mortality rate. The MMR is a measure of the risk of death once pregnant, and is calculated from the number of direct and indirect maternal deaths during a given period per 100,000 live births in the same period. In Australia, the AIHW has used a three-year period for reporting national MMRs. The maternal mortality rate is the number of direct and indirect maternal deaths in a given period per 100,000 women of reproductive age during the same period.⁹

Data Sources and Limitations

Several data collections are used for ascertaining perinatal mortality in Australia and NSW. However, these collections use different data sources, and definitions may vary slightly. As a result, estimates of the same parameter (e.g. a mortality rate for a given jurisdiction in a particular year) varies across reports (Table 4.1).

Table 4.1: Fetal, neonatal and perinatal mortality rates (per 1,000 births) variation by reporting system, 2008

	AUSTRALIA		NSW		
	Data source		Data source		
Mortality	ABS	AIHW	ABS	AIHW	NSW PDC
Fetal	5.5	7.4	-	6.1	6.1
Neonatal	2.9	2.8	-	2.6	3.0
Perinatal	8.4	10.2	8.2	8.7	8.7

Notes: ABS = Australian Bureau of Statistics, AIHW = Australian Institute of Health and Welfare, PDC = Perinatal Data Collection.
 Source: ABS Perinatal Deaths, Australia, 2008, 3304. Commonwealth of Australia 2009; Laws PJ et al. 2010. Australia's mothers and babies 2008. Perinatal statistics series no. 24. Cat. no. PER 50. Canberra: AIHW; NSW Department of Health. New South Wales Mothers and Babies 2008. NSW Public Health Bull 2010: 21 (5-2).

Australian perinatal deaths are reported to the NPDC from states and territories, and are sourced from maternal and perinatal administrative and clinical record systems. The national perinatal data collection is defined by the Perinatal National Minimum Data Set (NMDS) and are compiled by the AIHW National Perinatal Epidemiology and Statistics Unit (formerly the National Perinatal Statistics Unit) to produce the regular *Australia's Mothers and Babies* reports.¹⁷ Perinatal and infant mortality data reported by the ABS are sourced from state and territory Registrars of Births, Deaths and Marriages and may differ slightly from NPESU owing to birth outcomes outside of hospital and other clinical recording systems

Calculations of rates made for this report follow the method used by the ABS: fetal and perinatal death rates are per 1,000 all births (live and stillborn) and neonatal death rates are calculated per 1,000 live births for the calendar year.

In NSW relevant data collections include the NSW PDC, the Neonatal Intensive Care Units Data Collection and NSW Register of Congenital Conditions (formerly the NSW Birth Defects Register). These are used to compile annual *NSW Mothers and Babies* reports. The New South Wales Perinatal Data Collection (PDC, formerly the Midwives Data Collection) is a population-based surveillance system covering all births in NSW public and private hospitals and home births. Data are collected on all live births, and stillbirths of at least 20 weeks gestation or at least 400 grams birth weight.⁷

The NSW PDC collects data on perinatal and maternal deaths only to the point of separation (when the baby is discharged or transferred). While most infant mortality occurs within the first week of birth, deaths occurring after discharge and those from non-hospital births are not recorded on the NSW PDC.

Over the period 1994 to 2001, a comparison of data in the NSW PDC with the more complete AIHW National Death Index identified 15 cases of maternal mortality out of 97 (16%) that had not been captured in the state collection.¹⁸ Infant and maternal mortality estimates from the NSW PDC will therefore differ from those produced by the AIHW and the ABS, and the latter are more complete for the determination of rates.⁷

Data reported in this chapter for NSW is primarily sourced from the NSW PDC. Where the indicated source is a published report, the data have been abstracted from that report. Where the source has been indicated as "NSW Perinatal Data Collection", the data have been compiled by Family Planning NSW from de-identified PDC data provided by NSW Health. The Area Health Service refers to health area of residence of the mother based on 2005 Health Area classifications, and not to where the confinement took place.

A further data limitation lies in the ascertainment of Aboriginality in perinatal data collections.^{2,19} Generally, the Aboriginal status of the mother is reported and used as

a proxy for the baby.⁸ Whilst ascertainment is improving in all jurisdictions, data from the ACT and Tasmania are less reliable for the assessment of trends in Aboriginal and Torres Strait Islander populations. Differences may also exist in the quality of ascertainment in rural compared with metropolitan centres.¹⁹ For the NSW PDC, births to Aboriginal and Torres Strait Islander mothers as with non-Aboriginal mothers not confined to a hospital may not be recorded.

Notification of maternal deaths involves several levels of reporting and review, and reporting is not mandatory at a national level. Maternal deaths are notified to relevant state

and territory committees, and there are inconsistencies in the collection of some data elements such as Aboriginal status and gestation at time of death. These inconsistencies have implications for the comparability of maternal mortality data among states and territories.⁹

An ABS review of fetal, neonatal, perinatal and infant death data has resulted in the modification of definitions to provide consistency between ABS and other Australian and international data collections. This aims to provide more comparable reporting between Australian and international agencies (see ABS 3304. Perinatal Deaths, Australia, 2007, explanatory notes 18–20).

4.1 Neonatal, Perinatal and Infant Mortality

4.1.1 Neonatal and infant mortality: international comparisons

The World Health Organisation (WHO) reported an average global neonatal mortality rate of 26 deaths per 1,000 live births for 2008, a small decline from 28 per 1,000 reported in 2006 (Figure 4.1).²⁰ Whilst there was considerable variation among countries in low and lower middle income groups, the average neonatal mortality rate in low income countries was 37 per 1,000 live births, and in lower middle income countries 29 deaths per 1,000 live births. This contrasted with averages of 11 and 4 deaths per 1,000 live births in upper middle and high income group countries respectively.

For infant mortality, the WHO reported a global rate of 45 deaths per 1,000 live births in 2008, a decline from 49 per 1,000 in 2006.²⁰ Infant mortality rates in high income countries averaged 6 deaths per 1,000 live births. This pattern of moderately higher infant than neonatal mortality was similar in some low and lower middle income countries (e.g. Vietnam, Thailand), whereas in others the infant mortality rate was substantially higher (e.g. Cambodia, India, Figure 4.1). Despite this variation, mean infant mortality rates decreased as income rose, with average rates of 76, 44 and 19 deaths per 1,000 live births in low, lower middle and upper middle income countries respectively.

For both neonatal and infant mortality, the rates in Australia were lower than the average for high income countries, but were not as low as countries such as Japan, Iceland or Singapore (with neonatal and infant mortality rates of less than 2 per 1,000 live births). By comparison, for 2006 the ABS reported Australia's IMR to be 4.7 deaths per 1,000 live births.

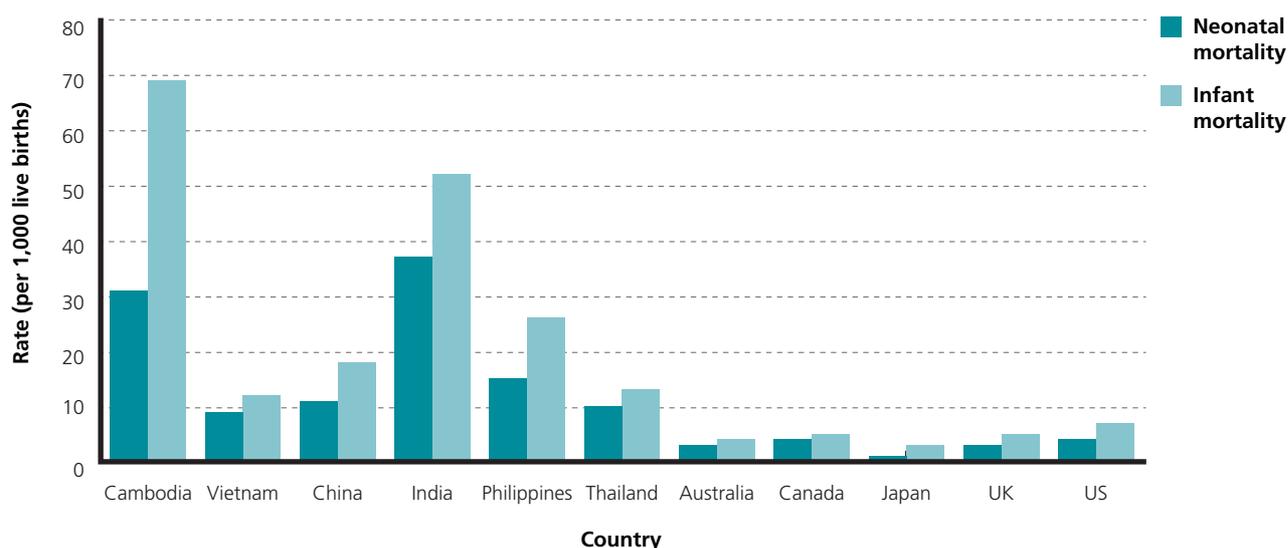
4.1.2 Fetal, neonatal, perinatal and infant mortality: Australia

Estimates of the four infant mortality indicators (fetal, neonatal, perinatal and infant mortality) for Australia from 1999 to 2004 were comparatively low and declining^{1,12} (Figure 4.2). Following a small increase in 2005, the subsequent decrease of approximately 20% perinatal

mortality was mostly attributable to decreases in fetal deaths, with neonatal mortality decreasing less sharply.

In 2008, the fetal mortality rate in Australia was 5.5 deaths per 1,000 births, neonatal mortality 2.9 deaths per 1,000 live births and perinatal mortality 8.4 deaths per 1,000 births. From 1999 to 2008, annual infant mortality rates declined from 5.8 to 4.4 per 1,000 live births.

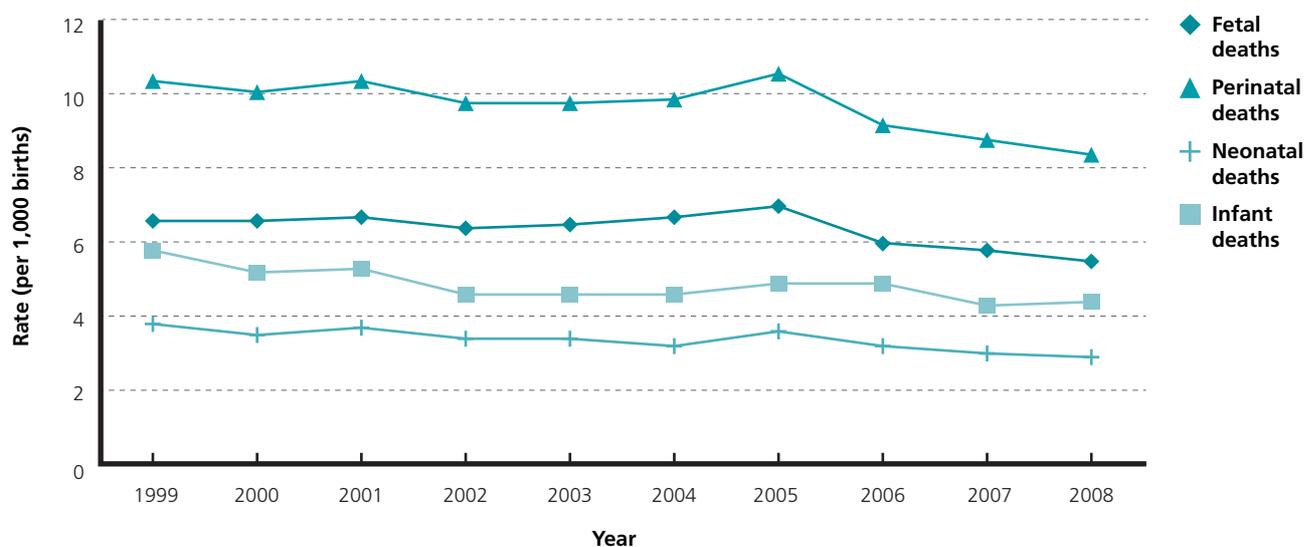
Figure 4.1: Neonatal and infant mortality rates, selected low, lower middle and high income countries, 2008



Income groups: Low income – Cambodia, Vietnam; Lower middle income – China, India, Philippines, Thailand; High income – Australia, Canada, Japan, UK, US.

Source: World Health Organisation, World Health Statistics 2010.

Figure 4.2: Fetal, neonatal, perinatal and infant mortality rates, Australia, 1999 to 2008



Note: Neonatal deaths per 1,000 live births.

Source: Australian Bureau of Statistics, 3304 Perinatal Deaths, 2009 and 3302, Deaths, 2009.

4.1.3 State and territory comparisons of fetal, neonatal and perinatal mortality

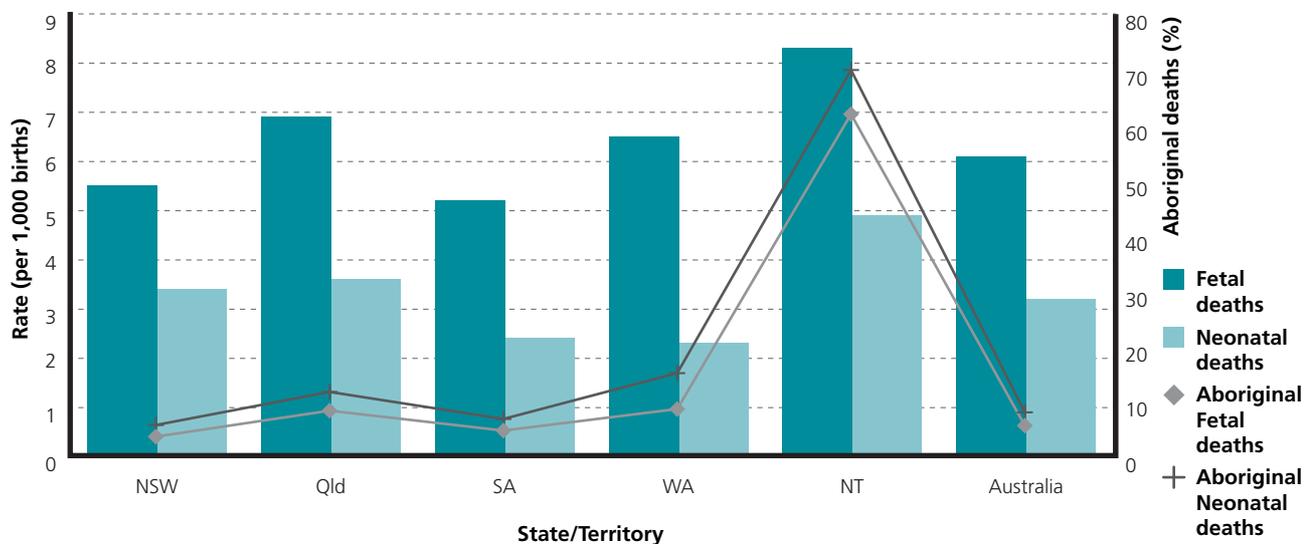
Fetal Deaths

Mean annual fetal mortality for 2004–2008 (Figure 4.3) was 6.1 per 1,000 births for Australia, and ranged from 5.2 per 1,000 in South Australia to 8.3 per 1,000 in the Northern Territory.¹ Fetal death rates correlated positively with the proportion of total fetal deaths contributed by Aboriginal and Torres Strait Islander babies. In the Northern Territory, 62% of fetal deaths were recorded in Aboriginal and Torres Strait Islander babies, compared to 4.7% of total fetal deaths in South Australia. The fetal death rate for NSW (5.5 per 1,000 births) is the only jurisdiction inconsistent with the trend, although Aboriginality data in NSW are less complete and therefore likely to have underestimated fetal mortality in Aboriginal and Torres Strait Islanders.

Neonatal Mortality

Neonatal mortality in Australia for 2004–2008 was 3.2 deaths per 1,000 live births, and in all jurisdictions was below 5 deaths per 1,000 live births (Figure 4.3).¹ Western Australia had the lowest neonatal mortality rate (2.3 per 1,000 live births), and Northern Territory the highest (4.9 per 1,000). The pattern of higher rates of mortality correlating with higher contributing proportions of deaths from Aboriginal and Torres Strait Islander babies (e.g. Queensland and the Northern Territory) was less strong in neonates than for fetal deaths. In Western Australia, the high proportion of Aboriginal and Torres Strait Islander deaths contributing to neonatal mortality (15%) did not translate into a high statewide mortality rate.

Figure 4.3: Total fetal and neonatal mortality rates and percent Aboriginal and Torres Strait Islander deaths, Australia, selected states and territories, 2004 to 2008



Note: Total fetal and neonatal rates plotted as bars against primary y-axis. Proportions of Aboriginal and Torres Strait Islander deaths plotted as lines against secondary y-axis. Data for Aboriginality for NSW are incomplete and probably underestimate fetal deaths in Aboriginal and Torres Strait Islanders in this state. Neonatal deaths per 1,000 live births.

Source: Australian Bureau of Statistics, 3304 Perinatal Deaths, 2009.

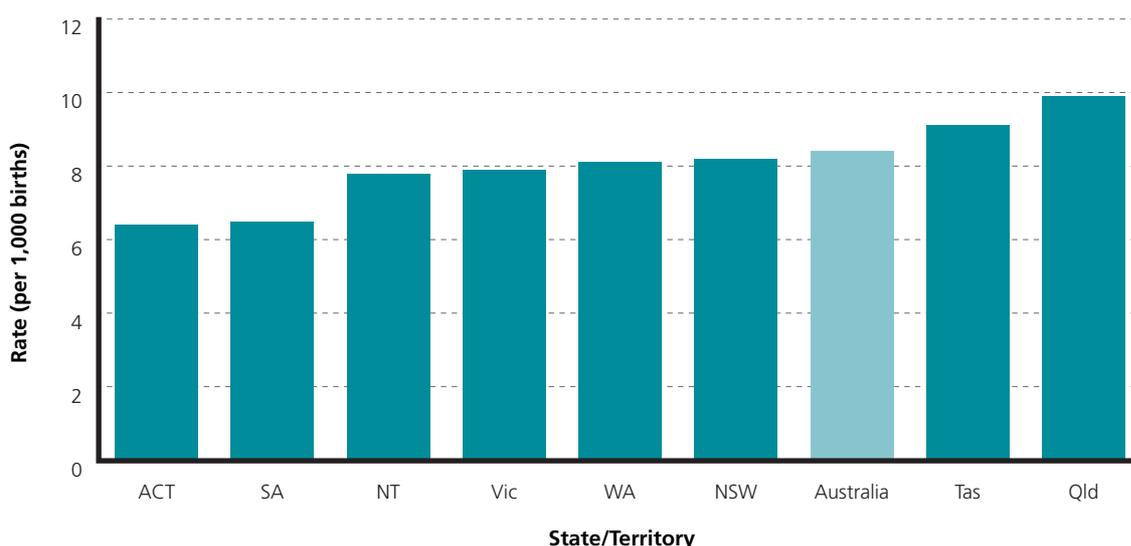
Perinatal Mortality

Perinatal mortality, the sum of fetal and neonatal mortality, showed somewhat different jurisdictional variation for 2008 (Figure 4.4), where the rate was highest in Queensland (9.9 per 1,000 births) followed by Tasmania (9.1 per 1,000). The rate for NSW (8.2 deaths per 1,000 births) was similar to Australia overall (8.4 deaths per 1,000 births). Perinatal mortality in the Northern Territory for 2008 (7.8 deaths per 1,000 births) was substantially lower than that recorded for 2007 (12.7 deaths per 1,000 births), largely the result of small underlying event numbers causing large variation.¹

4.1.4 Infant mortality

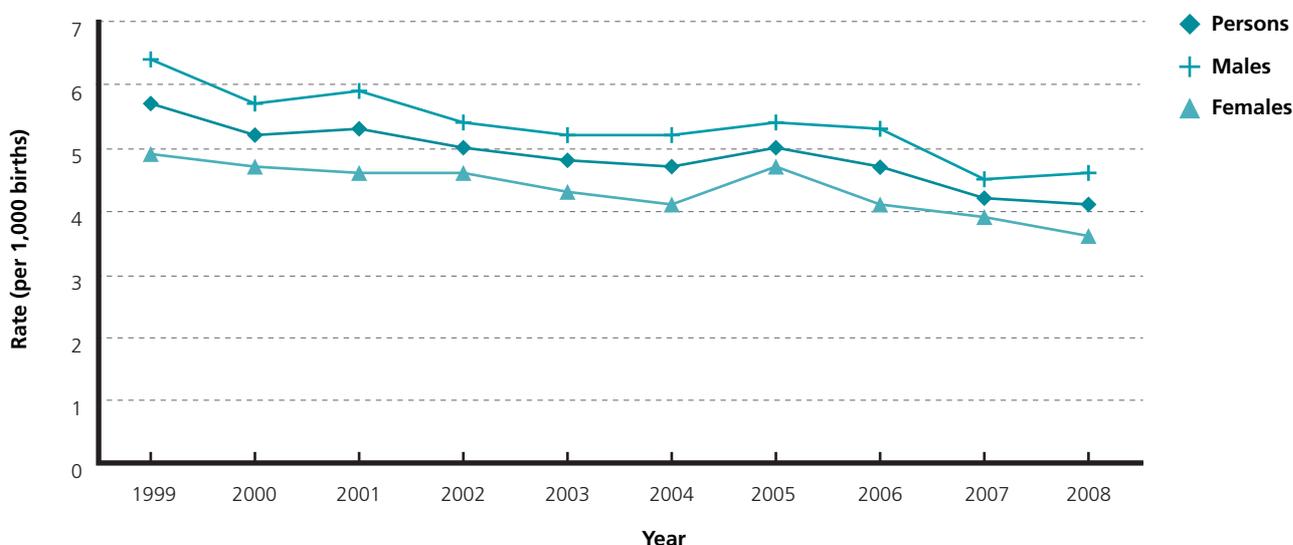
The Australian infant mortality rate (IMR) of 5.7 deaths per 1,000 live births in 1999 declined to 4.1 deaths per 1,000 live births by 2008 (Figure 4.5).¹² The IMR for male infants generally exceeded that for females, predominantly owing to sex differences in susceptibility to life-threatening conditions (which offset higher male than female birth rates). In particular, male infants are more susceptible to infections and conditions associated with prematurity and development, as well as mortality from perinatal conditions.²¹

Figure 4.4: Perinatal mortality rates, Australia, selected states and territories, 2008



Source: Australian Bureau of Statistics, 3304 Perinatal Deaths, 2009.

Figure 4.5: Infant mortality rates, Australia, 1999 to 2008



Source: Australian Bureau of Statistics, 3302 Deaths, 2010.

The highest IMR in 2008 was recorded in the Northern Territory (6.1 deaths per 1,000 live births), followed by the ACT and Queensland (5.0 and 4.9 per 1,000 respectively) (Figure 4.6). The IMR for NSW at 4.4 deaths per 1,000 live births was only slightly higher than the national IMR (4.1 deaths per 1,000 live births), with the remaining jurisdictions recorded IMRs lower than the national value.

Figure 4.6: Infant mortality rates by Australian states and territories, 2008



Source: Australian Bureau of Statistics, 3302 Deaths, 2010.

The majority of infant deaths occurred within the first day after birth (39% in 2008, Table 4.2). Infant deaths decline sharply after the first day, but a further 30% of deaths occur by the end of the first month with half of these deaths occurring in the first week. The remaining 30% of infant deaths occur from the end of the first month to the end of the first year.¹²

Table 4.2: Timing of infant deaths, Australia, 2008

TIMING OF INFANT DEATH (AFTER BIRTH)	INFANT DEATH	%
Under 1 day	477	39
1 day to under 1 week	180	15
1 week to under 4 weeks	197	16
4 weeks to 1 year	327	30
Total infant deaths	1,226	100

Source: Australian Bureau of Statistics, 3302 Deaths, 2010.

4.2 Fetal, Neonatal and Perinatal Mortality: New South Wales

The number of live born surviving births in NSW has increased over the 10-year period 1999 to 2008, from approximately 86,500 to 95,500 (Table 4.3).⁵⁻⁷ Neonatal and perinatal mortality rates have declined overall from 1999 to 2008 (Figure 4.7), with some annual variation around the mean for the period. Neonatal mortality rates declined from 3.2 deaths per 1,000 live births in 1999 to 2.7 deaths per 1,000 live births in 2008, with a mean over the period of 2.8 deaths per 1,000 live births.

Perinatal mortality rate estimates using the NSW Perinatal Data Collection declined from 9.2 per 1,000 births in 1999 to 8.7 in 2008, with a mean of 9.0 deaths per 1,000 births. The NSW PDC estimate for 2008 was higher than the ABS estimate (8.2 deaths per 1,000 births) and higher than the ABS estimate for Australia of 8.4 perinatal deaths per 1,000 births.¹ As noted previously, estimates from the NSW PDC are not expected to equal those of the ABS owing to differing scopes of data capture. Most of the decline in NSW perinatal mortality has been from decreases in neonatal mortality (Table 4.3).

Table 4.3: Neonatal and perinatal birth outcomes, NSW, 1999 to 2008

YEAR	LIVE BORN SURVIVING	STILLBORN	NEONATAL DEATHS	TOTAL BIRTHS	MORTALITY RATE (PER 1,000 BIRTHS)		
					Fetal	Neonatal [†]	Perinatal
1999	86,468	533	271	87,289	6.1	3.1	9.2
2000	87,066	595	257	87,922	6.8	2.9	9.7
2001	85,063	538	251	85,858	6.3	2.7	9.2
2002	85,222	515	233	86,005	6.0	2.7	8.7
2003	85,669	523	221	86,414	6.1	2.6	8.6
2004	84,849	561	212	85,626	6.6	2.5	9.0
2005	89,786	535	257	90,610	5.9	2.9	8.7
2006	91,840	592	229	92,781	6.4	2.5	8.8
2007	94,973	629	239	96,030	6.6	2.5	9.0
2008	95,440	585	256	96,343	6.1	2.7	8.7
Mean					6.3	2.8	9.0

[†] Per 1,000 live births

Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports 2004, 2009, 2010.

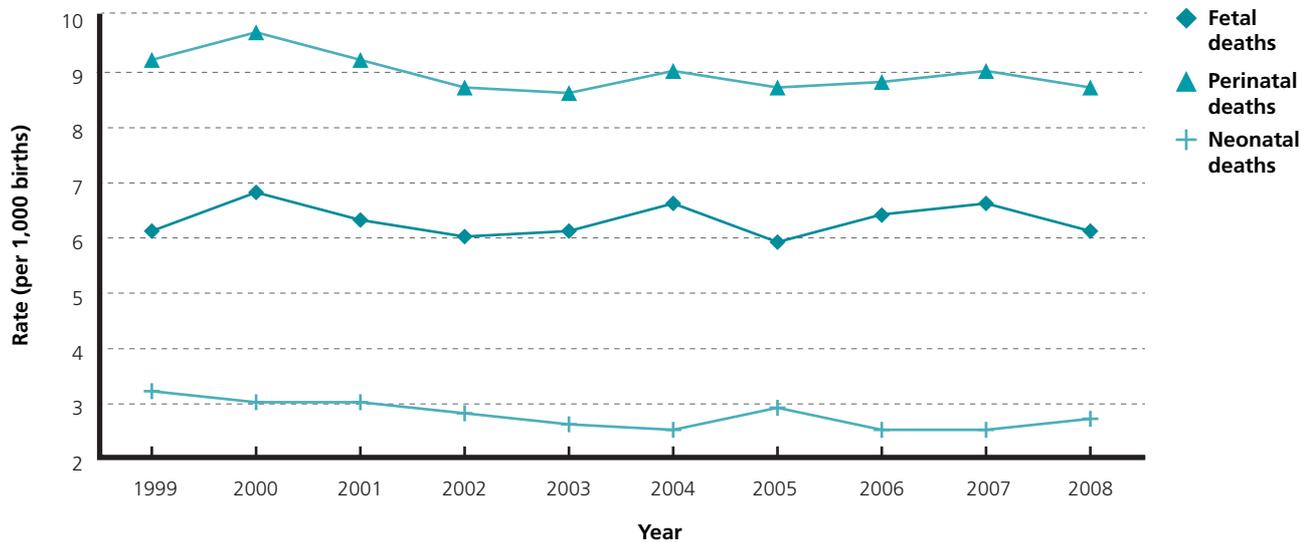
4.2.1 Perinatal mortality in New South Wales Aboriginal and Torres Strait Islander babies

Accurate determination of perinatal mortality in Aboriginal and Torres Strait Islander babies in NSW remains problematic, primarily owing to issues of under-reporting of Aboriginality.⁷ Nonetheless, estimates consistently suggest that perinatal mortality remains higher in Aboriginal and Torres Strait Islander babies compared to non-Aboriginals, and the rate of 15.3 perinatal Aboriginal and Torres Strait

Islander deaths per 1,000 live births in 2008 (Figure 4.8) was substantially higher than the 8.5 deaths per 1,000 live births in non-Aboriginal babies.

Small numbers of Aboriginal and Torres Strait Islander perinatal deaths result in large fluctuations in estimates of rates and therefore trends are difficult to determine (Figure 4.8). The 2007 perinatal mortality rate increase (to 22.6 deaths per 1,000 births) may partly reflect small underlying event numbers or an increase in ascertainment of Aboriginality in 2007. NSW Health has estimated that Aboriginal and Torres Strait Islander identification in the PDC may occur in only approximately 50% of Aboriginal and Torres Strait Islander mothers.⁷

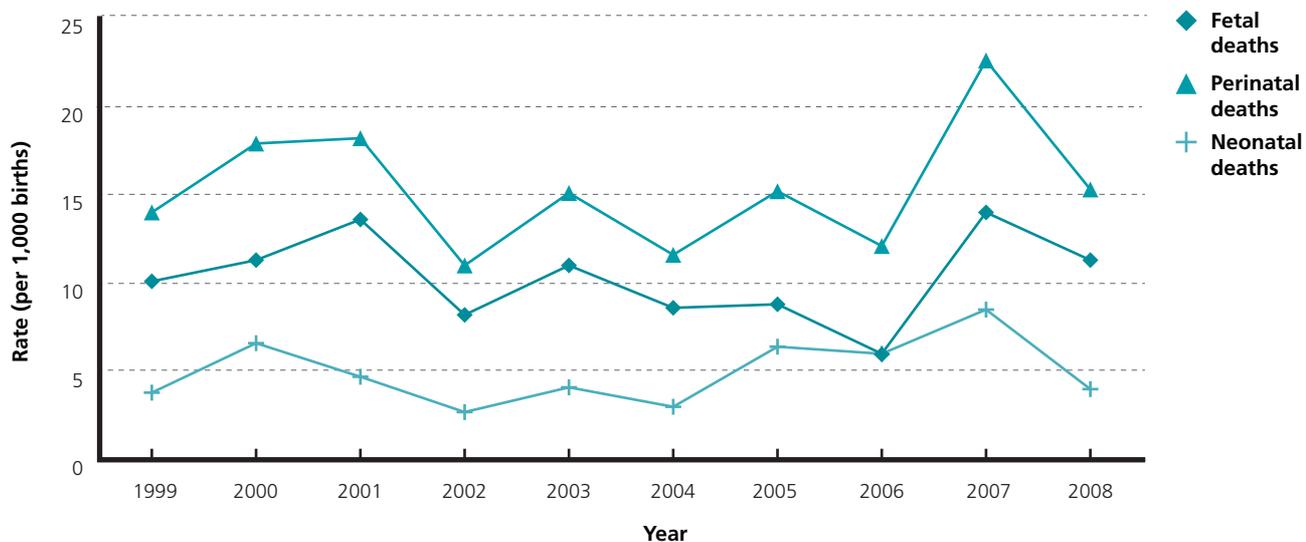
Figure 4.7: Fetal, neonatal and perinatal mortality rates, NSW, 1999 to 2008



Note: Neonatal deaths per 1,000 live births.

Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports 2004, 2009, 2010.

Figure 4.8: Perinatal mortality rates, Aboriginal and Torres Strait Islander babies, NSW, 1999 to 2008



Note: Neonatal deaths per 1,000 live births.

Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports 2004, 2009, 2010.

4.2.2 Perinatal outcomes and mother's country of birth

For most years during 2003 to 2007, NSW perinatal mortality levels were higher than for the state overall in mothers born in Central and South America, Oceania, Southern Europe, the Middle East and Africa, and Southern Asian (Table 4.4). Perinatal mortality was lower than NSW for most years in mothers born in South East and North East Asia, and perinatal mortality were consistently lower than for the state overall in mothers from English-speaking countries. However, these figures should be treated with caution owing to low event numbers in some country-of-birth groups with consequent wide year-by-year variation in perinatal mortality rates. However, overall, perinatal mortality is somewhat higher in mothers from non-English speaking than English-speaking countries.

Table 4.4: Perinatal mortality rates per 1,000 births, by mother's country of birth group, NSW, 2002 to 2008¹

COUNTRY OF BIRTH	2002	2003	2004	2005	2006	2008
English speaking ²	8.7	8.2	8.8	8.6	8.6	8.5
Central and South America	10.6	11.4	17.6	9.4	9.0	8.3
Oceania ³	9.6	9.6	13.1	11.3	10.9	12.5
Southern Europe	9.8	9.4	9.6	13.8	8.7	8.1
Western and Northern Europe	-	9.0	-	7.1	6.8	9.3
Eastern Europe	15.0	14.2	7.6	5.1	12.2	-
Middle East and Africa	12.1	12.4	10.7	12.6	13.5	11.9
South East Asia	7.6	7.6	9.8	8.0	10.5	7.9
North East Asia	6.7	5.3	6.2	5.1	5.7	7.4
Southern Asia	5.2	14.7	11.3	10.7	7.9	10.3
Total NSW	8.7	8.6	9.0	8.7	8.8	8.7

Notes: ¹ Data not published for 2007. ² Includes Australia, UK, New Zealand, Canada, United States. ³ Melanesia, Micronesia and Polynesia. Rates not provided for country-of-birth groups with less than 5 perinatal deaths per annum.

Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports 2004, 2009, 2010.

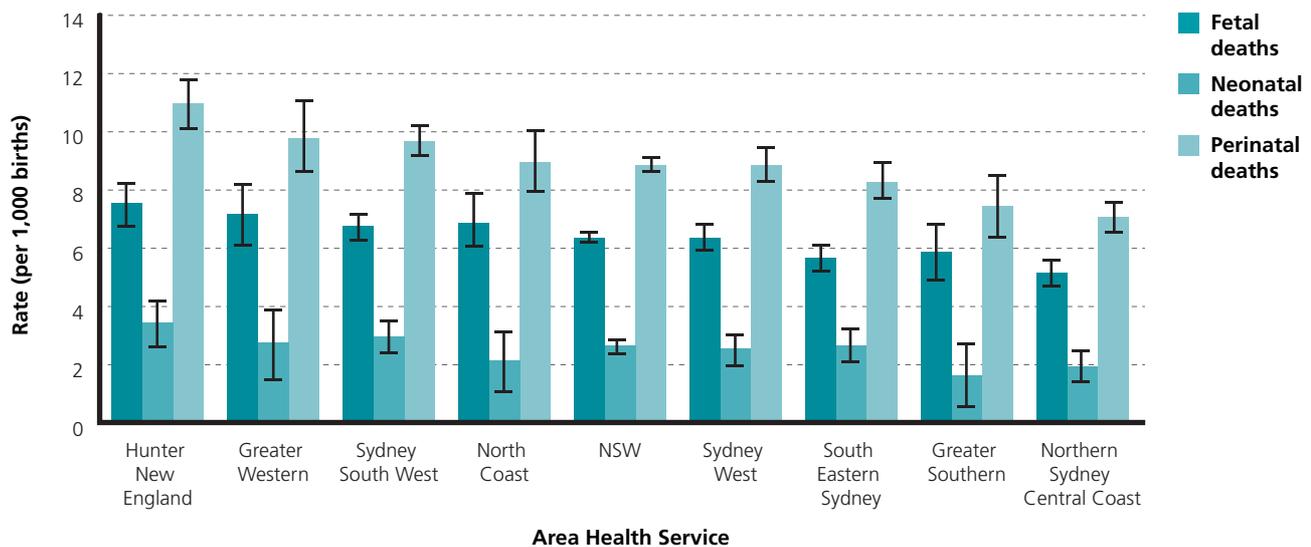
4.2.3 Neonatal and perinatal mortality among New South Wales Area Health Services

Compared to NSW overall, higher rates of perinatal mortality from 2003 to 2008 occurred in Hunter New England, Greater Western, and Sydney South West Area Health Services (10.9, 9.7 and 9.6 deaths per 1,000 births respectively) (Figure 4.9). Perinatal mortality in the Hunter and New England Area Health Service was statistically significantly higher than for NSW, as indicated by non-overlapping 95% confidence bars. Perinatal mortality was similar to NSW in North Coast and Sydney West Area Health Services, and significantly lower in Greater Southern and Northern Sydney and Central Coast Area Health Services.

Most of the perinatal mortality in Hunter New England Area Health Service was associated with higher fetal mortality. Lower perinatal mortality in Greater Southern and Northern Sydney Central Coast Area Health Services came both from lower fetal and neonatal mortality.

Despite these variations among Area Health Services, over 99.6% of live births in NSW hospitals survive to discharge or transfer from the maternity setting irrespective of Area Health Service.

Figure 4.9: Perinatal mortality rates, NSW Area Health Services, 2003 to 2008



Note: Bars represent 95% confidence intervals. Neonatal deaths per 1,000 live births.

Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports 2004, 2009, 2010. PDC data for 2007 provided by NSW Health.

4.3 Infant Morbidity

The most prevalent infant morbidity outcomes recorded at birth are prematurity and low birth weight. Key risk factors for these are:

- the point in the pregnancy when the first antenatal clinic visit occurs (babies of women who present early for antenatal care have better outcomes)
- smoking status of the mother during pregnancy

The effects of smoking during pregnancy and its association with infant morbidity have been widely documented, with smoking shown to cause both lower birth weight, prematurity and several other conditions.^{22,23}

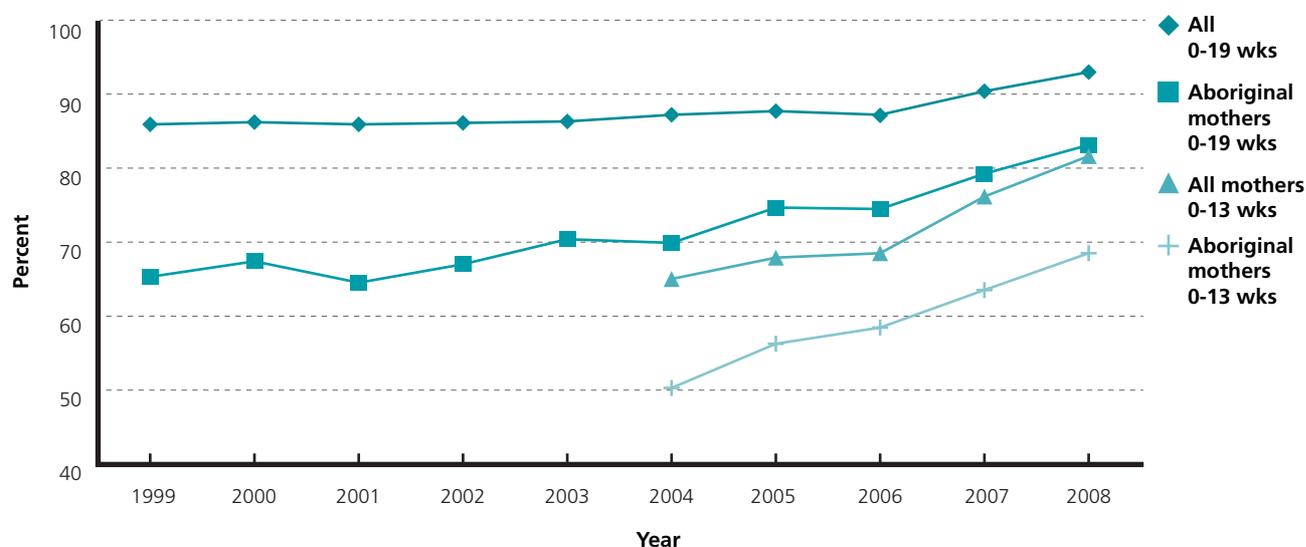
4.3.1 Infant morbidity risk factors: New South Wales

Duration of pregnancy at first antenatal visit

The proportion of mothers starting antenatal care in the first 19 weeks of pregnancy has remained high in NSW (86 to 88% during 1999 to 2006), and increased to 93% by 2008 (Figure 4.10). Data from 2004 allow for separate enumeration of mothers presenting for ante-natal care from zero to 13 and 14 to 19 weeks. From 2004 to 2008 the proportion of women first presenting in the zero to 13 week time window has increased from 65 to 82%.

While lower proportions of Aboriginal and Torres Strait Islander mothers commenced antenatal care in the first 19 weeks of pregnancy, these increased substantially from 66% in 1999 to 83% in 2008.^{2,24} From 2004 the proportion of Aboriginal and Torres Strait Islander mothers first presenting for antenatal care at zero to 13 weeks has increased from 50 to 69%. Some of the increase may be attributable to the state wide NSW Aboriginal Maternal and Infant Health Strategy (AMIHS).²⁵ AMIHS services combine midwife and Aboriginal Health Workers to provide antenatal checks, education and information to pregnant Aboriginal and Torres Strait Islander women.

Figure 4.10: Percentage of antenatal visits in the first 19 and 13 weeks of pregnancy, Aboriginal and Torres Strait Islander and all mothers, NSW, 1999 to 2008



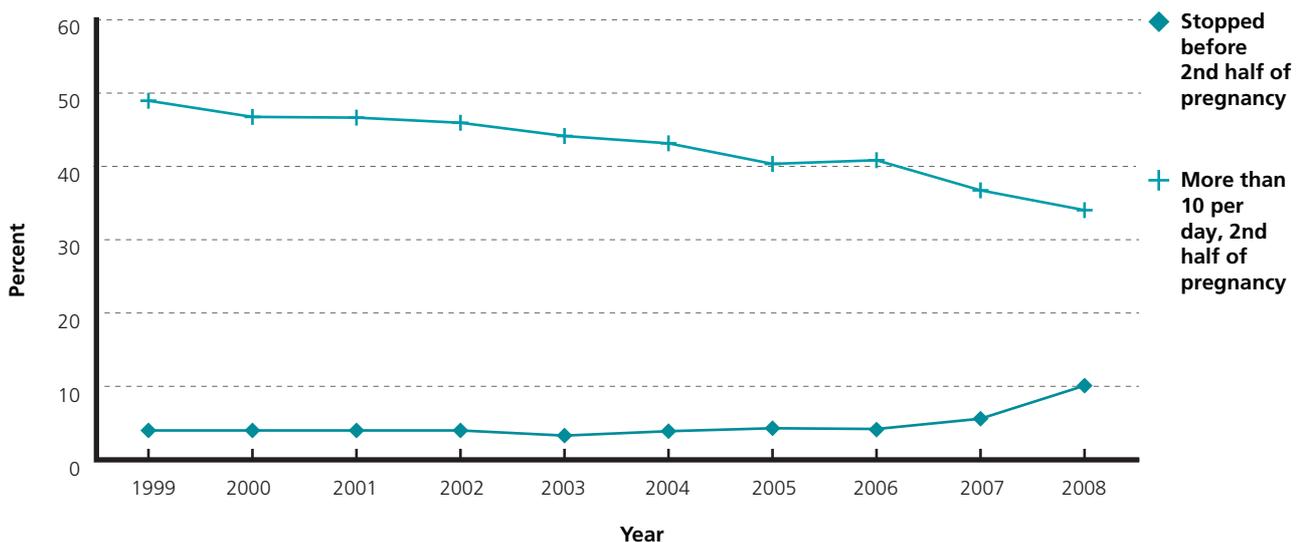
Note: Aboriginal includes Aboriginal and Torres Strait Islander mothers. Data for antenatal visits in first 13 weeks of pregnancy available from 2004. Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports, 2001 to 2010.

Smoking in pregnancy

Smoking during pregnancy declined between 1999 and 2008 from 19 to 13% of mothers. There was also a decline in the percentage of smokers who smoked more than 10 cigarettes per day in the second half of their pregnancy (from 49% in 1999 to 34% in 2008), and from 2006 an increase in the percentage who stopped smoking before the second half of pregnancy from 4 to 10% of smokers (Figure 4.11).^{4,7}

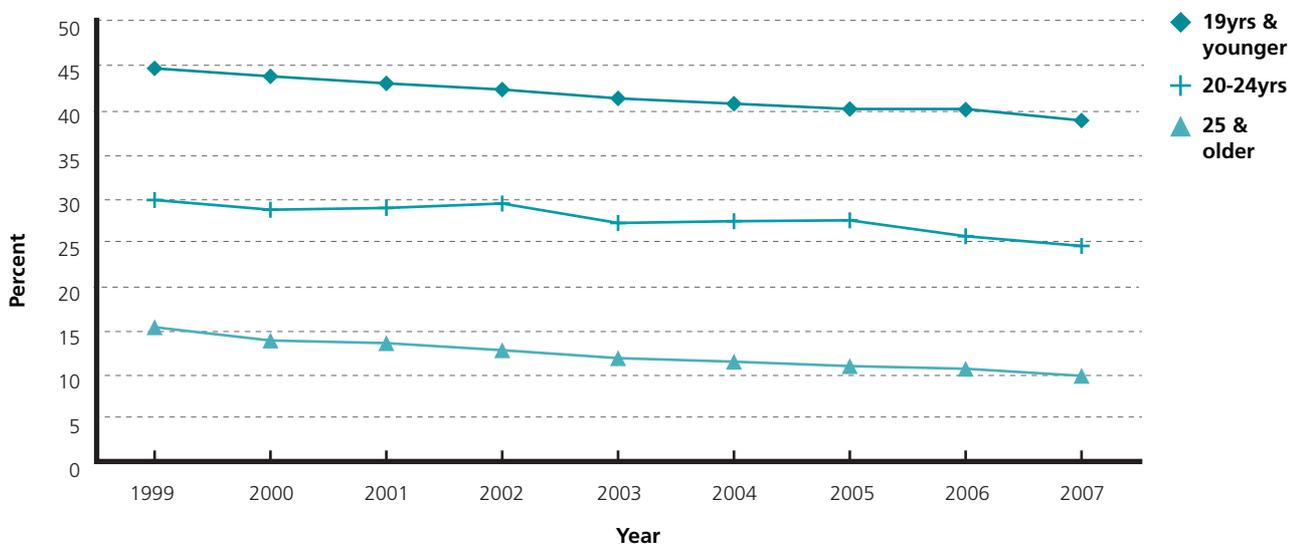
Younger women were more likely to smoke during pregnancy, but smoking decreased in all age groups in NSW women from 1999 to 2007 (Figure 4.12). In women aged 19 years or less, the proportion smoking during pregnancy decreased from 45 to 39%, from 30 to 24% in women aged 20–24 years, and from 15 to 10% in women aged 25 or older.

Figure 4.11: Percentage of pregnant mothers smoking more than 10 cigarettes per day or stopping smoking before the second half of pregnancy, NSW, 1999 to 2008



Note: More than 10 per day in second half of pregnancy is percent of smokers who smoked in second half of pregnancy.
Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports, 2001 to 2010.

Figure 4.12: Percentage of pregnant mothers smoking at any time during pregnancy by maternal age group, NSW, 1999 to 2007



Note: Data not available for 2008 at time of preparation.
Source: NSW Department of Health, NSW Perinatal Data Collection.

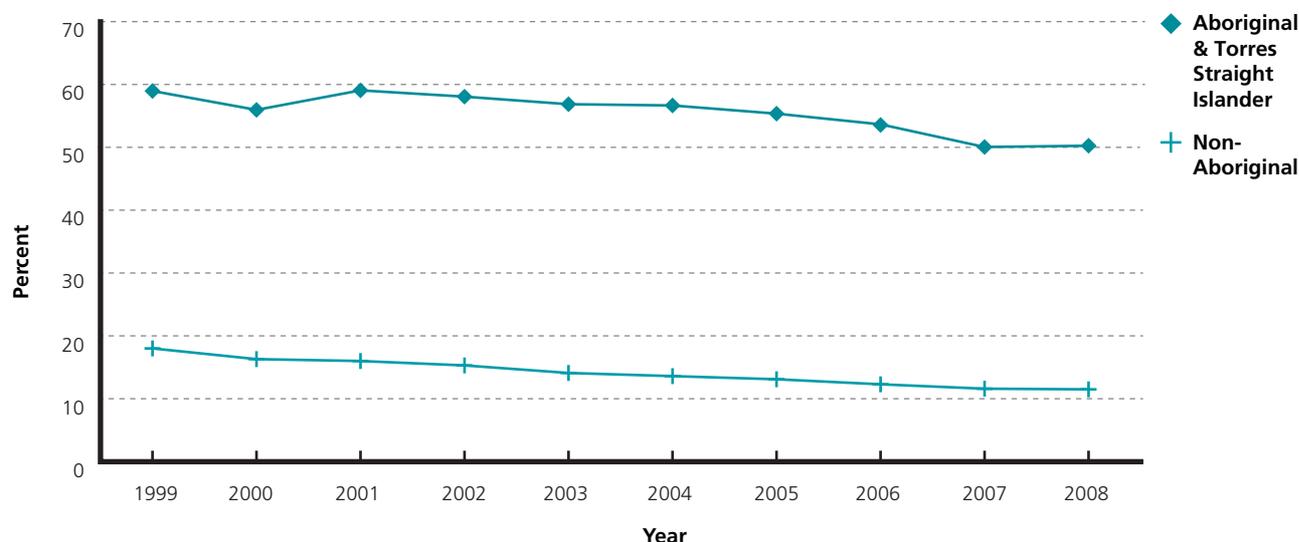
Smoking in pregnant Aboriginal and Torres Strait Islander women continues to remain substantially higher than in non-Aboriginal women (Figure 4.13). Despite this, rates of smoking during pregnancy in Aboriginal and Torres Strait Islander women have declined from 59% in 1999 to 50% by 2008. Over the same period, smoking rates in non-Aboriginal mothers declined from 18 to 12%. Proportionally, the decline has been greater in non-Aboriginal mothers (33%) than Aboriginal and Torres Strait Islander mothers (15%). Some of the excess smoking in Aboriginal and Torres Strait Islander women reflects the younger median age of Aboriginal and Torres Strait Islander mothers and higher smoking rates in younger mothers overall.

4.3.2 Infant morbidity outcomes: New South Wales

Prematurity

From 1999 to 2008 the pattern of gestational age at birth has been comparatively stable in NSW (Table 4.5). The majority of births (over 92%) occurred after 37 weeks, while the proportion of births occurring after 42 weeks has declined from 2.2% in 1999 to 0.8% in 2008. The proportion of premature births (gestation of less than 37 weeks) has risen slightly from 1999 to 2008 from 7.1% to 7.5%.

Figure 4.13: Percentage of pregnant mothers smoking at any time during pregnancy, Aboriginal and Torres Strait Islander and non-Aboriginal mothers, NSW, 1999 to 2008



Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports, 2001 to 2010.

Table 4.5: Births (%) by gestational age at birth, NSW, 1999 to 2008

GESTATION (WEEKS)	YEAR									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<31	1.4	1.5	1.5	1.4	1.4	1.5	1.4	1.5	1.4	1.5
32-36	5.8	5.8	5.7	5.7	5.6	5.8	5.8	5.9	5.9	6.0
37-41	90.6	90.3	90.3	90.5	90.5	90.6	90.9	91.0	91.6	91.7
42+	2.2	2.4	2.4	2.4	2.5	2.1	1.9	1.6	0.9	0.8
Premature (<37 weeks)	7.1	7.3	7.2	7.1	7.0	7.3	7.2	7.4	7.4	7.5
Total births	87,289	87,922	85,858	86,005	86,414	85,626	90,610	92,781	96,030	96,343

Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports 2004, 2009, 2010.

Premature births in Aboriginal and Torres Strait Islanders

Despite rates of prematurity in Aboriginal and Torres Strait Islander babies being more variable than in non-Aboriginal babies (reflecting the smaller population of Aboriginal and Torres Strait Islander women in NSW), rates of prematurity in Aboriginal and Torres Strait Islander babies have been consistently higher than for non-Aboriginal babies in NSW (Table 4.6). Over the period 1999 to 2008, around 12% of births to Aboriginal and Torres Strait Islander women were premature, compared to around 7% in non-Aboriginal women.

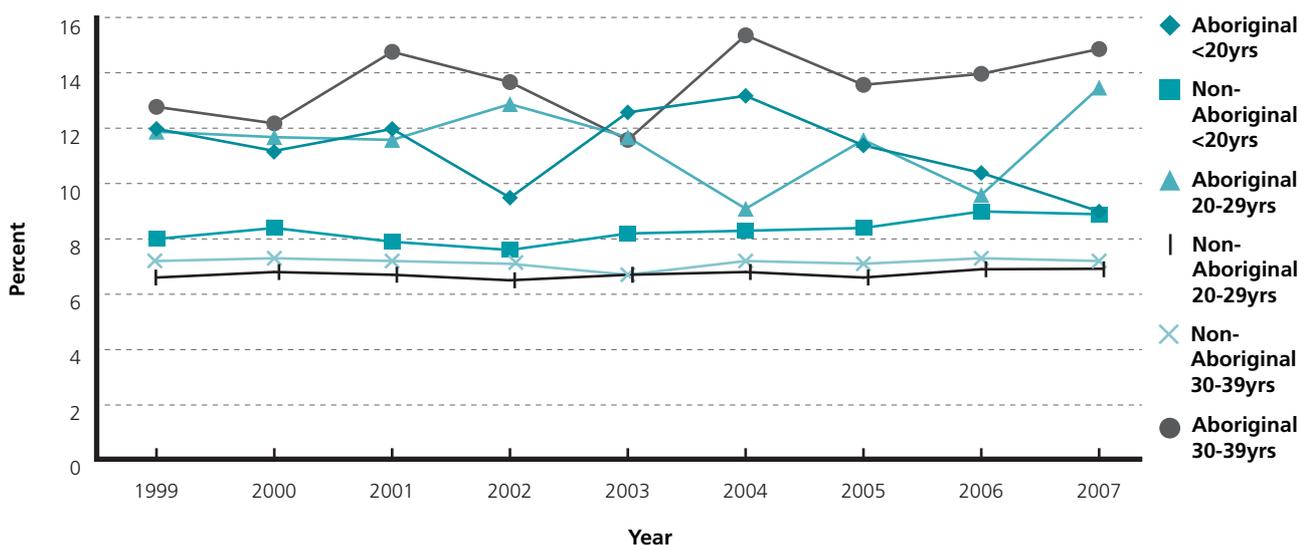
The higher proportions of premature births in Aboriginal and Torres Strait Islander women occur across age groups (Figure 4.14). In contrast to non-Aboriginal mothers and in spite of their high variability, proportions of premature births were highest in Aboriginal and Torres Strait Islander mothers aged 30 to 39 years, compared to the highest proportion of premature births in non-Aboriginal mothers occurring in those aged under 20 years.

Table 4.6: Premature births (<37 weeks, %) in Aboriginal and Torres Strait Islander and non-Aboriginal women, NSW, 1999 to 2008

	YEAR									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Aboriginal	12.3	11.6	12.4	12.2	12.1	11.7	12.0	10.8	12.7	12.2
Non-Aboriginal	7.1	7.3	7.2	7.1	7.0	7.3	7.2	7.4	7.4	7.5

Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Reports 2004, 2009, 2010.

Figure 4.14: Percentage of premature births (<37 weeks) by maternal age group in Aboriginal and Torres Strait Islander and non-Aboriginal women, NSW, 1999 to 2007



Notes: Data not available for 2008 at time of preparation. Numbers too small for precise reporting of Aboriginal and Torres Strait Islander women aged 40 years and older.

Source: NSW Department of Health, NSW Perinatal Data Collection.

Low birth weight

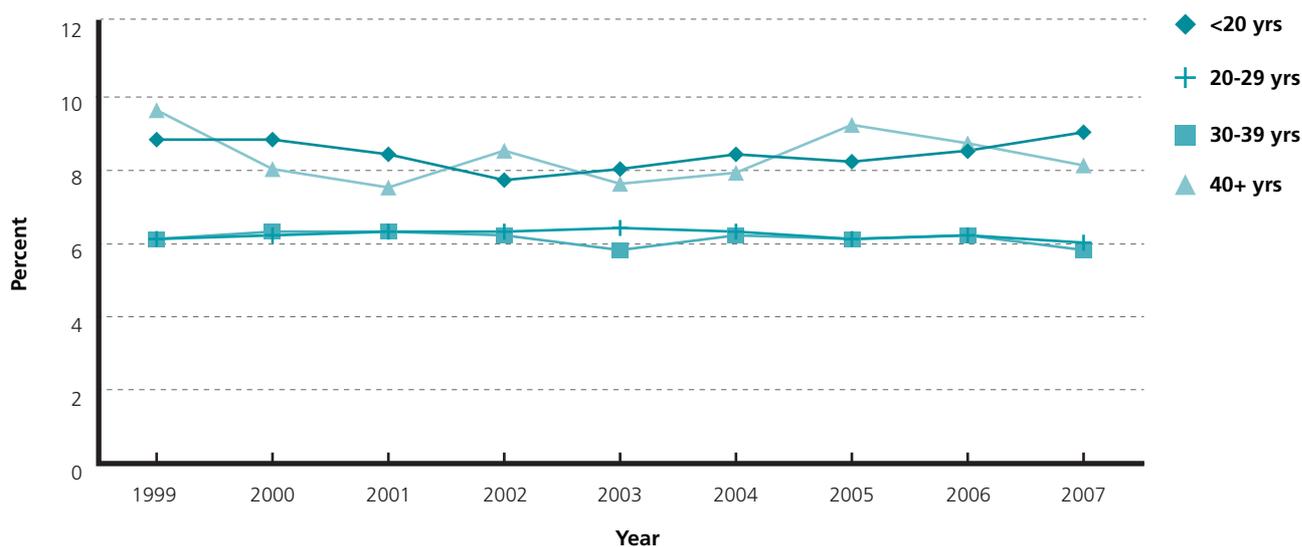
During 1999 to 2008, the proportion of babies born underweight (less than 2,500g) in NSW varied between 6.1 and 6.4%.^{4,7} However, low birth weight babies were more common (around 8.3%) in younger mothers (aged under 20 years) and in older mothers (40 years and older), compared to around 6.2% in mothers aged 20 to 39 years (Figure 4.15).

The proportion of low birth weight babies born to Aboriginal and Torres Strait Islander mothers is about twice that in non-Aboriginal babies (Figure 4.16), and

has averaged 12.6% of births during 1999 to 2008.^{4,7} Reflecting the age pattern for prematurity, low birth weight babies tended to be more common in older (30 to 39 years) Aboriginal and Torres Strait Islander mothers, and less common in teenaged Aboriginal and Torres Strait Islander mothers (numbers were too small for precise reporting of Aboriginal and Torres Strait Islander women aged 40 years and older.)

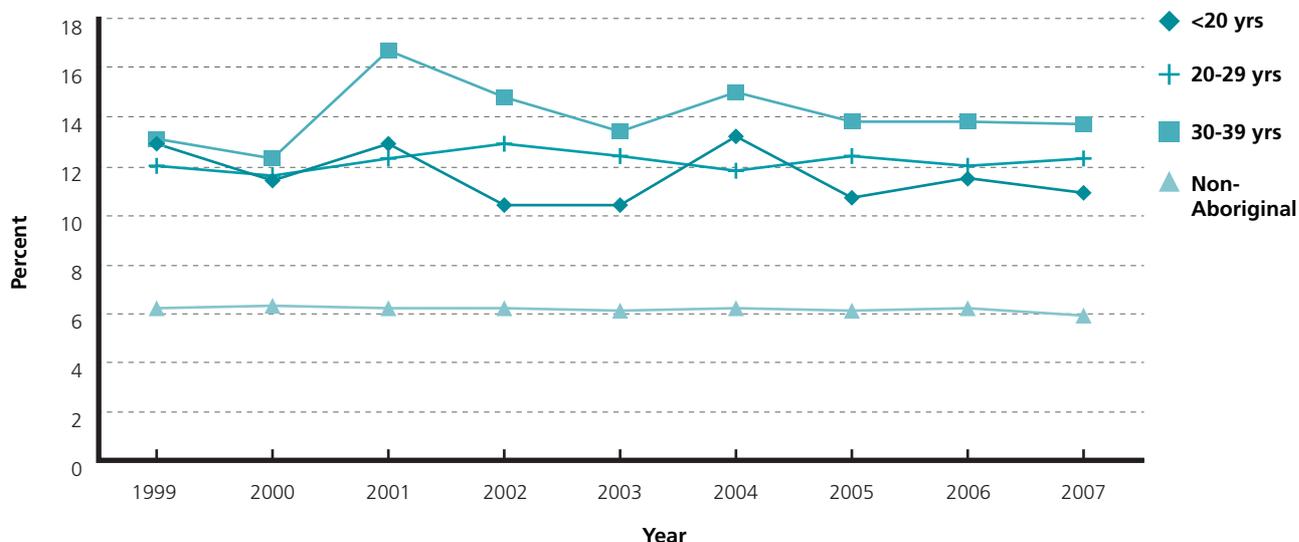
It should again be noted that the reporting of Aboriginality to the NSW PDC is incomplete and inferences regarding trends in Aboriginal and Torres Strait Islander data or comparisons to non-Aboriginal populations should be made with caution.^{4,7}

Figure 4.15: Proportion (%) of births with low birth weight (<2,500g) by maternal age group, NSW, 1999 to 2007



Notes: Data not available for 2008 at time of preparation.
Source: NSW Department of Health, NSW Perinatal Data Collection.

Figure 4.16: Proportions (%) of births as low birth weight (<2,500g) by maternal age group in Aboriginal and Torres Strait Islander versus non-Aboriginal mothers, NSW, 1999 to 2007



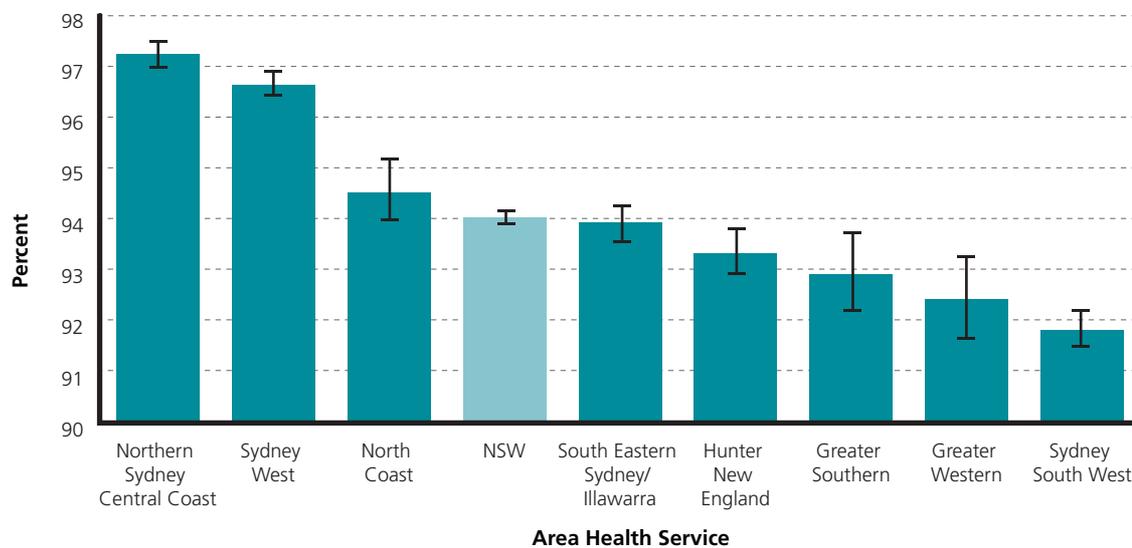
Notes: Data not available for 2008 at time of preparation. Numbers too small for precise reporting of Aboriginal and Torres Strait Islander women aged 40 years and older.
Source: NSW Department of Health, NSW Perinatal Data Collection.

4.3.3 Infant morbidity risk factors and outcomes: New South Wales Area Health Services

Duration of pregnancy at first antenatal visit

The proportion of mothers attending antenatal visits in the first 19 weeks of pregnancy was high across all NSW Area Health Services in 2008 (>91%). Significantly higher attendances occurred in the Northern Sydney Central Coast (97.2%) and Sydney West (96.6%) Area Health Services (Figure 4.17). Significantly lower proportions of mothers attending their first antenatal visit in the first 19 weeks occurred in the Hunter and New England, Greater Southern, Greater Western and Sydney South West Area Health Services (93.3, 92.9, 92.4 and 91.8% respectively).

Figure 4.17: Percentage of antenatal visits in the first 19 weeks of pregnancy, NSW Area Health Services, 2008



Note: Bars represent 95% confidence intervals.

Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Report 2010.

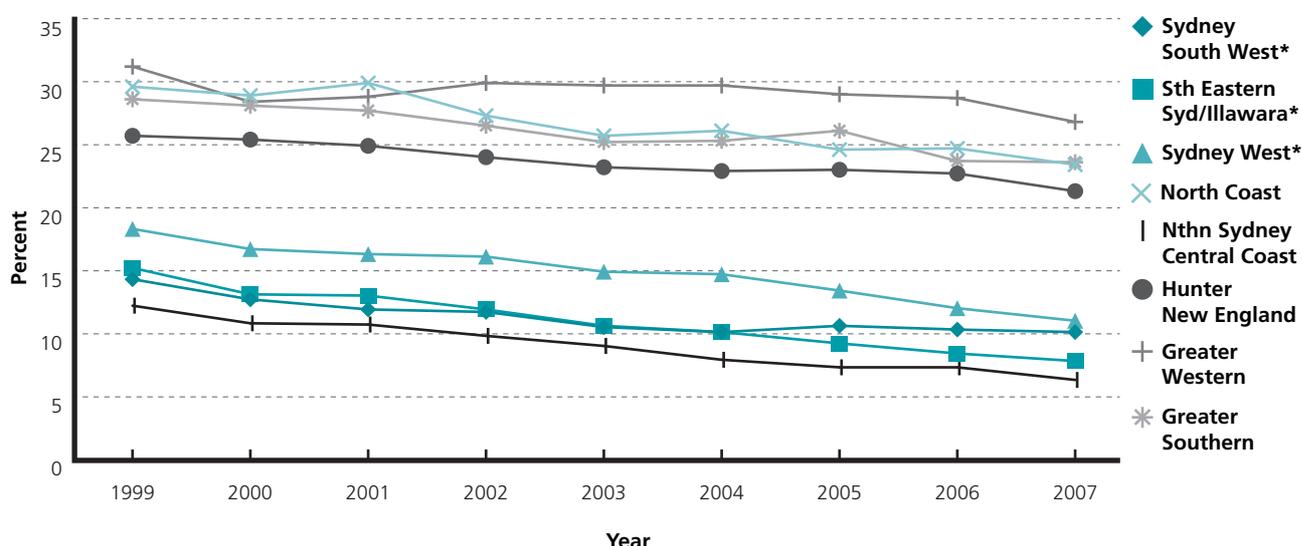
Smoking in pregnancy

Proportions of mothers reporting smoking during pregnancy declined in all NSW Area Health Services (AHS) during 1999 to 2007 (Figure 4.18). Smoking prevalence was highest in non-metropolitan Area Health Services (Greater Western, North Coast, Greater Southern and Hunter New England), varying between 26 and 31% in 1999, declining to 22 to 27% by 2007. The proportions of mothers who smoked during pregnancy from metropolitan AHS (Sydney West, South Eastern Sydney and Illawarra, Sydney South West and North Sydney and Central Coast) ranged from 12 to 18% in 1999 then declined to between 6 and 11% by 2007. The decline in smoking amongst pregnant women in

relative terms was greatest in metropolitan AHS. In 1999 non-metropolitan women were less than twice as likely to smoke during pregnancy than metropolitan women, whereas by 2007 they were nearly 2.5 times as likely to smoke during pregnancy (Table 4.7).

From 1999 to 2007 smoking prevalence was highest in the Greater Western AHS, despite decreasing from 31 to 27% during this period. Of metropolitan Area Health Services, Sydney West had the highest smoking prevalence, with a consistent decline from 1999 to 2007. While smoking prevalence in mothers from Sydney South West AHS has also declined, the decline ceased in 2004 to 2005.

Figure 4.18: Percentage smoking during pregnancy, NSW Area Health Services, 1999 to 2007



Notes: Data not available for 2008 at time of preparation. * = metropolitan area health services.

Source: NSW Department of Health, NSW Perinatal Data Collection.

Table 4.7: Prevalence (%) of women smoking during pregnancy, Area Health Services, 1999 and 2007

YEAR	AREA HEALTH SERVICES		
	Non-metropolitan	Metropolitan	Non-metropolitan to metropolitan relative prevalence
1999	28.1	15.2	1.8
2007	23.2	9.1	2.5

Source: NSW Department of Health, NSW Perinatal Data Collection.

Prematurity

From 1999 to 2008 the highest rates of premature births (gestation of less than 37 weeks) were in the Hunter and New England and Greater Western Area Health Services

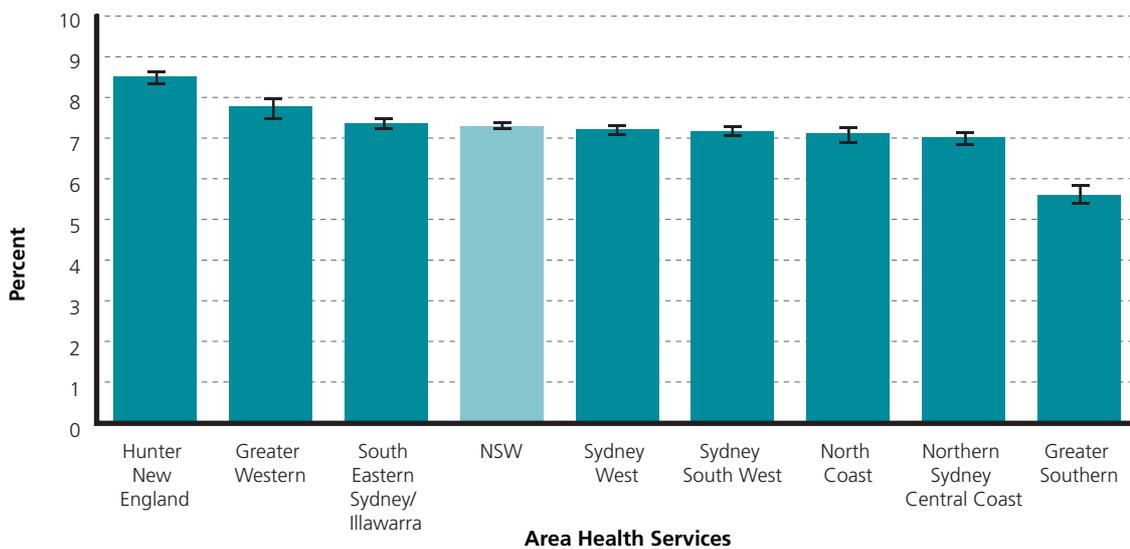
(8.5 and 7.7% respectively, Figure 4.19). The lowest rate was in the Greater Southern Area Health Service (5.6%), with little variation around the state average (7.3%) in the remaining Area Health Services.

Low birth weight

The pattern of low birth weights (less than 2,500g) in NSW AHS was similar to that observed for premature births for 1999 to 2008 (Figure 4.20). Hunter and New England and Greater Western AHS had the highest rates of low birth weight babies (7.3 and 7.1% of births respectively), and

the lowest rates occurred in Greater Southern and Northern Sydney and Central Coast AHS (5.1 and 5.6% of births respectively). The remaining Services reported rates similar to the state average over 1999 to 2008 (ranging from 6.1 to 6.5%).

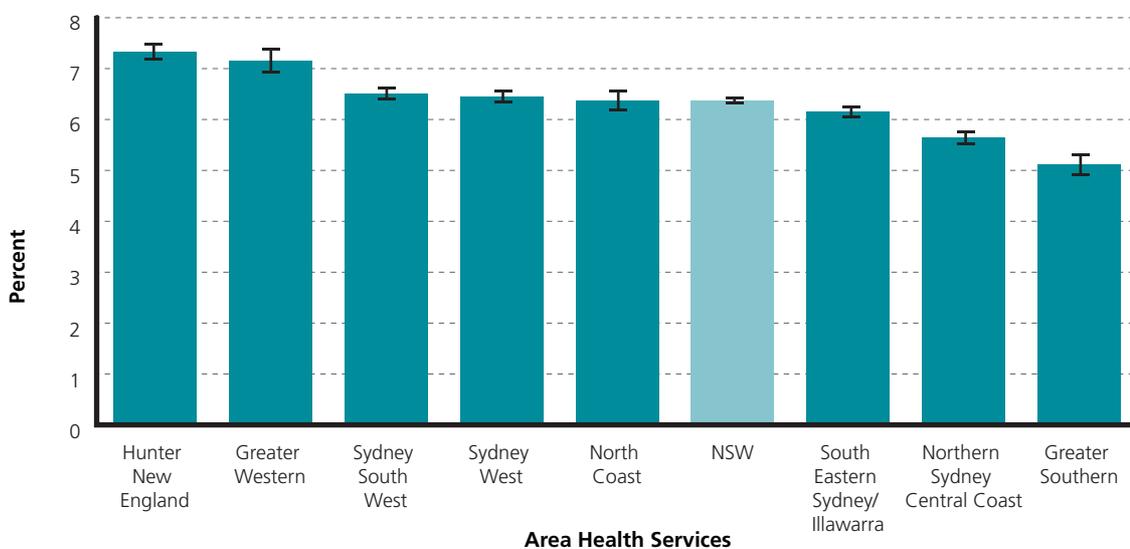
Figure 4.19: Percentage of premature births (<37 weeks), NSW Area Health Services, 1999 to 2008



Note: Bars represent 95% confidence intervals.

Source: NSW Department of Health, NSW Perinatal Data Collection. 2008 data from Centre for Epidemiology and Research. NSW Department of Health. New South Wales Mothers and Babies 2008. NSW Public Health Bull 2010; 21 (S-2).

Figure 4.20: Percentage of low birth weight (<2,500g) births, NSW Area Health Services, 1999 to 2008



Note: Bars represent 95% confidence intervals.

Source: NSW Department of Health, NSW Perinatal Data Collection. 2008 data from Centre for Epidemiology and Research. NSW Department of Health. New South Wales Mothers and Babies 2008. NSW Public Health Bull 2010; 21 (S-2).

4.4 Maternal Mortality

Maternal deaths include all deaths of women who were pregnant at the time of death or who died within 42 days of childbirth. Direct maternal deaths (resulting from obstetric complications of the pregnancy, including its management) have shown a long term decline in Australia. From 2003 to 2005, 29 direct maternal deaths occurred in Australia.⁹ Death owing to amniotic fluid embolism was the most common direct cause of maternal death (8 cases). Hypertensive disorders, thrombosis, thromboembolism, obstetric haemorrhage and cardiac conditions accounted for the majority of remaining maternal deaths (16 cases). From 1997 to 2005, almost half of direct maternal deaths were from amniotic fluid embolism or genital tract haemorrhage.⁹

Indirect maternal deaths include deaths from pre-existing disease or disease that develops during pregnancy that may have been aggravated by the physiological effects of pregnancy. Thirty-six indirect maternal deaths were recorded in Australia between 2003 and 2005. Ten of these deaths resulted from cardiac conditions, a further six from psychiatric causes, five were due to non-obstetric haemorrhage and four to infection, with the remaining 11 deaths attributable to other causes. Cardiac, psychiatric conditions, infection and non-obstetric haemorrhage were responsible for the majority (67%) of the 116 indirect maternal deaths recorded in Australia from 1997 to 2005.⁹

Incidental maternal deaths, where pregnancy is unlikely to have contributed to the cause of death, are not used for reporting maternal mortality.

4.4.1 Maternal mortality: international comparisons

The World Health Organisation (14) estimated an average maternal mortality ratio (MMR) in 2008 of 14 deaths per 100,000 live births for developed countries. This was significantly lower than the rate of 290 deaths per 100,000 live births in developing regions. The rate for Australia was 8 per 100,000, below many other developed countries including the USA, UK, Canada and New Zealand (Figure 4.21).

4.4.2 Maternal mortality: Australia

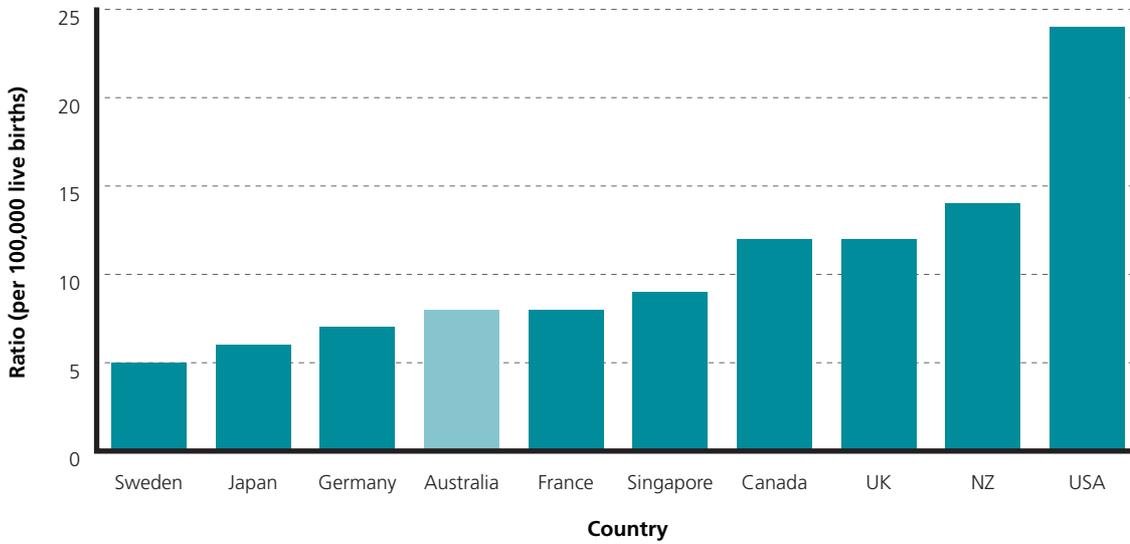
Owing to small case numbers and inconsistent case ascertainment over time, national maternal mortality data should be interpreted with caution when making comparisons or assessing trends.

The AIHW report Australian maternal mortality ratios (MMR) as the number of direct and indirect maternal deaths in three year periods per 100,000 women who gave birth either to a live or stillborn baby of more than 20 weeks gestation or weighing at least 400 grams at birth. These ratios are directly age-standardised to the 15 to 44 year old female population from the 2001 Australian census. Despite wide variability among triennia, the maternal mortality ratio has declined from over 12 deaths per 100,000 women who gave birth in the 1970s and early 1980s, to around 8.4 deaths per 100,000 women who gave birth in 2003–2005 (Figure 4.23). This decrease has been attributable mainly to a decrease in direct maternal mortality.⁹

The age-standardised maternal mortality rate for Australia – the number of maternal deaths per 100,000 women aged 15 to 44 years – has declined similarly, although the decline from 1973–1975 to 1979–1981 reflects population growth more than an improvement in maternal mortality *per se* as is evident when compared with the slight MMR increase for the same period (Figure 4.22). The maternal mortality rate has declined from 1.1 deaths per 100,000 women aged 15 to 44 years in 1973–1975 to 0.5 deaths per 100,000 by 2003–2005.

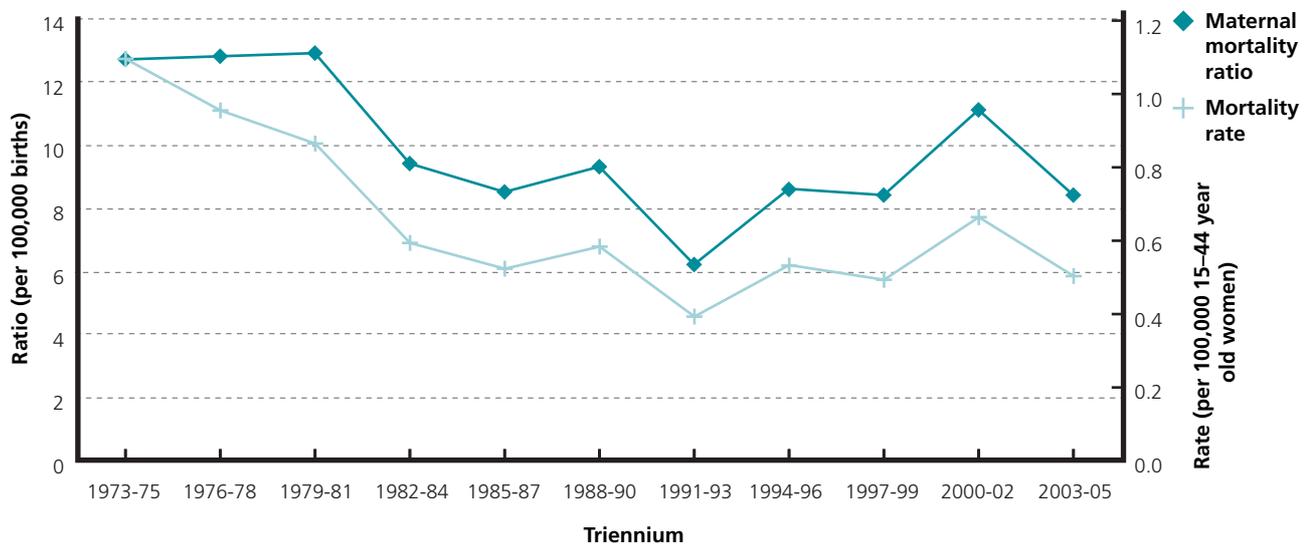
The higher MMR and maternal mortality rates for 2000–2002 partly reflect improved case ascertainment and changes in the classification of deaths.²⁶ In particular, the inclusion of some incidental death categories (not previously counted in MMR and rate calculations) as indirect maternal deaths resulted in a sharp increase in maternal mortality indicators for that triennium.

Figure 4.21: Maternal mortality ratio, Australia and selected countries, 2005



Source: World Health Organization 2010. Trends in Maternal Mortality: 1990 to 2008.

Figure 4.22: Maternal mortality ratios and rates, Australia, by triennia 1973–1975 to 2003–2005



Notes: Maternal mortality ratio plotted on primary y-axis. Mortality rate, direct and indirect deaths, plotted on secondary y-axis, per 100,000 female population standardised to 2001 female population aged 15 to 44 years.

Source: Sullivan EA, Hall B and King JF. 2008. Maternal deaths in Australia 2003–2005. Maternal deaths series no. 3. Cat. No. PER 42. Sydney: AIHW National Perinatal Statistics Unit.

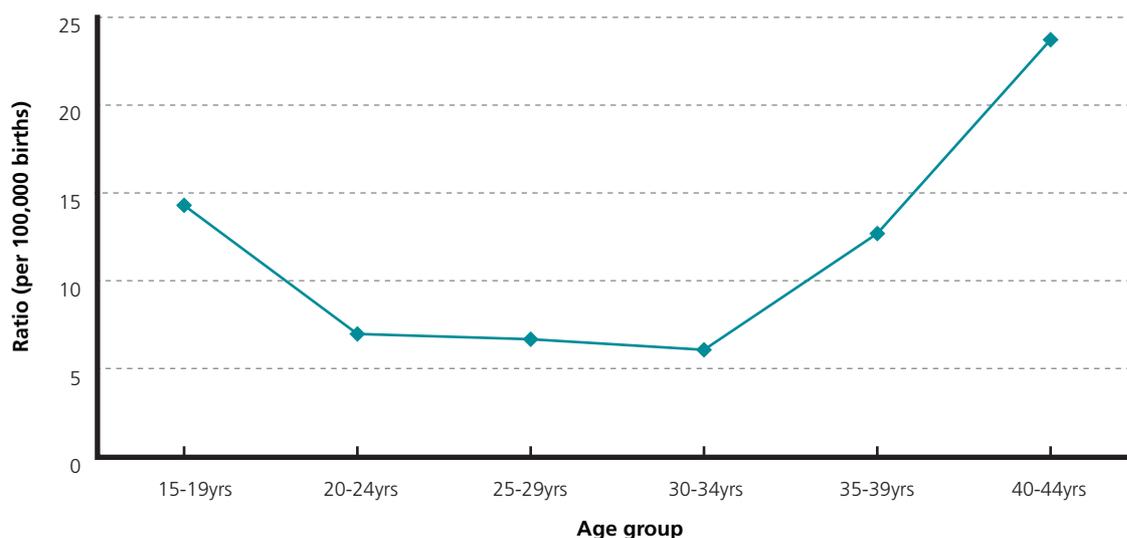
Maternal mortality by age

As noted above, very low maternal mortality event numbers mean that interpretation of trends and patterns is limited and this is exacerbated when the data are further broken down into age groups. Age-specific MMRs for the 2003–2005 triennium show 15 to 19 and 40 to 44 year mothers to have the greatest risk of maternal death (Figure 4.23). From age 30 to 34 years, the risk of death once pregnant increases with age. Despite these patterns, it is important to

remember that the overall risk of death through pregnancy in Australia remains exceedingly low.

Over the period 1994 to 2005 women aged 40 to 44 years have consistently had the highest MMR, ranging from 28.0 to 23.2 deaths per 100,000 live births (Figure 4.24). The MMR for women aged 35 to 39 years has been similarly high but has declined and in the 2003–2005 triennium was exceeded slightly by that of women aged 15 to 19 years (12.7 and 14.3 deaths per 100,000 live births respectively).

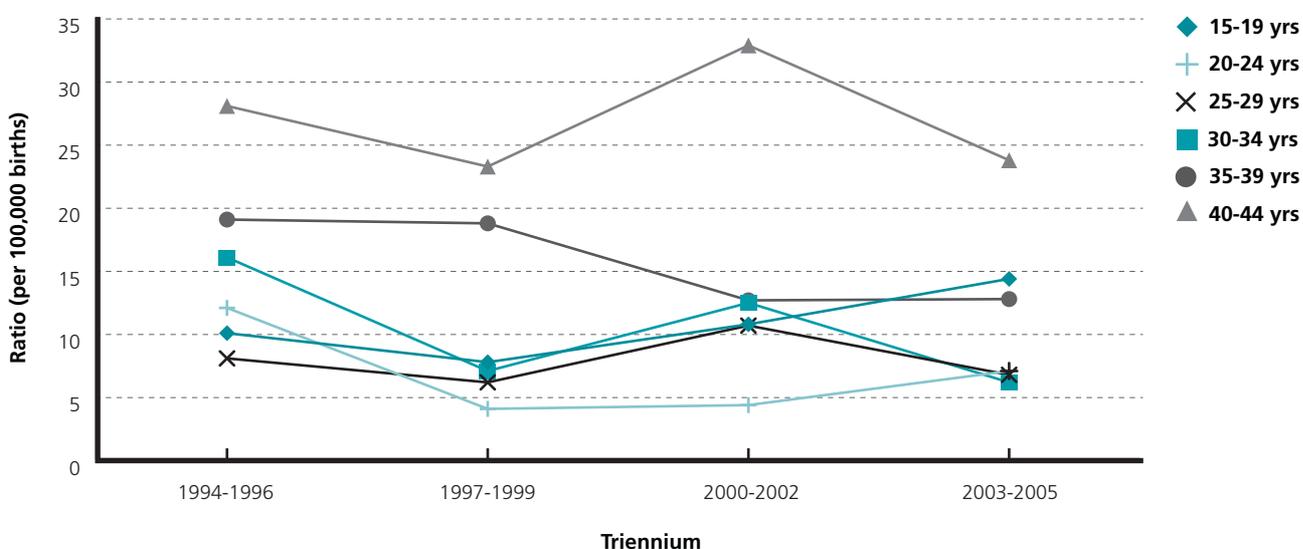
Figure 4.23: Maternal mortality ratio (MMR) by age, Australia, 2003–2005 triennium



Note: Mortality ratio per 100,000 births. Direct and indirect deaths.

Source: Sullivan EA, Hall B and King JF. 2008. Maternal deaths in Australia 2003–2005. Maternal deaths series no. 3. Cat. No. PER 42. Sydney: AIHW National Perinatal Statistics Unit.

Figure 4.24: Maternal mortality ratio (MMR) by age group, Australia, triennia 1994–1996 to 2003–2005



Note: Mortality rate per 100,000 live births standardised to 2001 female population aged 15 to 44 years.

Sources: Report on Maternal Deaths in Australia, 1994–96, Commonwealth of Australia 2001 and AIHW Maternal deaths series Cat. Nos. PER 24, 32 and 42. Sydney: AIHW National Perinatal Statistics Unit.

Maternal deaths and place of residence

Owing to small numbers of cases per jurisdiction, AIHW reporting of maternal death by state and territory is grouped into six-year periods. For 2000–2005 Queensland recorded the highest MMR (13.7 deaths per 100,000 births), and the lowest MMRs were recorded in NSW/ACT and WA (7.6 and 6.7 deaths per 100,000 births, respectively, Figure 4.25).

There was a disproportionate distribution of maternal deaths in women whose place of usual residence was outer regional and remote Australia (Figure 4.26).⁹ Over the period 2003 to 2005, outer regional Australia accounted for 9% of the Australian population and recorded 14% of direct and indirect maternal deaths. Similarly, remote or very remote Australia, with only 2% of the population, recorded 8% of maternal deaths. In contrast, the major cities of Australia, which include 68% of the population recorded only 56% of maternal deaths.

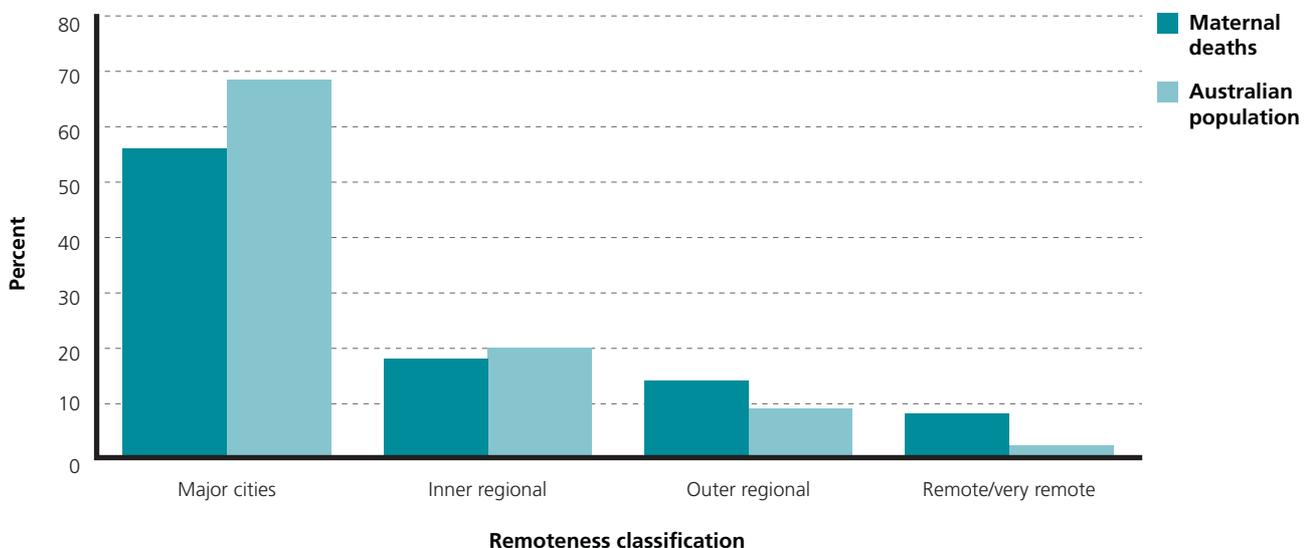
Figure 4.25: Maternal mortality ratio (MMR), Australian states and territories, 2000 to 2005



Note: Mortality ratio per 100,000 births. Direct and indirect deaths.

Source: Sullivan EA, Hall B and King JF. 2008. Maternal deaths in Australia 2003-2005. Maternal deaths series no. 3. Cat. No. PER 42. Sydney: AIHW National Perinatal Statistics Unit.

Figure 4.26: Maternal deaths and population (%) by place of usual residence, Australia, 2003–2005



Sources: Population estimates: Australian Bureau of Statistics 3218.0 - Regional Population Growth, Australia, 2006–07; Sullivan EA, Hall B and King JF. 2007. Maternal deaths in Australia 2003–2005. Maternal deaths series no. 3. Cat. No. PER 42. Sydney: AIHW National Perinatal Statistics Unit.

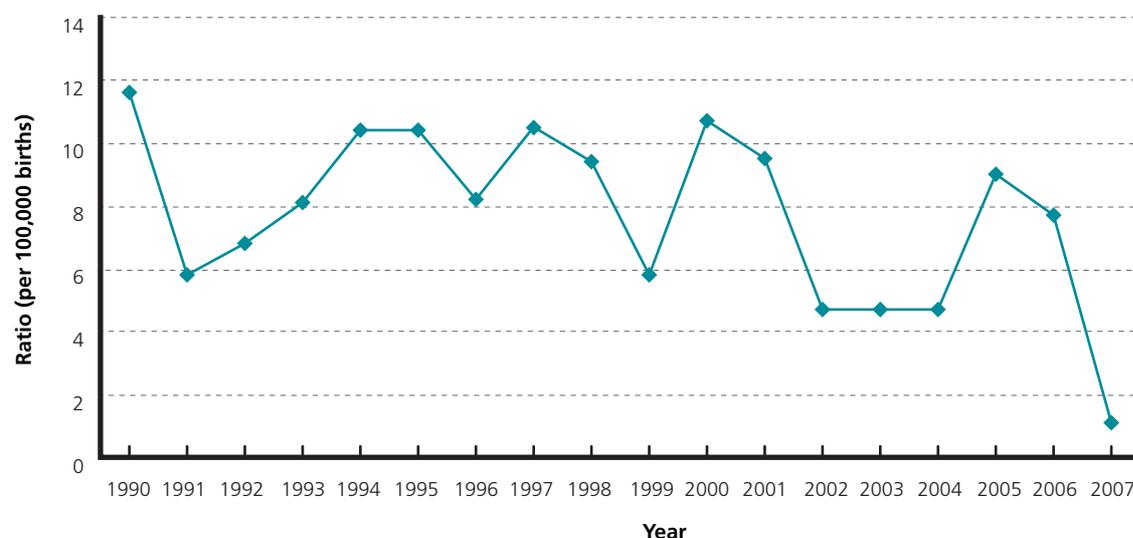
Maternal mortality among Aboriginal and Torres Strait Islander mothers

Recording of Aboriginality in mortality records, and of maternal mortality in Aboriginal and Torres Strait Islander women, has been relatively high since the mid 1980s, ranging from 83% to 92% completeness. In the triennium 2003–2005 six maternal deaths were recorded in Aboriginal and Torres Strait Islander women.⁹ The MMR for the 2003–2005 triennium was 21.5 deaths per 100,000 Aboriginal and Torres Strait Islander women who gave birth, almost triple the ratio for non-Aboriginal women (7.9 deaths per 100,000 births). However, small event numbers preclude meaningful statistical inferences.

4.4.3 Maternal mortality: New South Wales

Maternal deaths are rare in NSW, with fewer than 10 deaths per year reported since 1990.⁷ From 1990 to 2007 the maternal mortality ratio for NSW has varied around a mean of 7.7, with only one death in 2007 resulting in an exceptionally low rate of one death per 100,000 births (Figure 4.27).

Figure 4.27: Maternal mortality ratio (MMR), NSW, 1990 to 2007



Note: Mortality ratio per 100,000 births. Direct and indirect deaths, excluding incidental deaths.

Source: NSW Department of Health, NSW Perinatal Data Collection, Mothers and Babies Report, 2010.

4.5 Summary

The death of a baby either prior to birth or within a year of birth as well as the death of a mother up to 42 days after birth are primary international indicators of the reproductive and sexual health of a population. The reduction from historically high rates of death of babies, infants and their mothers represents one of the greatest health and social achievements of the developed world. However, the persistent gap between rates in the developed and the developing world, and within sub-populations in developed countries, remains a global challenge.

In Australia, infant and maternal mortality rates are comparatively low (concomitant with Australia's status as a developed nation) and data are comparatively complete. Data on mortality in general and infant and maternal mortality in particular are managed by several agencies nationally and at state level. These include the Australian Bureau of Statistics, the Australian Institute of Health and Welfare and in NSW the Perinatal Data Collection (formerly the Midwives Data Collection). These sources have slightly different collecting frameworks and timelines, and thus report slight differences in values. However, the causes of these differences are well documented and the results not inconsistent.

Using ABS estimates, the fetal mortality rate for Australia for 2008 was 5.5 deaths per 1,000 births, the neonatal death rate 2.9 per 1,000 live births and the perinatal death rate therefore 8.4 per 1,000 births. Australia compares favourably with other high-income countries, which on average were reported to have a neonatal death rate of 4 per 1,000 live births in 2008 by the World Health Organisation.

Despite these positive findings, heterogeneity within Australia, when measured by state or the proportion of deaths contributed by Aboriginal and Torres Strait Islanders, suggests that efforts are still required to closely monitor and control infant deaths. For example, the rate of fetal deaths was notably higher in the Northern Territory compared to other states over the period 2004 to 2008 (8.3 per 1,000 births compared to 5.3 per 1,000 in South Australia and 5.5 per 1,000 in NSW). Over 60% of the fetal deaths in the NT were contributed by Aboriginal and Torres Strait Islanders. Infant mortality was similarly higher in the NT (6.1 deaths per 1,000 live births) compared to the national infant mortality rate of 4.1 deaths per 1,000 live births).

In NSW the perinatal mortality rate has declined slightly from 9.2 per 1,000 births in 1999 to 8.7 per 1,000 births in 2008, varying around a mean of 9.0 per 1,000 births. This decline has reflected a more consistent decline in neonatal deaths (from 3.2 to 2.7 deaths per 1,000 live births). Fetal deaths were more variable around a mean of 6.3 deaths per 1,000 births.

Reporting of Aboriginality in NSW is incomplete, and therefore accurate comparisons of perinatal mortality in Aboriginal and Torres Strait Islander and non-Aboriginal residents of NSW remains difficult. Estimates for 2008 nevertheless indicated a substantially higher rate of perinatal mortality in Aboriginal and Torres Strait Islanders in NSW (15.3 deaths per 1,000 births) compared to non-Aboriginals (8.5 per 1,000). These estimates may be conservative, as perinatal deaths in Aboriginal and Torres Strait Islander babies may have been undercounted.

Similar variation in NSW related to the mother's country of birth and Area Health Service require further investigation. For example, in 2008 mothers whose countries of birth were Oceania, the Middle East and Africa or Southern Asia had rates of perinatal mortality greater than 10 deaths per 1,000 births, compared to 8.5 per 1,000 in women born in English-speaking countries.

Infant morbidity in NSW, measured by premature births (less than 37 weeks gestation) or low birth weight babies (less than 2.5kg) is comparatively low. In 2008 7.5% of births were premature, and overall less than 6.5% of babies were of low birth weight. However, birth weight was related to the age of the mother, with greater than 8% of younger (less than 20 years) and older (greater than 40 years) mothers having babies of low birth weight, compared to approximately 6% in mothers aged from 20 to 39 years.

Aboriginal and Torres Strait Islander mothers were approximately twice as likely to have premature births or low birth weight babies in NSW and this will in part reflect the poorer risk factor profile seen in Aboriginal and Torres Strait Islander women. In 2008 over 90% of all mothers attended for their first antenatal visit within the first 19 weeks of pregnancy, whereas only 83% of Aboriginal and Torres Strait Islander mothers did so. Similarly in 2008, 50% of Aboriginal and Torres Strait Islander mothers reported smoking during pregnancy, compared to approximately 10% in non-Aboriginal mothers. However, this gap is

decreasing in NSW, probably as a result of the NSW Health AHMIS program which provides culturally appropriate and holistic care for Aboriginal and Torres Strait Islander women during pregnancy.

Maternal mortality, the death of a mother either during pregnancy or within 42 days of childbirth is a comparatively rare event in Australia. In 2005 Australia reported a Maternal Mortality Ratio (MMR) of 8 deaths per 100,000 live births, compared to WHO estimates of 14 per 100,000 births for developed countries. The maternal mortality rate – i.e. the risk of death through childbirth for a woman of reproductive age – was 0.5 per 100,000. Within Australia, there was variation in maternal mortality by state (Queensland reported a MMR of nearly 14 per 100,000 births) and remoteness (maternal mortality was over-represented in outer regional and remote settings). These differences may reflect other health service or social factors and require further investigation.

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Chapter 5 :

Trends in Contraception

Chapter Outline

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Key Indicators

- Prevalence and patterns of contraceptive use
- Contraceptive use by age, socio-demographic factors and sub-populations, in particular young people and Aboriginal and Torres Strait Islanders
- Types of contraception available and costs to users
- Medicare PBS claims for listed contraceptives: oral contraceptives, intrauterine contraceptive methods, contraceptive implants; contraceptive injections
- Medicare MBS claims for sterilisation procedures and intrauterine device insertions

Primary Data Sources

Medicare Australia on-line statistics for claims data relating to MBS and PBS reimbursed contraceptive items

The Australian Bureau of Statistics
Health Surveys

Survey data that include contraception items

Introduction

Access to effective contraception is essential for optimal reproductive and sexual health. It allows for the planning of the number and spacing of pregnancies as well as the prevention of unplanned pregnancies.¹ For healthcare providers, monitoring population trends in contraception use, knowledge and preferences is essential for the provision of effective contraceptive services, especially given the increasing array of products and methods available. A thorough understanding of the methods of contraception used across the population, the factors predicting or directing contraceptive choices, and differences geographically and in specific population sub-groups is essential for maintaining and improving reproductive and sexual health.

A wide range of contraceptives is currently available in Australia (Table 5.1). With the exception of emergency contraception and barrier methods such as condoms, most require a prescription from a medical practitioner and are thus not available over-the-counter (OTC).

The availability of a range of contraceptive products provides options for users that can better support preferences related to method of use, prescribed versus OTC availability, reversibility or permanence, the requirement for daily or less frequent action, effectiveness and mitigation of side effects. Potential benefits can extend to co-management of menstrual symptoms, emergency contraception and, for some methods, protection against sexually transmissible infections (STIs).²⁻⁴ The most beneficial individual and population-level outcomes require knowledge, both on the part of the consumer and the clinician, so that consumers can be supported to make effective contraceptive choices that best meet their needs and circumstances.

It is highly likely that the range of contraceptive products available will increase. Research continues to explore new and more versatile approaches to contraception, including immunological methods,⁵ male hormonal contraceptives including pills, injections and implants,^{6,7} and effective on-demand contraception, in particular methods that are accessible and acceptable to younger people.⁸ However, these remain in comparatively early development.

The information presented in this chapter is based largely on cross-sectional surveys, Medicare claims for Pharmaceutical Benefits Scheme (PBS)-listed contraceptives and Medical Benefits Scheme (MBS)-listed contraception related procedures:

- The Australian Bureau of Statistics (ABS) 2001 *National Health Survey* (NHS) prevalence estimates for contraceptive use among women and their partners.⁹
- The *Australian Study of Health and Relationships* (ASHR) population health survey undertaken in 2001–2002 which investigated the experiences of 19,307 people aged 16 to 59 years.^{4,10,11}
- The *National Survey of Australian Secondary Students and Sexual Health* (NSASS) survey of Year 10 and 12 students from more than 100 secondary schools in 2003 (n=2,388 students) and 2008 (n=2,929 students).^{12,13}
- The *Australian Longitudinal Study on Women's Health* (ALSWH) longitudinal population-based survey which commenced in 1996 with randomly selected cohorts of women then aged 18 to 23, 45 to 50 and 70 to 75 years. The cohorts were surveyed again in 2000, 2003 and 2006.¹⁴
- The *Household, Income and Labour Dynamics in Australia* (HILDA) national household panel survey on families, income, employment and wellbeing. The survey began in 2001 with 7,682 households at which interviews were conducted on 19,917 participants. Data reported here are from the 2001–2005 surveys.¹⁵
- The ABS 2004–2005 *National Aboriginal and Torres Strait Islander Health Survey*.¹⁶
- Medicare data: Pharmaceutical Benefits Scheme (PBS) data and Medicare Benefits Schedule (MBS) data for contraceptive related procedures (online at: www.medicareaustralia.gov.au/about/stats/index.jsp.)

Table 5.1: Contraception in Australia, 2010

CONTRACEPTIVE METHOD	USE	PRODUCTS AVAILABLE	AVAILABILITY*: PBS/MBS/OTC
Reversible			
Combined hormonal contraceptive pills (containing both oestrogen and progestogen)	Daily	30	PBS: 18
Progestogen-only pills (mini-pills)	Daily	2	PBS: 2
Combined hormonal vaginal rings	Monthly	1	No
Contraceptive injections	Three-monthly	2	PBS: 2
Contraceptive implants	Three-yearly	1	PBS: 1
Intrauterine methods: • copper-bearing non-hormonal intrauterine device (IUD) • hormonal releasing intrauterine system (IUS)	IUD 5 or 10 years IUS 5 years	2 1	IUD not listed IUS MBS/PBS
Barrier methods: condoms (male and female)	As required	Many	OTC
Barrier methods: diaphragms	As required	1	OTC [†]
Natural and safe period methods: • Billing's, symptothermal and calendar rhythm to guide periodic abstinence • withdrawal • lactational amenorrhoea	As required	-	-
Permanent			
Female tubal ligation	-	-	MBS [‡]
Female tubal occlusion	-	2	MBS [‡]
Male vasectomy	-	-	MBS [‡]
Emergency contraception			
Emergency contraceptive pills	72 (to 120) hrs of unprotected sex	3, (2 generic)	OTC [§]
Intrauterine device	Up to 5 days after unprotected sex	2	No

*PBS = Pharmaceutical Benefits Scheme; MBS = Medicare Benefits Schedule. Products listed on the PBS or procedures on the MBS are available to the consumer at reduced cost. OTC = Over-the-counter; no prescription is required and products may be available at pharmacies and supermarkets.

† Available without prescription but requires a fitting by a doctor in general practice or at a Family Planning clinic

‡ MBS reimbursement for sterilisation procedure; products reimbursed through Prosthesis List.

§ Over the counter at pharmacies only; not all pharmacies in Australia dispense emergency contraception.

Sources: MBS-Medicare Benefits Schedule Book Commonwealth of Australia 2009; PBS-Schedule of Pharmaceutical Benefits Commonwealth of Australia 2010.

Data Limitations

There are no routinely collected data on contraceptive use in Australia that are both reliable and complete, and our understanding of trends and patterns of contraceptive use is consequently fragmented and limited. Information is largely derived from survey data, and most of these surveys only included contraception as part of a wider survey scope; i.e. with the exception of the Australian Study of Health and Relationships (ASHR) and National Survey of Australian Secondary Students and Sexual Health (NSASS), reproductive and sexual health in general and contraception in particular were not the primary focus of the survey.

The most recent survey data are more than five years old and do not capture comparatively new contraceptive methods such as the implant, vaginal ring and hormonal Intrauterine System (IUS). Comparisons between surveys and over time are limited by differences in the types of contraceptive methods assessed, the terminology and classification of contraceptive methods, and the sampling frames and populations from which the samples were drawn. Surveys may further overestimate the use of condoms, as they rarely differentiate between condom use primarily for contraception or for STI protection.

Household surveys such as the ASHR and Australian Longitudinal Study on Women's Health (ALSWH) are subject to bias through omitting people who are less likely to be surveyed. For example, surveys based on telephone interviews with households (e.g. ASHR) omit households without a landline telephone and exclude people in colleges, prisons, oil rigs, camps, and hospitals, etc. Adjustment by matching to census demographic profiles can ameliorate or at least identify where biases may be present. The ALSWH was based initially on the Medicare database of Australian citizens and permanent residents, but owing to errors in this database response rates cannot be defined exactly (although they are estimated at between 37 and 56%).

The National Survey of Australian Secondary Students and Sexual Health (NSASS) does not include young people who are out of school, who are known to have a lower age at first intercourse and be at greater risk of unplanned pregnancy or STI.^{17,18}

Although regular National Health Surveys have been conducted by the ABS since 1983, the 2004–2005 and 2007–2008 surveys did not include contraceptive practice items. Data on contraceptive use in women aged 18 to 49 years are available from the 1995 and 2001 surveys but are not directly comparable owing to differences in the classification of contraceptive methods.

The ALSWH allows for comparison of oral contraceptive and condom use from 1996 to 2005 but does not contain data on copper intrauterine devices (IUDs), hormonal intrauterine

systems (IUSs) or the vaginal ring. The Household, Income and Labour Dynamics in Australia (HILDA) survey began in 2001, but contraceptive data were collected in 2005 only. No data were collected on hormonal IUSs. The ASHR and NSASS are the only surveys to provide data on contraceptive use in people under the age of 18 years.

The usefulness of analysing Medicare data is limited as government reimbursement is not provided for all contraceptive procedures or products and therefore not all are listed on the Medicare (MBS) or Pharmaceutical (PBS) benefits schedules (Table 5.1). The earliest marketed contraceptive pills containing the progestogens levonorgestrel and norethisterone, either in the form of progestogen-only pills (mini-pills) or as combined pills with ethinyl oestradiol, are listed on the PBS. The hormonal IUS (Mirena[®]) was listed in 2001 and the contraceptive implant (Implanon[®]) in 2003. Newer pills such as those containing drospirenone (e.g. Yasmin[®]), as well as the vaginal ring and copper IUD are not listed. A further limitation is that the PBS data reflect prescriptions filled and are not counts of numbers of users.

MBS claims for intrauterine contraceptive insertions (Medicare Item 35503: Introduction of an Intrauterine Contraceptive Device) and sterilisation procedures can be tracked through the Medicare claims for these services, although these do not include procedures carried out at family planning clinics, for example, which do not bill through Medicare.

Associated socio-demographic or geographic data that might guide the development of relevant policies and services are not reported in Medicare data. Such data that have been collected in surveys are limited, and meaningful comparisons are hampered by the lack of methodological consistency across the surveys. In particular, the service and education needs of groups such as teenagers, rural women and Aboriginal and Torres Strait Islander women are difficult to assess and address. Either access to unit records from surveys with more detailed information (e.g. Yusuf and Seidlecky's 2007 expanded analysis of the ABS 2001 NHS)¹⁹ or surveys which report associated data (e.g. the ASHR) are required to widen our understanding of contraceptive behaviour beyond simple estimates of use.

5.1 Trends in the Use of Contraception: Australia

5.1.1 Prevalence of contraceptive use

The majority of Australian women use or have used contraception. The ABS 2001 National Health Survey found that 65.5% of Australian women aged 18 to 49 years currently used some form of contraception including partner sterilisation and natural methods.⁹ The HILDA study found that 63.0% of women aged 18 to 44 years used contraception (excluding sterilisation),^{2,15} and 85.3% had ever done so. The 2002 ASHR survey found that 70.8% of Australian women aged 16 to 59 years used some form of contraception, including sterilisation.⁴ In a sample of women from the ALWHS who had had at least one pregnancy, 92% reported having ever used the contraceptive pill and 49% condoms.²⁰ These estimates are consistent, but demonstrate the lack of direct comparability of survey data owing to differing definitions and measures of contraception (excluding or including sterilisation for example) and different sampling frames such as age ranges.

5.1.2 Type of contraceptive used

In the three main surveys reported here (NHS, ASHR and HILDA), oral contraception was consistently reported as the most common contraceptive method used by Australian women. Estimates suggested that between one quarter and one third of Australian women of childbearing potential use oral contraceptives (Table 5.2 and Figure 5.1) and over three quarters of Australian women have ever used the pill.¹⁹ Condoms and sterilisation methods[†] were the next most common method of contraception. Withdrawal or other natural methods were used by a small proportion of women, as were IUDs and diaphragms. However, these data are in need of update to ascertain changing usage patterns over time and particularly the effect of IUS, implant and ring methods on overall usage patterns.

The ABS 2001 National Health Survey reported oral contraceptives (combined and progestogen-only pills) were the most common form of contraception used in women aged 18 to 49 (26.8%), followed by condoms (22.9%), partner vasectomy (11.2%), tubal ligation (8.6%) and withdrawal (6.6%).⁹

The 2002 ASHR reported the oral contraceptive pill as the most common method used by women who were using a form of contraception (33.6%), followed by tubal ligation/hysterectomy (22.5%), condoms (21.4%) and partner vasectomy (19.3%).¹⁰

The 2005 HILDA survey reported that of women using contraception, condoms were used by 57.5%. The contraceptive pill was used by 56.5%[‡] of women reporting using contraception whilst 41.8% of males reported that their spouse used this method.¹⁵ These data were reanalysed to assess contraceptive use as a proportion of all women surveyed who were at risk of pregnancy (Table 5.2).²¹ For these women, aged 18 to 44, 29.9% were currently using oral contraception, and 22.9% condoms, estimates consistent with the earlier ABS and ASHR estimates.

† The ASHR included hysterectomy with tubal ligation, noting that although not medically indicated for contraception, hysterectomy has the incidental effect of sterility.

‡ In preparing this report, an error was noted in the source HILDA report. The data for all contraceptive pill use for men and women (Headey and Warren 2008, Table 7) had been transposed. Correctly, 41.8% of all men reported contraceptive pill use and 56.5% of all women, *pers. com. N. Sapar, HILDA, Melbourne Institute of Applied Economic and Social Research.*

Table 5.2: Survey estimates of contraceptive use in Australian women (%)

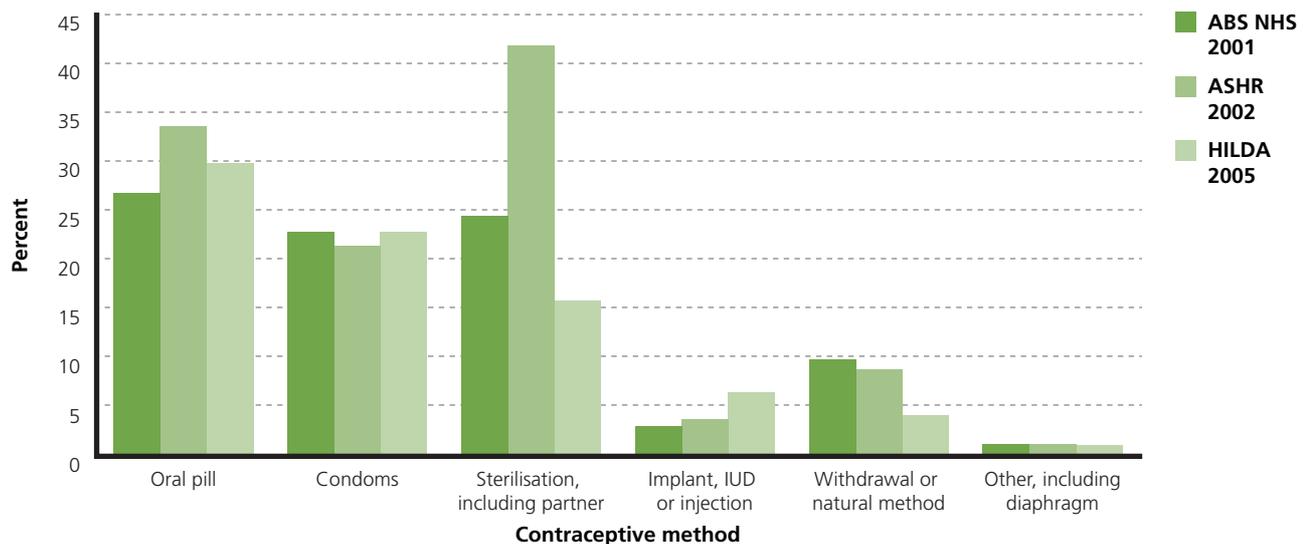
CONTRACEPTIVE METHOD	STUDY*		
	ABS NHS, 2001 n=5,872	ASHR, 2002 n=6,278	HILDA, 2005 n=2,544
Oral contraceptives	26.8	33.6	29.9
Condoms	22.9	21.4	22.9
Tubal ligation	8.6	22.5 [†]	6.6
Partner has been sterilised	11.2	19.3	9.3
Withdrawal method	6.6	4.5	2.5
Implant	Not measured	1.1	2.8
Natural, rhythm or Billings method	3.3	4.4	1.7
IUD	1.2	1.2	1.6
Contraceptive injection	1.9	1.5	2.1
Other, including diaphragm	1.2	1.2	1.1

* Studies are not directly comparable. Refer to source publications for explanations of sampling and criteria for classification of contraceptive method. Years shown in table are years surveys carried out.

[†] Includes hysterectomy.

Sources: ABS 2001 National Health Survey, Cat. No. 4364.0 National Health Survey 2001; Australian Study of Health and Relationships (ASHR): Richters J et al. Sex in Australia: Contraceptive practices among a representative sample of women. *Aust NZ J Public Health* 2003, 27: 210–6; Household Income and Labour Dynamics in Australia (HILDA): Gray E and McDonald P. Using a reproductive life course approach to understand contraceptive method use in Australia. *J Biosoc Sci* 2010; 42: 43–58.

Figure 5.1: Estimates of contraceptive use, Australia



Note: Studies are not directly comparable. Refer to source publications for explanations of sampling and criteria for classification of contraceptive method. The ASHR category for sterilisation includes hysterectomy, hence the higher estimate from this survey.

Sources: ABS 2001 National Health Survey, Cat. No. 4364.0 National Health Survey 2001; Australian Study of Health and Relationships (ASHR): Richters J et al. Sex in Australia: Contraceptive practices among a representative sample of women. *Aust N Z J Public Health* 2003, 27: 210–6; Household Income and Labour Dynamics in Australia (HILDA): Gray E and McDonald P. Using a reproductive life course approach to understand contraceptive method use in Australia. *J Biosoc Sci*. 2010; 42: 43–58.

5.1.3 Dual protection

The regular and correct use of condoms provides protection against sexually transmissible infections (STIs) in addition to contraception.¹⁰ There is little information on the concurrent use of contraceptive methods such as the combined pill and condoms and it is therefore difficult to determine if condoms are being used for contraception, STI protection or both.

In the 2001 ABS survey⁹ approximately half of the women (48%) who indicated that their partner used condoms reported that the condoms were used for contraception only. More than a third (36%) indicated that the use of condoms was for both contraception and protection against sexually transmissible infection, with the remaining 16% reporting condom use only for protection against infection.

Extended analysis of the 2005 HILDA survey found that 15.4% of female respondents used multiple contraceptive methods, with oral contraception and condoms being the most common combination reported.^{2,21} A similar proportion of sexually active secondary school students reported dual contraception that included condom use (17.2%).²²

Use of more than one method of contraception tended to be much higher among users of traditional and coitally-related methods (condoms, diaphragms, withdrawal, safe period methods) than among users of medical methods such as pills, implants, injections and IUDs. Condoms were most frequently used concurrently with other methods. The combined use of condoms with either withdrawal or safe period methods was more prevalent than either of these methods alone, and substantial proportions of women who used the contraceptive pill or injection were also using condoms (28.4% and 21.0% respectively).²

However, a qualitative study of the reasons that young adults used condoms with another reliable method of contraception identified attitude to condoms, intention to use and discussion with partner as factors that predicted dual contraception.²³ Concern about protection from STIs and unplanned pregnancy were not factors that predicted for dual protection behaviour.

Although combined methods have been associated with falling fertility rates and fewer abortions, particularly in young people,² a Marie Stopes International (Australia) online survey found that one in five women who experienced an unplanned pregnancy were using multiple methods at the time of conception.²⁴ Users of multiple methods were more likely to have included protection from STIs in their contraceptive decision making than women who used a single method or no contraception.

5.1.4 Reasons for not using contraception

Approximately 25% of women at risk of pregnancy in Australia report not using contraception.^{25,26} The most common reasons given by female respondents in the ASHR study for not using contraception were that they were not at risk of pregnancy, i.e. not having intercourse (41.6%), menopause (21.6%), current or intended pregnancy (16.2%) and infertility (including partners, 7.1%).¹⁰

For women at risk of pregnancy in the ASHR (i.e. sexually active and not sterile or postmenopausal), reasons for not using contraception included concern about or having experienced side effects, contraindications, fatalism ("leaving it to chance"), forgetfulness or lack of interest, breast feeding, and concern about health and fertility effects (Table 5.3).¹⁰ Data collected from a subset of women on contraceptive use at the time of an unplanned pregnancy showed a similar pattern, but further identified unplanned or unexpected sexual intercourse or the effects of drugs or alcohol on the failure to use contraception.²⁴

The Secondary Students and Sexual Health Survey reported (for males and females in 2002 and 2008) that having trust or knowledge of the partner, or being unprepared for sex were the most common reasons for young people not using condoms.¹² However, this question was put to the students primarily in relation to STI prevention rather than contraceptive behaviour; students were not given an explicit option to indicate that they or their partner were using another form of contraception.

Table 5.3: Reasons for not using contraception in women reporting sexual activity (%), Australian surveys

REASON FOR NON-CONTRACEPTIVE USE	STUDY*	
	ASHR, 2002 n=336	Marie Stopes, 2006 n=418
Wasn't planning or expecting sex / drugs or alcohol impaired judgement	-†	45
Embarrassed to buy or use / uninformed	1	4
Partner didn't want to use contraception / I or partner don't like condoms	-	8
Don't care / forgot / have never got pregnant / didn't think I would get pregnant from one time / thought I was infertile	19	17
Restricted access or service	0	3
Side effects	23	8
Believe unnatural / unhealthy	14	-
Leave it to chance / fate / god	20	-
Other including breast feeding / missing	23	-

Notes: * Studies are not directly comparable. Refer to source publications for explanations of sampling and selection criteria. ASHR sample of women 'at risk of pregnancy', single response only; Marie Stopes sample of women who reported a previous unplanned pregnancy. Years in table are years surveys conducted.

† Missing cells: item not explicitly collected in survey.

Sources: Australian Study of Health and Relationships (ASHR): Richters J et al. Sex in Australia: Contraceptive practices among a representative sample of women. Aust NZ J Public Health 2003, 27: 210-6; Marie Stopes International. Real choices: Women, contraception and unplanned pregnancy. Melbourne: Marie Stopes International, 2008.

5.1.5 Socio-demographic characteristics of contraceptive users

Contraceptive choice in Australia has been shown in several surveys to correlate with socio-demographic factors such as age, household income, education, country of birth or language spoken at home (Table 5.4).

However, owing to the different sampling frames and definitions across these surveys, contradictions arise. For example, the ASHR reported that pill use was highest

in women with a regular but non-cohabiting partner, compared to single or cohabiting women.¹⁰ In contrast, the HILDA study did not differentiate single women from those with a regular but non-cohabiting partner, and reporting that cohabiting women were more likely to use the pill.^{2,21} Similarly, the ASHR included permanent contraception, whereas Parr and Siedlecky's analysis of the HILDA data² excluded this category. Hence broad statements on contraceptive patterns in relation to socio-demographic factors, such as those provided in Table 5.4, must be interpreted cautiously.

Table 5.4: Summary of contraceptive use by socio-demographic factors in Australian surveys

AGE
<ul style="list-style-type: none"> • Condom use declined with age^{*, †, §, ††} • Pill use increased with age up to 30 years then declined^{†, §, ††} • Contraceptive use increased with age but declined at age 30–35, followed by another increase with the use of permanent contraception in older women and men^{¶a, ††} • Use of withdrawal method declined with age[§] • Sterilisation is rare under age 30. After 35 sterilisation becomes more common^{†, §, ††}
MARITAL/PARTNER STATUS
<ul style="list-style-type: none"> • Condom use was more likely in women without a permanent partner and least likely in women with a live-in partner[†] • Condom use was more likely in people who report two or more sexual partners in the last year[*] • Condom and pill use were more common in the never married/single than in the ever married^{§, ¶, ††} • Women cohabiting were more likely to use oral contraception than married or single women^{††} • Sterilisation was very rare in the never married; married women were more likely to use a permanent method^{§, ††}
PARITY
<ul style="list-style-type: none"> • Use of any contraception increased with number of children born^{††} • Women with no or few children were more likely to use oral contraceptives; women with three or more children were more likely to use a permanent method^{††}
BIRTHPLACE/LANGUAGE AT HOME
<ul style="list-style-type: none"> • Australian born women were more likely to use the pill or be sterilised; overseas born women or non-English speaking men and women were more likely to report condom use and women who spoke a language other than English at home were less likely to use the pill^{*, †, §} • Asian born women were less likely to use the pill; and Australian and European born women were more likely to use the pill than condoms[†] • European born non-English speaking women reported equal condom and pill use[†] • Withdrawal or safe period methods were more likely used by women from non-English speaking backgrounds[†] • Women from Asia were least likely to use permanent methods of contraception^{††} • Women born outside of Australia and the UK were more likely to use an IUD or have a vasectomised partner^{**}
EDUCATION
<ul style="list-style-type: none"> • Use of the pill and condom increased with level of education^{*, †, §, ¶} • Tubal ligation decreased with level of education^{†, §} • Vasectomy increased with level of education^{**b}
REGION OF RESIDENCE: CITY, REGIONAL, REMOTE
<ul style="list-style-type: none"> • Use of the pill was not related to region of residence[†] • Condoms were less likely to be used in regional and remote settings[*] • Regional and remote women were slightly less likely to be using contraceptives[¶] • Tubal ligation was more common in women living in regional or remote areas^{†, ††} • Safe period methods were significantly less likely in women from rural and remote areas[†]

Notes: Surveys are not directly comparable. Refer to source publications for explanations of sampling and selection criteria.

a. cf. Yusuf and Siedlecky (2007) who reported an increase in vasectomy with level of education up to Year 11 followed a decrease reported by women with Year 12 or more schooling.

b. Lucke et al. reported all contraceptive use declined with age, as sterilisation was not treated as contraception.

Sources: *deVisser et al. *Aust NZ J Public Health* 2003; 27: 223; †Richters et al. *Aust NZ J Public Health* 2003; 27: 210; ‡Parr and Siedlecky *Aust NZ J Public Health* 2007; 31: 567; §Yusuf and Siedlecky *J Biosoc Sci* 2007; 39: 735; ¶Lucke et al. *Contraception* 2009; 80: 533; **Read et al. *Aust NZ J Obstet Gynaecol* 2009; 49: 429; ††Gray and McDonald *J Biosoc Sci* 2010; 42: 43.

Studies assessing contraceptive use across age ranges (generally 18 to 45 or 49) showed consistent patterns of contraceptive use in women.^{10,19,21} In general, the use of contraceptives was related to age, the relationship and the perception of risk and trust associated with the relationship. Condoms were more commonly used by younger people, or in situations of casual intercourse. In school students

condom use for the most recent sexual encounter was reported by 65% of respondents, the pill by 36.8% and withdrawal by 12%.²² In older people and people in live-in relationships the contraceptive pill was most commonly used.

The use of the pill declined in the 30 to 35 year age group, and this was also the age group that showed the highest

rates of childbirth. After age 35 or in married women, the use of sterilisation increased. These patterns probably reflect planned childbirth dominating other factors.

The 2001 NHS found that never-married women were more likely to use oral contraceptive pills (OCPs) than ever-married women (42.2 compared to 22.5%); Australian-born women reported higher use (32.3%) than those born in other countries (20%), and women from a non-English speaking background reported substantially lower levels of OCP use (20%) than women from English speaking backgrounds (31%).¹⁹

Oral contraceptive pill use has also been associated with higher education levels,¹⁹ and being single or in a regular non-cohabitating relationship.¹⁰ Tubal ligation (and hysterectomy) were associated with lower levels of education, living in remote/regional areas, blue collar occupations and living with a regular partner. The 2005 HILDA survey data suggest that single women were more likely to use the pill and long-acting reversible methods including implants and injection, and less likely to use condoms and safe period methods than were partnered women.

Gray and McDonald²¹ applied a multivariate approach to the HILDA data to assess changes in contraceptive behaviour over time, and showed that a combination of factors predict contraceptive choice and these vary across a woman's lifetime. Parity and fertility intentions as well as age independently affected contraceptive choices. Younger women or women of lower parity were more likely to use easily reversible methods including oral contraception or

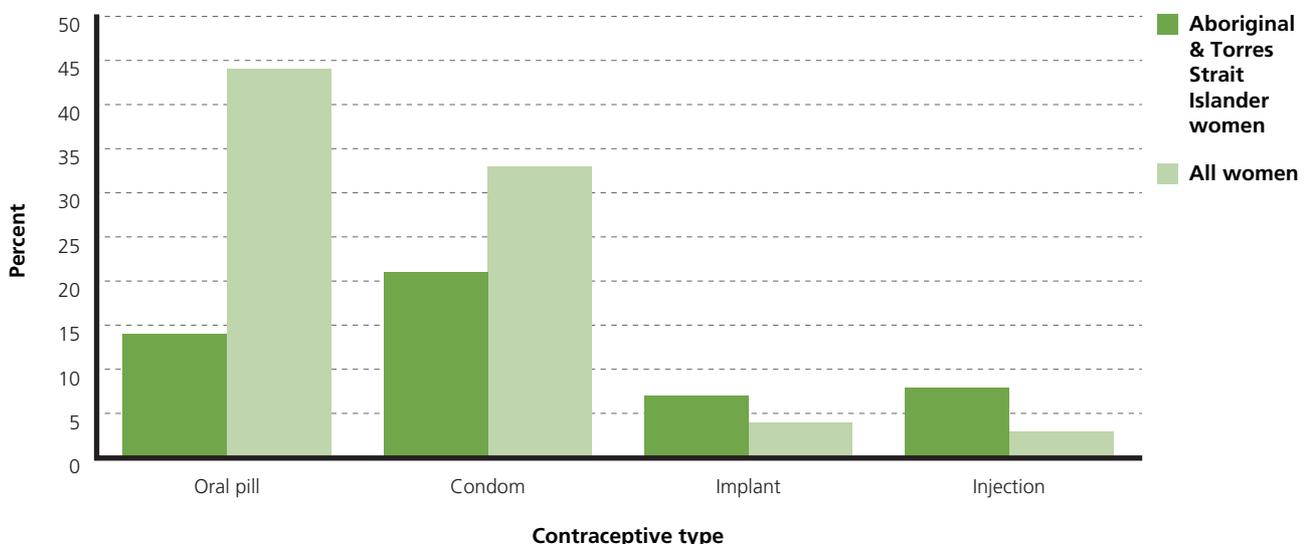
condoms, compared with older women, married women or those with two or more children who favoured longer acting or permanent methods. Permanent methods of sterilisation were strongly associated with the number of children ever had, as well as age, and were almost always used by women who were at the end of their reproductive years or had a completed family. IUDs were also preferred by women not intending to have children in the future.

5.1.6 Contraceptive use among population sub-groups

Aboriginal and Torres Strait Islander communities

Contraceptive use among Aboriginal and Torres Strait Islander women was included in the 2004–2005 National Aboriginal and Torres Strait Islander Health Survey.¹⁶ Current contraceptive use reported by Aboriginal and Torres Strait Islander women in 2005 had changed little compared to 2001, except for an increase in the use of implants that had not been available prior to 2001. Contraceptive use in Aboriginal and Torres Strait Islander women was generally lower and condoms were more commonly used than oral contraceptive pills (21 and 14% respectively) compared to Australian women overall (Figure 5.2). The use of non-daily methods such as implants and contraceptive injections were more commonly reported by Aboriginal and Torres Strait Islander women.

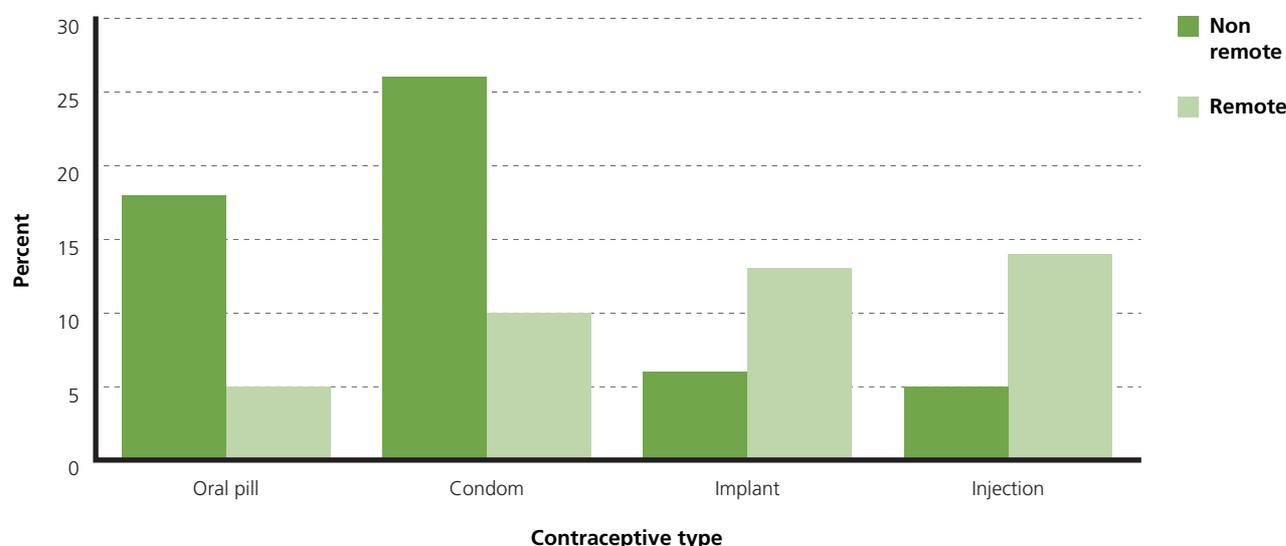
Figure 5.2: Current contraceptive use in Aboriginal and Torres Strait Islander and all Australian women



Note: Surveys are not directly comparable. Refer to source publications for explanations of sampling and selection criteria.

Sources: ABS National Aboriginal and Torres Strait Islander Health Survey Australia 2004–05. Commonwealth of Australia 2006 ABS Catalogue No. 4715.0; Gray E and McDonald P. Using a reproductive life course approach to understand contraceptive method use in Australia. *J Biosoc Sci* 2010; 42: 43–58.

Figure 5.3: Current contraceptive use in non-remote and remote Aboriginal and Torres Strait Islander women



Source: ABS National Aboriginal and Torres Strait Islander Health Survey Australia 2004–05. ABS Catalogue No. 4715. Commonwealth of Australia 2006.

Contraceptive preferences differed for Aboriginal and Torres Strait Islander women living in remote areas compared to those in non-remote settings (Figure 5.3). Condoms (26%) and the pill (18%) were the most commonly reported contraceptives used among Aboriginal and Torres Strait Islander women living in non-remote areas, followed by the contraceptive injection (5%) and implant (6%). In contrast, those living in remote regions were more likely to use the contraceptive injection (14%) or implant (13%) than condoms (10%) or the oral contraceptive pill (5%).

Several factors have been identified as important for accessing condoms for Aboriginal and Torres Strait Islander people, and in particular young Aboriginal and Torres Strait Islander people. Cultural and physical barriers have been identified which prevented Aboriginal and Torres Strait Islander women accessing condoms, including shame surrounding the discussion of contraception and condoms with a partner, limited access to services and outlets distributing contraceptives, and unplanned sexual encounters where condoms were not available.²⁷ These issues were not restricted to remote communities. Young urban Aboriginal and Torres Strait Islander people have similarly reported shame preventing them buying condoms, limited access to free condoms and the effects of alcohol on unplanned sexual encounters where condoms were either not available or not used.^{28,29}

Culturally and linguistically diverse communities

Information on contraceptive use in Australian Culturally and Linguistically Diverse (CALD) communities is comparatively sparse. However, survey data have shown trends indicating that contraceptive use and patterns are not consistent among CALD communities, or between CALD communities and the wider Australian population (Table 5.4).

For example, in the ASHR, whilst contraceptive use overall was approximately equally reported by women whose language at home was English and not English, condom use, withdrawal and safe period methods were significantly more common in women who did not speak English at home.¹⁰ The use of the contraceptive pill was less common in women who did not speak English at home, although this was not statistically significant (15.4% compared to 32.4% of women who spoke English at home).¹⁰

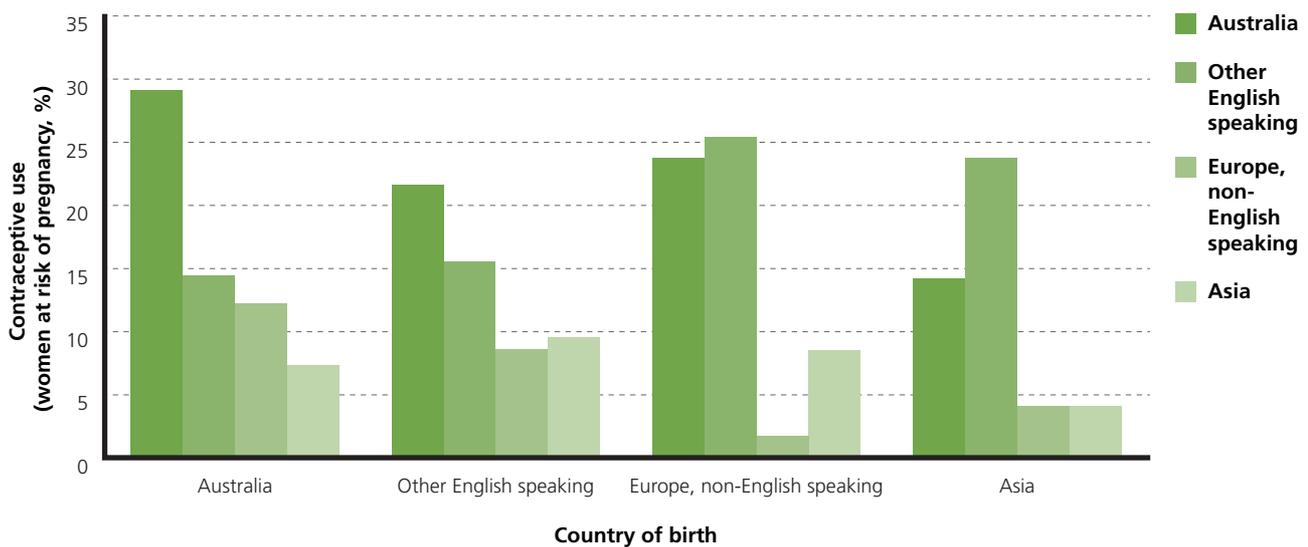
Condom use has similarly been shown in the HILDA survey to be more commonly reported as a sole method of contraception in women born in Asia or Europe (excluding the UK and Ireland) than in women born in English-speaking countries, with oral contraception alone the most widely used method in women born in English-speaking countries (Table 5.4).

The use of IUDs in general was not high, but was more common in women from English-speaking countries excluding Australia and Europe, and less common in women born in Asia or Australia. Methods that were new

at the time of the survey, such as implants and injections, were assessed and usage was generally low. However, injections were most commonly used by women born in Australia, and implants more commonly used by women born in English-speaking countries and Europe, and least commonly used by women born in Asia.

Australian women and those born in English-speaking countries were more likely to combine oral contraceptive pill and condom use (12% and 9% respectively), with women from Asia less likely to use this combined method and women from Europe least likely (4% and 2% respectively).²

Figure 5.4: Contraceptive use in women born in English and non-English speaking countries



Notes: 'Other English Speaking' = UK, Ireland, New Zealand, Canada, USA. 'Long-term method' = implant, injection or IUD.

Source: Household Income and Labour Dynamics in Australia (HILDA): Parr N, Siedlecky S. Use of 'dual protection' and other combinations of contraceptive methods in Australia. *Aust NZ J Public Health* 2007; 3:567-70.

Young people

Patterns of contraceptive use are not well described in young people in Australia. Condom use is generally greater in people younger than 20 years of age, the contraceptive pill used less than in older women and permanent sterilisation virtually nonexistent.^{10,21} In the ASHR, condom and oral contraceptive pill use were approximately equal in women aged 16 to 19 (53 and 51% respectively),¹⁰ and condom use was significantly higher in 16 to 19 year olds than any other age group at the most recent event of vaginal intercourse (80% of males and 54% of females).⁴

Condoms are a significant method of contraception for younger people. This relates to their availability (for example in supermarkets and without parental or medical intervention) and ease of use. However, for young people more than other age groups there are overlapping and

conflicting messages and motivations for condom use as (i) a method of contraception and (ii) for the prevention of STIs.^{4,23,30} Reported condom use could reflect both contraceptive and STI-preventive behaviour, or, if the woman is using another form of contraception, primarily STI prevention alone.

Some data that report condom use have primarily assessed this in terms of STI preventive behaviour (e.g. the National Survey of Australian Secondary Students and Sexual Health, NSASS) and must therefore be interpreted with care as a measure of contraceptive behaviour. Nevertheless, in the 2008 NSASS survey, 68% of Year 10 and 12 students reported using a condom and 50% the pill at last sexual encounter.¹² Similarly, in an analysis of contraception in the ALSWH,¹⁴ the contraceptive pill was used more commonly in women aged 22 to 27 than in younger women.

The survey of NSASS, most recently undertaken in 2002 and 2008,^{12,13} provides some evidence of trends in contraceptive behaviour in young people over time. There was a significant decline in the proportion of students reporting not using any method of contraception at their last sexual encounter (9% in 2002 compared to 0.2% in 2008), but the use of withdrawal as a method of contraception had only declined slightly from 2002 to 2008 (11.8% to 9.5% respectively).

Student condom use remained relatively stable between the 2002 and 2008 surveys, either as use reported over the past year or at the most recent sexual encounter. Approximately 51% of sexually active Year 10 and 12 students reported using a condom in the previous year and 65% at their most recent sexual encounter. However, there was an increase in the proportion of students reporting use of the oral

contraceptive pill (50% in 2008 compared to 37% in 2002). Reported use of the emergency contraceptive pill (ECP) at last sexual encounter increased from 4% in 2004 to 8% in 2008, largely driven by female students, where ECP use increased from 3% in 2002 to 9% in 2008.

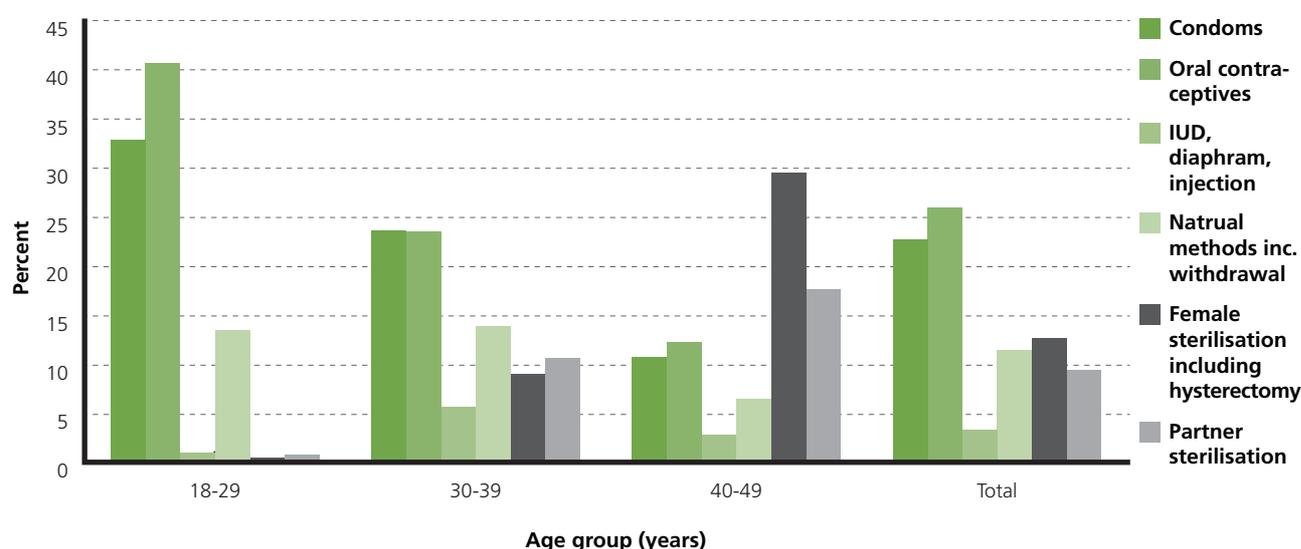
There are no data on the use of contraceptive injections, implants, rings or intrauterine devices in younger people. These methods could be of particular importance for young people, offering contraception that does not rely on daily pill use or the availability of condoms, with their concomitant potential for irregular use and unintended pregnancy. Further data on the uptake of these methods and the barriers to their use is needed to help ensure young people are provided with contraceptive choices appropriate to their needs and circumstances.

5.2 Contraceptive Use: New South Wales

Contraceptive use in NSW largely reflected national patterns. For example, the 2001 ABS National Health Survey⁹ reported 63.3% of NSW women using some form of contraception at the time of the survey. The oral contraceptive pill was the most common method reported in women aged 18 to 29 years (40.7%), followed by condoms (32.8%, Figure 5.5). Tubal ligation was the least

common method in this age group (0.5%). The most commonly used contraceptive methods used by women aged 30 to 39 years were condoms (23.6%) and oral contraceptives (23.5%), and in 40 to 49 year old women permanent sterilisation methods were most common (17.6% reported partner sterilisation and 29.5% tubal ligation and hysterectomy).

Figure 5.5: Contraceptive use in women aged 18 to 49, NSW, 2001



Note: Contraception at time of survey.

Source: ABS 2001 National Health Survey, Cat. No. 4364.0 National Health Survey 2001.

5.3 Oral Contraception – PBS Data

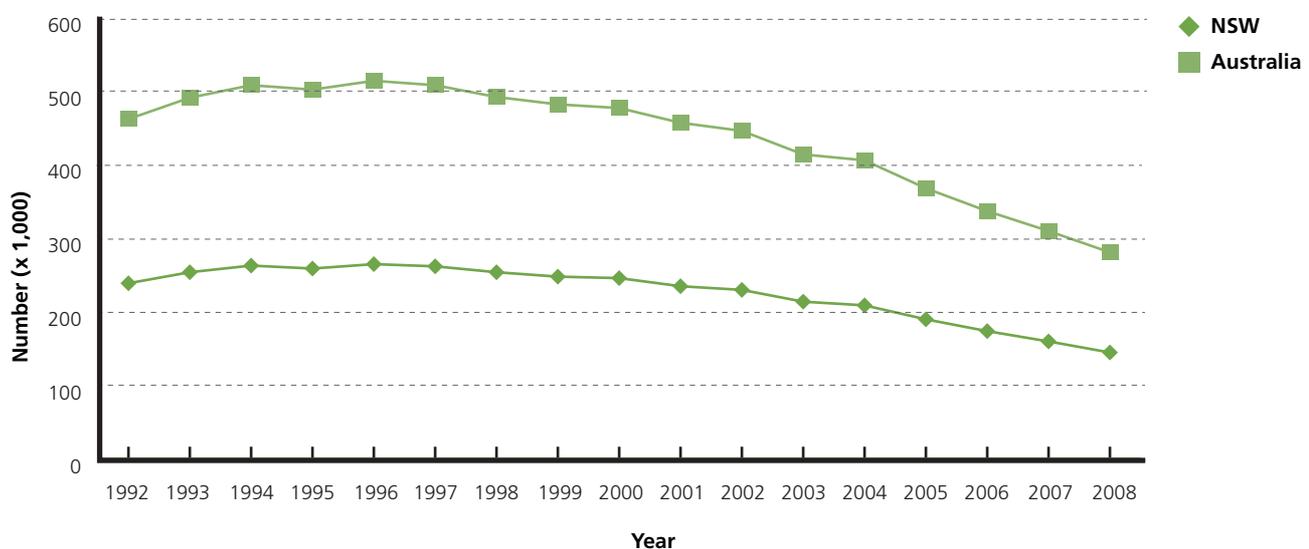
Since its introduction in 1961 the oral contraceptive pill (OCP) has significantly altered family planning practices among Australian women.^{20,31,32} The combined oral contraceptive pill (COCP), which contains both oestrogen and progestogen, is the most commonly used readily reversible contraceptive method used by Australian women. The progestogen only pill or mini-pill (POP) is used less frequently as a low dose alternative for women intolerant of oestrogen or for whom the COCP is contraindicated. However, available surveys do not distinguish between COCP or POP use, so usage data by OCP type are available only from Medicare prescription data.

Approximately two thirds of combined oral contraceptive products available in Australia are listed on the PBS with this subsidisation aimed at minimising the cost to consumers. This further means that the filling of prescriptions for many oral contraceptive products can be tracked, but oral contraceptive use estimates derived from Medicare PBS data are limited by both the failure to count products not listed for reimbursement and that the available counts represent claims made and not the number of women using the product.

The number of Medicare claims for the COCP containing ethinyloestradiol and levonorgestrel in Australia showed a marked decrease between 1992 to 2008 from 460,242 to 279,259 claims (Figure 5.6), and this trend was also seen in NSW where claims dropped from 237,132 in 1992 to 143,354 in 2008. This most likely reflects the increasing market share of new formulations that are not listed on the PBS such as those containing the progestogen drospirenone (e.g. Yasmin[®]).³³

PBS data for the POP in Australia also show a marked decrease in claims over the last decade from 71,291 in 1992 to 34,520 in 2008 (Figure 5.7) and this trend was also seen in NSW from 22,946 in 1992 to 10,054 in 2008. This may relate to the introduction of other longer-acting progestogen-only methods such as the contraceptive implant and hormonal IUS.³³

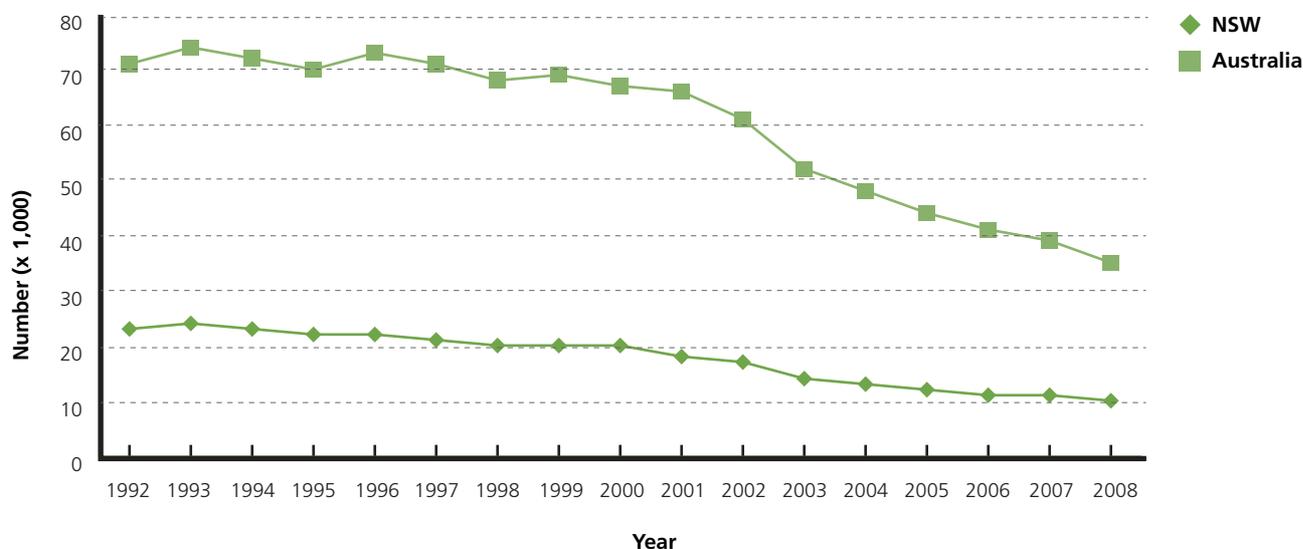
Figure 5.6: PBS claims for levonorgestrel plus ethinyloestradiol combined oral contraceptive pills, Australia and NSW, 1992 to 2008



Note: PBS items 1456P, 1394J, 1393H and 1392G. 1393H no longer in use.

Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/pbs_item.shtml, accessed Jul2010.

Figure 5.7: PBS claims for progestogen-only oral contraceptive pill, Australia and NSW, 1992 to 2008.



Note: PBS items 2913H and 1967M.

Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/pbs_item.shtml, accessed Jul2010.

5.4 Intrauterine Contraceptive Methods

Intrauterine contraceptive methods are highly effective, safe and long acting reversible forms of contraception. There are two types of intrauterine method available in Australia: the copper bearing Intrauterine Device (IUD), introduced in the 1970s but not available on the PBS, and the hormone-releasing Intrauterine System (IUS, Mirena®), available since 1999 and through the PBS since 2003 for contraceptive use. The IUS has the long-acting benefits of an IUD with the further beneficial effect of reducing blood loss and potentially pain at menstruation, and Mirena® is also registered in Australia for the treatment of menorrhagia and prevention of endometrial hyperplasia during oestrogen replacement therapy.

Worldwide IUDs are the most common method of contraception, whereas the oral contraceptive pill has consistently been the most commonly preferred contraceptive by Australian women (Table 5.2).³⁴ Intrauterine methods have been relatively unpopular among Australian women for a variety of reasons. The low uptake may reflect misperceptions about the risk of infection and associated infertility³⁵ as well as limitations in service provision. Concern about the risk of IUDs dates back to issues with early IUDs (the widely publicised medical and legal experiences with the Dalkon Shield in the 1970s), which have now been overcome by improved products, methods of insertion and selection of women safely eligible for IUD contraception.^{36,37} Nevertheless, uptake of

intrauterine contraception in Australia remains low (Table 5.2).

Limitations in qualified staff to insert IUDs may, however, remain an issue in Australia. Intrauterine methods require insertion by a trained gynaecologist, General Practitioner (GP) or family planning practitioner, such that limited service and limited demand may be correlated. As awareness of the advantages and safety of IUD technology grows through evidence-based information made available to both practitioners and consumers, requests for intrauterine contraception may drive wider clinician training in insertion and management of the methods.

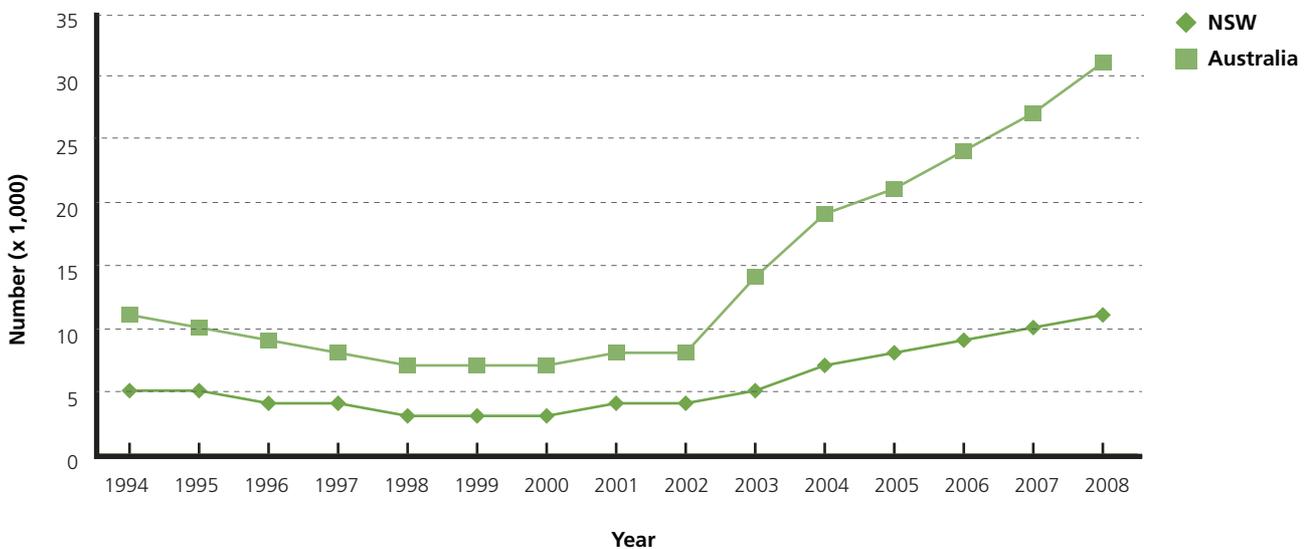
The trend for decreasing intrauterine contraception has reversed since the introduction of the hormonal IUS on the PBS in 2003, and was observed in Medicare claims for an intrauterine contraceptive insertion procedure (item number 35503, including both IUD and IUS insertion). The fall in MBS claims between 1994 and 1999, which had levelled out by 2000 to 2002, reversed sharply when the IUS was listed on the PBS in 2003. Correspondingly, Medicare procedure claims increased from approximately 6,500 in 2002 to approximately 31,000 in 2008 for Australia and from approximately 4,000 to 11,000 for NSW (Figure 5.8).

This has been reflected in a marked increase in PBS claims for the IUS, from approximately 20,000 in 2003 to approximately 62,000 in 2008 for Australia, and from

approximately 6,000 to approximately 18,000 for NSW over the same period (Figure 5.9). The number of PBS claims for reimbursement of the cost of the device is substantially higher than the number of claims for insertions (e.g. in 2008 claims for reimbursement of devices exceeded 60,000, whilst claims for insertions was closer to 30,000

including insertion of IUDs that were not reimbursable on the PBS). This is probably attributable to insertions by services which do not claim rebates on the procedure, such as Family Planning clinics, and reflects the comparatively limited use of intrauterine contraception in general practice billing environments.

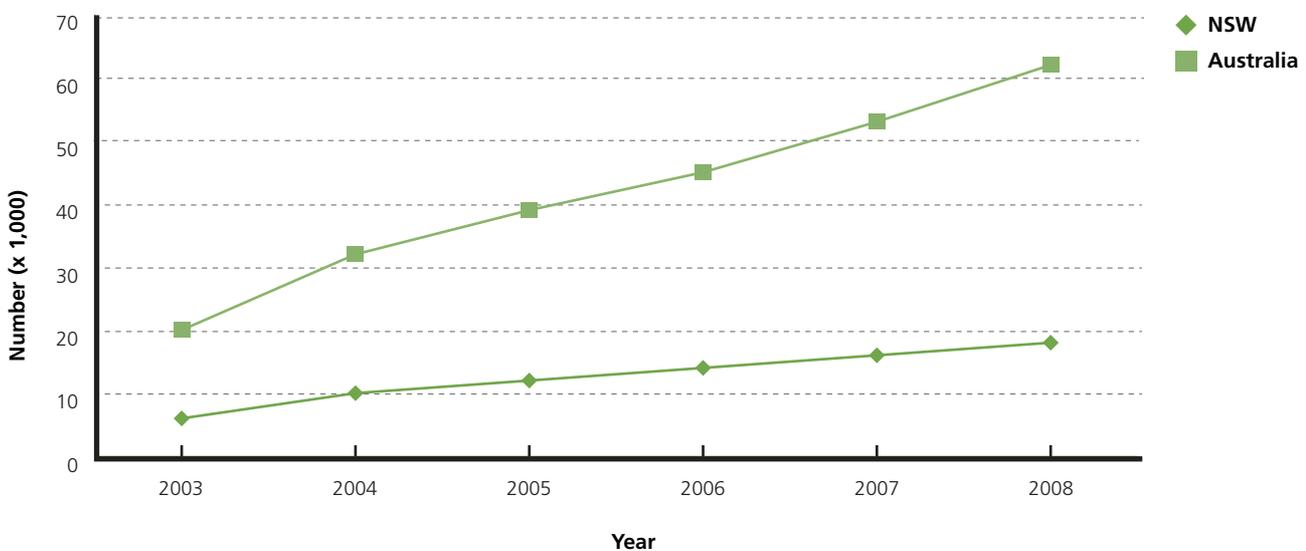
Figure 5.8: Claims for introduction of intrauterine contraceptive device, Australia and NSW, 1994 to 2008



Note: MBS item 35503.

Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/mbs_item.shtml, accessed Jul2010.

Figure 5.9: Claims for intrauterine drug delivery systems, Australia and NSW, 2003 to 2008

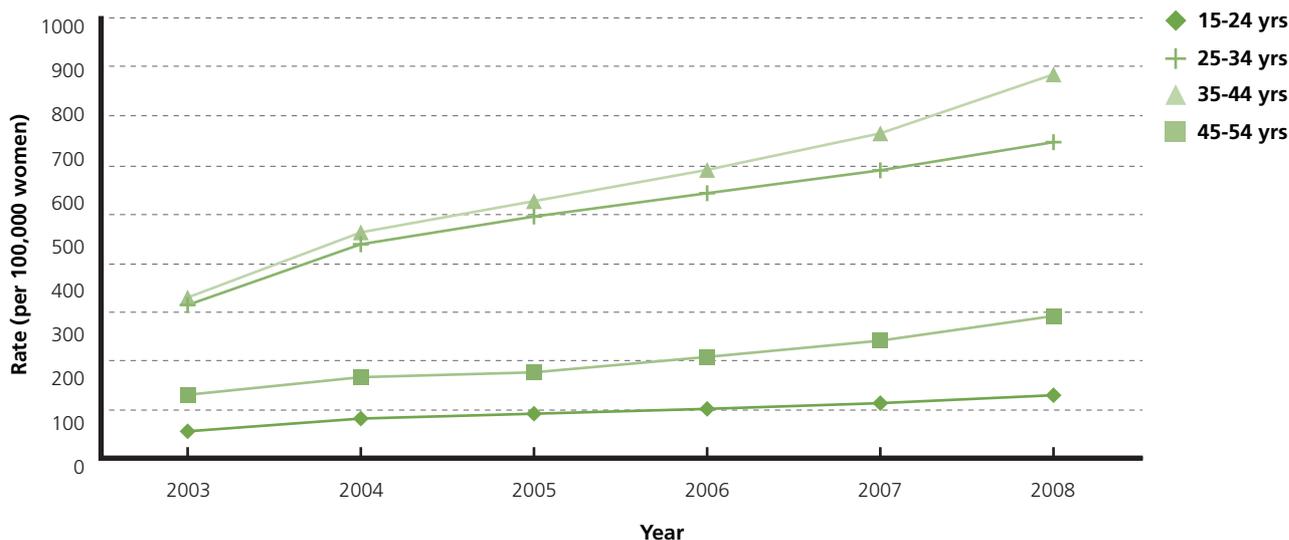


Note: PBS item 8633J.

Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/pbs_item.shtml, accessed Jul2010.

IUD insertion claims in Australia (Figure 5.10) and NSW generally increased across all age groups between 2003 and 2008, with the highest claim rates and greatest increase for Medicare-rebated IUD/IUS insertion in women aged 25 to 44 years.

Figure 5.10: Claims for introduction of intrauterine contraceptive device by age group, Australia, 2003 to 2008



Note: Age standardised claims for MBS item 35503.
 Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/mbs_item.shtml, accessed Jul2010.

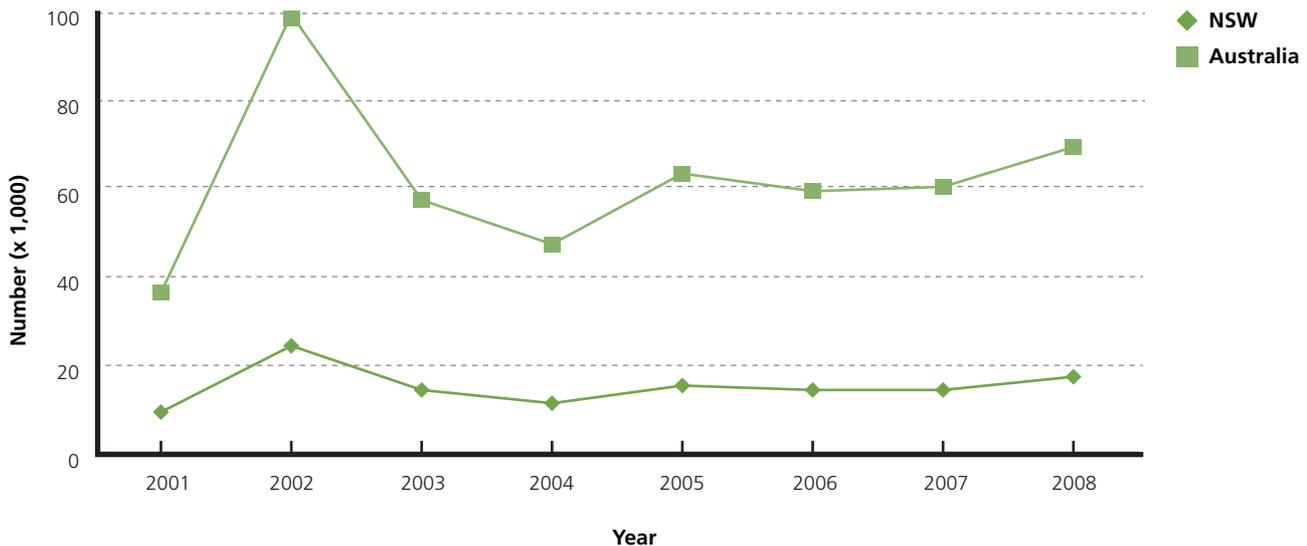
5.5 The Contraceptive Implant

The contraceptive implant is a silicon rubber rod placed under the skin of the inner upper arm that releases a steady level of progestogen to prevent ovulation. The implant is effective for three years and is readily reversible. Implants, marketed in Australia as Implanon®, were introduced in 2001 with a PBS listing and initially were taken up by a reasonably high number of women.³⁸ However, uptake declined in 2003, partly owing to early controversy associated with the insertion technique (Figure 5.11).³⁹

This was rectified with the introduction in 2003 of mandatory training and accreditation requirements for inserting doctors,³⁹ and improved insertion methods continue to be developed.⁴⁰ Nationally, claims for Implanon (PBS item 8487Q) increased from 35,994 in 2001 to 69,144 in 2008 and claims in NSW totalled 16,604 in 2008.

However, insertions have not returned to the original peak of 98,500 claims nationally for 2002 and use remains considerably lower than the OCP and condoms. Persistent issues with side effects, such as prolonged irregular bleeding, continue to affect uptake and result in early removal of implants.^{39,41}

Figure 5.11: Claims for Implanon®, Australia and NSW, 2001 to 2008



Note: PBS item 8487Q.

Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/pbs_item.shtml, accessed Jul2010.

5.6 Injectable Contraceptives

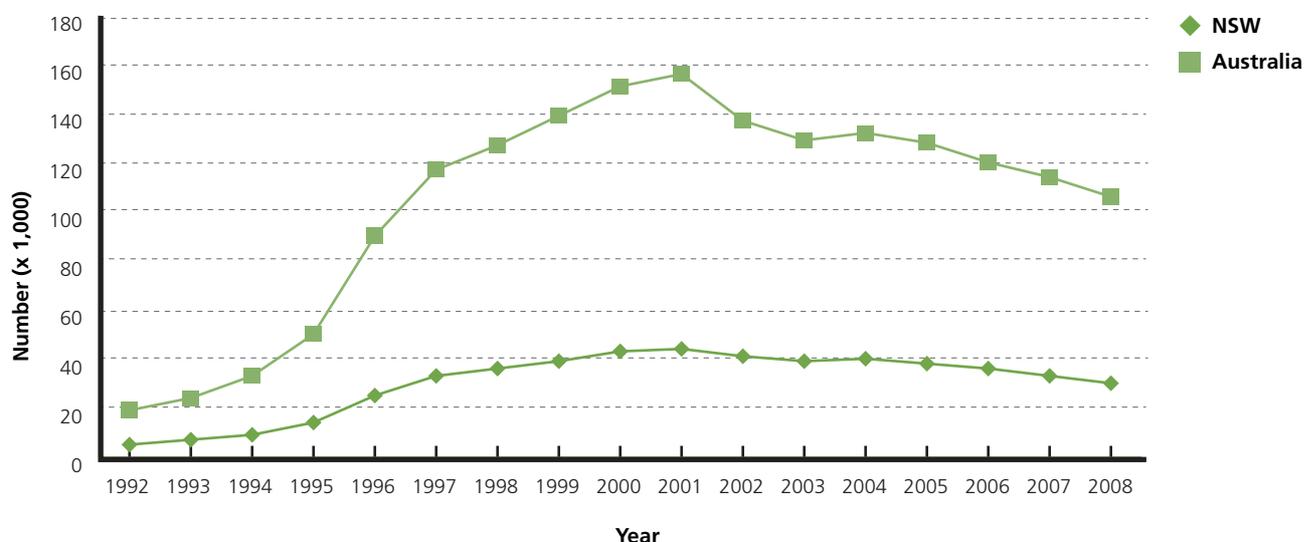
Injectable depot medroxyprogesterone acetate (DMPA, marketed in Australia as DepoProvera®) is an effective contraceptive, with each injection providing protection from pregnancy for 12 weeks. However, DMPA is not immediately reversible and women may take up to 18 months to re-establish fertility. Health Surveys in Australia show a relatively low proportion of women use the injectable contraceptive (approximately 2%). The contraceptive injection was more commonly used among older women. For example, in the 2001 National Health Survey 2.6% of women aged 30 to 34 reported the use of injectable contraceptives, and in the later HILDA survey (2005) the highest proportion of injection use as a lone contraceptive (2.5%) was in the 35 to 39 year age group.^{2,9}

PBS claims for DMPA decreased from a peak of 156,408 in 2001 to 105,710 in 2008 (Figure 5.12). Despite these numbers being higher than in the 1990s, the fall since 2001 may reflect the introduction of newer, immediately reversible long-acting methods such as the contraceptive implant. The move away from injectable contraception may have further been affected by a 2004 safety warning indicating a higher risk of significant bone mineral density loss associated with DMPA use.⁴² Although it is now known that bone mass loss from the use of DMPA contraceptives is largely reversible and not clinically significant for women aged 18 to 45,⁴³ the decline in DMPA use in Australia has continued.

5.6.1 Injectable contraceptive use: New South Wales

Injectable contraceptive use is similarly low in NSW, with the ABS 2001 National Health Survey reporting a prevalence of 1.1% in women aged 18 to 49 years. PBS claims for DMPA increased from 5,029 in 1992 to the 2001 peak of 44,475 claims, but the uptake was not as rapid as nationally. However, there was a corresponding decrease in claims from 2001 to 30,365 by 2008.

Figure 5.12: Claims for DepoProvera®, Australia and NSW, 1992 to 2008



Note: PBS item 3118D.

Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/pbs_item.shtml, accessed Jul2010.

5.7 The Diaphragm

Diaphragms have historically played an important contraceptive role in developed countries, however this waned with the introduction of the contraceptive pill.⁴⁴ In Australia the diaphragm is currently little used, (Table 5.2)⁴⁵ but this may change with renewed interest and new products. Diaphragms and cervical caps have the advantage of being effective and comparatively easily used contraceptives for women who cannot or choose not to use hormonal methods.⁴⁶ The diaphragm may also have

advantages in settings where cost is a factor, as there is no regular ongoing cost, and in situations where intercourse is unexpected or irregular.

Effective use of the diaphragm requires a proper fitting in a clinical setting as well as correct use. The fitting is comparatively time consuming, and this may in part explain why the uptake of diaphragms is not more substantial in general practice.⁴⁵

5.8 Sterilisation

Sterilisation methods are highly effective and mostly viewed as appropriate for older people, or those who have completed their families.³ Male sterilisation can be carried out in a clinic or outpatient setting and involves cutting the vas deferens tubes, usually under local anaesthetic. Female sterilisation involves the occlusion of the fallopian tubes by means including clips and ligation, and as an invasive laparoscopic technique is almost always carried out under general anaesthetic in a hospital setting.^{47,48} Newer transcervical systems (Essure® and Adiana®) can be performed by a hysteroscopic procedure under local anaesthetic as an outpatient. These methods cause occlusions by stimulating benign fibrotic growth into an artificial insert in the fallopian tubes.

The Essure® product is a pair of soft coils placed directly into the fallopian tubes, with occlusion of the tubes completed by in-growths of the tube wall stimulated by polyethylene terephthalate fibres. Adiana® combines controlled heat damage to the tube lining with insertion of a silicone matrix. In response to the thermal damage, fibroblastic in-growth through the matrix occludes the fallopian tube.⁴⁸

Sterilisation attracts a Medicare rebate (Table 5.5) in both women and men. However, the reimbursement is for the sterilisation procedure and the item numbers do not provide accurate data for the use of Essure® or Adiana® products.

In more developed countries rates of sterilisation have decreased since the 1990s,⁴⁷ possibly in part owing to the availability of safe, long-acting but reversible methods of

contraception. The extent to which hysteroscopic outpatient female sterilisation will affect this trend remains to be seen. In Australia the decline in female sterilisation temporarily reversed consistent with the introduction of Essure® in 2001 (Figure 5.14). However, since 2001 the rate has continued to decline and this has only begun to slow since 2006.

5.8.1 Sterilisation: Australia and New South Wales

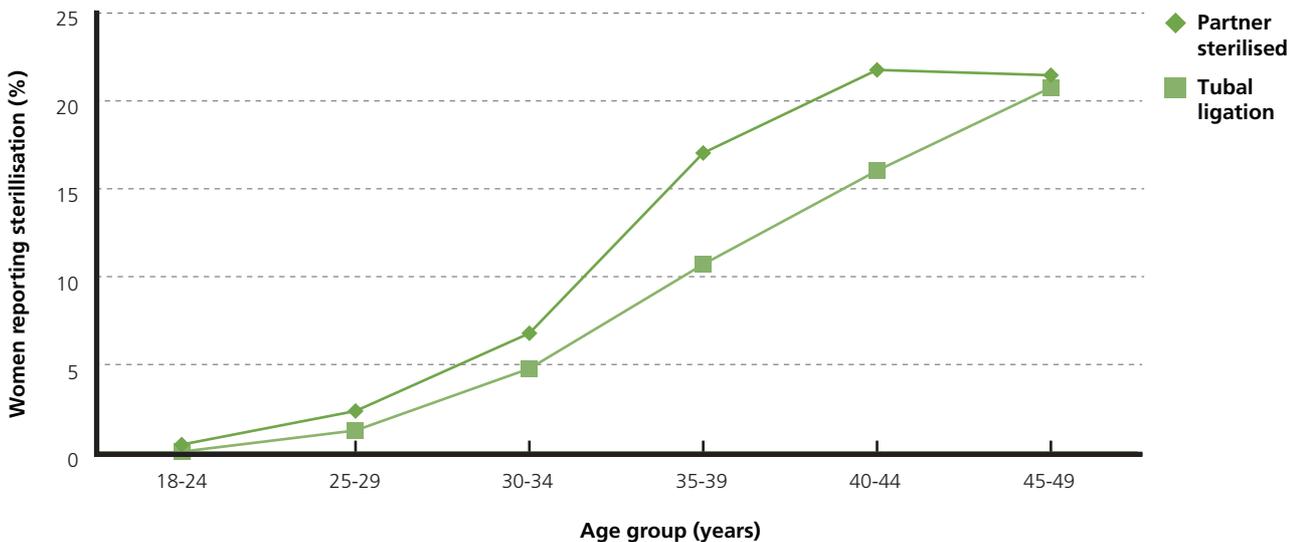
Tubal ligation was reported by 8.6% and partner sterilisation by 11.2% of women aged 18 to 49 in the 2001 National Health Survey,⁹ and rate of sterilisation increased with age (Figure 5.13). The HILDA survey estimates²¹ were consistent with the NHS but slightly lower (6.6 and 9.3% respectively).

Table 5.5: Medicare items for sterilisation

PROCEDURE	ITEM	PROVIDER
Female sterilisation		
Sterilisation by transection or resection of fallopian tubes, via abdominal or vaginal routes or via laparoscopy using diathermy or any other method	35687	General practitioner Specialist
	35688	
Sterilisation by interruption of fallopian tubes, when performed in conjunction with caesarean section	35691	Not specified
Male sterilisation		
Vasotomy or vasectomy, unilateral or bilateral	37622	General practitioner Specialist
	37623	

Source: MBS-Medicare Benefits Schedule Book Commonwealth of Australia 2009.

Figure 5.13: Contraception through sterilisation by age group

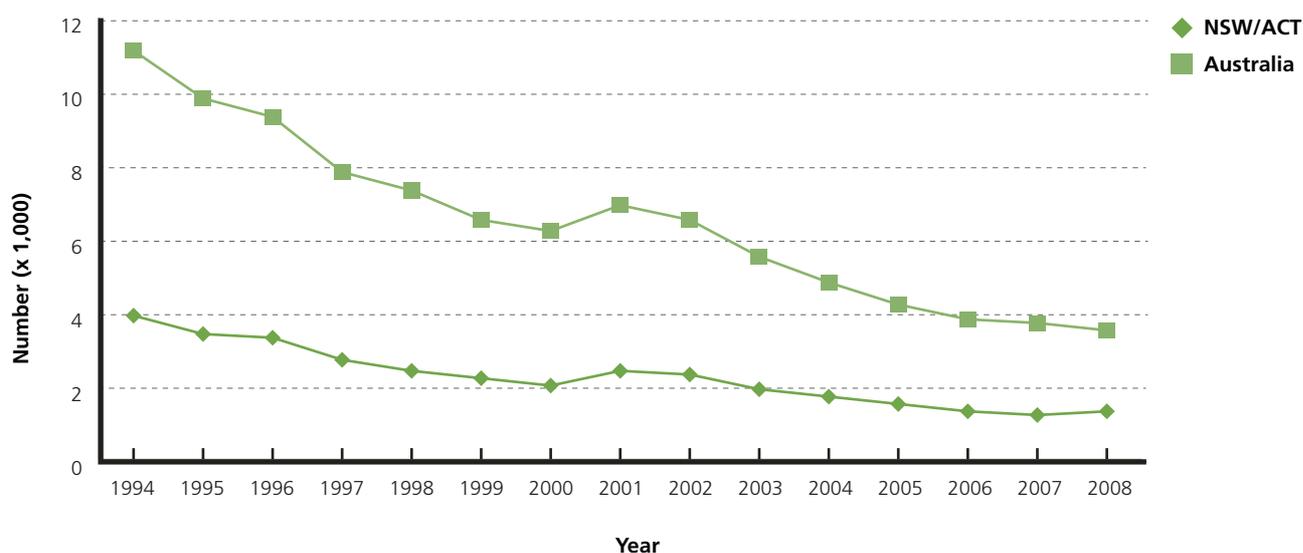


Source: ABS 2001 National Health Survey, Cat. No. 4364.0 National Health Survey 2001.

A detailed analysis of the 2001 National Health Survey data⁴ showed that older women and women who had ever been married were more likely to use permanent contraception. Similarly, multivariate analysis of the HILDA survey data showed that age and marital status predicted the use of permanent contraception. However, age and parity were both highly significant and independent predictors for permanent contraception,²¹ and parity or fertility intention may be more relevant than marital status as factors in contraceptive choice.

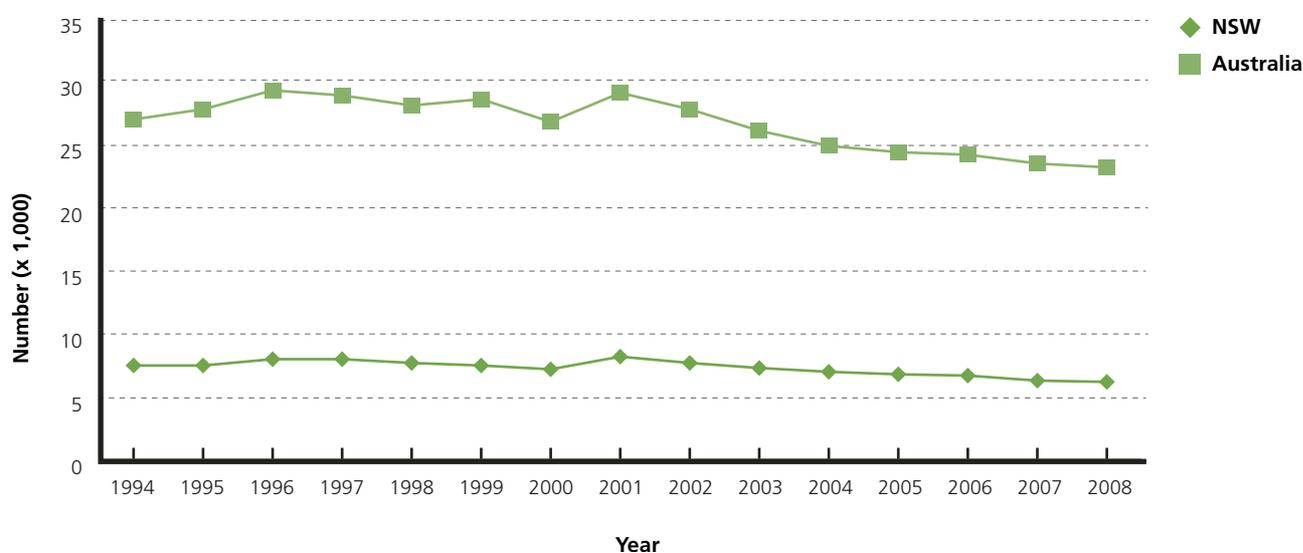
Sterilisation rates in Australia can also be estimated using Medicare claims for the relevant items. Claims for tubal ligation decreased from over 11,000 in 1994 to 3,547 in 2008 (Figure 5.14). Although not as marked, vasectomy claims similarly declined from approximately 27,000 in 1994 to 23,000 in 2008 (Figure 5.15). A similar pattern was observed for claims for tubal ligation and vasectomy in New South Wales/Australian Capital Territory.

Figure 5.14: Female sterilisation, NSW/ACT and Australia, 1994 to 2008



Note: MBS items 35688, 35687 and 35691 for tubal ligation.
 Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/mbs_item.shtml, accessed Jul2010.

Figure 5.15: Male sterilisation, NSW* and Australia, 1994 to 2008



Note: MBS items 37622 and 37623 for vasectomy; *State data available for NSW (excluding ACT).
 Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/mbs_item.shtml, accessed Jul2010.

5.9 Emergency Contraception

Emergency contraception is used post-coitally to reduce the chance of an unplanned pregnancy following unprotected intercourse. Emergency contraception is commonly sought as a result of condom breakage, missed contraceptive pills or failure to use contraception. The primary method is the emergency contraceptive pill (ECP), previously known as the 'morning after pill'.

Early ECPs used combined oestrogen and progestogen (the Yuzpe regimen) as an escalated dose of conventional contraceptive pills. Current ECPs use a progestogen-only (levonorgestrel) regimen, and a dedicated ECP became available in Australia in 2002 in pre-packaged form. The mechanism of action of progestogen-only emergency contraception remains unclear, but appears to be primarily by delaying or preventing ovulation rather than as an abortifacient.⁴⁹⁻⁵²

Emergency contraception with levonorgestrel can be effective up to 120 hours after intercourse, but is most effective up to 72 hours.⁵¹ Ease and timeliness of access are therefore significant factors in the effective use of ECP to prevent unplanned pregnancy, and in Australia ECP became available in 2004 as an over-the-counter (OTC) product, i.e. from pharmacies without prescription.⁵³ Contrary to expectations, pharmacy access to emergency contraception has not demonstrably reduced the rate of unplanned pregnancy or abortion in Australia or other countries with similar availability.^{51,54}

This failure of emergency contraception to affect abortion rates in particular is in part attributed to issues of knowledge. Whilst most women are aware of emergency contraception, in Australia many are not aware that it is available without requiring a visit to the doctor, nor that the efficacy of treatment may extend beyond 24 hours after unprotected intercourse.^{55,56} Moreover, many women continue to harbour misinformation about the safety and potential effects of emergency contraception, and underestimate their ability to become pregnant.⁵⁵

Copper bearing IUDs can also be used for emergency contraception up to five days post-coitally but this method is rarely used in Australia owing to cost, access and acceptability issues. Similarly, mifepristone is effective as an emergency contraceptive but is not readily available in Australia.^{51,57} A new selective progesterone receptor modulator, ulipristal acetate, has been shown to be as effective and safe for emergency contraception as levonorgestrel with potential efficacy for up to five days after unprotected intercourse.⁵⁸

There is little information on ECP use in Australia, and as the ECP is available over-the-counter there are no prescription tracking data. Estimates of the proportion of women who have ever used the ECP range from 19.2% in 2002,¹¹ to 26.8% in 2010 (Table 5.6).⁵⁵ These studies were limited and are not directly comparable, nevertheless do provide some evidence that the use of emergency contraception is increasing.

Table 5.6: Survey estimates of emergency contraceptive use in Australian women

	EMERGENCY CONTRACEPTIVE USE (%)	SAMPLE SIZE	AGE RANGE (YEARS)	SAMPLING FRAME
ASHR; 2002*	19	8,988	16–59	Australian women; random sample telephone interview
Marie Stopes; 2008	20	1,033	18–50	Self-selected marketing survey pool of women who had had an unplanned pregnancy
Mohoric-Stare et al.; 2009	29	460	Not specified	University students; self-complete questionnaire
Hobbs et al.; 2008¹	27	600	16–35	Australian women; random sample telephone interview

* Survey date.

Sources: Australian Study of Health and Relationships (ASHR): Smith AMA *et al.* *Aust NZ J Public Health* 2003; 27: 204–9; Women, contraception and unplanned pregnancy. Marie-Stopes International 2008; Mohoric-Stare D and De Costa C. *Aust NZ J Obstet Gynaecol* 2009; 49: 307–11; Hobbs *et al.* Pharmacy access to the emergency contraceptive pill: a national survey of a random sample of Australian women. *Contraception* 2011; 83: 151–8.

Use of the ECP is lower in school students although there is some evidence that the rate of emergency contraception in this group may be rising. The Secondary Students and Sexual Health survey reported an increase in the use of the ECP as a method of contraception for sexually active students at last sexual encounter. In 2002, 3.9% of sexually active Year 10 and 12 students reported using the ECP, and in 2008 this had risen to 7.6%. Similarly in 2008, 11.9% of sexually active Year 12 female students reported using the ECP, compared with 4.5% in 2002, and use had increased for Year 10 female students from 1.8% in 2002 to 4.0% in 2008.

5.10 Summary

Effective, safe and affordable contraception, as the means to control fertility through methods other than abstinence or the termination of pregnancies, has provided unprecedented choices and control of fertility for women in particular. Natural contraceptive methods such as withdrawal and barrier methods such as condoms have an ancient history in human society, whereas medical methods such as hormonal pills and intrauterine devices are comparatively recent.

Contraception can have multiple social and medical benefits through providing control of fertility primarily to women. The choice of the number and spacing of children through contraception can have health benefits for the mother and social benefits for the family. Similarly, the choice not to have or to delay children through contraception allows couples to both have a sexual life and undertake other societal roles such as career development whilst managing when they have children.

However, despite the current widespread availability of contraception in Australia, issues such as unplanned and unwanted pregnancies persist for women of all reproductive ages, and contraceptive usage focuses on a few well known methods. Each method and type of contraception has strengths and weaknesses. Whilst most modern contraceptives, if used properly, are generally equally highly effective, side effect profiles, type and usage of method, availability and cost differ. To ensure the most effective use of contraception at an individual and population level, a thorough understanding of the available products, patterns of use and the reasons for the choices made by women is required.

Contraception is widely used and accepted in Australia, with the oral contraceptive pill and the condom the two most widely applied methods. The range of available contraception in Australia includes the hormonal contraceptive pill and newer forms of the pill offering different hormonal regimens and side-effect profiles.

ECP use has been shown to be associated with age (higher use among women aged 20 to 29 years),^{11,19,55} higher levels of education, living in major cities and bisexuality.¹¹ ECP use has also been associated with being a student and having a regular sex partner.⁵⁹ Women from non-English speaking backgrounds were significantly less likely to have ever used ECP.¹¹ However, in a more recent survey⁵⁵ only the association between age and marital status was observed: married women were significantly less likely to have ever used ECP than women who were single, partnered or in a *de facto* relationship.

These have been augmented by a suite of long-acting reversible methods (that do not require daily maintenance) and contraceptive periods ranging from months to years. The range of products and methods available now provides Australian men and women with wide choices to suit contraceptive need, stage of life, child planning and lifestyle.

Unfortunately, there are little data in Australia to support the required level of analysis and to provide a broad understanding of contraceptive use. Knowledge about the use of contraception in Australia must be inferred from several incomplete sources and differences in usage and trends over time are thus difficult to ascertain. Consistent and reliable data are not routinely available to assist in the provision of contraception services, the identification of needs for Australian women and men, or to ensure that contraceptive choice is offered across the wide range of methods and products available.

Contraceptive products or procedures that are reimbursed through Medicare (for example some contraceptive pills and some devices) can be tracked. However, these report the number of claims and, with the exception of long-acting devices such as intrauterine systems (IUSs), do not accurately estimate the number of users. For example, it is difficult to determine from the number of claims for contraceptive pills how many women are indeed using these products, and any estimate excludes users of products not reimbursed through Medicare or for which claims were not made.

Key new products such as the vaginal ring and newer contraceptive pill formulations are not listed for reimbursement, hence it is not possible to effectively gauge the uptake of these products or methods. In particular, there are questions around whether newer long-acting reversible methods are being effectively integrated into contraceptive choices.

Several population-based health and other surveys have included items collecting data on contraception. However, in nearly all of these surveys contraception or reproductive and sexual health were not the primary focus of the research, and differences in definitions used and questions asked render the studies difficult to compare. Moreover, the studies are now several years old and do not report on the uptake of newer products or methods. There are no reliable estimates of the uptake of newer contraceptive methods or the knowledge of clinicians and consumers about the range of contraceptive methods and choices currently available.

The lack of data is surprising given that surveys suggest that approximately 65 to 70% of women will be using some form of contraception, and as high as 90% may ever use some form of contraception. Oral contraception using the contraceptive pill has consistently been the most common form of contraception used by women in Australia, with over 75% of women using the pill at some time in their lives. The data currently available suggest that only small proportions of women use methods such as hormonal implants, intrauterine devices (IUDs) or intrauterine systems (combined IUD with hormonal drug delivery), but these proportions of less than 5% each may not reflect current trends and there are no data on methods such as vaginal rings.

The choice of contraception in Australia has been shown to be related to several socio-demographic factors, with age, household income, education and country of birth indicated as predictors for contraceptive usage and choices. However, as noted, these survey-based data are not recent and both consistent and inconsistent patterns have been observed. For example, choices over the age range have consistently shown a transition from 'point of intercourse' methods such as condoms in younger people, through to the pill prior to having children and followed by the use of longer-acting reversible products or sterilisation in older women. The role of education, income, place of residence (especially rural and remote compared to regional and metropolitan settings), cultural background and birthplace and relationship type remain less clearly understood.

The effective and appropriate use of contraception in Aboriginal and Torres Strait Islanders similarly requires further study. Uptake of long-acting reversible methods such as the hormonal implant and contraceptive injection may be greater in Aboriginal and Torres Strait Islander women, in particular in young women as a means to prevent teenage pregnancy in settings where access to the pill or consistent use may be compromised. These differences are accentuated in rural and remote areas, where the ability to easily access continuing supply of contraceptive pills or condoms may be limited.

Equally important is an understanding of why women who are at risk of pregnancy are not using contraception. In surveys that addressed this question, common reasons provided were concerns about side-effects, subsequent

fertility and other health effects, taking the risk (an attitude of 'leaving it to chance') and forgetfulness. In young people, issues around the role of drugs and alcohol and unexpected sexual intercourse have also been identified and have direct implications for unplanned pregnancies.

There is currently little data on the use of contraceptive injections, implants, rings or intrauterine devices in younger people. These long-acting reversible methods could be of particular importance for young people, offering contraception that does not rely on daily pill use or the availability of condoms, with their concomitant potential for irregular use and unintended pregnancy. Further data on the uptake of these methods and the barriers to their use is needed to help ensure young people are provided with contraceptive choices to suit their needs and circumstances.

Data gaps

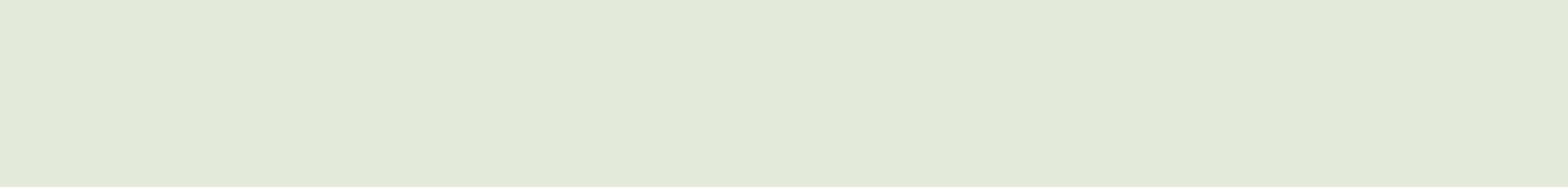
There are significant gaps in our knowledge of the prevalence of contraceptive use by Australian women, the methods and products used, how contraceptive choices are made and how they vary by geographic, social and other factors. Contraception represents a foundation of population reproductive and sexual health, and individual choice with regard to fertility. A consistent, national approach to the collection of data around contraception, either through routine data capture and reporting through Medicare or regular, population-based survey research is required to provide the level of information needed to ensure effective health service provision and cost-effective policy:

- renewed surveys to assess the accessibility, acceptability and uptake of newer contraceptive methods. Both cross-sectional and longitudinal surveys are required, and that sample effectively and widely to capture the social and geographical diversity within Australia
- rigorous qualitative studies to assess awareness of contraceptives available both by health care practitioners and contraceptive users, knowledge about contraception, risks and benefits and factors that affect contraceptive choice
- studies to identify the degree to which general practitioners and other providers of contraception offer contraceptive advice that assesses lifestyle factors and the concerns of the woman and providers access to the appropriate contraceptive choices from the range of products and methods available
- addition of agreed contraception items in health and other national surveys with consistent definitions
- linking of Medicare data to allow demographic and other assessments of patterns of contraception choices and use

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Chapter 6 : Induced Abortion

Chapter Outline

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Key Indicators

- Incidence of induced abortion: Australian Institute of Health and Welfare estimation using corrected National Hospital Morbidity and Medicare data
- Medicare claims for events with an abortive outcome
- Age-standardised and age-specific trends in induced abortion rates
- Induced abortion rates by state, territory and remoteness of residence
- Estimates of incidence of induced abortions based on population health surveys (e.g. abortion rates and proportion of women who have ever had an abortion)
- International comparisons

Primary Data Sources

Medicare Australia

National Hospital Morbidity Database

National Perinatal Statistics Unit, Australian Institute of Health and Welfare Reports 2003, 2004

Survey data

Notes

1. Spelling convention: fetus vs foetus. British English common usage is foetus, however, the preferred technical usage is fetus. This document will follow the technical usage.
2. Rates are per 1,000 women aged 15 to 44 years unless otherwise stated.

Introduction

Abortion in the medical setting refers to both spontaneous abortion, often called a 'miscarriage,' and to induced abortion, where a pregnancy is actively terminated. The number of unwanted pregnancies in a community, i.e. those that might result in induced abortion, is an important indicator in the context of unmet needs for reproductive and sexual health services. It has become common practice to estimate the number of unwanted pregnancies using the number of induced abortions.

However, it is important to differentiate between an unplanned and an unwanted pregnancy. An unplanned pregnancy is not necessarily unwanted nor results in an abortion outcome. In an Australian survey of two thousand women addressing contraception and unplanned pregnancy, more than half (51%) reported having experienced an unplanned pregnancy. Of those, 49% continued the pregnancy, 31% had an abortion, 18% miscarried and 2% adopted out.¹ It is also important to recognize that not all pregnancies that are terminated are unwanted; this is particularly true of the pregnancy in which a fetal abnormality is diagnosed.²

In Australia, there is no national data collection reporting the incidence of induced abortion, or the reasons for these procedures, and so there is no data to reliably ascertain the numbers of unplanned and unwanted pregnancies. There are also considerable limitations to the data that are available to report the number of induced abortions and the reasons for those abortions. Moreover, there are little data collected for important associated variables describing the geographic, social and economic situation of the women who present for abortion. These limitations impact on the capacity of reproductive and sexual health services to adequately target reductions of unwanted pregnancies and to provide services for the management of these pregnancies.

Reasons for induced abortion

- Older women and women with a family history of genetic abnormality are usually offered testing for fetal chromosomal abnormalities and abortion if the fetus is abnormal
- Fetal death in utero does not always spontaneously terminate, requiring abortion to be induced
- Other medical indications may result in the decision to induce abortion if, after appropriate assessment, termination of the pregnancy is deemed to be the best outcome
- An abortion may be induced where the pregnancy is unwanted and after appropriate assessment, termination of the pregnancy is deemed to be the best outcome

State legislation and service provision

Variability in state and territory legislation controlling access to and reporting of abortion (Table 6.1) creates a complex situation in accurately assessing the number of induced abortions performed and the reasons for these procedures.³

In South Australia, for example, the number and reasons for induced abortions are required to be reported under state legislation, and therefore South Australian data may more accurately represent the numbers of induced abortions provided to women in that state (a caveat being South Australians living near state borders who use interstate health services). In NSW there is no legislative requirement to report the numbers and reasons for abortion and these can only be estimated indirectly.

Abortions are also performed in different types of facilities.⁴ In NSW, both public and private facilities are able to provide abortions; in the Northern Territory, abortions are only provided at the main public hospitals; in South Australia abortions are performed in prescribed hospitals. This has an impact on the validity of the data collected and the reliability of comparisons between states and territories, as procedures are identified in different data sets according to the type and location of the service.

Table 6.1: State and territory provision of abortion services and reporting

STATE OR TERRITORY	PUBLIC HOSPITAL	PRIVATE CLINIC OR HOSPITAL	MANDATORY NOTIFICATION
Queensland	Very limited	Yes [†]	No
New South Wales	Limited	Yes	No
Victoria	Yes	Yes	No
Australian Capital Territory	No	Yes	No
South Australia	Prescribed hospital [‡]	No	Yes
Western Australia	Very limited – single hospital	Yes	Yes
Tasmania	Limited	Yes	No
Northern Territory	Limited	No	Yes

Notes: † Legislation in relation to private health facilities in Queensland requires that facilities providing abortion services are licensed as hospitals. ‡ Declared by regulation to be a prescribed hospital (to provide abortions) – all such hospitals are part of the Area Health Services, but may be in a ‘stand alone’ clinic setting.

Source: Adapted from Children by Choice. Available at: www.childrenbychoice.org.au, accessed 19 January 2010; Calcutt C. Abortion Services in Australia. *O&G Magazine* 2007; 9: 27–28 and personal communications with state-based Family Planning organisations.

Data Limitations

Several discussions on the limitations of Australian abortion data have been published.⁵⁻⁷ The principal sources used here include: a Department of Parliamentary Services Research Brief⁵ which examined the available abortion statistics, their limitations and options for improvement; Australian Institute of Health and Welfare (AIHW) reports which estimated the numbers and rates of abortions in Australia for 2003 and 2004 from routine data collections;^{6,8} and research which estimated the numbers and rates of abortion in Australia over an eighteen year period from routine data collections.⁷ The South Australian data capture model around abortion provides an indication of the potential quality data that may be gathered in such a setting,⁹ however these data are not reported in detail here.

The AIHW report for 2003⁶ and the eighteen year (1985 to 2003) estimates by Chan and Sage⁷ examined the available data in detail to estimate the numbers of induced abortions performed in Australia. Principal sources were Medicare Australia claims for abortion-related procedures performed in the private sector and the National Hospital Morbidity Database (NHMD) for the numbers of admitted hospital patients who were identified as having an abortion-related diagnosis and procedure. The authors recognised that the limitations of these two sources were significant and in each case made carefully considered statistical adjustments to generate the final numbers reported.

Medicare Australia claims

The Health Insurance Commission (HIC) collects Medicare Benefits Schedule (MBS) claims data for funded procedures relating to both spontaneous and induced abortion under two items:

- Item 35643: evacuation of the contents of the gravid uterus by curettage or suction curettage
- Item 16525: management of second trimester labour, with or without induction, for intrauterine fetal death, gross fetal abnormality or life threatening maternal disease

The coding of procedures to these items does not give unique data on induced abortions that are related to unwanted pregnancies as it also counts abortive procedures that are performed for other reasons.

When providing information to an Australian Parliamentary research brief on abortion, service providers including gynaecologists and abortion clinics varied greatly in their estimations of the number of ‘procedures with an abortive outcome’ claimed under Medicare for non-viable pregnancies; estimates ranged from 15% to 90% of procedures.⁵ This was probably related to the different types of medical services provided; specialist gynaecological practice would be expected to see many non-viable pregnancies (spontaneous and missed abortions) that require a procedure, while a private abortion clinic would see far fewer of these cases.

The accuracy of MBS claims for induced abortion made by private patients in South Australia, where there is the capacity to identify the specific reason for abortion using statutory notification data, was estimated by Chan and

Sage.⁷ An overestimation by 18.7% of the numbers of induced abortions in the years 1988–1989 and 1999–2000 was identified, i.e. nearly one in five abortions counted through MBS claims in private patients were not necessarily induced abortions of unwanted pregnancy. The overestimation may result from the use of the MBS item 35643 for induced abortions of non-viable pregnancies.

In contrast, some abortions may not be claimed through Medicare at all. Surveys have found that between 13 and 15% of women having an induced abortion related to an unwanted pregnancy and eligible for Medicare rebate did not intend to claim.^{10,11} Consequently, the AIHW method for estimating abortion includes a correction, adding 13.1% to Medicare estimates for jurisdictions with non-hospital Medicare services (NSW, Tasmania and the ACT).

Medicare claims data cannot capture all induced abortions, as claims are only permitted for procedures performed where the woman is not a public hospital inpatient. However, except in states where abortion is provided by public hospitals only, the majority of abortions associated with unwanted pregnancy appear to take place outside of public hospitals, supporting the AIHW position that corrected estimates for abortion of unwanted pregnancies using Medicare item 35643 are valid.^{5,6}

Furthermore, Medicare claims data do not include any abortions performed after 24 weeks of pregnancy, as the two Medicare item numbers are appropriate only for procedures that are able to be performed in the first and second trimesters of pregnancy. There is no specific MBS funding for abortions conducted after 24 weeks. However, the number of cases in this category is small and these are most likely induced abortions for fetal or maternal health reasons.[†]

To estimate the number of abortions using Medicare data the AIHW⁶ proposed the use of:

- In-hospital services only: MBS item 16525 (see above); MBS items 35639G/35640S (Uterus, curettage of), 35653–35657 and 35661–35673 (Hysterectomy), 35649 (Hysterotomy or Uterine myomectomy) and 16519, 16520, 16522 (Caesarian section). Note that all could possibly be used to claim for an induced abortion in certain specific circumstances
- Out-of-hospital services for induced abortion: MBS item 35643 (see above)

National Hospital Morbidity Database (NHMD)

The NHMD is compiled by the AIHW and is a record of hospital separations of admitted patients from public and private hospitals where the episode of care ended with a discharge, transfer, death or a change in care type. Diagnoses and procedures performed in hospital are recorded and coded to the ICD-10-AM.[‡]

Codes relating to induced abortion^{5,6} are for a principal or additional diagnosis of:

- Incomplete abortion – ICD-10-AM code *O04.1-O04.4 incomplete* and *O04.5-O04.9 medical abortion, complete or unspecified*
- Spontaneous abortion – ICD-10-AM code *O03*

Other abortion codes, such as *O05 Other abortion* and *O06 Unspecified abortion*, were determined by the AIHW to capture an insignificant number of separations.⁶

The AIHW concluded that to be counted as an induced abortion a separation should include both an abortion diagnosis code and a related procedure code. In some circumstances a woman is admitted under the diagnostic code ‘medical abortion’ and the procedure is not performed but the diagnostic code still records her as having an abortion.⁶ Chan and Sage⁷ used South Australian statutory notifications to assess the veracity of the NHMD data in that state and found an overestimation of 2.3%, which they concluded was primarily attributable to re-admissions. The AIHW report examined the South Australian data in detail and concluded that, overall the discrepancies between the NHMD data using the criteria for induced abortion and the data reported from the South Australian Abortion Statistics Collection are relatively small, and indicate that the criteria would be satisfactory for enumeration of induced abortion in the NHMD.⁶

NHMD data for estimating abortion are affected by:⁵

- Alternative coding of terminations occurring after 20 weeks gestation
- Separations data do not include services to women in outpatient clinics and non-hospital facilities
- A small number of private hospitals are not included in the NHMD database, leading to a possible underestimation of abortion rates
- Changed coverage of the database having implications for annual comparisons
- Demographic and other data relevant for reproductive and sexual health care population monitoring and service provision are not collected

† Pregnancy Outcome Unit SA Department of Health, personal communication.

‡ International Statistical Classification of Diseases and Related Health Problems, 10th revision, Australian Modification.

Terminations occurring after 20 weeks gestation are not included in the NHMD. These late procedures are recorded differently in the hospital setting, which leads to the possibility of under reporting. However, the number of these late procedures is likely to be small, and, similar to Medicare reporting, less likely to be terminations of unwanted pregnancies.⁵

6.1 Induced Abortion: Australia

6.1.1 Estimates of induced abortion: Australia

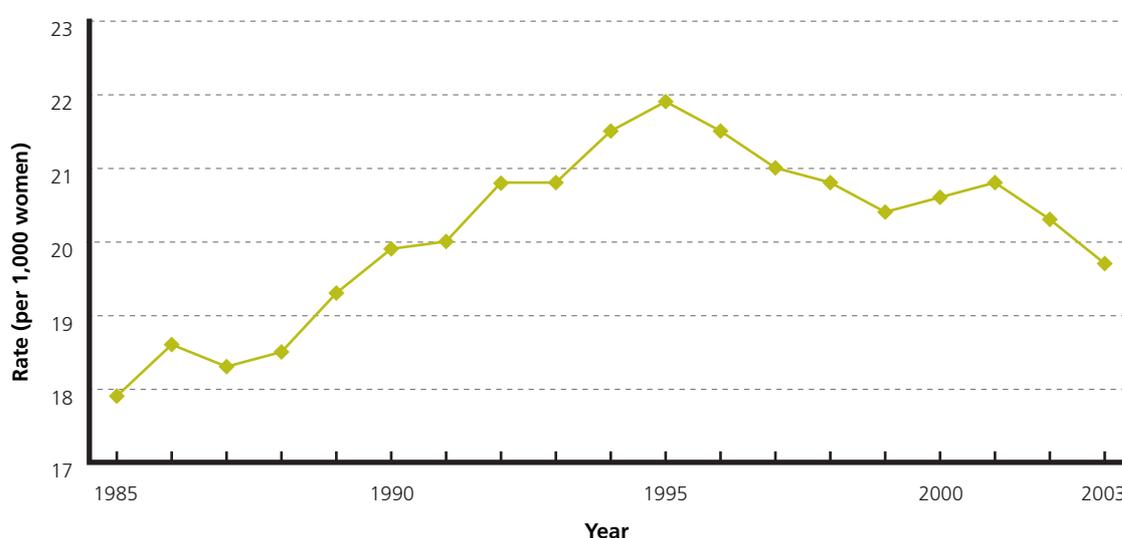
The number of abortions occurring in Australia has been estimated on several occasions: for 1995–1996 the Australian Bureau of Statistics estimated 95,200 induced abortions nationally. The AIHW estimated 84,218 induced abortions for 2003 and 83,210 for 2004.^{6,8} Estimates in Australia covering 1985 to 2003 were provided by Chan and Sage⁷ (Figure 6.1), who documented an increase in the adjusted abortion rate from 1985 to 1995, followed by a decline to 2003.

The 2003 and 2004 AIHW abortion estimates combined NHMD and Medicare data, were adjusted for state-based variation, and included an additional 13.1% of patients who were estimated to have had an induced abortion in a

private clinic but did not claim a Medicare rebate (Table 6.2 and Figure 6.2).⁶ The national age-standardised abortion rate by state or territory of provider was 19.7 per 1,000 women in 2003 (the same as estimated by Chan and Sage)⁷ and 19.3 in 2004.

In 2003 and 2004, NSW recorded the highest rates of induced abortion (24.3 and 23.4 per 1,000 women respectively) with the lowest recorded for Queensland (15.4 and 14.8 per 1,000) (Table 6.2). The difference decreased somewhat when assessed by place of usual residence rather than place of service, with higher NSW service rates partly reflecting cross-border service provision. In 2004 39% of induced abortions in Australian Capital Territory residents and 11% of those in Queensland residents occurred interstate, mostly in NSW. Rates of cross-border services in the remaining jurisdictions were less than 5%.

Figure 6.1: Abortion rates per 1,000 Australian women aged 15 to 44 years, 1985 to 2003



Source: Chan A and Sage LC. 2005. Estimating Australia's abortion rates 1985–2003. *Med J Aust* 182: 447–452.

Table 6.2: Age-standardised induced abortion rates, 2003 and 2004

STATE AND TERRITORY OF:	YEAR	RATE PER 1,000 WOMEN AGED 15 TO 44 YEARS								
		NSW	QLD	WA	SA	NT	VIC	TAS	ACT	Australia
Service	2003	24.3	15.4	19.7	16.7	19.7	n.p.	n.p.	n.p.	19.7
	2004	23.4	14.8	19.3	15.9	20.5	19.0	n.p.	n.p.	19.3
Usual residence	2003	23.2	17.0	n.p.	17.1	19.7	18.5	11.8	17.2	17.7
	2004	22.1	16.4	n.p.	16.1	19.8	19.1	13.1	17.8	17.3

Note: n.p. = not published; refer to source documents for detailed explanations.

Source: Grayson N, Hargreaves J and Sullivan EA 2005. Use of routinely collected national data sets for reporting on induced abortion in Australia. AIHW Cat. No. PER 30. Sydney: AIHW National Perinatal Statistics Unit (Perinatal Statistics Series No. 17), Laws PJ, Grayson N and Sullivan EA 2006. Australia's mothers and babies 2004. Perinatal statistics series no. 18. AIHW cat. no. PER 34. Sydney: AIHW National Perinatal Statistics Unit and Chan A, Scott J, Nguyen A-M, Sage L. Pregnancy Outcome in South Australia 2008. Adelaide: Pregnancy Outcome Unit, SA Health, Government of South Australia, 2009.

Figure 6.2: Age-standardised induced abortion rates per 1,000 women aged 15 to 44 years by state and territory of service provision, selected states and territories, 2003 and 2004



Note: Australia total includes Tasmania and Australian Capital Territory (data not available for separate presentation).

Data not available for Victoria in 2003.

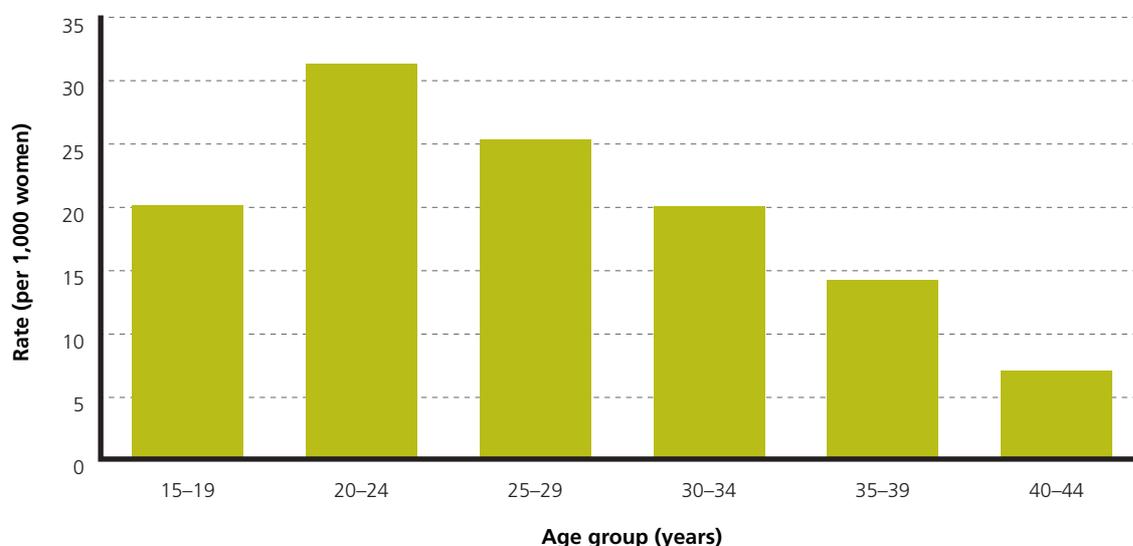
Source: Grayson N, Hargreaves J and Sullivan EA 2005. Use of routinely collected national data sets for reporting on induced abortion in Australia. AIHW Cat. No. PER 30. Sydney: AIHW National Perinatal Statistics Unit (Perinatal Statistics Series No. 17), and Laws PJ, Grayson N and Sullivan EA 2006. Australia's mothers and babies 2004. Perinatal statistics series no. 18. AIHW cat. no. PER 34. Sydney: AIHW National Perinatal Statistics Unit.

The AIHW 2005 estimate by age group (Figure 6.3) showed women aged 20 to 24 years had the highest abortion rate (31.3 per 1,000 women), with the lowest rate occurring in women aged 40 to 44 years (7.0 per 1,000 women).

Abortion rates (based on place of usual residence) were higher in women living in major cities (19.3 in 2003

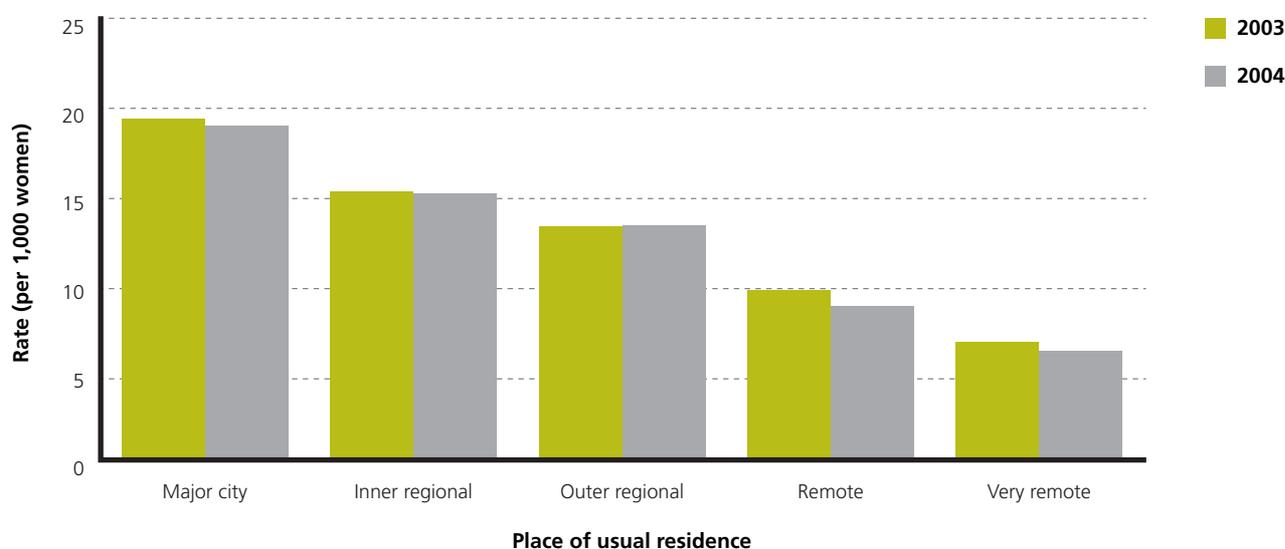
and 18.9 in 2004 age-standardised per 1,000 women), compared to women living in very remote areas (6.7 and 6.2 per 1,000 women, Figure 6.4).⁶ As with many health and other services, the accessibility and affordability of abortion is generally better for women living in cities than for those in rural and remote areas.⁸

Figure 6.3: Abortion rates by age group, Australia, 2004



Source: Laws PJ, Grayson N and Sullivan EA 2006. Australia's mothers and babies 2004. Perinatal statistics series no. 18. AIHW cat. no. PER 34. Sydney: AIHW National Perinatal Statistics Unit.

Figure 6.4: Induced abortion rates by place of usual residence, Australia, 2003 and 2004



Source: Grayson N, Hargreaves J and Sullivan EA 2005. Use of routinely collected national data sets for reporting on induced abortion in Australia. AIHW Cat. No. PER 30. Sydney: AIHW National Perinatal Statistics Unit (Perinatal Statistics Series No. 17), and Laws PJ, Grayson N and Sullivan EA 2006. Australia's mothers and babies 2004. Perinatal statistics series no. 18. AIHW cat. no. PER 34. Sydney: AIHW National Perinatal Statistics Unit.

6.1.2 Number of Medicare claims related to induced abortions: Australia

Medicare claims data for abortion related procedures are valuable for the review of trends and provide some indication of the frequency of induced abortion over time. However, caution is required in the interpretation of these data, as inferences about abortion rates are based on assumptions regarding the application of the relevant Medicare items.

The AIHW, in preparing abortion estimates, have proposed that Medicare item number 35643 generally represents induced abortion performed outside of hospital.⁶ There are known limitations as discussed previously, especially with absolute differences between states and territories. However, if it is assumed that the number of abortions

performed for other reasons, such as maternal or fetal problems, does not change significantly over time in these settings, or the legislative or service provision and reporting environment has not changed, then Medicare claim trends can indicate whether the rate of induced abortion in Australia is likely to be increasing or decreasing.

From 1999 to 2008 there was an overall decrease in Medicare claims made for item 35643, from 73,392 to 71,800, although the number of claims has been stable since 2006 (Table 6.3). The number of claims increased slightly for item 16525 (management of second trimester labour) from 609 to 794 in the same period. Similarly, the abortion rate estimated from Medicare item 35643 declined from 19 to 16 abortions per 1,000 women aged 15 to 44 over the period 1994 to 2008 (Figure 6.5).

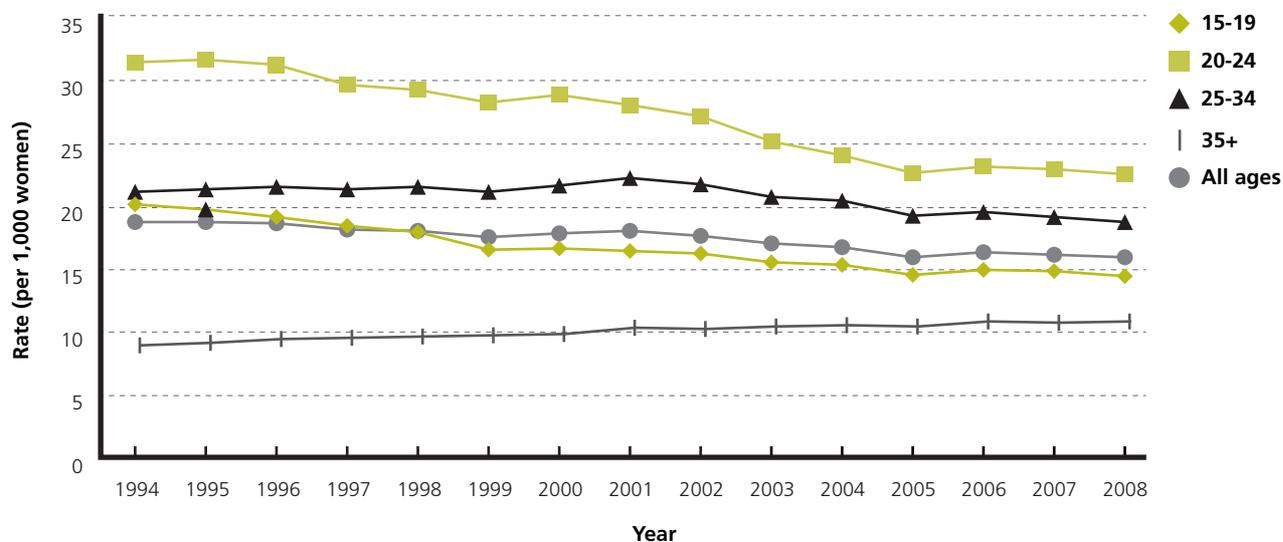
Table 6.3: Claims for Medicare items 35643 and 16525, Australia, 1999 to 2008

YEAR	ITEM 35643	ITEM 16525	TOTAL SERVICES
1999	73,392	609	74,001
2000	74,888	655	75,543
2001	76,332	714	77,046
2002	75,282	624	75,906
2003	72,967	656	73,623
2004	72,214	683	72,897
2005	69,383	770	70,153
2006	71,773	777	72,550
2007	71,848	790	72,638
2008	71,800	794	72,594

Note: 35643: evacuation of the contents of the gravid uterus; 16525: management of second trimester labour for intrauterine fetal death, gross fetal abnormality or life threatening maternal disease.

Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/mbs_item.shtml, accessed Jul2010.

Figure 6.5: Induced abortion rates by age group: Medicare item 35643, Australia, 1994 to 2008



Note: Age groups 25–29 and 30–34 combined into 25–34 group. Medicare item 35643: evacuation of the contents of the gravid uterus.
 Source: Medicare Australia www.medicareaustralia.gov.au/statistics/mbs_item.shtml, accessed Jul2010, denominator from ABS population estimates.

Age and abortion

Women aged 20 to 24 years have had the highest abortion rates (Figure 6.5), and since 2000 abortions in this age group have represented approximately 24% of all abortions annually. However, the decline in abortions was also the greatest in this age group, from 32 (in 1995) to 23 per 1,000 women in 2008. Rates have declined less dramatically for the other age groups except in women aged 35 and over, which showed a consistent but slight increase to above 10 per 1,000 women. Similarly, a study examining changing patterns in women seeking pregnancy termination from a South Australian service provider found a significant increase in older women (aged 30 to 50 years) having a termination from 1996 to 2006.¹²

The reasons for these trends need further study. For example, does the decline in younger women reflect either better availability of, or access to, effective contraception, or a move towards continuing with unplanned pregnancies rather than termination? In older women, what are the factors behind decisions to terminate pregnancies? Some may represent termination of fetal abnormalities, but may also include completion of family, or balancing the prospect of a child with career pathways.

6.2 Estimates of Induced Abortion Based on National Population Health Surveys

Two population-based surveys have collected information about induced abortion. The *Australian Longitudinal Study on Women's Health* (ALSWH), established in 1996, was a random sample of women in three cohorts; young (18 to 23 years), middle-aged (45 to 50 years) and older (70 to 75 years) respectively when first surveyed.¹³ Data collected in 1996 from women in the mid-age cohort who had largely completed child bearing by survey time showed 19.8% have had at least one abortion.¹⁴

The second survey, the *Australian Study of Health and Relationships* (ASHR), which interviewed over 9,000 women in 2001 on reproductive outcomes, found that among women aged 16 to 59 years who had ever been pregnant, 22.6% reported an abortion.¹⁵ The survey results represent an accumulation over the reproductive years for each respondent and are close to annual cross-sectional rates derived from Medicare item 35643 for all 15 to 44 year old women. Assuming that the majority of women who do have an abortion have only one in a lifetime or are unlikely to have more than one in a calendar year, then the validity of Medicare item 35643 as an indicator of induced abortion would appear to be robust, especially for jurisdictions where abortion is overwhelmingly provided in private settings.

6.2.1 Demographic data – characteristics of women seeking or reporting abortion

Medicare, the NHMD and private termination clinics do not collect detailed demographic data that would allow assessment of trends in abortion by population subgroups such as Aboriginal and Torres Strait Islander women, women from Culturally and Linguistically Diverse (CALD) backgrounds or in women with disabilities. However, data collected by health surveys do provide limited information on socio-demographic variation in abortion rates.

The ALSWH found that women in the younger cohort who reported teenage terminations were likely to be less well educated, and those reporting teenage terminations were more likely to be in a *de facto* relationship, have no private health insurance and be a victim of partner violence.^{16,17}

In contrast the ASHR¹⁵ showed that women with higher education levels were significantly more likely to have had an abortion. Women identifying as lesbian or bisexual were significantly more likely to report an abortion than heterosexual women. The survey showed no difference in regional rates of reported abortion. The ASHR showed no correlation between abortion and having a non-English speaking background, income or occupational classification.

In an audit of a Victorian Pregnancy Advisory Service in which 90% of women were seeking abortion (n=3,598), 6.9% preferred a language other than English, 12% lived in rural Victoria or interstate, 2.1% identified as Aboriginal or Torres Strait Islander (compared to 0.6% of the Victorian population), 42.2% already had one child and 51.3% were holders of a Health Care Card (compared to 23% of the overall Australian population).¹⁸

Whilst these survey data are important they should be viewed with care. The information sources are limited, and there are no population comparisons available at a national level to allow thorough interpretation.

6.2.2 International comparisons

Australia's abortion rate, while less than that reported worldwide, is comparable to other developed countries (excluding Eastern Europe, Table 6.4), and is at the upper end of countries with comparable health services, abortion legislation and reporting processes (Table 6.5).

Table 6.4: Global abortion estimates

AREA	ABORTION RATE (PER 1,000 WOMEN AGED 15 TO 44 YEARS)	
	1995	2003
World	35	29
Developed countries	39	26
Excluding Eastern Europe	20	19
Developing countries	34	29
Excluding China	33	30
Region		
Africa	33	29
Asia	33	29
Europe	48	28
Latin America	37	21
North America	22	21
Oceania	21	17
Australia	22 [†]	20 [‡]

Sources: Sedgh *et al.* 2007. Induced abortion: estimated rates and trends worldwide. *Lancet* 370:1138–45, †McLennan W. Australian social trends 1998. Canberra: Australian Bureau of Statistics, 1998, ABS Cat. No. 4102.0 and ‡Grayson N, Hargreaves J, Sullivan EA 2005. Use of routinely collected national data sets for reporting on induced abortion in Australia. AIHW Cat. No. PER 30. Sydney: AIHW National Perinatal Statistics Unit (Perinatal Statistics Series No. 17).

Table 6.5: Rates of abortion for 2003 in developed countries where reporting is relatively complete

COUNTRY	ABORTION RATE (PER 1,000 WOMEN AGED 15 TO 44 YEARS)
New Zealand	35
United States	39
Australia	20
Sweden	34
England and Wales	33
Canada	15
Singapore	15
Scotland	12
Netherlands	9
Germany	8

Note: International comparisons of abortion data should be interpreted cautiously as abortion data collection methods, definitions and completeness vary. Australia may have more complete abortion reporting than some of the countries included in this table (e.g. the United States) and some international differences will reflect different approaches to reporting and recording abortion.

Source: Sedgh *et al.* 2007. Legal abortion worldwide: incidence and recent trends. *International Family Planning Perspectives* 2007, 33 (3): 106–116.

6.3 Induced Abortion: New South Wales

6.3.1 Estimates of induced abortions: New South Wales

The most reliable figures for New South Wales are provided by the AIHW^{6,8} which estimated that 34,747 and 33,518 induced abortions were performed in New South Wales in 2003 and 2004 respectively, corresponding to abortion rates of 24.3 and 23.4 per 1,000 women aged 15 to 44 years.

The 2003 estimate included 9,384 induced abortions recorded in the NHMD, of which 1,216 were public and 8,168 private hospital patients. There were 31,981 Medicare claims for MBS-item 35643, of which 9,556 (30%) were in-hospital claims and 22,425 (70%) non-hospital claims, signifying that most abortion services in New South Wales were provided out of hospital.⁶

The discrepancy between the MBS and NHMD data for in-hospital claims was small (<2%), but does indicate the extent of inaccuracy in figures for induced abortion. The final abortion estimate was calculated as the sum of the NHMD abortion separations and non-hospital MBS claims, plus an additional 13.1% of the MBS estimate to account for unclaimed services (Table 6.6).

Based on state of usual residence, the number of abortions in women resident in NSW was 33,088 in 2003 and 31,619 in 2004, corresponding to rates of 23.2 and 22.1 per 1,000 women in 2003 and 2004, respectively. Only 2.1 to 2.5% of women from NSW had an induced abortion interstate.

Table 6.6: Abortion estimate, NSW, 2003

DATA SOURCE	PATIENT GROUP	COUNT	TOTAL
NHMD	Public patients	1,216	
	Private patients	8,168	
			9,384
Medicare	Non-hospital claims	22,425	
	Estimated unclaimed (13.1%)	2,938	
			25,363
NHMD + Medicare			34,747

Note. NHMD = National Hospital Morbidity Database. Medicare claims for item 35643: evacuation of the gravid uterus.

Source: Grayson N, Hargreaves J, Sullivan EA. Use of routinely collected national data sets for reporting on induced abortion in Australia. AIHW Cat. No. PER 30. Sydney: AIHW National Perinatal Statistics Unit (Perinatal Statistics Series No. 17), 2005.

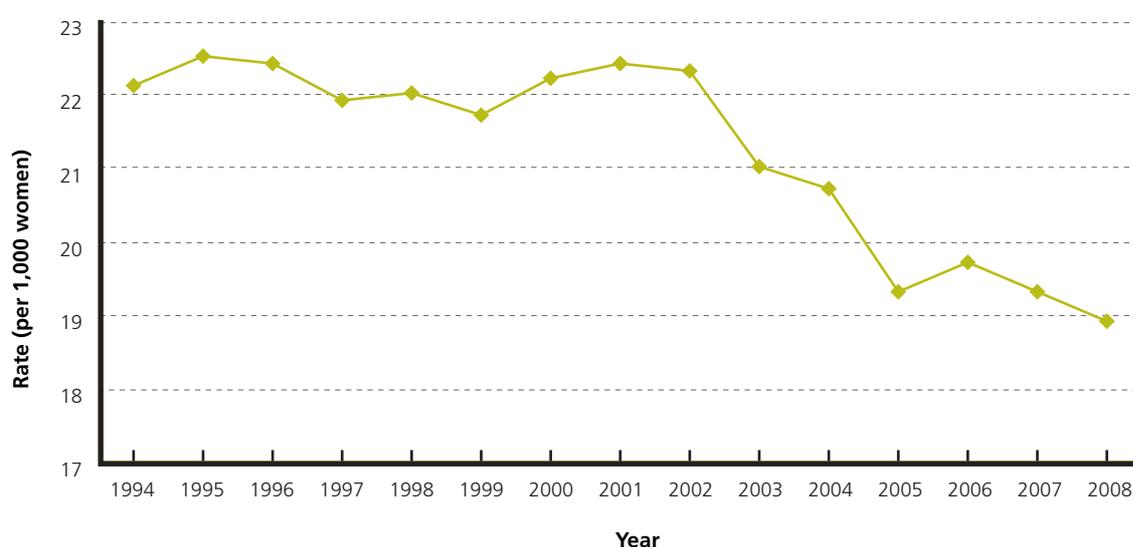
6.3.2 Trends in Medicare claims for items related to induced abortion: New South Wales and the ACT

The estimates provided by the AIHW are useful and important but, as discussed earlier, do not address the issue of routine and timely reporting for service providers to assess the need for services in reproductive and sexual health. MBS claims data, despite validity issues, do provide a surrogate for the assessment of trends.

Claim rates for MBS item 35643 in NSW and the ACT (separate data were not available for NSW and the ACT) from 1994 to 2008 showed a decrease which occurred mostly between 2002 and 2005 (Figure 6.6).

The management of second trimester pregnancies (MBS item 16525) accounted for less than 1% of all abortion-related Medicare claims, and showed a fall in second trimester abortions to 1999 followed by a sharp rise (Figure 6.7). This rise may reflect both developing obstetric practice, with the increasing uptake of prenatal ultrasound and diagnosis of fetal abnormality,¹⁹ as well as the demographic shift to later childbearing.^{11,20} Pregnancy in older women is associated with higher complication rates which may result in termination.²¹⁻²³

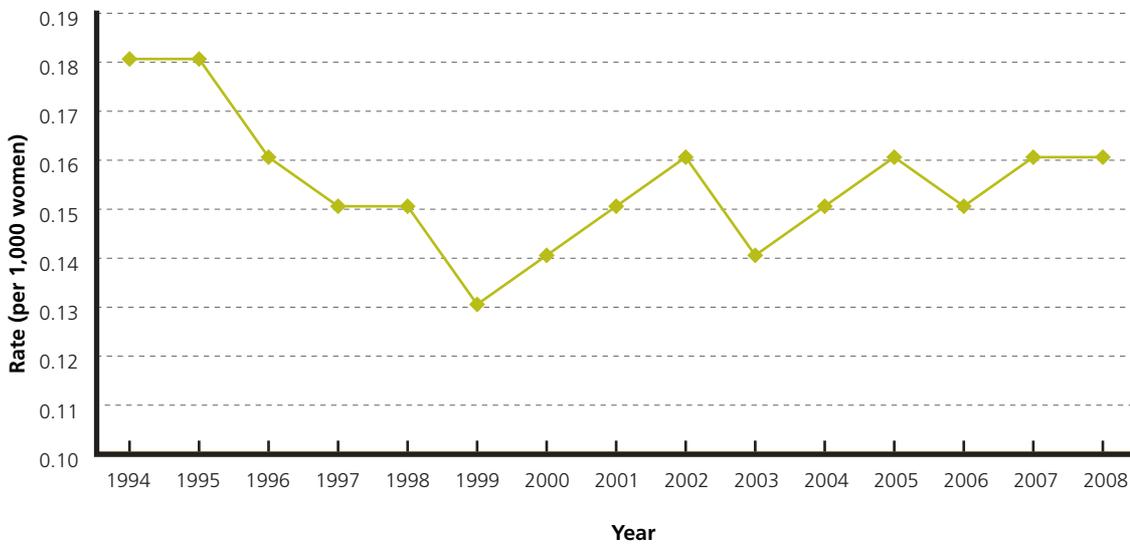
Figure 6.6: Induced abortion rates: Medicare item 35643, women aged 15 to 44 years, NSW/ACT, 1994 to 2008



Note. Medicare item 35643: evacuation of the contents of the gravid uterus.

Source: Medicare Australia www.medicareaustralia.gov.au/statistics/mbs_item.shtml, accessed Jul2010, denominators from ABS population estimates.

Figure 6.7: Induced abortion rates: Medicare item 16525, women aged 15 to 44 years, NSW/ACT, 1994 to 2008



Note. Medicare item 16525: management of second trimester labour for intrauterine fetal death, etc..

Source: Medicare Australia www.medicareaustralia.gov.au/statistics/mbs_item.shtml, accessed Jul2010; denominators from ABS population estimates.

6.3.3 Trends in Medicare claims for items related to induced abortion: New South Wales and the ACT by age group

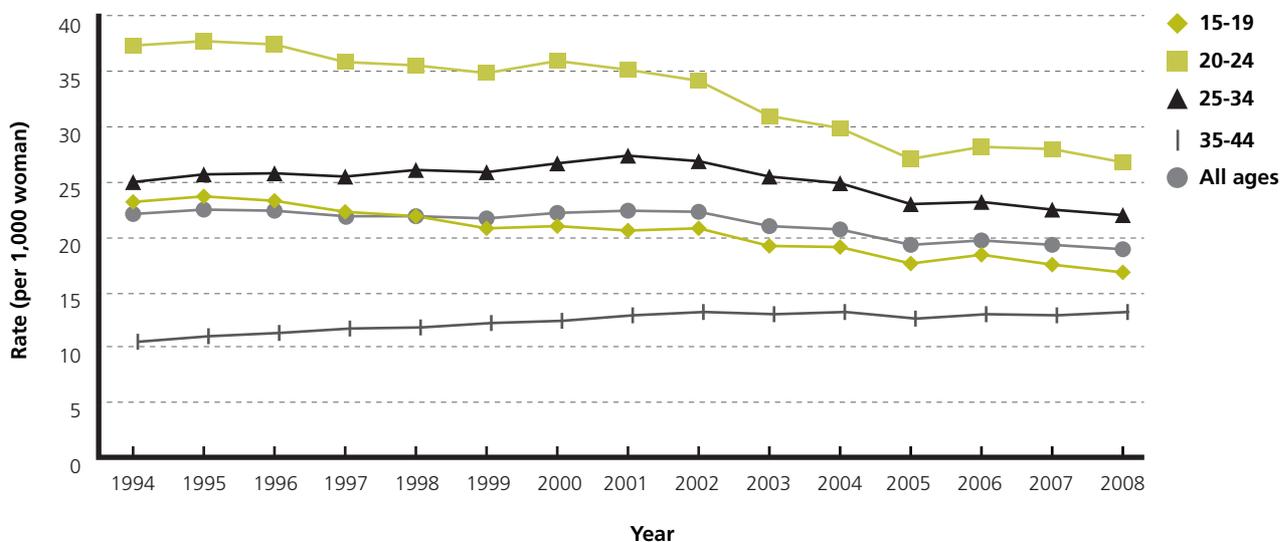
Claims for Medicare item 35643 from 1994 to 2008 for NSW and the ACT† by age (Figure 6.8) are similar to those nationally and show:

- Women aged 20 to 24 years consistently have had the highest rates of claims, with some decrease since 2002–2003
- The decrease in the claim rates was greatest in the 20 to 24 year-old age group
- Women aged 35 or over had the lowest claims rate overall, but the rate has increased over time, proportionately by around 30% since the mid 1990s

Possible explanations for an increasing trend in induced abortions in the older age group include better and earlier detection of fetal abnormality. Unwanted pregnancies in older women may also have contributed to this trend.²⁰ Older women may experience an unwanted pregnancy for reasons including a completed family, financial pressure and career choices.

† Analysis includes item 35643 only. Item 16525 was not included as there were comparatively few claims for this item.

Figure 6.8: Induced abortion rates by age group: Medicare item 35643, NSW/ACT, 1994 to 2008



Note: Age groups 25–29 and 30–34 combined. Note. Medicare item 35643: evacuation of the contents of the gravid uterus. Source: Medicare Australia www.medicareaustralia.gov.au/statistics/mb_s_item.shtml, accessed Jul2010; denominators from ABS population estimates.

6.4 Summary

Australian data and the ability to provide current information on abortion is sub-optimal. Data unambiguously delineating induced abortion are difficult to obtain, and estimates have relied on data derived from several sources with assumptions used to correct for known limitations and omissions in the captured data. The method developed by the AIHW provides a basis for regular reporting,⁶ however, direct accurate information on the number of abortions in Australia will not be available until appropriate systems of collection are put in place.⁵

There have been ongoing calls, from government and researchers, for complete and consistent reporting of abortion in Australia, to better understand service needs and to facilitate health service planning. However, there are also very real concerns about the potential for these data, collected to benefit women and for the improvement of health services, to be misused. Steps towards a more reliable understanding of abortion in Australia might include:

- Regular reporting of abortion in Australia using standardised estimation methods (e.g. the AIHW method discussed in this chapter)
- Regular validation (for example on a 2 to 5 year timescale) of estimation methods using surveys or detailed sample data analysis
- A move by all state legislatures to allow steps to be made to clarify reporting and provide for consistency in data collection

Estimated number of induced abortions

Australia

There are significant limitations in providing reliable measures of numbers, rates and the reasons for abortion in Australia. Therefore all data presented are estimates only.

- Approximately 1 in 5 Australian women (20 to 25%) will have an abortion in their lifetime and approximately 80,000 induced abortions are performed annually in Australia
- There are around 19 abortions performed per 1,000

women aged 15 to 44 years each year in Australia

- Australia's rate of abortions per 1,000 women aged 15 to 44 years is at the higher end of comparisons with similar developed countries. However, this may result in part from under-reporting of abortion in some countries
- Women aged 20 to 24 years have 23 to 24% of the estimated number of abortions, but the rate of abortion has declined in this age group
- The rate of abortion has increased in women aged 35 and over
- Medicare data for claims relating to mostly first trimester induced abortions indicate a decrease in the number and rate of claims from 1999 to 2008
- The highest abortion rates were for women in major Australian cities (19.3 per 1,000 women) and the lowest for women in very remote areas (6.7 per 1,000 women)

New South Wales

- NSW has a higher abortion rate than other Australian states and territories
- The majority of abortions in NSW are performed in non-hospital facilities, most of which are claimed through Medicare

Data issues

Data Limitations

- Abortion notification requirements differ by state and territory, with some reporting abortion in out-of-hospital and in-hospital facilities, and others from in-hospital facilities only
- Legislation differs by state and territory: notification is mandatory only in South Australia, the Northern Territory and Western Australia
- There is no routine national data collection or minimum data set for induced abortion
- Non-hospital abortions may not always be recorded in routinely collected data, particularly if no Medicare claims are made.
- Medicare claims do not reliably distinguish between induced and spontaneous abortion.
- Routinely collected hospital separations data fail to distinguish between medically indicated abortion and abortion for other reasons

Data gaps

It is currently not possible in Australia to reliably estimate:

- The extent of induced abortions among population sub-groups
- Socio-demographic characteristics of women having abortions
- Information about the use of contraception at the time of conception
- Rate of use of surgical versus medical abortion
- Measures of out-of-state procedures (i.e. state or territory where procedure was carried out is not the woman's usual state or territory of residence)
- Reason for abortion

Data opportunities

Effective, evidence-based service delivery in Australia requires:

- Development of national recording standards for improved reporting and analysis of pregnancy terminations
- More detailed information from Medicare claims regarding place of residence and age breakdowns

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Chapter 7 : Sexually Transmissible Infections

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Key Indicators

- International comparison of sexually transmissible infection rates

Chlamydia, gonorrhoea, syphilis and hepatitis B

- Incidence rate per 100,000 population
- Incidence by geography, age, gender,
- Incidence by population sub-groups including country of birth, socio-economic indicators, sexual behaviour (e.g. men who have sex with men)
- Incidence in Aboriginal and Torres Strait Islander populations
- Gonorrhoea resistance to antibiotic therapy

HIV/AIDS

- Incidence rate per 100,000 population
- Incidence by mode of transmission – male to male, heterosexual, intravenous drug use etc.
- Incidence by geography, age, gender
- Incidence by country of origin
- Incidence in Aboriginal and Torres Strait Islander populations

Other non-notifiable sexually transmissible infections: genital warts, genital herpes

- Incidence and prevalence per population

Primary Data Sources

Medicare Australia on-line statistics

National Notifiable Diseases Surveillance System (NNDSS), Communicable Diseases Surveillance Online Database, Department of Health and Ageing

NSW Notifiable Diseases Database, Communicable Diseases Branch and Epidemiology and Surveillance Branch, NSW Health Department, now the NSW Health Department Notifiable Conditions Information Management System (NCIMS) (HOIST), Communicable Diseases Branch and Centre for Epidemiology and Research, NSW Department of Health.

Note: Other hepatitis viral infections are not here included as they are not reported as a sexually transmitted infections.

Introduction

Sexually Transmissible Infections (STIs) are a recognised public health issue in Australia and worldwide. Infection with chlamydia, gonorrhoea, syphilis, hepatitis B, human immunodeficiency virus (HIV), genital warts or genital herpes* has significant implications for population reproductive and sexual health. Unprotected sex is associated with an increased risk of contracting an STI, and the increasing incidence of several STIs supports the need for targeted interventions which encourage safe sex behaviours. A combination of sexual practices and epidemiologic factors have resulted in STIs presenting more commonly in population sub-groups such as men who have sex with men (MSM), young people and in Aboriginal and Torres Strait Islander communities.^{1,2}

This chapter summarises trends in the diagnosis and notification of STIs in Australia and New South Wales, to the level of NSW Area Health Service where possible. The chapter draws primarily on notifications to the national collation of state disease notifications (National Notifiable Diseases Surveillance System, NNDSS) and NSW notifiable diseases surveillance systems (Table 7.1).

Table 7.1: Online data sources for sexually transmissible infections

NATIONAL	URL
The National Notifiable Diseases Surveillance System Searchable database of all notifiable diseases – excludes HIV, reported through the Kirby Institute	www9.health.gov.au/cda/Source/CDA-index.cfm
Communicable Diseases Intelligence (CDI) Annual surveillance reports	www.health.gov.au/internet/main/publishing.nsf/Content/cda-pubs-cdi-cdiintro.htm
The Kirby Institute (formerly the National Centre for HIV Epidemiology and Clinical Research, NCHECR) Downloadable summary reports – sexually transmitted and blood borne diseases including HIV/AIDS Reports for Aboriginal and Torres Strait Islanders	http://hiv.cms.med.unsw.edu.au/
NSW	
NSW Public Health Bulletin Monthly and summary Communicable Diseases Reports Report by NSW Area Health Service	www.publish.csiro.au/nid/226.htm
NSW Health Report of the Chief Health Officer Searchable database, downloadable data by disease	www.health.nsw.gov.au/publichealth/chorep/index.asp
NSW Health Infectious Diseases Fact sheets Weekly reports	www.health.nsw.gov.au/publichealth/infectious/index.asp
NSW Health A–Z of infectious diseases	www.health.nsw.gov.au/publichealth/Infectious/a-z.asp
Specific Diseases	
HIV world statistics WHO World Health Statistics/Health Status Indicators	http://apps.who.int/globalatlas/DataQuery/default.asp

* Other hepatitis viral infections are not here included as they are not reported as a sexually transmitted infections.

Data Limitations

Notification of infectious disease reflects healthcare seeking behaviours and testing, and screening practices which will vary geographically, demographically and over time. Many infections are asymptomatic and remain undiagnosed, hence notification data will underestimate the true population prevalence of infection. Overall, notification data reflect:^{1,3}

- the underlying disease burden, transmission rates and disease progression
- changes in health promotion and awareness activities which can, for example, lead to increased safe-sex behaviour and disease prevention or increased testing for asymptomatic disease
- population screening, targeted screening and testing of sub-populations
- changes in testing practice or advances in testing procedures and technology

The quality and extent of information collected varies according to the process of disease notification and whether additional demographic information is collected or public health follow-up is routinely required. The interpretation of disease rates, and in particular comparisons of rates between places and over time, must take these factors into account.

Similarly, the action of direct health interventions to encourage testing must also be considered, especially in the Australian context when implemented in vulnerable, remote or disadvantaged communities. One instance has been the Federal Government National Sexually Transmissible Infections Strategy (2005)⁴ which included a chlamydia screening pilot program targeting sexually active people under 25 years old. Resulting elevated notifications, whilst they may bring estimates of prevalence in the target community closer to the true value, may also artificially inflate differences between the target community and other comparable populations not subject to the intervention. Interpretation of apparently inflated rates of STIs must therefore be made within the context of health interventions and changes in other relevant non-disease factors.

Notification data may further underestimate STI prevalence among Aboriginal and Torres Strait Islander communities both nationally and in NSW.^{5,6} This results from reduced access to health services in Aboriginal and Torres Strait communities, and factors inhibiting the identification of Aboriginality.^{3,4} Epidemiological data are routinely only presented by Aboriginality where data completeness for Aboriginality exceeds 50 per cent. In NSW, only data for HIV, syphilis and hepatitis meet this criterion.³

As a result, nationally and in NSW, STI surveillance data on Aboriginal and Torres Strait people are largely regarded as incomplete.^{7,8}

The *NSW Public Health Act (1991)* requires that medical practitioners and laboratories notify the NSW Department of Health of certain sexually transmissible infections. Chlamydia, gonorrhoea, hepatitis B and HIV are exclusively notifiable by laboratories, whereas syphilis is notifiable by doctors and laboratories. The NSW notifiable disease data reported in this chapter are only for cases with laboratory evidence of infection that are notified to the NSW Notifiable Conditions Information Management System (NCIMS). National notification data were available for this report to 2008, whereas data for NSW was largely only available to 2007. Donovanosis has not been included in this report as, although notifiable, the disease is currently well controlled and rates have declined from 36 cases nationally in 1998 to 2 cases in 2008.

NSW laboratories are required to notify all newly diagnosed cases of HIV infection to the NSW Health Department.⁹ In 2008, the standard data collection form was expanded to include more complete information for people with a diagnosis of HIV infection, however these data were not included in this report.

Initiatives to improve the quality of notification data for Aboriginal and Torres Strait Island people have contributed to increased notifications in various jurisdictions. Mak and Watkins,⁵ for example, found that by using data linkage to confirm Aboriginality, the proportion of STI and Blood Borne Virus (BBV) notifications with missing Aboriginality data was reduced by 74%.

Pathology services for STI testing are reimbursable through several Medicare items:

- 69316 Detection of *Chlamydia trachomatis* by any method – one test
 - 69317 one test described in item 69494 and a test described in 69316
 - 69319 two tests described in item 69494 and a test described in 69316
- 69494 Detection of a virus or microbial antigen or microbial nucleic acid – one test
 - 69495 two tests described in 69494
 - 69496 three or more tests described in 69494

However, Medicare data on STI testing will underestimate testing rates as public sexual health clinics do not claim through Medicare.

7.1 Selected International STI Trends

Australia's place internationally in terms of the impact of STIs reflects differences in national disease prevalence, surveillance and the efficacy of preventive interventions and screening programs. While such differences affect direct comparability of STI rates, international comparisons remain valuable as indicators of the general status of STIs in Australia compared to other developed countries. For example, for bacterial STIs in Australia, Canada, the United Kingdom and the United States (Table 7.2):¹⁰

- chlamydia was the most commonly notified STI, however the incidence in the United States was substantially higher than Australia, Canada and the United Kingdom
- gonorrhoea rates in the United States were approximately three times higher than Australia, Canada and the United Kingdom
- the incidence of syphilis was lower than chlamydia and gonorrhoea, with the United States reporting the lowest incidence for syphilis

The United Nations AIDS organization bases international HIV prevalence on estimated adult (15 to 49 year old) prevalence.¹¹ The prevalence of HIV in Australia was similar to the UK and lower than Canada and the United States (Table 7.3).

Table 7.2: Notification rates for bacterial sexually transmissible infections, 2004

COUNTRY	RATE PER 100,000 POPULATION		
	Chlamydia	Gonorrhoea	Syphilis
Australia	179.3	35.4	3.1
Canada	197.1	28.9	3.5
United Kingdom	174.1	37.3	3.8
United States	319.6	113.5	2.7

Source: Public Health Agency of Canada. 2004 Canadian Sexually Transmitted Infections Surveillance CDR 2007; 33S1: 1–69 and National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW

Table 7.3: Estimated HIV prevalence (%) among 15 to 49 year olds in selected countries, 2007

COUNTRY	PREVALENCE	ESTIMATE BOUNDS*
Australia	0.2	0.1–0.3
New Zealand	0.1	<0.1–0.1
Canada	0.4	0.2–0.6
United Kingdom	0.2	0.1–0.5
United States	0.6	0.4–1.0
Africa		
Botswana	23.9	22.5–24.9
South Africa	18.1	15.4–20.9
Asia		
Cambodia	0.8	0.7 – 0.9
Japan	...	<0.1
Vietnam	0.5	0.3 – 0.9

* The width of the bounds reflects the type of epidemic, the quality, coverage and consistency of surveillance and, in generalised epidemics, whether data were available from a population-based survey with HIV testing. See Sexually Transmitted Infections: 2008, 84 (Suppl 1).

Source: UNAIDS 2008. Report on the global AIDS epidemic: Executive summary. Joint UN Programme on HIV/AIDS (UNAIDS) 2008.

7.2 Chlamydia

Chlamydia is a bacterial STI affecting the cervix and fallopian tubes in women and the urethra in men. In women, untreated chlamydia is associated with Pelvic Inflammatory Disease (PID), pregnancy complications, neonatal infection and tubal infertility.^{1,12,13} However, the evidence regarding the risk of infertility is inconclusive and the long term effects of chlamydia on fertility in particular continue to be debated.^{14,15}

Chlamydia infection is age-related, with rates highest in people younger than 25 years, and is associated with having two or more sexual partners within a 12 month period.^{1,16-18} The majority of infections are asymptomatic and consequently undetected, suggesting underestimation of the true extent of infection.¹⁹

7.2.1. Chlamydia notifications: Australia

In Australia and most developed countries chlamydia is the most commonly notified STI. In Australia in 2008, 58,484 new cases were notified equating to 278 per 100,000 population and representing an increase of over 50% from 2003 (Figure 7.1).⁹ Chlamydia control and prevention strategies including increased screening and detection in asymptomatic individuals, targeted health promotion and screening campaigns have probably contributed to the rise in rates since 2006.^{6,20}

Rising chlamydia notification rates have been reported for all Australian states and territories (Figure 7.1). Rates for the Northern Territory have been three to four times higher than

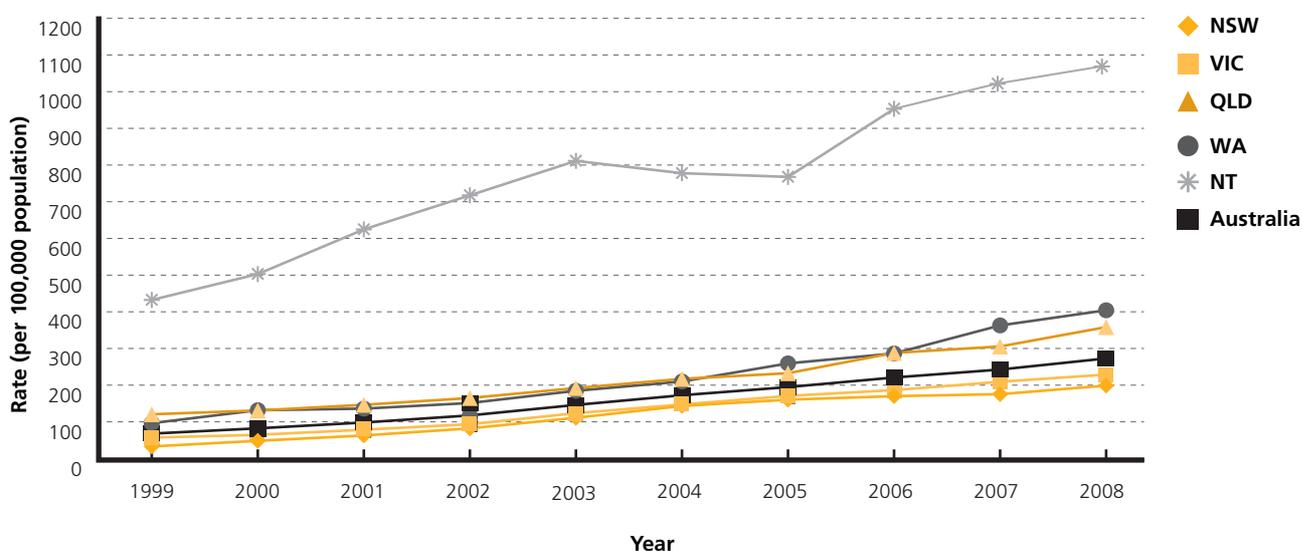
other states and territories and reflect the higher incidence in Aboriginal and Torres Strait Islander communities.^{21,22} However, the validity of the higher incidence in Aboriginal and Torres Strait Islander communities is not known as higher testing rates in these communities through health intervention programs may have inflated notifications.

Chlamydia notification rates in Western Australia and Queensland also exceeded those nationally. The Western Australian increase, from 215 per 100,000 population in 2004 to 409 per 100,000 in 2008, has been attributed to a real increase in incidence and prevalence as well as increased testing and more complete notification.²¹ The incidence of chlamydia in NSW has been lower than other states and territories (Figure 7.1), including South Australia, Tasmania and the ACT.

Chlamydia notifications by age and gender

Chlamydia notification rates are highest among younger age groups (less than 30 years, but with the greatest burden in women aged 15 to 24)²³ and are increasing. In 2008, the highest chlamydia notification rates were among females aged 15 to 24 years, substantially higher than in their male counterparts (Figure 7.2). However, the differences between females and males need to be interpreted cautiously as STI testing rates have differed between the sexes (see Figure 7.6).²⁴ From age 30 the difference in notification rates between males and females decreases, with slightly higher notification rates in older male age groups.

Figure 7.1: Chlamydia notifications in Australia and selected states and territories, 1999 to 2008



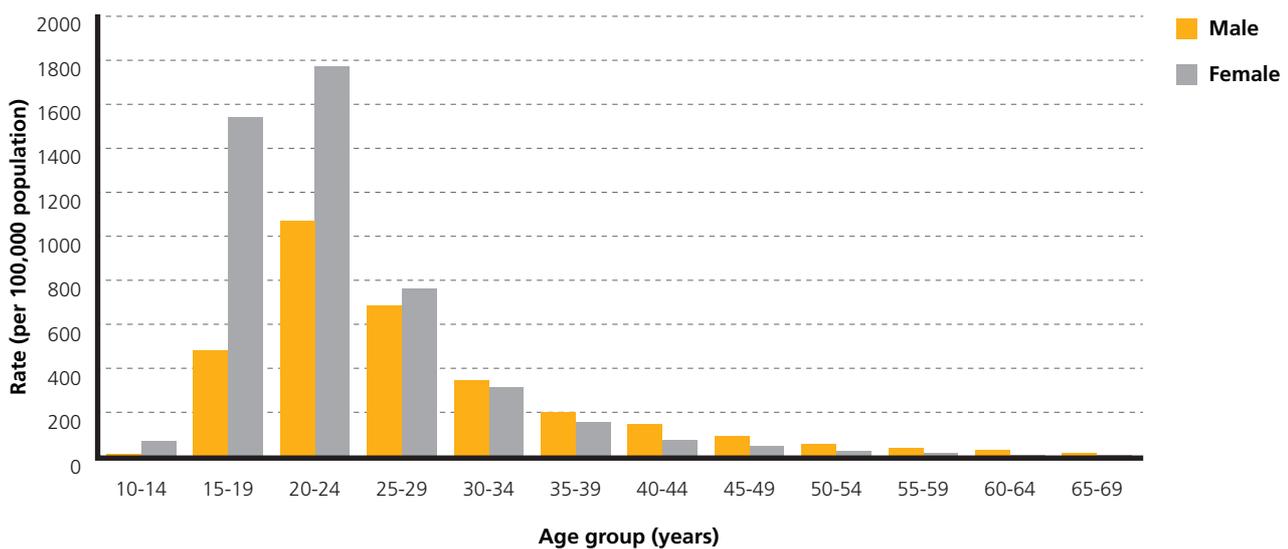
Source: Communicable Diseases Surveillance Online Database, National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Chlamydia notifications in Aboriginal and Torres Strait Islander populations

Chlamydia notification rates are higher in Aboriginal and Torres Strait Islander than non-Aboriginal populations (Figure 7.3), but some of this difference is attributable to health interventions that have increased STI testing in Aboriginal and Torres Strait Islander communities.^{8,16,24} The Northern Territory, for example, has high notification rates

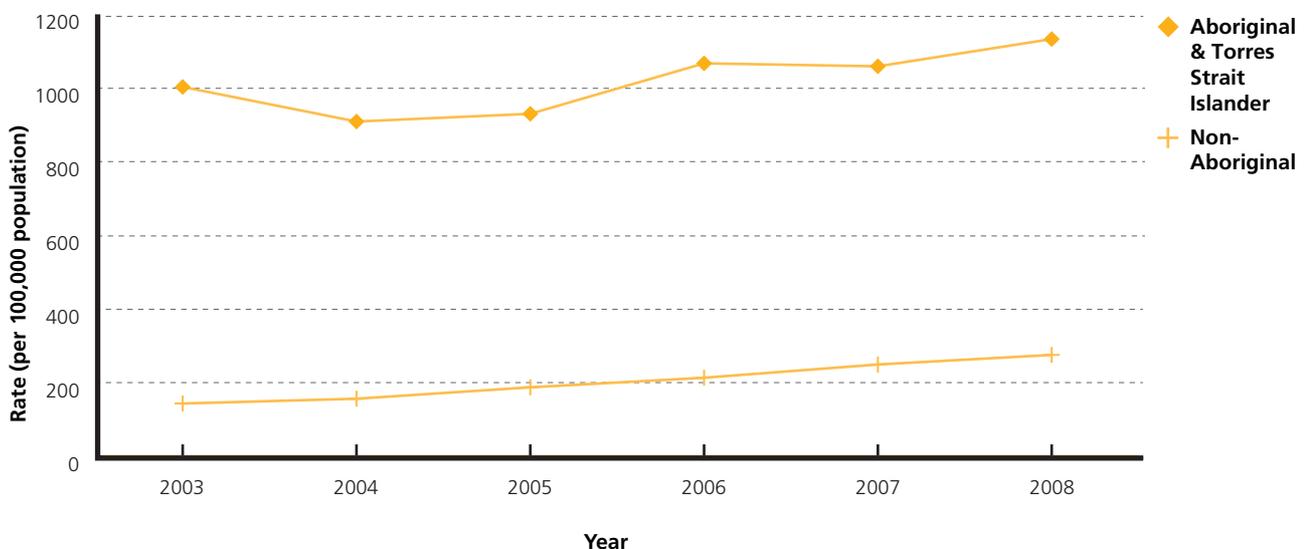
in Aboriginal and Torres Strait Islanders, largely owing to the impact of the National Sexually Transmissible Infections Strategy from 2005 to 2008.⁴ This strategy has led to increased chlamydia testing, with a concomitant increase in detection. Since 2005 there has also been more reliable data linkage in STI reporting systems for Aboriginal and Torres Strait Islander populations. In Western Australia, the notification data for Aboriginality were 99% complete by age and gender in 2005, increasing the number of notifications that could reliably be reported as occurring in Aboriginal and Torres Strait Islander people.⁵

Figure 7.2: Chlamydia notifications by age group and gender, Australia, 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.3: Chlamydia notifications in Aboriginal and Torres Strait Islander and non-Aboriginal Australians, 2003 to 2008



Note: Includes data from jurisdictions where reporting of Aboriginal status was greater than 50% complete: Northern Territory, South Australia, Tasmania, Victoria, Western Australia.

Source: NCHECR. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Reports 2008 and 2009. National Centre in HIV Epidemiology and Clinical Research, The University of New South Wales, Sydney, NSW.

7.2.2 Chlamydia notifications: New South Wales

Chlamydia notifications in NSW increased four-fold between 2000 and 2007 (Table 7.4),²⁵ which was attributed to the enhanced screening of high risk groups such as Aboriginal and Torres Strait Islander people, men who have sex with men (MSM) and young people.²⁶ The increase in notifications since 2006 has also been attributed to the Medicare subsidisation of urine-based chlamydia testing, which has enabled testing to be more accessible in general practice.²⁷ However, whether these factors account for the significant overall NSW increase requires further investigation. In particular, there are no clear indications of whether the increase also reflects changes in sexual behaviours such as a decrease in the age of sexual initiation or the use of condoms, or an increase in the number of sexual partners or the frequency of partner changes.

New South Wales chlamydia notifications by gender and age

From 1998 to 2007 the age-standardised notification rate for chlamydia in NSW increased to reach 184 per 100,000 population (Figure 7.4). This was more marked in females, partly reflecting increased opportunistic chlamydia testing among asymptomatic sexually active young women.¹⁷ This is supported by Medicare Australia data that show the highest number of services in 2008 were accessed by 15 to 24 year old women (5,952 per 100,000, Figure 7.6).

Most of the increase can be attributed to notifications in people aged 29 or less, particularly in 20 to 24 year olds where notifications since 2000 increased more than three-fold (Figure 7.5).

Table 7.4: Chlamydia notification by gender, NSW 1998 to 2007

	YEAR									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cases										
Female	242	1102	1611	1990	2611	3440	4240	4847	5122	5279
Male	320	1332	1867	2475	3157	4282	5724	6363	6888	7075
Total	565	2445	3488	4473	5778	7736	9985	11233	12029	12391
Rate*										
Female	7	34	49	61	79	104	128	145	152	155
Male	10	42	59	77	98	132	175	194	208	213
Total	9	38	54	69	88	118	151	169	179	184

* Age standardised rate per 100,000 population.

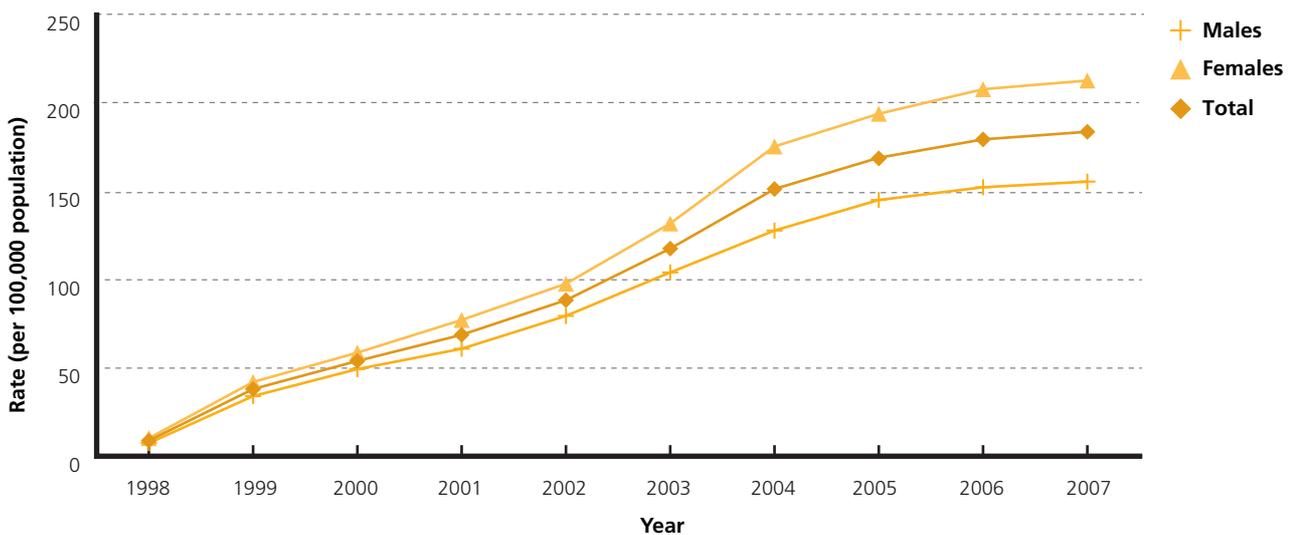
Source: Population Health Division. 2008. Report of the Chief Health Officer 2008. Summary Report. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 06Jan2011.

Medicare claims for chlamydia testing

In 2007 approximately 50,000 claims were processed in NSW for chlamydia testing under Medicare item number 69316. By 2008 the number of claims had increased to over 81,000, corresponding to 1,153 tests per 100,000 people. The 15 to 24 year age group had the highest

test rates, with 952 males and 5,952 females tested per 100,000 population (Figure 7.6). This gender difference may reflect healthcare seeking behaviour differences between young men and women generally, the targeted screening of women and increased opportunities for screening concomitant with Pap tests. However, these data suggest that the male disease pool is not being adequately addressed.

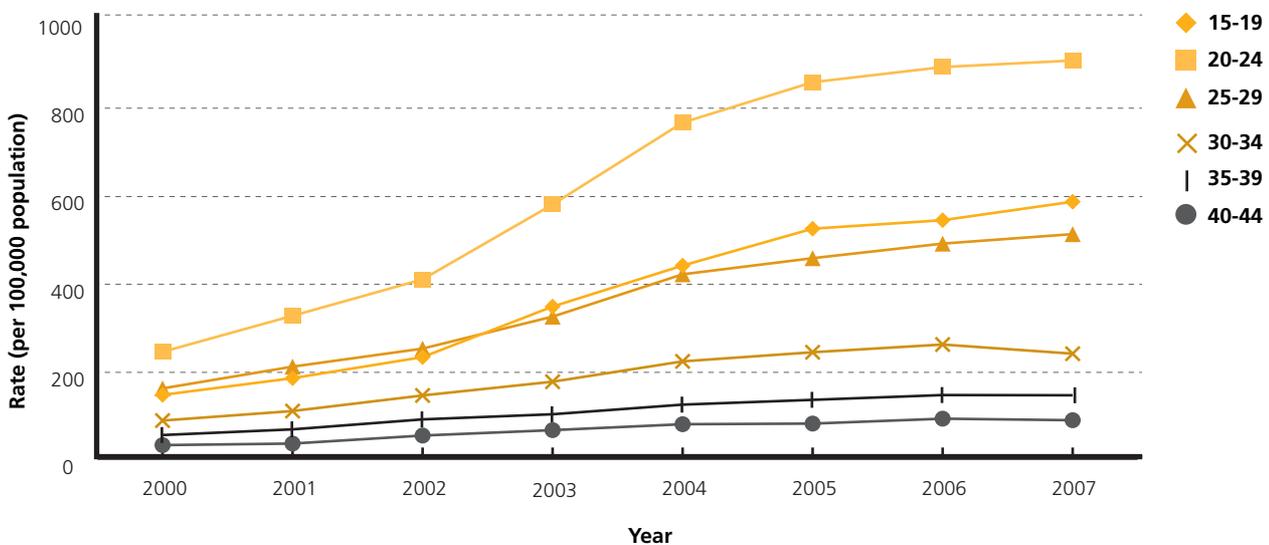
Figure 7.4: Chlamydia notifications by gender, NSW, 1998 to 2007



Note: Age standardised rate.

Source: Population Health Division. 2008. Report of the Chief Health Officer 2008. Summary Report. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 06Jan2011.

Figure 7.5: Chlamydia notifications by age group, NSW, 2000 to 2007



Note: ages 45 and greater have rates less than 50 in 100,000.

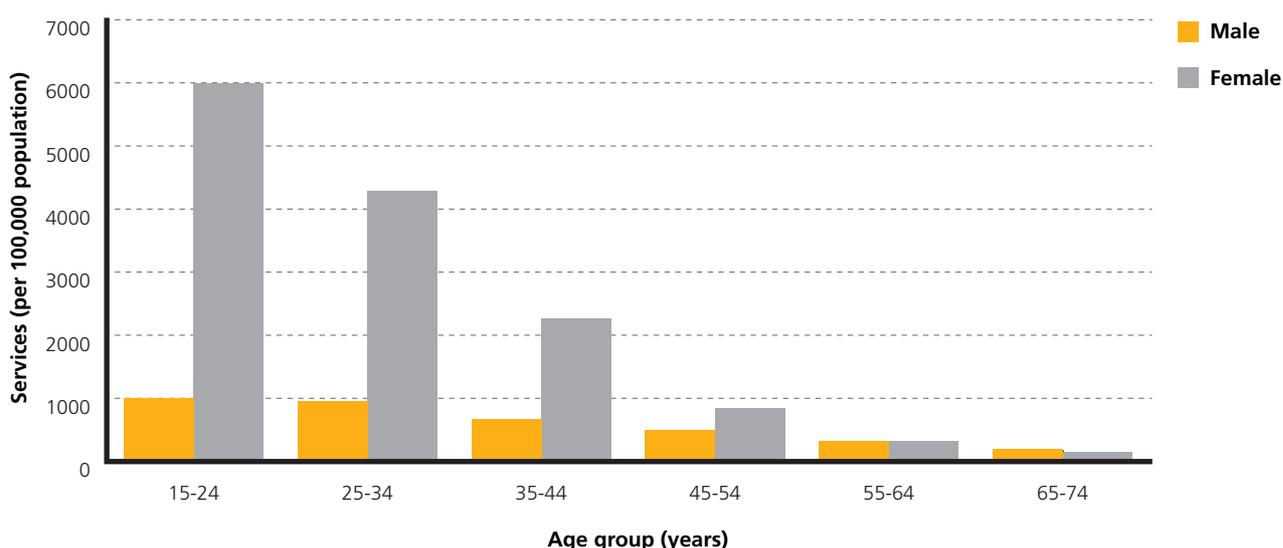
Source: NSW Notifiable Disease Surveillance Database, Communicable Diseases Branch 2009, NSW Department of Health.

7.2.3 Chlamydia notifications: New South Wales Area Health Services

NSW Department of Health data averaged for 2005 to 2007 indicate that the North Coast Area Health Service had the highest notification rate for chlamydia (249 per 100,000 population), while Sydney West Area Health Service had the lowest (116 per 100,000 population, Figure 7.7).

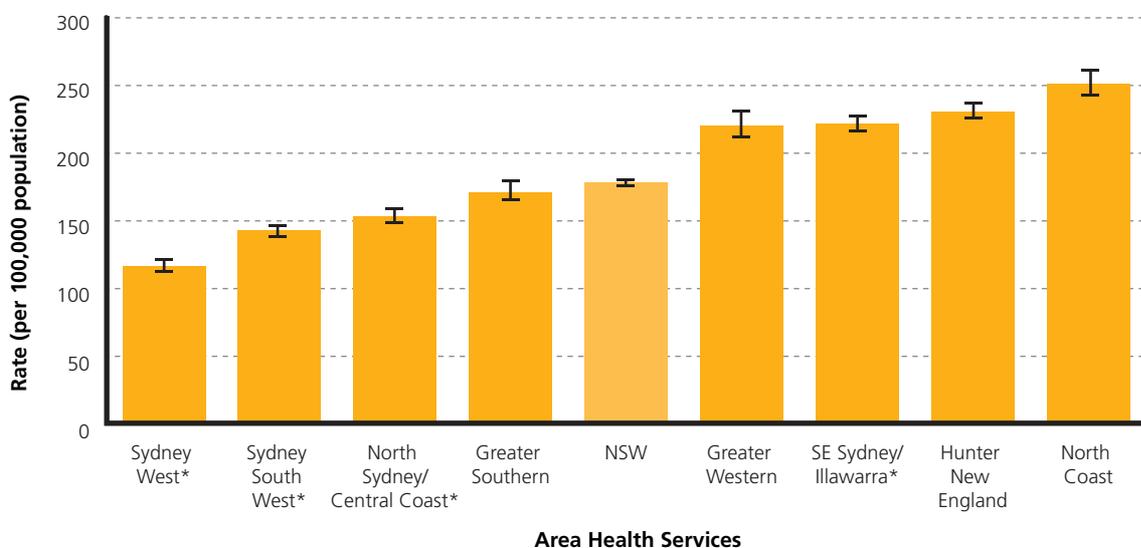
Non-metropolitan Area Health Services (North Coast, Hunter New England, Greater Western and Greater Southern) reported higher notification rates than metropolitan areas, except for South Eastern Sydney and Illawarra Area Health Service. The significantly higher notification rate for chlamydia in South Eastern Sydney and Illawarra Area Health Service is partly because this Area Health Service includes the Eastern Sydney catchment with large MSM and transient young populations, both generally at higher risk for sexually transmissible infections.²⁸

Figure 7.6: Chlamydia tests by age group, MBS item 69316, NSW, 2008



Source: Medicare Australia Statistics. Available at: www.medicareaustralia.gov.au/statistics/mbs_item.shtml.

Figure 7.7: Chlamydia notifications, NSW Area Health Services, 2005 to 2007



Notes. Data averaged 2005 to 2007, bars represent 95% confidence intervals. Age-standardised rate.

* = Metropolitan Area Health Services.

Source: Population Health Division. Report of the Chief Health Officer. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

7.3 Gonococcal Infection

The terms *gonorrhoea* and *gonococcal infection* are often used interchangeably, however, they can also describe different things. A person with gonorrhoea is positive for and displaying symptoms of gonococcal infection; where gonococcal infection merely describes the presence of the bacterium *Neisseria gonorrhoeae*, however this person may be asymptomatic. The National Notifiable Diseases Surveillance System (NNDSS) only collects information on gonococcal infection, so this term is used when describing data from the NNDSS.

Gonorrhoea is a sexually transmitted bacterial infection that presents with symptoms of abnormal discharge and pain at urination. Infection in women is more likely to be asymptomatic and can lead to pelvic inflammatory disease (PID), tubal infertility and neonatal infection.²⁹ Current standard antimicrobial treatment for gonorrhoea has been highly effective. However, resistance is now emerging to both first line and cephalosporin regimens, raising concerns for future treatment options and the potential effects of treatment failure on disease spread.³⁰⁻³² Furthermore, gonococcal infection has been shown to amplify HIV transmission risk, and the development of resistant infection may have implications beyond the spread of gonorrhoea alone.³³

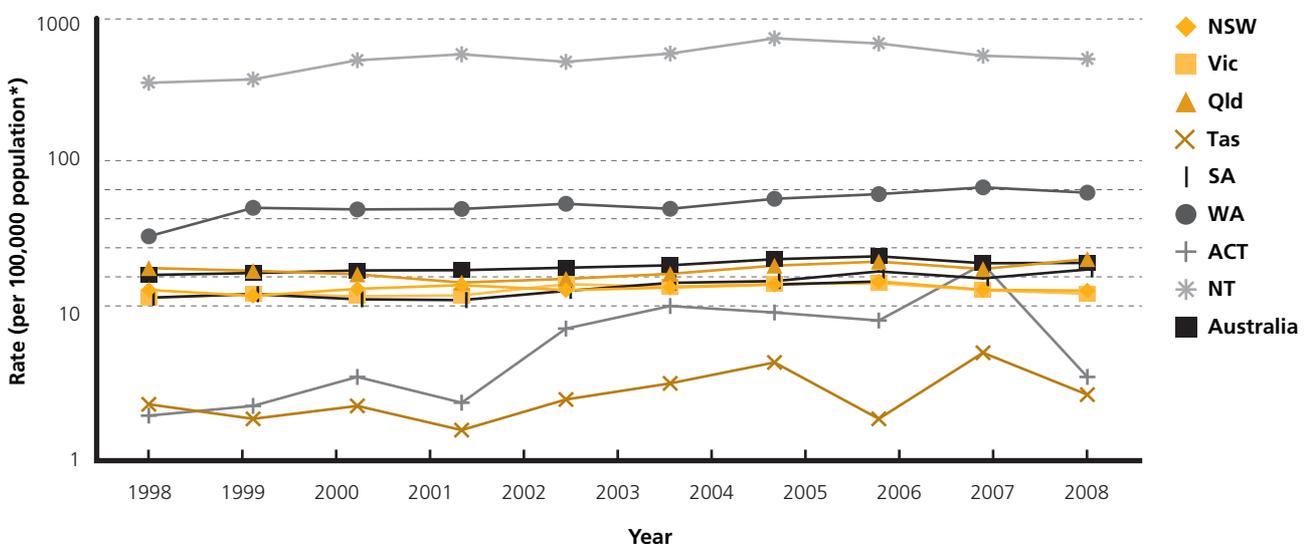
Infection rates vary within countries geographically, by population subgroup, age and gender.³⁴ Infections are more prevalent among socio-economically disadvantaged population groups³⁵ and in Australia this particularly translates into high rates in some Aboriginal and Torres Strait Islander communities.³⁶

Whilst gonorrhoea rates in the Australian general community are relatively low, extremely high rates have been found among residents of Aboriginal and Torres Strait Islander communities in rural and remote areas.²² In urban populations, gonorrhoea is found most commonly among men who have sex with men, commercial sex workers in non-approved premises, clients of sex workers, and international travellers.^{29,36-38}

7.3.1 Gonococcal infection notifications: Australia

Gonococcal infection notification rates in the Australian general community are relatively low (Figure 7.8). Nonetheless, the National Notifiable Diseases Surveillance System shows a steady rise in gonococcal infection notifications in Australia, from 5,448 notifications in 1998 to 7,697 notifications in 2008, with the notification rate peaking at 41.4 per 100,000 in 2006 (Figure 7.8). Rates in the Northern Territory were substantially higher than all other states (731 per 100,000 population in 2008; about 20 times the national rate of 37 per 100,000), while rates in Western Australia were approximately double the national average (80 per 100,000 in 2008). In both the Northern Territory and Western Australia the higher gonococcal infection notification rates are attributed to high infection rates in the larger Aboriginal and Torres Strait Islander populations in these jurisdictions. Rates for Queensland, New South Wales, South Australia and Victoria have clustered slightly below the national average, with

Figure 7.8: Gonococcal infection notifications, Australian states and territories, 1999 to 2008



Note: * Axis plotted on logarithmic scale

Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

the smaller jurisdictions of Tasmania and the ACT showing the lowest rates (generally close to or below 10 cases per 100,000 population.)

In 2008, the highest notification rates were in males of all ages, except in the 15 to 19 year age group (Figure 7.9). There are also gender variations in rates across jurisdictions, with the Northern Territory routinely reporting higher rates of gonococcal infection among females (for example in 2008, 748 per 100,000 in females compared to 677 per 100,000 in males). This is attributed to heterosexual transmission in Aboriginal and Torres Strait Islander communities in the Northern Territory.^{8,24}

7.3.2 Gonorrhoea notifications: New South Wales

Notification rates for gonococcal infection in NSW have shown an increasing trend over the period 1998 to 2007 (Figure 7.10). Despite the decline in notifications from 2006 to 2007 (driven by fewer cases in NSW men), over the ten year period 1998 to 2007 notifications increased in NSW by 25%.³⁹

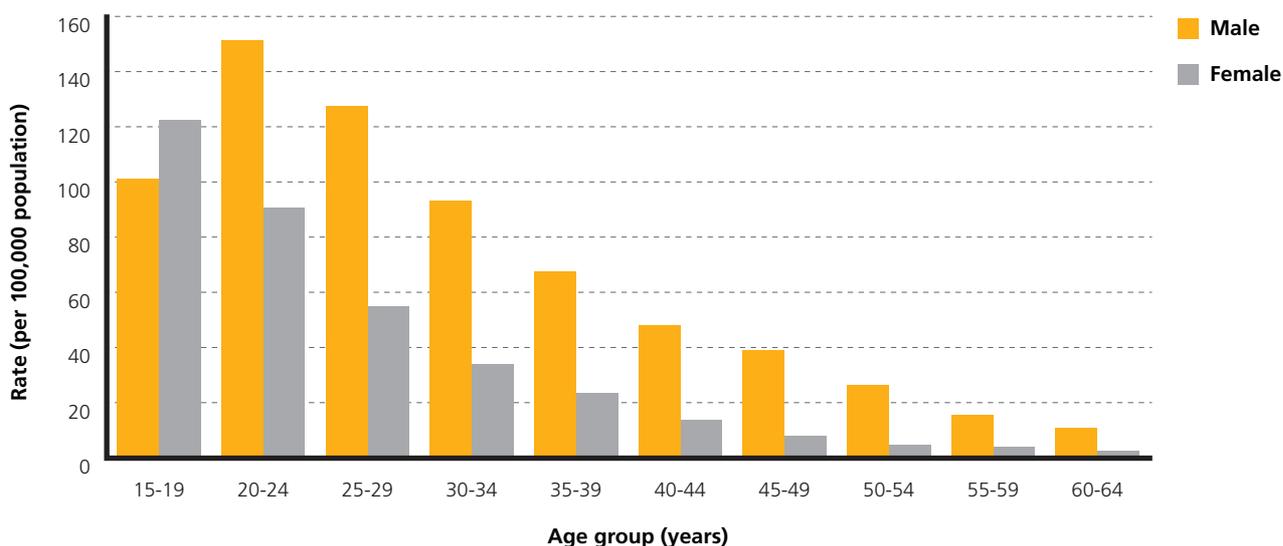
In males, notification rates increased from around 30 per 100,000 in 1998 to almost 45 per 100,000 in 2006, with a decrease to 35 per 100,000 in 2007. In females, while rates have been substantially lower than males, the increase has

been proportionately larger, approximately doubling from 3 per 100,000 to 6 per 100,000 in the period 1998 to 2007. In absolute terms, the number of notifications in 1998 was 1,051, which had climbed to 1,722 in 2006 but declined to 1,368 in 2007. In 2008 notifications in NSW declined again slightly to 1331.

The increase in notifications from 2000 to 2007 has been most pronounced in people aged between 20 and 29 years, as was the decrease from 2006 to 2007 (Figure 7.11). A similar pattern was seen in people aged 35 to 39 years however at lower rates. The largest overall increase was in notifications and rates for people aged 20 to 24 years, with a near doubling of the rate of gonorrhoea notifications from 2000 to 2007 in this age group. All ages groups up to the age of 44 showed a decline in gonorrhoea rates from either 2005 or 2006.

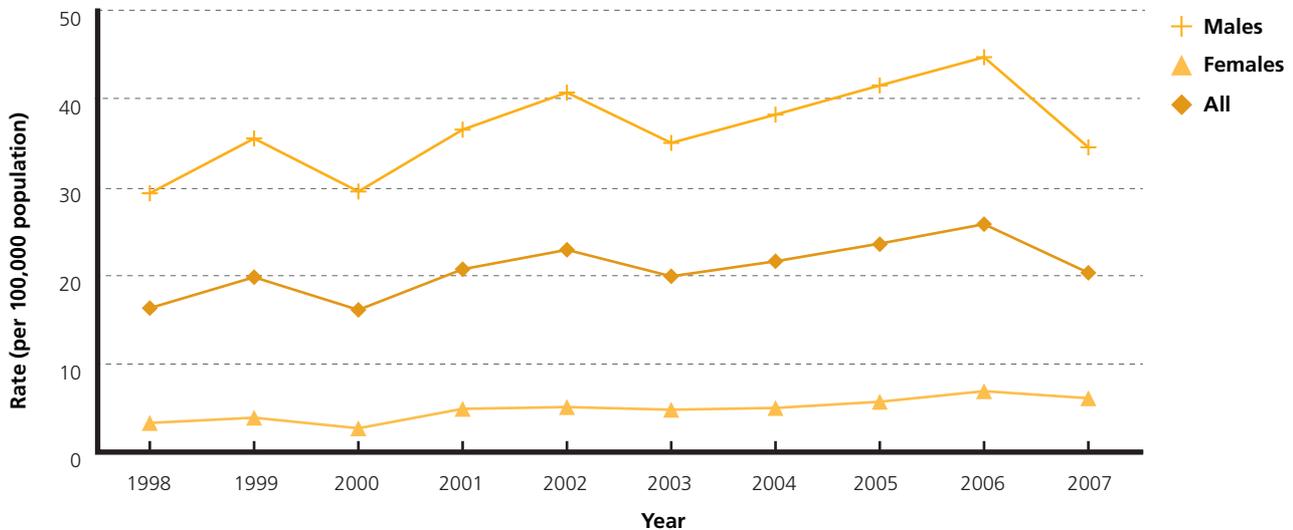
Rates were lower in older people in NSW (Figure 7.12), and for ages 45 to 54 the rate of gonococcal notifications increased overall but showed a similar decline from 2005 or 2006 that was observed in notifications for people younger than 45. However, for people 55 and older, notification rates increased from 2005 and did not show any decline from 2006 to 2007. This trend reflects an increase in gonorrhoea among older MSM who are more likely to engage in unprotected anal intercourse leading to infection with urethral and anal gonorrhoea.³⁸

Figure 7.9: Gonococcal infection notifications by age group and gender, Australia, 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.10: Gonorrhoea notifications by gender, NSW, 1998 to 2007

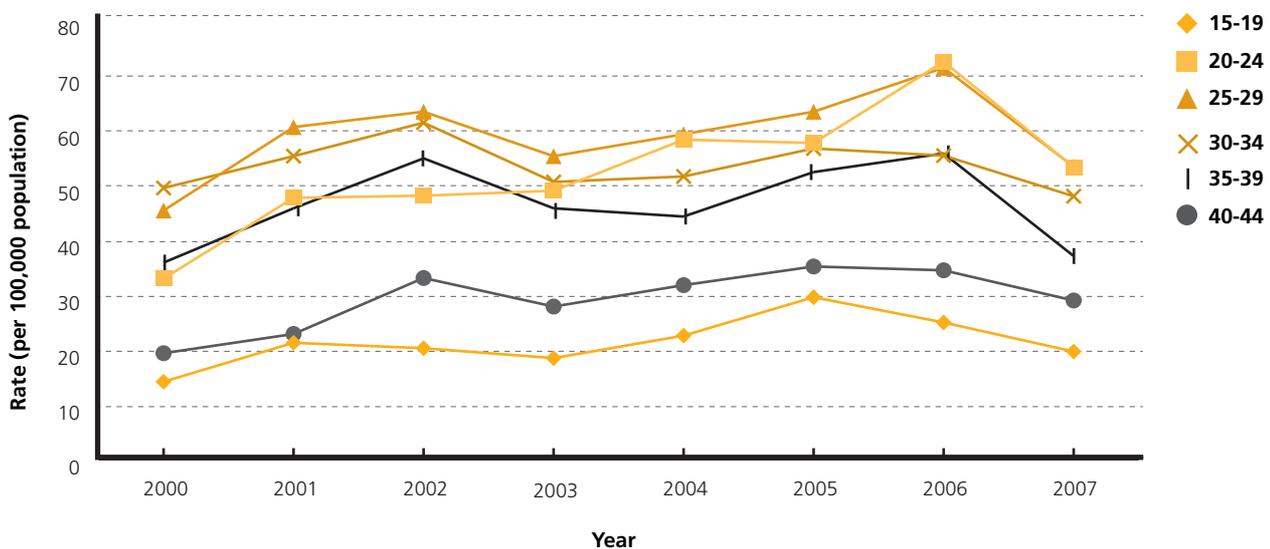


Note: Age standardised rate.

Source: Population Health Division. Report of the Chief Health Officer. Sydney: NSW Department of Health.

Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

Figure 7.11: Gonorrhoea notifications by age group (15 to 44), NSW, 2000 to 2007

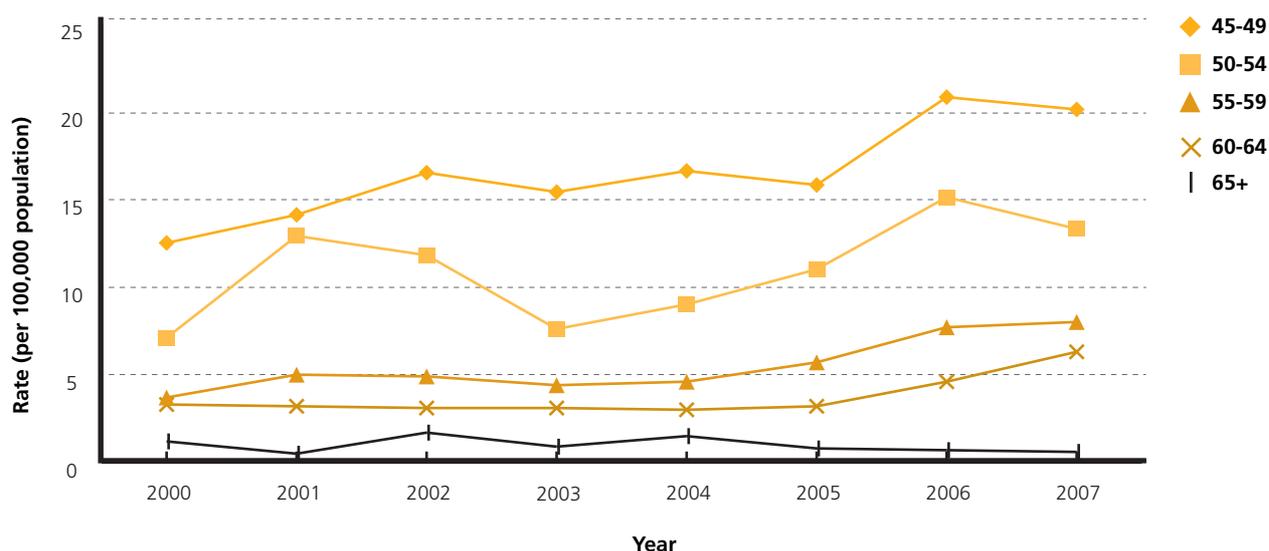


Source: NSW Notifiable Disease Surveillance Database, Communicable Diseases Branch 2009, NSW Department of Health.

7.3.3 Gonorrhoea notifications: New South Wales Area Health Services

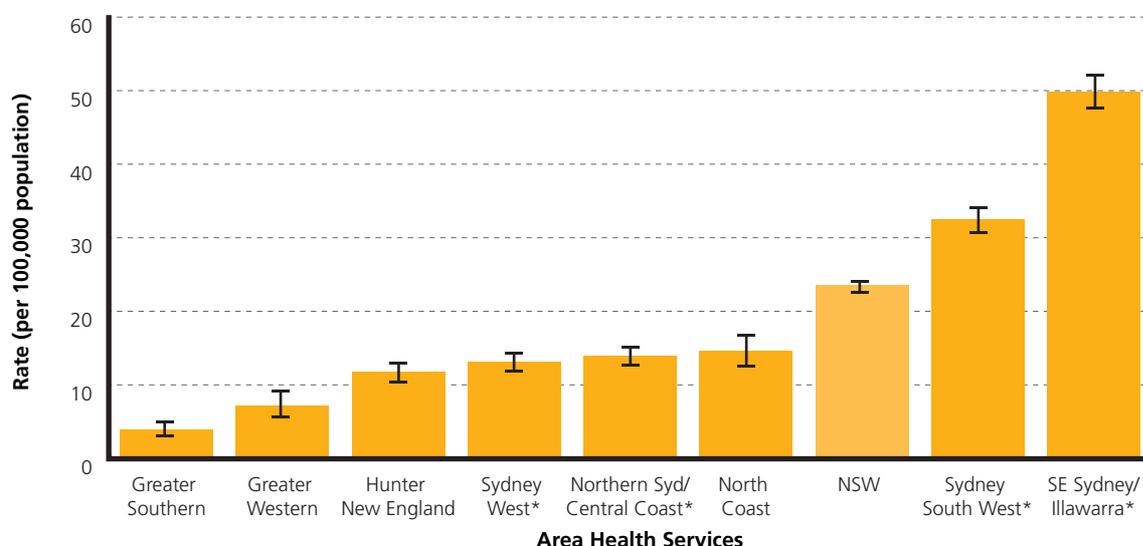
There were relatively higher rates of notification for gonorrhoea from South Eastern Sydney and Illawarra, and Sydney South West Area Health Services, and relatively lower rates from Greater Southern and Greater Western Area Health Services (Figure 7.13). The higher rates in South Eastern Sydney and Illawarra area are attributed to the large inner Sydney population of MSM.

Figure 7.12: Gonorrhoea notifications by age group (45 or older), NSW, 2000 to 2007



Source: NSW Notifiable Disease Surveillance Database, Communicable Diseases Branch 2009, NSW Department of Health.

Figure 7.13: Gonorrhoea notifications, NSW Area Health Services, 2005 to 2007



Notes: Data averaged 2005 to 2007, bars represent 95% confidence intervals. Age standardised rate.

* = Metropolitan Area Health Services.

Source: Population Health Division. Report of the Chief Health Officer. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

7.3.4 Gonococcal resistance to treatment

Gonorrhoea has routinely been managed as a curable infection. However, since the initial application of sulphonamides and penicillin in the 1930s the bacterium has shown to be adaptable and treatments have been modified as resistance has resulted in treatment failure. Continued microbial adaptation has now resulted in widespread antimicrobial resistance, with a general failure of oral treatments and emerging resistance to cephalosporins.⁴⁰ This raises the risk that the disease could return to more widespread population infection and calls have been made for appropriate monitoring and public health strategies to address this threat.^{40,41}

Resistance in Australia is monitored by the Australian Gonococcal Surveillance Programme (AGSP).⁴² Gonococcal isolates are routinely submitted to the Programme for assessment of the resistance of the isolates to antibiotics. Resistance to penicillin, quinolone antibiotics and the cephalosporin ceftriaxone has been detected in Australia for several years and the proportion of isolates that showed resistance to penicillin and quinolone remained high in 2009 (Figure 7.14).

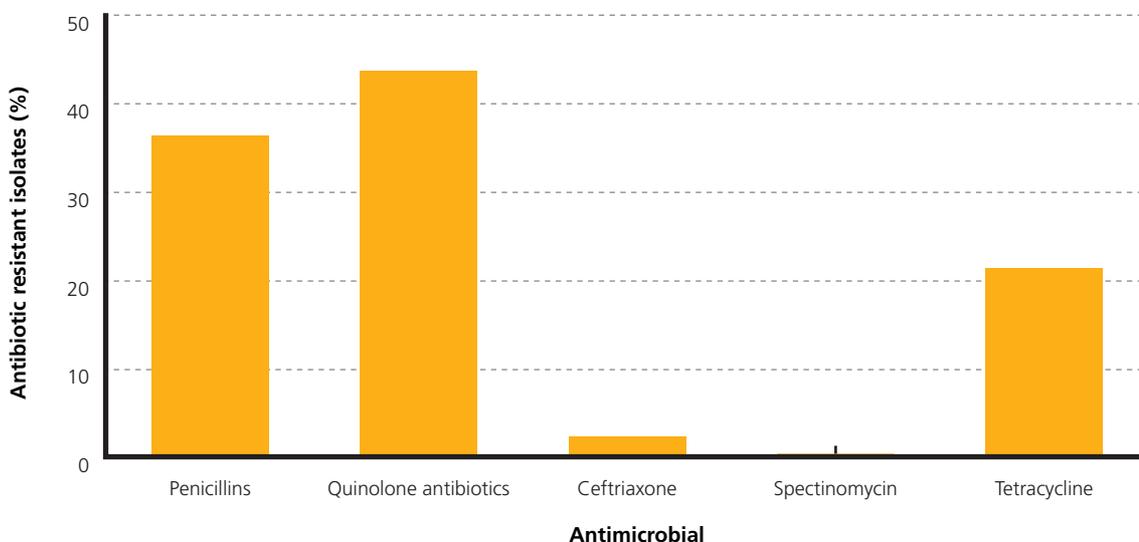
Gonorrhoea infection in Australia remains contained to several defined subpopulations. For example, in the Northern Territory in heterosexual Aboriginal and Torres

Strait Islander communities and in NSW in MSM.² However, one source of infection is through acquisition overseas or with partners from overseas, and combined with the acquisition of treatment resistant infection could potentially re-introduce gonorrhoea into the wider Australian community.²⁹

Data were limited on countries of origin for the Australian isolates tested in 2009, however, where available approximately half of penicillin resistant infections were acquired in Australia and half overseas. The Western Pacific and South East Asia were the most common overseas source countries, including Thailand, the Philippines and Indonesia, but cases were also reported from China, Vietnam and Cambodia. Some cases were reported to have been sourced in Europe, notably The Netherlands and the UK.³²

The majority of quinolone resistant isolates in 2009 were acquired in Australia (68%). The primary sources of the 32% of overseas acquired cases were similar to those for penicillin resistance, with additional acquisition more widely in Europe (Germany, Switzerland, Italy), Asia (Sri Lanka, Hong Kong) and elsewhere (South Africa, USA and Iran).³²

Figure 7.14: Gonorrhoea antibiotic resistant isolates, Australia, 2009



Source: The Australian Gonococcal Surveillance Programme. Annual Report of the Australian Gonococcal Surveillance Programme, 2009. *Commun Dis Intell* 2010; 34: 89-95.

7.4 Syphilis

Syphilis is relatively rare in developed countries.⁴³ In Australia syphilis is notifiable and the National Notifiable Diseases Surveillance System (NNDSS) separates syphilis notifications into syphilis of less than two years duration, more than two years or unknown duration and congenital syphilis. However, reporting of syphilis categorised as infectious (less than 2 years duration) versus greater than 2 years duration or unknown was only undertaken by all jurisdictions from 2004.⁴⁴

Syphilis is primarily transmitted by sexual contact and early syphilis can be transmitted through oral, anal or vaginal sex. Early syphilis (primary, secondary or early latent) is generally symptomatic and considered infectious. Once the infection becomes latent, the carrier is usually asymptomatic and only minimally infectious. In approximately 50% of cases latent syphilis can progress to cause tertiary disease which may manifest in diverse neurological and cardiovascular complications.

Transmission can be non-sexual through close contact in the highly contagious early stages of the infection, and congenitally, through mother to child. Screening for syphilis infection is a routine antenatal test in Australia.

7.4.1 Syphilis notifications: Australia

Except for the Northern Territory, infectious syphilis notifications to the Australian National Notifiable Diseases Surveillance System were low (<10 per 100,000 population) but increased slightly for all states and territories from 2004 to 2007, followed by an overall decline from 2007 to 2008 (Figure 7.15).^{8,44} This decrease was not seen in notifications from Western Australia, where the number of notifications increased from 2007 to 2008 (from 98 to 179) and the rate of infectious syphilis in this state continued to climb.

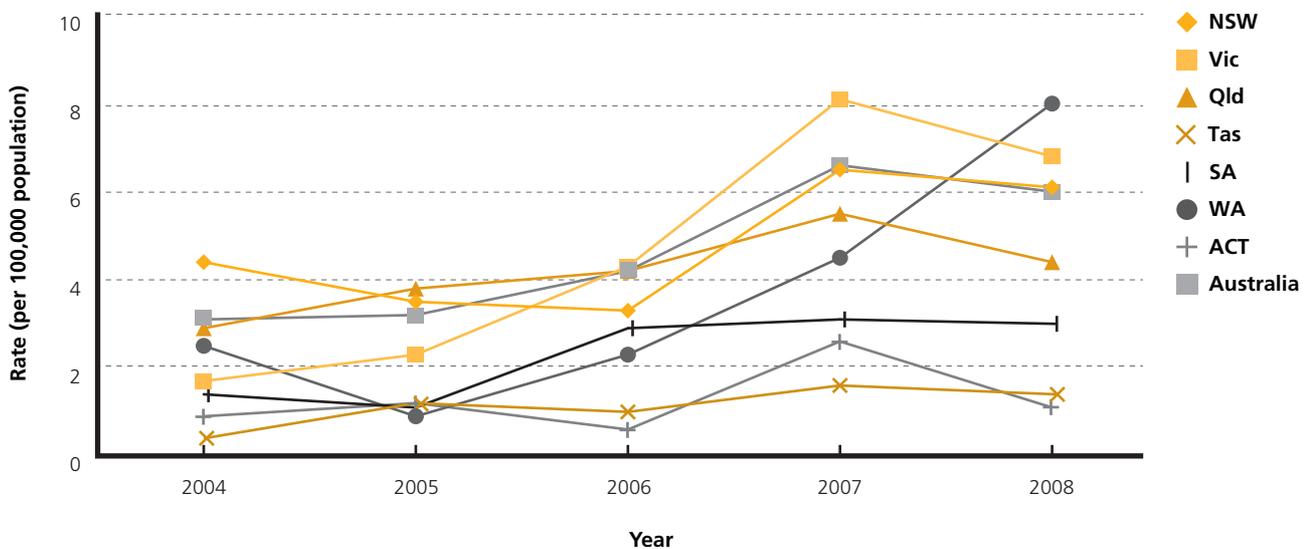
The rate of infectious syphilis in the Northern Territory rose sharply from nearly 30 per 100,000 population in 2004 and was notably higher than any other state or territory (Figure 7.16). The rate in the Northern Territory continued to climb and peaked in 2006 at nearly 70 cases per 100,000 population, and although the rate had declined sharply by 2008 remained considerably higher than the rest of Australia.

The rate and changes in the rate of infectious syphilis in the Northern Territory have largely been determined by diagnoses in Aboriginal and Torres Strait Islander communities, whereas in other jurisdictions diagnoses in MSM is the primary determinant.^{2,45,46}

There were less consistent patterns for the rates of late syphilis (greater than two years or where duration was unknown), except for the Northern Territory where rates were again substantially higher than other jurisdictions (Figure 7.17, Figure 7.18). In contrast to early syphilis in the Northern Territory, the rate of late syphilis has not declined substantially after reaching a peak of 81 cases per 100,000 population in 2007.

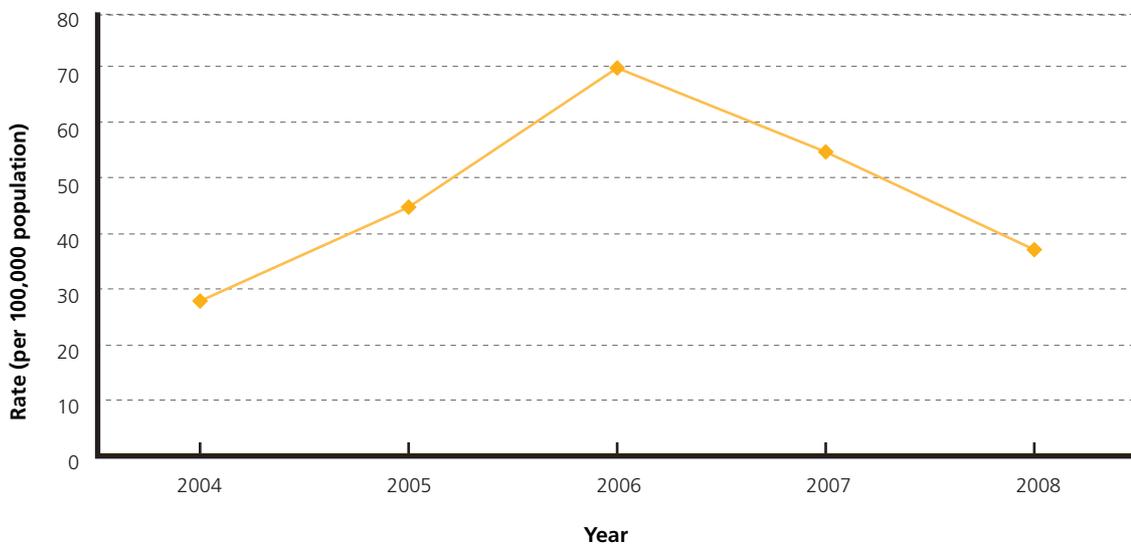
Congenital syphilis is rare in Australia: the number of cases reported has declined since 2002 (Figure 7.19) and is negligible on a per population basis (less than 1 per 1,000,000). No cases were recorded in South Australia, Tasmania, Western Australia or the Australian Capital Territory from 2002 to 2008. From 2007, less than 10 cases have been reported nationally per year.

Figure 7.15: Infectious syphilis notifications (<2 years duration), Australian states and territories except the Northern Territory, 2004 to 2008



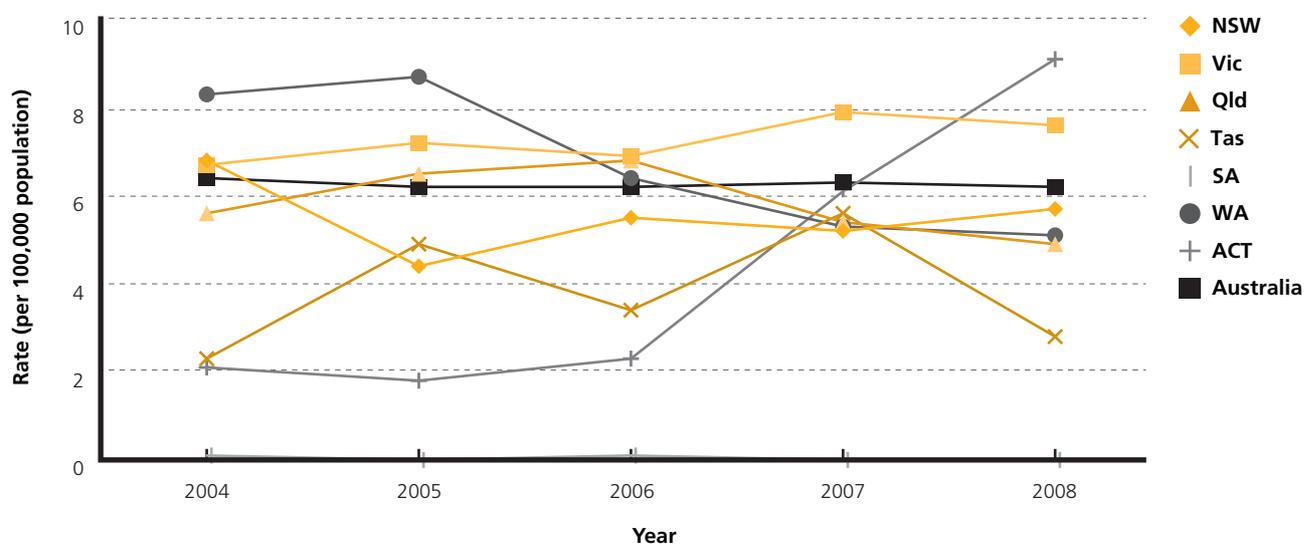
Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.16: Infectious syphilis notifications (<2 years duration), Northern Territory, 2004 to 2008



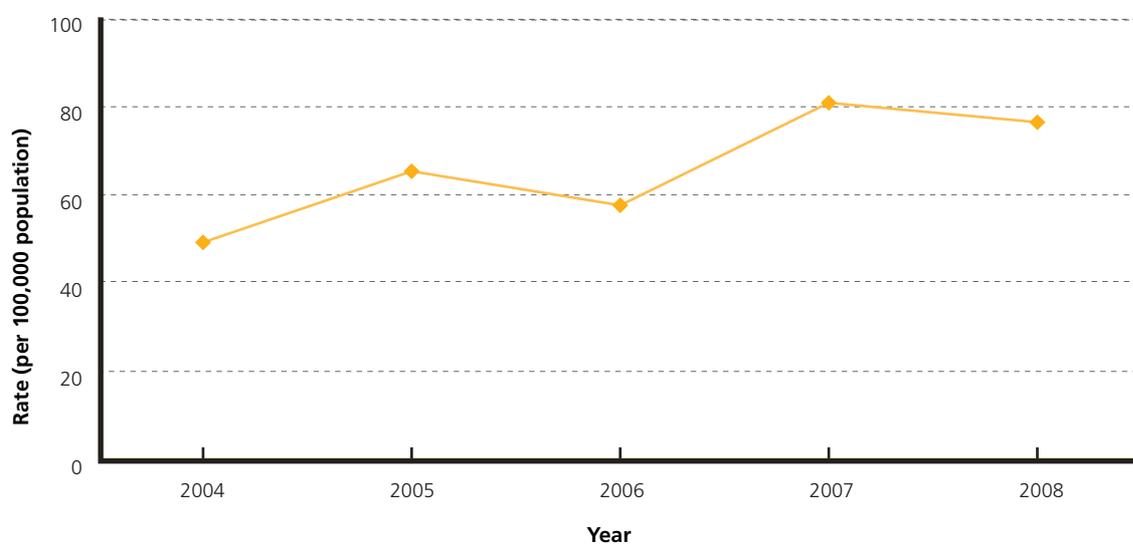
Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.17: Infectious syphilis notifications (>2 years or duration unknown), Australian states and territories except the Northern Territory, 2004 to 2008



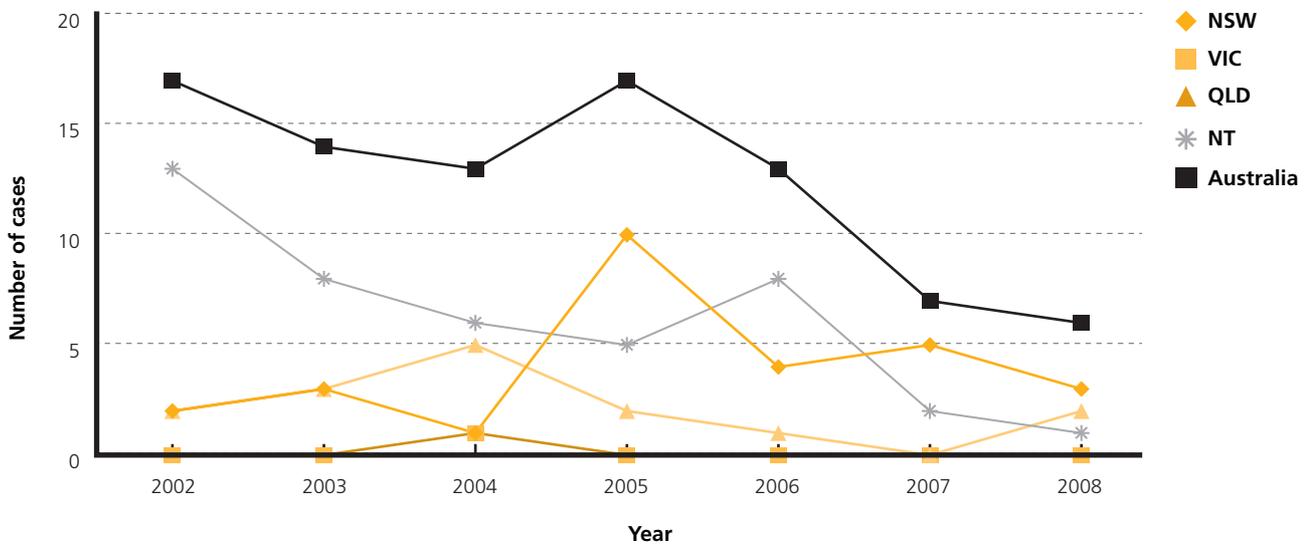
Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.18: Infectious syphilis notifications (>2 years or duration unknown), Northern Territory, 2004 to 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.19: Congenital syphilis notifications, Australian states and territories, 2002 to 2008



Note: No cases were recorded in SA, TAS, WA or the ACT.

Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

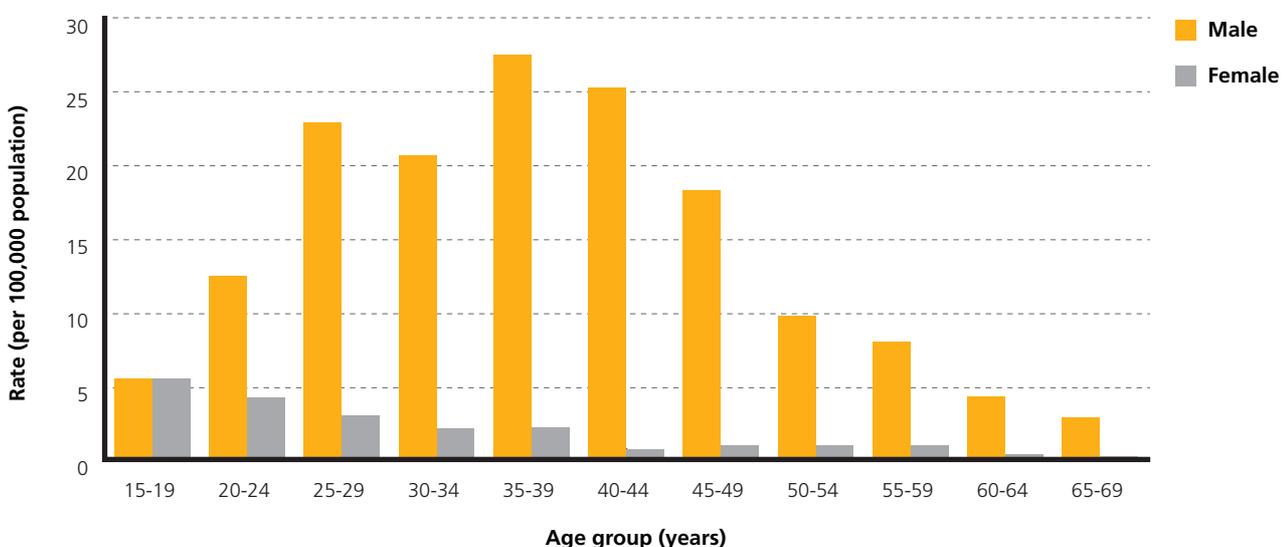
Infectious syphilis notification by age group and gender

There were 1,164 notifications of syphilis of less than two years duration in males in 2008, representing 88% of notifications and a rate of 10.9 cases per 100,000 population compared to 1.4 per 100,000 females. Male syphilis rates were highest in those aged 35 to 39 years (27.3 per 100,000), while the highest rate for females occurred in those aged 15 to 19 years (5.3 per 100,000): equal to males in that age range, Figure 7.20).

Syphilis increased in the period 2004 to 2008 for all age groups in men except those aged 75 years and over. The greatest increase was in the 2006 to 2007 period (Figure 7.21), where rates doubled for men aged 30 to 44 years (from 11.5 to 24.3 per 100,000) and tripled in men aged 45 to 59 and 60 to 74 (4.1 to 12.2 per 100,000 and 1.3 to 3.0 per 100,000 respectively).

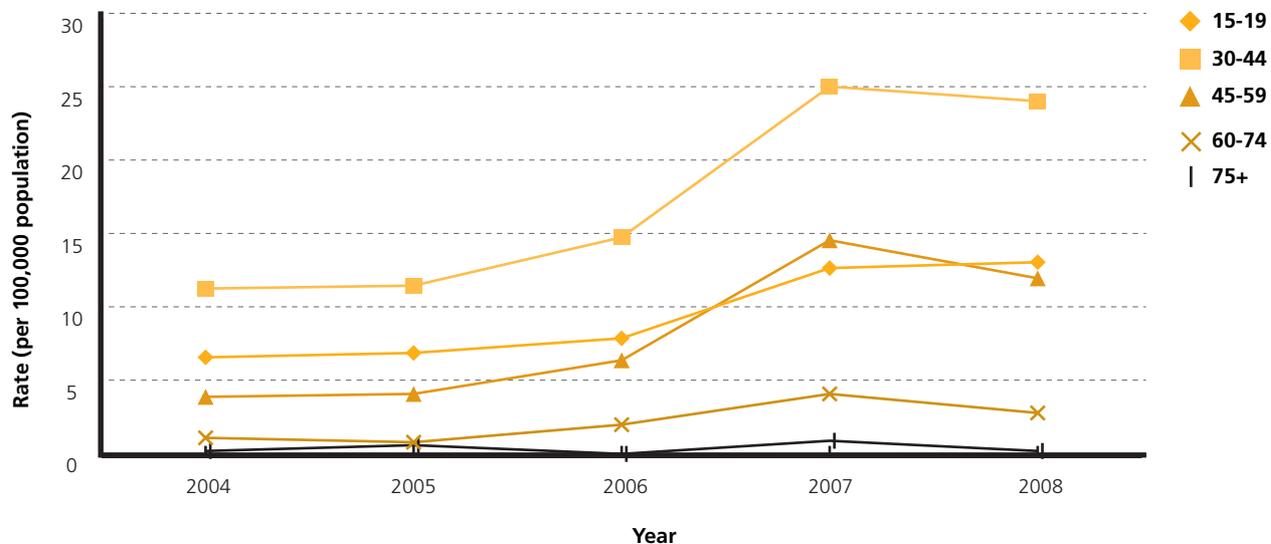
In females, syphilis rates have similarly increased over 2004 to 2008, but this increase was comparatively slight compared to that in males (Figure 7.22).

Figure 7.20: Infectious syphilis notifications (< 2yrs duration) by age group and gender, Australia, 2008



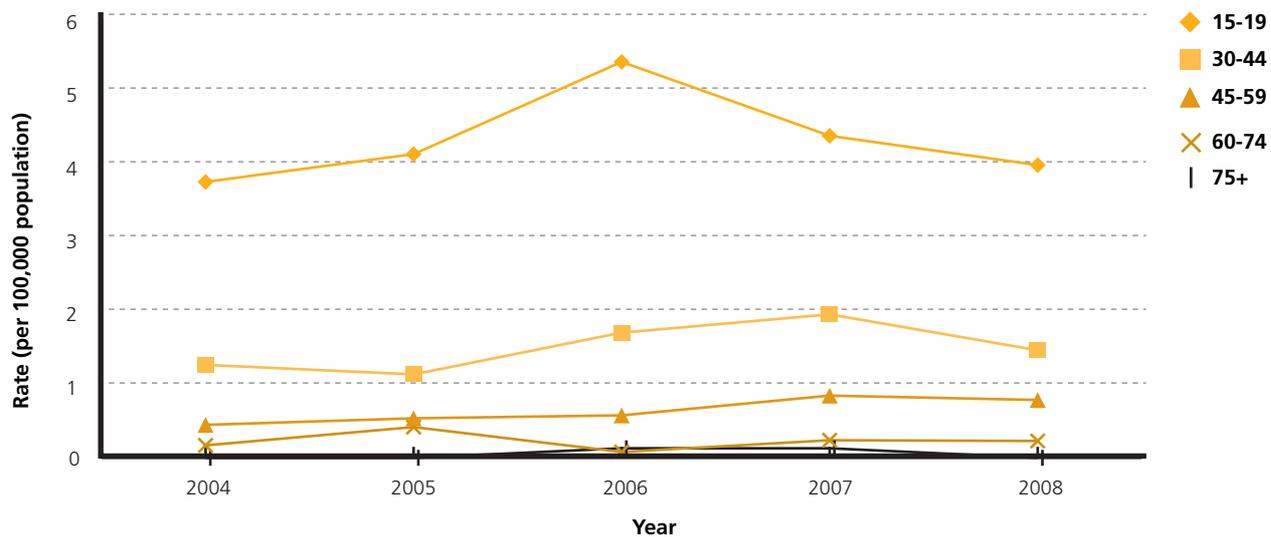
Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.21: Infectious syphilis notifications (<2yrs duration) in males by age group, Australia, 2004 to 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.22: Infectious syphilis notifications (<2yrs duration) in females by age group, Australia, 2004 to 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Syphilis infection among men who have sex with men (MSM)

Syphilis in MSM was nearly eliminated concomitant with widespread behavioural changes to control the AIDS epidemic in the 1980s and 1990s.²⁸ However, since the late 1990s infection has begun to re-establish, with increases in infection rates most notable in NSW and Victoria.⁴⁷

Some increase in syphilis rates in MSM is attributed to the impact of more frequent testing, however the increases have been shown to independently reflect increased transmission with infection more prevalent in men with higher numbers of sexual partners and casual sexual partners, who were HIV positive or had higher rates of recreational drug use.^{47,48} HIV positive MSM are over-represented in syphilis notifications, but the reasons for this are unclear and lower immunity owing to HIV infection does not seem to be the primary explanation.^{28,47}

Alternatively, unsafe sex practices among identifying HIV positive men may increase the likelihood of syphilis transmission,²⁸ but a parallel concern is the effect of syphilis infection on HIV transmission. Syphilis may have the potential to increase the likelihood of HIV infection through tissue damage from syphilis ulcers and biochemical mechanisms.⁴⁸

Syphilis infection among young people

The rate of syphilis in females was highest in younger women (aged 15 to 19 years) but infection remains relatively uncommon in women (less than 6 per 100,000

population, Figure 7.23).^{8,24} The rate of syphilis in men was higher than women and whilst males aged 15 to 19 years had similar notification rates for infectious syphilis as females in that age group and young women generally, after this age the rate of notification was higher in men. The highest syphilis rates were in men aged 25 to 29 years, where the rate rose sharply from 2006 to 2008. Increasing rates of syphilis (and other STIs) in younger people can be attributed partly to a testing bias, for example following targeted campaigns and opportunistic screening for STIs. However, there has been an increasing trend of notification rates for all STIs in young people, some of which can be attributed to engagement in high risk behaviour including multiple sex partners and limited safe sex practices.⁴⁵

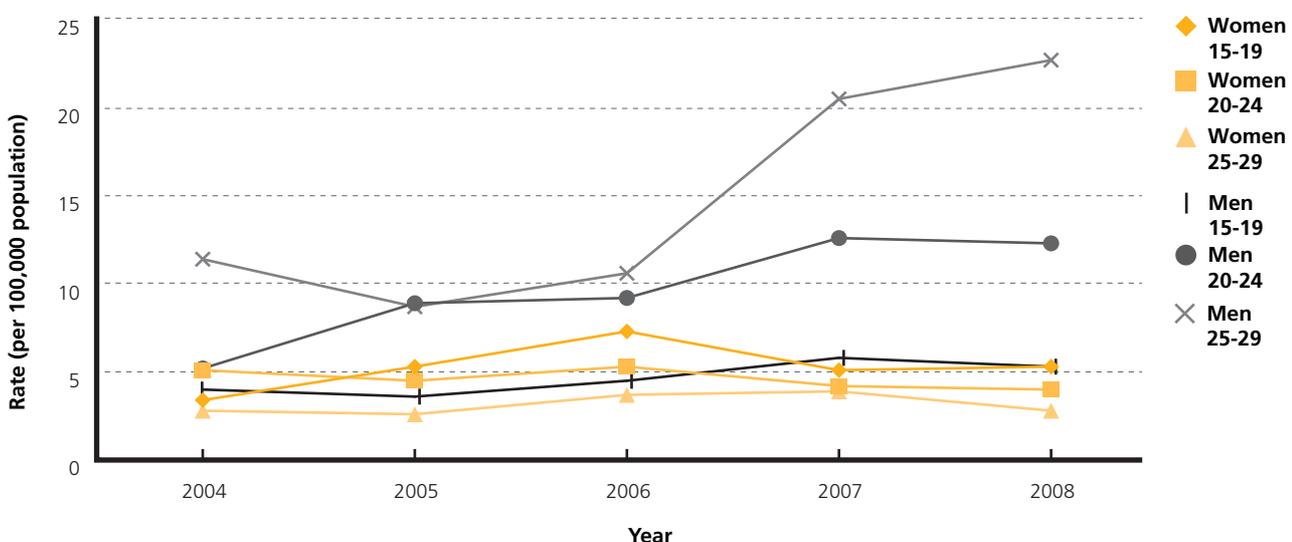
Syphilis infection among Aboriginal and Torres Strait Islander Australians

Infectious syphilis in Aboriginal and Torres Strait Islanders saw a peak in 2006 and subsequent decline, but the rate remains significantly higher than in non-Aboriginal Australians (Figure 7.24). For the period 2004 to 2006 the rate of syphilis in Aboriginal and Torres Strait Islanders was 61 times higher than that in non-Aboriginal people.⁴⁶

The majority of notifications in the Northern Territory (Figure 7.25), as for other STIs, came from Aboriginal and Torres Strait Islander populations, who have historically had a poorer knowledge of STIs, and lower rates of condom use and other safe sex practices.²²

In contrast, Western Australia has seen the high proportion of notifications in Aboriginal and Torres Strait Islander people in 2004 (86%) decline to 43% in 2008 (Figure

Figure 7.23: Infectious syphilis notifications (<2yrs duration) in people aged less than 30 years, Australia, 2004 to 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm. Denominator ABS 3101.0 Australian Demographic Statistics 2010.

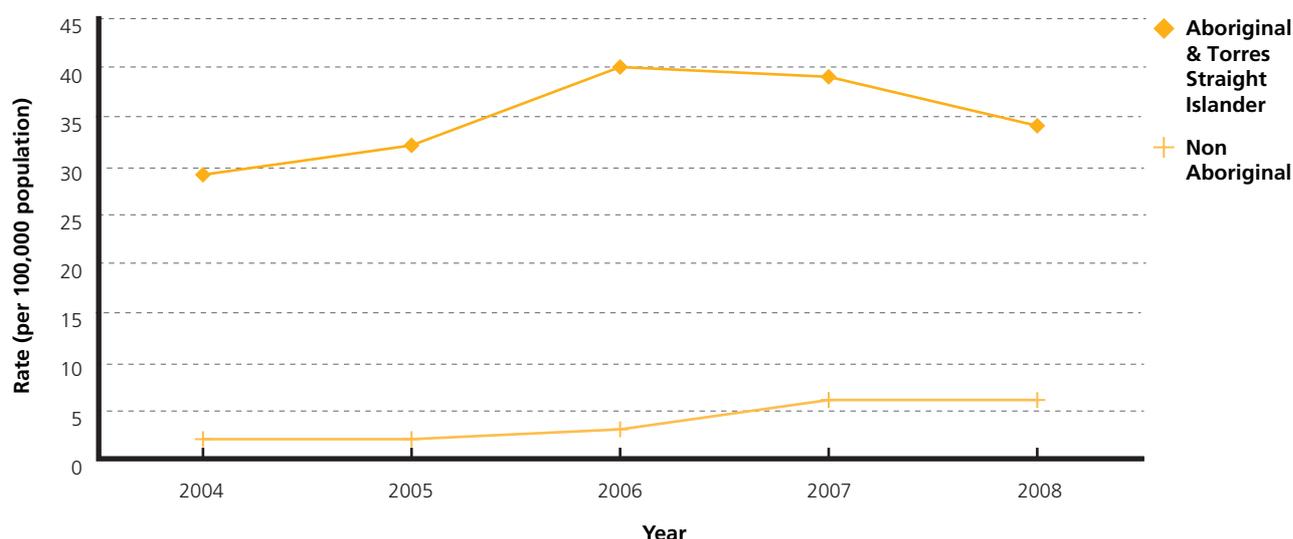
7.25). The proportion of Aboriginal and Torres Strait Islander notifications of infectious syphilis has similarly declined in Queensland and South Australia, in the latter after an increase to 2006. In NSW and Victoria the proportion of infectious syphilis notifications in Aboriginal and Torres Strait Islander Australians has remained low.

Remote communities may report particularly high rates of infection,^{49,50} and the well documented experience of the Kimberly region in Western Australia provides a model demonstrating how appropriate surveillance and response can minimise the effects of syphilis outbreaks.^{21,51}

Strategies such as wider screening, education for health staff, increased community knowledge and changes in health service delivery can reduce the risk of acute outbreaks of syphilis in remote Aboriginal and Torres Strait Islander communities.⁵²

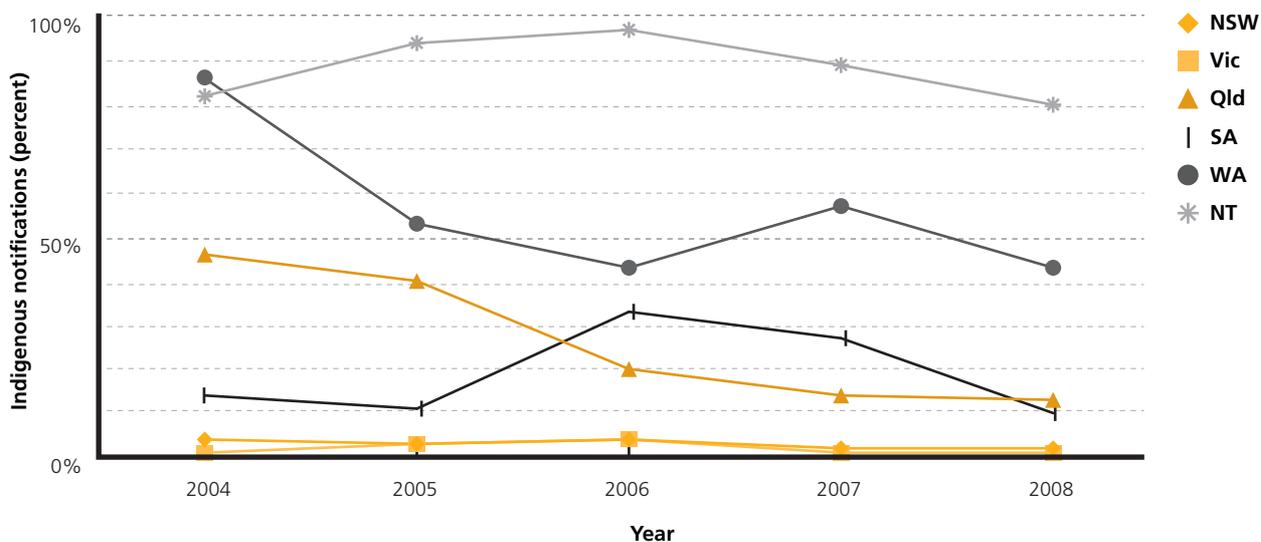
However, a wider clinical and community collaborative approach may be required to prevent recurring outbreaks⁵ and the issues around remoteness may also be interrelated with social disadvantage.⁵³

Figure 7.24: Infectious syphilis notifications (<2yrs duration) in Aboriginal and Torres Strait Islander and non-Aboriginals, 2004 to 2008



Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

Figure 7.25: Infectious syphilis notifications (<2yrs duration) in Aboriginal and Torres Strait Islander Australians, selected states and territories, 2004 to 2008



Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

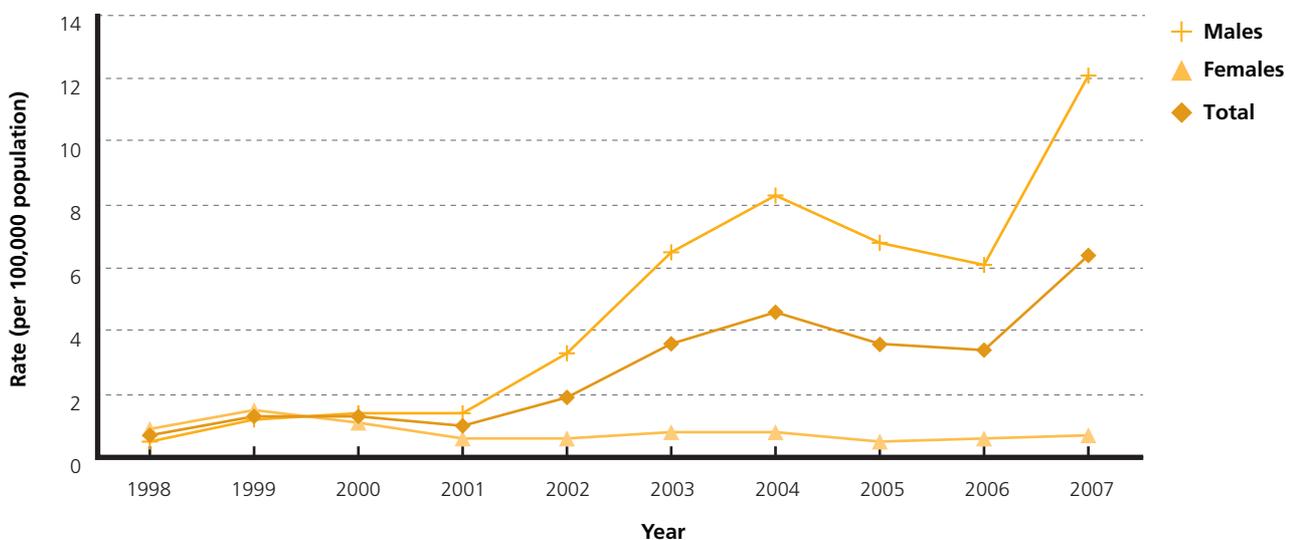
7.4.2 Infectious syphilis notifications: New South Wales

NSW Health reported an increasing trend in notifications of infectious syphilis in New South Wales over 1998 to 2007, from 0.7 per 100,000 population in 1998 to 6.4 in 2007 with the majority of this increase in men (Figure 7.26). From 2002 to 2007 the number of notifications increased from 128 to 431.

Notifications of infectious syphilis in New South Wales by age group and gender

NSW infectious syphilis notifications in males increased substantially from less than 2 per 100,000 in 2001 to over 8 per 100,000 in 2004 and was followed by a decline between 2004 and 2006 (Figure 7.26). However, the rate subsequently rose to 12 per 100,000 in 2007, consistent with national increases that were attributed largely to outbreaks of infection in MSM communities.² Similarly consistent with national trends, the age groups with the highest notification rates were 35 to 39 years (20.6 cases per 100,000) and 40 to 44 years (16.8 per 100,000) (Figure 7.27).

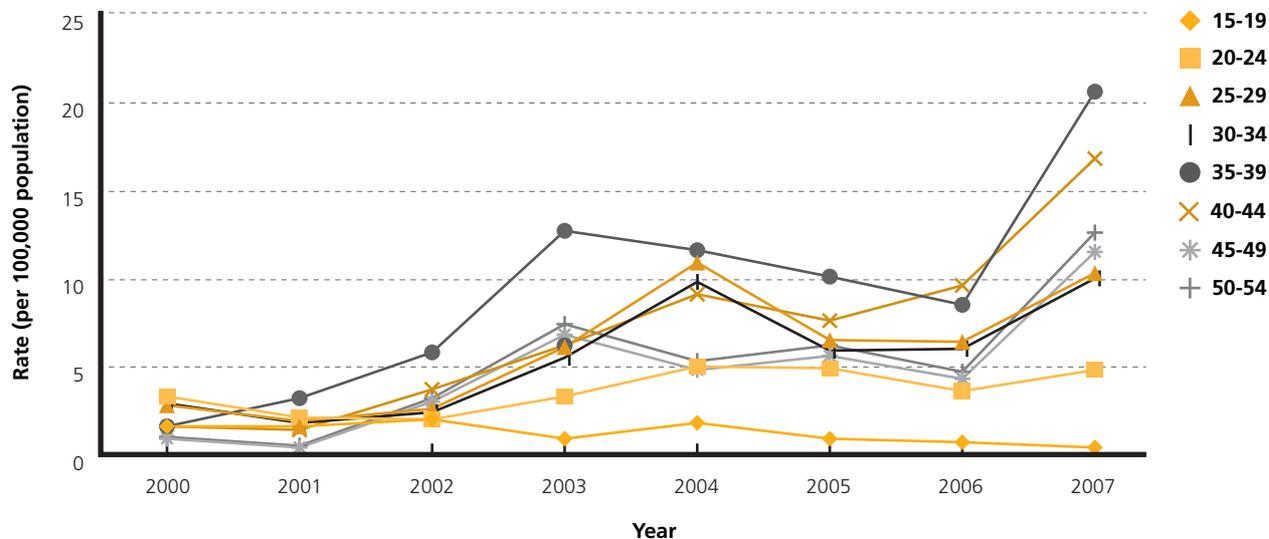
Figure 7.26: Infectious syphilis notifications by gender, NSW, 1998 to 2007



Note: Data not available by gender for 2008. Age standardised rates.

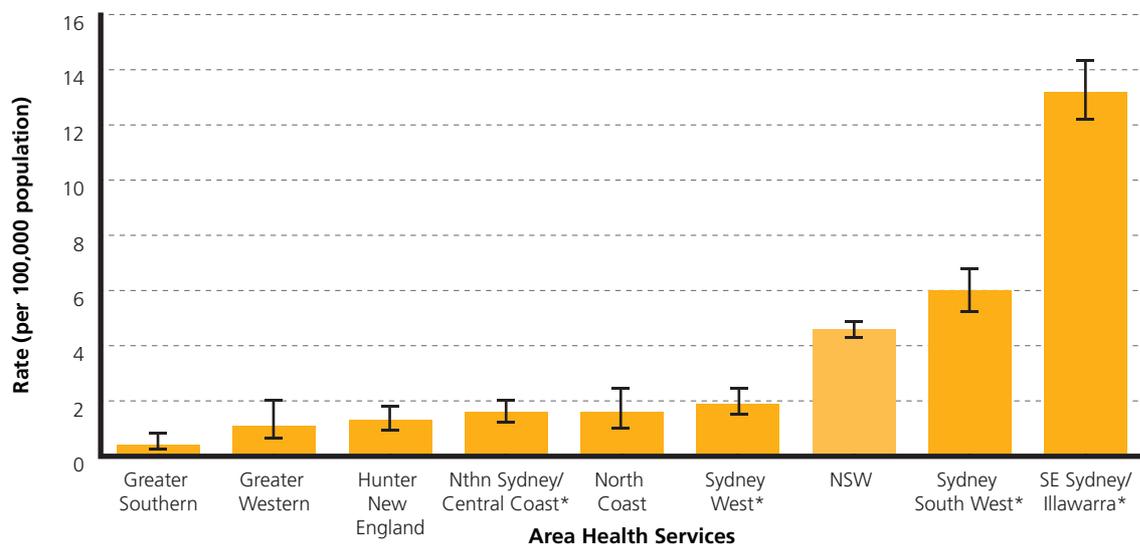
Source: Population Health Division, Report of the Chief Health Officer 2010, NSW Department of Health and NSW Health Department Notifiable Conditions Information Management System (NCIMS)(HOIST), Communicable Diseases Branch and Centre for Epidemiology and Research, NSW Department of Health.

Figure 7.27: Infectious syphilis notifications by age group, NSW, 2000 to 2007



Source: Population Health Division. Report of the Chief Health Officer. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

Figure 7.28: Infectious syphilis notifications, NSW Area Health Services, 2005 to 2007



Notes. Data averaged 2005 to 2007. Bars represent 95% confidence intervals. Age standardised rates.

* = Metropolitan Area Health Services.

Source: Population Health Division. Report of the Chief Health Officer. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

Infectious syphilis notifications in New South Wales by Aboriginality

The number of notifications of infectious syphilis in Aboriginal and Torres Strait Islander people in NSW decreased from 29 notifications in 2000 to 7 in 2008.² This may reflect the success of various interventions, including those undertaken under the *NSW Sexually Transmissible Infections Strategy 2006–2009*, which specifically targeted the elimination of infectious syphilis in NSW Aboriginal and Torres Strait Islander communities.³

7.4.3 Infectious syphilis notifications: New South Wales Area Health Services

For 2005 to 2007 combined, infectious syphilis notification rates were highest in the metropolitan NSW Area Health Services of South Eastern Sydney and Illawarra and Sydney South West (Figure 7.28). The higher rate in inner Sydney was attributed to the larger number of sexually active MSM. Between 1996 and 2003 a syphilis epidemic was reported in inner Sydney where a ten-fold rise in notifications occurred. The epidemic was largely located in communities of sexually active homosexual men.^{45,48}

The rate of syphilis was concomitantly higher in major cities (5.6 per 100,000 population compared with 4.5 per 100,000 population in NSW) and lowest in rural and regional areas (both at 0.8 per 100,000 population).

7.5 Hepatitis B

The hepatitis B virus (HBV) is transmitted through sexual or blood contact, although infection through injecting drug use has declined from 76% of cases in 2004 to 42% of cases in 2008 where data were available from the ACT, South Australia, Tasmania and Victoria.² If acquired as an adult, hepatitis B in most cases is eliminated and rarely causes acute disease, but in 3 to 5% of cases infection will lead to chronic disease. If acquired perinatally, approximately 80% of infections lead to chronic disease.

Hepatitis B is a risk factor for primary liver cancer. Since 2000 the hepatitis B vaccination has been incorporated into the routine immunisation of babies, with a temporary catch up program for high school students.⁵⁴ In addition, vaccination is recommended for high risk groups (for example, inmates and staff of long-term correctional facilities, recipients of certain blood products, MSM and health care workers). As a result of vaccination, hepatitis B infection and hepatocellular carcinoma rates are expected to decrease.

Hepatitis B cases are notified as either newly acquired or unspecified. Newly acquired cases require either that the patient was shown to be negative for the virus in the previous 24 months or the absence of prior evidence of hepatitis B infection. Unspecified infection is based on the detection of the virus that does not meet the criteria for newly acquired infection or where there is no evidence to suggest that the infection is recent (i.e. within the last 24 months). Notifications received from laboratories do not always distinguish between incident cases (newly infected), and those with a chronic infection (who carry the virus from a past infection but have only been recently diagnosed).⁹

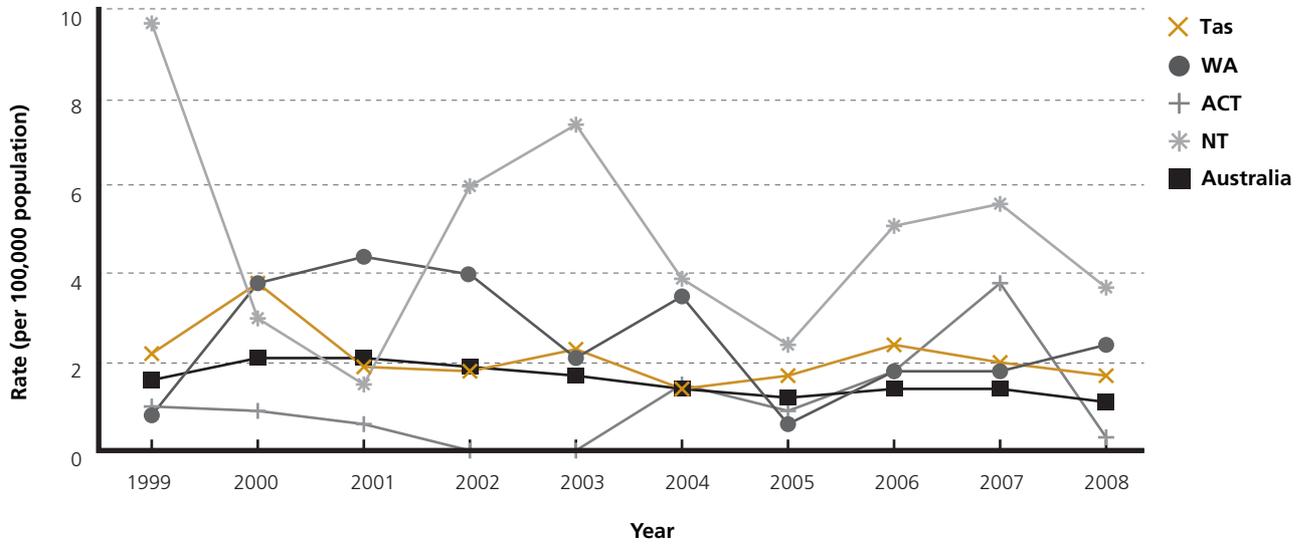
7.5.1 Newly acquired hepatitis B notifications: Australia

The number of newly acquired hepatitis B notifications in Australia has decreased from 305 cases in 1999 to 256 in 2008. Correspondingly, hepatitis B notification rates, which peaked at 2.1 per 100,000 in 2000 and 2001 declined to 1.1 per 100,000 in 2008 (Figure 7.29). The highest notification rates have largely come from the Northern Territory (3.7 cases per 100,000 in 2008) and this has been attributed to the high rates of infection among Aboriginal and Torres Strait Islander communities in remote areas.⁵⁵

As a consequence of the small absolute number of cases, hepatitis B rates can be variable. Notifications in the Northern Territory have fluctuated considerably, peaking at over 5 cases per 100,000 population in 1999, from 2002 to 2003 and from 2006 to 2007. Similarly, the rates of hepatitis B notifications have fluctuated in Tasmania and appear to be increasing, and in the ACT which saw a peak in 2007. However, in neither of these jurisdictions have the peaks exceeded 5 cases per 100,000 population and the small absolute number of cases makes the assessment of trends difficult.

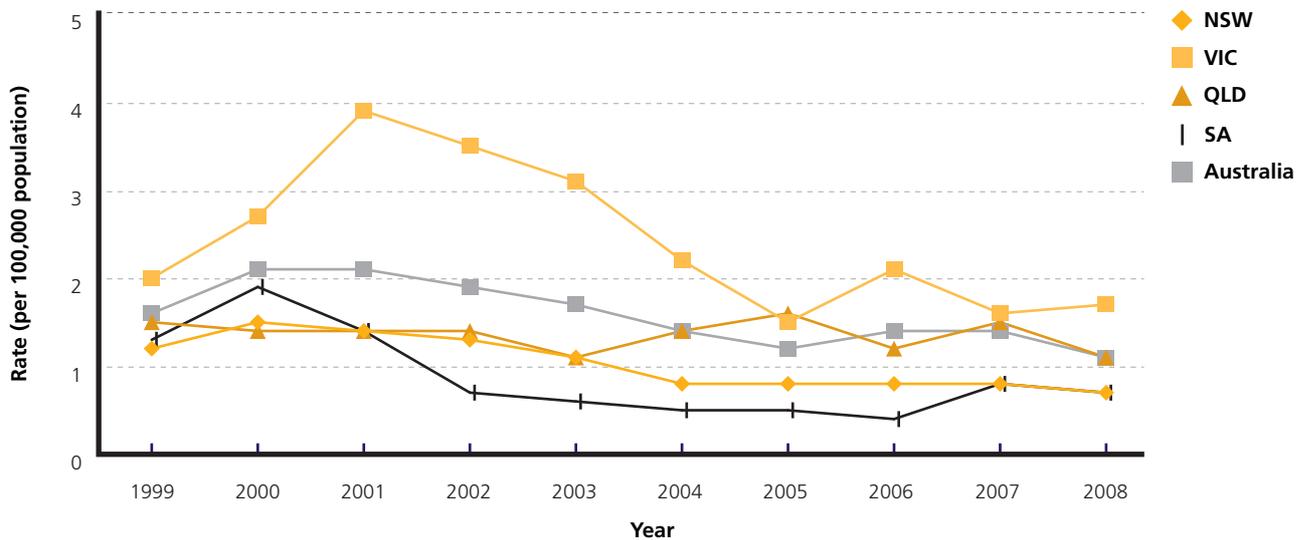
The rates of hepatitis B in the remaining jurisdictions are generally decreasing (Figure 7.30). Notification rates for NSW, South Australia and Queensland have remained below 2 per 100,000 population, whereas Victoria peaked at 3.9 per 100,000 population in 2001 but has largely declined since.

Figure 7.29: Newly acquired (incident) hepatitis B notifications, selected states and territories (I), 1999 to 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.30: Newly acquired (incident) hepatitis B notifications, selected states and territories (II), 1999 to 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

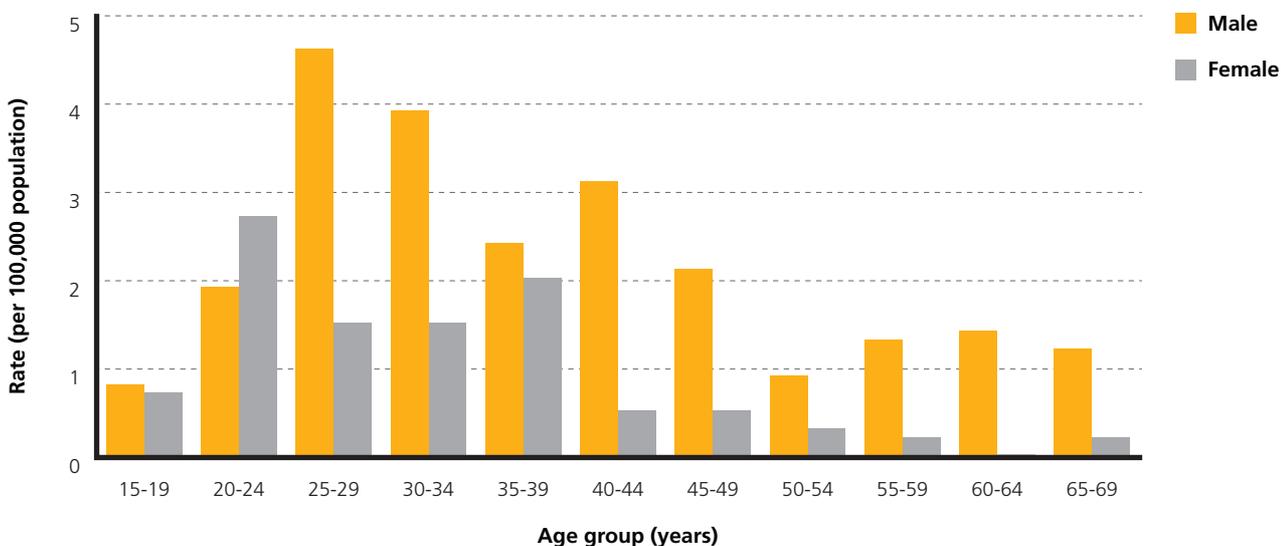
Incident hepatitis B notifications by age group and gender

Hepatitis B is more common in males: in 2008 there were 2.3 notifications of newly acquired infection to every notification in a female. Except for ages 15 to 19, where the rates in males and females are equivalent, and ages 20 to 24 where notifications in females exceeded those in males, the rate of notifications in men is generally substantially higher than in women (Figure 7.31).

In 2008, Australian males aged 25 to 29 years and females aged 20 to 24 years had the highest hepatitis B notification rates (4.6 and 2.7 cases per 100,000 respectively), while females aged 40 or older had the lowest rates. Whilst rates declined in males after age 29, a slight increase was seen in men aged 40 to 44 and older men (50 and above). In contrast, a slight peak in the notifications of hepatitis B was seen in women aged 35 to 39 but the rate of newly acquired infection remained low in women aged 40 and older.

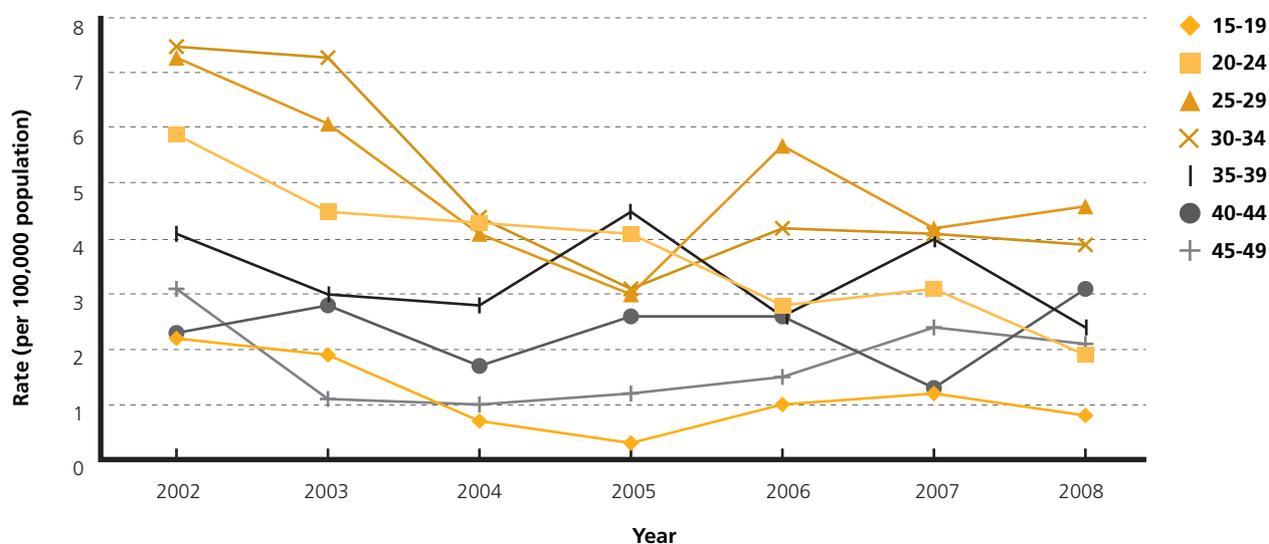
From 2002 to 2005 the rate of diagnosed newly acquired hepatitis B infection declined substantially among both men and women aged 15 to 29 years (Figure 7.32, Figure 7.33). For example, in men aged 25 to 29 notifications for newly acquired hepatitis B dropped from 7.3 per 100,000 in 2002 to 3.0 per 100,000 in 2005. This may be partly attributable to adolescent 'catch up' vaccination programs,⁴⁵ however the concomitant decrease in notifications for men aged 30 to 34 (from 7.5 to 3.1 per 100,000) suggests that other factors may be important also. In men aged 25 to 29 rates again increased after 2005 (to 4.6 per 100,000 in 2008, Figure 7.32).

Figure 7.31: Newly acquired (incident) hepatitis B notifications by age group and gender, Australia, 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

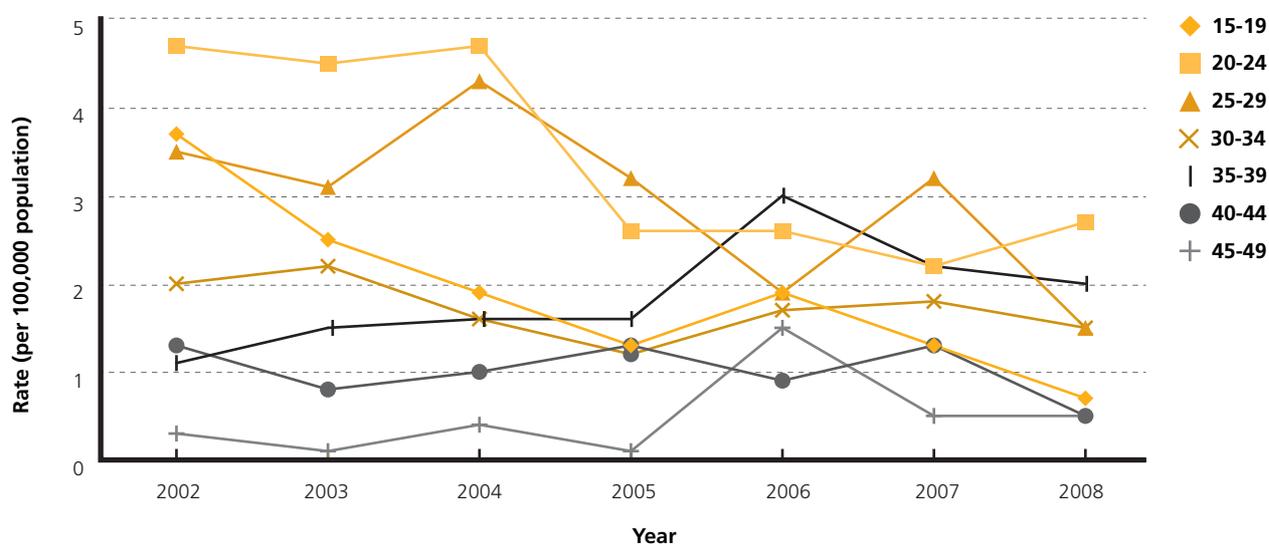
Figure 7.32: Newly acquired (incident) hepatitis B notifications in males by age group, Australia, 2002 to 2008



Note. In men aged 50 and over notification rates for incident hepatitis B did not exceed 2.0 per 100,000 population except for one instance (2.3 per 100,000, men aged 60 to 64, 2002).

Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.33: Newly acquired (incident) hepatitis B notifications in females by age group, Australia, 2002 to 2008



Note. In women aged 50 and over notification rates for incident hepatitis B did not exceed 1.0 per 100,000 population.

Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

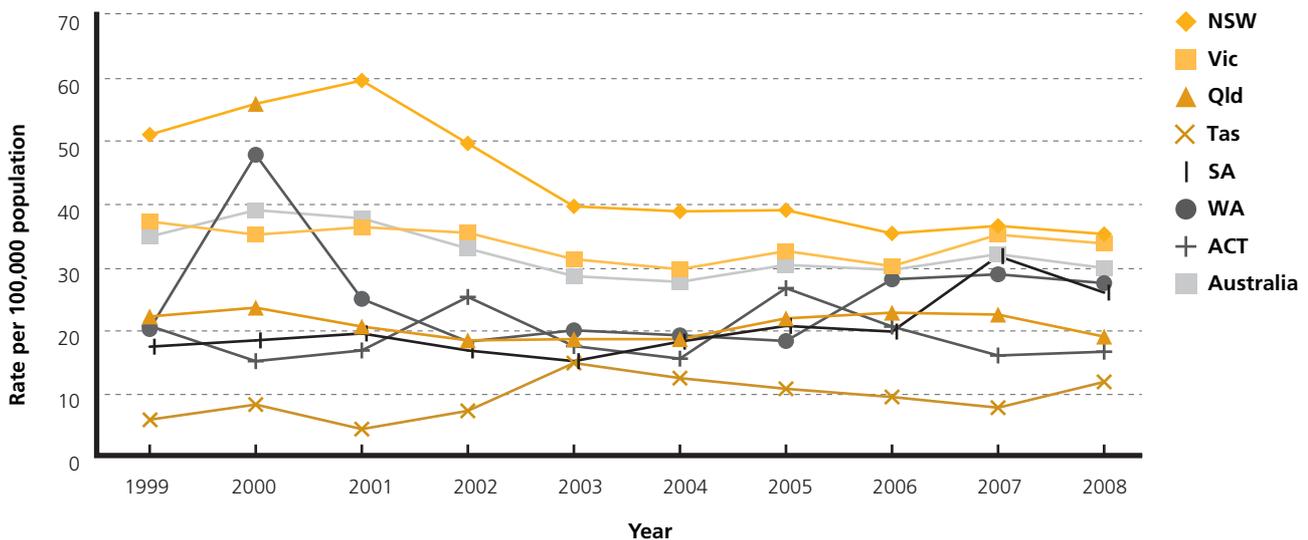
Unspecified hepatitis B and infection among sub populations

Notifications for unspecified hepatitis B remain high compared to newly acquired cases (Figure 7.34). Except for the Northern Territory, rates were highest in NSW but saw a sharp decline from 2001 to 2003 (60 per 100,000 to 40 per 100,000 population) where the rate has remained comparatively constant. This is concomitant with the introduction of vaccine catch-up programs and the pattern is seen in Australia as a whole. However, whilst the rate of

unspecified hepatitis B in Victoria has remained close to the national rate at between 30 and 40 cases per 100,000 populations, other jurisdictions have seen fluctuations.

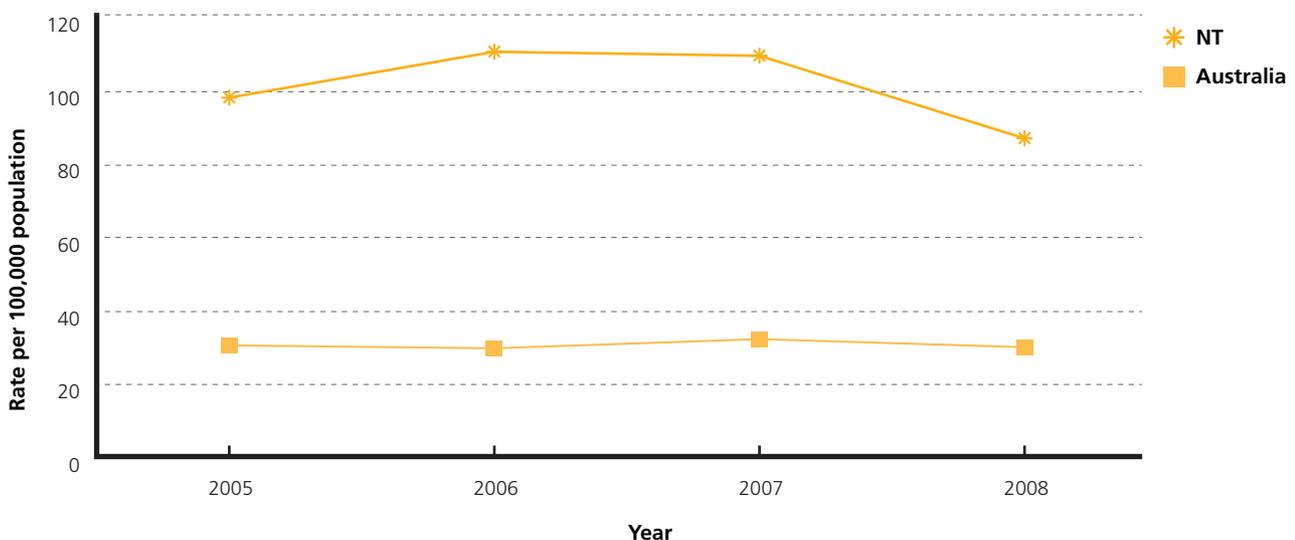
Rates of unspecified hepatitis B were unavailable for the Northern Territory until 2005, but have since been the highest nationally at greater than 80 cases per 100,000 population (Figure 7.35). The rate in the Northern Territory from 2007 to 2008 declined from 109 to 87 cases per 10,000, but remained above the highest peak reached in NSW in 2001 (60 per 100,000 in 2001).

Figure 7.34: Hepatitis B (unspecified) notifications, selected states and territories, 1999 to 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Figure 7.35: Hepatitis B (unspecified) notifications, Northern Territory and Australia, 2005 to 2008



Source: Communicable Diseases Surveillance National Notifiable Disease Surveillance System 2009, Commonwealth Department of Health and Ageing. Available at: www9.health.gov.au/cda/Source/CDA-index.cfm.

Higher rates of chronic hepatitis B infection in Australia are largely attributed to increases in immigration from countries with high chronic HBV infection rates and to transmission in high risk groups such as injecting drug users, men who have sex with men and in Aboriginal and Torres Strait Islander communities. These high-risk groups similarly have a potentially suboptimal uptake of HBV vaccination and compromised or limited access to healthcare services which may adversely affect disease management and control of transmission.⁵⁵

Chronic hepatitis B in migrants to Australia contributes between 50 and 60% of the prevalence burden of the disease.⁵⁶ This is anticipated to increase over the next 20 years with ongoing migration from regions with high endemic rates of infection,⁵⁷ including South East Asia, the Middle East, Southern Europe, Africa, the Indian sub continent and Pacific Islands.

Hepatitis B in Aboriginal and Torres Strait Islanders

Newly acquired hepatitis B rates in Aboriginal and Torres Strait Islanders remain higher than in the non-Aboriginal population (Figure 7.36). Whilst Aboriginal and Torres Strait Islanders represent only approximately 2.5% of the Australian population, 16% of chronic hepatitis B infection occurs in Aboriginal and Torres Strait Islanders, with much of this disease load in people living in remote areas.⁵⁵

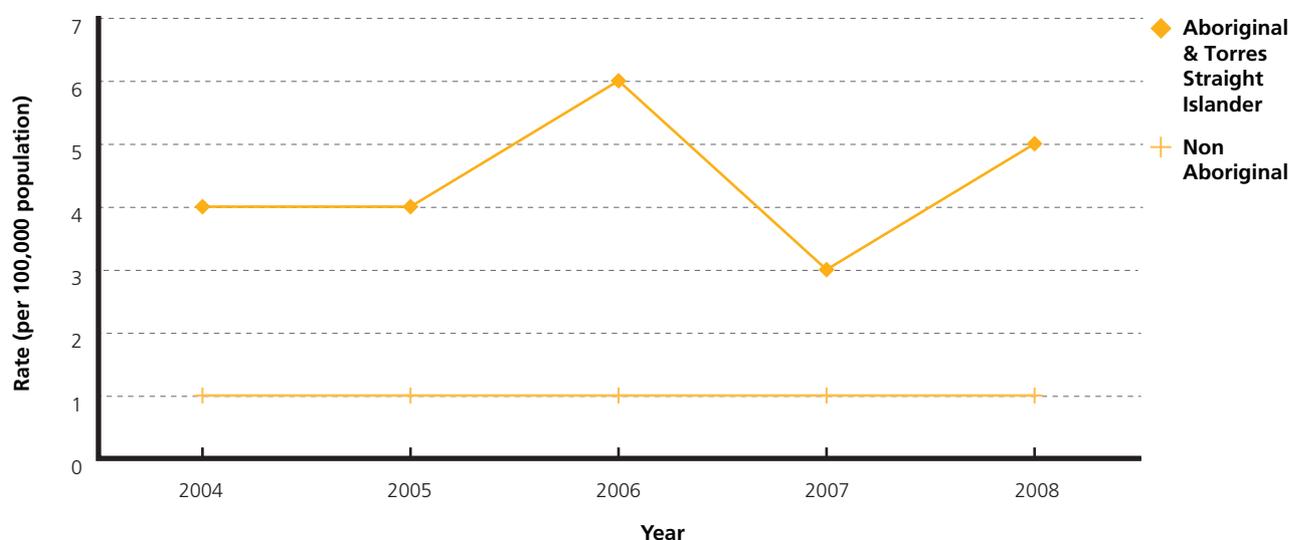
7.5.2 Hepatitis B notifications: New South Wales

Hepatitis B notifications reported to NSW Health (which include both acquired and unspecified cases) peaked in 2001, however this may have been the result of enhanced testing around the introduction of HBV vaccination (Figure 7.37). Subsequently the rates have remained stable at around 40 cases per 100,000 population with rates higher in males.

Hepatitis B notifications by remoteness area

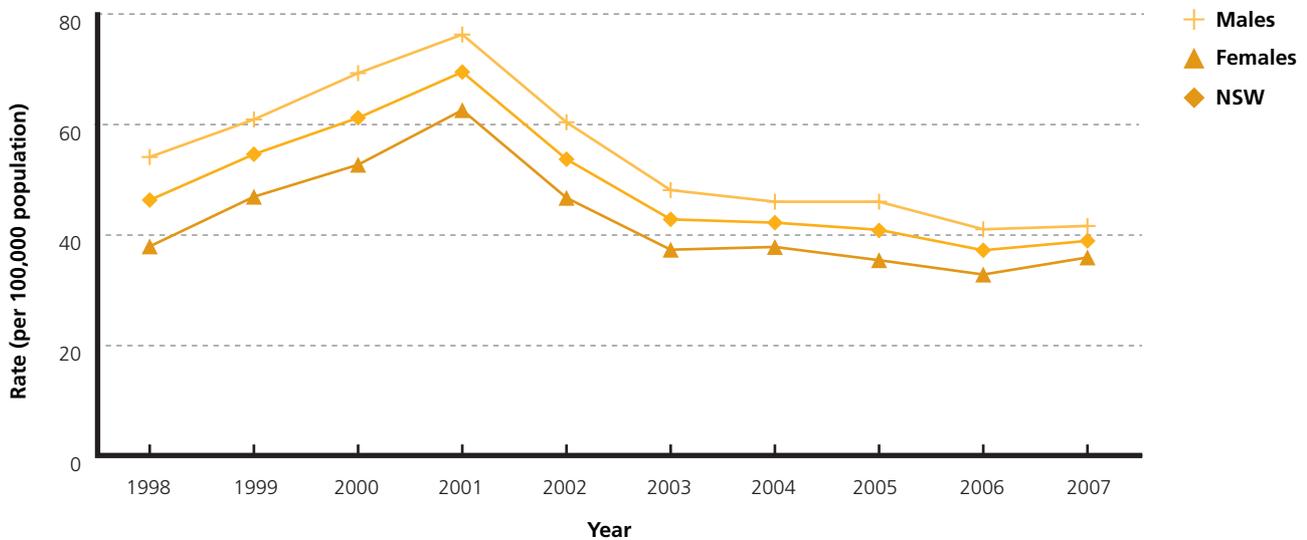
Major cities in NSW had substantially higher age-standardised rates of hepatitis B (47.3 per 100,000) than inner regional (10 per 100,000) and outer regional and remote areas (13.5 per 100,000) (Figure 7.38) for the combined period 2005 to 2007.

Figure 7.36: Newly acquired hepatitis B infection in Aboriginal and Torres Strait Islander and non-Aboriginal Australians, 2004 to 2008



Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

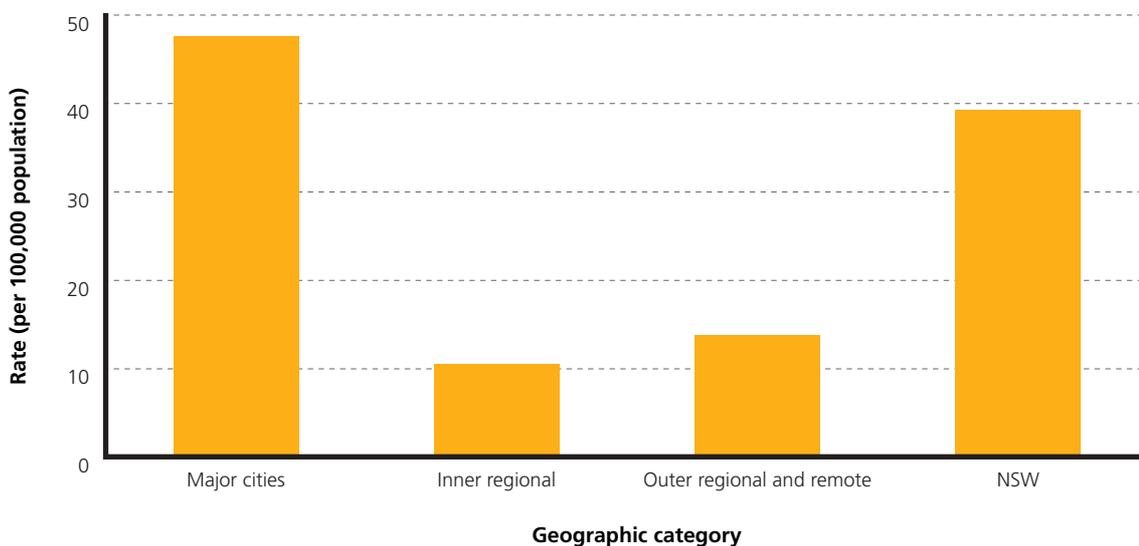
Figure 7.37: Hepatitis B notification by gender, NSW, 1998 to 2007



Note: Age standardised rate.

Source: Population Health Division. Report of the Chief Health Officer. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

Figure 7.38: Hepatitis B notification by place of usual residence, NSW, 2005 to 2007



Note: Age standardised rate.

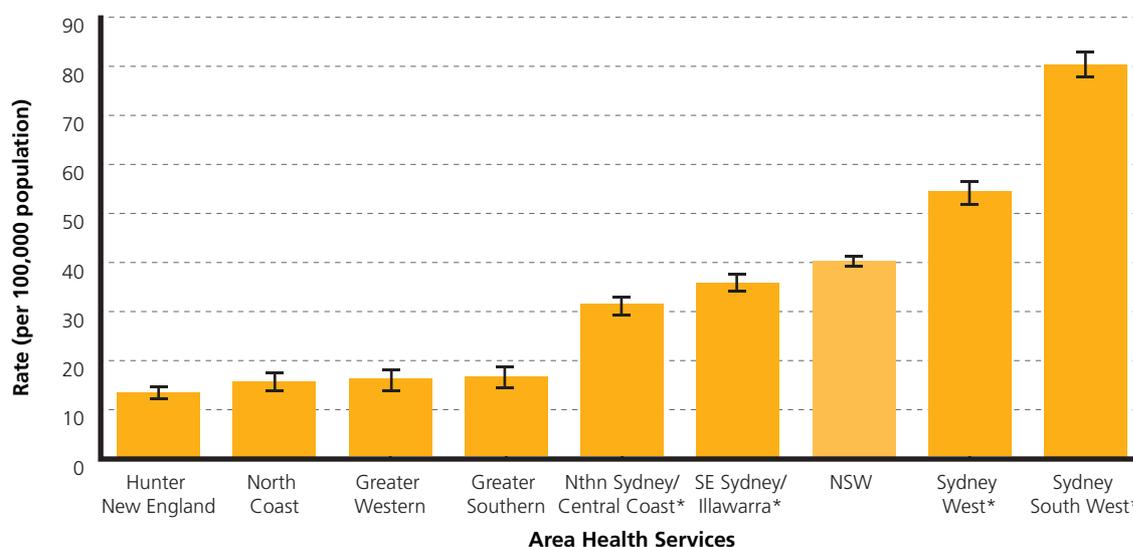
Source: Population Health Division. Report of the Chief Health Officer. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

7.5.3 Hepatitis B notifications: New South Wales Area Health Services

Age standardised hepatitis B notification rates from 2005 to 2007 were significantly higher in the Sydney South West (77 per 100,000 population) and Sydney West (52 per 100,000 population) Area Health Services than

in other Area Health Services, with rates in Sydney South West nearly double the state average (39 per 100,000 population) (Figure 7.39). This reflects higher prevalence in immigrant populations, particularly migrants from South East Asian countries such as China and Vietnam in these Area Health Services,⁹ however these Area Health Services also have significant representation from the other high risk groups including Aboriginal and Torres Strait Islanders, MSM and injecting drug users.

Figure 7.39: Hepatitis B notifications, NSW Area Health Services, 2005 to 2007

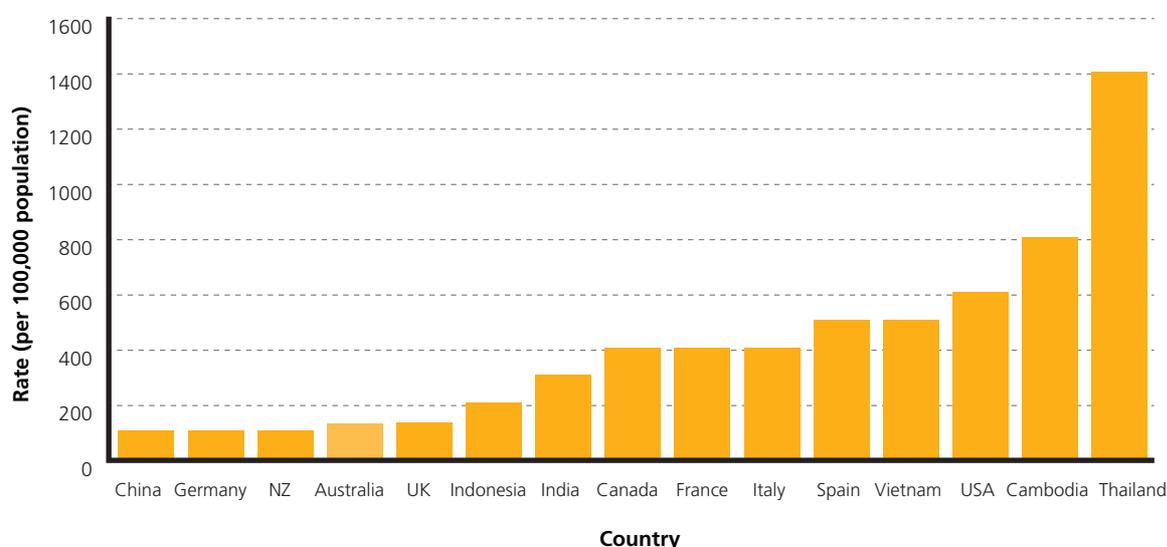


Note: Data averaged 2005 to 2007, bars represent 95% confidence intervals. Age standardised rate.

* = Metropolitan Area Health Services.

Source: Population Health Division. Report of the Chief Health Officer. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

Figure 7.40: HIV prevalence in selected countries



Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

7.6 HIV and AIDS

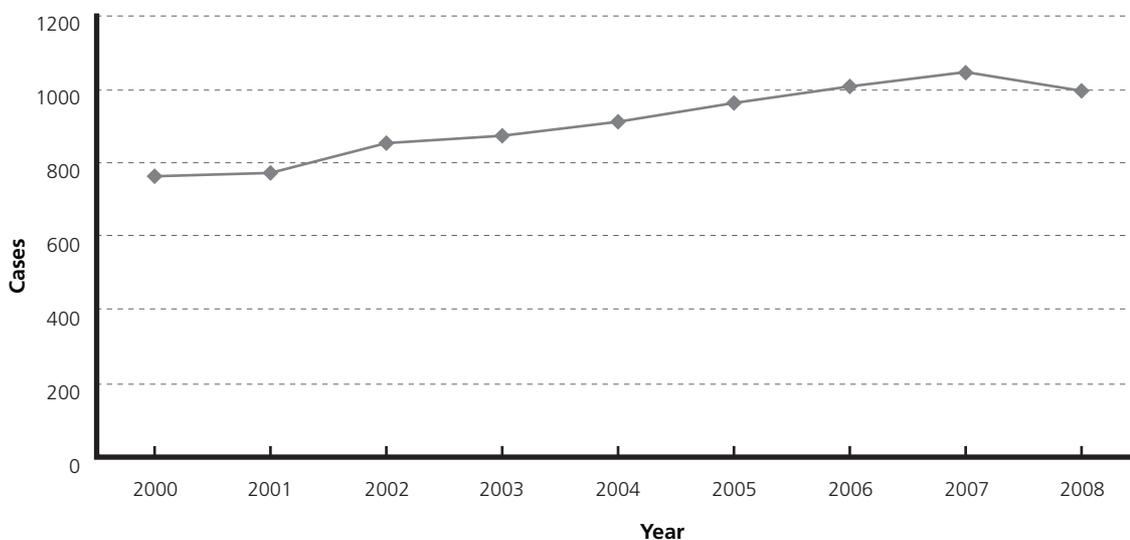
The Human Immunodeficiency Virus (HIV) is the causative agent of Acquired Immune Deficiency Syndrome (AIDS). During 2007 more than two and a half million adults and children worldwide became infected with HIV. The number of people worldwide living with HIV has increased from an estimated 8 million in 1990 to 33 million in 2008, with 67% of people living with HIV in sub-Saharan Africa.⁵⁸ The increased prevalence of HIV is a result of both increased incidence and improved therapy leading to improved survival. Despite recent progress in access to anti-retroviral treatment, two million deaths from AIDS were recorded worldwide in 2007.⁵⁸

7.6.1 HIV and AIDS notifications: Australia

HIV remains comparatively well controlled in Australia, with notification rates per 100,000 population peaking at 5.0 in 2007 and dropping to 4.6 in 2008. The prevalence rate in 2008 (123 per 100,000 population)⁵⁹ was equivalent to rates in the UK but lower than the US, Canada and some areas of Western Europe and Asia (Figure 7.40).

New cases of HIV increased from 763 in 2000 to 995 in 2008 and since 2005 there have been approximately 1,000 HIV notifications annually in Australia (Figure 7.41). The majority of cases (>85%) were in men and whilst HIV in Australia is primarily transmitted through sexual contact between men (representing nearly 70% of transmission),⁵⁹ the rate of heterosexual transmission has been rising and now represents almost a third of new cases annually (Figure 7.42). Injecting drug use alone accounts for less than 5% of transmission, with negligible transmission through maternal or health care related blood or tissue receipt.

Figure 7.41: New cases of HIV, Australia, 2000 to 2008



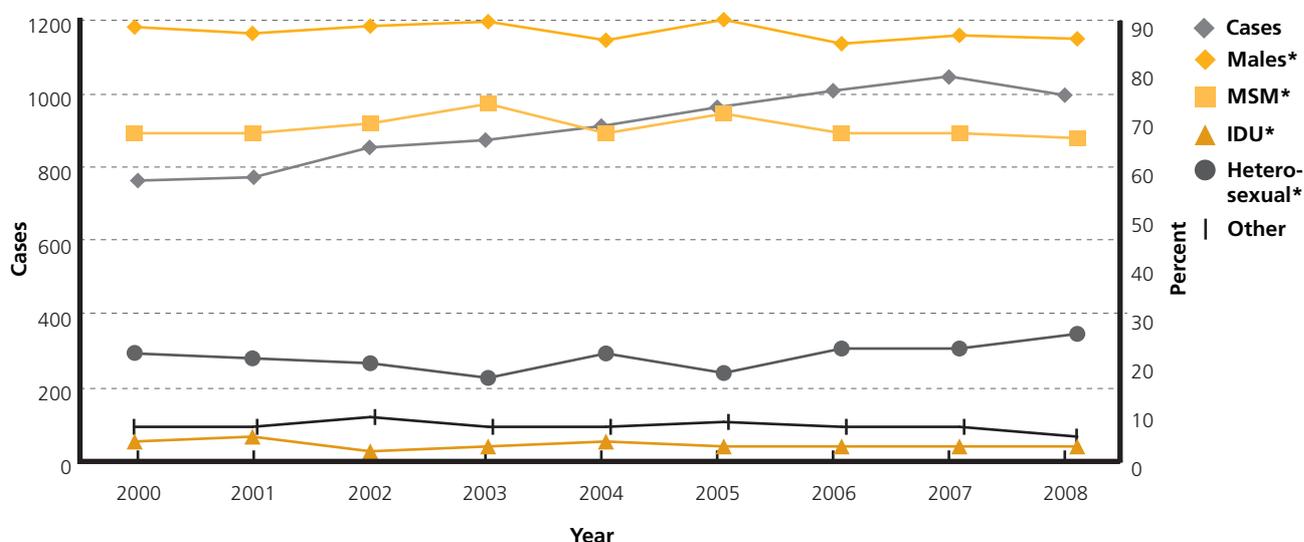
Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

NSW continues to report the majority of newly diagnosed HIV cases, however this percentage has decreased from 59% of new cases in 1999 to 37% in 2008 (Figure 7.43). The proportion of new cases reported in Victoria and Queensland has increased by approximately 10% in each jurisdiction over the same period, from 20 to 29% in Victoria and 10% to 20% of national notifications in Queensland.

South Australia and Western Australia have over the period 1999 to 2008 each accounted for less than 10% of national HIV notifications annually, whilst in Tasmania, Victoria and the Northern Territory the proportion of cases notified has remained generally less than 1% in each jurisdiction.

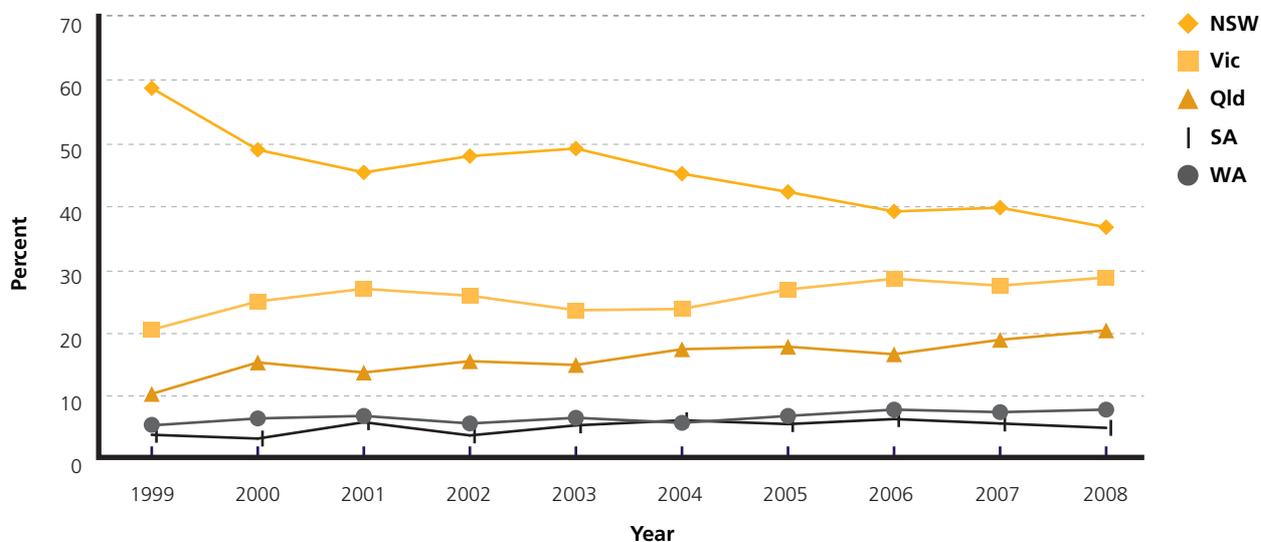
HIV notification in Australia is primarily in men aged 20 to 50 (Figure 7.44).

Figure 7.42: HIV indicators: percent male and exposure categories, Australia, 2000 to 2008



Notes. *HIV exposure categories: MSM = men who have sex with men, including MSM with IDU; IDU = injecting drug use; Other includes receipt of blood/tissue, healthcare setting, maternal exposure and other or unknown.
 Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

Figure 7.43: Percent of newly diagnosed HIV notified in selected states and territories, 1999 to 2008



Notes: Tasmania, Northern Territory and Australian Capital Territory not plotted as proportions less than 1.5% per jurisdiction.
 Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

Notifications of HIV among Aboriginal and Torres Strait Islander Australians

The number of cases of HIV in Aboriginal and Torres Strait Islander people remains low, ranging from a high of 27 in 2002 to 19 in 2008.⁵⁹ The peak number of cases in 2002 resulted in the age-standardised rate for HIV in Aboriginal and Torres Strait Islanders (6.5 per 100,000 population) rising above that of non-Aboriginal Australians (approximately 4 per 100,000 population). However, since 2004 the rate of newly diagnosed HIV infection in Aboriginal and Torres Strait Islanders has fallen to approximately 3.5 per 100,000 population, slightly below that of non-Aboriginal people.⁵⁹

In non-Aboriginal Australians the majority of cases were in males (79% in 2008), and male to male transmission remains the primary mode of infection with HIV in Aboriginal and Torres Strait Islander people, representing 53% of cases in 2008. However, a higher proportion of infections in Aboriginal and Torres Strait Islanders was attributed to injecting drug use than in the non-Aboriginal population (32% among Aboriginal and Torres Strait Islanders compared to 3% in non-Aboriginal people). Similarly, a higher proportion of infections was among women (21% of Aboriginal and Torres Strait Islander cases in 2008 compared to 13% of non-Aboriginal cases).

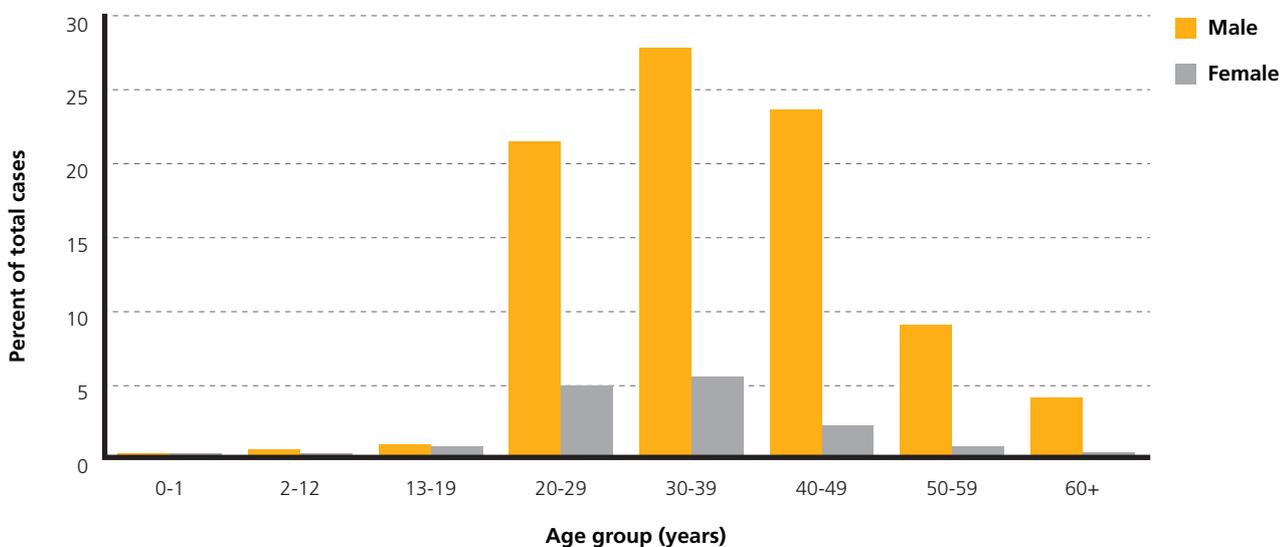
Whilst HIV is currently comparatively well controlled in Australia and in Aboriginal and Torres Strait Islanders, vigilance is required to ensure the prevention of a wider outbreak in Aboriginal and Torres Strait Islander communities.^{60,61}

Notifications of HIV among culturally and linguistically diverse communities

The proportion of new HIV notifications in Australia in people born overseas increased from 33% of notifications in 2004 to 41% in 2008. The rate of new HIV diagnoses has increased slightly in people in Australia who were born outside of Australia from 4.4 per 100,000 in 2004 to 6.4 per 100,000 population in 2008, and across this period was consistently slightly higher than rates in Australian born people (4.1 per 100,000 population in 2004 and 2008 (Table 7.5)).⁵⁹

The majority of notifications in people born outside of Australia were in those born in Asia or Sub-Saharan Africa, and in 2008 these regions represented 12 and 10% of new HIV notifications in Australia respectively. However, the age-standardised rate of Australian HIV notifications is notably higher in people born in Sub-Saharan Africa, increasing from 24% in 2004 to 42% in 2008.

Figure 7.44: Newly diagnosed HIV by age group and gender, Australia, 2008



Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

Notifications of AIDS in Australia

Owing to the availability of effective anti-retroviral therapies, the annual number of diagnoses of AIDS in Australia has declined from 265 in 2000 to 161 in 2007 (Figure 7.45). Similarly, the number of deaths following AIDS has declined from 149 to 53 over the same period. Concomitant with the geographical pattern of HIV infection, the majority of AIDS cases were reported in NSW and this remained comparatively stable to 2007 at approximately 50% of cases. The number of cases notified in Victoria has increased from a low of 20% in 2002 to 31% in 2007 (Figure 7.46).

Rates of AIDS in Aboriginal and Torres Strait Islander Australians are similar to those of non-Aboriginal people (0.7 per 100,000 population in 2007). However, estimates of the incidence of AIDS in the Aboriginal and Torres Strait Islander population may be affected by incomplete notification.⁴⁵

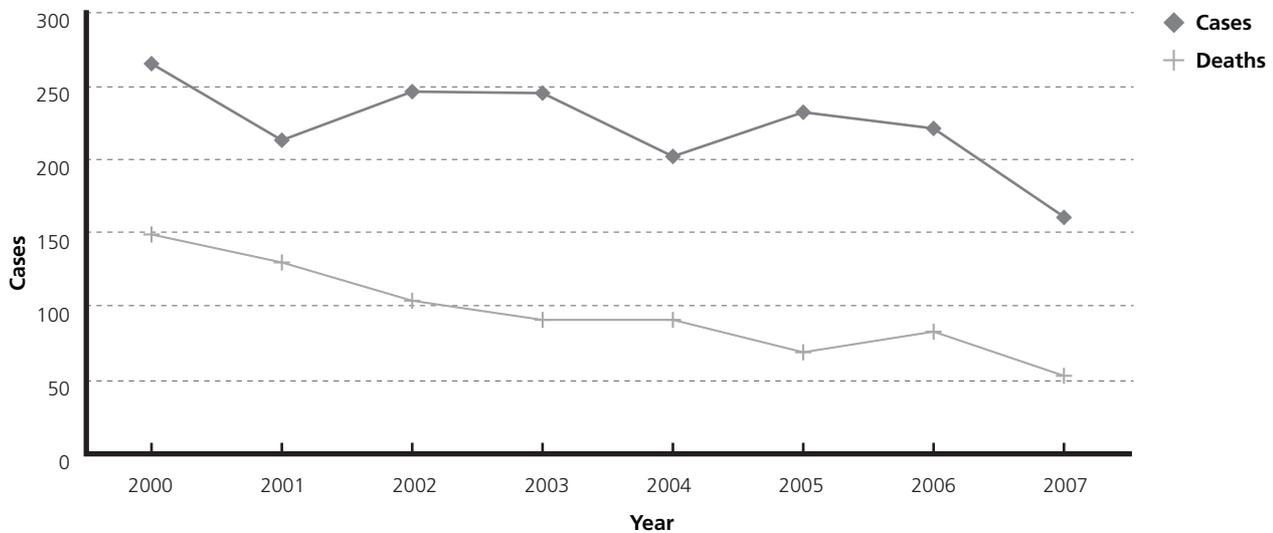
Table 7.5: New notifications of HIV in Australia by region or country of birth, 2004 to 2008

PLACE OF BIRTH	2004		2005		2006		2007		2008	
	% ¹	Rate ²	%	Rate	%	Rate	%	Rate	%	Rate
Australia	66.6	4.1	67.5	4.4	62.3	4.3	61.2	4.5	58.8	4.1
Overseas	33.4	4.4	32.5	4.6	37.7	5.7	38.8	6.3	41.2	6.4
Other Oceania	3.7	4.8	4.2	5.9	5.0	6.9	3.5	5.2	6.1	10.7
UK/Ireland	4.8	3.3	5.8	4.2	4.2	3.5	4.6	4.1	4.8	4.4
Other Europe	4.3	5.0	4.5	4.9	4.6	5.4	3.7	5.9	3.8	4.7
Middle East, North Africa	1.8	5.2	1.4	5.7	2.2	7.1	1.9	5.8	0.6	2.2
Sub-Saharan Africa	6.9	24	5.4	20	6.9	28.3	7.3	36.3	10.2	41.6
Asia	8.2	4.2	8.5	4.4	12.9	7.6	13.5	8.2	11.9	6.7
North America	2.0	13.9	1.7	12.3	1.2	9.6	1.4	11.5	1.2	9.1
South/Central America ³	1.7	11.3	1.0	7.4	0.8	5.8	2.9	24.8	2.6	20

Notes: 1. Percent of total cases annually excluding place of birth unknown. 2. Age standardised rate per 100,000 population. 3. Including the Caribbean.

Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHCR, The University of New South Wales, Sydney, NSW.

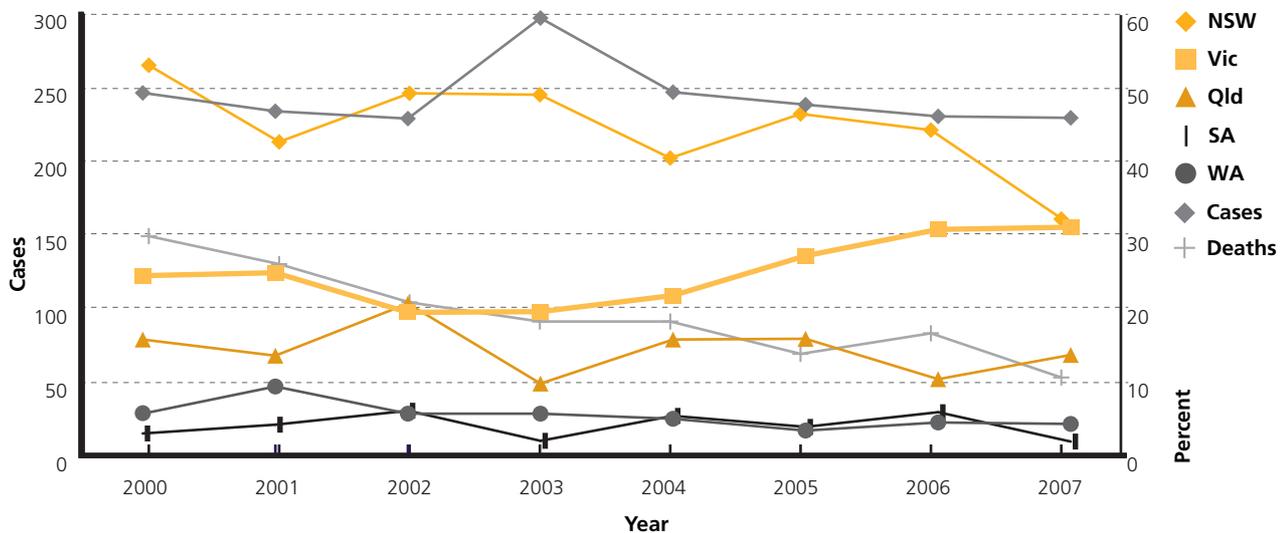
Figure 7.45: AIDS diagnoses and deaths, Australia, 2000 to 2007



Notes. Annual data not available pre-2000; data not available for all jurisdictions for 2008.

Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

Figure 7.46: AIDS diagnoses (%), selected states and territories, 2000 to 2007



Notes. Tasmania, Northern Territory and Australian Capital Territory excluded as proportions less than 2% per jurisdiction. Annual data not available pre-2000; data not available for all jurisdictions for 2008.

Source: National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2009. NCHECR, The University of New South Wales, Sydney, NSW.

7.6.2 HIV and AIDS notifications: New South Wales

Annual notifications of newly diagnosed HIV have declined in NSW from 423 in 1997 to 402 in 2007, having dropped to a low of 342 cases in 2001.²⁵ This corresponds to a decrease in the age-standardised rate from 6.6 per 100,000 population for 1997 to 6.0 per 100,000 in 2007 (Figure 7.47). The majority of cases in 2007 were in males (88%) and the majority of cases (66%) were acquired through male to male sexual contact. Approximately one in six cases (17%) were heterosexually acquired.

HIV notification rates have been comparatively stable, particularly since 2002 (Figure 7.47), and this has been attributed to a decrease in risk-taking sexual behaviour among homosexually active men, stabilization of illicit drug use associated with risk behaviours, more stable relationships among homosexually active men and successful collaborative investment and interventions in HIV education and prevention.² The age-standardised rate of newly diagnosed HIV infection among men in 2007 was 10.5 per 100,000 and significantly higher than that for women (1.5 per 100,000).²⁵

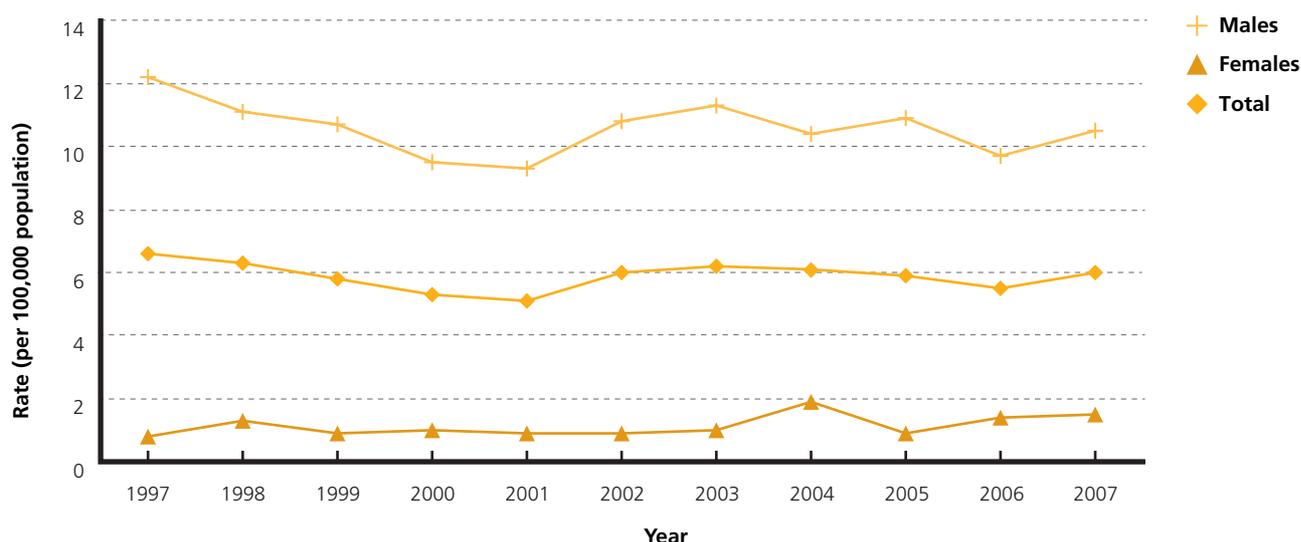
AIDS notifications

In NSW AIDS notifications decreased from 208 persons in 1997 to 72 in 2007.²⁵ The corresponding change in age-standardised rates was from 3.3 in 1997 to 1.1 per 100,000 in 2007. The decline since the mid-1990s has been attributed to improvements in anti-retroviral therapy.

7.6.3 HIV notifications: New South Wales Area Health Services

The majority of cases of newly diagnosed HIV in NSW were reported in the two metropolitan Area Health Services: South Eastern Sydney and Illawarra, and Sydney South West, (Figure 7.48), reflecting larger concentrations of MSM particularly in inner Sydney. Non-metropolitan Area Health Services recorded the least notifications of HIV and this pattern was consistent over the period 2004 to 2007.

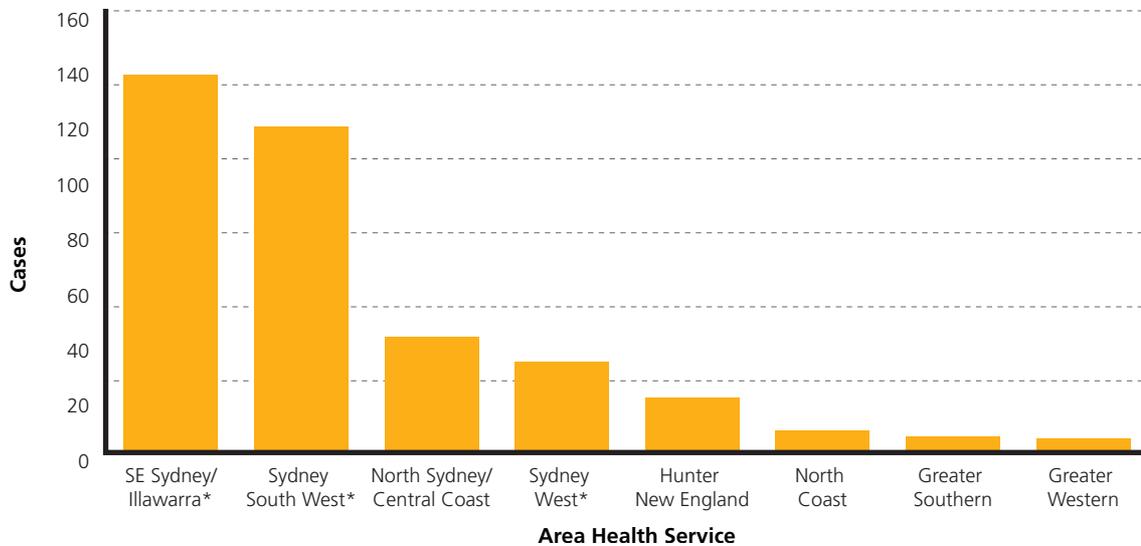
Figure 7.47: Rate of newly diagnosed HIV by gender, NSW, 1997 to 2007



Note: Age standardised rate.

Source: Population Health Division. The health of the people of New South Wales - Report of the Chief Health Officer. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

Figure 7.48: HIV cases, NSW Area Health Services, 2007



Note. * = Metropolitan Area Health Services.

Source: Population Health Division. Report of the Chief Health Officer. Sydney: NSW Department of Health. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 05Jan2011.

7.7 Genital Warts

Human Papilloma Virus (HPV) is a ubiquitous virus implicated in genital warts (HPV types 6 and 11) and cervical cancer (mainly HPV types 16 and 18). Infection with wart HPV types is usually asymptomatic and wart development variable and often undetected or minimally bothersome.⁶² However, genital warts remain one of the most commonly reported STIs globally^{63,64} and incur real costs to health care and to patient quality of life and psychological well-being.^{62,63,65}

Despite being commonly encountered clinically, the prevalence and incidence of genital warts is difficult to determine. Estimates for the prevalence of genital warts in the Australian population range from 1 to 2% to 14% with a higher rates among young adults.⁶⁶⁻⁶⁸ Incidence rates have been estimated at 2.5 cases per 1,000 population, with similarly higher rates in people aged 20 to 29 (an average of 6.8 per 1,000 in men and 7.5 per 1,000 in women).⁶⁵

Risk factors for exposure to HPV wart types include having a greater number of sexual partners, smoking and living in a rural area.⁶⁶⁻⁶⁸ Sustained condom use is significantly associated with reducing the incidence of genital warts,⁶⁸ and immunisation with the quadrivalent HPV vaccine is expected to further reduce the incidence of genital warts.^{62,65,69}

7.8 Genital Herpes

Herpes Simplex virus (HSV) is the causative agent of genital herpes and is spread through physical contact including sexual activity. HSV occurs in two types (HSV-1 and HSV-2) and infection presents as sores or blisters. Whilst not curative, antiviral drugs can help reduce the duration and severity of symptoms, but once acquired HSV establishes lifelong infection.

HSV-1 has typically been associated with the lips and mouth, but oral HSV-1 infection has declined, with proposed social explanations including living standards, hygiene and a reduced frequency of babies being kissed by strangers or relatives with active infection.^{70,71} HSV-2 remains the predominant viral type causing genital herpes, however the changing epidemiology, both in Australia and elsewhere, of HSV infection is showing a growing proportion of genital and anal HSV-1 infection, primarily owing to engagement in oro-genital sex.⁷¹⁻⁷⁴ In MSM and women, HSV-1 may already represent the major cause of first-episode infection.⁷⁵

There have been few national population studies establishing the seroprevalence of HSV-1 and 2 in Australia. In an Australia-wide, population-based study of HSV-1 and

HSV-2 seroprevalence using serum and socio-demographic data collected from 4,000 people, approximately 76% had antibodies to HSV-1 and the prevalence was highest in those aged 65 to 74 years (85%).⁷⁶ Women also had significantly higher prevalence than men (80% compared to 71%).

The estimate of national adult seroprevalence of HSV-2 was 12%.⁷⁶ Females had twice the rate of HSV-2 than males (16% compared to 8%), and the prevalence was highest among 35 to 44 year olds. HSV-2 rates were lower for adults living in rural and remote areas (9%) compared to those in metropolitan areas (15%). Aboriginal and Torres Strait Islander people had higher seroprevalence than non-Aboriginal people (18% compared to 12%).

While there have been no population-based studies conducted in younger people in Australia (e.g. under 25 year olds), international research indicates that while HSV-2 infection is uncommon in people younger than 15 years, seroprevalence increases rapidly from mid-teens to mid-twenties.⁷³ High rates of infection have been reported in MSM, with HIV-positive men having almost twice the prevalence of HSV-2 than HIV-negative men.⁷⁷

7.9 Summary

Sexually transmissible infections are a significant cause of morbidity in Australia, and both morbidity and mortality worldwide. Infection with STIs generally results from unprotected sex, and the population burden of STIs is therefore controllable through monitoring, detection, disease management and behavioural changes that decrease the risk of contraction or transmission of infection.

In Australia, all significant STIs are notifiable upon diagnosis by law. This ensures both state and national effective tracking of disease patterns and outbreaks, and the ability to respond effectively both with targeted treatments and targeted safe-sex campaigns. Bacterial STIs, chlamydia, gonorrhoea, syphilis, viral HIV and hepatitis B are notifiable and the diseases comparatively well controlled in Australia.

The requirement for notification ensures that data are collected and available regarding the extent and patterns of infection within the population. For infections that are generally symptomatic (e.g. gonorrhoea, HIV) notifications will be comparatively complete and the data will provide a similarly complete picture of the status of the disease. In contrast, infections that are largely asymptomatic (e.g. chlamydia) will be under-reported through the notifiable diseases system, where identification of the disease will be through either serendipitous testing or a screening

campaign. In these cases, comparisons between areas for example are difficult to make, as differences may reflect testing rates rather than infection rates.

Whilst notifications may be complete or with known biases, the inclusion of relevant socio-economic and other data is less so. In particular, identification of Aboriginality remains incomplete although improving, but nevertheless hinders accurate assessment of the burden of STIs in Aboriginal and Torres Strait Islander communities. This may be exacerbated by screening and testing programs, which may artificially inflate estimates of the incidence of these diseases relative to the general Australian population.

On an international scale, Australia rates very well in terms of notification rates for chlamydia, syphilis, gonorrhoea and especially HIV. In 2004, the rates in Australia for chlamydia and gonorrhoea were consistent with the United Kingdom and Canada and lower than the United States, whereas rates for gonorrhoea were consistent with the United States but lower than the UK and Canada. The prevalence of HIV in Australia was consistent with the UK and Canada but lower than the United States. International comparisons are important, but limited owing to issues such as different screening and notification regimens in different countries, and differences in population composition and dynamics that may explain differences in disease epidemiology

(including population geographic and age distribution, migration and other transmission factors).

Chlamydia

Chlamydia remains the most commonly notified STI in Australia and most developed countries, with the majority of the disease burden in young people (aged 15 to 29) and amongst those with the majority of reporting in young women. The excess rates in younger women may reflect both presentation owing to symptoms and serendipitous testing concomitant with cervical screening. In Australia in 2008 over 58,000 new cases of chlamydia were notified yielding a rate of 278 per 100,000 population. The greatest burden of disease was in women aged 15 to 19 years and 20 to 24 years with rates of 1,531 and 1,762 per 100,000 respectively.

Chlamydia was more commonly notified in Aboriginal and Torres Strait Islanders (in 2008 rates of over 1,100 per 100,000 compared to less than 300 per 100,000 in non-Aboriginal people). However, some of this excess will result for targeted health interventions and testing in Aboriginal and Torres Strait Islander communities.

Similarly, the increasing rate of chlamydia in NSW (from 54 per 100,000 in 2000 to 184 per 100,000 in 2007) is also partially attributable to targeted screening of Aboriginal and Torres Strait Islanders, men who have sex with men and young people, and the availability of subsidized urine-testing for chlamydia. It is important to note that whilst the increase in the rate may be an artefact of increased testing, the rates may still not be accurate estimates of the true population prevalence and incidence of disease, and may still be underestimates, particularly in high-risk population sub-groups.

Gonorrhoea

Infection with gonorrhoea remains comparatively rare in Australia and has been well controlled with penicillin and subsequent antibiotic treatments. In 2008 there were nearly 7,700 notifications of gonorrhoea, a rate of 37 per 100,000 population. Gonorrhoea is traditionally a disease associated with socio-economic disadvantage, and in Australia the largest burden of the disease rests with Aboriginal and Torres Strait Islanders. For example, the Northern Territory reported a rate of 731 per 100,000 in 2008 and Western Australia 80 per 100,000, both substantially higher than the national figure and reflecting the large Aboriginal and Torres Strait Islander populations in these jurisdictions.

Most cases of gonorrhoea are reported in men and in NSW this reflects transmission in the men who have sex with men community. In contrast, in the Northern Territory high rates of gonorrhoea are reported in both males and females, reflecting transmission in the Aboriginal and Torres Strait Island heterosexual community.

A further element of gonorrhoea disease measurement is the assessment of isolates for resistance to antibiotic treatments. The potential for gonorrhoea to develop widespread antibiotic resistance may return the disease to the situation prior to the introduction of penicillin infection was not treatable. In Australia in 2009 over 30% of tested isolates were resistant to penicillins and over 40% to quinolone antibiotics. Less than 3% were resistant to cephalosporin treatment, however increasing resistance to this current last-line of therapy being reported internationally.

Infectious syphilis

Syphilis remains comparatively rare in Australia with less than 10 cases per 100,000 populations in all states and territories in 2008 with the exception of the Northern Territory. Again with the exception of the Northern Territory, syphilis notifications for all jurisdictions rose from 2004 to 2007 and except for Western Australia declined from 2007 to 2008. The rate in the Northern Territory rose from 2004 to 2006 and has declined subsequently, but remains higher than 30 cases per 100,000 population.

The overall higher rate and changes in the rate in the Northern Territory are largely determined by the degree and patterns of infection in Aboriginal and Torres Strait Islander communities. In Australia overall for the period 2004 to 2006, the rate of syphilis in Aboriginal and Torres Strait Islander people was 61 times higher than that in non-Aboriginals. Higher rates of syphilis may also be associated with outbreaks in remote Aboriginal and Torres Strait Islander communities.

In other states and territories infection in men who have sex with men and outbreaks in these communities is the primary determinant of notified cases. The majority of disease therefore is in males, with 88% of syphilis of less than two years duration notified in males in 2008, giving a rate of 11 cases per 100,000 compared to 1 case per 100,000 in females. Male syphilis rates were highest in ages 35 to 39 years, reflecting transmission in the older MSM community.

Notifications for infectious syphilis in NSW have been increasing over the period 1998 to 2008 from less than 1 to more than 6 per 100,000 population. However, the rate is variable and for example peaked at over 8 per 100,000 in 2004, followed by a decline then a subsequent rise to 12 per 100,000 in 2007. These peaks and troughs are consistent with outbreaks of syphilis in MSM communities, and are reflected by the significantly higher rates of syphilis in metropolitan Area Health Services with large MSM communities (e.g. South Eastern Sydney and Illawarra, and Sydney South West, with rates of 13 and 6 per 100,000 respectively, compared to all other Area Health Services where rates were less than 2 per 100,000.)

Hepatitis B

Hepatitis B is comparatively rare in Australia with 256 newly acquired cases notified in 2008 representing a rate of 1.1 per 100,000 population. Once again the highest notification rates were in the Northern Territory (3.7 per 100,000) reflecting notification in Aboriginal and Torres Strait Islanders. Hepatitis B is more common in men, with over 2 male notifications for every female notification in 2008. In people aged between 20 and 24 notifications were higher in females than in males, but in all other age groups there were more male than female notifications and this was substantially so in ages 25 to 34 and 40 to 44.

The introduction of postnatal hepatitis B Virus (HBV) vaccination in 2000 and a school-based catch-up program is expected to reduce the rates of hepatitis B in Australia. From 2002 to 2005 the rates of notifications in both men and women aged 15 to 29 years did indeed decline, in men for example from 7.3 to 3.0 per 100,000 population.

However, the majority of notifications for hepatitis B remains for unspecified cases, i.e. where new infection cannot be ruled out. In Australia in 2008 there were 30 notifications of unspecified hepatitis B per 100,000 population, with the highest rate recorded in the Northern Territory at 86.7 per 100,000. The Northern Territory figures again reflect the disease pool and transmission in Aboriginal and Torres Strait Islander communities. Elsewhere in Australia, the high rate of notification of unspecified hepatitis B is largely attributed to immigration from countries with high endemic HBV rates and to transmission within high risk groups such as intravenous drug users and men who have sex with men. Chronic hepatitis B in migrants which will be reported as unspecified hepatitis B cases has been estimated to contribute between 50 and 60% of notifications, and this is expected to increase as migration continues from high-risk regions such as South East Asia, the Middle East and others.

HIV and AIDS

Following Australia's rapid and effective response to the initial global outbreak of HIV infection, Australia has maintained control of the epidemic and the notification rate in 2008 was less than 5 cases per 100,000 population. There are approximately 1,000 HIV notifications annually, with the majority of cases (more than 85%) in men and nearly 70% of cases in Australia are transmitted through male to male sexual contact. Nevertheless, the rate of heterosexual transmission has been rising and in 2008 represented nearly a third of new cases.

The majority of newly reported HIV cases are in NSW, although the distribution of disease is changing and NSW in 2008 reported 37% of cases whereas in 1999 NSW was the source of 59% of cases. Conversely, the proportion of cases has increased in Victoria and Queensland. The proportion

of notifications in people born outside of Australia is also increasing, with over 40% of new cases in 2008 reported in people born outside of Australia. The majority of these latter notifications were in people born in Asia or sub-Saharan Africa.

HIV is comparatively rare in Aboriginal and Torres Strait Islanders, with only 19 cases reported in 2008 and the rate of 3.5 per 100,000 is slightly less than the rate in non-Aboriginal people. The pattern of disease is different in Aboriginal and Torres Strait Islander cases. A higher proportion of infection is contracted through injecting drug use (32%, compared to 3% in non-Aboriginals) and a higher proportion of infection is in women (21% compared to 13% in non-Aboriginals).

This is a positive state of control of HIV in Australia, both in the general as well as the Aboriginal and Torres Strait Islander population. However, efforts are required to ensure rates of infection do not increase, through the continued emphasis on safe-sex practices, the use of clean injecting drug equipment and appropriate testing in high-risk communities. AIDS is similarly well controlled in Australia, primarily owing to the availability of effective anti-retroviral therapy. In 2007 there were 161 new AIDS diagnoses and 53 AIDS-related deaths.

Genital warts and genital herpes

Whilst neither notifiable nor causing any mortality, genital warts and herpes are sexually transmissible infections that can have significant consequences to those infected and incur substantial health costs. Genital warts are caused by a Human Papilloma Virus (HPV), and there is evidence that infection rates are declining concomitant with the introduction of HPV vaccination primarily aimed at oncogenic HPV variants. However the prevalence of infection is difficult to ascertain and estimates range from approximately 1% to 14% with rates highest in young adults.

Genital herpes has traditionally been associated with infection with Herpes Simplex Virus-2 (HSV-2), whilst the related HSV-1 is the primary cause of oral cold sores. The primacy of HSV-2 in genital infections remains, however there is a growing proportion of genital HSV-1 infection resulting from oro-genital sex. Infection with HSV-1 is widespread with estimates suggesting seroprevalence in more than three quarters of the population. HSV-2 seroprevalence estimates show infection to be rarer at approximately 12%, with a higher prevalence in females (16%) compared to 8% in males.

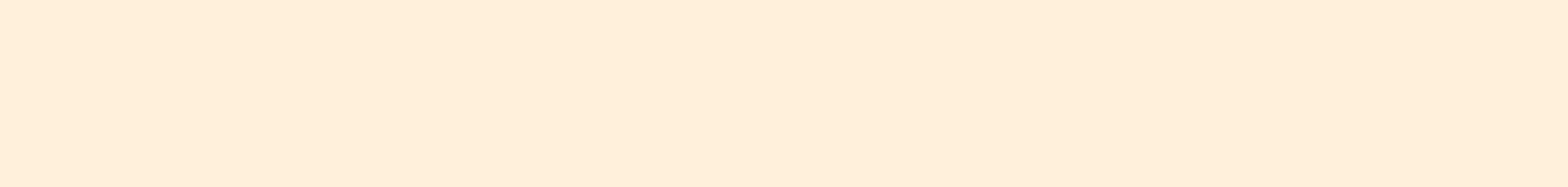
Continued focus on the need for safe sex practices, in particular the use of condoms, and education around the potential for oro-genital infection with HSV-1 are required to ensure minimization of infection rates.

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Chapter 8 :

Cancers of the Reproductive Tract and Cervical Screening

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Key Indicators

Cervical, ovarian and uterine cancer:

- Age-standardised incidence and mortality per 100,000 females, monitored over time
- Assessment of incidence and mortality by co-factors including socio-economic status, country of birth, region or area of residence (e.g. metropolitan, regional, rural or remote)
- Incidence and mortality in Aboriginal and Torres Strait Islanders

Cervical screening:

- Cervical screening participation rate overall and by age
- Cervical screening participation by co-factors including socio-economic status, country of birth, region or area of residence
- Cervical screening rates in Aboriginal and Torres Strait Islanders
- Rate of technically unsatisfactory cervical screening Pap smears or samples without endocervical component
- Medicare claims for Pap smears taken by practice nurses

Primary Data Sources

GLOBOCAN 2008 Cancer Incidence and Mortality Worldwide in 2008, International Agency for Research on Cancer (WHO), www-dep.iarc.fr

Australian Institute of Health and Welfare and Australian Association of Cancer Registries *Cancer in Australia* reports

Australian Institute of Health and Welfare *Cervical Screening in Australia* reports

Cancer Institute NSW *Cancer in NSW* reports

Cancer Institute NSW *Cervical Screening* reports

ACIM (Australian Cancer Incidence and Mortality) Books 2007, Australian Institute of Health and Welfare

NSW Central Cancer Registry online statistical reporting module, Cancer Institute NSW, www.cancerinstitute.org.au

NSW Pap Test Register (PTR), Cancer Institute NSW

Medicare Australia online statistics

Introduction

Cancers of the reproductive tract, including cervical, ovarian and uterine malignancies, are major causes of reproductive disease in women.

Cervical cancer

Most cervical cancers are squamous cell carcinomas that are primarily viral in origin. The causative agent, Human Papilloma Virus (HPV), is responsible for over 90% of cervical malignancies.¹ HPV infection of the female genital tract is sexually transmitted and in most cases resolves spontaneously. More rarely, infection results in precursor lesions, which take on average 10 to 20 years to progress to cancer. Cervical cancer is thus one of the few cancers preventable through screening.

High-risk oncogenic HPV variants 16 and 18 account for up to 70% of cervical cancers in Australia^{2,3} with approximately 12 other oncogenic HPV variants accounting for the remaining malignancies.⁴ Other HPV strains (predominantly variants 6 and 11 in Australia) cause genital warts, but are low risk for the development of cervical cancer.⁵

Whilst HPV has been identified as the causative agent in cervical cancer, several risk factors are associated with the likelihood of HPV infection and with progression to malignant disease. Risk factors for HPV infection include the number of sexual partners, younger age, multiple pregnancies, long-term oral contraceptive use, a family history of cervical cancer and lifestyle factors such as smoking, being overweight and low consumption of fruit and vegetables.⁶ Enlargement of the transformation zone of the cervix during puberty, pregnancy and oral contraceptive use may also increase vulnerability to HPV infection.⁷ Progression to cervical cancer is associated with infection with multiple HPV variants, high viral load, higher parity, tobacco consumption and suppressed immune function.

Ovarian cancer

Ovarian neoplasia occur in four main types: epithelial, germ cell, sex-cord stromal cell and borderline tumours. Ovarian epithelial cancer is the most common type and accounts for 90% of ovarian cancers. The causes of ovarian cancer are not known, but the major risk factors are having few or no pregnancies, early menarche (before age 12) and later onset of menopause (after age 50). Never having taken the oral contraceptive pill, a family history of ovarian, bowel, breast or colorectal cancer, and having a personal history of breast cancer are also associated with increased ovarian cancer risk.⁸ Some studies have indicated that taking oestrogen-only hormone replacement therapy (HRT) after menopause and having treatment with fertility drugs may increase the risk of developing ovarian cancer, but other studies have not shown this relationship.

Women with a strong family history of breast cancer, ovarian cancer or both have a 50% higher risk of developing ovarian cancer, and women with a strong family history of colon cancer have an elevated risk of up to 10%.^{8,9} Factors associated with lower ovarian cancer risk are a low fat diet, pregnancy, breast feeding, and the use of oral contraception. In Australia, approximately 60% of ovarian cancers are diagnosed in post-menopausal women.¹⁰

Uterine cancer

Cancer of the uterus is now the most common gynaecological cancer affecting women in Australia¹¹ as cervical cancer, previously the most common, has been reduced through the population screening program. The majority of uterine cancers affect the endometrium, whilst the remainder mostly develop in the muscle layers of the uterus. A wide range of risk factors has been shown to be related to the development of uterine cancer.¹² Personal and lifestyle risk factors include being over 50 years of age, menopause, nulliparity, being overweight or obese, a high fat diet, physical inactivity and high energy intake. Familial risk factors include a family history of cancers such as endometrial, breast, bowel or uterine cancer or hereditary non-polyposis colorectal cancer. Medical risk factors include high blood pressure, endometrial hyperplasia, oestrogen-only hormone replacement, tamoxifen for the treatment of breast cancer, oestrogen-producing tumours, polycystic ovary syndrome, gallbladder disease, diabetes or high blood glucose concentrations and hypertension.

Cervical screening

Cervical cancer is the only cancer of the female reproductive tract for which screening programs have been demonstrated effective and have been implemented. Cervical cancer screening programs have been among the most successful public health achievements in the developed world. The aim of population-based cervical screening is to reduce the incidence of cervical cancer, and therefore the associated morbidity and mortality, through detecting and treating pre-cancerous lesions and early stage disease.¹³ Ninety per cent of cervical cancers can be detected by cervical screening with Papanicolaou (Pap) tests for cellular neoplasia and effectively treated.¹⁴ Higher rates of cervical cancer occurs in women who have never had a Pap test or not had one for four years or longer.¹⁵

A national cervical screening program was established in Australia in 1992, and the subsequent reduced incidence of cervical cancer, now the second lowest in the developed world, is directly attributable to this program.¹⁶⁻¹⁸ The target group for screening is asymptomatic women aged 20 to 69 years with an intact cervix, with a recommended screening interval in Australia of two years. Access to screening through general practitioners and Family Planning clinics has led to generally high participation rates and the successful

detection and treatment of abnormalities has significantly reduced the incidence and mortality from cervical cancer.^{13,18} Monitoring of cervical screening participation rates, especially among under-screened population sub-groups, and maximising screening in these groups, is critical to both the ongoing and wider population success of the screening program.

Family Planning NSW (FPNSW) is contracted by the *NSW Cervical Screening Program (CSP)* to provide cervical screening training for doctors, practice nurses and outreach nurses to perform Pap tests. Program monitoring data such as cervical screening participation and rates of technically unsatisfactory Pap smears in NSW assists FPNSW in developing and targeting training for locally-based health professionals.

The introduction in 2007 of the HPV vaccine Gardasil®, which provides immunity to the oncogenic HPV varieties 16 and 18 and wart varieties 6 and 11, is expected to lower cervical cancer incidence and mortality further. Gardasil, administered to adolescent girls and young women preferably prior to the onset of sexual activity, is highly effective in preventing HPV infection¹⁷ but it is not a therapeutic vaccine. Cervical screening models will require re-evaluation in the light of HPV population vaccination,¹⁹ but screening will remain important, if only because HPV strains other than 16 and 18 can also cause cervical cancer.^{20,21} The advent of cost-effective HPV testing is similarly expected to impact on the design of cervical screening programs,⁴ and HPV testing may eventually supplant the Pap smear as the screening evaluation, with the Pap smear being part of diagnostic follow-up for women with a screen-detected oncogenic HPV infection.²²⁻²⁴

Data Sources and Limitations

This chapter reports on age-standardised incidence and mortality rates of cervical, ovarian and uterine cancers in Australia, NSW and by NSW Area Health Service. Where possible, these rates are also provided by country of birth, the main area-based socioeconomic indicator as measured by the Socio-Economic Indicator For Areas (SEIFA) index, and by accessibility and remoteness of area (measured by the ARIA index). Data on cancer of the reproductive tract for NSW Aboriginal and Torres Strait Islander women are not considered sufficiently complete to be reported, although they are reportable at a national level.

The Globocan report for 2008,²⁵ produced by the World Health Organisation (WHO) International Agency for Research on Cancer (IARC), provides international comparisons of cancer incidence and mortality. As these cancer data are collected and compiled sometime after the event and under varying conditions of cancer registration,

international comparisons against Australian data must be made cautiously. Moreover, whilst mortality data by cause are available for many countries, the degree of detail and quality of the data vary considerably, especially in establishing cancer cause of death.

Caution should also be exercised in comparing international age-standardised rates with those reported in Australia. The WHO 'world' population standard is heavily weighted to younger age groups compared to ageing populations such as in Australia. Hence age-standardised rates based on WHO world population denominators can vary significantly from those based on Australian census data as the standard population.

The coordination of cervical screening activity in Australia is the responsibility of state and territory programs and each state and territory has a cervical cytology registry that manages the Pap test results in that jurisdiction. Cervical screening data from the National CSP is overseen by the Australian Institute of Health and Welfare (AIHW). Screening data from state and territory cervical cytology registers include all women screened in each jurisdiction, except Victoria and the Australian Capital Territory (ACT) which supply data only on women resident in those jurisdictions. NSW recently changed its practices and bases its screening rate estimates on NSW residents only. National monitoring of cervical screening commenced in 1996, but screening data are absent from some jurisdictions until commencement of the respective cervical cytology registries after 1996 (for example, Queensland).

With the exception of Victoria and the ACT, screening participation rates based on women screened in each jurisdiction may lead to overestimation of screening participation by women living in these jurisdictions.¹³ In contrast, participation by geographic region and by area-based socioeconomic status includes only women with a postcode coinciding with geographical areas of residence. Postcodes unique to mail centres or post offices may not coincide with areas of residence which may lead to underestimation of women screened in some residential areas and over-estimates of screening in business centres. The AIHW also note some discrepancies in participation rate estimates between those reported in the national data and those presented in state-based publications (including NSW). This is attributable mainly to differing adjustments of population denominators for age-specific hysterectomy fractions at state and national levels, but overall the published rates do not differ greatly.¹³

8.1 Incidence and Mortality of Cancers of the Reproductive Tract: International Comparisons

International trends in cancer incidence and mortality are monitored by the WHO's International Agency for Research on Cancer.^{14,25} Rates are standardised to the WHO 1966 world population and are appropriate for international comparisons of cancer incidence and mortality data. Australian data standardised to the Australian population are more appropriate for the assessment of rates and trends in Australia (see later in this chapter).

Cervical cancer

Cervical cancer is the third most common cancer diagnosed in women worldwide. Approximately 529,000 new cases of cervical cancer were diagnosed in 2008 around the world, with 274,000 women dying from the disease. The Australian age-standardised incidence rate (4.9 cases per 100,000 females) is one of the lowest among developed countries, as is the cervical cancer mortality rate of 1.4 deaths per 100,000 females. The rates in Australia are strongly attributable to the continued implementation of the cervical screening program.

Ovarian cancer

Ovarian cancer is the leading cause of death from gynaecological malignancies,⁹ and is more common in developed countries, possibly owing to lower fertility rates

and increasing obesity in these countries.²⁶ The 2008 age-standardised incidence for Australia was 7.7 cases per 100,000 females, with mortality at 4.5 deaths per 100,000 females. Incidence and mortality in Australia are slightly lower than in developed countries overall (9.3 and 5.1 per 100,000 females respectively). Cancer staging information in Australia is only reported in NSW, where over half (53%) of ovarian cancers diagnosed between 1980 and 2006 were diagnosed at an advanced stage (with metastatic spread).²⁷

Uterine cancer

In 2008 the age-standardised incidence for Australia was 11.3 cases per 100,000 females, and mortality was 1.5 deaths per 100,000 females. This compares favourably with the age-standardised incidence of 13.0 and 2.3 deaths per 100,000 females reported for developed countries overall.²⁸ Less developed countries had a lower incidence of uterine cancer (5.9 per 100,000 population) but similar mortality to Australia (1.7 per 100,000). Asian countries, especially Japan and South Korea, have relatively low incidence rates of uterine cancer compared to other countries (7.6 and 4.4 per 100,000 respectively).²⁹

8.2 Incidence and Mortality of Cancers of the Reproductive Tract: Australia

8.2.1 Incidence

Cervical cancer

New cases of cervical cancer diagnosed in Australia decreased from 868 in 1998 to 739 in 2007. The age-standardised incidence rate fell from 8.6 per 100,000 in 1998 and was 6.8 per 100,000 in 2007 (Figure 8.1).³⁰⁻³² The incidence of cervical cancer in NSW in 2007 was equivalent to the national rate (6.8 per 100,000 females).

The Northern Territory had the highest rate of 11.3 per 100,000 and was among the highest in the developed world. Age-standardised cervical cancer incidence in Aboriginal and Torres Strait Islander women, who form a substantial proportion of the Northern Territory population, was estimated 18.3 per 100,000 in 2007, compared to 6.6 per 100,000 for non-Aboriginal women.³²

For the period 2001 to 2005, the incidence of cervical cancer in NSW (6.8 per 100,000 females) was slightly lower than the national figure (7.0 per 100,000) but the lowest

rates were recorded in Victoria (6.0 per 100,000) and South Australia (5.7 per 100,000 females) (Figure 8.2). The highest rate over this time was recorded in the Northern Territory (12.1 per 100,000), with Queensland, Western Australia and Tasmania recording rates of over 8.0 per 100,000 females (8.1, 8.6 and 8.2 per 100,000 respectively.)

Ovarian cancer

New cases of ovarian cancer diagnosed in Australia increased slightly from 1,216 in 1998 to 1,266 in 2007.^{30,31,33} The age-standardised incidence decreased from 11.5 per 100,000 women in 1998 and was 10.8 per 100,000 in 2007 (Figure 8.1).

The Australian age-standardised incidence rate for 2001 to 2005 was 11.0 per 100,000 females, and the rate for NSW was 10.9 per 100,000 (Figure 8.2).¹¹ In the period 2002 to 2006 these had only changed marginally for Australia (11.1 per 100,000) and NSW (11.0 per 100,000).¹⁰

At rates of over 12 per 100,000, women in Western Australia (12.1 per 100,000) and the Australian Capital Territory (12.5 per 100,000) had the highest ovarian cancer

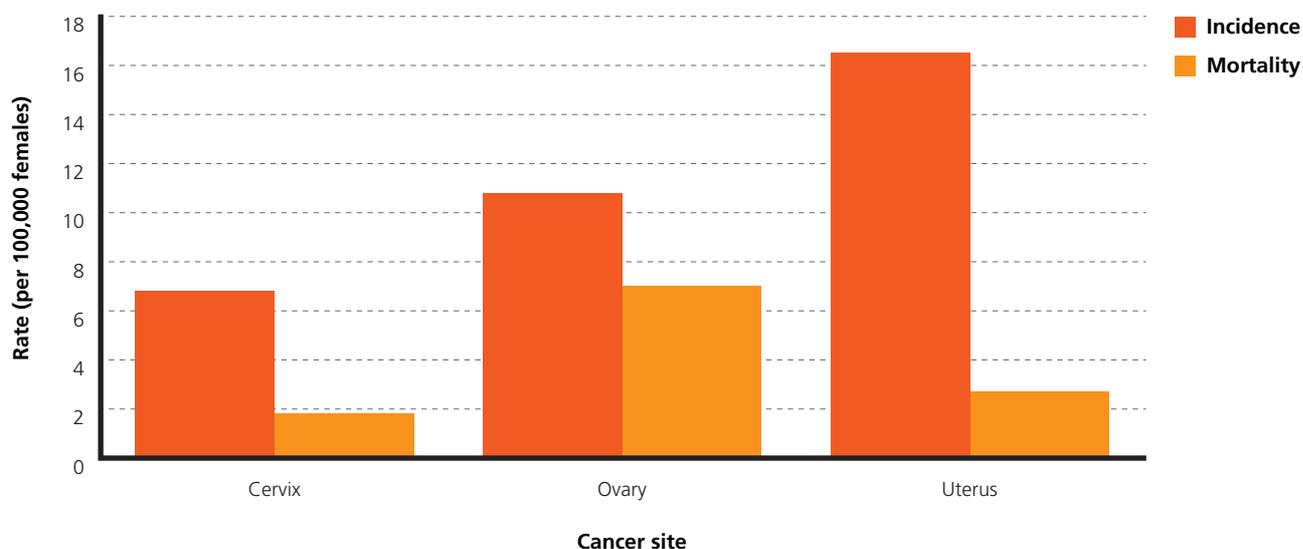
incidence rates (Figure 8.2). The lowest rates of ovarian cancer occurred in South Australia (9.5 per 100,000) and Tasmania (9.9 per 100,000 females).

From 2002 to 2006, 38 cases of ovarian cancer were recorded in Aboriginal and Torres Strait Islander women from Queensland, South Australia, Western Australia and the Northern Territory,³⁴ corresponding to an incidence rate of 12.4 per 100,000.^{10,34} Although higher than the rate for non-Aboriginal women (11.2 per 100,000 women), this was not statistically significant.

Uterine cancer

New cases of uterine cancer increased from 1,399 in 1998 to 1,942 cases in 2007.^{30,31} Age-standardised incidence rates increased from 13.2 in 1998 to 16.5 per 100,000 females in 2007 (Figure 8.1). The Australian age-standardised incidence rate for 2001 to 2005 was 15.2 per 100,000 women. At 13.8 per 100,000 women, the New South Wales rate was lower than the national rate over this five year period, while South Australia had the highest incidence at 17.7 per 100,000 women (Figure 8.2).

Figure 8.1: Incidence and mortality rates of gynaecological cancers, Australia, 2007



Source: AIHW and AACR 2010. Cancer in Australia: an overview, 2010. Cancer series no. 60. Cat. no. CAN 56. Canberra: AIHW.

8.2.2 Mortality

Cervical cancer

There were 264 cervical cancer deaths in 1998 and 208 in 2007.^{30,31} Age-standardised mortality decreased from 2.4 per 100,000 females in 1997 to 1.8 per 100,000 in 2007.^{30,33} Mortality from cervical cancer in Aboriginal and Torres Strait Islander women is estimated to be five times that of other Australian women.³⁵ This reflects significantly higher HPV infection, lower cervical screening rates in Aboriginal and Torres Strait Islander women,^{17,36} and probably poorer outcomes from treatment for cervical cancer or pre-cancerous lesions. For the period 2003 to 2007 the age-standardised mortality rate for Aboriginal and Torres Strait Islander women was 9.9 per 100,000 women, compared to 1.9 per 100,000 non-Aboriginal women.³⁵

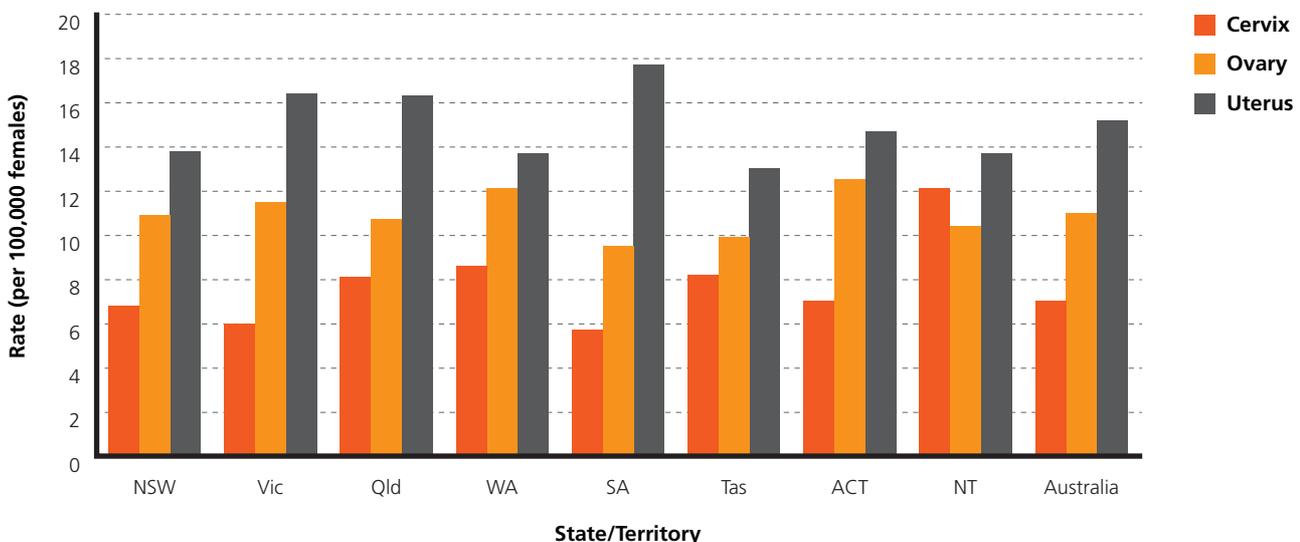
Ovarian cancer

Deaths from ovarian cancer in Australian women increased from 769 in 1998 to 848 in 2007, however the corresponding age-standardised mortality rate was comparatively constant (6.9 per 100,000 women in 1997 and 6.7 per 100,000 in 2007).^{30,31} Similar to the incidence of ovarian cancer, the rate of mortality from ovarian cancer in Aboriginal and Torres Strait Islander women in NSW, Queensland, South Australia, Western Australia and the Northern Territory over 2002 to 2006 was higher than the non-Aboriginal women but not statistically so (8.4 deaths per 100,000 Aboriginal and Torres Strait Islander women compared to 7.9 per 100,000 non-Aboriginal women).^{10,34}

Uterine cancer

The number of deaths from uterine cancer in Australian women increased from 246 in 1998 to 338 in 2007. The corresponding age-standardised mortality increased from 1.4 per 100,000 females in 1997 to 2.7 per 100,000 in 2007.^{31,32}

Figure 8.2: Incidence rates of gynaecological cancers, Australian states and territories, 2001 to 2005



Source: AIHW and AACR 2008. Cancer in Australia: an overview, 2008. Cancer series no. 46. Cat. no. CAN 42. Canberra: AIHW.

8.3 Incidence and Mortality of Cancers of the Reproductive Tract: New South Wales

Two hundred and forty-eight new cases of cervical cancer, 426 ovarian cancers and 625 uterine cancers were diagnosed in NSW in 2008.³⁷ However, uterine cancer resulted in the lowest number of deaths (126 in 2008) relative to diagnoses, less than 1 in 5, compared to cervical cancer (less than 1 in 2) and ovarian cancer (greater than 1 in 2) (Figure 8.3). The main reason for high ovarian cancer mortality is the late stage of presentation: ovarian cancer is difficult to detect at early stages because it has minimal symptomatology, and the majority of cancers, approximately 50 to 60%, present at an advanced stage, usually with metastatic disease.^{38,39}

8.3.1 Incidence

Cervical cancer

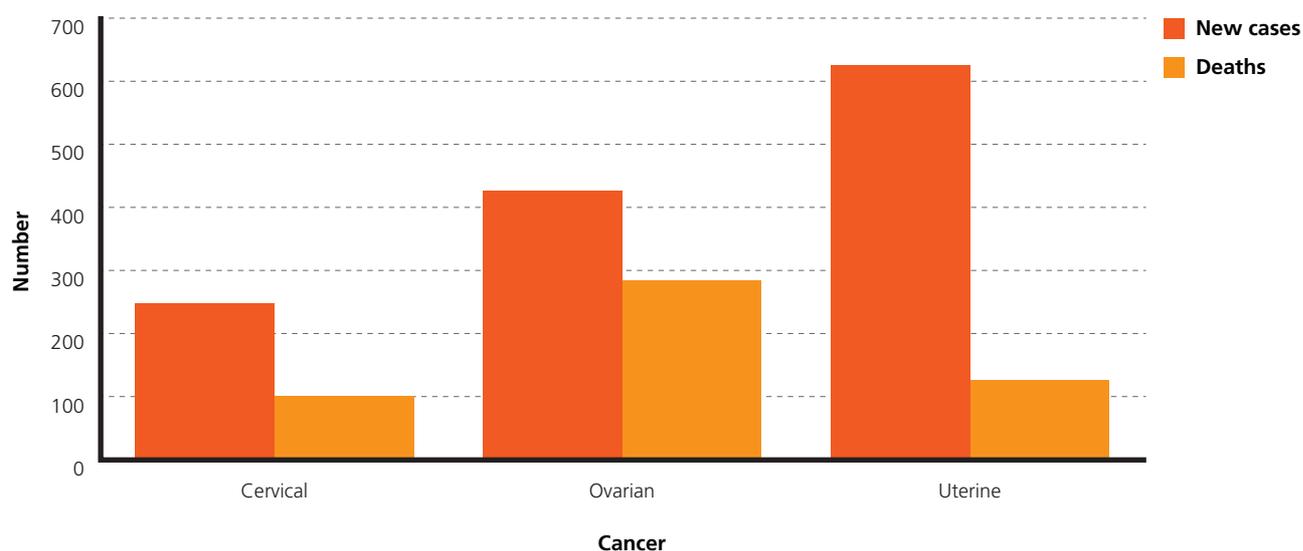
In 2008, cervical cancer ranked sixteenth for incidence in NSW with an age-adjusted incidence rate of 6.7 per 100,000 NSW females.³⁷⁻³⁹ Between 1997 and 2006 cervical cancer incidence fell by 40%. From 1972 to 1992 cervical cancer incidence rates declined on average 1.4%

per annum, but from 1992 the mean annual decline was 5.2% per annum (Figure 8.4), largely attributable to the introduction of the national cervical screening program.^{18,38}

From 2004 to 2008, NSW women born in the UK and Ireland had the highest age-standardised incidence rate of cervical cancer (9.3 per 100,000 females), followed by women born in New Zealand (7.9 per 100,000) and Northern Europe (6.9 per 100,000). Women of Middle Eastern background had significantly lower rates than women born in other regions (2.6 per 100,000),³⁹ and this may be a result of cultural factors that limit exposure to HPV.

Cervical cancer incidence by area-based quintile of socioeconomic disadvantage was highest in the most disadvantaged quintile (7.8 per 100,000 females) and lowest in the least disadvantaged (5.6 per 100,000). However, incidence did not consistently increase with increasing disadvantage: the third SES quintile had an incidence of 7.6 per 100,000 women, compared to incidence in the second most disadvantaged (fourth) SES quintile of 6.7 per 100,000.

Figure 8.3: Cancer of the reproductive tract, new cases and deaths, NSW, 2008



Source: Tracey E, et al. Cancer In NSW: Incidence and Mortality Report 2008. Sydney: Cancer Institute NSW, 2010.

Higher cervical cancer rates have been recorded for remote areas of NSW (13.2 per 100,000), however population numbers in these areas are small and the differences were not statistically significant from the overall incidence for NSW.³⁹ Higher incidence rates in remote areas may reflect lower cervical screening participation in these areas⁴⁰ and higher proportions of Aboriginal and Torres Strait Islander women.

Ovarian cancer

In 2008 ovarian cancer incidence was the eleventh highest cancer incidence reported in NSW women, with 426 new cases reported. There was a slight downward trend in ovarian cancer incidence³⁹ (Figure 8.4), from 12.1 per 100,000 women in 1972³⁹ to 10.7 per 100,000 in 2008. However, this has been counterbalanced with a rising trend in the presentation of ovarian cancer with distant (metastatic) disease, which has risen from 3.5 per 100,000 in 1972 to around 6.0 per 100,000 in 2004. Concomitantly there has been a declining incidence of localised and regional cancer, from around 3.5 per 100,000 in 1972 to 2.0 per 100,000 by 2004.²⁷

Over 2004 to 2008, the highest ovarian cancer incidence rates in NSW were reported in women born in Eastern European countries (14.8 per 100,000 females), followed by New Zealand-born women (12.2 per 100,000). The lowest rates occurred in women born in Asia (9.7 per 100,000) but

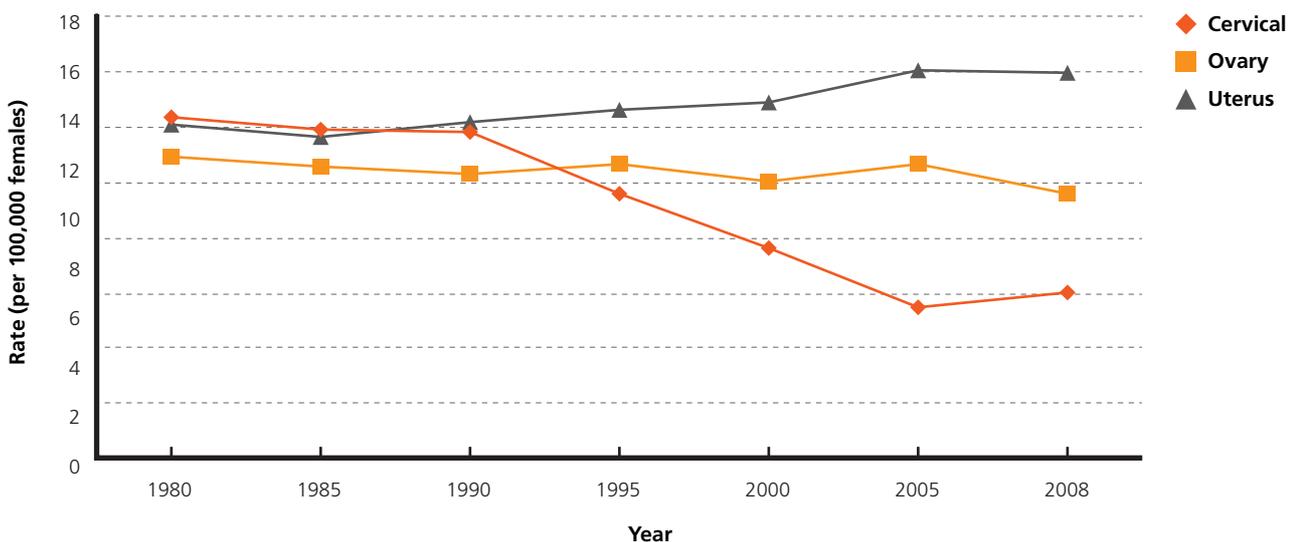
these differences were not statistically significant compared to NSW overall.³⁹ By quintile of socio-economic status, the highest rates of ovarian cancer in NSW occurred in women from the least disadvantaged SES quintile, and the lowest rates in women from the most disadvantaged SES quintile. However, these differences were not statistically significant. Similarly, the variation in ovarian cancer rates by remoteness index showed no statistically significant differences from NSW overall.³⁹

Uterine cancer

In 2008 uterine cancer was the eighth most common cancer in NSW women. Uterine cancer incidence in NSW has risen from its lowest point of 11.9 per 100,000 females in 1989 to 15.6 in 2008 (Figure 8.4). Uterine cancer incidence (for 2004 to 2008) was highest in NSW women born in Southern and Eastern Europe (both 18.4 per 100,000) and Northern Europe (15.9 per 100,000), and was lowest in women born in Asia (14.9 per 100,000).³⁹

For 2004 to 2008, uterine cancer incidence showed little variability by SES quintile. By ARIA remoteness category, the highest uterine cancer incidence was recorded in women from accessible regions (16.1 per 100,000), and the lowest in women from remote regions (8.7 per 100,000). However, there were no statistically significant differences between these regional categories.³⁹

Figure 8.4: Age-standardised incidence rates, cancers of the female reproductive tract, NSW, 1980 to 2008



Note: Intervals on x-axis are 5-year except for 3-year interval 2005 to 2008.

Source: Tracey E *et al.* Cancer In NSW: Incidence and Mortality Report 2008. Sydney: Cancer Institute NSW, 2010 and NSW Central Cancer Registry Reporting Module, 2010. Available at: www.statistics.cancerinstitute.org.au.

8.3.2 Age-specific incidence

Cervical cancer incidence (2006 to 2008) rose sharply from negligible levels in younger age groups, reached a plateau of approximately 10 to 12 per 100,000 from age 40 to 84 years, then rose to above 15 per 100,000 by age 85 and over (Figure 8.5). These age trends relate both to age-specific infection rates of human papilloma virus (HPV), and to possible age-related differences in the rate of viral clearance or progression to cervical cancer.⁴¹

In contrast, ovarian cancer incidence increases linearly with age from 4.6 per 100,000 at age 35 to 39 years to nearly 50 per 100,000 by age 85 and older. The age trend for uterine cancer is more curvilinear, where incidence rises sharply from age 45 to 49, peaks at 65 to 69 years and then declines (Figure 8.5). Some of the decline in uterine cancer past the age of 65 may be related to increasing proportions of women who have had a hysterectomy.

8.3.3 Mortality

Cervical cancer

Cervical cancer was responsible for 80 to 100 deaths annually in NSW over the period 2004 to 2008.³⁷ Cervical cancer mortality has declined from 6 to 7 per 100,000 women in the 1970s to less than 3 per 100,000 from 1998 (Figure 8.6).

Age-specific cervical cancer mortality over the period 2006 to 2008 was 1 to 2 per 100,000 in women aged 30 to 49 years, 4 to 5 per 100,000 in women aged 50 to 74 years, then rises more steeply to over 10 per 100,000 women by age 85 years and over (Figure 8.7).

Ovarian cancer

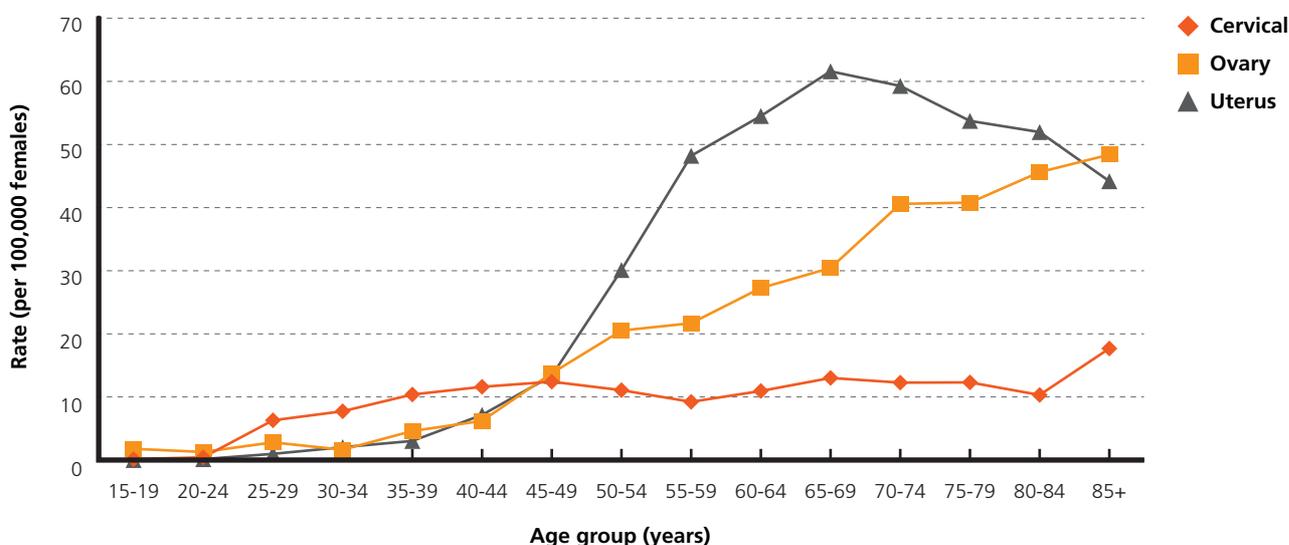
Ovarian cancer mortality rates have declined less dramatically, from 7.5 to 9.0 per 100,000 during the 1970s to 6.2 to 7.5 per 100,000 by 2004 to 2008 (Figure 8.6). There were 285 deaths from ovarian cancer in NSW in 2008, which corresponds to an age-standardised mortality rate of 6.8 per 100,000 women. Ovarian cancer mortality represented 4.4% of all female cancer deaths during 2004 to 2008 and ranked sixth highest among cancer-related causes of death in NSW women.³⁹

Over the period 2006 to 2008, rates of ovarian cancer mortality up to age 50 remained comparatively low at less than 5 per 100,000, then increased sharply to over 45 deaths per 100,000 by age 85 years and over. In the oldest age groups ovarian cancer mortality is of similar magnitude to its incidence, which partly reflects lower survival owing to the trend of increasing proportions of metastatic ovarian cancers presenting at diagnosis.³⁸

Uterine cancer

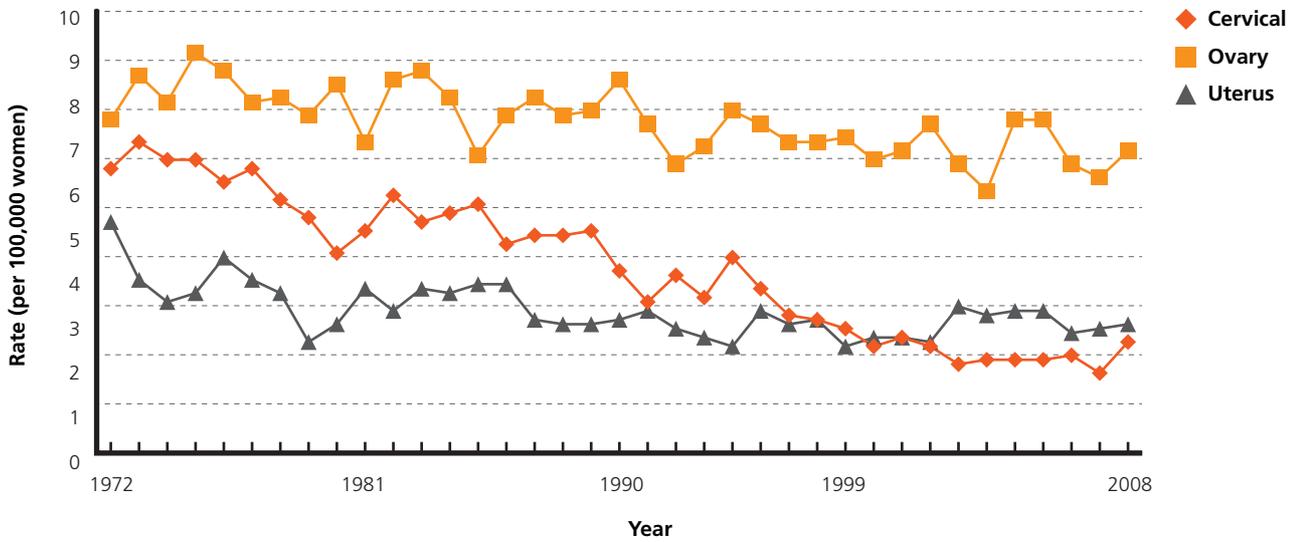
Uterine cancer mortality declined from 3 to 5 per 100,000 women during the 1970s to around 3 per 100,000 women since the 1990s. During 2004 to 2008 uterine cancer was the sixteenth highest cause of cancer mortality among NSW women.³⁹ Uterine cancer mortality increases with age: in the period from 2006 to 2008, there were negligible levels up to age 45 years, which then gradually increased to approximately 5 per 100,000 by age 60 years, then more steeply to over 25 deaths per 100,000 women aged 85 and over (Figure 8.7).

Figure 8.5: Incidence rates, cancers of the reproductive tract by age group, NSW, 2006 to 2008



Source: NSW Central Cancer Registry Reporting Module, 2010. Cancer Institute NSW: www.statistics.cancerinstitute.org.au.

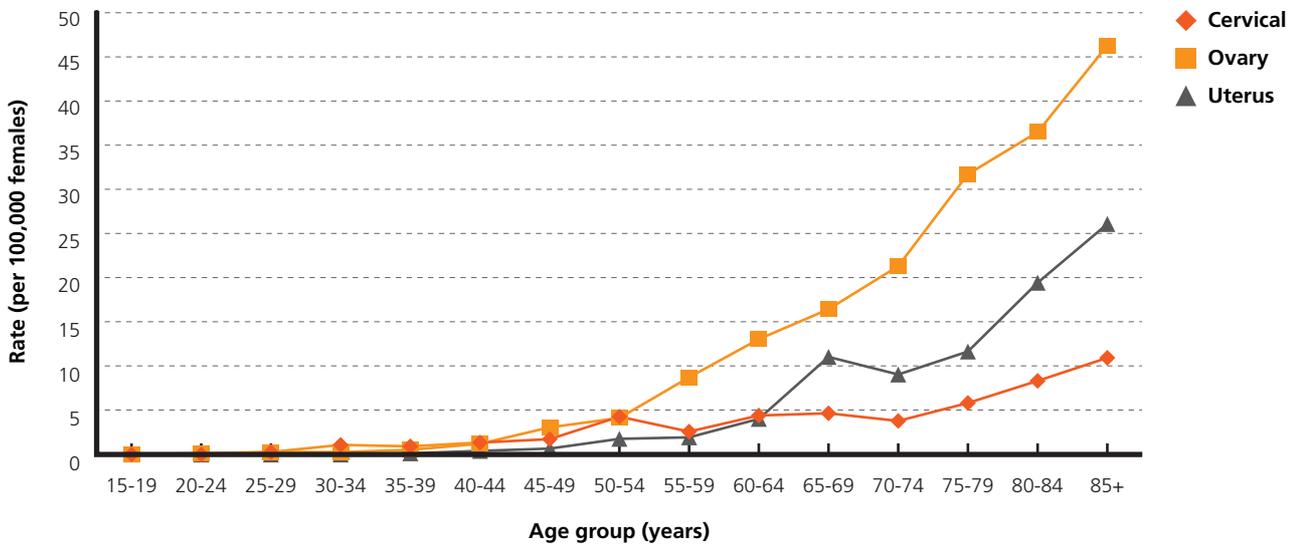
Figure 8.6: Age-standardised mortality rates, cancers of the female reproductive tract, NSW, 1972 to 2008



Note: Intervals on x-axis are 5-year except for 3-year interval 2005-2008.

Source: Tracey E et al. Cancer In NSW: Incidence and Mortality Report 2008. Sydney: Cancer Institute NSW, 2010 and NSW Central Cancer Registry Reporting Module, 2010. Available at: www.statistics.cancerinstitute.org.au.

Figure 8.7: Mortality rates, cancers of the reproductive tract by age group, NSW, 2006 to 2008



Source: NSW Central Cancer Registry Reporting Module, 2010. Cancer Institute NSW: www.statistics.cancerinstitute.org.au.

8.4 Incidence and Mortality from Cancers of the Reproductive Tract: New South Wales Area Health Services

Cervical cancer

During the period 2004 to 2008 South Eastern Sydney and Illawarra Area Health Service had the highest age-standardised incidence of cervical cancer of NSW Health Areas (8.2 per 100,000 females, Figure 8.8). The incidence of cervical cancer was also higher than the NSW rate (6.8 per 100,000 females) in the North Coast, Hunter and New England, and Greater Western Area Health Services (6.9, 7.3 and 7.9 per 100,000 respectively).

The incidence of cervical cancer in Sydney South West Area Health Service was the same as the NSW figure (6.8 per 100,000 females), and Greater Southern, Northern Sydney and Central Coast, and Sydney West Area Health Services had lower cervical cancer incidence rates than the state rate over the period 2004 to 2008, with the lowest incidence (5.6 per 100,000) in the Greater Southern Area Health Service.

Cervical cancer mortality over the period 2004 to 2008 was similar among NSW Area Health Services (Figure 8.8). The highest cervical cancer mortality rate was in the Greater Western Area Health Service (2.8 per 100,000) and rates were similarly higher than NSW in the Sydney South West, Hunter and New England, and South Eastern Sydney and Illawarra Area Health Services (2.2, 2.6 and per 100,000 females respectively).

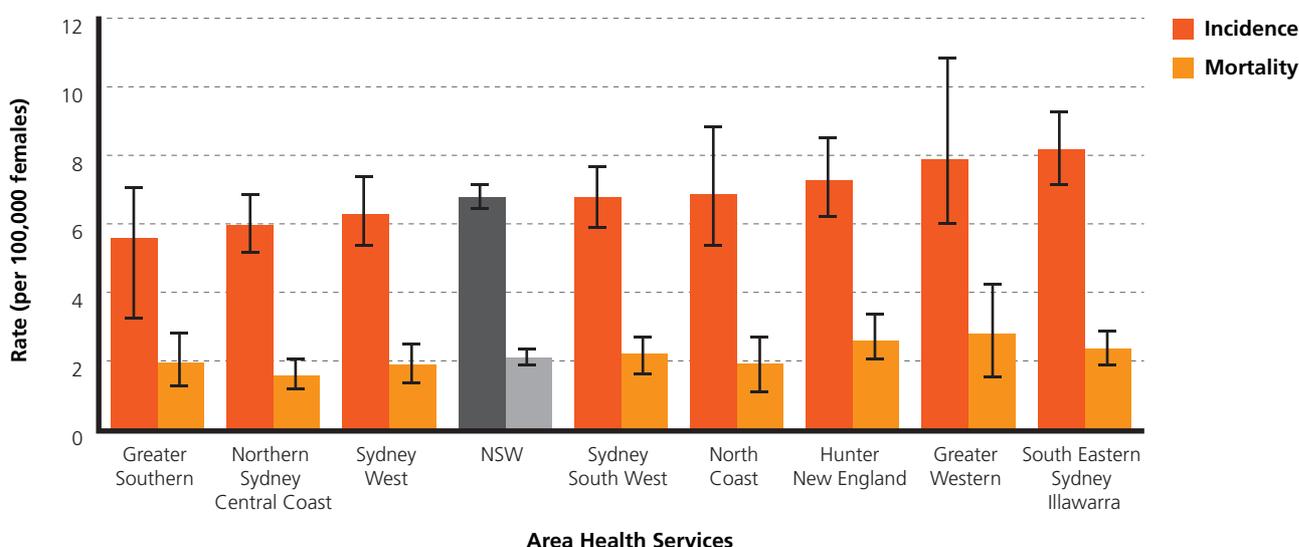
Lower rates of cervical cancer mortality over the period 2004 to 2008 were recorded in Greater Southern, Sydney West, and North Coast Health Area Health Services (all at 2.0 per 100,000 females), with the lowest rate in Northern Sydney and Central Coast (1.6 per 100,000).

Ovarian cancer

In the period 2004 to 2008 the Area Health Services with the highest ovarian cancer incidence were Sydney South West, Greater Southern, South Eastern Sydney and Illawarra, and Northern Sydney and Central Coast (11.7, 11.9, 12.0 and 12.5 per 100,000 females respectively, Figure 8.9). The lowest rates were recorded in Hunter New England, Sydney West, and Greater Western Area Health Services (10.0, 10.0 and 10.2 per 100,000 respectively).

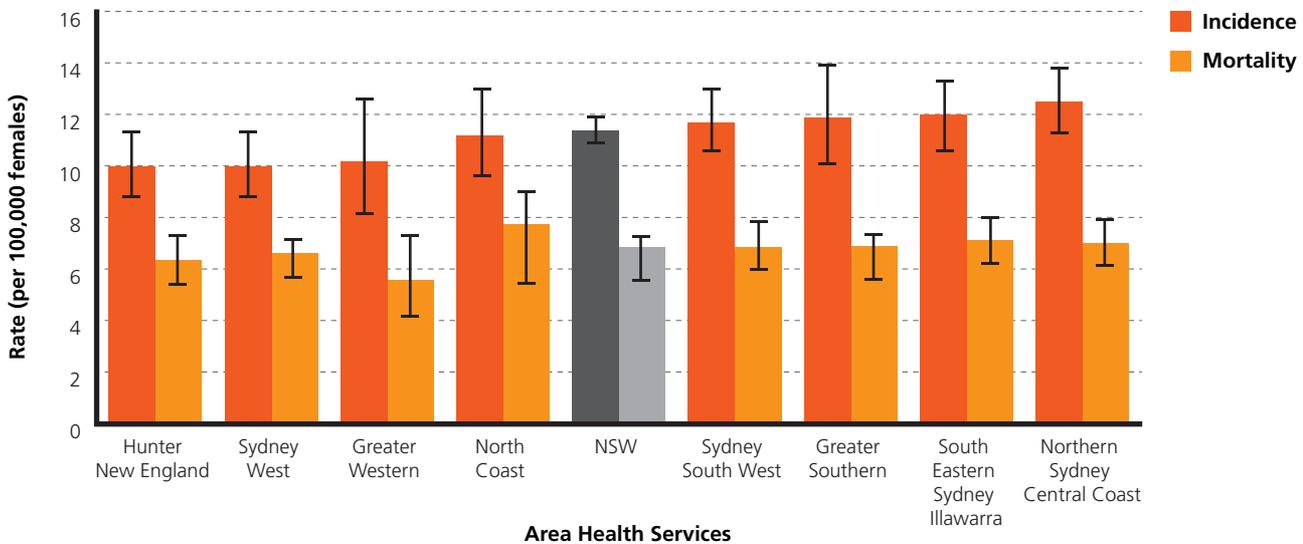
Ovarian cancer mortality rates 2004 to 2008 were highest in the North Coast, South Eastern Sydney and Illawarra, and Northern Sydney and Central Coast Area Health Services (7.7, 7.1 and 7.0 per 100,000 females respectively, Figure 8.9). The lowest rate was in the Greater Western Area Health Service (5.6 per 100,000).

Figure 8.8: Cervical cancer incidence and mortality rates, NSW Area Health Services, 2004 to 2008



Notes: Age standardised rates. Residence when diagnosed. Order = ascending incidence. Mortality data provided by Cancer Institute NSW. Source: Incidence - NSW Central Cancer Registry Reporting Module, 2010. Cancer Institute NSW: www.statistics.cancerinstitute.org.au.

Figure 8.9: Ovarian cancer incidence and mortality rates, NSW Area Health Services, 2004 to 2008



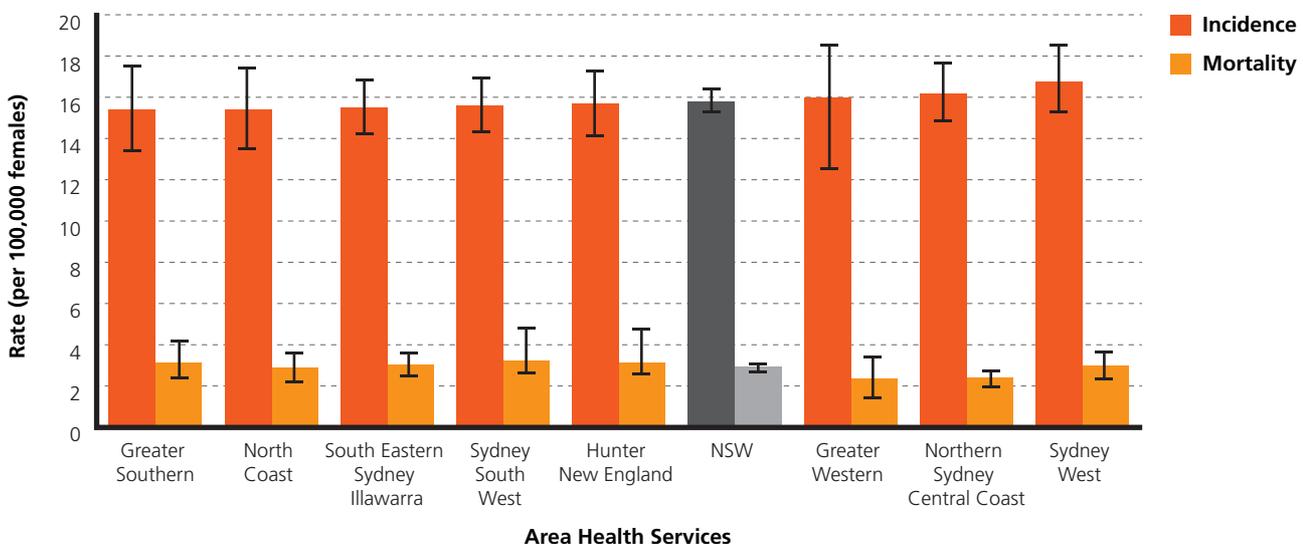
Notes: Age standardised rates. Residence when diagnosed. Order = ascending incidence. Mortality data provided by Cancer Institute NSW.
Source: Incidence - NSW Central Cancer Registry Reporting Module, 2010. Cancer Institute NSW: www.statistics.cancerinstitute.org.au.

Uterine cancer

Uterine cancer incidence 2004 to 2008 showed little variation by Area Health Service (Figure 8.10). NSW overall recorded an incidence rate of 15.8 per 100,000 females, with the highest Area Health Service rate recorded in Sydney West (16.8 per 100,000 females) and the lowest in the Greater Southern and North Coast Area Health Services (both 15.4 per 100,000 females).

Uterine cancer mortality similarly showed little variability among NSW Area Health Services for the period 2004 to 2008 (Figure 8.10). The rate of mortality reported for NSW was 2.9 per 100,000 females. The highest mortality rate was recorded in Sydney South West (3.2 per 100,000 females) and the lowest in the Greater Western Area Health Services (2.3 per 100,000).

Figure 8.10: Uterine cancer incidence and mortality rates, NSW Area Health Services, 2004 to 2008



Notes: Age standardised rates. Residence when diagnosed. Order = ascending incidence. Mortality data provided by Cancer Institute NSW.
Source: Incidence - NSW Central Cancer Registry Reporting Module, 2010. Cancer Institute NSW: www.statistics.cancerinstitute.org.au.

8.5 Cervical Screening: Australia

Organised cervical screening has been responsible for most of the decline in cervical cancer incidence and mortality in Australia. Screening participation is the single most important measure for assessing the extent to which these benefits are maintained and projected through the entire eligible population. For the Australian program, screening women aged 20 to 69 years:

- The number of women participating in cervical screening increased from over 2.5 million in 1996-1997 to over 3.6 million by 2007-2008
- Biennial participation was stable at approximately 61% since 1999-2000; the highest participation rate achieved was 63% in 1998-1999 and in 2007-2008 the participation rate was 61%
- High participation rates (>60%) are generally reported in the age groups from 30-34 to 55-59 years; in 2007 to

2008, participation was highest in women aged 55-59 years (70%) and lowest in women aged 20-24 years (47%)

- In 2007 to 2008, participation by geographic region was 61% in major cities, 61% in inner regional, 62% in outer regional, 55% in remote, and 60% in very remote areas. These differences were significant and reflect, in part, greater difficulty in access to or provision of screening to women in remote and very remote areas
- The number of women who re-screen early following a normal Pap test (i.e. have a Pap test before a routine reminder is issued by the Cervical Screening Program) has continued to decline and indicates compliance with the recommended two-yearly screening interval^{13,35}

8.6 Cervical Screening: New South Wales

Cervical screening in NSW is overseen by the NSW Cervical Screening Program (CSP), and screening data are collated in the NSW Pap Test Register (PTR) which commenced operation in August 1996. The NSW PTR is a central and confidential database of NSW women's Pap test and cervical biopsy results. The register provides a safety-net reminder service to encourage women to have Pap tests every two years.⁴⁰ The PTR is also responsible for monitoring the follow-up of screen-detected cervical abnormalities and for monitoring pathology laboratory performance.

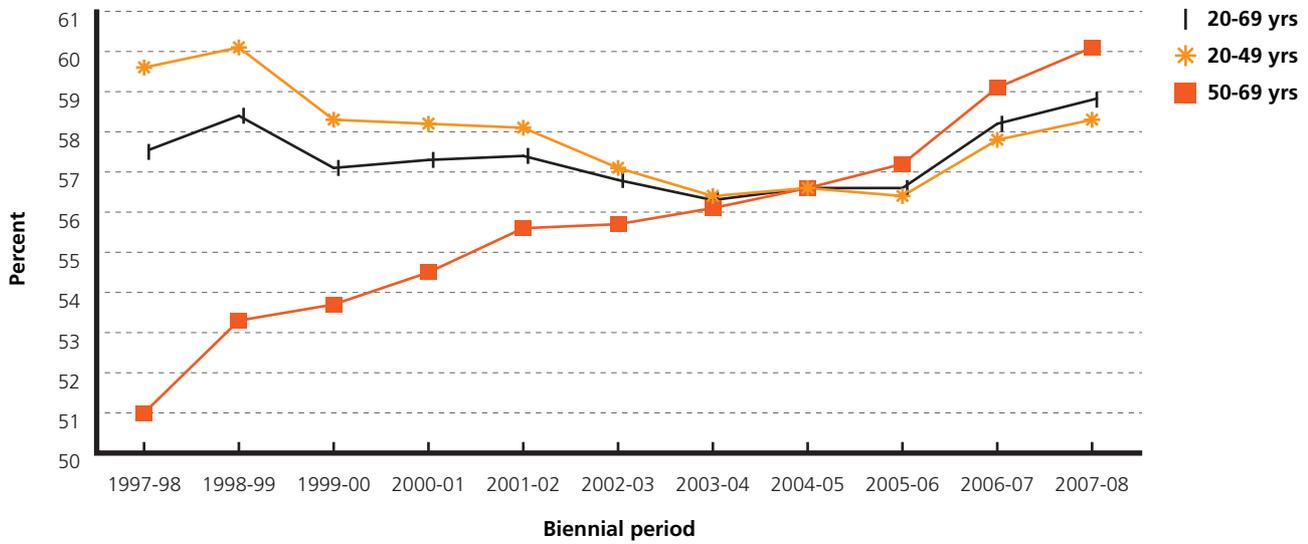
8.6.1 New South Wales cervical screening participation rate

Biennial screening participation rates for women aged 20 to 69 years were approximately 58% in the 1997-1998 and 1998-1999 reporting periods, but then declined to below 57% in 2003-2004⁴⁰ (Figure 8.11). The trend was reversed sharply in 2006-2007 when screening participation returned to approximately 58% and then nearly 59% in 2007-2008. Some of the trend reversal is attributable to the "Don't Just Sit There" television advertising campaign conducted by the NSW CSP.¹⁵

Younger women (aged 20 to 49 years) account for more than 70% of screening participants, and hence the participation rates in this age group largely reflect the overall pattern (Figure 8.11). In contrast, participation rates have consistently increased in the older age group (50 to 69 years), rising from 51% in 1997-1998 to 60% in 2007-2008.⁴²

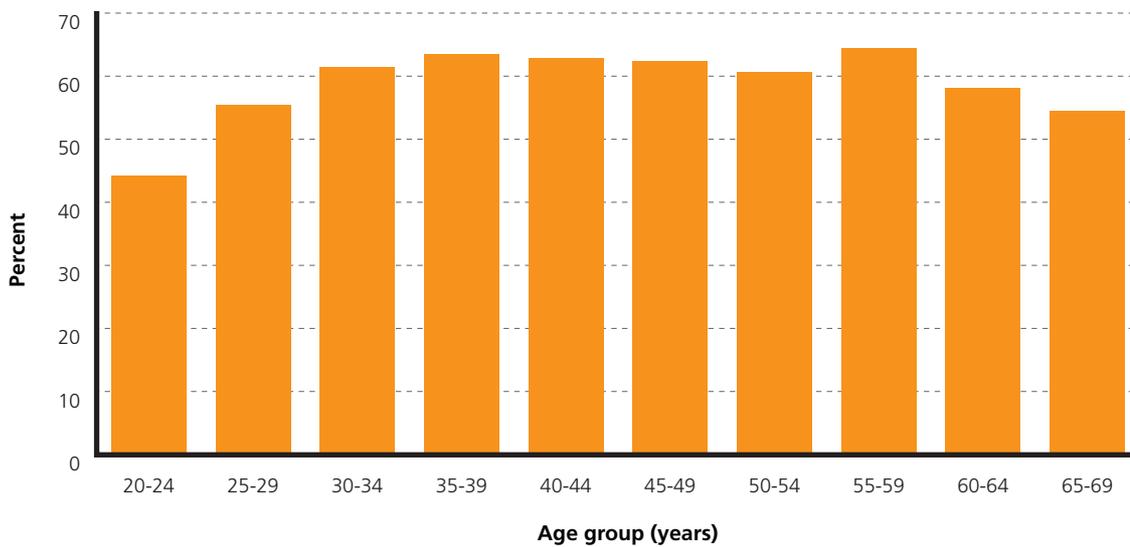
In 2007-2008, 59% of 20 to 69 year old women participated in biennial cervical screening and women aged 55 to 59 years had the highest screening participation rate (64.4%, Figure 8.12). Women aged 20 to 24 years had the lowest screening participation (44%).⁴²

Figure 8.11: Biennial cervical screening participation rates by age group, NSW, 1997-98 to 2007-08.



Source: Cervical Cancer Screening in New South Wales: Annual Statistical Report 2007-08. Sydney: Cancer Institute NSW, June 2011.

Figure 8.12: Biennial cervical screening participation rates by age group, NSW, 2007 to 2008.



Source: Cervical Cancer Screening in New South Wales: Annual Statistical Report 2007-08. Sydney: Cancer Institute NSW, June 2011.

Screening participation by accessibility and remoteness of area

The majority of women aged 20 to 69 years screened in 2007-2008 were resident in major cities (56%), and the participation rate for these women was 58.1% (Figure 8.13).⁴² Whilst only representing 33% of cervical screens, women from inner regional NSW had the highest screening participation rate (60%). Women living in outer regional or remote NSW had participation rates of 57% and 53% respectively in 2007-2008, with the lowest screening participation in very remote areas (47%).

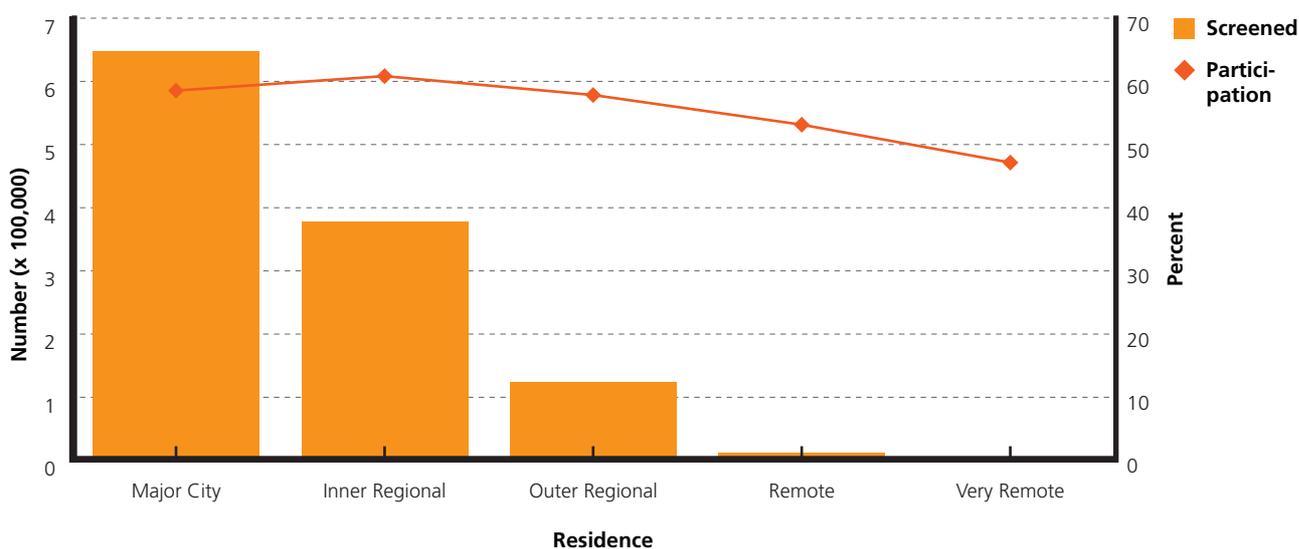
Screening participation rates by socioeconomic index

Biennial screening rates in the screening period 2007-2008 were highest among women with the highest relative index of socioeconomic advantage (i.e. the most advantaged, 67%) and lowest among women with the lowest index of socioeconomic advantage (55%).⁴² This difference was seen in both urban and rural settings. However, in rural settings higher proportions of women in the more disadvantaged SES groups were screened than similar women in urban settings. In SES quintiles from the second most advantaged to least advantaged (quintiles 2 to 5), an average of 54% of women were screening in urban settings compared with 59% in rural settings.⁴²

8.6.2 Cervical screening: New South Wales Area Health Services

Comparison of biennial screening rates by Area Health Service helps to identify areas where screening participation might be increased by targeted interventions. Screening rates in 2007-2008 for women aged 20 to 69 years ranged from 54% in the Greater Western and Sydney West Area Health Services to 65% for the Northern Sydney and Central Coast Area Health Service (Figure 8.14).

Figure 8.13: Number of women screened and participation rates by place of residence, NSW, 2007-2008



Note: Number screening plotted against primary y-axis, participation rate plotted against secondary y-axis.

Source: Cervical Cancer Screening in New South Wales: Annual Statistical Report 2007-08. Sydney: Cancer Institute NSW, June 2011.

Figure 8.14: Cervical screening participation rates, NSW Area Health Services, 2007-2008



Note: 95% confidence intervals not shown as error estimates less than 1%.

Source: Cervical Cancer Screening in New South Wales: Annual Statistical Report 2007–08. Sydney: Cancer Institute NSW, June 2011.

8.7 Pap Tests by Practice Nurses: New South Wales

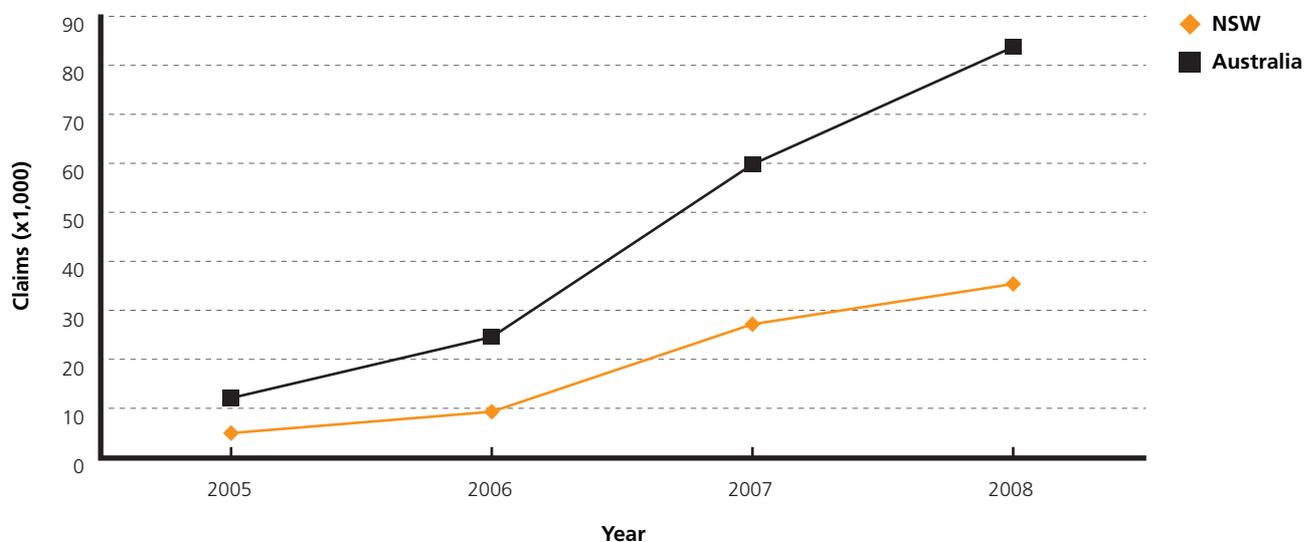
Appropriately qualified and trained practice nurses can take cervical smears for Pap testing and these procedures can be claimed under Medicare (Table 8.1). Family Planning NSW is an accredited provider of training for practice nurses to perform Pap smears and Pap smears taken by practice nurses have risen significantly in NSW and Australia since 2005 (Figure 8.15). The number of Medicare claims processed for cervical smears taken by practice nurses increased in NSW from approximately 5,000 in 2005 to nearly 35,000 by 2008.

Table 8.1 Medicare items for the undertaking of cervical smears by nurses

PROCEDURE	ITEM
Services provided by a practice nurse, being the taking of a cervical smear and preventive checks	10994
Service provided by a practice nurse, being the taking of a cervical smear from a woman between the ages of 20 and 69 inclusive, who has not had a cervical smear in the last 4 years, and preventive checks	10995
Service provided by a practice nurse, being the taking of a cervical smear from a person	10998
Service provided by a practice nurse, being the taking of a cervical smear from a woman between the ages of 20 and 69 inclusive, who has not had a cervical smear in the last 4 years	10999

Source: Medicare Benefits Schedule Book. Commonwealth of Australia 2009. Online: www.mbsonline.gov.au/.

Figure 8.15: Medicare claims for cervical smears taken by practice nurses, Australia and NSW, 2005 to 2008.



Source: Medicare Australia: www.medicareaustralia.gov.au/statistics/mbs_item.shtml, accessed Jul2011.

8.8 Technically Unsatisfactory Pap Tests and Endocervical Component Samples: New South Wales

Technically unsatisfactory Pap smears fail to allow assessment of exfoliated cervical cellular material. These can result from inadequate sampling (no cervical cellular material collected) or where the cellular sample is contaminated by the presence of blood, semen or other discharge. An adequate smear depends on the competence of the clinician in assessing the client before taking the smear and in performing the sampling.

Collection of an endocervical component sample is also desirable, as cellular material collected from the endocervical canal can enable assessment of cervical glandular cells, lesions of which can lead to adeno- and adeno-squamous cervical cancer. Moreover, as women age the transformation zone of the cervix migrates further into the endocervix, resulting in greater difficulty in adequately sampling endocervical squamous cells.

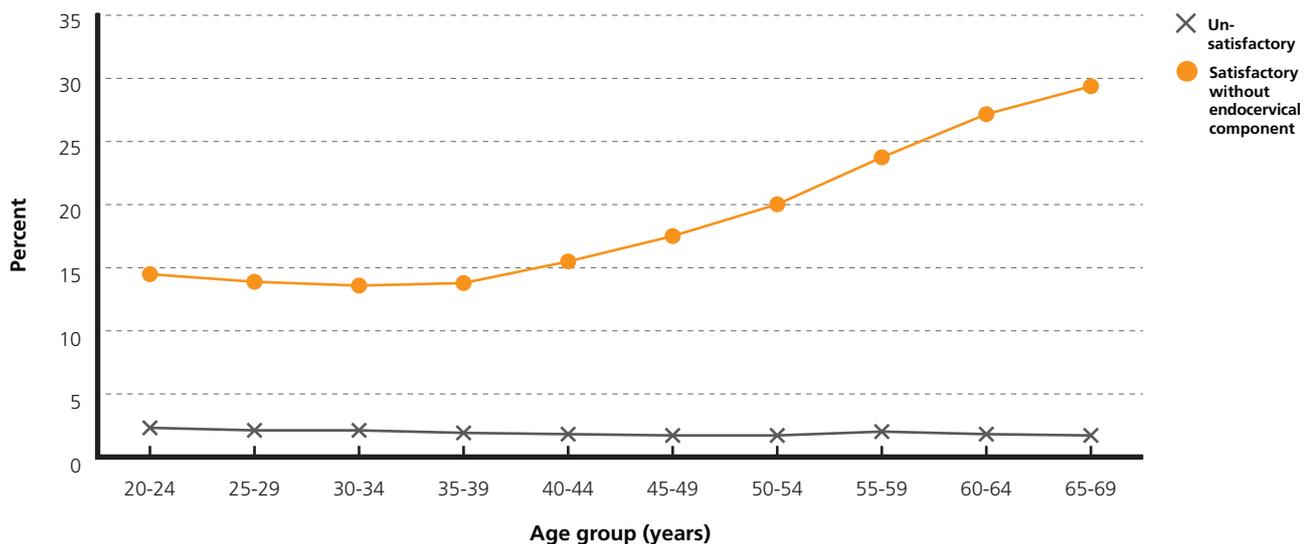
In 2005, 2.2% of 641,932 Pap tests performed in New South Wales were reported as being technically unsatisfactory,⁴⁰ but this rate had fallen to 1.9% in 2008.⁴² Both of these figures were well within the acceptable upper level of 5%. In 2008 the proportion of unsatisfactory smears was highest among women aged 20 to 24 years (2.3%) and lowest among women aged 40 to 49 years (1.7%), however the proportion of unsatisfactory smears remained low in all age groups (Figure 8.16). In contrast, the proportion of smears without an endocervical component increased with age after approximately age 40 years (Figure 8.16).

8.8.1 Technically unsatisfactory Pap tests: New South Wales Area Health Services

No NSW Area Health Service reported technically unsatisfactory smear rates in excess of the upper limit of 5% in 2008. Sydney West Area Health Service reported

the highest proportion of technically unsatisfactory smears (2.3%), and Northern Sydney and Central Coast Area Health Service the lowest (1.3%, Table 8.2). The Greater Southern Area Health Service reported the greatest proportion of smears without an endocervical component (20.2%) while Sydney West reported the lowest (15.4%). As noted above, cells from the cervical canal become more difficult to collect in older women and the variation in cervical component sampling may reflect underlying age differences in the respective screened populations.

Figure 8.16: Technically unsatisfactory cervical smears and smears without endocervical component by age group, NSW, 2008.



Source: Cervical Cancer Screening in New South Wales: Annual Statistical Report 2007–08. Sydney: Cancer Institute NSW, June 2011.

Table 8.2 Technically unsatisfactory smears and smears without endocervical component, NSW Area Health Services, 2008

AREA HEALTH SERVICE	TECHNICALLY UNSATISFACTORY SMEARS (%)	SATISFACTORY SMEARS WITHOUT ENDOCERVICAL COMPONENT (%)
Northern Sydney & Central Coast	1.3	16.8
South Eastern Sydney & Illawarra	1.8	16.7
Greater Western	1.9	17.9
Hunter & New England	2.0	18.7
Greater Southern	2.1	20.2
Sydney South West	2.1	17.1
North Coast	2.3	19.0
Sydney West	2.3	15.4

Source: Cervical Cancer Screening in New South Wales: Annual Statistical Report 2007–08. Sydney: Cancer Institute NSW, June 2011.

8.9 Summary

Cancers of the reproductive tract remain significant causes of morbidity and mortality for Australian women. Ovarian cancer continues to represent the greatest cause of mortality from reproductive tract cancers, whereas cervical cancer now causes the least number of deaths of the reproductive tract cancers. This is primarily a result of the successful introduction of cervical screening, which detects and allows for the treatment of both cancerous and pre-cancerous lesions. Since the introduction of cervical screening, the rate of cervical cancer incidence and mortality has fallen. In contrast, ovarian cancer is largely asymptomatic and often presents when the disease has advanced beyond the ovaries. Uterine cancer, although having the highest incidence of the reproductive tract cancers, causes relatively less mortality as it is comparatively easily detected and treated at early disease stages.

Cervical cancer

Cervical cancer is the third most common cancer in women worldwide and in 2008 over half a million cases were responsible for over a quarter of a million deaths. However, there is significant variation in rates among countries, and in particular cervical cancer is comparatively well controlled in countries such as Australia where a cervical screening program has been implemented. In 2007, the age-standardised incidence for cervical cancer in Australia was 6.8 per 100,000 women and the 208 deaths yielded a mortality rate of 1.8 per 100,000 women.

Whilst overall the rate of cervical cancer incidence and mortality in Australia is comparable with similar developed countries providing population-based cervical screening, some sub-populations in Australia are not accessing the screening program effectively and thus the resultant incidence and mortality reduction is not being universally realised.

In particular, the disparity in cervical cancer incidence and mortality between Aboriginal and Torres Strait Islander women and non-Aboriginal women remains a concern. The incidence of cervical cancer in Aboriginal and Torres Strait Islander women in 2007 was 18.3 per 100,000 compared with 6.6 per 100,000 for non-Aboriginal women. This translated into an alarming cervical cancer mortality rate five times higher than that of non-Aboriginal women, with Aboriginal and Torres Strait Islander women dying at a rate of 10 per 100,000 women compared to 2 per 100,000 non-Aboriginal women.

In NSW, cervical cancer ranked sixteenth for cancer with an incidence of 6.7 per 100,000 women. Women born in the UK and Ireland residing in NSW had the highest rates of cervical cancer, with women of Middle Eastern background

the lowest. Higher incidence rates were similarly observed for women in rural and remote settings, which may reflect both access to cervical screening and larger proportions of Aboriginal and Torres Strait Islander women.

Cervical cancer mortality in 2008 was less than three women per 100,000, with rates very low in women younger than 45, but rising to over 10 per 100,000 from age 75.

Cervical screening in New South Wales

Biennial participation rates for women aged 20 to 69 years have approached but not quite achieved 60%. When the program was introduced in 1996, screening rates reached 58% but subsequently declined until a reversal, potentially the result of health promotion campaigning, saw the participation rate rise to 59% in 2007-2008. Women aged 20 to 49 account for more than 70% of screening participants, but rates have increased in women aged 50 to 69 years from 51% at the initiation of the program to 60% in 2007-2008.

Participation in screening was related to area of residence: women from cities and inner regional NSW had screening rates of 58 and 60% respectively, whereas women in remote and very remote areas were screened at rates of 53 and 47%. Similarly, screening rates were lowest in women from more disadvantaged socio-economic groups (55%) compared to 67% screened in less disadvantaged socio-economic groups.

Access to screening is potentially increased, particularly in rural and remote settings, when the screening Pap test can be taken by a nurse practitioner rather than a doctor. In NSW, the role of the nurse practitioner in cervical cancer screening has increased, with nearly 35,000 Medicare claims processed in 2008 for Pap smears undertaken by practice nurses.

Whilst the introduction of vaccination against the Human Papilloma virus may ultimately change how cervical screening is managed in Australia, both nationally and in NSW emphasis must remain on maximising the participation in cervical screening. In particular, focus needs to address the hard-to-reach sub-groups of the population, and this is especially acute in Aboriginal and Torres Strait Islander women. The continuing disparity in the cervical cancer mortality rate between Aboriginal and Torres Strait Islander and non-Aboriginal women remains a key element to the overall success of the cervical screening program.

The ability to address this issue has been hampered by incomplete data on Aboriginal and Torres Strait Islander participation in cervical screening, and Aboriginality has not been collected fully by cancer screening (Pap test) registries. However, in NSW this is being rectified with the collection of Aboriginality data at screening.

Ovarian cancer

Ovarian cancer is the leading cause of mortality from gynaecological malignancies. In 2007 ovarian cancer incidence was 10.8 per 100,000 women in Australia and mortality was 6.7 per 100,000. In contrast to cervical cancer, the incidence and mortality rates for Aboriginal and Torres Strait Islander women were not significantly greater than those for non-Aboriginal women. Over the period 2002 to 2006, the incidence of ovarian cancer in Aboriginal and Torres Strait Islander women was 12.4 per 100,000 women and mortality 8.4 deaths per 100,000 women. This compared to an incidence of 11.2 and mortality of 7.9 per 100,000 non-Aboriginal women in the same period.

The incidence of ovarian cancer in NSW showed a downward trend from the 1970s (12.1 per 100,000 women) to 10.7 per 100,000 in 2008. However, a greater number of women are presenting with metastatic disease and this will have a significant effect on mortality rates. Women born in Eastern European countries reported the highest incidence of ovarian cancers in the period 2004 to 2008 (nearly 15 per 100,000), whereas women born in Asia reported the lowest rates of nearly 10 per 100,000. Although not statistically significant, the highest rates of ovarian cancer were recorded in women from the least disadvantaged socio-economic status quintiles.

The mortality rate for ovarian cancer in NSW was 6.8 per 100,000 women in 2008 and ovarian cancer was the sixth highest cancer related cause of death. The risk of ovarian cancer was below 5 deaths per 100,000 in women aged less than 50, but thereafter increased rapidly to over 45 deaths per 100,000 in women aged 85 or older.

Uterine cancer

Cancer of the body of the uterus is now the most common gynaecological cancer of women in Australia and increased from 13.2 per 100,000 women in 1998 to 16.5 per 100,000 in 2007. Uterine cancer caused more mortality than cervical cancer with 2.7 cases per 100,000 women in 2007. However, this was relatively lower than deaths caused by cervical cancer: in 2007 there were 6 cancers for every death, whereas for cervical cancer, there were only 3 cancers for every death.

In NSW the incidence of uterine cancer has risen to 15.6 per 100,000 women in 2008. Mortality from uterine cancer in NSW has been stable at approximately 3 deaths per 100,000 women from 1990. Uterine cancer was most common in women born in Southern and Eastern Europe and least common in women born in Asia, and the cancer was less likely in women in remote NSW although regional differences were not statistically significant.

The incidence of uterine cancer in NSW rose sharply from age 40 to reach over 60 cases per 100,000 for women aged 65 to 69 years. However, after this age the incidence of uterine cancers declined.

Cancer data

Cancer data are comparatively well collected and reported. National and state-based cancer and cancer screening registers report routinely, although there is always a delay as data are compiled and processed from different sources. The availability of some data online at state level in NSW represents a growing recognition of the importance of cancer data as a publicly available resource, but the reporting and variables available remain limited.

Focus must remain on detailed assessment of the patterns of incidence and mortality in population subgroups, by geographic and socio-demographic factors and with particular reference to the impact of cancers of the reproductive tract in Aboriginal and Torres Strait Islander communities.

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Abbreviations

A

AACR	Australasian Association of Cancer Registries
ABS	Australian Bureau of Statistics
ACDC	Assisted Conception Data Collection
ACIM	Australian Cancer Incidence and Mortality
ALSWH	Australian Longitudinal Study on Women's Health
AMIHS	Aboriginal Maternal and Infant Health Strategy
AGSP	Australian Gonococcal Surveillance Programme
AHS	Area Health Service
AIDS	Acquired Immune Deficiency Syndrome
AIHW	Australian Institute of Health and Welfare
ANZARD	Australian and New Zealand Assisted Reproduction Database
ARIA	Australian Remoteness Index Area
ART	Assisted Reproductive Technology
ASFR	Age-Specific Fertility Rate
ASHR	Australian Study of Health and Relationships

B

BBV	Blood Borne Virus
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C

CALD	Culturally and Linguistically Diverse Communities
CFR	Crude Fertility Rate
CI	Confidence interval
COCP	Combined Oral Contraceptive Pill
CSP	Cervical Screening Program

D

DMPA	Depot Medroxyprogesterone Acetate
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E

ECP	Emergency Contraceptive Pill
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F

FPNSW	Family Planning NSW
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G

GFR	General Fertility Rate
GIFT	Gamete Intrafallopian Tube Transfer

H

HBV	Hepatitis B Virus
HIC	Health Insurance Commission
HILDA	Household, Income and Labour Dynamics in Australia
HIV	Human Immunodeficiency Virus
HOIST	Health Outcomes Information Statistical Toolkit
HPV	Human Papilloma Virus
HRT	Hormone Replacement Therapy
HSV	Herpes Simplex Virus

I

IARC	International Agency for Research on Cancer
ICSI	Intracytoplasmic Sperm Insertion
IDU	Injecting Drug User
IMR	Infant Mortality Rate
IUD	Intrauterine Device
IUS	Intrauterine System
IVF	In-vitro Fertilisation

L

LGA	Local Government Area
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M

MBS	Medicare Benefits Schedule
MDC	Midwives Data Collection
MDG	Millennium Development Goal
MMR	Maternal Mortality Ratio
MSM	Men who have sex with Men

N

NCHECR	National Centre for HIV Epidemiology and Clinical Research
NCIMS	Notifiable Conditions Information Management System
NHMD	National Hospital Morbidity Database
NHS	National Health Survey
NMR	Neonatal Mortality Rate
NMDS	National Minimum Data Set
NNDSS	National Notifiable Diseases Surveillance System
NPDC	National Perinatal Data Collection
NPESU	National Perinatal Epidemiology and Statistics Unit
NPSU	National Perinatal Statistics Unit
NSASS	National Survey of Australian Secondary Students
NSW PDC	New South Wales Perinatal Data Collection
NZ	New Zealand

O

OCP	Oral Contraceptive Pill
OECD	Organisation for Economic Cooperation and Development
OTC	Over the counter

P

Pap	Papanicolaou
PBS	Pharmaceutical Benefits Scheme
PDC	Perinatal Data Collection
PID	Pelvic Inflammatory Disease
PMR	Perinatal Mortality Rate
POP	Progestogen Only Pill
PTR	Pap Test Register

R

RSH	Reproductive and Sexual Health
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S

SEIFA	Socio Economic Index For Areas
SES	Socioeconomic Status
SIDS	Sudden Infant Death Syndrome
SLA	Statistical Local Area
STI	Sexually Transmissible Infection
SUZI	Subzonal Insemination

T

TFR	Total Fertility Rate
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U

UK	United Kingdom
US(A)	The United States of America
UN	United Nations

W

WHO	World Health Organization
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Abbreviations continued

Australian States and Territories

ACT	Australian Capital Territory
AUS	Australia
NSW	New South Wales
NT	Northern Territory
QLD	Queensland
SA	South Australia
TAS	Tasmania
VIC	Victoria
WA	Western Australia

NSW Area Health Services

NSCC	North Sydney and Central Coast
SES&I	South Eastern Sydney and Illawarra
SSW	Sydney South West
SW	Sydney West
GS	Greater Southern
GW	Greater Western
HNE	Hunter and New England
NC	North Coast

Glossary

Accessibility/Remoteness Index (ARIA): sponsored by the Department of Health and Aged Care, uses accessibility by road to services to develop a standard classification and index of remoteness for areas in Australia. ARIA scores range from 0–12 and define five categories from very remote, remote, moderately accessible, accessible to highly accessible.

Age-Specific Fertility Rate (ASFR): the number of live births per 1,000 females in each maternal age group. Teenage fertility refers to females aged 15–19 years, although the Australian Bureau of Statistics (ABS) also includes fertility in females aged less than 15 years in their fertility calculations.

Assisted reproductive technology (ART): treatments or procedures that involve the in vitro handling of human oocytes (eggs) and sperm or embryos for the purposes of establishing a pregnancy.

Autologous cycle: an ART treatment cycle in which a woman intends to use, or uses her own oocytes or embryos. GIFT cycles are classified separately from autologous cycles.

Clinical pregnancy: a pregnancy in which at least one of the following criteria is met:

- Known to be ongoing at 20 weeks
- Evidence by ultrasound of an intrauterine sac (with or without a fetal heart)
- Examination of products of conception reveal chorionic villi, or
- An ectopic pregnancy has been diagnosed by laparoscope or by ultrasound

Cervical cancer: this term, covers all cancers specific to the uterine cervix, including micro-invasive cervical cancer. Types of cervical cancers include squamous cell carcinoma, adenocarcinoma (including mucoepidermoid and adenoid carcinomas), adenosquamous, and other and unspecified carcinomas. The term 'all cervical cancer' denotes all these types of cervical cancer, unless otherwise specified.

Cervical cytology register: a database that stores Pap test results and related test results for women in each state and territory of Australia. The term cervical cytology register is often used interchangeably with the terms Pap test register and Pap smear register.

Cervical cytology registry: the component of each state and territory cervical screening program which maintains the cervical cytology register. The term cervical cytology registry is often used interchangeably with the terms Pap test registry and Pap smear registry.

Crude Fertility Rate (CFR): the number of live births registered each year per 1,000 resident population.

Culturally and linguistically diverse (CALD): refers to the ethnicity and language background of individuals or groups, including non-English speaking background and English-speaking background population groups, Indigenous Australian and other culturally defined groups.

Embryo transfer: a procedure whereby embryo(s) are placed in the uterus or fallopian tube. The embryo(s) can be fresh or thawed following cryopreservation, and may include the transfer of cleavage stage embryos or blastocysts.

Fetal death (stillbirth): Death prior to the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation of 400 grams or more birth weight. The death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord of definite movement of voluntary muscles.

Fetal mortality: (stillbirths) per 1,000 births

Gamete Intrafallopian Transfer (GIFT): an ART treatment where mature oocytes and sperm are placed directly into a woman's fallopian tubes so that in vivo fertilisation may take place.

General Fertility Rate (GFR): the number of live births per 1,000 women of reproductive age, usually taken to be 15–49 years.

Gestational age: the duration of pregnancy in completed weeks calculated from the date of the first day of a woman's last menstrual period and her baby's date of birth, or via ultrasound, or derived from clinical assessment during pregnancy or from examination of the baby after birth.

Incidence: the number of new cases (for example, of an illness or event) occurring during a given period.

Indicator: a key statistical measure selected to help describe (indicate) a situation concisely, track performance and guide decision making, and may be direct or indirect for example infant death rate is a measure of infant mortality and also a major indicator of population sexual and reproductive health.

Indigenous: a person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander and is accepted as such by the community with which he or she is associated.

Induced abortion: Termination of pregnancy through a medical or surgical intervention.

Infant mortality: The death of a live-born child before his or her first birthday (i.e. under one year of age).

Infant Mortality Rate (IMR): is the number of deaths of infants under one year of age in a given year per 1,000 live births in the same year.

Infertility: is the diminished or impaired capacity of a person to conceive or bear offspring.

International Classification of Diseases (ICD): The World Health Organization's internationally accepted classification of diseases and related health conditions. The 10th Revision (ICD-10) is currently in use in Australia for mortality coding. The 10th Revision, Australian Modification (ICD-10-AM) is currently in use in Australian hospitals for admitted patient coding.

Intracytoplasmic Sperm Injection (ICSI): a procedure whereby a single sperm is injected directly into the oocyte to aid fertilisation.

In vitro Fertilisation (IVF) Procedure: A procedure whereby an egg (or more than one egg) is retrieved from the body of a woman and combined with sperm outside the body to achieve fertilisation.

Live birth: The complete expulsion or extraction from its mother of a product of conception, irrespective of duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered liveborn.

Live delivery: a live delivery is the delivery of one or more liveborn infants, with the birth of twins, triplets or more counted as one live delivery.

Low birth weight: birth weight of less than 2,500 grams.

Maternal age: mother's age in completed years at the birth of her baby.

Maternal mortality: the death of a woman while pregnant or within 42 days of the termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management.

Maternal Mortality Ratio (MMR): the risk of death once pregnant, per 100,000 births.

Maternal Mortality Rate: the risk of death through pregnancy, per 100,000 women aged 15 to 45.

Medicare Benefits Schedule (MBS): a listing of the Medicare services subsidised by the Australian government.

Morbidity: ill health in an individual and levels of ill health in the population.

Mortality: death.

Neonatal death: death of a liveborn baby within 28 days of birth.

Neoplasia: the new and abnormal development of cells that may be harmless or cancerous.

Notification: in this report notifications concern cases of communicable diseases reported by GPs and other registered practitioners, to a governing body such as Director-General of the NSW Department of Health.

Oocyte Pick-Up (OPU): refers to the procedure to collect oocytes from ovaries by ultrasound guided transvaginal aspiration or by laparoscopic surgery.

Perinatal death: fetal plus neonatal deaths, per 1,000 births.

Perinatal mortality: The sum of fetal mortality and neonatal mortality.

Perinatal Mortality Rate (PMR): is the annual number of perinatal deaths per 1,000 total births including combined live and stillbirths.

Pharmaceutical Benefits Scheme (PBS): is a program of the Australian Government that provides subsidised prescription drugs to residents of Australia.

Premature birth: birth before 37 completed weeks of gestation.

Prevalence: the number or proportion (of cases, instances etc) in a population at a given time (AIHW, Australia's Health 2008). Prevalence is often estimated from population health surveys and routinely collected data.

Recipient cycle: an ART treatment cycle in which a woman receives oocytes or embryos from another woman.

Remoteness Area: A classification of the remoteness of a location using the Australian Standard Geographical Classification Remoteness Structure, based on the Accessibility/Remoteness Index of Australia which measures the remoteness of a point based on the physical road distance to the nearest urban centre. The categories are:

- Major cities
- Inner regional
- Outer regional
- Remote
- Very remote
- Migratory

Reproductive and Sexual Health (RSH): refers to health in relation to sexual health, including disease and illness such as STIs, and to reproductive health which pertains to male and female fertility factors, and related conditions.

Risk factor: any factor which represents a greater risk of a health disorder or other unwanted condition or event. Some risk factors are regarded as causes of disease, and are also known as determinants.

SEIFA index: a measure of the socio-economic status of the population, including four indexes to allow ranking of regions/areas, providing a method of determining the level of social and economic well-being in each region. Each of the four indexes summarises different aspects of the socio-economic conditions of people living in an area; and provide more general measures of socio-economic status than is given by measuring, for example, income or unemployment alone.

Screening: the performance of tests on apparently well people in order to detect a medical condition at an earlier stage than would otherwise be the case.

Sexually Transmissible Infections (STIs): STIs are infections that are passed on through close body contact or the exchange of body fluids. Many people who have an STI don't have any obvious symptoms or signs.

Spontaneous abortion: Spontaneous loss of a clinical pregnancy before 20 completed weeks of gestation or if gestational age is unknown, a weight of 400 grams or less.

Subzonal Insemination (SUZI): Spermatozoa are inserted into the perivitelline space between the oocyte outer layer (zona pellucida) and the oocyte membrane

Teenage mother: mother aged less than 20 years at the birth of her baby.

Total Fertility Rate (TFR): the number of live births that a female could expect to have in her lifetime, assuming the current age-specific fertility rate persists. The TFR is calculated from cumulating age-specific birth rates over single years through the reproductive age range.



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