

Reproductive health indicators, Australia, 2002

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Reproductive health indicators, Australia, 2002

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Contents

List of figures.....	vii
List of tables.....	ix
Executive summary	xi
Acknowledgments.....	xiv
Abbreviations	xvi
Report layout.....	xviii
References.....	xix
PART A: Reproductive health.....	1
Section 1: Introduction	2
1.1 The concept of reproductive health.....	2
1.2 Objectives of this report.....	3
1.3 Health status indicators.....	3
1.4 Consultation with professional and consumer groups.....	4
References.....	5
Section 2: Reproductive health indicators	6
2.1 WHO reproductive health indicators.....	6
2.2 Selection of reproductive health indicators.....	7
2.3 Indicators covered in this report	10
2.4 How to read the indicators in this report.....	11
References.....	13
Section 3: Data sources	14
3.1 Description of data sources.....	14
3.2 Other data sources for future reports	21
3.3 Limitations of currently available data sources	22
References.....	28
Section 4: Discussion	29
4.1 Key findings – Australia’s reproductive health	29
4.2 Reproductive health information.....	31
4.3 Future steps–development of a reproductive health framework.....	33
References.....	36
PART B: Selected reproductive health indicators	39
Fertility	41
Subfertility	49
Sexually transmissible infections.....	59

Family planning	67
Pregnancy and childbirth	79
Cancer of the reproductive tract	131
Appendix: Calculation of rates	140
Glossary	141
Web site links.....	145
Index of indicators	146

List of figures

Figure 1:	WHO short list of reproductive health indicators (WHO 1999)	6
Figure 2:	Reproductive health indicators	10
Figure 3:	Development phases for a reproductive health framework	34
Figure 4:	Crude birth rate, Australia, 1971–1999	43
Figure 5:	Crude birth rate, States and Territories, 1971–1999	43
Figure 6:	Total fertility rate, Australia, 1971–1999	45
Figure 7:	Age-specific fertility rate, Australia, 1999	45
Figure 8:	Teenage fertility rate, States and Territories, 1999	47
Figure 9:	Cause of infertility among assisted conception pregnancies, Australia, 1990–1998	53
Figure 10:	Number of cases of surgery for undescended testes (orchidopexy), public and private hospitals, Australia, July 1996–June 1999	57
Figure 11:	Age-specific rate of surgery for undescended testes, free-standing clinics and private patients in public and private hospitals by State/Territory, Australia, 1999	57
Figure 12:	Age-specific notification rate of chlamydia, syphilis and gonorrhoea diagnosis for males and females, Australia, 1999	61
Figure 13:	Proportion of correct responses of HIV knowledge factors, TAFE students, States and Territories, Australia, 1998	64
Figure 14:	Age-specific rates for adolescent males and females living with diagnosed HIV infection, Australia, 1998–2000	66
Figure 15:	Contraceptive use by women at risk, Australia, 1995	69
Figure 16:	Age-specific rate of vasectomies, free-standing clinics and private patients in public and private hospitals, Australia, January 1999–December 1999	71
Figure 17:	Age-specific rate of female hospital separations involving sterilisation, public and private hospitals, Australia, 1999	73
Figure 18:	Tubal occlusions performed in free-standing clinics and on private patients in public and private hospitals, by State/Territory and age group, Australia, 1998–2000	73
Figure 19:	Age-specific hysterectomy separation rate, public and private hospitals, Australia, July 1998–June 1999	75
Figure 20:	Hysterectomy separation rate, public and private hospitals by State and Territory of separation, Australia, July 1998–June 1999	75
Figure 21:	Presence of anaemia in pregnancy, selected States and Territories, 1998	81
Figure 22:	Knowledge of folate–spina bifida association, Western Australia, 1992–1995	83
Figure 23:	Age-specific rate of syphilis diagnosis, Australia, 1999	86
Figure 24:	Tobacco/cigarette use by women of child-bearing age, 14–49 years, Australia, 1998	90

Figure 25: Alcohol consumption of pregnant women, Northern Territory, 1998	92
Figure 26: Illicit drug use by women in the last 12 months, Australia, 1998.....	94
Figure 27: Number of women using amniocentesis and CVS, Victoria, 1989–1999.....	96
Figure 28: Percentage of women attending for first antenatal visit at different gestations, Victoria, 1998	98
Figure 29: Type of augmentation by maternal age, all confinements, States and Territories, 1999	104
Figure 30: Births by caesarean section, Australia, 1991–1999	108
Figure 31: Proportion of vaginal births after caesarean section, selected States and Territories, 1998	110
Figure 32: Instrumental delivery rates, all confinements, States and Territories, 1999.....	112
Figure 33: Specialists/sub-specialists in obstetrics and gynaecology, States and Territories, 1998	114
Figure 34: Specialists/sub-specialists in obstetrics and gynaecology by geographic location, States and Territories, 1998	116
Figure 35: Classification of maternal deaths in Australia	120
Figure 36: Age-specific separation rates with a diagnosis of ectopic pregnancy, public and private hospitals, Australia, 1996	122
Figure 37: Ectopic pregnancy separation rates by State/Territory of admission, public and private hospitals, Australia, 1996	122
Figure 38: Fetal, neonatal and perinatal mortality rates, States and Territories, 1999.....	124
Figure 39: Infant mortality rates, Australia, 1971–1999	126
Figure 40: Proportion of low birthweight babies by maternal age, all births, Australia, 1999	128
Figure 41: Sex ratio States and Territories, 1999	130
Figure 42: Percentage of women in the target age group, 20–69 years, participating in the National Cervical Screening Program, Australia, 1996–1998.....	133
Figure 43: Age-standardised incidence and mortality rates for cervical cancer, Australia, 1997	135
Figure 44: Age-specific incidence and mortality rates for cervical cancer, Australia, 1997.....	135
Figure 45: Age-specific incidence and mortality rates for ovarian cancer, Australia, 1997	137
Figure 46: Age-specific incidence and mortality rate for cancer of the testes in males, Australia, 1997	139

List of tables

Table 1: Principal data sources and assessment of data completeness for reproductive health indicators, Australia	23
Table 2: Prevalence of current infertility, surgical sterility and associated reproductive disability according to age of the female partner.....	51
Table 3: Percentage of erectile dysfunction in a community study by age group, Western Australia, 2000.....	55
Table 4: Estimated age distribution of women reporting contraceptive use, and the reason for non-use of contraception, Australia: National Health Survey, 1995.....	69
Table 5: Vasectomy rates by age group, public and private hospitals (National Hospital Morbidity Database) compared with free-standing clinics and private patients in public and private hospitals (Health Insurance Commission), Australia, July 1998–June 1999.....	71
Table 6: Number of women infected with HIV reported as delivering a live birth, Australia, 1982–2000	88
Table 7: Pregnancy rates after assisted conception in Australia, 2000	100
Table 8: Adverse infant outcomes of women undergoing assisted conception treatment in Australia in 1999 who had births in 1999 and 2000	100
Table 9: Multiple pregnancies by maternal age, Australia, 1999.....	102
Table 10: Fetal, neonatal and perinatal death rates for singleton and multiple births, Australia, 1999	102
Table 11: Place of birth, all confinements, States and Territories, 1999	106
Table 12: Caesarean rate by maternal age, States and Territories, 1999	108
Table 13: Distribution (%) of obstetrics and gynaecology Medicare service providers (including GPs) by geographic location, Australia, 1995–1996.....	116
Table 14: Selected maternal morbidity, Australia, January 1994 – December 1996.....	118
Table 15: Maternal mortality ratio, Australia, 1994–1996.....	120

Executive summary

The *Reproductive Health Indicators, Australia, 2002* report was commissioned by the Department of Health and Ageing to provide an accessible, systematic overview of Australia's reproductive health. This report was administered by the Australian Institute of Health and Welfare (AIHW) National Perinatal Statistics Unit, and represents the collaborative efforts of a number of professional, research, policy and consumer groups.

This inaugural report uses a set of reproductive health indicators to provide a synthesis of findings on a broad range of reproductive health topics. The set of indicators adopted for this report provides an overall 'picture' of Australia's reproductive health and highlights a number of important emerging reproductive health issues and trends. An assessment of the data sources currently available to measure reproductive health in Australia is also provided, setting the agenda for the formation of a comprehensive framework and integrated national surveillance system for Australia's reproductive health. This report will no doubt be an important reference for clinicians, policy makers and consumers alike.

Reproductive health is of central importance to people's lives and is fundamental to what it means to be human. The importance of reproductive health is being increasingly recognised at an individual, societal and global level. The issues it encompasses are different for men and women and change over a person's lifetime. Definitions of reproductive health vary, but for the purposes of this report, encompass the reproductive and sexual health of men and women during their reproductive lives, and includes reproductive outcomes such as fertility, pregnancy, childbirth, and diseases of the reproductive tract. In this report reproductive health is also reflected and measured by the physiological, behavioural and health-care factors that are important determinants of reproductive health.

The primary objectives of this inaugural report on Australian reproductive health indicators are:

- to provide a snapshot of Australia's reproductive health status, by systematically measuring a set of reproductive health indicators. This enables risk and protective factors relevant to reproductive health to be highlighted, and provides a basis from which international and sub-population comparisons can be made;
- to provide base lines for prospective measurement and monitoring of Australia's reproductive health. The indicators presented in this report will act as a benchmark against which future analyses of reproductive health will be measured;
- to provide a comprehensive and cohesive description of currently available information sources for measuring Australia's reproductive health. An assessment of the usefulness and value of each data source is provided, and further information requirements explored;
- to provide a foundation from which a comprehensive conceptual and information framework on reproductive health can be developed.

There are many indicators that can be used to measure the reproductive health status of a population. The indicators chosen in this report are based upon a subset of

indicators developed by the World Health Organization (WHO) (WHO 1999), customised for the Australian context. Forty-four indicators were chosen for inclusion in the report, covering six key areas: fertility, subfertility, sexually transmissible infections, cancers of the reproductive tract, family planning and pregnancy and childbirth (including prenatal/antenatal health factors, pregnancy and assisted conception, childbirth, maternal health outcomes and fetal and infant health outcomes).

Each of the 44 indicators is presented in a clear two-page format, which includes definition, context, data sources and relevant measures. Where possible, disaggregation by age, sex, geographical location and other appropriate categories has been performed to provide an insight into the health status of various sub-populations.

Australia compares well in a world context of reproductive health. In 1999, the crude birth rate in Australia was 13.1 per 1,000 population, and the total fertility rate was 1.75, which is comparable to countries such as the United Kingdom, United States, Canada, France, Sweden and Japan (ABS 2000a; UNPD 2000). In the same year, the national caesarean rate in Australia was almost 22%, the highest level ever recorded in Australia (AIHW National Perinatal Statistics Unit perinatal collection), and the vaginal birth after a caesarean section rate was almost 25%. These rates are comparable to other more developed countries; however the WHO recommends a figure of 15% as a reasonable national rate for caesarean section (Caan & Messent 2002; Eberhardt et al. 2001; WHO 1985).

The infant mortality rate in 1999 was 5.7 per 1,000 live births compared with 8 per 1,000 live births among the more developed countries monitored by WHO (ABS 2000b; UNPD 2000; Moon, Rahman & Bhatia 1998). The proportion of low birthweight infants in Australia was 7% of all births, which is similar to that of other developed nations (UNPD 2000).

Approximately 750 and 1,200 women were diagnosed with cervical and ovarian cancer respectively in 1997. Incidence and mortality rates for cervical cancer have declined over the previous decade, due partly to population-based cervical screening, while the incidence and mortality rates for ovarian cancer have remained relatively constant (AIHW & AACR 2000). The incidence and mortality rates for these cancers are similar to other English-speaking developed countries (IARC/WHO 2001).

The data used in this report come from a variety of sources, ranging from national population-based data to small community-based studies. The four principal national data sources were the AIHW National Hospital Morbidity Database, the AIHW National Perinatal Data Collection, Health Insurance Commission data and Australian Bureau of Statistics data. A detailed description and assessment of each of these data sources and other important secondary data sources is included.

A key finding of this report is that there is a need to strengthen the quality, breadth and cohesiveness of information available on reproductive health in Australia. Almost half the indicators presented in this report were considered incomplete (21: 48%), primarily because of a lack of national data and/or State- and Territory-based data. While comprehensive data on fertility rates, birth rates and cancers are

available, other indicator areas such as maternal morbidity, infertility and family planning generally reflect a lack of standardised definitions and data collection tools. This assessment serves to emphasise that significant gaps remain in our knowledge of reproductive health.

This report supports the need for the development of a national conceptual and information framework for reproductive health. Such a framework must include a clear and accepted definition of reproductive health, a conceptual model of reproductive health, a list of core reproductive health indicators, and a plan for a comprehensive and cohesive surveillance and performance measurement system. The selection of the 44 core indicators and the identification and evaluation of currently available reproductive health data sources provides an invaluable foundation from which to advance the understanding and measurement of reproductive health for the benefit of all Australians.

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Preparation of specific indicators

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- pregnancy rates and outcomes after assisted conception
- multiple pregnancy rates

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Abbreviations

AACR	Australasian Association of Cancer Registries
AAS	Anabolic-androgenic steroids
ABS	Australian Bureau of Statistics
AC	Assisted conception
ACHS	Australian Council on Healthcare Standards
AIDS	Acquired immunodeficiency syndrome
AIHW	Australian Institute of Health and Welfare
AGSP	Australian Gonococcal Surveillance Programme
AISAP	Australian Iron Status Advisory Panel
AMWAC	Australian Medical Workforce Advisory Committee
ARM	artificial rupture of membranes
BEACH	Bettering the Evaluation and Care of Health program
CDC	Center for Disease Control and Prevention (United States)
CDNA	Communicable Diseases Network of Australia
CVS	chorionic villus sampling
DHAC	Commonwealth Department of Health and Aged Care
ED	erectile dysfunction
FAS	fetal alcohol syndrome
FPA	Family Planning Australia
GIFT	gamete intrafallopian transfer
GP	general practitioner
HIC	Health Insurance Commission
HIV	human immunodeficiency virus
HPV	Human Papilloma Virus
HRP	human reproduction
ICD	International Classification of Disease
ICSI	intracytoplasmic sperm injection
IUD	Intrauterine device
IVF	in-vitro fertilisation
MBS	Medicare Benefits Schedule
NAA	Nucleic-acid-based amplification assays
NHDD	<i>National Health Data Dictionary</i>
NHMD	National Hospital Morbidity Database

NHMRC	National Health and Medical Research Council
NCHECR	National Centre in HIV Epidemiology and Clinical Research
NNDSS	National Notifiable Diseases Surveillance System
NPDC	National Perinatal Data Collection
NPSU	National Perinatal Statistics Unit
NS	national surveys
NTD	neural tube defect
OCRF	Ovarian Cancer Research Foundation
OR	odds ratio
PCR	polymerase chain reaction
RACOG	Royal Australian College of Obstetricians and Gynaecologists (now known as RANZCOG)
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists (formerly RACOG)
RRMA	Rural, Remote and Metropolitan Areas classification
SABDR	South Australian Birth Defects Register
SBS	state-based surveys
SID	sudden infant death syndrome
SPR	Specialist to population ratio
STI	Sexually transmissible infection
TFR	total fertility rate
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNFPA	United Nations Population Fund
VBAC	vaginal birth after caesarean section
WHO	World Health Organization

Report layout

This report provides a contemporary representation of the status of Australia's reproductive health using a set of reproductive health indicators. It is also intended as a reference source for currently available data on Australian reproductive health. The report is organised into Part A and Part B.

Part A provides a background discussion on the selection of the indicators, available data sources and a summary of the key indicator findings. Part A is organised into the following four sections:

Section 1 discusses the concept of reproductive health, the objectives of the report and the use of indicators in health surveillance.

Section 2 provides a discussion of the selection process and relevance of selected indicators.

Section 3 details the primary data sources used for the measurement of the indicators and provides a critique of the limitations of each data source.

Section 4 highlights some key findings from the report, discusses overall deficiencies in currently available information, and recommends future steps for advancing the formation of a reproductive health framework for Australia.

Part B presents each of the 44 indicators in a standard two-page format, which sets out the definition, context and relevant data. Data sources and limitations are well documented. Where possible, disaggregation by age, sex, geographical location and other appropriate categories is included to provide an insight into the health status of various sub-populations.

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PART A: Reproductive health

Section 1: Introduction

1.1 The concept of reproductive health

Reproductive and sexual health is central to what it means to be human and is of critical importance at an individual, societal and global level. Whilst the importance of reproductive health is being increasingly recognised, its definition, the concepts it encompasses and information to describe and monitor it are still poorly developed.

The World Health Organization defines reproductive health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes' (WHO 1999).

The International Conference on Population and Development held in Cairo in 1994 provided a major international forum for considering the breadth of issues concerning reproductive health. The Conference concluded that:

reproductive health therefore implies that people are able to have a satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so. Implicit in this last condition are the rights of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice, as well as other methods of their choice for regulation of fertility which are not against the law, and the right of access to appropriate health-care services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant. In line with the above definition of reproductive health, reproductive health care is defined as the constellation of methods, techniques and services that contribute to reproductive health and well being by preventing and solving reproductive health problems. It also includes sexual health the purpose of which is the enhancement of life and personal relations, and not merely counselling and care related to reproduction and sexually transmitted disease. (WHO 1996)

By encompassing these broad principles at the Cairo Conference, added impetus was given to efforts to assess the reproductive health of the whole population. Instead of focusing on women and men separately, the emphasis in reproductive health care shifted to couples (Edouard, Dodd & Bernstein 2000). For couples planning to have children, the aim of reproductive health care is to ensure normality during the main phases of reproductive life, namely, puberty, the reproductive period of conception and fertility, and the post-reproductive phase (Lunenfeld & Insler 1997). Sociocultural, familial, behavioural and sometimes genetic antecedents all influence, and are inexorably implicated with, an individual's reproductive health.

Using these broad concepts, reproductive health, for the purposes of this report, encompasses the reproductive and sexual health of men and women during their reproductive lives and includes reproductive outcomes such as fertility, pregnancy, childbirth and diseases of the reproductive organs. Reproductive health is also

reflected and measured in this report by the physiological, behavioural and health-care factors that are important determinants of reproductive and sexual health outcomes.

The scope of reproductive health covered in this report is centered primarily on the 15–49 years age group, and includes the following six key areas of reproductive health:

- **Fertility:** the child-bearing performance of the population, including birth and fertility rates.
- **Subfertility:** the degree of reduced fertility in the population.
- **Sexually transmissible infections:** the prevalence of sexually transmissible diseases in the population and knowledge of preventative practices.
- **Family planning:** the use of methods to regulate fertility through contraception and induced terminations.
- **Pregnancy and childbirth:** the degree of safe and healthy motherhood, including antenatal factors, pregnancy, childbirth, and maternal, fetal and infant health outcomes.
- **Cancer of the reproductive tract:** the incidence of selected female and male reproductive tract cancers.

1.2 Objectives of this report

The primary objectives of this inaugural report on Australian reproductive health indicators are:

- to provide a snapshot of Australia's reproductive health status, by systematically measuring a set of reproductive health indicators. This enables risk and protective factors relevant to reproductive health to be highlighted, and provides a basis from which international and sub-population comparisons can be made;
- to provide base lines for prospective measurement and monitoring of Australia's reproductive health. The indicators reviewed in this report will act as a benchmark against which future analyses of reproductive health will be measured;
- to provide a comprehensive and cohesive description of currently available information sources for measuring Australia's reproductive health. An assessment of the usefulness and value of each data source is provided, and further information requirements explored;
- to provide a foundation from which a comprehensive conceptual and information framework on reproductive health can be developed.

1.3 Health status indicators

Health status indicators are statistical measures of a specific health outcome, determinant or attribute. Indicators are generally expressed quantitatively in terms of absolute numbers, rates, frequencies and percentages. They are important health surveillance tools that can be used to establish benchmarks and to monitor and compare the health status of population groups over time. They are useful for monitoring and evaluating the effectiveness of health care initiatives, for generating public debate regarding health care issues, and ultimately, for setting the agenda for health care priorities.

When considered as a framework, such as in this report, health status indicators provide a useful representation of the status of health of a population. The 44 reproductive health indicators compiled in this report provide the first overall 'picture' of Australia's reproductive health.

1.4 Consultation with professional and consumer groups

This report was commissioned by the Commonwealth Department of Health and Ageing in response to the growing interest in population-based reproductive health, and the lack of a comprehensive framework to describe and measure Australians' reproductive health. An important requirement of this report was to identify and assess national reproductive data sources. This report represents the collaborative efforts of a number of individuals from professional, research, policy and consumer groups.

In consultation with the Commonwealth Department of Health and Ageing and professional and consumer groups, the AIHW National Perinatal Statistics Unit hosted a Reproductive Health Forum at the Royal Hospital for Women in Sydney in July 2000. Participants in the Forum included representatives from a number of stakeholder groups, including:

- professional organisations: Royal Australian and New Zealand College of Obstetricians and Gynaecologists; Australian College of Midwives; Australasian College of Sexual Health Physicians; Royal College of Pathologists of Australasia; Royal Australian and New Zealand College of General Practitioners; Perinatal Society of Australia and New Zealand;
- reproductive health data and research groups: Commonwealth Department of Health and Ageing; State and Territory perinatal data groups; AIHW National Perinatal Statistics Unit; Australian Bureau of Statistics; Women's Health Australia; ANZAC Research Institute; Infertility Treatment Authority, Victoria;
- a consumer organisation: Maternity Alliance;
- other interest groups: epidemiologists and public health practitioners; demographers, microbiology and pathology laboratory services, male reproductive health practitioners; Family Planning Australia; Australian Reproductive Health Alliance; geneticists; women's community health centres.

The objective of the forum was to canvas views on the content of a national report on reproductive health indicators, and to identify existing national sources of data and their deficiencies.

Subsequent to this forum, a Reproductive Health Advisory Committee was formed comprising representatives from the participant stakeholder groups and technical and content experts from the field of reproductive health. The role of the Reproductive Health Advisory Committee was to select the final indicators for inclusion in the report and to provide technical expertise and quality assurance of the information, analysis and content of the report.

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Section 2: Reproductive health indicators

2.1 WHO reproductive health indicators

The indicators chosen for this report were based upon a set of indicators developed by the World Health Organization (Figure 1) (WHO 1999). The WHO list was reviewed for relevance to the Australian context, with some indicators more relevant to the developing world being replaced with Australian-based indicators.

Figure 1: WHO short list of reproductive health indicators (WHO 1999)

- Total fertility rate
- Contraceptive prevalence rate
- Maternal mortality ratio
- Antenatal care coverage
- Percentage of births attended by skilled health personnel (excluding trained and untrained traditional birth attendants)
- Number of facilities with functioning basic essential obstetric care per 500,000 population
- Number of facilities with functioning comprehensive essential obstetric care per 500,000 population
- Perinatal mortality rate
- Percentage of live births of low birth weight (<2,500 g)
- Positive syphilis serology prevalence in pregnant women (15–49)
- Percentage of women of reproductive age (15–49) screened for haemoglobin levels who are anaemic
- Percentage of obstetric and gynaecology admissions owing to abortion
- Reported prevalence of women with female genital mutilation
- Percentage of women of reproductive age (15–49) at risk of pregnancy who report trying for a pregnancy for two years or more

Of the 15 indicators on the WHO short list, 11 have been included in this report. Of the remaining four indicators, two were excluded because they were not deemed to be relevant to the Australian context, and two were modified to more accurately reflect the Australian health care system:

- ‘Number of facilities with functioning basic essential obstetric care per 500,000 population’. This indicator was excluded because it is considered that all birth facilities in Australia have basic essential obstetric care, as defined by the WHO;
- ‘Number of facilities with functioning comprehensive essential obstetric care per 500,000 population’. A more relevant indicator of the comprehensiveness of obstetric care in Australia is a comparison of services in rural and urban Australia. An indicator covering the number of obstetric care providers by rural/remote classifications has been included in place of this WHO indicator.

- 'Reported prevalence of women with female genital mutilation'. Although there are women in Australia who have experienced female genital mutilation, this indicator was excluded because it is not a national problem on the same scale as that faced by some developing countries.
- 'Percentage of women of reproductive age (15–49 years) at risk of pregnancy who report trying for a pregnancy for two years or more'. This indicator was modified to reflect the Australian practice of reporting reduced fertility as a period of attempting to conceive for one year or more.

The WHO has also established a list of priority areas for indicator development in which acceptable indicators have not been developed. These include abortion, violence against women, quality of care, access to care, antenatal care, postpartum care, adolescent reproductive health, 'male factor', reproductive health policy, HIV/AIDS, reproductive tract infections, preventative behaviour and cervical cancer. Many of the indicators included in this report reflect these global priority areas (WHO 1999).

Although the WHO indicators are an invaluable source for global monitoring of reproductive health, the relevance of the full list of indicators for a developed country such as Australia needs to be evaluated. It is anticipated that a number of the WHO indicators will be expanded and modified in future reports to further reflect the information needs of a developed country.

2.2 Selection of reproductive health indicators

Criteria for selection of indicators

Using the minimal list of WHO indicators as a starting point, and adding other indicators reflecting the priority areas listed by WHO (WHO 1999) and other key areas nominated by the Reproductive Health Advisory Committee, a list of 44 indicators was developed.

The resulting indicators presented in this report were those given the highest priority by the Reproductive Health Advisory Committee. The final 44 indicators and their measures were chosen to reflect the following:

- *Internationally accepted core indicators of reproductive health*; the reproductive health indicators recommended by the WHO were adopted in a modified format to allowing international comparisons of reproductive health status.
- *Relevance to the Australian reproductive health context*; indicators were chosen to accurately capture the key components of reproductive health including information on emerging issues in reproductive health.
- *Data considerations*; indicators and their measures were chosen to reflect available data sources. Only data sources that were considered to contain reliable, integral and valid data were utilised.
- *Limited overlap with other comprehensive reports covering specific areas of reproductive health*; for example, an extensive list of child health indicators were not included due to the existence of a separate report on children's health and wellbeing published by the Australian Institute of Health and Welfare (Al-Yaman, Bryant & Sargeant 2002).

Omission of a reproductive health indicator from the report in no way reflects upon the relevance or value of that indicator but represents the priorities set by the Reproductive Health Advisory Committee based on the above criteria. A number of indicators not included in this first report may be included in future reproductive health indicator reports. The list of indicators will evolve over time to meet emerging reproductive health issues and trends, and to take advantage of improved information collection.

Rationale for inclusion of particular indicators

Although the reasons for including most of the indicators are apparent, there is a number of indicators that warrant individual discussion.

- The teenage fertility rate indicator was reported separately from the total fertility rate indicator to facilitate reporting on the outcomes of pregnancies among an age group which has traditionally been associated with increased risks of poor maternal and fetal outcomes.
- The prevalence of erectile dysfunction and prevalence of undescended testes indicators were included because they represent two male reproductive health indicators with available information.
- The periconceptional use of folate indicator was included to give a measure of the increased use of folate supplementation to assist in the prevention of neural tube defects.
- The sex ratio of births indicator was included to provide benchmark data, given possible future changes to the sex ratio if sex-selection in assisted conception occurs.
- Three indicators related to HIV have been included in this report: prevalence of HIV among adolescents, knowledge of HIV-related prevention practices and HIV prevalence in pregnant women. The emphasis on reporting of this sexually transmissible infection reflects community concerns over its increasing worldwide occurrence over the last few decades.
- Although a number of other reproductive system cancers indicators could have been included, for example, breast cancer, indicators were restricted to those of the reproductive tract. Incidence and mortality associated with cancer is well reported in Australia, being one of the few countries with national cancer registration (AIHW & AACR 2001).

Other indicators/issues not included in this report

Since the potential scope of reproductive health is so broad, this report could not cover all of what may be thought to constitute reproductive health. The Reproductive Health Advisory Committee decided to report on areas of reproductive health which centred on the reproductive health age group (15–49 years), and for which there was sufficient data to develop an indicator. Some of the areas for the development of possible future indicators include:

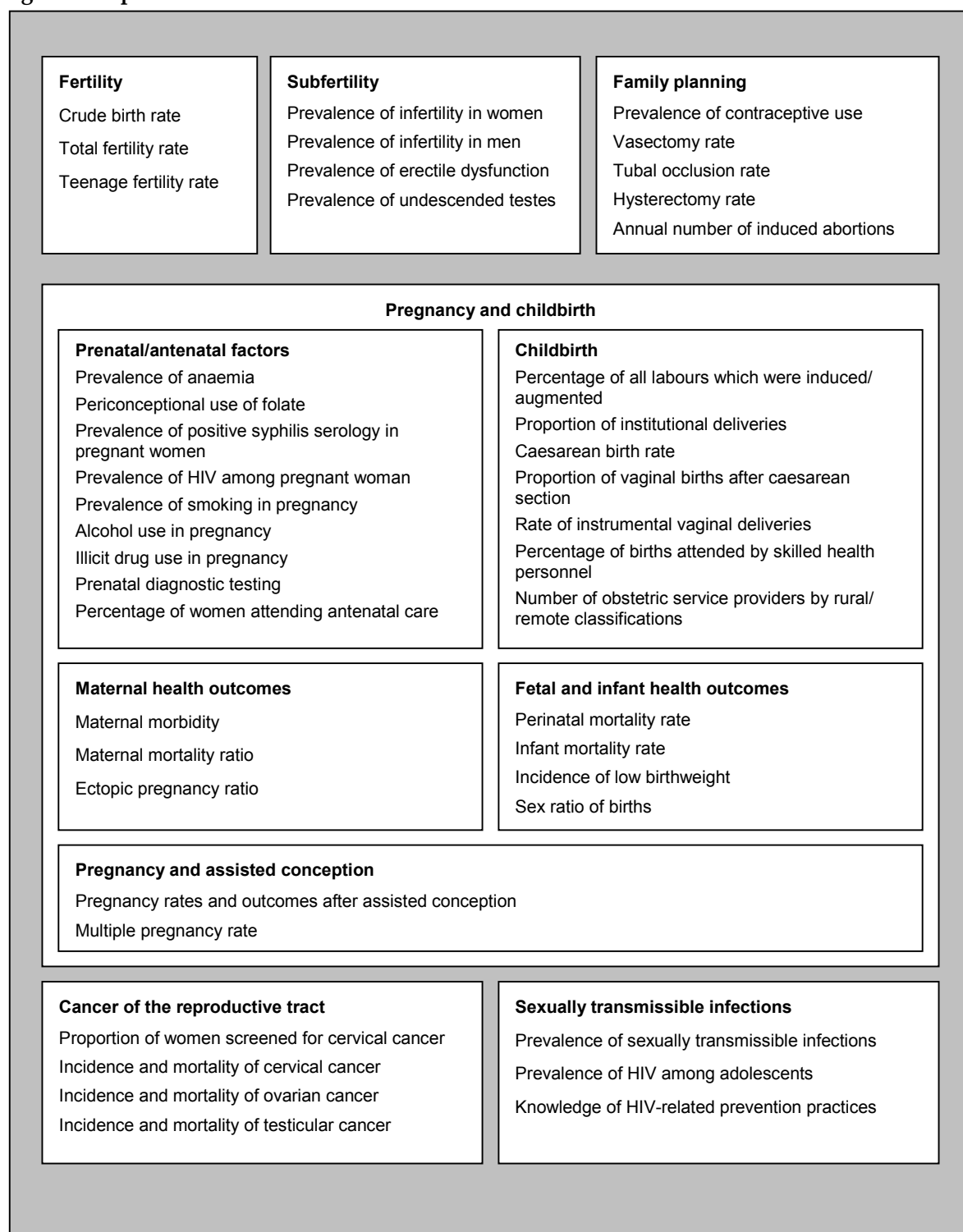
- Birth defects: A number of related indicators have been included in the current report, namely prenatal diagnosis and use of periconceptional folate. The AIHW NPSU regularly produces a report on birth defects in Australia (Hurst, Shafir & Lancaster 2001)

- Neonatal morbidity: A number of indicators covering fetal outcome were included in the current report, namely low birthweight prevalence, perinatal and infant mortality rates. These indicators form part of the WHO minimal list of indicators for global reporting. However, with the increasing survival of very pre-term babies in developed countries, reporting on neonatal morbidity could be an important future indicator.
- Menopause: Hormone replacement therapy (HRT) and the decreasing age of onset of menopause along with some of the associated health problems occurring with a lack of oestrogens, represent an important area for future study. To date there has been conflicting evidence on the risks versus benefits of the use of certain hormone replacement therapies to treat symptoms of menopause and to prevent long-term effects of ageing, such as heart disease and osteoporosis (Al-Azzawi; 2001, Writing Group for the Women's Health Initiative Investigators 2002). This indicator was not included since menopause primarily affects women outside of the reproductive age group (15–49 years).
- Prostate cancer: Although a cancer of the reproductive tract, the incidence of prostate cancer is relatively low among men aged 15–49 years (AIHW & AACR 2000).
- Uterine/endometrial cancer: Uterine cancer is primarily a disease of postmenopausal woman. This indicator was not included because this disease primarily affects women outside of the reproductive age group (15–49 years). Indicators for cervical cancer were included because the incidence is relatively high in woman of reproductive age and because of the national population based screening program (AIHW & AACR 2000).
- Use of Viagra: The lack of available data on prescription or use of Viagra precluded reporting of this indicator.
- Access to emergency contraception: While access to emergency contraception, especially in rural and remote areas, is problematic there is a lack of data on the extent of this problem.
- Survivors of childhood cancer: A significant number of adults who are survivors of childhood cancer will experience fertility problems due to the effects of earlier treatment (radiation and chemotherapy). This is an area that warrants further investigation and monitoring.

2.3 Indicators covered in this report

The final list of 44 indicators chosen by the Reproductive Health Advisory Committee represent six key areas of reproductive health. The area of pregnancy and childbirth is further defined by prenatal/antenatal factors, childbirth, maternal health outcomes, fetal and infant health outcomes and pregnancy and assisted conception (Figure 2).

Figure 2: Reproductive health indicators



2.4 How to read the indicators in this report

The indicators are presented in the format shown below. Details of the type of information included in each indicator are also included to give the reader a guide on how to read each of the indicators.

Indicator

This section gives a brief outline of the indicator, that is, the target population, the denominator for calculation of rates

Background information

- Is designed to highlight some of the key issues raised in current research, particularly Australian research.
- Often includes a definition of the terms, if required.
- May include some risk factors or outcomes associated with the indicator.

Current data

- Being a national report, ideally all data reported would be population based. Where national data are not available, State- and Territory-based research is reported,

followed by community-based studies.

- In most cases, the most recent data from each relevant data set are reported. Comparable data for individual years are not necessarily available. The indicator is designed to give a broad picture of the data available and what it is currently reporting.
- Where smaller, community-based studies are included they are not intended to be representative of the whole population. Such studies have been included to highlight some of the potential issues related to these sub-groups.
- Where available, current data are presented for the three most recent years, by five-year age groups and by State and Territory. An indication of patterns among rural and remote Australia and among the Indigenous population is also included, where possible.

Figure/table

One or two tables or figures are included with each indicator, usually using the most comprehensive data source. These may illustrate one or more of the following:

- a trend over the last 3–10 years;
- the influence of age on the indicator;
- an indication of patterns across States and Territories; and
- data from two different data sources and how they compare.

Data limitations

This section includes the data limitations, usually of the primary data source.

Indicator status

This indicates whether or not the collection of data on the indicator, at a national level, is complete. It may also suggest steps that could be taken to improve the collection of data on the indicator.

Data source(s)

Lists the primary sources of data and supplementary State and Territory sources where appropriate.

References

- List of all articles, reports or books referred to in the text of each indicator, presented alphabetically.
- Where possible, internet site addresses are also included, with a hyperlink for those with electronic access to the report.

References

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Section 3: Data sources

The data in this report come from a variety of sources ranging from national, population-based data to small community-based studies. Being a national report, ideally all data reported would be population based. However, where national data are not available, State and Territory-based data is reported, followed by community-based studies.

In most cases, the most recent data from each relevant data set at the time of preparation of this report have been included. The indicators are designed to give a broad picture of the data available and what is currently being reported.

3.1 Description of data sources

The four principal reproductive health data sources used in this report are described in detail below – AIHW National Hospital Morbidity Database, AIHW National Perinatal Data Collection, Health Insurance Commission and the Australian Bureau of Statistics. A brief description of a number of secondary data sources used in this report is also included.

AIHW National Hospital Morbidity Database (NHMD)

The Australian Institute of Health and Welfare's National Hospital Morbidity Database (NHMD) is a national database on admitted patients in public and private hospitals in Australia that is compiled by each State and Territory. It is a collection of in-patient hospital statistics. Data relating to admitted patients in almost all hospitals are present, including public acute hospitals, public psychiatric hospitals, private acute hospitals, private psychiatric hospitals and private free-standing day hospital facilities (AIHW 1999a). As such there is no information on the use of other hospital services, such as outpatients' clinics or casualty visits, or about visits to other health professionals outside of hospitals.

The statistics are presented in terms of 'separations' rather than admissions, since this is the stage at which more information is known, for example, length of stay, diagnoses, treatments. The database is a database of separations at discharge, not patients. Since all records are de-identified it is not possible to determine patterns of re-admission.

Overview

The NHMD is a database of hospital separations which includes demographic, diagnostic and procedural information on each admission to public and private hospitals in Australia. The NHMD data used in this report have been reported in several formats:

- Data related to maternal health such as ectopic pregnancies have been reported for the years 1994–1996, in calendar years (after conversion from financial years).

As noted on each of the relevant indicators, data for one State were excluded for 1994 and 1995 due to systematic coding errors.

- Other data relating to reproductive health (for example, vasectomy, hysterectomy, and undescended testes) have been reported in financial years. These data were provided by the Australian Institute of Health and Welfare, who only report hospital morbidity data in financial years.
- Data have been reported either for all hospital separations, that is both private and public, or for public hospital separations only. This is specified in the indicator.
- Data are reported by State of separation unless specified.

Access to data

The NPSU maintains a subset of the NHMD including diagnostic data and patient characteristics for hospital admissions related to pregnancy, childbirth and the puerperium for women aged 10–54 years.

Relevant items

The NHMD only records the primary diagnosis prompting admission and any additional diagnoses where they represent a complication or co-morbidity.

Demographic information for each hospital separation is collected and recorded by each hospital in a standardised format. Diagnostic and procedural information is coded using the International Statistical Classification of Diseases (ICD) and Related Health Problems. Data included in this report have primarily been coded using ICD-9-CM, the ninth revision of the International Statistical Classification of Diseases and Related Health Problems. However, ICD-10-AM, the tenth revision, was introduced in four States in the 1998–99 financial year: Queensland, South Australia, Western Australia and Tasmania. Where 1998–99 data are included in the report, ICD-10-AM diagnoses and procedures have been mapped to ICD-9-CM diagnoses and procedures for comparability.

The indicators using the NHMD as a primary data source include: maternal morbidity, ectopic pregnancy rate, hysterectomy rate, tubal occlusion rate, complications after spontaneous and induced abortions and operations for undescended testes.

Data quality

- Validation of the morbidity database was jointly undertaken by the AIHW and the data providers to ensure data quality.

Data limitations

- Being a database of separations, not individuals, it is not possible to track individual patients and their outcomes in the NHMD.
- Not all private hospital separations are included in the NHMD. In 1996–1997, the NHMD reported 80,695 (4.6%) fewer separations than the Australian Bureau of

Statistics' Private Health Establishments Collection, which has wider coverage (AIHW 1999a).

- The NHMD was not designed as a data collection for epidemiological research. Data can reflect an aspect of the burden of diseases in the community, but they are not usually used as measures of the incidence or prevalence of conditions since not all people with a particular illness are treated in hospital, and differing admission practices and levels of service provision may affect admission patterns.
- The State-specific hospital separation rates have not been controlled for differences in populations such as age distribution, access to services, education, parity and geographic factors, all of which may impact upon the rates.
- Key information about pregnancy such as parity, pre-existing medical conditions and risk behaviours such as smoking is not collected.
- Large variations among State and Territory separations identifying Indigenous status cast doubt on the ascertainment of Indigenous status.
- The data do not allow calculation of prevalence estimates of the presented conditions or procedures.

AIHW National Perinatal Data Collection (NPDC)

The AIHW National Perinatal Data Collection (NPDC) is based upon a national perinatal minimum data set first introduced in 1979.

Overview

This data set is produced from notification forms for each birth in Australia, which are completed by midwives, and sometimes medical practitioners.

Access to data

The NPSU are data custodians of the perinatal data collected by individual States and Territories. The perinatal data are provided annually by the States and Territories and are collated and compiled by the NPSU to enable analysis of national data. There is a standing arrangement with the States and Territories that the NPSU are only able to publish State- and Territory-specific information from an agreed selection of data items.

Relevant items

- Data items include sociodemographic characteristics of the mother; previous pregnancies; the current pregnancy; labour, delivery and the puerperium; and the infant, including birth status, sex, birthweight, Apgar scores, resuscitation, neonatal morbidity and congenital malformation (Nassar et al. 2001).
- Data in this report are presented using 1999 data, the most recently available data at the time of publication.
- The indicators using the NPDC as a primary data source include: crude birth rate, teenage fertility rate, induced/augmented labours, institutional deliveries, caesarean birth rate, instrumental vaginal delivery rate, sex ratio of births.

Data quality

State and Territory perinatal data groups constantly request further information on missing or doubtful data items from hospitals and homebirth practitioners. In addition, edit checks and summaries of data provided in reports to individual hospitals enable review of data quality. Most States and Territories have also conducted validation studies on their perinatal data (Nassar et al. 2001).

Data limitations

- There are limitations in the ascertainment of data items such as maternal medical conditions, obstetric complications, and neonatal morbidity. In some instances, clinical diagnoses may have been recorded without reference to specific definitions. States and Territories differ in their collection of clinical diagnoses: some record each specified diagnosis whereas others include checklists of the more common diagnoses (Nassar et al. 2001).
- Information collected is limited by the data being from a cross-sectional data collection. Key information about previous pregnancy outcomes, sociodemographic and risk behaviours are not collected.
- Tasmanian data for 1999 were unavailable, so 1998 data have been used as an estimate.

Health Insurance Commission (HIC)

The Health Insurance Commission (HIC) is the statutory authority that administers Medicare, the Pharmaceutical Benefits Scheme, the Australian Childhood Immunisation Register, the Practice Incentives Program and other government programs.

Access to data

Summary statistics based on items and groups in the Medicare Benefits Schedule are accessible from the HIC web site, www.hic.gov.au/statistics. Reports can be produced for benefits and services by patient gender and age group.

Overview

The data presented here are from Medicare records of benefits for which claims have been processed for medical rebate of expenses.

Relevant items

- The HIC Medicare data include the following items: item number, medicare benefit, date of service and processing, provider number of requesting/referring provider, recipient of the service, indication of whether or not the item was provided in hospital.
- HIC Medicare data are available by State or Territory of service, patient gender and age group.

- In most cases HIC data presented here cover the three most recent years for which data are available, 1998–2000.
- HIC data are used as a primary data source for rate of vasectomy, but are included for comparison with other data in many other indicators including incidence of procedures related to erectile dysfunction, operations for undescended testes, number of tubal ligation and ectopic pregnancy rate.

Data quality/data limitations

- Medicare records only include services that qualify for Medicare benefits and for which claims have been processed. They do not include services that qualify for benefits under the Department of Veterans' Affairs National Treatment Account.
- HIC data do not include services that have been provided by a doctor in a hospital to public patients or services provided in outpatients or emergency departments of hospitals.
- For some items individual State and Territory data are not available, only combined State/Territory data (for example, induced abortion data).
- HIC data are not always presented in five-year age groups.
- Ascertainment of certain services may be under-reported due to misclassification of services to other item codes.
- The data do not allow calculation of prevalence estimates of the presented conditions or procedures.

Australian Bureau of Statistics (ABS)

The Australian Bureau of Statistics (ABS) is Australia's official statistical agency. It provides statistics on a wide range of economic and social matters, covering government, business and the population in general (ABS 2000a).

Overview

The ABS data presented in this report relate to vital statistics, primarily birth and mortality data. Registration of births and deaths is a legal requirement in Australia, and compliance is virtually complete. Registrars provide birth and death data to the ABS for coding and compilation into national statistics.

Access to data

ABS data were sourced through published reports and de-identified unit record files of registered births and perinatal deaths.

Relevant items

- The ABS births publication (ABS 2000b) covers births in Australia, confinements, fertility rates, fertility differentials, projected fertility and Aboriginal and Torres Strait Islander births.

- The ABS deaths publication (ABS 2000c) covers population change, standardised death rates, infant mortality, expectation of life, leading causes of death and deaths in Aboriginal and Torres Strait Islander people.
- Australian Bureau of Statistics data has been used as a primary data source in the following indicators: total fertility rate, perinatal mortality rate and infant mortality rate.

Data quality/data limitations

Generally, statistics on births and deaths are registered in the calendar year of occurrence, however:

- There is usually an interval between the occurrence and registration of a birth and, as a result of delay in registration, some births occurring in one year are not registered until the following year or even later (ABS 2000b). For example, in 1998 there was a 15.3% discrepancy between the number of live births recorded in the perinatal collections (253,771) and the number of live births in 1998 registered in the same year (220,010) (AIHW NPSU perinatal collections, and ABS births, 1999 data).
- There is a time lag between the occurrence of a death and the registration of the event so that some deaths that occur late in the year are registered in the early part of the following year (ABS 2000d). For example, in the case of perinatal deaths occurring in 1998, 87.3% were registered in the relevant year and the remaining registered in subsequent years (ABS perinatal deaths, 2000 data).
- Compliance with birth registration is not complete. Births in 1997 are not comparable between the perinatal collection (254,390) and live birth registrations (248,429) with a 2.4% discrepancy between the collections (AIHW NPSU perinatal collections, and ABS births, 1999 data).

State and Territory data: State-based surveys (SBS)

Where national data were not available, State and Territory data have been used in the compilation of indicators.

State and Territory data presented in this report came primarily from the perinatal data collections. Each State and Territory has a perinatal data collection in which midwives and other staff, using information obtained from mothers and from hospital or other records, complete notification forms for each birth. The aggregated data form the AIHW Perinatal Data Collection described above.

Although the perinatal collections are based on a national perinatal minimum data set, additional items are collected by some States and Territories. These items are often reported in the State or Territory reports.

The indicators reporting some of the additional items collected by State and Territory perinatal collections include those covering anaemia, smoking in pregnancy, prenatal diagnostic testing, induced abortions and antenatal care.

National surveys and registries

Another important data source in this report was the results of national surveys that have been conducted in Australia. Brief details of the surveys and registries referred to in this report are presented below.

National drug and alcohol surveys

The National Drug and Alcohol Survey 1995 and the 1998 National Drug Strategy Household Survey were comprehensive national surveys of Australians aged 14 years and older. They involved a national geographic stratified random sample selection of households and included personal interview and self-complete questionnaires. The 1998 survey involved 10,030 Australians (AIHW 1999b; Higgins, Cooper-Stanbury & Williams 2000). Data from the survey have been included in the indicators of alcohol use in pregnancy, and drug use in pregnancy.

Women's longitudinal study

The Women's Longitudinal Study, funded by the Commonwealth Department of Health and Ageing, is being conducted over a 20-year period covering three cohorts of women (aged 18–23, 45–50, 70–75 years) from urban, rural and remote areas of Australia, and covers many aspects of women's health. The Medicare database held by the Health Insurance Commission (HIC) was used as the sampling frame to select women who were sent an initial invitation to participate in the main cohort studies. Results from surveys of the younger age group (n = 14,739; Research Institute for Gender and Health 1997) and the middle age group (n = 14,011; Research Institute for Gender and Health 1999) have been used in some indicators in this report including prevalence of sexually transmissible infections, prevalence of HIV among adolescents, hysterectomy and screening for cervical cancer indicators.

Cancer registries

Information on cancers is collected by registries operated by each State and Territory. Every attempt is made to report all cancer cases, although not every case will be identified. Although there are some differences in coding systems for site, morphology and other variables, the majority of information is directly comparable (AIHW & AACR 2000). Data based on the State and Territory cancer registrations have been included in the three cancer indicators: incidence and mortality of cervical, ovarian and testicular cancer. Information pertaining to cervical screening is collated by the National Cervical Screening Program based on data from each of the State and Territory cervical cytology registries. This data has been included in the indicator regarding the proportion of women screened for cervical cancer.

National Notifiable Diseases Surveillance System

The National Notifiable Diseases Surveillance System (NNDSS) was established in its current form in 1991, under the auspices of the Communicable Diseases Network of Australia and New Zealand (CDNANZ), now CDNA. The CDNA monitors the incidence of an agreed list of communicable diseases in Australia via a national collation of notifications of these diseases received by health authorities in the States and Territories. More than 40 diseases or disease categories are included, largely as

recommended by The National Health & Medical Research Council (NHMRC). The notifiable disease data incorporated in this report include syphilis, chlamydia, gonorrhoea and urethritis.

HIV surveillance

Newly diagnosed HIV infection is also a notifiable condition in all State and Territory health jurisdictions in Australia. Cases of diagnosed HIV infection are notified through State/Territory health authorities to the national HIV surveillance centre (National Centre for HIV Epidemiology and Clinical Research (NCHECR)) on the first occasion of diagnosis. Sentinel surveillance for HIV infection is also conducted based on a network of metropolitan sexual health clinics. Data from the NCHECR have been reported in the prevalence of HIV among adolescents and prevalence among pregnant women indicators.

Smaller community-based data

Where national or State and Territory data are not available, data from smaller community-based studies have been presented in the indicators. These studies, however, are usually used to supplement other data from larger data sources. Where smaller, community-based studies are included they are not intended to be representative of the whole population. Such studies have been included to highlight some of the potential issues related to these sub-groups.

3.2 Other data sources for future reports

The list of data sources described above is not an exhaustive list. It represents the primary data sources deemed to be relevant to reporting on the selected list of reproductive health indicators. Future reports will use an expanded list of data sources to reflect the changing core set of indicators, and new sources of Australian reproductive health information. A few possible future sources of data on reproductive health include the Bettering the Evaluation and Care of Health (BEACH) data and Family Planning Australia data.

BEACH data

One important source for future reports on reproductive health is the BEACH program, a continuous national study of general practice activity in Australia that began in 1998–1999. The most recent BEACH data (2000–2001) covers a random sample of 999 general practitioners (GPs) that provided details of 99,900 GP–patient encounters across Australia. Results include GP and patient characteristics, patient reasons for encounter, problems managed and management techniques used including medications, non-pharmacological management, referrals and admissions and investigations.

In 2000–01, BEACH data reported 5.5 per 100 patient encounters with the GP were related to the female genital system (for example, check-up/Pap smear, menstrual problems), 3.5 per 100 patient encounters were related to pregnancy and family planning and 1.1 per 100 patient encounters involved reasons related to the male genital system (Britt et al. 2001).

Family Planning Australia data

Family Planning Australia collects some data on client visits to their clinics including demographic data, contraceptive use of clients, use of services for management of sexually transmitted infections and reproductive health investigation services. In 1996–1997 the database included information on 185,879 clients. This data may be useful in reporting on contraceptive use and other aspects of the management of reproductive health.

3.3 Limitations of currently available data sources

Less than half of the 44 indicators (21, 48%) presented in this report were considered to be complete at the time of press (Table 1). An indicator was considered ‘complete’ if there was sufficient national and/or State- and Territory-based data to ensure the indicator represented an inclusive, valid and reliable measure of reproductive health. Multiple data sources were used where possible to maximise the comprehensiveness of each indicator (Table 1).

Indicators relating to fertility, fetal and infant health outcomes, pregnancy and assisted conception, and cancers of the reproductive tract were considered to be complete. However, the indicators relating to the remaining reproductive areas were considered to be only partially complete, with information relating to subfertility and prenatal/antenatal factors being particularly deficient. Specific data limitations associated with each of the ten reproductive areas are summarised in subsequent paragraphs.

Table 1: Principal data sources and assessment of data completeness for reproductive health indicators, Australia

Indicator	Indicator complete ²	Primary data sources ¹						
		NHMD	NPDC	ABS	HIC	NS	SBS	Other
Fertility								
Crude birth rate	✓		×	×				
Total fertility rate	✓		×	×				
Teenage fertility rate	✓		×	×				
Subfertility								
Prevalence of infertility in women							×	
Prevalence of infertility in men								×
Prevalence of erectile dysfunction					×		×	
Prevalence of undescended testes		×			×			
Sexually transmissible infections								
Prevalence of sexually transmissible infections	✓					×		
Prevalence of HIV among adolescents	✓					×		
Knowledge of HIV-related prevention practices							×	
Family planning								
Prevalence of contraceptive use						×	×	
Vasectomy rate		×			×			
Tubal occlusion rate		×			×			
Hysterectomy rate	✓	×			×			
Annual number of induced abortions					×		×	
Prenatal/antenatal factors								
Prevalence of anaemia							×	
Periconceptional use of folate							×	
Positive syphilis serology prevalence in pregnant women							×	
HIV prevalence in pregnant women						×		
Prevalence of smoking in pregnancy						×	×	
Alcohol use in pregnancy						×	×	
Illicit drug use in pregnancy						×	×	
Prenatal diagnostic testing					×		×	
Percentage of women attending antenatal care							×	

(continued)

Table 1 (continued): Principal data sources and assessment of data completeness for reproductive health indicators, Australia

Indicator	Indicator complete ²	Primary data sources ¹						
		NHMD	NPDC	ABS	HIC	NS	SBS	Other
Pregnancy and assisted conception								
Pregnancy rates and outcomes after assisted conception	✓							×
Multiple pregnancy rate	✓		×					
Childbirth								
Percentage of all labours which were induced/augmented	✓		×					
Percentage of institutional deliveries	✓		×					
Caesarean birth rate	✓	×	×					
Proportion of vaginal births after caesarean section			×					
Rate of instrumental vaginal deliveries	✓		×					
Percentage of births attended by skilled health personnel						×	×	
Obstetric service providers by rural/remote classifications						×		
Maternal health outcomes								
Maternal morbidity		×						
Maternal mortality ratio	✓	×		×				
Ectopic pregnancy rate		×			×			
Fetal and infant health outcomes								
Perinatal mortality rate	✓		×	×				
Infant mortality rate	✓			×				
Incidence of low birthweight	✓		×					
Sex ratio of births	✓		×					
Cancer of the reproductive tract								
Proportion of women screened for cervical cancer	✓					×		
Incidence and mortality of cervical cancer	✓					×		
Incidence and mortality of ovarian cancer	✓					×		
Incidence and mortality of testicular cancer	✓					×		

(1) NHMD—AIHW National Hospital Morbidity Database; NPDC—National Perinatal Data Collection; ABS—Australian Bureau of Statistics; HIC—Health Insurance Commission; NS—National survey information; SBS—State-based surveys.

(2) Completeness refers to sufficient national data to compute indicators.

Fertility (3 indicators)

There are national-level data available on the three indicators, allowing computation of the indicators. There is good ascertainment of the number of births in Australia, through national births and perinatal data collections, both of which are based upon State and Territory collections. The data could be strengthened by standardised collection of data on induced and spontaneous abortions by all States and Territories.

Subfertility (4 indicators)

There are limited national data available on all the indicators in the subfertility section. There are no national survey data on infertility in men or women; and this information is not collected by other routine data sets. There are no adequate proxy collections that provide information that could be used to inform policy or evaluate programs and health initiatives targeted at the populations with infertility problems. There are no national population-based data on the prevalence of erectile dysfunction or the prevalence of undescended testes; instead there is proxy information by diagnostic and procedure codes from the AIHW NHMD on hospital-based procedures used to treat both conditions. There are also HIC data on services to private patients claimed from the Medicare Benefits Schedule.

Sexually transmissible infections (3 indicators)

The National Notifiable Diseases Surveillance System (NNDSS) captures information on syphilis, gonorrhoea and chlamydia, but the quality of the data is limited by the use of a passive surveillance system. Currently, the ascertainment of urethritis is incomplete at a national level. There is no routine national reporting of gonococcal urethritis or non-gonococcal urethritis; there are however gender-specific data available on the notification rates for gonorrhoea and chlamydia. The national surveillance of HIV is limited by the lack of uniform notification and screening procedures for the States and Territories. The survey data available about knowledge of HIV is adequate for a low-prevalence country such as Australia.

Family planning (3 indicators)

There is limited national data available on all the indicators. The 1995 National Health Survey was the second of two national population-based surveys that looked at contraceptive use. The data are limited by their age (six years old) and the lack of information on contraceptive use in teenagers. There is no routine collection of information on contraceptive use by States and Territories. There is incomplete ascertainment of induced abortions in Australia. Only South Australia, the Northern Territory, Australian Capital Territory and Western Australia require notification of induced abortion at a State and Territory level. State-level data are not collected in New South Wales, Victoria and Queensland. Ascertainment of the number of abortions using the HIC and NHMD are incomplete, and have not been presented with studies having shown that both data sources under-ascertain the number of induced abortions performed. There is no routine monitoring of induced abortions that occur in freestanding clinics.

There are also limitations in the data collection of the three operative procedures: hysterectomy, vasectomy and tubal occlusion from the NHMD (covering public and

private hospitals) and the HIC (covering freestanding clinics, private hospitals and private patients in public hospitals). The incidence rate for any of these procedures cannot be calculated using a combination of these data due to the inclusion of private patients in both data collections.

Antenatal factors (9 indicators)

There are no national data collected on any of the presented antenatal factors: anaemia in pregnancy, periconceptional use of folate during pregnancy, smoking, alcohol and drug use in pregnancy, sexually transmissible infection and HIV infection in pregnancy, proportion of women attending antenatal care and prenatal diagnostic testing undertaken. A number of the States and Territories collect information indirectly on anaemia as a complication of pregnancy or a pre-existing medical condition of the mother. The importance of this indicator needs to be reviewed with the development of a definition and gestational age for data collection. A number of the States and Territories collect information on smoking in pregnancy, but there is no standardised national data definition. Development of standardised data items in the national perinatal minimum data set for smoking in pregnancy would greatly improve the ascertainment of this important indicator. There are very limited data on the use of alcohol and illicit drugs during pregnancy, with the National Drug Strategy Household Survey providing the only national data. It is anticipated that data will be strengthened in the next survey with more specific and sensitive questions on alcohol and illicit drug use in the current pregnancy.

Periconceptional use of folate during pregnancy has only been measured by periodic surveys. There are no national data collected specifically on the prevalence of STIs or HIV infection in pregnant women. The development and inclusion of a composite antenatal screening indicator in the perinatal collection would improve ascertainment of these indicators. Only three States collect information on women undergoing prenatal testing including the outcomes such as termination of pregnancy. There needs to be development of a system for monitoring the use and outcomes of prenatal diagnostic tests.

Pregnancy and assisted conception (2 indicators)

There is a lack of population-based information about male and female infertility and the use of assisted conception in Australia. The State and Territory perinatal collections do not have information on fertility drug use or other assisted conception procedures; this limits the interpretation of data on multiple births, ascertainment of successful assisted conception procedures and the evaluation of the use of these procedures. There is no information on ovulation induction using only fertility drugs. The national conception data is based upon pregnancies, not treatment cycles, which does not allow investigation into demographic and medical factors that impact upon the pregnancy rate after assisted conception. A database for collection of data on all treatment cycles will be implemented in 2002.

Childbirth (7 indicators)

The ascertainment of the childbirth indicators on augmentation and induction, hospital-based deliveries, caesarean birth rate and instrumental deliveries are adequate using the dedicated perinatal data collection. There is less complete

ascertainment of the proportion of vaginal births after caesarean section, with only some of the State and Territory perinatal collections collecting the information. The quality of the data item vaginal birth after caesarean section would be improved if there was a nationally accepted definition. Data quality would also be improved if we were able to discriminate between ever having a caesarean section and caesarean section as a form of delivery in the confinement previous to the current one. There is no routine collection of data on the service provider present during delivery by the State and Territory perinatal data collections, which could be linked to the development of an indicator on the number of obstetric service providers by rural and remote classification.

Maternal health outcomes (3 indicators)

The ascertainment of ectopic pregnancy could be strengthened. Interpretation of the current data are limited by the NHMD reporting separations, not individuals, and only covering ectopic pregnancies treated in the hospital setting; and the HIC only covering services claimed from Medicare Benefits Schedule (for example, free-standing clinics, private hospitals and private patients in public hospitals). The incidence ratio for ectopic pregnancy cannot be calculated using a combination of these data due to the inclusion of private patients in both data collections. The ascertainment of maternal morbidity is also constrained by the lack of population-based data on individual women and their risk factors, reproductive history and outcomes. Both indicators are constrained by the fact that the NHMD was not specifically designed to be an epidemiological data collection instrument.

The ascertainment of maternal deaths is limited by the use of passive surveillance to detect cases, however, the use of multiple data sources has enhanced the ascertainment of maternal deaths. The development of uniform reporting standards would enhance the ascertainment of maternal deaths, as would the development of a better coding framework for hospital deaths.

Fetal and infant health outcomes (4 indicators)

The ascertainment of the fetal and infant health outcome indicators is adequate using the dedicated perinatal data collection and ABS perinatal deaths. There could be improvement in the ascertainment of perinatal and infant mortality if there was more timely registration of deaths.

Cancer (4 indicators)

The ascertainment of the reproductive tract cancers is adequate with Australia being one of the few countries in which there is national cancer registration, however, Indigenous identification in cancer registries needs to be improved. The ascertainment of those who participate in screening for cervical cancer is adequate, with national coverage since 1999 through States and Territories cervical cytology registers. There is poor ascertainment of population sub-groups that are under-represented in the screened population, including Indigenous and older women, and women from non-English-speaking backgrounds.

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Section 4: Discussion

4.1 Key findings—Australia's reproductive health

The systematic measurement of the 44 reproductive health indicators presented in this report provides a snapshot of Australia's reproductive health, and highlights a number of relevant factors and trends. By reviewing the 44 indicators and comparing them to other countries, it is evident that Australia continues to rate well, in terms of the indicators, in a world context of reproductive health.

Highlights from each of the key areas of reproductive health examined in this report are summarised in the following paragraphs.

Fertility

Australia's crude birth rate was 13.1 per 1,000 population in 1999. This is the lowest rate ever recorded in Australia, representing a continual and gradual decline in crude birth rate over previous decades. Australia's total fertility rate is also declining with an average woman estimated to have 1.75 children by the end of her reproductive life. Current fertility rates suggest that 26% of Australian women will remain childless at the end of their reproductive lives (ABS 2000a). These rates are comparable to countries such as the United Kingdom, United States, Canada, France, Sweden and Japan (UNPD 2000).

Subfertility

A national data collection on infertility is not available in Australia, but it is generally assumed that the prevalence and causes are similar to those in other developed countries. Almost 25,000 hospital separations in 1998 had a principle diagnosis of female infertility (AIHW 1999). It is estimated that male infertility affects one man in 20, and is the underlying reason for 40% of infertile couples using assisted-reproductive techniques (McLachlan & de Krester 2001).

Sexually transmissible infections

Sexually transmissible infections are a major public health problem worldwide. Notifications of chlamydia, gonorrhoea and syphilis to the National Notifiable Diseases Surveillance System (NNDSS) have increased over the last decade. Reported notifications for chlamydia, gonorrhoea and syphilis were 74.5, 29.7 and 9.0 per 100,000 population in 1999 (NCHECR 2000; Thomson et al. 2000). The prevalence of diagnosed HIV infection among adolescents (13–19 year olds) was 1.54 per 100,000 females, and 3.57 per 100,000 males in 2000 (Law M personal communication; NCHECR 2001).

Family planning

Forty-four per cent of all women aged 18–49 years reported current use of a method of contraception in 1995. The most commonly reported methods were the oral contraceptive pill (60%) and condoms (27%) (Yusuf & Siedlecky 1999).

Induced abortions are subject to different legal requirements in the different States and Territories of Australia. Only South Australia, Western Australia and Australian Capital Territory require notification of all induced abortions. In 1999 the State-based notification systems in South Australia and Western Australia reported an induced abortion rate of 17.8 and 19.6 per 1,000 women aged 15–44 years, respectively (Chan et al. 2000; personal communication Executive Director of Public Health, Western Australia).

Prenatal/antenatal factors

Comprehensive and reliable data are not widely available in this area. The available measures primarily reflect national- or State-based collections. However, one of the critical indicators is smoking in pregnancy; in a New South Wales survey conducted in 1998, almost 20% of mothers reported smoking during pregnancy. Of these, 96% continued smoking during the second half of their pregnancy, the time of greatest risk to the health of both mother and baby (Taylor et al. 2000).

Pregnancy and assisted conception

The use of assisted conception has increased significantly during the 1990s. In 1999, among all assisted conception treatment cycles, there were 23,947 embryo transfer cycles resulting in 4,288 viable pregnancies. The viable pregnancy rates varied between 17% and 21%, depending on the procedure (Hurst & Lancaster 2001).

Childbirth

In 1999, 25.9% of all deliveries were induced and 20.6% of all spontaneous births in Australia were augmented (Nassar et al. 2001). The national caesarean rate in the same year was 21.9%, the highest level ever recorded in Australia (AIHW NPSU perinatal collection). Vaginal birth after a caesarean section rate was almost 25% in 1999, a slight increase from 22% in 1997 (ACHS 2001). These rates are comparable to other more developed countries, however the WHO recommends a figure of 15% as a reasonable national rate for caesarean section (Caan & Messent 2002; Eberhardt et al. 2001; WHO 1985).

Maternal health outcomes

The maternal mortality rate was 12.9 deaths per 100,000 live births in Australia in the three years from 1994 to 1996. This rate includes maternal deaths from direct and indirect causes, and reflects a slight increase from the previous triennium (AIHW & NHMRC 2001).

Fetal and infant health outcomes

Perinatal mortality, defined as fetal and neonatal deaths, has declined dramatically in Australia during the last three decades from 22.3 per 1,000 births in 1973 to 8.5 per 1,000 live births in 1999 (Nassar et al. 2001). Infant mortality, defined as deaths of infants aged less than one year, has trended downward over the last two decades. In 1999, the infant mortality rate was 5.7 deaths per 1,000 live births, compared with 8 deaths per 1,000 live births amongst the more developed countries monitored by WHO (Moon, Rahman & Bhatia 1998; ABS 2000b; UNPD 2000). The proportion of low birthweight infants in Australia was 7% of all births in 1999 which is very similar to that of other developed nations (Nassar et al. 2001; UNPD 2000).

Cancer of the reproductive tract

Australia's incidence and mortality rates for cancers of the reproductive tract are similar to the more English-speaking developed nations (IARC & WHO 2001). There were almost 800 new cases of cervical cancer identified and almost 300 deaths due to cervical cancer in 1997. The incidence and mortality rates for cervical cancer have declined over the previous decade, partly due to population-based cervical screening (AIHW & AACR 2000). There were almost 1,200 women diagnosed and 740 deaths attributable to ovarian cancer in 1997. The incidence and mortality rates for ovarian cancer have remained relatively constant over the last decades (AIHW & AACR 2000). The 1997 age-standardised rate of testicular cancer was 6.2 per 100,000 population, with the incidence of testicular cancer rising by an average of 2.0% each year over the last decade (AIHW & AACR 2000).

Reproductive health-related service provision places a significant burden on the health care system. For instance, 14.4% of female hospital separations and 7.8% of all hospital separations at public or private hospitals in 1997–1998 involved a principal diagnosis related to pregnancy, childbirth or the puerperium. In the same period there were 36,051 separations involving sterilisation procedures representing 0.6% of all hospital separations. Furthermore, 2000–2001 BEACH data reported 5.5 per 100 patient encounters with the GP were related to the female genital system (for example, check-up/Pap smear, menstrual problems), 3.5 per 100 patient encounters were related to pregnancy and family planning and 1.1 per 100 patient encounters involved reasons related to the male genital system (Britt et al. 2001).

These figures only further emphasise the importance of reproductive health at an individual, societal and global level, and the need to continually monitor and manage Australia's reproductive health.

4.2 Reproductive health information

One of the purposes of this report was to provide a comprehensive and cohesive description of currently available information sources for measuring Australia's reproductive health, the aim being to lay the foundation for a coherent information framework which will form part of an overall reproductive health framework for Australia.

The reproductive health indicators chosen for this inaugural report were based on WHO reproductive health indicators customised to the Australian context. One of the conditions for inclusion was that sufficient data were available to provide meaningful measures. This report demonstrates that limited surveillance can be conducted using routinely collected data from hospital-captured services and health insurance claims. However, a key finding of this report is that there is a need to strengthen the quality and breadth of information available on reproductive health in Australia.

The information available in Australia reflects the international picture to a large extent, where despite advancing on a policy agenda, women's health and reproductive health lack standard definitions, rigorous assessment and surveillance tools and adequate funding. A comprehensive approach to reproductive health care is also needed that includes men as well as women and encompasses the full age spectrum of reproductive life.

There isn't an integrated national public health surveillance of reproductive health in Australia. There is national surveillance of perinatal health through the AIHW National Perinatal Data Collection (NPDC), which is based upon the State and Territory perinatal or midwives collections. However, the NPDC is limited for reproductive health surveillance by: a lack of risk factor and behavioural information on the mothers; no data on the fathers; and poor quality data on the complications of pregnancy, childbirth and the puerperium arising from a lack of standardised data definitions and collection methods.

The report is also limited by the lack of standardised definitions and data collection tools to measure the proposed core indicators. Of the 44 indicators covered in the report, the authors consider available data on 21 (48%) indicators to be adequate, while the remaining 23 indicators were considered to be incomplete. This assessment serves to emphasise that there remain significant areas related to reproductive health about which little is known.

Information on contraceptive use, sterilisation and termination of pregnancy is limited, with no routine collection of it. There are large gaps in the monitoring of sexually transmissible diseases in pregnant women where, for example, syphilis rates in pregnant women could not be identified. The extent of morbidity associated with pregnancy-related complications remains poorly documented and measured. While there have been a large number of hospital-based studies, these give little indication about the incidence and prevalence of conditions at a population level. Information on subfertility, infertility and family planning remains incomplete. There is a growing awareness of the importance of the mental as well as the physical ill health and suffering associated with sexual abuse and violence but, again, there is no way of quantifying this burden. Also there is no means of capturing the positive aspects of reproductive health. The contraceptive prevalence rate, for example, while easily measurable and long used to demonstrate improvements in reproductive health, is in reality a poor reflection of the benefits (health and non-health) that accrue from avoiding unwanted fertility.

This report is further limited by the significant gaps in information in two of the primary data sources used, the Health Insurance Commission (HIC) data and the AIHW National Hospital Morbidity Database (NHMD). The HIC does not collect

information on public patients in public hospitals and the NHMD collects information on separations not individuals. Neither data collection was designed for epidemiological study of particular diseases and procedures or for surveillance of the health care system. This report does not provide prevalence estimates of the presented conditions.

The HIC data and NHMD are both significantly affected by the sensitivity and specificity of the coding systems they use to accurately capture the diagnosis or procedure – the Medicare benefit schedule for the HIC and the international disease classification for NHMD. During the data time period for this report the NHMD coding has changed from ICD-9-CM to ICD-10-AM, with resulting changes to some reproductive-related codes. Both data sources miss key demographic, risk factor and medical data items (for example, parity, smoking, substance use, intensive care admission, underlying medical conditions) which substantially limits the utility of the data for measuring reproductive health. Also the measurement of a number of indicators are limited to hospitalisations occurring during pregnancy, childbirth and the puerperium or for a specific reproductive health procedure (for example, hysterectomy, vasectomy). As such, these data sources only describe the public health burden of the particular indicator not the likelihood of an individual suffering such morbidity.

In most cases, the most recent data from each relevant data set at the time of preparation of this report have been included. The indicators were designed to give a broad picture of the data available and what is currently being reported. Often, this resulted in using different time periods, data sources and populations depending on the indicator. Whilst this provides information from the most recently collected data, it limits further comparisons between indicators.

4.3 Future steps—development of a reproductive health framework

This report supports the need for the development of a national conceptual and information framework for reproductive health, including a plan for an integrated surveillance system. Such a framework will advance the understanding, measurement and, ultimately, provision of high quality reproductive health care for all Australians.

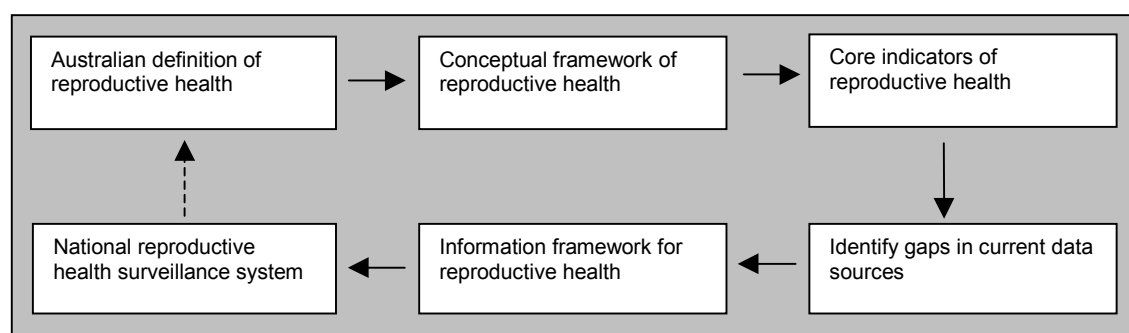
It is important that the development of a reproductive health framework involved extensive consultation with the following stakeholders: Commonwealth, State and Territory health departments, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, Royal Australian College of General Practitioners, Australasian College of Sexual Health Physicians, Australian College of Midwives, and other professional, consumer and community groups. It is also imperative that such a framework is in line with national health information strategies, models and systems.

The indicators presented in this report were chosen by the Reproductive Health Advisory Committee based on a working definition of reproductive health, consideration of reproductive health priorities and available data sources. Due to

limitations in current data sources and the need for a workable list of indicators, 44 indicators were chosen. It is recognised that a number of key indicators were omitted from this report. However, this inaugural report into reproductive health indicators provides an invaluable basis from which to develop a cohesive, meaningful and useful reproductive health framework.

The phases that might be undertaken to implement such a framework are shown in Figure 3 and summarised in the following paragraphs.

Figure 3: Development phases for a reproductive health framework



Australian definition of reproductive health – A clear and acceptable definition of reproductive health must be specified to set the scope of the reproductive health framework and guide its development. The definition must be in-line with international definitions and relevant to the Australian context.

Conceptual framework – A conceptual framework would define the elements that reflect the scope and definition of reproductive health (for example, health outcomes, health care services, behaviours and demographic factors) and represent how they interact and relate. The features that characterise each element would then be defined (for example, ‘health outcomes’ would include information on fertility, sexually transmissible disease and maternal and baby health). A conceptual framework assists in guiding the development of an indicator set and minimises the risk of overlooking the inclusion of key indicators.

Core indicators of reproductive health – A set of core reproductive health indicators would then be chosen based on the conceptual design. The indicators would allow the reproductive health of a population to be measured and monitored as part of a reliable and meaningful process. As previously stated in this report, the indicators would evolve over time to meet emerging reproductive health issues and trends, and take advantage of changing information sources.

Identify gaps in current data sources – This report has identified and assessed currently available data sources on reproductive health. The areas of the conceptual plan where information is either lacking or deficient would be identified.

Information framework for reproductive health – As with the conceptual framework, information sources would be identified and their relationship to each other specified. It is envisaged that existing data sources would form the basis of the

framework, and that these would be supplemented with additional data and perhaps additional purpose-built systems.

National reproductive health surveillance system – The information framework would form the basis for a comprehensive and cohesive surveillance and performance measurement system. This would allow the core reproductive health indicators to be measured and monitored in a systematic and reliable manner. It would allow emerging reproductive trends to be identified and tracked, allow health care initiatives to be evaluated, and set the agenda for reproductive health priorities.

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PART B: Selected reproductive health indicators

Fertility

The child-bearing performance of the population:

- Crude birth rate
- Total fertility rate
- Teenage fertility rate

Crude birth rate

Indicator

**The number of live births
per 1,000 population**

Background information

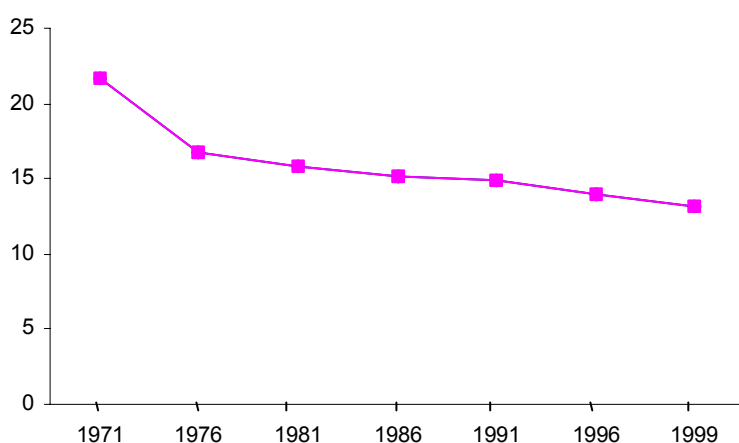
- The crude birth rate is the number of live births registered during the calendar year per 1,000 estimated resident population of Australia at 30 June that year (ABS 2000).
- The crude birth rate is the most easily obtained and most often reported fertility measure.

Current data

- There were 248,870 live births registered in Australia in 1999 – a crude birth rate of 13.1 per 1,000 population (ABS 2000).
- The rate in Australia is at its lowest ever, continuing a gradual decline in the overall crude birth rate from 21.7 per 1,000 population in 1971 (Figure 4).
- The crude birth rate varied among States and Territories, ranging from 18.5 in the Northern Territory to 12.0 in South Australia (Figure 5) (ABS 2000).
- Australia's crude birth rate is relatively high compared to other developed nations. Israel, New Zealand, the United States, Singapore and Ireland were the only developed countries to exceed Australia's crude birth rate in 1998 (UN 2001).

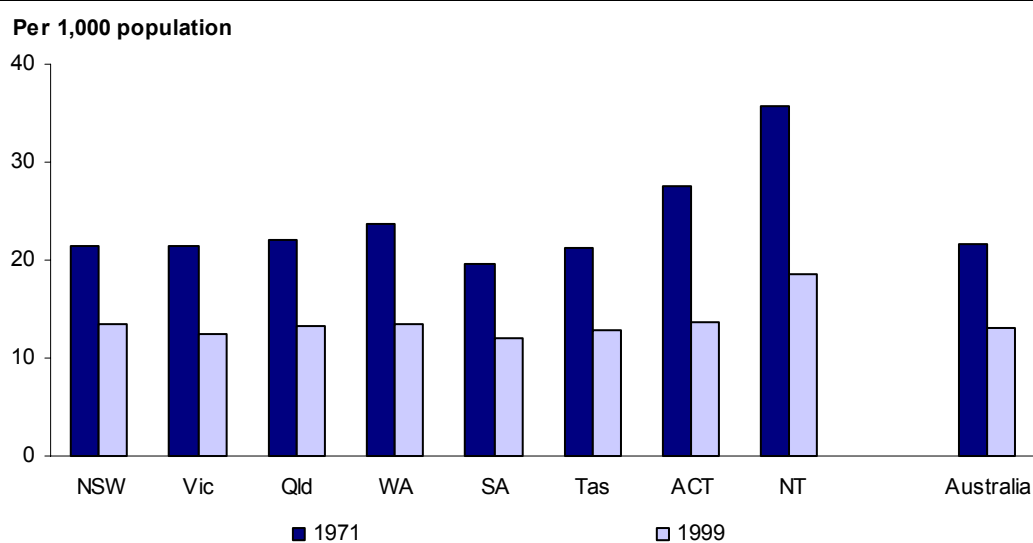
Data limitations

- The crude birth rate is an imprecise measure of a society's childbearing patterns. It does not take into account the percentage of women who are in the reproductive ages and is affected by differing age structures of the population. Age-specific fertility rates are often used to overcome this difficulty.
- The crude birth rate is an imprecise measure of pregnancy rates as it is based on live births and does not include any information about stillbirths or induced and spontaneous abortions.



Source: ABS 2000.

Figure 4: Crude birth rate, Australia, 1971–1999



Source: ABS 2000.

Figure 5: Crude birth rate, States and Territories, 1971 and 1999

Indicator status

Adequate.

Data source

Australian Bureau of Statistics.

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Total fertility rate

Indicator

Total number of children an average woman would have by the end of her reproductive period if she experienced the currently prevailing age-specific fertility rates throughout her childbearing life

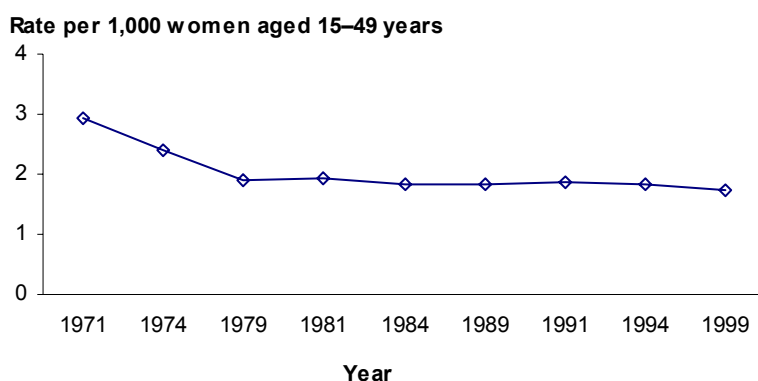
Background information

- The total fertility rate is based on the summation of age-specific fertility rates. Age-specific fertility rates¹ show the number of births registered per 1,000 women at each reproductive age or age group (ABS 2000).
- Fertility rates are an imprecise measure of pregnancy rates as they are based on live births and do not include any information about stillbirths or induced and spontaneous abortions.
- Delayed child-bearing, an increase in the number of women having no children and a decline in the number of women having three or more children have each been associated with lower fertility rates (Barnes 2001). The increased availability and access to contraception and abortion have also contributed to the decrease in fertility rates.
- Low fertility rates in conjunction with increasing life expectancy are shifting the age distribution of the population towards older age groups (Barnes 2001).
- An inverse relationship has been found between place of residence, educational qualifications, socioeconomic status and fertility rates (Barnes 2001). Women living in capital cities, with higher educational skills and those in high-skilled occupations tend to have lower fertility rates than women from rural areas or who are disadvantaged in terms of income, education or skills (ABS 2000).

Current data

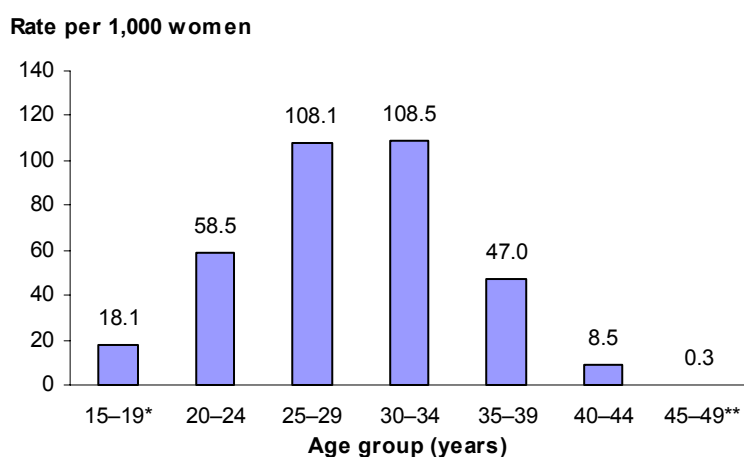
- The total fertility rate (TFR) in Australia in 1999 was 1.75, slightly lower than the 1998 level of 1.76 and continuing a decline from 2.9 in 1971 (Figure 6) (ABS 2000).
- The Australian TFR is below the replacement level fertility rate of 2.06, which is the number of children a woman would need to have during her lifetime to replace both herself and her partner (ABS 2000).
- Within the Australian States and Territories, the TFRs in 1999 were 2.15 in the Northern Territory, 1.87 in Tasmania, 1.81 in New South Wales, 1.76 in Queensland and Western Australia, 1.70 in South Australia, 1.68 in the Australian Capital Territory and 1.62 in Victoria (ABS 2000).
- The total fertility rate in 1999 was higher among Indigenous women at 2.1 babies per woman, compared with 1.75 for all women (ABS 2000).
- The total fertility rate of women living in capital cities is considerably lower than the rates elsewhere in each respective State or Territory. Fertility rates based on the Accessibility/Remoteness Index of Australia show that women in highly accessible areas have lower fertility rates (1.76) than women living in remote areas (2.12 to 2.38) (ABS 2000).
- Current fertility rates suggest that 26% of Australian women will remain childless at the end of their reproductive life (ABS 2000).
- Australian fertility remains higher than in Canada (1.5), Japan (1.4) and many European countries (for example, Italy at 1.2) and lower than in the United States (2.0) and New Zealand (1.9) (ABS 2000).
- In 1999, women aged 25–29 and 30–34 years experienced the highest fertility rates of 108.1 and 108.5 per 1,000 women in each respective age group (Figure 7) (ABS 2000).

¹ See Appendix for details on calculation of age-specific and age-standardised rates.



Source: ABS 2000.

Figure 6: Total fertility rate, Australia, 1971–1999



* Includes births to mothers aged less than 15 years.

** Includes births to mothers aged 50 years and over.

Source: ABS 2000.

Figure 7: Age-specific fertility rate, Australia, 1999

Data limitations

Age-specific fertility rates or, more strictly, age-specific birth rates do not include any information about stillbirths or induced and spontaneous abortions. Data on abortions in each age group are needed to give more accurate pregnancy rates. However, for the calculation of the total fertility rate, only births are relevant.

Indicator status

Adequate.

Data source

Australian Bureau of Statistics (ABS 2000).

References

- Australian Bureau of Statistics 2000. Births, Australia, 1999. Cat. no. 3301.0. Canberra: ABS.
- Barnes A 2001. Low fertility: a discussion paper. Occasional paper no. 2. Canberra: Department of Family and Community Services.

Teenage fertility rate

Indicator

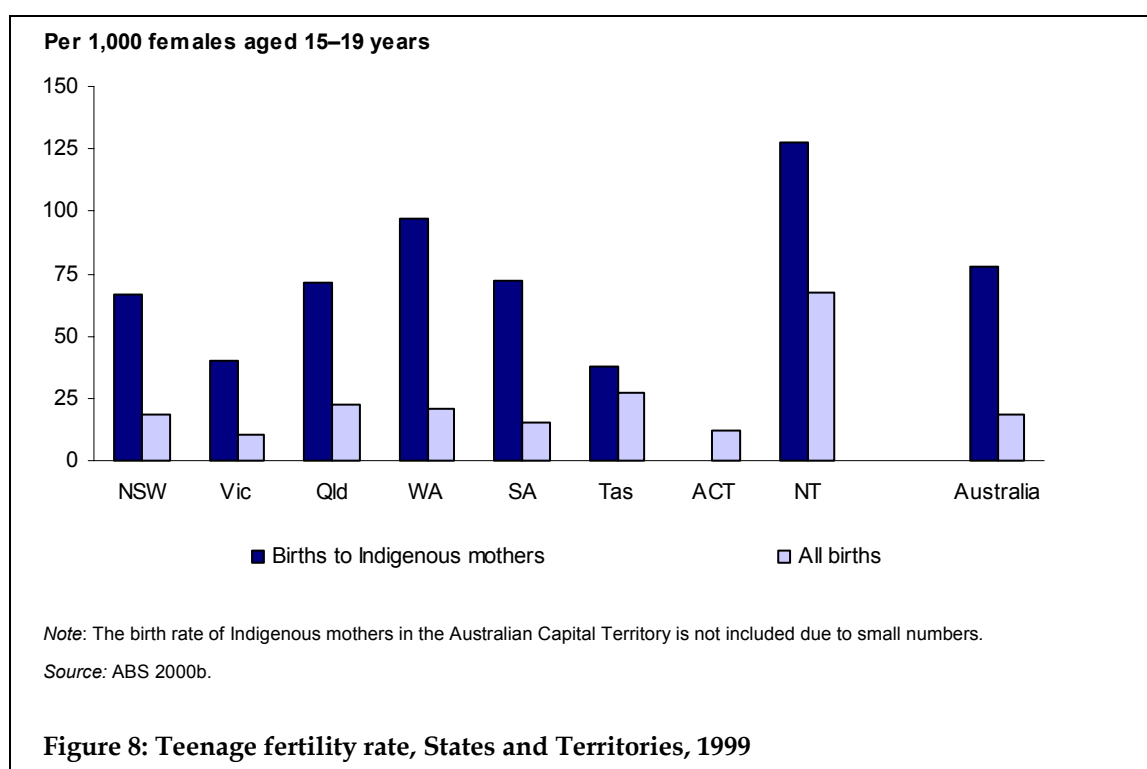
The number of live births to mothers aged less than 20 years in a given year per 1,000 females aged 15–19 years

Background information

- Over the last 30 years there has been a steady decline in the teenage fertility rate which has been attributed to increased access to and use of contraception and safe abortion (ABS 2000a).
- Teenage childbearing is often related to increased adverse health, social and economic outcomes for teenagers and their children (American Academy of Pediatrics 1999; Bai, Wong & Stewart 1999).
- Teenagers in South Australia during 1986–1988 were more likely to be single, primigravid, Aboriginal, have fewer antenatal visits and have a medical or obstetric complication during pregnancy compared with women in their twenties. However, those who were single, Caucasian and primigravida with seven or more antenatal visits had similar pregnancy outcomes to women in their twenties (Zhang & Chan 1991).
- In a recent study of teenage birth rates in Queensland between 1988 and 1997, it was found that teenagers who live in disadvantaged areas had two to four times higher birth rates than for all women in Queensland and 10 to 20 times higher rates than those from affluent areas (Coory 2000).
- A cohort study of 7,191 singleton births between 1996 and 1998 at Liverpool hospital in New South Wales found no difference in the overall obstetric outcomes of teenage mothers and adult mothers. Some differences in neonatal outcomes were identified, however these were not attributed to age, but to disadvantages caused by lower socioeconomic status and factors such as maternal smoking, parity and unmarried status (Bai, Wong & Stewart 1999).

Current data

- In Australia in 1999, there were a total of 11,751 live births to teenage mothers and a teenage fertility rate of 18.1 births per 1,000 females aged 15–19 years (ABS 2000a).
- Over the past three decades the teenage fertility rate has declined from 55.5 births per 1,000 females aged 15–19 years in 1971 to 18.1 per 1,000 in 1999 (ABS 2000a).
- The teenage fertility rate in 1999 varied across the States and Territories from 10.8 live births per 1,000 women aged 15–19 years in Victoria to 67.6 in the Northern Territory (Figure 8). The high rates in the Northern Territory reflect the large proportion of Indigenous population who have the highest teenage fertility rate (ABS 2000a).
- In 1999, the national fertility rate for Indigenous teenagers was 77.6 per 1,000 Indigenous women, 4.3 times higher than the overall Australian rate (ABS 2000a).
- South Australia, Western Australia and the Northern Territory provide information on all teenage pregnancies including all births and induced abortion. In 1998, the teenage pregnancy rate in South Australia, Western Australia and the Northern Territory was 44.4, 44.6 and 100.0 per 1,000 women aged 15–19 years, respectively (Chan et al. 1999; personal communication, Executive Director of Public Health, Western Australia; unpublished data, Epidemiology Branch, Territory Health Services, Darwin, 2001, respectively).
- Australia's teenage fertility rate is relatively low compared with other developed countries. Higher rates were found for women aged 15–19 years in Canada (20.2), United States (51.1) and in the United Kingdom (29.7) (ABS 2000a).



Data limitations

Age-specific fertility rates are an imprecise measure of pregnancy rates as they are based on live births and do not include any information about stillbirths or induced and spontaneous abortions. Currently, only South Australia, Western Australia and the Northern Territory collect population-based data on induced abortions.

Indicator status

Adequate.

Data source

Australian Bureau of Statistics

References

- American Academy of Paediatrics 1999. Adolescent pregnancy: current trends and issues, 1998. *Paediatrics* 103(2): 516–520.
- Australian Bureau of Statistics (ABS) 2000a. Teenage fertility. Australian demographic statistics, June quarter 2000. Cat. no. 3101.0. Canberra: ABS.
- Australian Bureau of Statistics 2000b. Births Australia, 1999. Cat. no. 3301.0. Canberra: ABS.
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- Coory M 2000. Trends in birth rates for teenagers in Queensland, 1988–1997: an analysis by economic disadvantage and geographic remoteness. *Australian and New Zealand Journal of Public Health* 24(3): 316–319.
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Subfertility

The degree of reduced fertility in the population:

- Prevalence of infertility in women
- Prevalence of infertility in men
- Prevalence of erectile dysfunction
- Prevalence of undescended testes

Prevalence of infertility in women

Indicator

Percentage of women of reproductive age (15–49 years) at risk of pregnancy who report trying unsuccessfully for a pregnancy for one year or more

Background information

- While the WHO indicator definition for female infertility is based on a period for attempting to conceive of two years or more, Australian studies have tended to use a definition of one year or more.
- Differing definitions of infertility affect the measurement of infertility, and thus the ability to compare studies conducted in this area.
- No national survey of the prevalence of infertility has been done in Australia but it is generally assumed that the prevalence is similar to that in other developed countries.
- In a public opinion survey on attitudes towards infertility and treatment options conducted in eight countries in 1998, the majority of more than 1,000 respondents in Australia underestimated the prevalence of infertility in the community. Only 19% agreed with the authors' perception of the burden of infertility in Australia: that about 1 in 6 couples seek medical assistance for an infertility problem lasting at least one year (Roy Morgan Research 1999; Bertarelli Foundation Scientific Board 2000).

Current data

- *Australian Hospital Statistics 1997–98* identified 25,464 separations from Australian public and private hospitals in which the principal diagnosis was female infertility. Predictably, the majority of separations were among women aged 25–34 (54%) and 35–44 (41%) (AIHW 1999).
- Couples whose infertility is treated by IVF and other types of assisted conception are a highly selected group and do not

necessarily reflect the relative importance of the various causes of infertility in the community. Among couples treated by assisted conception in Australia and New Zealand in 1999, the stated causes of infertility were tubal only (13.3%), other female only (12.1%), male only (27.8%), multiple causes (19.1%) and unexplained (17.7%) (Hurst & Lancaster 2001). It has been estimated that male infertility is a factor in half of all infertility problems in relationships and is the underlying indication for assisted conception in 40% of couples (McLachlan & de Kretser 2001).

- In a study in Western Australia in the late 1980s, those with current infertility were defined as couples in a continuous relationship with intercourse unprotected by contraception or surgical sterility, who had been trying unsuccessfully for one year to become pregnant. The study of a stratified cluster sample of 1,511 couples in Perth found 19.1% of women in the study population reported infertility at some time in their lives (lifetime infertility), while the prevalence of current infertility was 3.5% (among couples with a female partner of reproductive age). The authors noted that this prevalence seemed unusually low compared to other international studies (Webb & Holman 1992).
- The Perth study found the highest prevalence of current infertility was found among couples where the women were aged 30–34 (4.2%) (Table 2) (Webb & Holman 1992).
- Some of the factors associated with infertility are a history of pelvic inflammatory disease, endometriosis, abdominal surgery, polycystic ovary syndrome and pregnancy outside the uterus.
- A retrospective, cross-sectional analysis of case notes of 342 Indigenous women between the ages of 20 and 45 years, living in a remote region of the Northern Territory, found the rate of current infertility (defined as inability to conceive over 36 months) in the community was 26.3% (Kildea & Bowden 2000).

Table 2: Prevalence of current infertility, surgical sterility and associated reproductive disability according to age of the female partner

Woman's age (years)	Number of couples*	Current infertility*	Surgical sterility*	Associated reproductive disability
	Number	Per cent	Per cent	Per cent
16–19	25	–	–	–
20 to 24	146	2.1	2.1	1.4
25 to 29	315	3.8	12.4	3.5
30 to 34	382	4.2	31.7	4.1
35 to 39	342	3.5	53.5	3.7
40 to 44	285	3.5	72.2	1.7
<i>All women</i>	<i>1,495</i>	<i>3.5</i>	<i>37.1</i>	<i>3.1</i>
95% CI		2.6–4.4	34.7–39.5	2.2–4.4
Mean age		33.3	37.2	32.9
SE		5.8	4.7	5.1

* For current infertility and surgical sterility there were 16 cases where information was missing.

Note: 'Associated reproductive disability' applied to couples who, because of biomedical or psychosocial factors associated with either infertility or surgical sterility, were unable to achieve their desired level of reproductive function.

Source: Webb & Holman 1992.

Data limitations

- There have been no national population-based studies of female infertility. As already noted, the authors of the Perth study note the prevalence of current infertility they found seemed unusually low using international comparisons (Webb & Holman 1992).
- The Perth study did not have a high response rate and is quite old, however it is the only published population-based study on female infertility in Australia.

Indicator status

Incomplete. National population-based data on the prevalence of female infertility are not currently available in Australia. At present data on female infertility are limited to small studies and hospital data.

Data sources

- Western Australian study by Webb and Holman 1992
- AIHW Australian Hospital Statistics 1997–98 using data from the National Hospital Morbidity Database (AIHW 1999).
- AIHW National Perinatal Statistics Unit Assisted Conception database.

References

- Australian Institute of Health and Welfare (AIHW) 1999. Australian hospital statistics 1997–98. AIHW cat. no. HSE 6. Canberra: AIHW (Health Services Series).
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- McLachlan RI & de Kretser DM 2001. Male infertility: the case for continued research. *MJA* 174: 116–117.
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- Webb S & Holman D 1992. A survey of infertility, surgical sterility and associated reproductive disability in Perth, Western Australia. *Australian Journal of Public Health* 16(4): 376–381.

Prevalence of infertility in men

Indicator

Percentage of men who report trying unsuccessfully for a pregnancy for one year or more

Background information

- While the WHO indicator definition for male infertility is based on a period for attempting to conceive of two years or more, Australian studies have tended to use a definition of one year or more.
- Differing definitions of infertility affect the measurement of infertility, and thus the ability to compare studies conducted in this area.
- It has been estimated internationally that in around 30% of cases of disturbed male fertility the cause remains aetiologically unclear (Nieschlag & Behre eds 1997).
- In Australia, it is estimated that male infertility affects one man in 20, and is the underlying reason for 40% of infertile couples using assisted-reproduction techniques (McLachlan & de Kretser eds 2001).
- Obstruction is the most common of the identifiable causes of male infertility and includes bilateral congenital absence of the vas, epididymal or ejaculatory duct obstruction and vasectomy-related infertility (which constitutes the largest group) (McLachlan & de Kretser eds 2001).
- In around 60% of infertile men no cause is found for low sperm counts or inadequate production of sperm (McLachlan & de Kretser eds 2001).

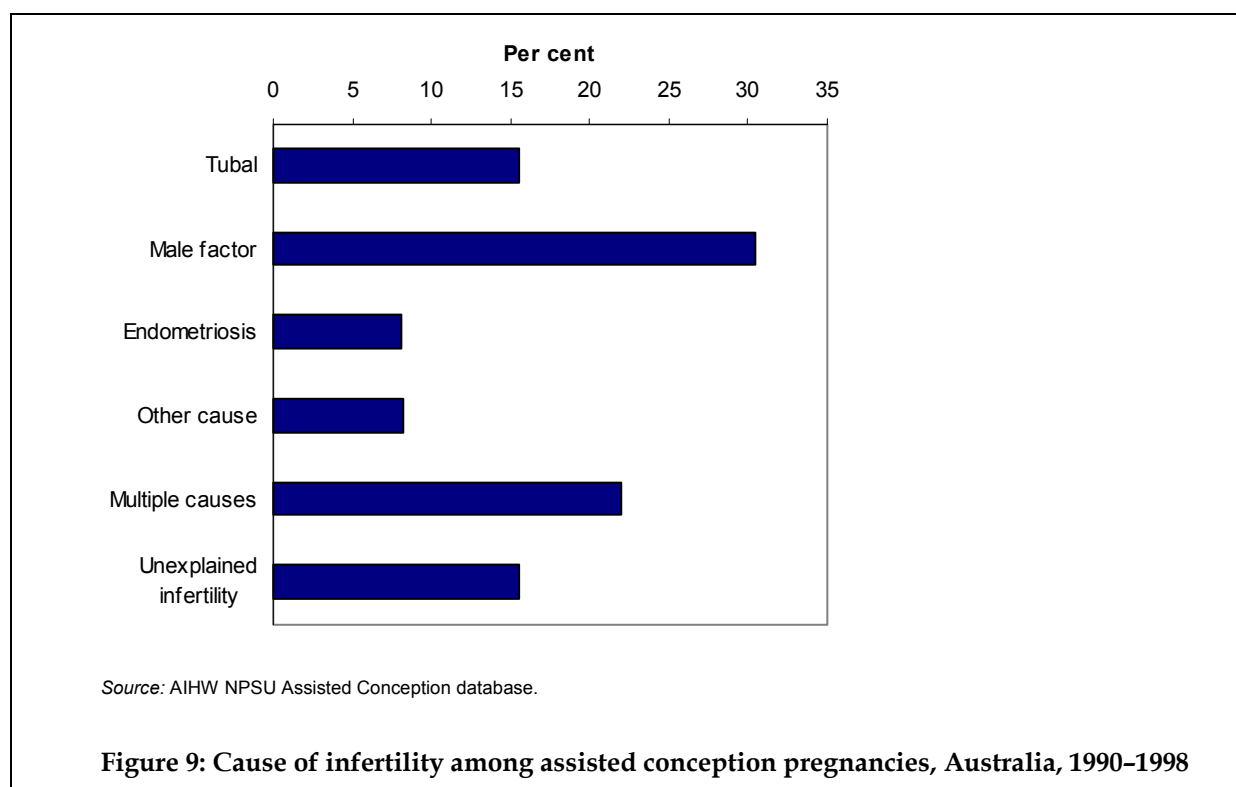
- Although some contend there have been declining sperm counts around the world, Australian research does not reflect such a decline (Handelsman 1997).

Current data

- Male factor infertility is the most common cause of infertility among couples undergoing assisted conception in Australia, being the main cause of infertility in 30.4% of assisted conception pregnancies and a contributing cause to many more cases of infertility between 1990 and 1998 (Figure 9) (AIHW NPSU Assisted Conception database).
- Between 1990 and 1998, 41.2% of assisted conception pregnancies involved any form of male factor infertility (excluding azoospermia and vasectomy), which may or may not have occurred in the presence of additional female factors (AIHW NPSU Assisted Conception database).
- Azoospermia (the absence of spermatozoa in the semen or failure of formation of spermatozoa) was identified in 6.1% of assisted conception pregnancies (AIHW NPSU Assisted Conception database).

Data limitations

Data presented on infertility relates to a cohort of assisted conception pregnancies, not a population-based sample.



Indicator status

Incomplete. Population-based data on the prevalence of male infertility are not currently available in Australia.

Data source

AIHW National Perinatal Statistics Unit. Assisted conception database 2001. For further information: www.npsu.unsw.edu.au.

References

- Handelsman DJ 1997. Sperm output in healthy men in Australia: magnitude of bias due to self-selected volunteers. *Human Reproduction* 12: 2701–2705.
- McLachlan RI & de Kretser DM 2001. Male infertility: the case for continued research. *Medical Journal of Australia* 174: 116–117.
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Prevalence of erectile dysfunction

Indicator

Proportion of men with erectile dysfunction, that is, a persistent inability to achieve and/or maintain an erection sufficient for satisfactory sexual activity

Background information

- Erectile dysfunction (ED) is a common problem affecting especially the elderly and those with cardiovascular disease and diabetes mellitus (Chew et al. 2000).
- Reported risk factors include cigarette smoking, hypertension, hyperlipidaemia and diabetes mellitus (McMahon 1999).
- It is estimated that 100 million men worldwide, and around 1 million Australians, are affected to some degree by ED (Lowy 1999).
- Viagra (sildenafil citrate) became available through the Repatriation Pharmaceutical Benefits Scheme (RPBS) in August 1999. This is likely to have resulted in decreased treatment of erectile dysfunction by other means.
- Lowy (1999) suggests the two community-based studies presented here show a pattern of erectile dysfunction similar to overseas studies.

Current data

- There is a Medicare Benefits Schedule (MBS) item for injection for the investigation and treatment of impotence. Two services are allowable in a period of 36 consecutive months. Between 1998 and 2000 there were 66,591 claims on this item. There was marked variation from year to year with 30,946 procedures in 1998, 14,251 in 1999 and 21,394 in 2000. The most procedures were carried out among men aged 45–54 years (24.5%) and 55–64 years (23.2%) (HIC 2000).

- Between July 1996 and June 1999 the AIHW National Hospital Morbidity Database recorded 725 hospital separations involving insertion or replacement of a penile prosthesis. Between 1998 and 2000 there were 647 claims for Medicare benefits for the insertion of artificial erection devices (HIC 2000).
- A Perth study surveyed 1,240 men aged 18 years and older among 62 general medical practices. They found 488 men (39.4%) reported difficulties obtaining or maintaining an erection: 119 (9.6%) 'occasionally', 110 (8.9%) 'often', and 231 (18.6%) 'all the time' (complete erectile dysfunction). The prevalence of complete erectile dysfunction increased with age, rising from 2.0% in the 40–49 years age group to 44.9% in the 70–79 years age group. Only 11.6% of men with erectile dysfunction had received treatment (Table 3) (Chew et al. 2000).
- A South Australian study of 427 men aged over 40 (a subset of a probability sample of the community completing a multi-user interview survey) found the prevalence of impotence² increased sharply from 3% in 40–49 year olds to 42% in 60–69 year olds (Pinnoc, Stapleton & Marshall 1999).

² Impotence was defined as nil or poor sexual desire, orgasm, ability to have an erection, frequency of erections when wanted, frequency of intercourse, frequency of morning or nocturnal erections and firmness of erections over the previous three months.

Table 3: Percentage of erectile dysfunction in a community study by age group, Western Australia, 2000

Age group	Number of participants	ED occasionally	ED often	ED all the time	ED all grades
<20	9	0	0	0	0
20–29	87	4.6	2.3	2.3	9.2
30–39	119	5.9	1.7	0.8	8.4
40–49	199	6.5	4.5	2	13.1
50–59	215	13.5	11.2	8.4	33.5
60–69	293	14	13.7	21.2	51.5
70–79	214	8	12.6	44.9	69.2
80+	84	8.3	6	52.4	76.2
All ages*	1240	9.6	8.9	18.6	39.4

ED = Erectile dysfunction Indicator status

* Includes 20 participants for whom the age group was not known.

Source: Chew et al. 2000.

Data limitations

- The AIHW National Hospital Morbidity Database has only been able to report on injections into the penis for impotence since July 1998.
- Health Insurance Commission data only includes services claimed from Medicare. Services to public patients in public hospitals are not included. There are no data on the use of Viagra to treat erectile dysfunction.
- The Perth study (Chew et al. 2000) does not provide an accurate estimate of population prevalence, being conducted among men attending GPs.

Indicator status

Incomplete. Population-based data on the incidence of erectile dysfunction are not currently available in Australia.

Data sources

- Perth study of men attending general practices (Chew et al. 2000).
- Health Insurance Commission medical benefits scheme data (HIC).

References

- Chew KK, Earle CM, Stuckey BGA, Jamrozik K & Keogh EJ 2000. Erectile dysfunction in general medicine practice: prevalence and clinical correlates. *International Journal of Impotence Research* 12(1): 41–45.
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- McMahon C 1999. New treatment options for erectile dysfunction. *Australian Family Physician* 28(8): 783–790.
- Pinnock CB, Stapleton AMF & Marshall VR 1999. Erectile dysfunction in the community: a prevalence study. *Medical Journal of Australia* 171: 353–357.

Prevalence of undescended testes

Indicator

Prevalence of undescended testes in boys aged 0–15 years

Background information

- During fetal development of males, the testes form on the posterior abdominal wall before descending into the scrotum. If one or both testes do not reach the scrotal sac, it is known as undescended testes (cryptorchidism).
- Descent of the testes usually takes place in the 28th week of fetal development in the uterus (Moore 1982).
- It is generally believed that testicular descent is controlled by the hormones gonadotropins and androgens (Moore 1982).
- Undescended testes often require an operation (orchidopexy) which is usually performed in early childhood.
- The increased survival of pre-term babies may influence the rates of undescended testes. Rates of undescended testes have been found to be elevated among low birthweight, pre-term, small-for-gestational age and twin neonates (Bertowitz, Lapinski, Dolgin et al. 1993).
- Associated complications of undescended testes include infertility and malignancy (Gordon 1995). Jannini et al. (1995) suggest impairment of fertility is a complication mainly in those with a history of bilateral cryptorchidism.

Current data

- AIHW National Hospital Morbidity data and Health Insurance Commission data both indicate that most surgery for undescended testes is performed on children aged 0–4 years (accounting for 51.0% and 53.4%, respectively) (Figures 10 and 11).
- The age-specific rate of separations involving orchidopexy between July 1998 and June 1999 in the National Hospital

Morbidity data was 11.4 per 10,000 males aged 0–15 years. The highest age-specific rate occurred in Tasmania (24.0), with the lowest being in Northern Territory (4.0).

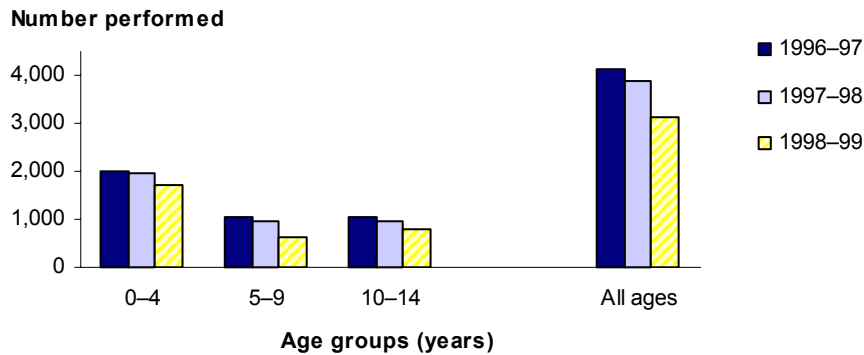
- The reasons for the high rate of orchidopexy in Tasmania are not immediately obvious and require further investigation.
- The number of cases of surgery in public and private hospitals for undescended testes dropped by 23.7% between July 1996 and June 1999 from 4,118 to 3,142 (Figure 10).
- The age-specific rate of surgery in private hospitals, free-standing clinics and on private patients in public hospitals for undescended testes for males aged 0–4 years in 1999 varied considerably by State/ Territory from 5.0 per 10,000 males in Western Australia to 24.2 per 10,000 males in Tasmania (HIC 2001) (Figure 11).

Data limitations

- Health Insurance Commission data only include services claimed from the MBS. Services to public patients in public hospitals are not included (see 'Data sources' for a full description of exclusions).
- Hospital morbidity data do not include procedures performed in free-standing clinics.
- The data only include those having surgery for undescended testes; the prevalence of undescended testes is likely to be higher than reported here.

Indicator status

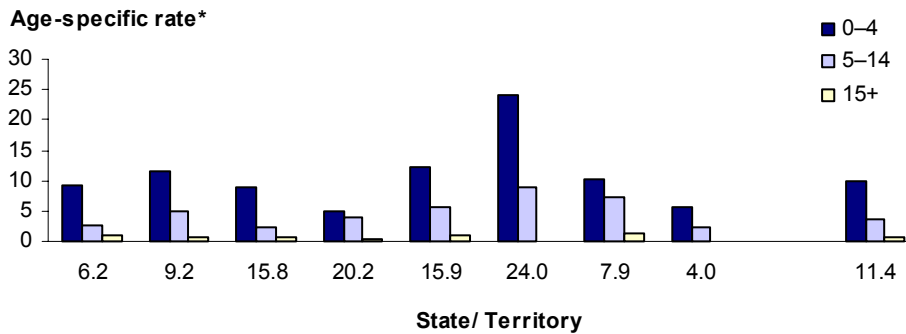
Incomplete. In this indicator, surgery for undescended testes in children aged 0–15 years has been used as a proxy for the prevalence of undescended testes.



Source: AIHW National Hospital Morbidity Database.

Note: Includes mobilisation and replacement of testis in scrotum, orchidopexy with detorsion of testis, Torek operation and/or transplantation to and fixation of testis in scrotum.

Figure 10: Number of cases of surgery for undescended testes (orchidopexy), public and private hospitals, Australia, July 1996–June 1999



*Calculated per 10,000 males as at June 1999.

Notes: Denominator for 15+ category was males aged 15–20 years.

Includes orchidopexy for undescended testes and orchidopexy for undescended testes in inguinal canal close to deep inguinal ring or within abdominal cavity.

Source: HIC 2001.

Figure 11: Age-specific rate of surgery for undescended testes, free-standing clinics and private patients in public and private hospitals by State/Territory, Australia, 1999

Data sources

- Health Insurance Commission 2001.
- AIHW National Hospital Morbidity Database.

References

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Sexually transmissible infections

The prevalence of sexually transmissible diseases in the population:

- Prevalence of syphilis, chlamydia and gonorrhoea in population
- Knowledge of HIV-related prevention practices
- Prevalence of HIV among adolescents

Prevalence of syphilis, chlamydia and gonorrhoea in population

Indicator

Percentage of the population of reproductive age (15–49 years) with a reported sexually transmissible infection

Background information

- Sexually transmissible infections (STIs) are defined as any infection characteristically transmitted by sexual contact (WHO 2000). If untreated, gonorrhoea and chlamydia may lead to infertility in both men and women and increased risk of pelvic inflammatory disease, ectopic pregnancy, spontaneous abortion, pre-term birth, perinatal death or infection of the newborn causing pneumonia or blindness (WHO 2000).
- Sexually transmissible infections are a major public health problem worldwide and contribute significantly to maternal and perinatal morbidity and mortality in developing and marginalised populations (Wasserheit 1989). They have been implicated as cofactors in the transmission of HIV and if untreated can increase the risk of HIV infection by a factor of 10 (Plummer et al. 1991; Cohen 1998; UNAIDS 1998).
- Diagnoses of STIs are notified to the National Notifiable Diseases Surveillance System (NNDSS) by medical practitioners, laboratories, hospitals or a combination of these, depending on reporting requirements in each State and Territory (Thomson et al. 1999). Chlamydia was only made notifiable in New South Wales in 1998 (NCHECR 2000).
- A study of Australian STI facilities found that the number of staff and services provided had increased since the last survey in 1983 and the complexity of medical conditions had broadened. There was still, however, a marked urban predominance of sexual health clinics (Marks, Tideman & Mindel 1996).

- The NHMRC has specified a number of STIs for surveillance in the NNDSS, including chlamydial infection, gonococcal infection and syphilis.

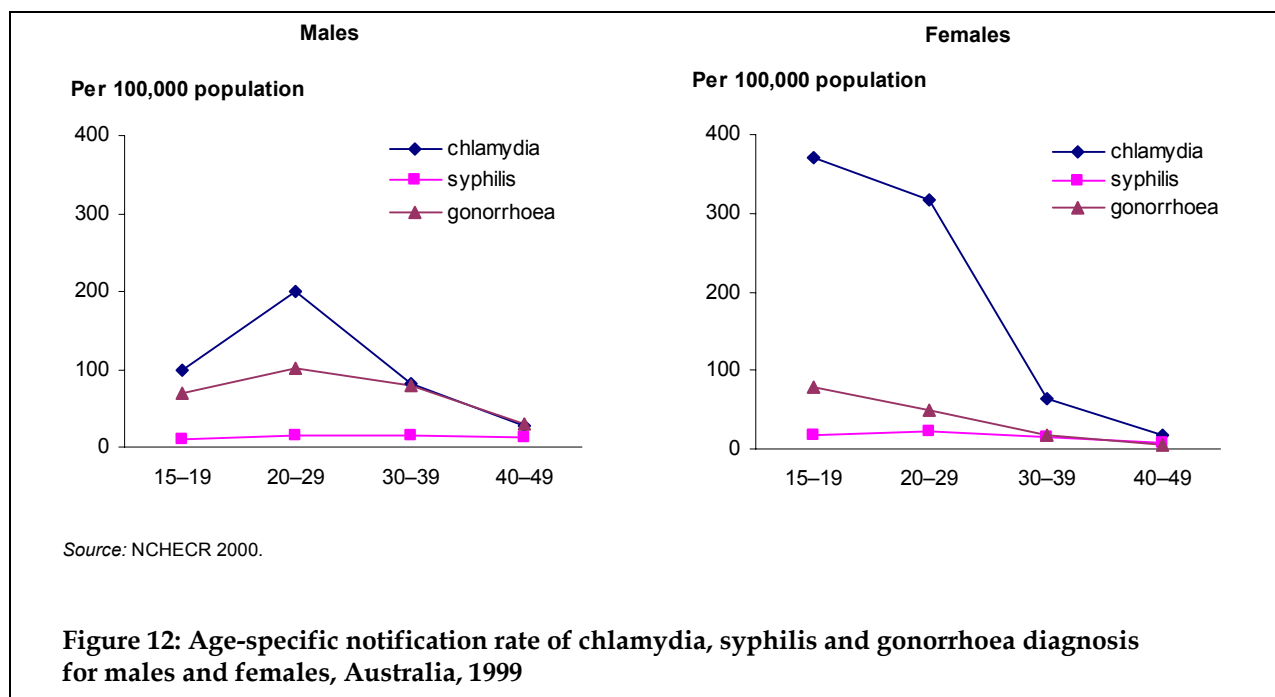
Current data

- Data are presented below for three treatable, non-viral STIs, which are primarily spread by sexual activity and are often asymptomatic in women—*Neisseria gonorrhoea*, *chlamydia trachomatis*, and *treponema pallidum*.
- The male:female ratios of notifications to the NNDSS in 1999 were 2:1 for gonorrhoea, 1.2:1 for syphilis and 0.6:1 for chlamydia. (NCHECR 2000).
- The highest rates of chlamydia (369.4 per 100,000) and gonorrhoea (79.1 per 100,000) were recorded for women aged 15–19 years. Chlamydia, syphilis and gonorrhoea were each most prevalent amongst males aged 20–29 years (199.5, 15.3 and 101.6 per 100,000 males aged 20–29 years, respectively) (Figure 12) (NCHECR 2000).
- In 1999, there were 13,644 notifications of chlamydia at a rate of 74.5 cases per 100,000 population, 33% higher than the rate of 53.7 per 100,000 population in 1993 (excluding New South Wales where chlamydia was only made notifiable in 1998) (NCHECR 2000).
- Over 95% of reported cases in 1999 were in the 15–49 years age groups with women having the majority of infection (NCHECR 2000). Young women aged less than 30 years were more likely to have chlamydial infection, whilst for males it peaked in the 20–29 year age group (Figure 12).
- Notifications of gonorrhoea have increased between 1995 and 1999, from 17.8 to 29.7 per 100,000 population (NCHECR 2000). However, these are well below the rate of 84.4 per 100,000 population in 1982 (Thomson et al. 2000)

- Syphilis rates have increased slightly over the last few years to 9.0 per 100,000 population with increases in the Northern Territory, Queensland and the Australian Capital Territory. Higher notification rates were reported in the Northern Territory and the Kimberley region of Western Australia (Thomson et al. 2000).
- The Australian Longitudinal Study on Women's Health found in 1997 that of women aged 18–22 years, 1.7% had a history of infection with chlamydia and 2.1% had

had other STIs diagnosed in the past (Research Institute for Gender and Health 1997).

- A study in Western Australia found chlamydia infection among 27% of a cohort of pregnant adolescents. The screening and treatment of chlamydia was associated with a significant decrease in the incidence of newborn febrile morbidity (Quinlivan, Petersen & Gurrin 1998).



Data limitations

- Different notification and screening procedures used in each State or Territory have resulted in inconsistency and inaccuracy of incidence and prevalence rates.
- Screening and reporting in rural and remote areas may be limited and are likely to be less complete.
- In 1998, notifications of chlamydial infection were the highest of all STIs and the third highest for all notifiable diseases. Part of the increase in diagnoses of chlamydia and gonorrhoea is attributable to the use of more sensitive diagnostic tests (NCECR 2000).

Indicator status

Adequate.

Data source

- National Notifiable Diseases Surveillance System and National Centre in HIV Epidemiology and Clinical Research.

References

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Knowledge of HIV-related prevention practices

Indicator

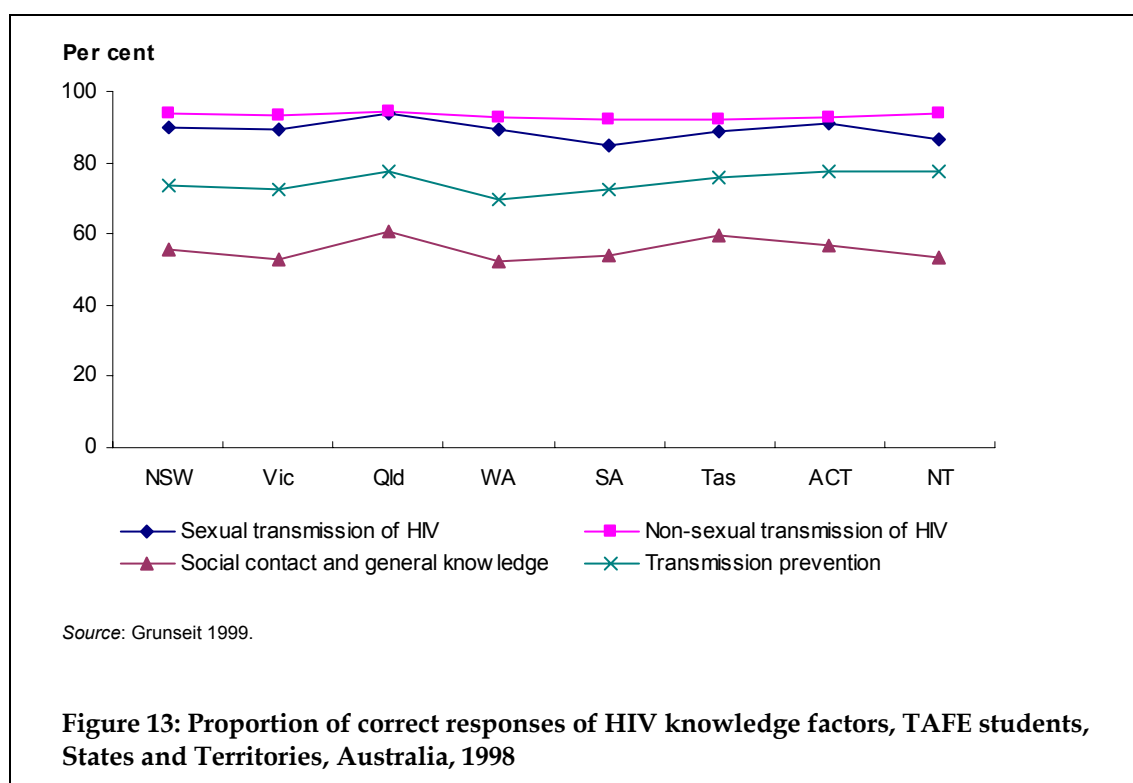
The percentage of all respondents who have accurate and appropriate knowledge about HIV transmission and prevention

Background information

- Knowledge about HIV is an important prerequisite in the promotion of safer sex behaviours and preventive actions in HIV transmission. Various studies since 1990 have found that between 70% and 95% of young people from English-speaking backgrounds are knowledgeable about HIV (Grunseit 1999).
- The National HIV/AIDS Strategy identified young people as a priority for education and prevention interventions. It nominated schools as the vehicle most likely to provide a comprehensive and effective means of educating for long-term change (Mitchell, Ollis & Watson 2000).
- Evidence suggests that HIV/sex education is most effective when given prior to commencement of sexual activity (Grunseit et al. 1997).
- The widespread change in HIV-related knowledge, attitudes and behaviour is in response to a variety of interventions. These include the introduction of HIV/AIDS education into high school curricula, mass media campaigns promoting the use of condoms, reducing individuals' willingness to deny risk and destigmatisation of HIV/AIDS by humanising representations of the epidemic (Smith et al. 1998).

Current data

- A study of over 4,000 TAFE apprentices in Australia found that students scored over 77% in their knowledge of sexual and other modes of HIV transmission. There were no significant differences in knowledge by gender, place of residence in States and Territories or rural versus urban students. Fewer than 60% of students displayed a general knowledge of the risk of transmission by social contact (Figure 13) (Grunseit 1999).
- Coital experience, year 10 education or higher, living with friends (rather than parents) and having HIV education at school were all associated with higher HIV knowledge scores. However, HIV knowledge was not significantly associated with condom use (Grunseit 1999).
- National surveys of year 10 and year 12 students conducted in 1992 and 1997 found high levels of HIV knowledge amongst students with scores of over 85%. In both surveys, year 12 students had significantly higher levels of knowledge than year 10 students (Rosenthal, Smith & Lindsay 1998).
- A study of 920 undergraduates from three Melbourne universities in 1996 found that over 75% of HIV-related knowledge questions were answered correctly, however females (77.4%) scored significantly better than males (75.1%) (Smith et al. 1998).
- A national survey of a sample of 2,583 homosexually active men conducted in 1992 found that men with an accurate knowledge about safety of sexual practices and HIV transmission were less likely to engage in unprotected sex with their casual partners than men with less accurate knowledge (Kippax et al. 1995).



Data limitations

- The data are limited to the population groups that have been surveyed and are not representative of the general population.
- There has been no sentinel surveillance of risk and behavioural factors associated with HIV transmission and prevention.

Indicator status

Incomplete.

Data sources

Periodic surveys – Grunseit 1999; Grunseit et al. 1997; Kippax et al. 1995; Rosenthal, Smith & Lindsay 1998.

References

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Prevalence of HIV among adolescents

Indicator

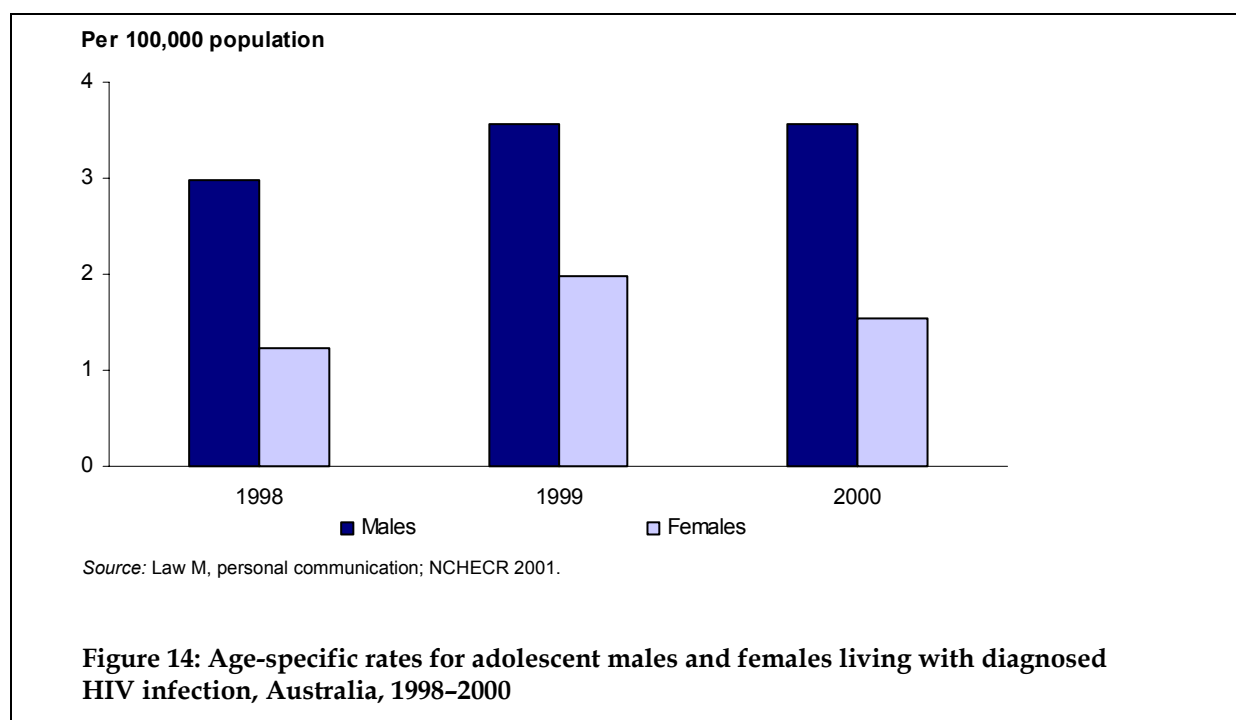
Prevalence of diagnosed HIV infection in adolescent males and females (aged 13–19 years) per 100,000 population

Background information

- Newly diagnosed HIV infection is a notifiable condition in all States and Territory health jurisdictions in Australia. Cases of diagnosed HIV infection are notified through all State and Territory health authorities to the National HIV surveillance centre on the first occasion of diagnosis in Australia (McDonald et al. 1994).
- Sentinel surveillance of HIV infection is also conducted based on a network of metropolitan sexual health clinics in Australia. At the end of each quarter and annually, tabulations are provided of the number of people seen, the number tested for HIV antibody and the number newly diagnosed with HIV infection by age and sex (NCHECR 2000).
- There is considerable evidence suggesting that young people are well informed about HIV/AIDS (Rosenthal et al. 1998). Knowledge about HIV is an important prerequisite for ensuring increased safer sex behaviours and preventive actions in HIV transmission.

Current data

- The prevalence of diagnosed HIV infection among adolescent females was 1.54 per 100,000 females aged 13–19 years in 2000. The prevalence for males was more than double at 3.57 per 100,000 males aged 13–19 years. Both measures remained relatively constant over a three-year period between 1998 and 2000 (Figure 14) (Law M, personal communication; NCHECR 2001).
- A total of 49 males and 25 females aged 13–19 years were living with diagnosed HIV infection during 1998 and 2000 (Law M, personal communication; NCHECR 2001).
- The major sources of HIV infection in adolescent males were homosexual contact (27%) and haemophilia (29%). In females the major source of exposure was heterosexual contact (60%) (Law M, personal communication; NCHECR 2001).
- In 1997, teenagers comprised 2.1% of the total population with HIV infection (Rosenthal, Smith & Lindsay 1998).
- During 1994 and 2000, 2,945 males (66.5%) and 5,883 females (57.9%) who visited one of the metropolitan sexual health clinics (described above) were tested for HIV antibodies. Three male and three female adolescents tested positive for HIV antibodies. The overall prevalence rate for males and females was 0.1% and 0.05%, respectively (NCHECR 2000).



Data limitations

The numbers of adolescent males and females living with undiagnosed HIV infection during the time periods considered is unknown. However, it is estimated that of all people living with HIV infection in Australia, at least 80% have been diagnosed with HIV infection (NCHECR 2000).

Indicator status

Adequate. Australia is a low prevalence country for HIV infection.

Data source

National Centre for HIV Epidemiology and Clinical Research.

References

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Family planning

The use of methods to regulate fertility through contraception and induced terminations:

- Prevalence of contraceptive use
- Vasectomy rate
- Tubal occlusion rate
- Hysterectomy rate
- Annual number of induced abortions

Prevalence of contraceptive use

Indicator

Percentage of women of reproductive age (15–49 years and at risk of pregnancy) who are using (or whose partner is using) a contraceptive method at a particular point in time

Background information

- Contraception is a means of avoiding pregnancy despite sexual activity. There are two main types of contraceptive methods—barrier and non-barrier. Barrier methods provide a physical barrier which prevents the sperm reaching the cervix and include condoms, female condoms, cervical caps, diaphragms and sterilisation. Non-barrier methods include hormonal (oral, injectable and implant) contraceptives, intrauterine devices (IUDs), spermicides and natural family planning methods. The level of contraceptive protection varies by method and user compliance.
- At an international level, research continues into developing new and existing contraceptives, including emergency contraception, injectable hormonal preparations for use by women and by men, immunocontraceptives, and non-surgical methods of pregnancy termination (WHO 1999)
- Family Planning Australia (FPA) reports that the three most commonly sought contraceptive services at their clinics include the combined oral pill (pill), the emergency pill and Depo-Provera (FPA 2000). FPA does not capture information on the provision and sale of condoms, since they are sold over the counter.

Current data

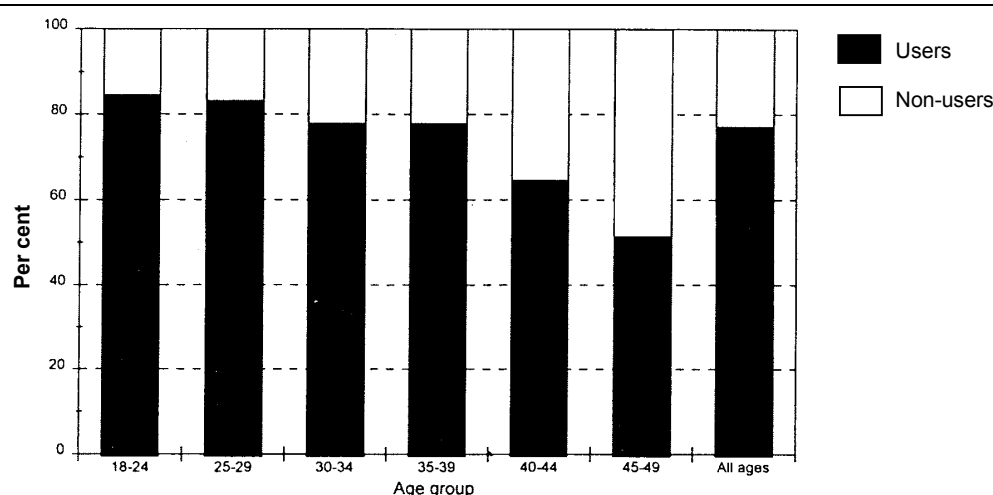
- Results from the 1995 National Health Survey showed that more than 44% of all women aged 18–49 years reported current use of a method of contraception. Among users, the two most commonly reported

methods were the oral contraceptive pill (60%) and condom (27%). Sterilisation of the woman/partner was the most frequently reported reason for non-use of contraception in women aged over 35 years; while among younger women the most frequently reported reasons were pregnancy, trying to get pregnant and not being sexually active (Yusuf & Siedlecky 1999).

- Contraceptive use was highest among women aged 18–24 years and gradually declined with increasing age (Figure 15). Of those using contraceptives, 60.3% of women were using the pill, 26.6% were using condoms, 4.6% were using natural methods, 4.5% were using IUDs and 4.0% were using other methods (Table 4).
- Data from a 1997 national survey of 3,550 Australian secondary school students were used to examine teenagers' choice of contraception. All 961 currently sexually active students reported using at least one contraceptive method, primarily condoms (78%) or the pill (45%). Some 31% of students reported exclusive condom use and 10% exclusive use of the pill (Lindsay, Smith & Rosenthal 1999).
- The 1996 Women's Longitudinal study asked 18–23 year olds and 45–50 year olds about their use of contraceptives. Among the younger women, 68% were using some form of contraception (Bryson, Strazzari & Brown 1999).

Data limitations

The 1995 National Health Survey is a population-based survey, which was distributed to a multistage stratified cluster sample of around 23,800 households. About half of the adult female respondents, aged 18–49 years, were asked to complete and return a supplementary questionnaire on women's health exploring contraceptive use. There was no information collected on uptake of contraception in young teenagers (less than 18 years).



Source: National Health Survey, 1995 in Yusuf & Siedlecky 1999.

Note: Excludes women not in need of contraception (e.g. one partner sterilised, those attempting pregnancy or not currently sexually active).

Figure 15: Contraceptive use by women at risk, Australia, 1995

Table 4: Estimated age distribution of women reporting contraceptive use, and the reason for non-use of contraception, Australia: National Health Survey, 1995

Age in years	18-24	25-29	30-34	35-39	40-44	45-49	18-49
% reporting contraceptive use	61.1	60.4	49.1	40.1	27.7	16.4	44.2
<i>Reasons for nonuse:</i>							
hysterectomy/ tubal ligation	0.4	2.3	7.0	15.5	25.9	33.6	12.8
partner vasectomized	0.1	1.8	9.2	16.1	18.1	17.4	9.7
pregnant or trying to get pregnant	4.1	11.4	10.9	5.5	2.5	0.6	5.9
no partner/ not sexually active	22.3	10.0	8.8	9.2	7.9	10.8	12.2
not in need*	1.0	2.1	1.2	2.2	2.8	5.8	2.4
other reasons**	1.8	3.3	3.3	2.4	2.7	1.4	2.4
not stated	9.1	8.6	10.4	9.0	12.1	14.0	10.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Estimated number of women (in 1,000's)</i>	895.6	663.9	694.2	665.2	624.3	582.7	4,125.9

Source: National Health Survey, 1995 in Yusuf & Siedlecky 1999;

* = includes reported infertility, menopause and don't need contraception;

** = includes breastfeeding, don't like and other medical reasons.

Indicator status

Incomplete. There are very limited population-based data on the prevalence of contraceptive use in Australia. There is no routine national data collection on contraceptive use.

Data source

1995 National Health Survey (Yusuf & Siedlecky 1999).

References

- Bryson L, Strazzari S & Brown W 1999. Shaping the life course: women, control and contraception. *Family Matters* 53: 31-38.
- Family Planning Australia (FPA) 2000. Annual report 1999-2000. Canberra: FPA.
- Lindsay J, Smith AM & Rosenthal DA 1999. Conflicting advice? Australian adolescents' use of condoms or the pill. *Family Planning Perspectives* 31(4): 190-194.
- World Health Organization (WHO) Department of Reproductive Health and Research 1999. Annual technical report, 1999. WHO: Geneva.
- Yusuf F & Siedlecky S 1999. Contraceptive use in Australia: evidence from the 1995 National Health Survey. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 39(1): 58-62.

Vasectomy rate

Indicator definition

Rate of vasectomies per 1,000 male population (aged 15–64) per year

Background information

- A vasectomy involves surgical sterilisation of males via cutting or blocking both vasa deferentia. Vasotomy refers to the surgical incision of the vas deferens.
- Analysis of the 1995 National Health Survey by family income found that for women aged 35–50 years, the percentage of partners sterilised increased with increasing income (Amir & Donath 2000).

Current data

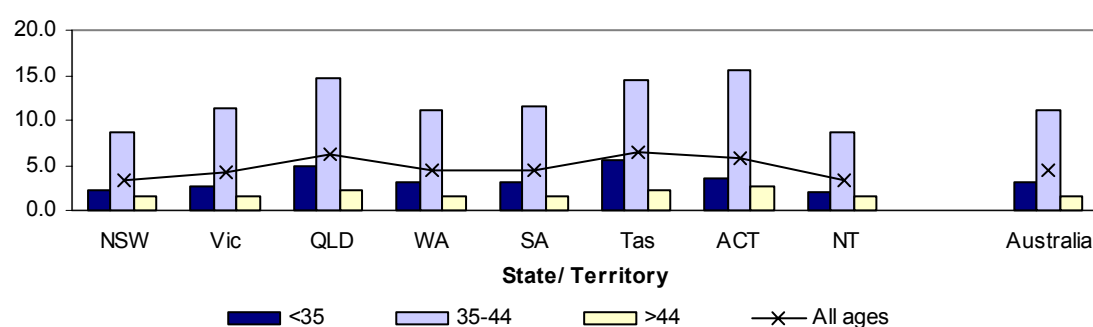
- The number of vasectomies or vasotomies (Item number 37622, 37623) claimed through the Medicare Benefits Scheme has declined by 5.2% since 1999. In 1998 there were 28,066 claims for services compared with 28,495 in 1999 and 26,603 in 2000 (HIC 2000).
- The highest vasectomy rate (in free-standing clinics and on private patients in public and private hospitals) was recorded in Tasmania (6.4 per 1,000 male population) with the lowest in the Northern Territory (3.4) (Figure 16).
- The highest vasectomy rate occurred among 35–44 year olds (10.9 per 1,000 male population in HIC data, 5.5 per 1,000 male population in AIHW National Hospital Morbidity data) (Table 5).
- Thirty per cent of all vasectomies/vasotomies performed in Australia in 1999, as identified in health insurance data, were performed on males aged 35–44 years in New South Wales and Victoria.

- *Australian Hospital Statistics 1997–98* (AIHW 1999) reported 'vasectomy and ligation of vas deferens' as one of the 30 principal procedures for male hospital separations with 13,280 recorded during the period July 1997–June 1998 in public and private hospitals in Australia. Fifty-eight per cent of these vasectomy-related separations occurred among men aged 35–44 years.
- The AIHW National Hospital Morbidity Database also recorded a decline of 9.6% in the number of hospital separations for male sterilisation between July 1996 and June 1999, from 15,698 to 14,187 separations. This represented a decline of 0.4 in the rate of hospital sterilisation per 1,000 male population over this period from 2.7 per 1,000 male population in 1996–97 to 2.3 in 1998–99.

Data limitations

- Health Insurance Commission data do not differentiate between vasectomies and vasotomies.
- Health Insurance Commission data only include services claimed from MBS. Services provided by hospital doctors to public patients in public hospitals or services that qualify for a benefit under the Department of Veterans' Affairs National Treatment Account are not included.
- Vasectomies performed in Family Planning Australia clinics are not captured in the HIC data.
- National Hospital Morbidity data do not include vasectomies performed in free-standing clinics where many are likely to be performed.

Rate per 1,000 male population



Note: Rates were calculated using population estimates for 1999.

Source: HIC 2000.

Figure 16: Age-specific rate of vasectomies, free-standing clinics and private patients in public and private hospitals, Australia, January 1999–December 1999

Table 5: Vasectomy rates by age group, public and private hospitals (National Hospital Morbidity Database) compared with free-standing clinics and private patients in public and private hospitals (Health Insurance Commission), Australia, July 1998–June 1999

	15–24*	25–34	35–44	45–54	55–64	Australia
Health Insurance Commission						
Number of services	153	8,441	15,987	3,144	274	27,999
Rate per 1,000 male population	0.1	5.8	10.9	2.5	0.3	4.4
Hospital Morbidity Database						
Number of separations	97	4,118	8,032	1,716	138	14,101
Rate per 1,000 male population	0.1	2.8	5.5	1.3	0.2	2.2

* AIHW National Hospital Morbidity Data only include males aged 20–24, not 15–24.

Sources: AIHW National Hospital Morbidity Database; HIC 2000.

Indicator status

Incomplete. Population-based data on the number of vasectomies are not currently available. Data from the National Hospital Morbidity Database (covering public and private hospitals) and the Health Insurance Commission (covering free-standing clinics, private hospitals and private patients in public hospitals) provide proxy rates of vasectomy in Australia. However, an overall rate of vasectomies using a combination of these data sets cannot be calculated due to the inclusion of private patients in both data sets. Furthermore, without the inclusion of vasectomies performed in FPA clinics, the national rate will be understated.

Data sources

- Health Insurance Commission Medicare Benefits Schedule statistics (HIC 2000).
- AIHW National Hospital Morbidity Database.

References

- Amir LH & Donath SM 2000. Rate of vasectomy rises with increasing income. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 40(1): 92.
- Australian Institute of Health and Welfare (AIHW) 1999. *Australian hospital statistics 1997–98*. Canberra: AIHW (Health Services Series).
- Health Insurance Commission (HIC) 2000. *Medicare Benefits Schedule item reports* accessible at HIC online: www.hic.gov.au/statistics.

Tubal occlusion rate

Indicator

Rate of tubal occlusions per 1,000 women aged 25–49 years per year

Background information

- Tubal occlusion is an effective form of female sterilisation. It is a surgical procedure that involves ligation or cauterisation (closure) of the fallopian tubes to prevent a fertilised egg from reaching the uterus. It may involve ligation and resection, or application of rings or clips to the fallopian tubes, or electrocoagulation of a segment of the fallopian tubes. Salpingectomy, involving the surgical removal of the fallopian tubes, or salpingo-oophorectomy, involving excision of the fallopian tube and ovaries, are other methods of sterilisation that may be performed. The procedure, if carried out laparoscopically or by laparotomy³, is associated with low rates of morbidity.
- A large case-control study conducted in eastern Australia between 1990 and 1993, that included 824 women aged 18–79 years diagnosed with epithelial ovarian cancer and 855 randomly selected controls, found tubal sterilisation was associated with a 39% reduction in risk of ovarian cancer (Green et al. 1997).
- There are conflicting findings over whether tubal occlusion is a predictor or a risk factor for hysterectomy (Taffe et al. 2000; Treloar et al. 1999).

Current data

- For the three-year period from July 1996 to June 1999 the AIHW National Hospital Morbidity Database shows (among women aged 25–49 years) there were 22,028 hospital separations in 1996–1997 (financial year) with any diagnosis of female sterilisation. This declined to 20,863 in 1997–1998 and to 20,492 in 1998–1999, representing a 7.0% fall in the number of procedures over the period. Seventy-one per cent of these

separations involved a principal diagnosis of female sterilisation.

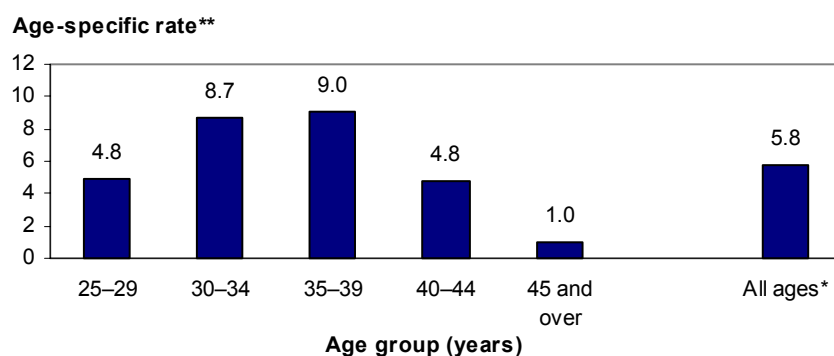
- The age-specific rates of hospital separation for female sterilisation were highest among 35–39 year olds (9.0 per 1,000 female population) and 30–34 year olds (8.0 per 1,000 female population) (Figure 17).
- The number of claims related to tubal occlusions⁴ presented to the Health Insurance Commission over the period 1998–2000 declined by 24.3% from 8,185 in 1998, to 6,464 in 1999 and 6,200 in 2000. There were another 870 sterilisations performed at the time of caesarean section recorded in the Health Insurance Commission data in 2000.
- Sixty-five per cent of tubal occlusions were performed on women aged 35 years and over (Figure 18).
- The Australian Longitudinal Study on Women's Health survey of 12,146 women aged 47–52 years found over 37% of women had had a tubal occlusion performed. The highest rates were among women from remote areas (41.1%) while the lowest were among women from capital cities and other metropolitan areas (34.2%) (Research Institute for Gender and Health 1999).

Data limitations

- The lack of a dedicated code for tubal occlusion in ICD-10-AM inhibits the reporting of tubal occlusions performed in public and private hospitals in Australia. However there is a less specific code for female sterilisation.
- With a code for sterilisation by transection or resection of the fallopian tubes, Health Insurance Commission data are more specific, however, these data only include services claimed from the Medicare Benefits Schedule. Services to public patients in public hospitals are not included.

³ See glossary.

⁴ Sterilisation by transection or resection of fallopian tubes, via abdominal or vaginal routes or via laparoscopy using diathermy or any other method (item no: 35687G, 35687S).

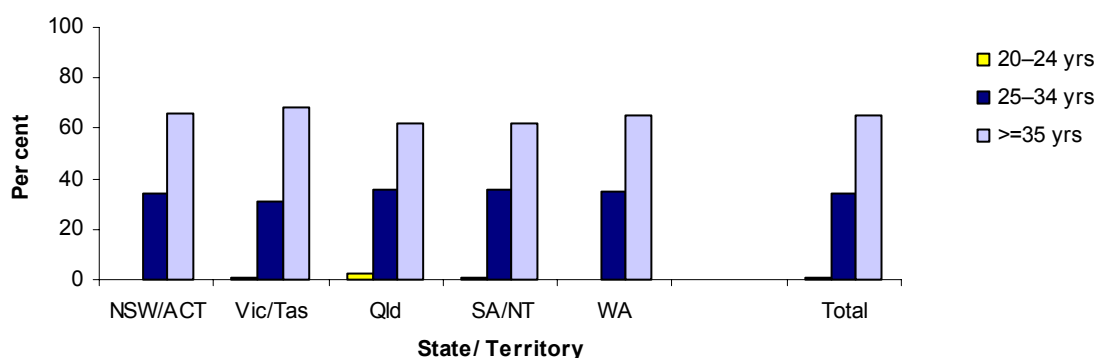


* All ages 25-49

** Age-specific rate calculated per 1,000 female population.

Source: AIHW National Hospital Morbidity Database.

Figure 17: Age-specific rate of female hospital separations involving sterilisation, public and private hospitals, Australia, 1999



Source: HIC 2000.

Figure 18: Tubal occlusions performed in free-standing clinics and on private patients in public and private hospitals, by State/Territory and age group, Australia, 1998-2000

Indicator status

Incomplete.

Data sources

- AIHW National Hospital Morbidity Database.
- Health Insurance Commission Medical Benefits scheme data (HIC 2000).

References

- Green A, Purdie D, Bain C, Siskind V, Russell P, Quinn M, Ward B & Survey of Women's Health Study Group 1997. Tubal sterilisation, hysterectomy and decreased risk of ovarian cancer. *International Journal of Cancer* 71: 948-951.

- Health Insurance Commission 2000. Medicare Benefits Schedule item reports accessible at HIC online: www.hic.gov.au/statistics
- Research Institute for Gender and Health, University of Newcastle 1999. Data book for the 1998 follow-up survey of the mid-age cohort (47-52 years). Australian Longitudinal Study on Women's Health. Newcastle: Women's Health Australia.
- Taffe J, Green A, Dudley E & Dennerstein L 2000. Tubal occlusion, hysterectomy and D and C: evidence from the Melbourne Women's Midlife Health Project. *Gynaecol Obstet Invest* 50: 117-122.
- Treloar S, Kim-Anh D, O'Connor V, O'Connor D, Yeo M & Martin N 1999. Predictors of hysterectomy: an Australian study. *American Journal of Obstetrics and Gynaecology* 180(4): 945-954.

Hysterectomy rate

Indicator

Rate of hysterectomies performed on women aged 15–69 years per year

Background information

- Hysterectomy, whereby the uterus is partially or completely removed, is one of the most common gynaecological surgical procedures performed. In Australia, just over one in ten women will undergo a hysterectomy by the age of 40 years, and around one in five women will undergo a hysterectomy before the age of 50 years (Graham et al. 2001).
- Hysterectomies are usually performed to treat pathological conditions, not as a sterilisation procedure.
- Findings from the Australian Longitudinal Study on Women's Health estimated a hysterectomy prevalence rate of 22% among women aged 45–49 years (Byles, Mishra & Schofield 2000).
- The same study found that women in remote areas were 25% more likely to have had a hysterectomy than women in urban areas, even after adjustment for differences in education level, parity and other health care factors (Byles & Mishra 1998).

Current data

- *Australian Hospital Statistics 1997–98* reported total abdominal hysterectomy to be one of the 30 principal procedures among female separations from hospitals, with 17,174 procedures being performed between July 1997 and June 1998 (AIHW 1999).
- The overall hysterectomy separation rate among public and private hospitals in the financial year 1998–1999 was 4.2 per 1,000 females aged 10–69 years (Figure 19). There were 2.4 abdominal hysterectomies and 1.8 vaginal hysterectomies per 1,000 females aged 10–69 years.

- The age-specific hysterectomy separation rate among public and private hospitals peaked among women aged 45–49 years (10.7 per 1,000 females) (Figure 19).
- South Australia recorded the highest overall hysterectomy separation rate (5.1), with Northern Territory recording the lowest (1.7 per 1,000 females aged 10–69 years) (Figure 20).
- Health Insurance Commission data recorded a decline of 12.9% in claims for hysterectomy services⁵ from 16,611 in 1996–1997, to 14,466 in 1998–1999 (HIC 2000) representing a decrease in hysterectomy claims from 2.3 per 1,000 women aged 10–69 years to 2.0 per 1,000 women. The AIHW National Hospital Morbidity Database also recorded a decrease in separations involving hysterectomy from 32,604 in 1996–1997 to 30,556 in 1998–1999 representing a decline in the rate of hysterectomy of 0.4 per 1,000 women.

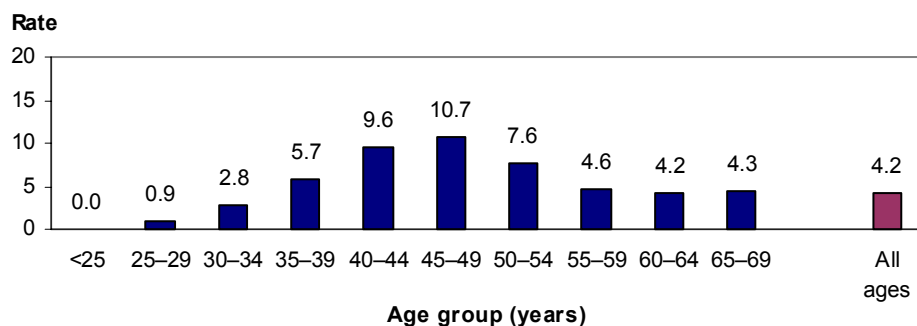
Data limitations

- Health Insurance Commission data only include services claimed from the MBS. Services to public patients in public hospitals are not included.
- Coding of hysterectomies in ICD-10-AM is much more specific than ICD-9-CM and should allow more detailed study of hysterectomies in the future using the AIHW National Hospital Morbidity Database.
- State-specific hospital separation rates are not controlled for differences in populations such as age distribution, access to services, education, parity and geographic factors that may all impact upon the rates.

Indicator status

Adequate. Using the AIHW National Hospital Morbidity database it is possible to calculate hysterectomy rates. Since hysterectomy is a single episode diagnosis, it could be assumed that separations are a proxy for individuals.

⁵ Includes Medicare item numbers 35653, 35657, 35661, 35664, 35667, 35670 and 35673.

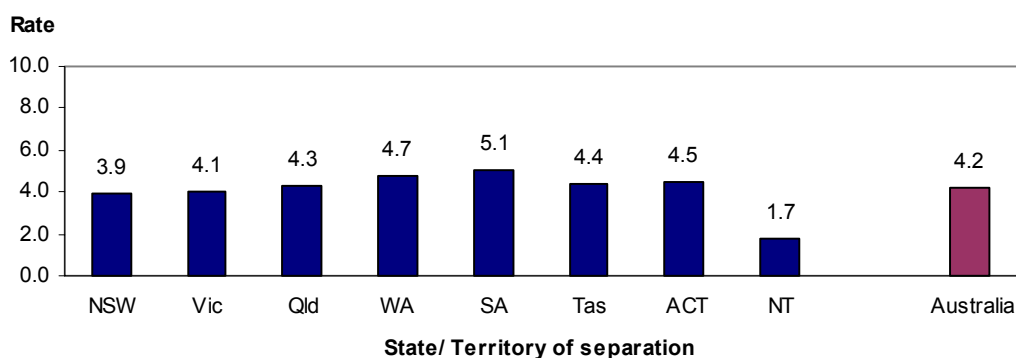


Notes: Rate calculated per 1,000 female population, using 1999 population estimates.

Includes women aged 10–69 years

Source: AIHW National Hospital Morbidity Database.

Figure 19: Age-specific hysterectomy separation rate, public and private hospitals, Australia, July 1998–June 1999



Notes: Rate calculated per 1,000 female population, using 1999 preliminary population estimates.

Includes women aged 10–69 years.

Source: AIHW National Hospital Morbidity Database.

Figure 20: Hysterectomy separation rate, public and private hospitals by State and Territory of separation, Australia, July 1998–June 1999

Data sources

- AIHW National Hospital Morbidity Database.
- Medicare Benefits Scheme (HIC 2000).

References

- Australian Institute of Health and Welfare (AIHW) 1999. Australian hospital statistics 1997–1998. AIHW cat. no. HSE 6. Canberra: AIHW (Health Services Series).
- Byles J & Mishra G 1998. Gynaecological procedures among women in urban, rural and remote areas of Australia: a view from the Australian Longitudinal Study on Women's Health. Royal Women's

Hospital 60-Year Anniversary Conference (presentation). Brisbane.

- Byles JE, Mishra G & Schofield M 2000. Factors associated with hysterectomy among women in Australia. *Health and Place: An International Journal* 2000; 6:301–308.
- Graham M, Keleher H, James E & Byles J 2001. Factors influencing women's decision-making about hysterectomy. *Women's Health Politics, Action and Renewal: 4th Australian Women's Health Conference*.
- Health Insurance Commission 2000. Medicare Benefits Schedule item reports accessible at HIC online: www.hic.gov.au/statistics.

Number of induced abortions

Indicator

Annual number of induced abortions⁶ among women aged 15–44 years

Background information

- Induced abortion involves the termination of pregnancy by medical or surgical means. This is usually done before the time of fetal viability (20–22 weeks) but some induced abortions are carried out later where indicated, such as for severe congenital malformations.
- Induced abortions are subject to different legal requirements and interpretations in the different States and Territories of Australia, and there are variations in the extent to which statistics are collected. Legislation in South Australia and Western Australia requires notification of all induced abortions.
- Routine collection of data about induced abortions in other States and Territories is difficult. In most States and Territories induced abortions are usually carried out in free-standing clinics; and not all clinics participate in hospital morbidity data collection. Almost all induced abortions performed in South Australia and all lawful induced abortions in the Northern Territory are carried out in hospitals and are recorded in hospital morbidity data collections.
- Data from the Health Insurance Commission on claims under Medicare related to abortion and data from the National Hospital Morbidity data collection do not give clear information on induced abortion. In principle, an induced abortion should be included in the HIC data collection if the procedure was carried out in a private setting and claimed through Medicare, and in the National Hospital Morbidity data collection if carried out on a public hospital patient. But detailed analysis is required to match the Medicare item numbers and ICD-10-AM diagnosis and

procedure codes to allow a reliable estimate from these two data sets. The use of either of these two data sets in isolation will give a misleading picture.

- Earlier studies have highlighted the data pitfalls. A 1990 study of terminations in New South Wales showed that approximately 21% of all terminations were performed in hospitals, of which 10% were performed in public hospitals (Adelson, Frommer & Weisberg 1996). The authors also found that in 1992, terminations of pregnancy performed in private clinics in New South Wales, as recorded by Health Insurance Commission claims, were under-reported by at least 15% (Adelson, Frommer & Weisberg 1995). These proportions may have changed in the last 10 years.

Current data

- The State-based collection in South Australia recorded 5,660 induced abortions in 1999 with an abortion rate of 17.8 per 1,000 women aged 15–44 years. The highest abortion rate was 33.7 per 1,000 women aged 20–24 years (SAACR 2000). Induced abortions occurred in almost 1 in 4 (23.4%) pregnancies (births plus induced abortions). A total of 118 induced abortions were performed for suspected or identified abnormalities, of which 105 were for identified fetal or chromosomal abnormalities (Chan et al. 1999).
- The Territory-based notification system in the Northern Territory recorded 997 induced abortions performed in 1998, with an overall abortion rate of 20.5 per 1,000 women aged 15–44 years. The highest abortion rate was 38.4 per 1,000 women aged 20–24 years. Induced abortions occurred in almost 1 in 5 (21.7%) of all reported pregnancies in 1998 (unpublished data, Epidemiology Branch, Territory Health Services, Darwin 2001).
- The State-based notification system in Western Australia recorded 8,324 induced abortions in 2000. The abortion

⁶ Often referred to as 'terminations of pregnancy'.

rate was 19.6 per 1,000 women aged 15–44 years. The highest abortion rate was 31.3 per 1,000 women aged 20–29 years (personal communication, Executive Director of Public Health, Western Australia).

- The Australian Capital Territory *Health Regulation (Maternal Health Information) Act 1998* requires quarterly reporting of abortions from approved facilities. The Territory-based notification system recorded 1,447 induced abortions for the period 1 July 2000 to 30 June 2001, with an overall abortion rate of 18.8 per 1,000 women aged 15–44 years (*Health Regulation (Maternal Health Information) Act 1998*, 4th Quarter Report 2001).
- Data from the Australian Women's Health baseline survey in 1997 showed that 6.8% of 18–23 year old women and 19.8% of women aged 45–50 years had had at least one induced abortion performed (Research Institute for Gender and Health 1997).

Data limitations

- There are no comprehensive and reliable national data on induced abortions. Notification of induced abortions is not required in the three most populous States: New South Wales, Victoria and Queensland. Only South Australia, Western Australia, the Australian Capital Territory and the Northern Territory require notification of induced abortion.
- The rate of induced abortions in the Australian Capital Territory was calculated using the Australian Capital Territory resident population, however clients for these services may include residents of the broader Australian Capital Region.
- Procedures for induced abortion are carried out in free-standing clinics or, public or private hospitals. The principal type of facility for performance of induced abortions varies by State and Territory. HIC data do not provide accurate or comprehensive rates for all States and Territories since HIC data do not include public patients treated in public hospitals. Similarly, the hospital morbidity data collection does not cover the field.

Indicator status

Incomplete. There is no comprehensive and standardised collection across all States and Territories of the number of induced abortions performed annually.

Data sources

- South Australia, Western Australia and Northern Territory perinatal data collection units (South Australian Abortion Committee Report 2000; Executive Director of Public Health, Western Australia, personal communication 2001; unpublished data, Epidemiology Branch, Territory Health Services, 2001; *Health Regulation (Maternal Health Information) Act 1998* 4th Quarter Report 2000–2001).

References

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Pregnancy and childbirth

The degree of safe and healthy motherhood, including antenatal factors, pregnancy, childbirth and maternal, fetal and infant outcomes:

Prenatal/ antenatal factors

- Prevalence of anaemia in pregnant women
- Periconceptional use of folate
- Prevalence of positive syphilis serology in pregnant women
- Prevalence of HIV among pregnant women
- Prevalence of smoking in pregnancy
- Alcohol use in pregnancy
- Illicit drug use in pregnancy
- Prenatal diagnostic testing
- Percentage of women attending antenatal care

Pregnancy and assisted conception

- Pregnancy rates and outcomes after assisted conception
- Multiple pregnancy rate

Childbirth

- Percentage of all labours which were induced or augmented
- Proportion of institutional deliveries
- Caesarean birth rate
- Proportion of vaginal births after caesarean section
- Rate of instrumental vaginal deliveries
- Percentage of births attended by skilled health personnel
- Number of obstetric service providers by rural/remote classification

Maternal outcomes

- Maternal morbidity rate
- Maternal mortality ratio
- Ectopic pregnancy rate

Fetal and infant outcomes

- Perinatal mortality rate
- Infant mortality rate
- Incidence of low birthweight births
- Sex ratio of births

Prevalence of anaemia in pregnant women

Indicator

Percentage of women diagnosed with anaemia during pregnancy

Background information

- Anaemia is a condition in which the blood is deficient in red blood cells, haemoglobin or total volume. The most common cause of anaemia is iron deficiency. Iron deficiency occurs when an insufficient amount of iron is absorbed to meet the body's requirements. Women of reproductive age, especially pregnant women, are at risk.
- Iron deficiency anaemia during the first two trimesters of pregnancy is associated with a two-fold risk of pre-term delivery and three-fold increased risk of delivering a low birthweight baby (CDC 1998).
- Evidence from a study of randomised controlled trials revealed that iron supplementation in pregnancy appears to prevent iron deficiency at birth. However, the effects on maternal and fetal outcomes were inconclusive (Mahomed 2001).
- Groups at higher risk for iron deficiency include vegetarians, multiparous women, those with multiple pregnancies, women with a past history of iron deficiency, blood donors, women of poor socioeconomic status, immigrants and adolescents (Fleming, Martin & Stenhouse 1984).
- WHO recommends that the haemoglobin concentration should not fall below 11.0 g/dL at any time during pregnancy.
- RANZCOG guidelines recommend that haemoglobin levels be assessed at the first antenatal visit and then retested at 28 weeks gestation. Anaemia is indicated when haemoglobin levels are less than 10.5 gm or if other risk factors of iron deficiency are present (RANZCOG 2000).

Current data

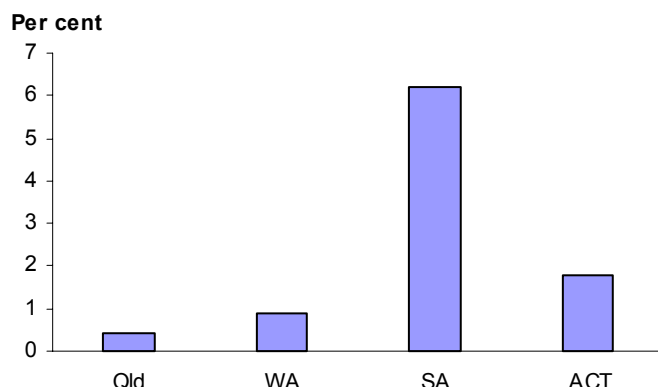
- Anaemia was present in 6.6% of 18,421 mothers who gave birth in South Australia in 1998. However, gestational date of testing was not noted (Figure 21) (Chan et al. 1999).
- Of mothers who gave birth in 1998, 0.4% in Queensland, 0.9% in Western Australian and 2.3% in the Australian Capital Territory were reported as anaemic during pregnancy (Figure 21) (Queensland Health 2000; Gee & O'Neill 2000; and Bourne 2001, respectively).
- One of the explanations for the reported higher rate of anaemia amongst pregnant women in South Australia may be that anaemia is specified as a category in the maternal medical conditions on the midwives data collection form in South Australia. However, it is not included amongst the maternal medical conditions on the forms in the other States and Territories where it is reported.
- The 1995 National Nutrition Survey of Australian Women reported that pregnant women consumed, in the previous 24 hours, on average, 44% less iron than the recommended daily intake (ABS 2000).

Data limitations

- There is no current national data definition of anaemia in pregnancy, hence, no standardised data item to collect information on anaemia. There is no national surveillance of anaemia in pregnancy or uniform collection of information on anaemia in pregnancy by the States and Territories. Some States and Territories ask a specific question on anaemia while others incorporate this information as 'other complications of pregnancy' or 'medical conditions of mother' in their perinatal data collection. The current data on anaemia do not specify the gestational age of testing, which limits its usefulness.

- There needs to be consideration of development of an antenatal care data element for the *National Health Data*

Dictionary and the inclusion of anaemia in pregnancy as an explicit data category.



Note: No data available from New South Wales, Victoria, Tasmania and the Northern Territory.
Source: Bourne 2000; Chan et al. 1999; Gee et al. 2000; Queensland Health 2000.

Figure 21: Presence of anaemia in pregnancy, selected States and Territories, 1998

Indicator status

Incomplete. Data are not collected nationally or on a state-wide basis in some States and Territories.

Data source

Reports based on each State and Territory perinatal data collection published by State and Territory health authorities.

References

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Periconceptional use of folate

Indicator

Percentage of women taking folic acid supplementation for at least one month before and in the first three months of pregnancy

Background information

- Neural tube defects (NTDs), which include spina bifida, anencephaly and encephaloceles are serious malformation that occur during the first 17–30 days after conception. These congenital malformations may result in fetal death, termination of pregnancy and death or disability among liveborn infants (Hurst, Shafir & Lancaster 2001).
- Evidence from the Cochrane Review of international randomised controlled trials shows that periconceptional folate supplementation – before pregnancy and in the first two months of pregnancy – has a strong protective effect against neural tube defects (Lumley et al. 1999; Lumley et al. 2001).
- Consumption of at least 0.4 mg of folic acid prior to and during early pregnancy can reduce NTDs by 50–70% (CDC 2001).
- The National Health & Medical Research Council (NHMRC) recommends that women planning pregnancy should supplement their diet with 0.5 mg (500 µg) of folic acid daily, starting from one month before conception and continuing for the first 12 weeks of pregnancy. Women at increased risk of NTDs should supplement their diet with 5 mg of folic acid daily (NHMRC 1993).
- Fortification of food with folate provides an extra source of folate to women who have an unplanned pregnancy. The NHMRC recommends mandatory fortification of flour (including breads and savoury

biscuits) and voluntary fortification of breakfast cereals, rice, pasta, yeast extracts and fruit and vegetable juices to 50% of the recommended dietary intake (RDI) for folate (NHMRC 1995).

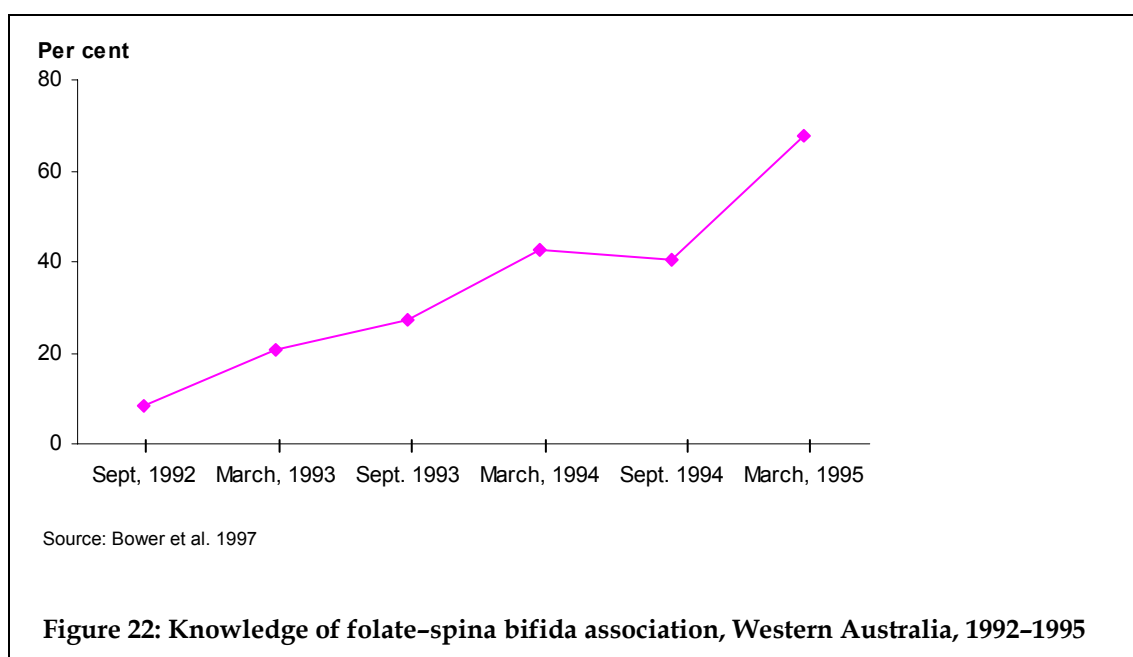
- Only 12.4% and 25.0% of women interviewed prior to two intervention studies in Victoria and South Australia, respectively, were aware that folate could prevent NTDs (Watson et al. 1999; Chan et al. 2001).
- These studies showed that folate awareness among women of childbearing age could be improved (4.0%) by printed educational material. Strategies for effective health promotion campaigns were also suggested.

Current data

- The evaluation of a population-based health promotion campaign conducted in South Australia between 1994 and 1995 found the proportion of women aged 15–44 years who took a periconceptional folic acid supplement increased significantly from 10.1% to 26.7% (Chan et al. 2001). In a follow-up survey in 1998, 46.1% of women reported taking folic acid supplements in the periconceptional period.
- A health promotion project of knowledge and use of periconceptional folic acid supplementation was conducted in Western Australia between 1992 and 1995. In a 1995 survey almost half (43.1%) of women planning pregnancy had taken folic acid supplements. This was a marked increase compared with 19.1% in a similar survey in 1993 (Bower et al. 1997).
- It was also found that knowledge of the association between folate and spina bifida increased from 8.2% before the project to 67.5% in 1994 (Figure 22). The main sources of information were health professionals and pamphlets and posters (Bower et al. 1997).

- A cross-sectional study of 140 women in South Australia in 1999 found the rate of periconceptional folate

supplementation was 31% (Henry & Crowther 2000).



Data limitations

- Periconceptional use of folate has only been measured by periodic surveys. There is no national or state-based surveillance of folate use during pregnancy. There is no current national data definition of periconceptional folate use in pregnancy.
- Development is needed of a prenatal data element for the *National Health Data Dictionary*, which includes periconceptional folate use as an explicit data category.

Indicator status

Incomplete.

Data sources

National reports on congenital malformations and other published articles.

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Prevalence of positive syphilis serology in pregnant women

Indicator

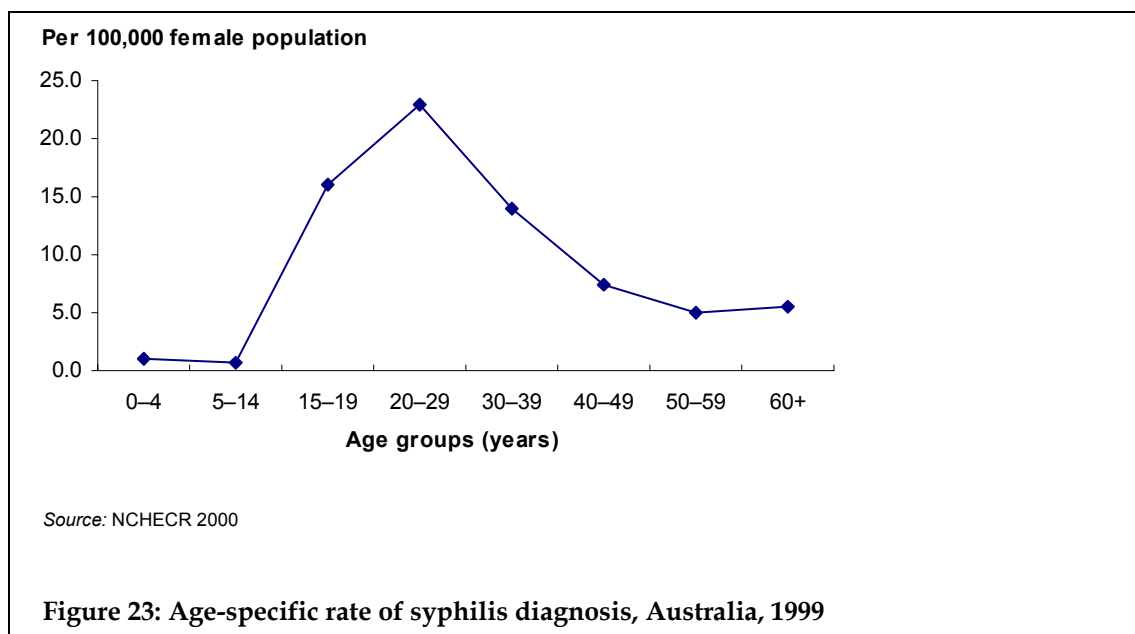
Percentage of pregnant women, aged 15–49 years, attending antenatal clinics, whose blood has been screened for syphilis, with positive serology for syphilis

Background information

- Untreated syphilis in women may lead to perinatal infection in the baby during pregnancy up to ten years after initial infection. Syphilis can seriously affect pregnancy outcomes causing up to half to end in spontaneous abortion, stillbirth or neonatal death (WHO 2000).
- Risk factors for congenital syphilis include (Humphrey & Bradford 1996):
 - lack of adequate antenatal care
 - failure to repeat a serological test for syphilis in the third trimester when it tested negative at first booking
 - past history of sexually transmissible infection
 - multiple sexual partners
 - substance abuse
 - being in a higher risk population group such as Indigenous peoples, substance abusers, homeless and commercial sex workers.
- RANZCOG guidelines recommend screening for syphilis as a routine test to be performed at the first antenatal visit (RANZCOG 2000).
- Screening and treating women for syphilis is cost effective, even where syphilis in pregnancy is rare, because effective treatment with parenteral penicillin is simple and readily available and the consequences of untreated infection are serious (Enkin et al. 2000).

Current data

- In 1999, a total of 731 cases of syphilis were reported amongst females aged 15–49 years, a rate of 9.0 cases per 100,000 females. The highest age-specific rate was 23.0 per 100,000 females aged 20–29 years population (Figure 23) (NCHECR 2000).
- The AIHW reported 22 separations of congenital syphilis in 1996–1997 and 11 separations in 1998–1999 (<0.1 separations per 1,000 population) (AIHW 2000).
- In 1998, there were two cases of congenital syphilis reported to the National Notifiable Diseases Surveillance System (Thomson et al. 1999).
- Active syphilis was identified in 27 of 3,058 pregnant women in a hospital-based study in northern Queensland in 1994–1995. Almost one in ten (8.8%) perinatal deaths in the region were attributed to congenital syphilis in association with poor antenatal care (Humphrey & Bradford 1996).



Data limitations

- There is no national monitoring of the prevalence of syphilis during pregnancy. There is no systematic collection of data by the States and Territories of syphilis screening in pregnancy.
- The ascertainment of congenital syphilis measures the rare sequelae and complications of active syphilis in pregnant women. It is a measure of failure in antenatal service provision not of syphilis prevalence in pregnant women.

Indicator status

Incomplete.

Data source

National Notifiable Diseases Surveillance System.

References

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Prevalence of HIV among pregnant women

Indicator

Prevalence of HIV infection in pregnant women per 100,000 live births

Background information

- The RANZCOG council recommends routine screening for HIV in all pregnant women. However, this should only be performed after appropriate counselling regarding the limitations of the testing and the implications of positive and negative findings (RANZCOG 2000).
- The most important benefit of antenatal screening is the opportunity to limit perinatal transmission of HIV in not previously identified HIV-positive mothers.
- A number of strategies have been developed to limit mother-to-infant transmission of HIV. These include:
 - antiretroviral medication for the mother before and during birth and for the infant
 - elective caesarean section, which halves the perinatal transmission rate
 - avoidance of invasive obstetric procedures (e.g. amniocentesis and amnioscopy)
 - bottle-feeding of infants to reduce the risk of transmission from 29% to 15% (Ziegler 1999)
- The risk of transmission of untreated mother to untreated child and where the child is also breastfed is at least 30% without treatment. It has been estimated that if the four measures above are taken, the risk of infection from mother to child is reduced to 2% (Ziegler 1999).
- Perinatal exposure to HIV may result in vertical transmission from mother to infant during pregnancy, birth or breastfeeding.

Current data

- The number of women with HIV infection reported to have delivered a child has increased from under 3.0 per 100,000 live births in the early 1980s to 7.1 per 100,000 in 1998–2000 (Table 6). (Law M, personal communication; NCHECR 2001).
- During 1998–2000, a total of 53 women with HIV infection were reported to have delivered a child (Law M, personal communication; NCHECR 2001).
- An increasing proportion of pregnant women infected with HIV were diagnosed with HIV prior to delivery, rising from 11% in 1982–1985 to 89% in 1998–2000 (Law M, personal communication; NCHECR 2001).
- In a cross-sectional survey of a random sample of private obstetricians, general practitioners and public hospital obstetric units, HIV prevalence in pregnant women in Australia in 1999 was estimated to be 0.23 per 1,000 (Law M, personal communication; NCHECR 2001).
- A study in 1991–1992 found that approximately 20% of pregnant women in Australia were screened for HIV as a part of their antenatal care (Elford et al. 1995).
- The major source of HIV infection was through heterosexual contact (69%) for the 181 women infected with HIV and reported to have delivered a child in Australia between 1982–2000. Other reported sources of exposure were injecting drug use (17%) and receipt of blood or blood products (11%) (Law M, personal communication; NCHECR 2001).

Table 6: Number of women infected with HIV reported as delivering a live birth, Australia, 1982–2000

Years	Number	Rate per 100,000 livebirths*	Interval of woman's HIV diagnosis			
			Before the birth		After the birth	
			Number	Per cent	Number	Per cent
1982–1985	28	2.9	3	11	25	89
1986–1988	18	2.5	4	22	14	78
1989–1991	35	4.5	21	60	14	40
1992–1994	47	6.0	26	55	21	45
1995–1997	40	5.3	25	63	15	37
1998–2000	53	7.1	47	89	6	11

*Based on ABS registered livebirths

Source: Law M, personal communication; NCHECR, 2001.

Data limitations

- There is no routine data collection by States and Territories or nationally of the number of antenatal HIV tests performed and the subsequent incidence of HIV infection among pregnant women. All HIV testing is anonymous; therefore repeat testing of an individual cannot be ascertained.
- Development of antenatal screening as a data element for the *National Health Data Dictionary*, including HIV serology as an explicit data category, could improve the quality of data.
- Data for women infected with HIV and delivering a child do not take into account women with HIV infection terminating pregnancies. There are data to suggest that the figures reported would be underestimates of HIV prevalence among all women who are pregnant (NCHECR 2000).

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Indicator status

Incomplete.

Data source

Cases of perinatal exposure to HIV are reported to the HIV surveillance centre by paediatricians through the Australian Paediatric Surveillance Unit. Diagnosis of HIV infection in women and exposed children are notified through national HIV/AIDS surveillance procedures (NCHECR 2000).

Prevalence of smoking in pregnancy

Indicator

Percentage of women smoking during pregnancy

Background

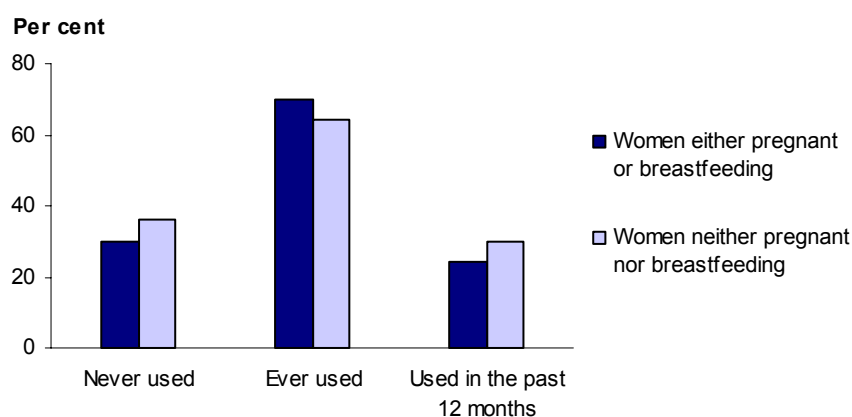
- Smoking during pregnancy is associated with low birthweight, pre-term birth and perinatal death. Smoking cessation programs in pregnancy reduce smoking, low birthweight and pre-term birth (Lumley, Oliver & Waters 2001).
- A review of a number of studies by English et al. (1995) found maternal smoking to significantly increase the risk of spontaneous abortion, ectopic pregnancy, antepartum haemorrhage, premature rupture of membranes and pre-eclampsia. Adverse outcomes in infants include an increased risk of low birthweight, stillbirth, perinatal mortality, birth defects and sudden infant death syndrome (Walsh, Lowe & Hopkins 2001).
- Analysis of retrospective data collected from women aged 45–49 years surveyed in the Australian Longitudinal Women's Health Study found a strong positive relationship between smoking status and the number of reported miscarriages. Compared with women who had never smoked, ex-smokers were more likely (1.25 times more likely) to have had two or more miscarriages, as were light smokers (1–19 cigarettes per day) (1.39 times more likely), and women who smoked 20 or more cigarettes per day (1.78 times more likely). An inverse relationship was also found between age at starting to smoke and a history of miscarriages (Schofield, Mishra & Dobson 1999).

Current data

- Almost one-quarter (24.0%) of pregnant or breastfeeding women

surveyed in the National Drug Strategy Household Survey in 1998 had smoked in the previous 12 months. In comparison, one-third of women (30%) neither pregnant nor breastfeeding smoked during the same period (Figure 24) (Higgins, Cooper-Stanbury & Williams 2000).

- In New South Wales, in 1998, 19.8% of mothers reported smoking during pregnancy, a fall from 22.1% in 1994. Of these, 95.9% continued smoking during the second half of their pregnancy, the time of greatest risk to the health of both mother and baby (Taylor et al. 2000). Almost 1 in 4 (23.2%) women born in English-speaking countries smoked at some time during pregnancy compared with 12.7% or less mothers born in non-English-speaking countries.
- In 1998, almost one in five (18.7%) pregnant women in the Northern Territory reported smoking at the 36th week of pregnancy. This included one in four (25.3%) Aboriginal mothers compared with one in seven (15.1%) non-Aboriginal mothers (Gladigau et al. 1999).
- In 1998, one in four (25.0%) of all pregnant women in South Australia were reported to be smokers at their first antenatal visit and 4.8% had quit smoking before their first visit. A higher proportion of Aboriginal women were reported to be smoking at their first antenatal visit (55.3%). In the second half of pregnancy, 21.6% of all pregnant women and 45.4% of Aboriginal women were reported to be smokers (Chan et al. 1999).
- A study of over 7,000 pregnant women between 1996 and 1998 in New South Wales found the prevalence of maternal smoking to be 18.8%. Marital status, ethnic origin and private health insurance were independent risk factors for maternal smoking. Smoking in pregnancy led to increased rates of abruptio placenta, threatened premature labour and premature labour. Adverse neonatal outcomes such as low birthweight and increased neonatal morbidity were also apparent (Bai et al. 2000).



Source: Higgins et al. 2000.

Figure 24: Tobacco/cigarette use by women of child-bearing age, 14–49 years, Australia, 1998

Data limitations

There are no overall national data on the prevalence of smoking in pregnancy. There are some prevalence data collected at the State and Territory level but this needs to be standardised and extended to all States. Development of a standardised smoking in pregnancy data instrument is needed. There is no ascertainment of the smoking status of the pregnant woman's partner or potential exposure to passive smoking. The validity of self-reported smoking status in pregnancy needs to also be taken into account.

Indicator status

Incomplete.

Data sources

Reports based on each State and Territory perinatal data collection published by State and Territory health authorities; National Drug Strategy Household Survey in 1998.

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Alcohol use in pregnancy

Indicator

Percentage of women who consume alcohol during pregnancy

Background information

- Maternal alcohol abuse is associated with adverse perinatal outcomes. These include the fetal alcohol syndrome, pseudo-Cushing's syndrome, alcohol withdrawal in the newborn, and increased risk of perinatal mortality (Tai, Saunders & Celermajor 1998).
- Fetal alcohol syndrome (FAS) refers to 'a specific cluster of anomalies associated with the use of alcohol during pregnancy'. FAS most commonly results in prenatal and/or postnatal growth restriction, characteristic facial features and central nervous system abnormalities (e.g. neurological abnormalities, developmental delays, behavioural dysfunction and learning difficulties), (Health Canada 1998).
- Alcohol consumption during the first trimester is more likely to lead to structural and anatomical defects, whereas consumption during the second and third trimester increases the risk of growth restriction and functional impairment (Health Canada 1998).
- The NHMRC recommends that women who are planning to have a child and women who are pregnant should abstain from the consumption of alcohol to avoid adverse risks to the unborn child (NHMRC 1992).
- A cross-sectional study of 140 women in South Australia found alcohol consumption decreased after diagnosis of pregnancy (Henry & Crowther 2000).

Current data

- Three in four (75.0%) pregnant or breastfeeding women compared with 83% of women neither pregnant nor breastfeeding surveyed in the National Drug Strategy Household Survey in 1998 reported that they had consumed alcohol in the previous 12 months. (Higgins, Cooper-Stanbury & Williams 2000).
- The 1995 National Nutrition Survey found 7% of women consumed alcohol in the previous 24 hours during pregnancy compared with 22% of non-pregnant women (ABS 2000).
- In 1998, over 1 in 10 (10.3%) women in the Northern Territory reported at the time of their first antenatal visit that they consumed alcohol in pregnancy. However, there was a decline in the percentage consuming alcohol by the 36th week of pregnancy (6.4%). These results may be under-ascertained as almost a quarter of responses were 'not stated' (Gladigau et al. 1999).
- Approximately 7.2% of Aboriginal women compared to 6.0% of non-Aboriginal women reported drinking alcohol at the 36th week of pregnancy (Figure 25) (Gladigau et al. 1999).
- A cross-sectional survey of 14,762 women aged 18–23 years enrolled in the Australian Women's Health Study was performed in 1996. Only 3% of women were pregnant and of these, the majority either abstained (24.2%) or drank very low levels of alcohol during pregnancy (71.8%). Hazardous or harmful drinking (>4 standard drinks/day or >28 standard drinks per week) was reported by 3.0% of pregnant women (Jonas, Dobson & Brown 2000).
- A study of Victorian women during pregnancy found that 99.5% of women drank, on average, less than two standard drinks per day. Older women were found to be more likely to consume alcohol than younger women.

Women who consumed alcohol during pregnancy were less likely to have pre-

term or low birthweight babies, than abstainers (Bell & Lumley 1989).

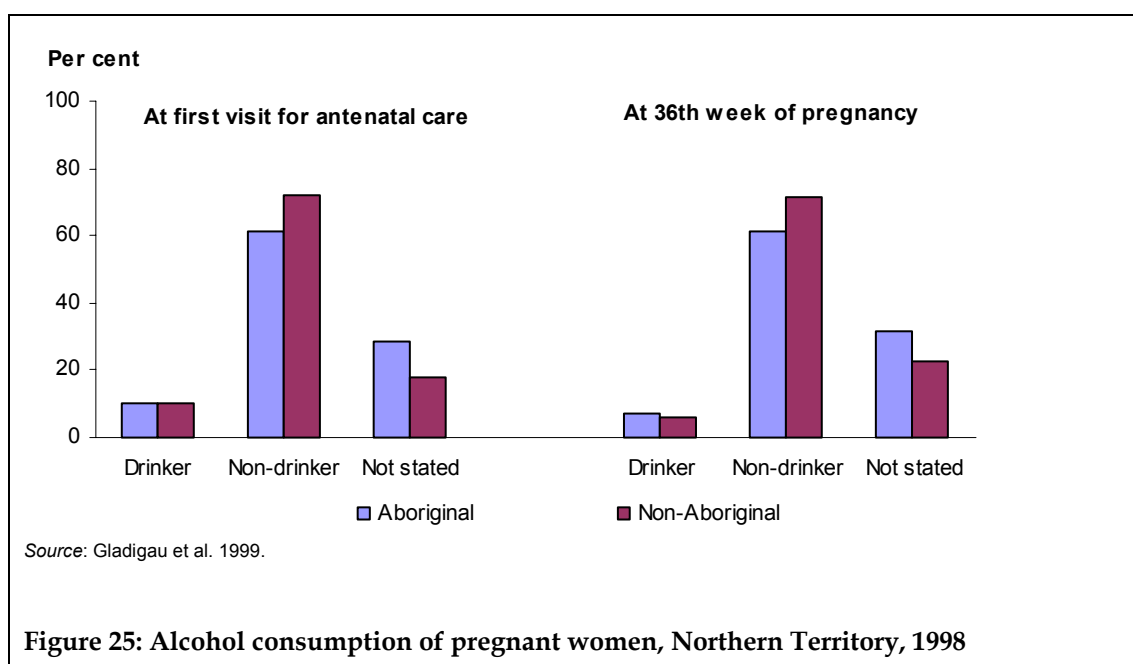


Figure 25: Alcohol consumption of pregnant women, Northern Territory, 1998

Data limitations

Alcohol consumption during pregnancy is not routinely collected on a national or state-wide level, except by the Northern Territory Midwives collection. There is no current standardised data collection instrument or data definition for alcohol consumption in pregnancy. Development of alcohol consumption in pregnancy is required as a data element for the *National Health Data Dictionary*.

Indicator status

Incomplete.

Data source

Northern Territory perinatal data collection; AIHW National Drug Strategy Household Survey 1998.

References

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Illicit drug use in pregnancy

Indicator

Percentage of women who use an illicit drug during pregnancy

Background information

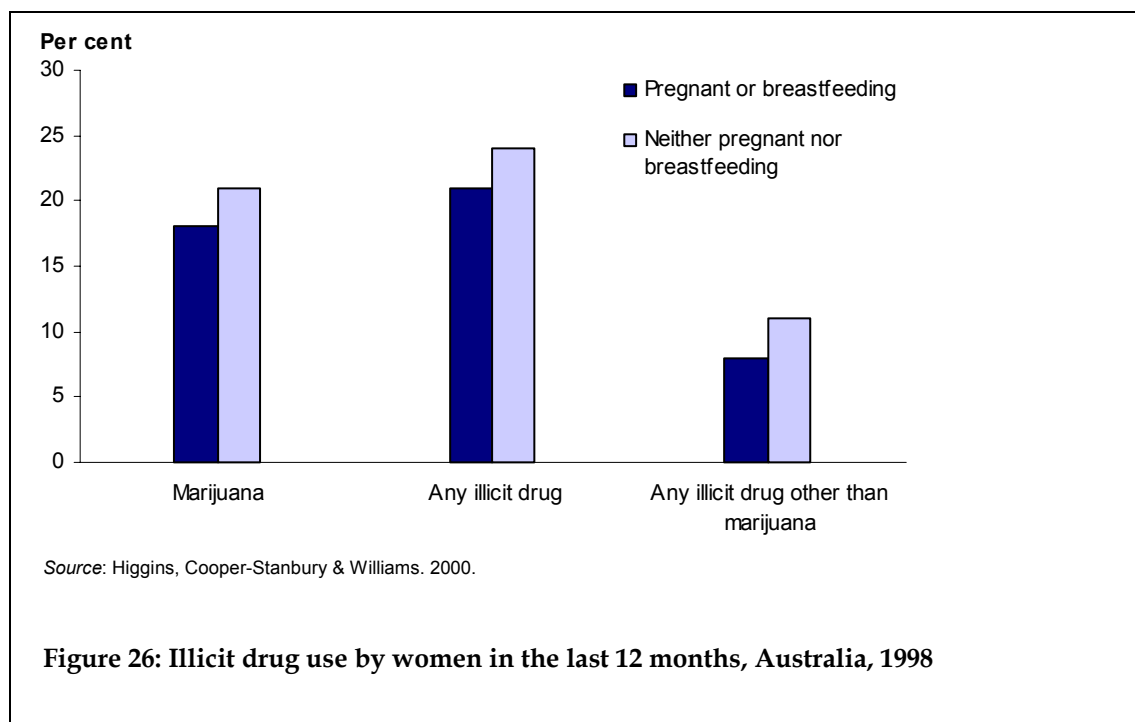
- Illicit drugs are defined as illegal drugs, drugs and volatile substances used illicitly, and pharmaceuticals used for non-medical purposes. These may include painkillers/analgesics, tranquillisers/ sleeping pills, steroids, barbiturates, amphetamines, marijuana/ cannabis, heroin, methadone, cocaine, LSD/synthetic hallucinogens, ecstasy and other designer drugs (AIHW 1999).
- Cocaine use during pregnancy has been associated with maternal complications including heart problems, strokes, seizures, bowel ischaemia, hyperthermia and sudden death. Congenital anomalies in infants, such as limb-reduction defects, brain defects, congenital heart defects, urinary tract anomalies and genitourinary tract malformations have also been identified (Cunningham et al. 1997).
- Infants of mothers who use heroin commonly experience fetal growth retardation and perinatal complications or death. Mild development delay or behavioural disturbances have been observed in children of heroin-addicted mothers (Cunningham et al. 1997).
- Withdrawal symptoms, including tremors, irritability, sneezing, vomiting, fever, diarrhoea and seizures have been observed in the first 10 days in 40–80% of infants (Cunningham et al. 1997).
- Methadone is primarily used in a medical situation as maintenance therapy for heroin addiction. A number of studies have found that

methadone treatment for women using heroin during pregnancy is associated with improvements in birthweight and neonatal mortality (Hulse et al. 1998). However, withdrawal from methadone is more severe for infants, taking up to 3 weeks (Cunningham et al. 1997).

- A meta-analysis, incorporating seven individual studies, found that there was an increased risk of neonatal mortality in infants of women using heroin (RR=3.27) or both heroin and methadone (RR=6.37) during pregnancy. However, women who received methadone treatment only, during pregnancy, did not have a significantly increased risk of neonatal mortality (Hulse et al. 1998).

Current data

- It is estimated that in 1998 there were over one million women of reproductive age (14–49 years) who recently used illicit drugs (AIHW 1999).
- Women had moderated their drug use during pregnancy. Less than one in 12 (8.0%) pregnant/breastfeeding women surveyed in the National Drug Strategy Household Survey 1998 reported using an illicit drug, other than marijuana, in the previous 12 months (Figure 26). Women neither pregnant nor breastfeeding were more likely to have used illicit drugs in the last 12 months (11%) (Higgins, Cooper-Stanbury & Williams 2000).
- Marijuana was used by 18% of pregnant/breastfeeding women during the previous 12 months, compared with 21% of women neither pregnant or breastfeeding (Higgins, Cooper-Stanbury & Williams 2000).



Data limitations

- There are no national or State or Territory level prevalence data of illicit drug use in pregnancy.
- The 1998 National Drug Strategy Household Survey did not ask specific questions about drug use in relation to current pregnancy.
- Data collection of the usage of illicit drugs is difficult because it is illegal and users are often marginalised and difficult to reach. Estimates of illicit drug use and behaviours are likely to be underestimates of true prevalences (AIHW 1999).

Indicator status

Incomplete.

Data source

National Drug Strategy Household Survey 1998.

References

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Prenatal diagnostic testing

Indicator

Number of amniocenteses performed and chorionic villus samples obtained annually among pregnant women

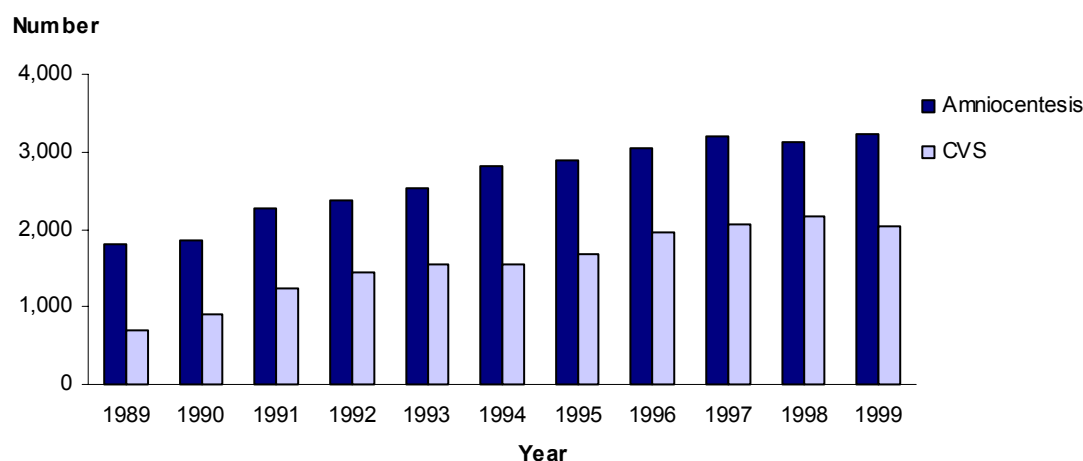
Background information

- Amniocentesis and chorionic villus sampling (CVS) are methods used to identify the presence of fetal chromosomal abnormalities. Amniocentesis involves sampling of the fluid in the amniotic sac during pregnancy. Chorionic villus sampling (CVS) involves obtaining a sample of the chorionic villi during pregnancy.
- CVS is usually performed at between 10 and 12 weeks gestation while amniocentesis is usually performed at between 15 and 18 weeks gestation in Australia (VCGS 2001).
- The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG 2000) has adopted the policy of the Human Genetics Society of Australia which recommends that facilities for prenatal diagnosis should be available at least for the following:
 - all women aged 37 years and over
 - all women who have had a child with a neural tube defect or who have been determined to be at increased recurrence risk for such, in light of a serum alpha-fetoprotein test
 - all women who have an ultrasound or serum screening test for Down syndrome, the results of which suggest the chromosome abnormality risk is greater than the accepted cut-off
 - all other women who have a high risk of a fetus with a diagnosable defect.
- RANZCOG recommends CVS should not be performed until at least 10 weeks gestation because of the risk of limb defects (RANZCOG 2000).

Current data

- The number of amniocenteses and CVS performed for diagnostic purposes in free-standing clinics or on private patients in public or private hospitals⁷ has fallen from 10,962 and 4,306 in 1998 to 10,668 and 4,261 in 1999 and 9,953 and 3,922 in 2000 for amniocentesis and CVS, respectively (items 16600 and 16603) (HIC 2000).
- Amniocentesis was performed for 9.8%, 5.2% and 4.0% of all pregnant women in 1998 in South Australia, Western Australia and Queensland, respectively, and for 5.3% of all women confined in 1999 in Victoria (SABDR 2000; Gee & O'Neill 2000; Queensland Health 2000; Webley & Halliday 2000).
- In 1998, fewer than 1% of pregnant women in Western Australia underwent CVS/placental biopsies, while in South Australia 1.1% underwent CVS. In Victoria, 3.3% of women underwent CVS in 1999 (Gee & O'Neill 2000; SABDR 2000; Webley & Halliday 2000).
- In Victoria, after steadily rising since 1989, the number of women having amniocentesis and CVS appears to have plateaued over the last few years (Figure 27). There has been a marked decline in utilisation of CVS and amniocentesis in age groups of 35 years and over since 1996 in Victoria, but an increase in women aged less than 35 years. In 1999 utilisation rates were 14% for women aged 35–36, 42% for 37–39 and 55% for women aged 40 years and over (Webley & Halliday 2000).
- The introduction of maternal serum screening in South Australia in 1991 has resulted in increased use of any prenatal testing for Down syndrome from about 7% (mainly older women having amniocentesis and CVS) to 84% of women (about 8% having direct amniocentesis or CVS and 76% having maternal serum screening first) (Cheffins et al. 2000).

⁷ HIC data do not include public patients, unlike data presented from each of the States and Territories which include all pregnant women.



Source: Webley & Halliday 2000.

Figure 27: Number of women using amniocentesis and CVS, Victoria, 1989–1999

Data limitations

- Data on amniocentesis and CVS are not routinely collected in all States and Territories.
- Health Insurance Commission data only include services claimed from MBS. Services to public patients in public hospitals are not included (see 'Data sources' for full description of exclusions).
- The ability to track CVS using the AIHW National Hospital Morbidity Database has been limited by the lack of a specific ICD-9-CM code for CVS. There is an ICD-10-AM code for CVS.

Indicator status

Incomplete. There is no routine national reporting of the proportion of pregnant women undergoing prenatal diagnostic testing, nor of the results of such testing. Such information would facilitate more accurate reporting of pregnancy rates, including terminations of pregnancy. Amniocentesis and CVS figures are currently reported in South Australia (SABDR 2000), Western Australia (Gee & O'Neill 2000) and Victoria (Webley & Halliday 2000).

Data sources

- Victorian report on prenatal diagnosis testing (Webley and Halliday 2000).
- South Australian Birth Defects Register.
- Health Insurance Commission Medicare Benefits Schedule statistics (HIC 2000).

References

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- Webley C & Halliday J 2000. Report on prenatal diagnostic testing in Victoria 1999. Melbourne: Perinatal Data Collection Unit and Murdoch Children's Research Institute.

Percentage of women attending antenatal care

Indicator

Percentage of women who attended, at least once during pregnancy, by skilled personnel for reasons related to pregnancy

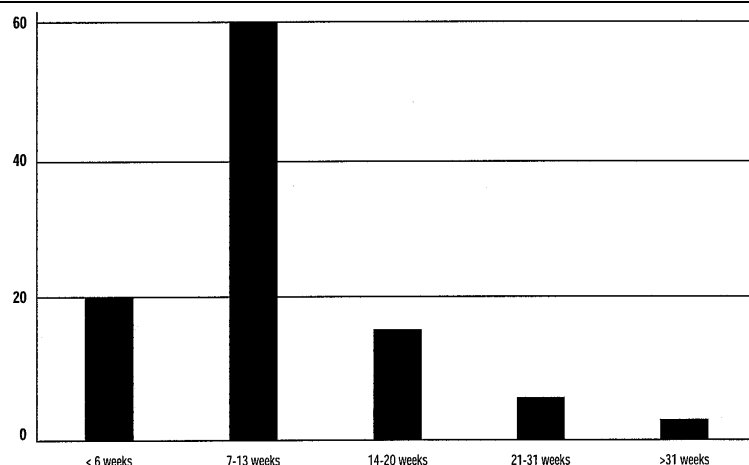
Background information

- Antenatal care in Australia is provided primarily by obstetricians, general practitioners and midwives. The care is delivered in a number of settings including private doctors' rooms and outpatient clinics in public hospitals and community centres. The aim of antenatal care is to maximise the health outcomes of the mother and baby. It aims to identify and manage risk factors or complications, and to monitor progress with information and support during pregnancy.
- Current recommendations for antenatal screening by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists recommend that tests at the first antenatal visit should include:
 - blood group and antibody screen
 - full blood count
 - rubella antibody status
 - syphilis serology
 - hepatitis B serology
 - hepatitis C serology (for high-risk groups)
 - HIV serology
 - cervical cytology.In addition, practitioners providing care should discuss:
 - the availability of maternal serum screening for Down syndrome
 - ultrasound examination at 18–20 weeks gestation (RANZCOG 2000).

- Evidence from a cochrane review of various randomised trials comparing antenatal programs found that a reduction in the number of antenatal visits was not associated with an increase in adverse maternal and perinatal outcomes. However, some women appeared to be less satisfied with reduced visits (Villar et al. 2001).

Current data

- During 1999, 78.4% of pregnant women in South Australia had seven or more antenatal visits. Less than 1% (65; 0.4%) of women reported that they did not receive any antenatal care (Chan et al. 1999).
- Information from New South Wales was collected on the duration of pregnancy at first antenatal visit. More than 1 in 8 (13.4%) women attended their first antenatal visit after 20 weeks of pregnancy (Taylor et al. 2000).
- In 1998 in the Australian Capital Territory, almost 90% of pregnant women reported eight or more antenatal visit (Bourne 2000).
- Over 98% of mothers in Queensland had two or more antenatal visits during pregnancy in 1998 (Queensland Health 2000).
- A study conducted in Victoria in 1998 over a four month period highlights that in 22,257 pregnancies, approximately 80% of women attended antenatal care in the first trimester of pregnancy (Figure 28) (Halliday, Ellis & Stone 1999).



Source: Halliday, Ellis & Stone 1999.

Figure 28: Percentage of women attending for first antenatal visit at different gestations, Victoria, 1998

Data limitations

- There is no standardised collection of data on the total number and timing of the first antenatal visits by State and Territory perinatal data collection units. There is a need to develop a national definition of antenatal care to be incorporated in the *National Health Data Dictionary*.
- Data are usually collected at the time of delivery which may lead to recall bias about early pregnancy care. The implementation of patient-held communication cards completed during antenatal care may be sourced to provide accurate information at time of delivery.
- A validation study performed by the New South Wales midwives data collection (MDC) unit in 1998 found that there was 78% agreement between medical records and the MDC for the item-duration of pregnancy at first antenatal check (Taylor et al. 2000).

Indicator status

Incomplete.

Data source

Reports based on each State and Territory perinatal data collection published by State and Territory health authorities.

References

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- Chan A, Scott J, Nguyen A & Keane R 1999. Pregnancy outcome in South Australia 1999. Adelaide: Pregnancy Outcome Statistics Unit, Epidemiology Branch, Department of Human Services (South Australia).
- Halliday J, Ellis I & Stone C 1999. WUDWAW: Who Usually Delivers Whom and Where: report on models of antenatal care. Melbourne: Victorian Perinatal Data Collection Unit, Department of Human Services.
- Queensland Health 2000. Perinatal Statistics Queensland 1998. Brisbane: Queensland Health.
- Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) 2001. Statement 2.2: Screening in pregnancy, accessible at: www.ranzcog.edu.au/open/statements/2_2.htm.
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- Villar J, Carroli G, Khan-Neelofur D, Piaggio G & Gulmezoglu M 2001. Patterns of routine antenatal care for low-risk pregnancy (Cochrane Review) in: The Cochrane Library, 4. Oxford: Update Software.

Pregnancy rates and outcomes after assisted conception

Indicator

Number of viable pregnancies per 100 assisted conception treatment cycles

Pregnancy rates are expressed per 100 treatment cycles that reach the stage of oocyte retrieval. In treatment cycles where embryos were transferred after embryo freezing or oocyte donation, pregnancy rates are expressed per 100 embryo transfer cycles. Pregnancy rates can be expressed in terms of viable pregnancies (those reaching 20 weeks gestation) or clinical pregnancies.

Background information

- Assisted conception pregnancies are those achieved by means of in-vitro fertilisation (IVF), intracytoplasmic sperm injection (ICSI) or gamete intrafallopian transfer (GIFT), and may include use of donor sperm, donor egg or surrogacy, but do not include pregnancies achieved by the use of fertility drugs only or artificial insemination of sperm (partner or donor).
- In Australia, assisted conception has been available to infertile couples for more than two decades.
- The first successful assisted conception pregnancy in Australia was in 1979.
- In 2001, there are 34 assisted conception units providing clinical services. Data on every assisted conception treatment cycle, resulting pregnancies and infants are collected from each unit.
- The use of assisted conception has increased markedly in the 1990s. The number of embryo transfer cycles in 1999 was nearly double that in 1992 (Hurst & Lancaster 2001).
- Since its introduction in the early 1990s, the use of ICSI has rapidly increased. In 2000, ICSI accounted for 48.4% of all assisted conception transfer cycles.
- The overall viable pregnancy rate increased annually in the 1990s.

Current data

- In 2000, among all assisted conception treatment cycles, there were 22,373 embryo transfer cycles resulting in 3,515 viable pregnancies. The viable pregnancy rates varied between 12% and 18%, depending on procedure (Table 7).
- There were 4,319 babies born after assisted conception in 1999, accounting for 1.7% of all babies born in Australia (Hurst & Lancaster 2001).
- Adverse infant outcomes, such as pre-term delivery, low birthweight, stillbirth and neonatal death, are higher among assisted conception births when compared with all births in Australia (Hurst & Lancaster 2001).
- Multiple birth is the primary reason for adverse infant outcomes of assisted conception births (Table 8). Other factors contributing to the higher perinatal death rate include relatively older age of mother and underlying causes of infertility.

Data limitations

- There is a lack of information about the prevalence of infertility in Australia. Treatment cycles using only fertility drugs (ovulation induction) are not recorded.
- Causes of infertility reported for women using assisted conception are only representative of the population that became pregnant. This is not a measure of the entire population that may be infertile.
- The national data on assisted conception are based on pregnancies. As such, pregnancy rates for different age groups or types of infertility cannot be determined. A database for collection of data on all treatment cycles is currently being developed and is due to be implemented in 2002.

Table 7: Pregnancy rates after assisted conception in Australia, 2000

Stage of treatment cycles	Fresh transfers			Frozen/thaw transfers	
	IVF	ICSI	GIFT	IVF	ICSI
Treatment cycles	7713	8938	1380	<i>n.a.</i>	<i>n.a.</i>
Oocyte retrieval cycles	6447	8032	1263	<i>n.a.</i>	<i>n.a.</i>
Embryo transfer cycles	5416	7086	1237	4386	4248
Clinical pregnancies	1259	1603	319	734	643
Viable pregnancies	962	1276	229	550	498
Clinical pregnancy rate*	19.5	20.0	25.3	16.7	15.1
Viable pregnancy rate*	14.9	15.9	18.1	12.5	11.7

* Per 100 oocyte retrieval cycles for fresh transfer cycles and per 100 embryo transfers for frozen/thaw transfers.

Source: AIHW NPSU Assisted Conception database.

Table 8: Adverse infant outcomes of women undergoing assisted conception treatment in Australia in 1999 who had births in 1999 and 2000

Adverse outcomes	Plurality			
	Singletons	Twins	Other multiples	All births
	n=2,741	n=1,394	n=159	n=4,294
Preterm birth (<37 weeks)	380 (13.9%)	890 (63.8%)	124 (78.0%)	1,394 (32.5%)
Low birthweight (<2500g)	273 (10.0%)	754 (54.1%)	132 (83.0%)	1,159 (27.0%)
Stillbirth	41	25	5	71
Neonatal death	9	21	6	36

Note: Per cents are based on number with known outcome—this figure is not necessarily equal to total births.

Source: AIHW NPSU Assisted Conception database.

Indicator status

Adequate. Information on all treatment cycles is reported annually by year of conception. In 2002 all assisted conception treatment cycles and pregnancies will be reported electronically to the National Perinatal Statistics Unit. Adjustment for maternal age and other risk factors is not possible until cycle-specific data are available.

Data sources

AIHW National Perinatal Statistics Unit (NPSU) Assisted Conception database.

References

- Hurst T & Lancaster PAL 2001. Assisted conception Australia and New Zealand 1999–2000. Sydney: Australian Institute of Health and Welfare (AIHW) National Perinatal Statistics Unit (NPSU) (Assisted Conception Series no. 6).

Multiple pregnancy rate

Indicator

The number of multiple pregnancies expressed per 1,000 confinements

A related indicator is the multiple birth rate based on the number of live births and stillbirths from a multiple pregnancy expressed per 1,000 live births and stillbirths.

Background information

- Multiple pregnancies include twin, triplet or higher-order multiple gestations.
- Factors influencing the rising trend in multiple pregnancies include the increasing availability and use of fertility drugs and assisted conception and a shift toward childbearing at older maternal age where multiples are more likely to occur (Jewell & Yip 1995).
- Multiple pregnancies are more likely to be delivered pre-term (<37 weeks gestation) and the resulting babies are at greater risk of perinatal death (stillbirth or neonatal death).
- Multiple gestation is associated with increased risk of maternal mortality and morbidity. Adverse maternal outcomes include increased risk of pre-term labour, pre-eclampsia, postpartum haemorrhage, puerperal infection, anaemia, urinary tract infection and caesarean delivery (Conde-Agudel, Belizan & Lindmark 2000).
- For assisted conception, the likelihood of multiple birth is usually related to the number of oocytes transferred. The more embryos and/or oocytes transferred, the more likely a multiple pregnancy will result.

Current data

- In 1999, multiple pregnancies accounted for 1.6% of all confinements in Australia representing a rate of 14.9 multiple births per 1,000 confinements (Nassar & Sullivan 2001).
- There were 3,929 twin pregnancies in 1999, a rate of 15.1 twins per 1,000 confinements and 104 triplet pregnancies and 4 higher-order pregnancies (Nassar & Sullivan 2001).
- There has been an increasing trend in multiple births in Australia over the last two decades. The twinning rate has risen from 9.0 per 1,000 confinements in 1977 to 15.1 per 1,000 confinements in 1999 (Nassar & Sullivan 2001).
- The multiple birth rate increases with maternal age (Table 9). In 1999, the twinning rate for mothers aged 35–39 years was 20.9 per 1,000 confinements, three times higher than the rate of 6.8 per 1,000 for teenagers (Nassar et al. 2001).
- Multiple pregnancies were more likely to be delivered pre-term. Half of all twin pregnancies (50.7%) and nearly all of triplet pregnancies (97.1%) were pre-term compared with 6.2% of singletons (Nassar & Sullivan 2001).
- In 1999, multiple pregnancies after assisted conception (20.1%) were much more likely than for all Australian births (1.3%) (Hurst & Lancaster 2001).
- In 1999, the perinatal death rate for twins was more than four times higher than the rate for singletons, 34.1 and 7.7 per 1,000 births, respectively (Table 10) (AIHW NPSU perinatal data collection, ABS 2000).

Table 9: Multiple pregnancies by maternal age, Australia, 1999

Maternal age (years)	Twin	All multiple pregnancies
Rate per 1,000 confinements		
Less than 20	5.9	5.9
20–24	9.7	9.8
25–29	13.9	14.3
30–34	17.8	18.2
35–39	20.9	21.6
40 and over	19.7	20.3
All ages	15.1	15.5

Note: Data for Tasmania unavailable, 1998 data used as an estimate.

Source: Nassar et al. 2001.

Table 10: Fetal, neonatal and perinatal death rates for singleton and multiple births, Australia, 1999

Plurality	Fetal deaths	Neonatal deaths	Perinatal deaths
Rate per 1,000 births			
Singleton	4.8	2.9	7.7
Twin	16.2	18.2	34.1
Other multiples	30.3	43.8	72.7
All births	5.1	3.4	8.5

Note: Fetal, neonatal and perinatal deaths from ABS based on year of registration with 400 g/20-week gestation definition.

Source: ABS perinatal deaths data.

Data limitations

- Birth notifications lack information on the use of fertility drugs outside assisted conception.
- The State and Territory perinatal data collections do not record whether pregnancies resulted from assisted conception.
- Perinatal deaths from ABS based on year of registration.

Indicator status

Adequate.

Data sources

AIHW National Perinatal Statistics Unit (NPSU) perinatal collection; AIHW National Perinatal Statistics Unit, Assisted Conception database; and ABS perinatal death registrations, 2001.

References

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- Nassar N & Sullivan EA 2001. Australia's mothers and babies 1999. Sydney: Australian Institute of Health and Welfare National (AIHW) Perinatal Statistics Unit (NPSU) (Perinatal Statistics Series no. 11).
- Australian Bureau of Statistics (ABS) 2000. Causes of death Australia, 1999. Cat. no. 3303.0. Canberra: Australian Government Publishing Service.

Percentage of all labours which were induced or augmented

Indicator

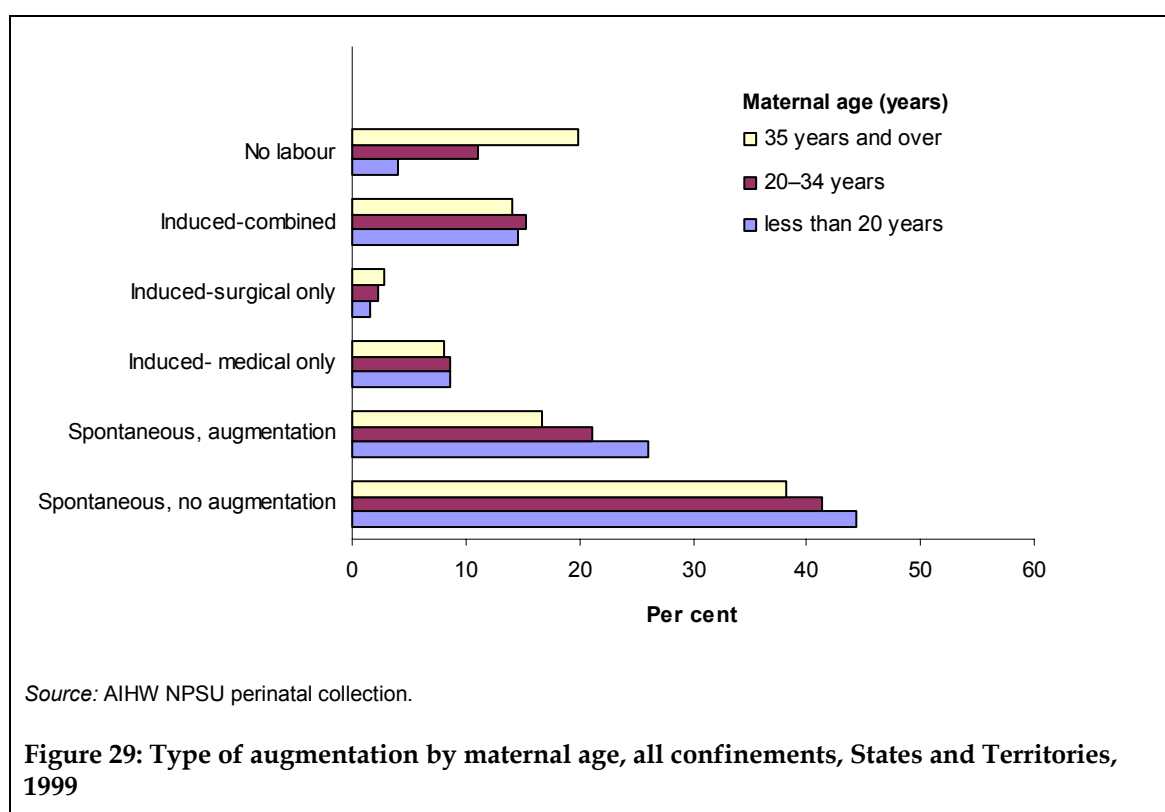
Percentage of all labours which were induced or augmented

Background information

- An induced labour occurs when an external agent is used to stimulate its onset before the onset of spontaneous labour.
- Induction of labour aims to start labour, whereas the augmentation of labour enhances uterine contractions after labour has commenced.
- Labour may be augmented or induced by artificial rupture of the membranes (ARM). Drugs may also be used including the hormone oxytocin or vaginal prostaglandin gel (RANZCOG 2000).
- The major medical indications for inducing labour are prolonged pregnancy, intrauterine growth restriction and maternal hypertension (Chamberlain & Zander 1999).
- The Australian Council on Healthcare Standards (ACHS) has included induction of labour other than for defined indications as a key indicator for measuring the level of obstetric intervention. Defined indications, by ACHS, for induction of labour include diabetes, premature rupture of membranes, hypertensive disorders (including chronic renal disease), intrauterine growth retardation, isoimmunisation, fetal distress, fetal demise, chorioamnionitis, and prolonged pregnancy (>41 weeks) (ACHS 2001a).

Current data

- In 1999, 25.9% of all deliveries in Australia were induced. Artificial rupture of the membranes (ARM) (11.1%) or a combination of ARM and drugs was the most common method of inducing labour (12.4%) (Nassar & Sullivan 2001) (Figure 29).
- The highest rates of induction were in Western Australia where almost one in three (29.8%) women were induced. Only 19.0% of women in the Northern Territory were induced (Nassar & Sullivan 2001).
- One in five (20.9%) spontaneous births in Australia were augmented. Surgical augmentation was the leading method used to augment labour (11.1% of all confinements), followed by medical augmentation (6.1% of all confinements). Victoria had the lowest rate of augmentation (17.3%) while the Northern Territory had the highest (36.7%) of the States and Territories (Nassar & Sullivan 2001).
- Women aged less than 20 years had a higher proportion of augmented births (26.7%) compared with older mothers aged 35 years and over (16.9%) (Figure 29) (AIHW NPSU perinatal collection, 2002).
- Mothers aged 20–34 years had a slightly higher rate of induction (25.8%) compared to younger (24.9%) and older mothers (24.9%) (AIHW NPSU perinatal collection 2002).
- In 2000, the Australian Council on Healthcare Standards (ACHS) reported 34.1% of all induced labours were for reasons other than those defined as appropriate. Rates were much higher in private health care (45%) than in public organisations (29%) (ACHS 2001b).



Data limitations

The ability to track the maternal morbidity associated with augmented and induced labour is limited by the lack of uniform reporting of maternal morbidity in the National Perinatal Data Collection.

Indicator status

Adequate.

Data source

AIHW National Perinatal Statistics Unit (NPSU) perinatal collection.

References

- Australian Council on Healthcare Standards (ACHS) 2001a. Clinical indicators: a user's manual. Obstetric and Gynaecology Indicators, Version 4. Sydney: ACHS.
- Australian Council on Healthcare Standards (ACHS) 2001b. Determining the potential to improve the quality of care in Australian health care organisations. Sydney: ACHS.
- Chamberlain G & Zandder L 1999. Clinical review: induction. British Medical Journal 318: 995–998.
- Nassar N & Sullivan EA 2001. Australia's mother's and babies 1999. AIHW cat. no. PER 15. Sydney: National Perinatal Statistics Unit (NPSU) (Perinatal Statistics Series no. 11).
- Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) 2001. The induction of labour. Patient information pamphlet, accessible at: www.ranzcog.edu.au/open/womens'health/pamphlets/induction.html.

Proportion of institutional deliveries

Indicator

Annual percentage of women who gave birth in hospital settings

Background information

- Most births in Australia occur in hospitals, either in conventional labour-ward settings or in hospital birth centres.
- Planned home births and births occurring unexpectedly before arrival in hospital comprise only a very small proportion of births in Australia.
- In 1998–1999 there were 341 obstetric/maternal services and 30 neonatal intensive care units in public acute hospitals in Australia (AIHW 2000).
- The actual number of maternity units in a region depends on its geographical location, the population of the region and policies regarding maternity services.

half of these had fewer than 100 deliveries per year. The majority of hospital births (66.1%) occurred in the larger maternity units that had more than 1,000 deliveries annually (Nassar & Sullivan 2001).

- During the period 1994–1996, one in five (20.9%) of all births in Australian hospitals occurred in private hospitals (AIHW Hospital Morbidity Data Collection).
- Data available for July–December 1996 reveal that almost one in three births in capital cities (28.1%) were in private hospitals. However, only 15.7% and 9.9%, respectively, of births occurred in private hospitals in rural and remote areas (AIHW Hospital Morbidity Data Collection).

Current data

- In 1999, over 99% of births in Australia took place in hospitals. Less than 1% of births were at home or born before arrival at hospital (Table 11) (Nassar et al. 2001).
- During 1998, most births in the Northern Territory occurred in hospitals (95.2%), however, 50 (4.1%) Indigenous women from the Northern Territory gave birth in a community health centre (Gladigau et al. 1999).
- The higher proportion of births in birth centres in the Australian Capital Territory (7.5%) may be attributed to the higher ratio of birth centres to the number of women giving birth each year (n=4,599) compared with the other States and Territories (Table 11).
- In 1999, women gave birth in one of 540 maternity units in Australia. Almost

Table 11: Place of birth, all confinements, States and Territories, 1999

Place of birth	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Number									
Hospital	83,216	60,333	47,256	24,765	17,220	5,726	4,214	3,425	246,155
Birth centre	2,249	888	387	417	925	81	346	–	5,293
Home	139	298	164	126	39	8	21	47	842
Born before arrival	363	62	234	70	49	84	18	–	880
Other	–	5	1	–	–	11	–	78	95
Not stated	–	1	–	–	–	86	–	–	87
All places of birth	85,967	61,587	48,042	25,378	18,233	5,996	4,599	3,550	253,352
Per cent									
Hospital	96.8	98.0	98.4	97.6	94.4	96.9	91.6	96.5	97.2
Birth centre	2.6	1.4	0.8	1.6	5.1	1.4	7.5	–	2.1
Home	0.2	0.5	0.3	0.5	0.2	0.1	0.5	1.3	0.3
Born before arrival	0.4	0.1	0.5	0.3	0.3	1.4	0.4	–	0.3
Other	–	0.0	0.0	–	–	0.2	–	2.2	0.0
All places of birth	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Nassar & Sullivan 2001.

Data limitations

No breakdowns are available by type of hospital and Rural, Remote and Metropolitan Areas classification in the AIHW National Perinatal Data Collection.

Indicator status

Adequate.

Data source

AIHW National Perinatal Data Collection.

References

- Australian Institute of Health and Welfare (AIHW) 2000. Australian hospital statistics 1998–99. AIHW cat. no. HSE 11. Canberra: AIHW (Health Services Series no. 15).
- Gladigau PW, Carnegie MA, Measey ML & d’Espaignet ET 1999. Northern Territory midwives collection: mothers and babies 1998. Darwin: Territory Health Services.
- Nassar N & Sullivan EA, 2001. Australia’s mothers and babies 1999. AIHW cat. no. PER 15. Sydney: AIHW National Perinatal Statistics Unit (NPSU) (Perinatal Statistics Series no. 11).

Caesarean birth rate

Indicator

Proportion of all births delivered by caesarean section

Background information

- The caesarean rate in Australia has continued to increase in recent decades (Lancaster & Pedisich 1993).
- Factors associated with higher caesarean rates include advancing maternal age, first births compared to subsequent births, multiple pregnancy, breech presentation, low birthweight and private accommodation status in hospital (Nassar & Sullivan 2001).
- The most common indications for caesarean delivery include: previous caesarean section, dystocia or failure to progress in labour, breech presentation and concern for fetal wellbeing (Cunningham et al. 1997).
- The decision to perform a caesarean section may be made before the onset of labour, generally known as an elective caesarean, or after the onset of labour, known as an emergency caesarean.
- The World Health Organization recommends a figure of 15% as a reasonable national rate for caesarean section (WHO 1985).

Current data

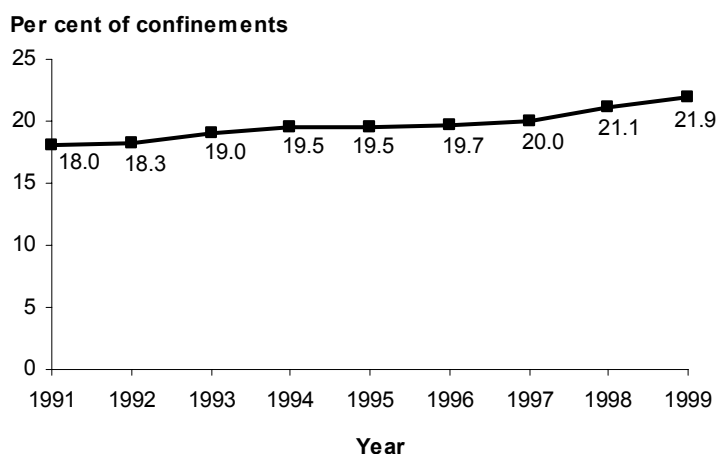
- In 1999, the national caesarean rate was 21.9%, the highest level ever recorded in Australia (Figure 30). For live births, the caesarean rate was 20.9%.
- The highest rate of caesarean births occurs among women aged 40 years and older (37.6 per 100 confinements) (Table 12).
- In 1999, South Australia reported the highest caesarean rate (24.9 per 100 confinements) while the Australian Capital Territory and New South Wales reported the lowest caesarean rates (19.6 and 19.7 per 100 confinements) respectively (Nassar & Sullivan 2001).

- Women admitted as private patients have a higher caesarean rate (29.5 per 100 confinements) than public patients (19.0 per 100 confinements) (Nassar & Sullivan 2001).
- The caesarean rate for Indigenous mothers is less than that for all mothers (18.4% compared with 21.9%) (Nassar & Sullivan 2001).
- Of the 131,511 caesarean sections reported in the National Hospital Morbidity Database between 1994 and 1996, 46,050 (35.0%) were repeat caesareans⁸.

Data limitations

- The National Perinatal Data Collection only collects information on the current pregnancy. Previous caesarean delivery is recorded in New South Wales, Victoria, Queensland, South Australia, Western Australia and Tasmania.
- Although the AIHW National Hospital Morbidity Database has information on both current and previous caesareans, the lack of an indication of parity, and the lack of a unique identifier, prevent tracing of any morbidity associated with caesarean delivery.

⁸ Western Australian births for 1994 and 1995 were not included.



Source: AIHW NPSU perinatal collection 2001.

Figure 30: Births by caesarean section, Australia, 1991–1999

Table 12: Caesarean rate by maternal age, States and Territories, 1999

Maternal age (years)	Caesarean rate (per cent)							
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Less than 20	10.4	13.0	12.1	13.4	17.0	12.0	9.8	14.7
20–24	12.8	15.8	16.2	16.3	17.8	18.5	12.8	16.2
25–29	17.6	20.1	22.3	20.6	23.7	20.9	17.4	22.4
30–34	21.7	24.4	27.5	27.1	27.6	22.4	22.9	23.7
35–39	27.9	29.9	32.1	32.1	31.9	26.4	23.2	28.5
40 and over	35.7	38.0	40.4	42.5	36.2	34.2	30.4	44.3
All ages	19.7	22.8	23.4	23.4	24.9	21.0	19.6	21.2

Note: Data for Tasmania for 1999 was unavailable, 1998 used as an estimate.

Source: Nassar et al. 2000.

Indicator status

Adequate. Although the WHO reports caesarean sections as a proportion of live births, the availability of data on all live births and stillbirths in Australia allows the rate to be reported per 100 confinements⁹.

Data sources

- AIHW National Perinatal Statistics Unit (NPSU) perinatal collection.
- AIHW National Hospital Morbidity Database.

References

- Cunningham FG, MacDonald PC, Gant NF, Leveno KJ, Gilstrap LC, Hankins GDV & Clark SL (eds) 1997. Williams obstetrics, 20th edition. Connecticut: Appleton and Lange.
- Lancaster P & Pedisich E 1993. Caesarean births in Australia, 1985–1990. Sydney: AIHW National Perinatal Statistics Unit (NPSU).
- Nassar N, Sullivan EA, Lancaster P & Day P 2001. Australia's mothers and babies 1999. AIHW cat. No. PER 19. Sydney: AIHW National Perinatal Statistics Unit (NPSU).
- World Health Organization (WHO) 1985. Appropriate technology for birth. Sometimes referred to as the Forteleza Declaration. WHO: Geneva.

⁹ Resulting in live births or stillbirths.

Proportion of vaginal births after caesarean section

Indicator

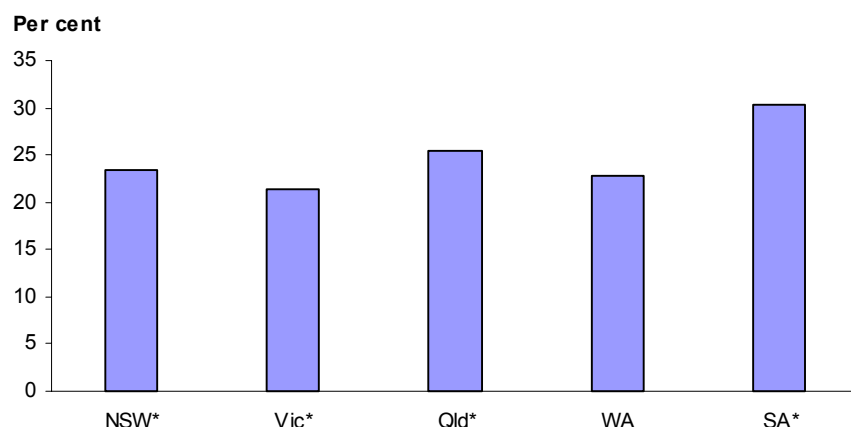
The number of women who have had a vaginal delivery following a previous caesarean section and no intervening pregnancies greater than 20 weeks gestation as a percentage of all mothers delivering immediately following a caesarean section

Background information

- Vaginal birth after caesarean section is sometimes referred to as 'trial of scar' or 'trial of labour'.
- There is a small risk that attempting a vaginal birth after a previous caesarean section in the presence of a uterine scar may lead to uterine rupture in labour. A meta-analysis by Rosen et al. (1991) found the risk of scar separation is 1.8% with a trial of labour versus 1.9% for elective caesarean section for women with a low transverse scar. In a prospective study of 5,000 women with a trial of labour, in the United States, uterine rupture developed in less than 1% of women (Cunningham et al. 1997).
- A meta-analysis involving 2,162 women with more than one previous caesarean found they had three times the risk of uterine rupture, compared with women with only one prior caesarean section (Cunningham et al. 1997).
- The Australian Council on Healthcare Standards (ACHS) has endorsed vaginal delivery following primary caesarean section, as a key indicator of the quality of obstetric care (ACHS 2001). In particular, it is to monitor the conduct of labour and trial of scar in patients who have had a previous primary caesarean section. This information is collated by ACHS for participating hospitals in Australia.
- Primary caesarean section is distinguished for those women whose last birth was by caesarean section and who have had only one previous caesarean section (Riley & Halliday 1999).

Current data

- Almost one in four women in Victoria (23.3%), 21.3% in New South Wales, 25.5% in Queensland and 30.4% in South Australia had a vaginal delivery after a previous primary caesarean section in 1998 (Figure 31) (Chan et al. 1999; Riley & Halliday 1999; Taylor et al. 2000). These were based on the ACHS clinical indicator-vaginal births after caesarean section.
- In Western Australia 22.7% of women had a vaginal birth after a caesarean section in any previous delivery (Gee & O'Neill 2000; Queensland Health 2000).
- In 1999, the Australian Council on Healthcare Standards reported Australia had a vaginal birth after caesarean section (VBAC) rate of 24.5%, a slight increase from 22% in 1997. The public and private rates in 1999 were 26% and 20%, respectively. These had each increased by 2% since 1998 (ACHS 2001).
- A retrospective analysis of 21,452 Australian women from 11 hospitals between 1992 and 1997 found vaginal delivery took place in 5,419 (25.3%) of cases who had had at least one previous caesarean section. The uterine rupture rate was estimated at 0.34% for women attempting. The VBAC rate ranged from 11% to 44% for the hospitals included in the study (Appleton et al. 2000).
- A retrospective study was performed for 244 women who had had one previous caesarean section and undergoing a trial of scar at Liverpool hospital in New South Wales between 1989 and 1994. Results showed that 80.7% of women who underwent a trial of scar labour had a vaginal delivery, and 19.3% required an emergency caesarean section. Maternal morbidity after vaginal delivery was lower than after caesarean section with fewer complications and shorter postnatal stays in hospital (Lovell 1996).



* Based on ACHS clinical indicator for vaginal births after caesarean section.

Sources: Chan et al. 1999; Gee & O'Neill 2000; Queensland Health 2000; Riley & Halliday 1999; Taylor et al. 2000.

Figure 31: Proportion of vaginal births after caesarean section, selected States and Territories, 1998

Data limitations

- There are some prevalence data collected at the State and Territory level by the perinatal data collection units, however, this needs to be standardised and extended to all States and Territories.
- In some States and Territories, where information regarding previous caesarean section is collected, information may be limited to women who have had a caesarean section in any previous delivery. This means that it is impossible to ascertain whether the last delivery was by caesarean section and whether there may have been intervening births prior to the current birth.

Indicator status

Incomplete.

Data source

- Selected reports based on each State and Territory perinatal data collections published by State and Territory health authorities.
- Australian Council on Healthcare Standards

References

- Appleton B, Targett C, Rasmussen M, Readman E, Sale F & Permezel M 2000. Vaginal birth after caesarean section: an Australian multicentre study. *Australian and New Zealand Journal of Obstetrics & Gynaecology* 40: (1) 87–91.
- Australian Council of Healthcare Standards (ACHS) 2001. Determining the potential to

improve the quality of care in Australian health care organisations: results from the ACHS clinical indicators data 1998–1999. Sydney: ACHS.

- Chan A, Scott J, McCaul K & Keane R 1999. *Pregnancy outcome in South Australia 1998*. Adelaide: Pregnancy Outcome Statistics Unit, Epidemiology Branch, Department of Human Services (South Australia).
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- Gee V & O'Neill MT 2000. *Perinatal statistics in Western Australia, 1998: 16th annual report of the Western Australian midwives' notification system*. Perth: Health Department of Western Australia.
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- Queensland Health 2000. *Perinatal statistics, Queensland 1998*. Queensland Health. Accessible at: www.health.qld.gov.au.
- Riley M & Halliday J 1999. *Births in Victoria 1996–1998*. Melbourne: Perinatal Data Collection Unit, Victorian Government Department of Human Services.
- Rosen MG, Dickinson JC & Westhoff CL 1991. Vaginal birth after cesarean: a meta-analysis of morbidity and mortality. *Obstetrics and Gynecology* 77(3): 465–70.
- Taylor L, Pym M, Bajuk B, Sutton L, Travis S & Banks C 2000. *New South Wales mothers and babies 1998*. NSW Public Health Bulletin Supplement, Number 1, February 2000. Sydney: New South Wales Health Department.

Rate of instrumental vaginal deliveries

Indicator

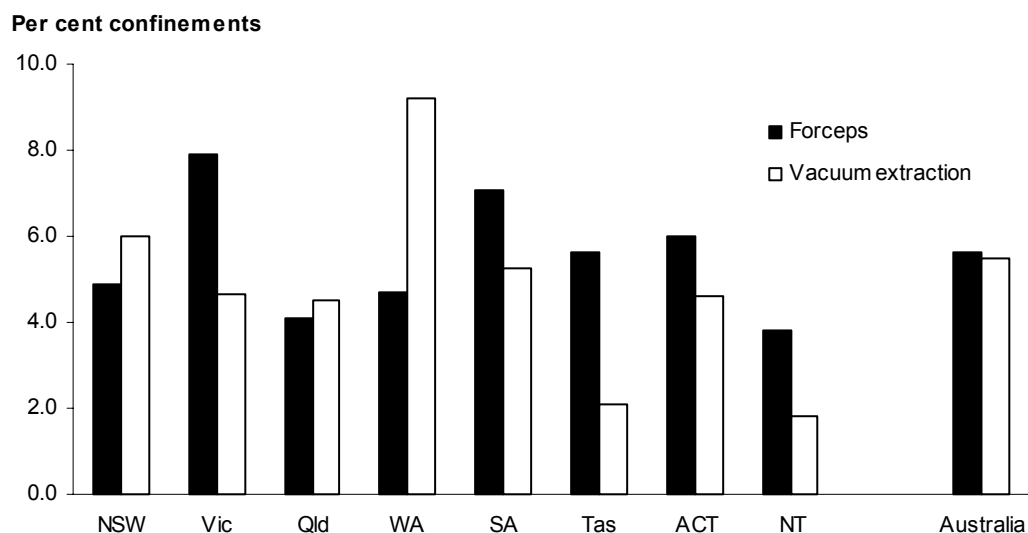
Instrumental deliveries (forceps, vacuum extraction) as a proportion of all confinements

Background information

- Vacuum extraction involves the delivery of an infant using a traction cup that is attached to the infant's head. Forceps delivery involves delivery of an infant using obstetrical forceps.
- Evidence from the systematic review of a number of randomised clinical trials found the use of the vacuum extractor instead of forceps appeared to reduce maternal morbidity (Johanson & Menon 2001).
- In a population-based study of women with low-risk pregnancies in New South Wales in 1996–1997 the authors concluded there was a significantly higher rate of instrumental deliveries among private patients in private hospitals (34%) than for public patients (17%). Results also showed that higher rates of interventions amongst private patients were due to instrumental deliveries rather than caesarean sections (Roberts, Tracy & Peat 2000).
- In a study in Victoria, assisted vaginal births (forceps and vacuum extraction) were associated with the highest rates of maternal morbidity when compared with spontaneous vaginal births (Brown & Lumley 1998). There was an increased likelihood of reporting perineal pain, sexual problems, urinary incontinence, bowel problems and haemorrhoids.
- The overall instrumental delivery rate has dropped from 12.5 per 100 confinements in 1991 to 11.1 per 100 confinements in 1999 (Nassar & Sullivan 2001).
- Between 1991 and 1999 the proportion of forceps deliveries has decreased from 10.0% to 5.6% of all deliveries in Australia. In contrast, vacuum extraction deliveries have risen from 2.5% to 5.5% in the same (Nassar & Sullivan 2001).
- In 1999, there were more vacuum extraction deliveries than forceps deliveries in Western Australia and New South Wales (Figure 32) (Nassar et al. 2001).
- The highest age-specific rate of instrumental delivery was among women aged 30–34 years (11.2 per 100 confinements) with the lowest rate among women aged 15–24 years (8.7 per 100 confinements).
- Indigenous mothers experience less intervention giving birth than non-Indigenous mothers. Between 1994 and 1996, 3.1% of Indigenous births involved forceps delivery compared with 8.0% of all other births; 2.3% of Indigenous births involved vacuum extraction compared with 3.7% of all other births (Day, Sullivan & Lancaster 1999).
- A population-based study of all women having a live baby during 1996 and 1997 in New South Wales found that among low-risk women (irrespective of parity), private patients had higher age-adjusted rates of instrumental delivery than public patients (Roberts, Tracy & Peat 2000).

Current data

- In 1999, there were 13,864 (5.5%) vacuum extractions and 14,253 (5.6%) forceps deliveries resulting in an instrumental delivery rate of 11.1 per 100 confinements (Nassar & Sullivan 2001).



Note: Data for Tasmania unavailable, 1998 data used as an estimate.
Source: Nassar & Sullivan 2001.

Figure 32: Instrumental delivery rates, all confinements, States and Territories, 1999

Data limitations

The ability to track the maternal morbidity associated with instrumental vaginal deliveries is limited by (a) the lack of uniform reporting of maternal morbidity in the National Perinatal Data Collection, and (b) the lack of a data item specifying parity in the AIHW National Hospital Morbidity Database.

Indicator status

Adequate. Although WHO define instrumental deliveries as a proportion of live births, the availability of confinement data in Australia allows the rate to be reported per 100 confinements.

Data source

AIHW National Perinatal Statistics Unit perinatal collection.

References

- Brown S & Lumley J 1998. Maternal health after childbirth: results of an Australian population based survey. *British Journal of Obstetrics and Gynaecology* 105: 156–161.
- Day P, Sullivan EA & Lancaster P 1999. Indigenous mothers and their babies, Australia, 1994–1996. AIHW cat. no. PER 9. Sydney: AIHW National Perinatal Statistics Unit (NPSU).
- Johanson RB & Menon BK 2001. Vacuum extraction versus forceps for assisted vaginal delivery (Cochrane Review) in *The Cochrane Library*, 4. Oxford: Update Software.
- Nassar N & Sullivan EA 2001. Australia's mothers and babies 1999. AIHW cat. no. PER 19. Sydney: AIHW National Perinatal Statistics Unit (NPSU).
- Roberts CL, Tracy S & Peat B 2000. Rates for obstetric intervention among private and public patients in Australia: population based descriptive study. *British Medical Journal* 321: 137–141.

Percentage of births attended by skilled health personnel

Indicator

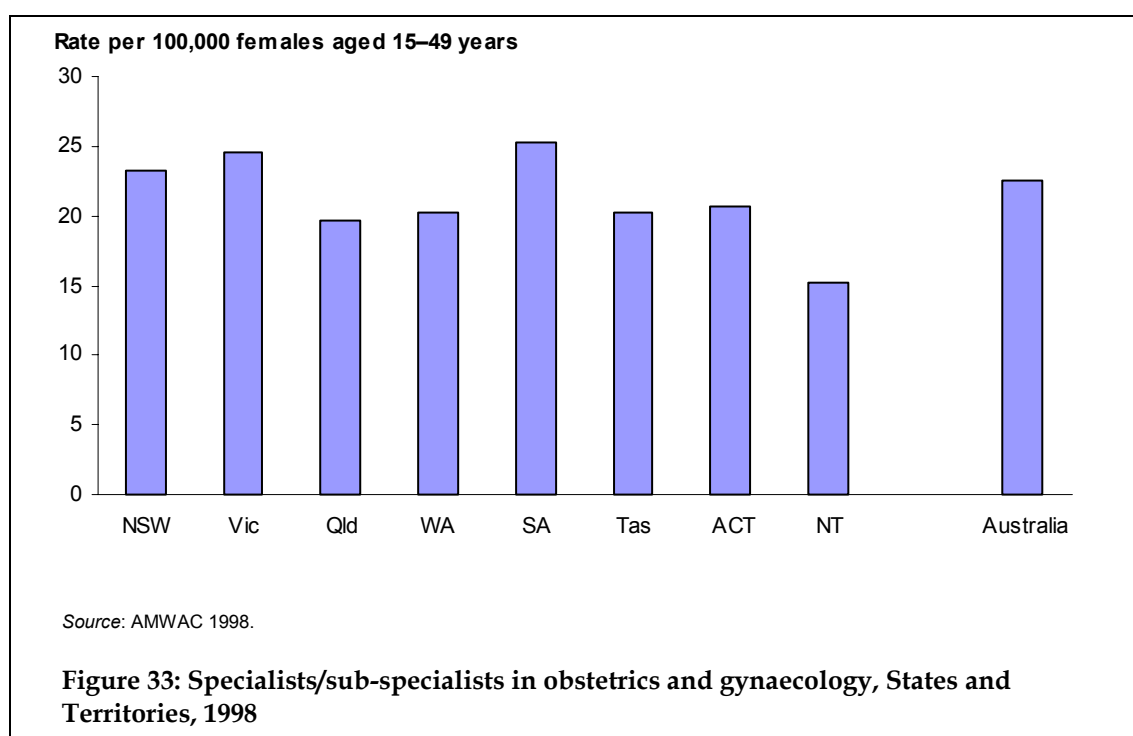
Percentage of births attended by skilled health personnel

Background information

- Skilled health personnel refers to a doctor (specialist or non-specialist), nurse, midwife or other health worker with midwifery skills who can diagnose and manage obstetric complications as well as normal deliveries.
- In Australia, pregnancy care is provided by specialist obstetricians and gynaecologists, general practitioners (GPs) with obstetric training and midwives.
- The person assisting during the time of birth is often called the accoucheur.
- GPs providing obstetric and gynaecology services are qualified with a Diploma of RANZCOG and are able to perform normal and assisted deliveries (AMWAC 1998).
- Midwives are legally qualified to provide total care for the well woman during her pregnancy, birthing and postnatal period.
- Australia has good access to care compared with developing countries. However, the pattern of health care provision varies by region, with specialist involvement more likely in capital cities and less likely in regional areas. In rural and remote areas, GP and midwifery care is predominant (AMWAC 1998).
- In Western Australia, in 1998, obstetricians attended 33.6% of all births and performed three-quarters (75%) of all caesarean sections.
- Medical officers performed the remaining 25% of caesarean section deliveries. Midwives were present at more than one-third of births (37.3%) and were involved in 60% of spontaneous vaginal deliveries. One in four women confined were assisted by a medical officer (Gee & O'Neill 2000).
- A study by the Victorian Perinatal Data Collection unit in 1998 found that an obstetrician was present at the time of birth for 38% of cases and a hospital midwife in another 38% of births (Halliday, Ellis & Stone 2000).
- In 1998, there were 1,055 obstetricians and gynaecologists in Australia, increasing from 974 in 1995 (AIHW 1997; AIHW 2000). There were 2,845 general practitioners with obstetric training (Diploma of RANZCOG) in 1997.
- There were 22.5 obstetricians and gynaecologists per 100,000 females aged 15–49 years in Australia in 1998. The highest rate of service provision was in South Australia (25.2 per 100,000 females 15–49 years), while the lowest rate of 15.2 was in the Northern Territory (Figure 33) (AMWAC 1998).
- The number of obstetricians and gynaecologists in training increased by 3% from 265 in 1995 to 273 in 1998 (AIHW 2000).
- There is some inconsistency in the definition and information regarding the number of midwives in States and Territories. The 1996 National Nursing Labour Force Survey identified 13,209 registered and enrolled nurses working in midwifery (AIHW 1999). Figures based on membership of the Australian College of Midwives suggest there could be 9,000–10,000 midwives in Australia (Tracy, Barclay & Brodie 2000).

Current data

- WHO health indicators reported that in 1991–1993, 99.9% of all deliveries in Australia were attended by trained personnel.



Data limitations

There is no routine collection of data on the birth attendant present during delivery (accoucheur) by States and Territory perinatal data collection units. Development is needed for the birth attendant during pregnancy to be included as a data element in the *National Health Data Dictionary*.

Indicator status

Incomplete.

Data sources

Australian Medical Workforce Advisory Committee.

References

- Australian Institute of Health and Welfare 1997. Medical labour force 1995. AIHW cat. no. HWL 1. Canberra: AIHW (National Health Labour Force Series no. 10).
- Australian Institute of Health and Welfare (AIHW) 1999. Nursing labour force 1998. AIHW cat. no. HWL 14. Canberra: AIHW (National Health Labour Force Series).
- Australian Institute of Health and Welfare 2000. Medical labour force 1998. AIHW cat. no. HWL 15. Canberra: AIHW (National Health Labour Force Series no. 16).
- Australian Medical Workforce Advisory Committee (AMWAC) 1998. The obstetrics and gynaecology workforce in Australia. Sydney: AMWAC.
- Gee V & O'Neill MT 2000. Perinatal statistics in Western Australia, 1998: 16th annual report of the Western Australian Midwives Notification System. Perth: Health Department of Western Australia.
- Halliday J, Ellis I & Stone C 2000. WUDWAW: Who Usually Delivers Whom and Where: report on models of antenatal care. Melbourne: Victorian Perinatal Data Collection Unit, Department of Human Services.
- Tracy S, Barclay L & Brodie P 2000. Contemporary issues in the workforce and education of Australian midwives. Australian Health Review 23(4): 78–88.

Obstetric service providers by rural/remote classification

Indicator

Number of obstetric service providers by rural/remote classification per 100,000 female population

Background information

- A recent report found that the general health of people living in rural and remote areas is poorer than that of those in metropolitan areas. This is evident in the higher mortality rates, lower life expectancy and higher hospitalisation rates for some causes among rural and remote area dwellers (AIHW 1998).
- People in rural and remote areas also have less access to health care compared with those living in metropolitan areas (AIHW 1998). The rural and remote access to reproductive health services, in particular, does not appear to have been quantified.
- In 1998, it was estimated that there were 22.5 obstetrics and gynaecology specialists in Australia per 100,000 females aged 15–49 years (AMWAC 1998).
- The Royal Australian College of Obstetrics and Gynaecology (RACOG – now known as RANZCOG) recommends that the acceptable specialist to population ratio for females in urban areas is 1:10,000 and for rural and remote areas 1:15,000 (AMWAC 1998).
- Specialist obstetricians are not the only medical personnel providing pregnancy care in Australia; midwives and some general practitioners with obstetric training also provide care.
- Findings from a RACOG/AMWAC survey of 501 RACOG fellows suggest that there is little incentive for specialists to practise in rural areas. Reasons stated include long hours, professional isolation, career dislocation, lack of relative financial reward, strain on family/spouse, lifestyle issues and lack of locum cover during leave (AMWAC 1998).

Current data

- Specialist obstetricians and gynaecologists practise mainly in capital cities and metropolitan areas (84.7% of the workforce). Fifteen per cent of specialists are located in rural and remote areas, where 28.5% of the female population lives (AMWAC 1998).
- In 1998, there were more than twice (26.2 versus 12.7 per 100,000 females aged 15–49 years) the number of specialists/sub-specialists on a per capita basis in capital cities and metropolitan areas compared with rural and remote areas (Figure 34).
- Using the urban specialist to population ratio indicator from RANZCOG, the Northern Territory falls below the suggested ratio with 0.3 specialists per 10,000 female population. In rural and remote areas all States and Territories appear to have adequate provision of specialists. There are no rural or remote areas in the Australian Capital Territory (Figure 34) (AMWAC 1998).
- Medicare data presented in Table 13 shows that in 1995–1996, over 95% of obstetric and gynaecology services were provided by specialists in urban and large rural areas. However, in small rural and in remote areas an increasing proportion of services are provided by GPs (AMWAC, 1998).
- According to Medicare data, only half (47.9%) of patients in ‘other remote areas’ have their obstetrics and gynaecology care provided by specialists (Table 13) (AMWAC 1998).
- The majority of nurses employed as clinicians in midwifery, obstetrics and gynaecology in 1995 were based in capital cities/metropolitan centres (74.1%), with only 23.9% located in rural areas and 1.9% in remote areas (AMWAC 1998).

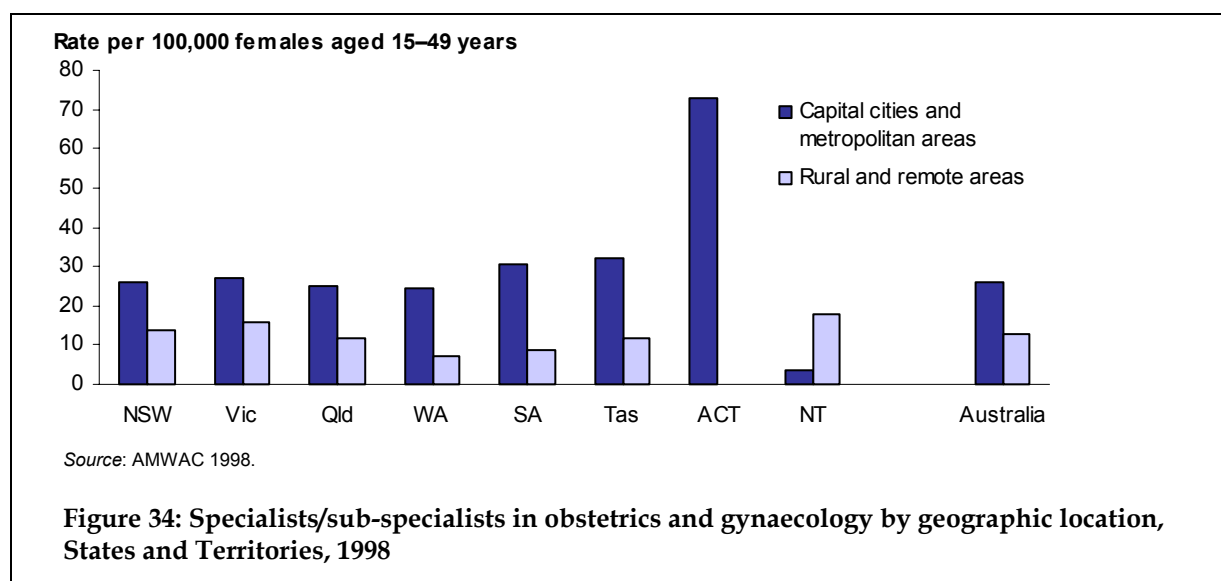


Table 13: Distribution (%) of obstetrics and gynaecology Medicare service providers (including GPs) by geographic location, Australia, 1995–1996

Provider location	Metropolitan		Rural			Remote		Australia
	Capital cities	Other	Large centres	Small centres	Other	Remote centre	Other	
Capital city	97.8	4.9	1.6	3.9	11.3	5.6	12.4	60.1
Other metropolitan	0.5	92.3	0.4	2.0	2.1	1.0	1.1	6.7
Large rural centre	0.2	0.2	94.7	3.2	11.8	5.6	7.4	9.2
Small rural centre	0.5	0.8	1.4	87.7	7.5	1	10.3	9.4
Other rural centre	0.8	1.7	1.6	2.8	66.2	0.8	8.4	11.8
Other rural area	0.1	0.1	0.2	0.1	0.4	82.4	12.4	1.6
Other remote area	0.1	0.2	0.2	0.2	0.6	3.6	47.9	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: AMWAC 1998.

Data limitations

The lack of identified data on all service providers of obstetric care including obstetricians, sub-specialist obstetricians, midwives, GPs and other health professionals, limits accurate mapping of pregnancy care providers and care coverage, particularly in rural and remote areas.

Indicator status

Incomplete. There is limited ascertainment of non-specialist pregnancy care services.

Data source

Australian Institute of Health and Welfare (AIHW 1998; AMWAC 1998; AMWAC and AIHW 1998).

References

- Australian Institute of Health and Welfare 1998. Health in rural and remote Australia. AIHW cat. no. PHE 6. Canberra: AIHW.
- Australian Medical Workforce Advisory Committee (AMWAC) 1998. The obstetrics and gynaecology workforce in Australia. (AMWAC report 1998.6.) Sydney: AMWAC.
- Australian Medical Workforce Advisory Committee (AMWAC) & Australian Institute of Health and Welfare (AIHW) 1998. Medical workforce supply and demand in Australia: a discussion paper. AIHW cat. no. HWL 12. Canberra: AIHW.

Maternal morbidity rate

Indicator

Number of women experiencing severe maternal morbidity per 1,000 confinements

Background information

- 'Maternal morbidity' is generally defined as any illness or injury (to the mother) caused by, aggravated by, or associated with pregnancy or childbirth (National Research Council 2000).
- With decreasing maternal mortality ratios, international attention has been turned to the ascertainment of maternal morbidity. This may be seen as an important indicator of the standard of maternal care during pregnancy, childbirth and the puerperium.
- International estimations of the extent of maternal morbidity range from 16–100 episodes of illness/acute obstetrical complications for every maternal death (Koblinksy 1995; Liskin 1992).
- One recent UK study developed definitions for six severe obstetric morbidities, and found an incidence of 12.0 cases of severe obstetric morbidity per 1,000 deliveries (Waterstone, Bewley & Wolfe 2001).
- International comparisons of maternal morbidity are hampered by the lack of an accepted classification of what constitutes (severe) maternal morbidity.
- The AIHW National Perinatal Data Collection (NPDC) includes data on essential hypertension (pre-pregnancy), pregnancy-induced hypertension, diabetes mellitus, gestational diabetes, epilepsy, antepartum haemorrhage, postpartum haemorrhage, perineal status, retained placenta and major puerperal infection. Further standardisation of data definitions, collection methods and validation is required before these data are considered reliable. The NPDC does not record morbidity data beyond the birth hospitalisation.

Current data

- The AIHW National Hospital Morbidity Database does include data on maternal morbidity. It is a de-identified database and consequently is a database of hospitalisations, not individuals
- The morbidities in Table 14 have been grouped into (a) single-episode morbidities which are likely to occur only once during a given pregnancy and can thus be considered in terms of confinements (rate per 1,000 confinements), and (b) multiple-episode morbidities which may have occurred multiple times during a pregnancy and as such can only be considered in terms of the overall burden of hospitalisation for these complications (rate per 1,000 pregnancy-related hospitalisations).
- Table 14 reports the rates of selected maternal morbidities in the 1994–1996 triennium, excluding data from one State for 1994 and 1995, and records involving false or threatened labour.

Data limitations

- The National Hospital Morbidity Database (NHMD) is not specifically designed as an epidemiological database or to be used in the study of pregnancy-related complications. Key information about pregnancy such as parity, pre-existing medical conditions and risk behaviours such as smoking are not collected.
- There are no uniform data definitions for individual conditions, which limits ascertainment. The NHMD is not of individuals but of hospital separations, therefore it can not be used to track the morbidity of individual women.
- Women re-admitted for the same morbidity may be counted multiple times in the data.

Table 14: Selected maternal morbidity, Australia, January 1994 – December 1996

Type of morbidity	Number	Rate
Single-episode morbidity		
Ruptured uterus	351	0.5 *
Septicaemia	6,175	8.9 *
Pulmonary embolism	510	0.7 *
Third/fourth degree perineal tears	7,877	11.4 *
Multiple-episode morbidity		
Antepartum haemorrhage	33,982	29.8 **
Severe pre-eclampsia/eclampsia	5,921	5.2 **
Postpartum haemorrhage	47,226	41.4 **
Severe venous complications	1,101	1.0 **

*Rate per 1,000 confinements (hospitalisations involving a birth outcome code).

**Ratio per 1,000 pregnancy-related hospitalisations (hospitalisations involving any of the pregnancy, childbirth and puerperium codes from ICD-9-CM).

Source: AIHW National Hospital Morbidity Database.

Indicator status

Incomplete. The lack of population-based data on individual women and their outcomes do not allow complete ascertainment of the burden of maternal morbidity. Surveillance of maternal morbidity in Australia would be strengthened by uniform definitions of maternal conditions reported in the NPDC, the inclusion of key pregnancy-related data items in the AIHW NHMD and the development of linked data allowing the tracking of individual women and their pregnancy outcomes.

Data source

AIHW National Hospital Morbidity Database, January 1994–December 1996, excluding one State for 1994 and 1995 and all cases of false/threatened labour.

References

- Koblinsky MA (1995). Beyond maternal mortality: magnitude, interrelationship, and consequences of women's health, pregnancy-related complications and nutritional status on pregnancy outcomes. *International Journal of Gynaecology and Obstetrics* 48 Supp: S21–S32.
- Liskin LS (1992). Maternal morbidity in developing countries: a review and comments. *International Journal of Gynaecology and Obstetrics* 37(2): 77–87.
- National Research Council (2000). The consequences of maternal morbidity and mortality: report of a workshop (Committee on Population), in HE Reed, MA Koblinsky & WH Moseley (eds), Commission on behavioural and social sciences and education. Washington DC: National Academy Press.
- Waterstone M, Bewley S & Wolfe C 2001. Incidence and predictors of severe obstetric morbidity: case-control study. *British Medical Journal* 322: 1089–1092.

Maternal mortality rate

Indicator

Annual number of maternal deaths per 100,000 live births

Background information

- The maternal mortality ratio in Australia, as calculated by the World Health Organization (WHO 1999) is comparable with other developed countries such as the United Kingdom, Denmark and Ireland.
- Triennial reports on maternal mortality in Australia have been produced since 1964. Maternal deaths are divided into three categories: direct, indirect and incidental. Whilst direct and indirect maternal deaths are related to the pregnant state, incidental maternal deaths are those in which the pregnancy is unlikely to have contributed significantly to the death (Figure 35).
- Maternal mortality as defined by the WHO is 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 (WHO 1992). This definition includes deaths of women from terminations of pregnancy, spontaneous abortion, miscarriage and ectopic pregnancy, but excludes deaths from incidental causes. Historically, the Australian convention has been to report maternal deaths with deaths from incidental causes included. Deaths from assisted reproduction technologies where pregnancy has not occurred are also excluded
- The maternal mortality ratio reported here includes deaths occurring up to 42 days post-pregnancy or post-termination. This definition equates to what are known internationally as 'pregnancy-related deaths'.
- State and Territory maternal mortality committees collect maternal death data through a variety of formal and informal

channels. In 2001, for the first time, three main data sources were used to identify maternal deaths: State and Territory Confidential Death Enquiries, Australian Bureau of Statistics data and hospital inpatient statistics. This was the first time inpatient hospital statistics have been used to ascertain maternal deaths (NHMRC & AIHW 2001).

Current data

- There were 104 maternal deaths in the period of 1994–1996. Of those 47 were classified as direct, 21 as indirect and 34 as incidental deaths (Table 15).
- The maternal mortality ratio in 1994–1996 using WHO definitions was 8.8 per 100,000 live births. The Australian maternal mortality ratio for 1994–1996 was 13.5 per 100,000 live births.

Data limitations

- The existence of a passive reporting system of maternal deaths to State and Territory Confidential Death Enquiries.
- The lack of national guidelines for the classification of maternal deaths by State and Territory maternal mortality committees.
- The lack of adequate classification of maternal cause of death in the National Hospital Morbidity Database (ICD-9-AM, ICD-10-CM) hampers the ascertainment of maternal deaths in inpatient hospital statistics.
- The exclusion of three late deaths that occurred outside the 42 days post-pregnancy time frame. Two of these deaths were classified as direct maternal deaths with causes of death of pulmonary embolus and postpartum cardiomyopathy.

Figure 35: Classification of maternal deaths in Australia

<i>Direct deaths:</i> are those resulting from obstetric complications of the pregnant state (pregnancy, labour and puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above. They are complications of the pregnancy itself, e.g. eclampsia, amniotic fluid embolism, rupture of the uterus, postpartum haemorrhage.
<i>Indirect deaths:</i> are those resulting from pre-existing disease or disease that developed during pregnancy and was not due to direct obstetric causes, but which may have been aggravated by the physiological effects of pregnancy, e.g. heart disease, diabetes, renal disease.
<i>Incidental deaths:</i> are those due to conditions occurring during pregnancy, where the pregnancy is unlikely to have contributed significantly to the death, although it is sometimes possible to postulate a distant association, e.g. road accidents, malignancies.

Source: NHMRC & AIHW 2001.

Table 15: Maternal mortality ratio, Australia, 1994–1996

Maternal mortality ratio	Number	Percent	Rate*
Direct maternal deaths	47	45%	6.1
Indirect maternal deaths	21	20%	2.7
Incidental maternal deaths	36	35%	4.7
Total	104	100%	13.5

*Per 100,000 live births.

The denominator used in Australia to calculate maternal mortality ratios is confinements, however for comparability with World Health Organization figures a live birth denominator has been used.

Source: AIHW National Perinatal Statistics Unit 2001.

Indicator status

Adequate. A national maternal mortality ratio is calculated and published on a triennial basis. Due to the small number of maternal deaths, the reports are triennial, not annual. The use of multiple data sources for complete ascertainment of maternal deaths is important for accurate reporting of this rare, but serious event. The development of uniform reporting standards would enhance the ascertainment of maternal deaths as would the development of a better coding framework for hospital deaths.

Data sources

State and Territory Maternal Mortality Committees and AIHW National Hospital Morbidity Database.

References

- National Health and Medical Research Council (NHMRC) & Australian Institute of Health and Welfare (AIHW) 2001. Report on maternal deaths in Australia. Canberra: NHMRC.
- World Health Organization (WHO) 1992. International statistical classification of diseases and related health problems, 10th revision (ICD-10). Geneva: WHO.
- World Health Organization (WHO) 1999. World health report 1999. Geneva: WHO.

Ectopic pregnancy rate

Indicator

Ectopic pregnancy rate per 1,000 confinements per year

Background information

- Ectopic pregnancy is where implantation of the blastocyst occurs outside the uterine cavity, that is, the presence of a gestation outside the uterus. The majority of ectopic pregnancies involve the fallopian tubes. Ectopic pregnancies are not uncommon, with more than 1 in every 100 pregnancies in the United States being an ectopic pregnancy (Cunningham et al. 1997).
- Earlier and more accurate diagnosis of ectopic pregnancy has allowed a wider array of conservative treatment options ranging from less radical surgery to medical treatment and even expectant management, in certain cases (Choong 1998).
- The sub-population of women utilising assisted reproductive techniques is at particularly high risk of ectopic pregnancy (Choong 1998).

Current data

- In 1996 there were 4,165 separations involving a diagnosis of ectopic pregnancy, representing a rate of 16.5 to every 1,000 confinements recorded in the National Perinatal Data Collection (Figure 36).
- In 1996, the highest age-specific hospital separation rate involving ectopic pregnancy was among women aged 40 and over (35.9 per 1,000 confinements) while the lowest age-specific rate was among women aged 15–19 years (12.7 per 1,000 confinements) (Figure 36).
- In 1996, the highest ectopic pregnancy separation rate was in Western Australia (19.6 per 1,000 confinements) with the lowest separation rate in Victoria (14.5) (Figure 37).
- Health Insurance Commission data from the Medicare Benefits Schedule indicate

there were 1,764 ectopic pregnancies removed between 1998 and 2000 in free-standing clinics and among private patients in public and private hospitals. The number of services dropped from 637 in 1998, to 575 in 1999 and 552 in 2000 (Item numbers 35676–35678) (HIC 2000).

- There were 825 ectopic pregnancies after assisted conception¹⁰ between 1990 and 1998, representing 3.1% of assisted conception pregnancies. The proportion of ectopic pregnancies after assisted conception has decreased from 5.0% in 1990 to 2.4% in 1998. This declining trend is partly attributable to relatively fewer ectopic pregnancies among the increasing proportion of women whose infertility was due to male factors (Hurst, Shafir & Lancaster 1999).

Data limitations

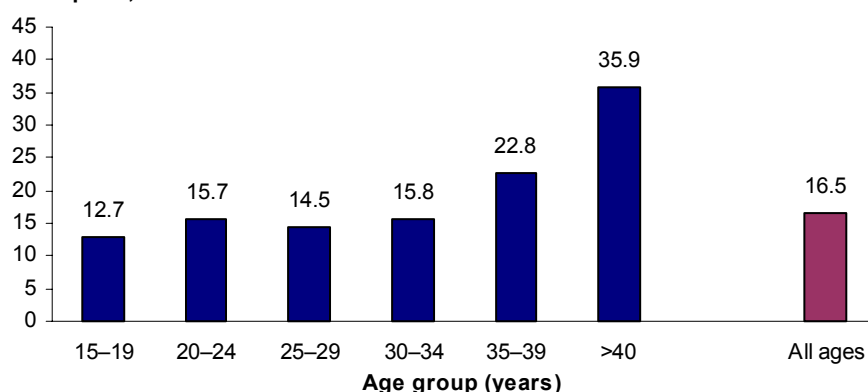
- AIHW National Hospital Morbidity data only identify ectopic pregnancies treated in the hospital setting.
- Health Insurance Commission data only include services claimed from MBS. Services to public patients in public hospitals are not included.

Indicator status

Incomplete. With advances in the medical treatment of ectopic pregnancies, it is difficult to calculate an accurate rate. Currently, the rate of ectopic pregnancy only includes surgical interventions in the hospital setting. Medical and expert care of ectopic pregnancy may mean this condition does not always result in hospital admission.

¹⁰ Assisted conception as defined here includes in-vitro fertilisation (IVF), gamete intrafallopian transfer (GIFT), and intracytoplasmic sperm injection (ICSI).

Ratio per 1,000 confinements



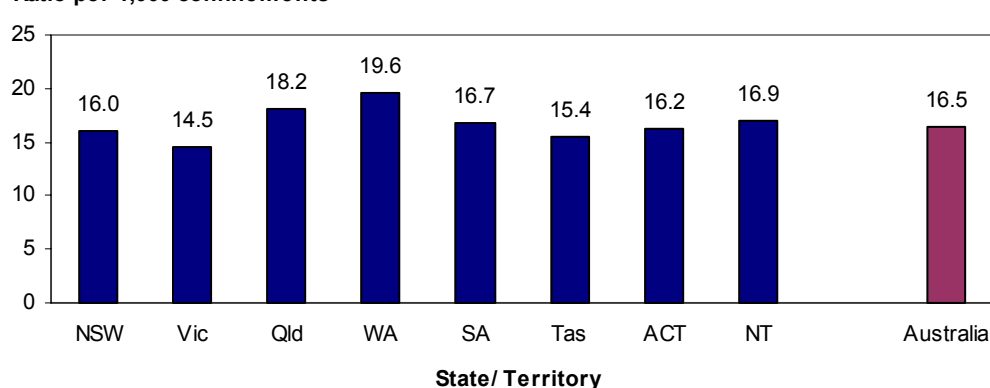
Notes: 1. The above table includes women aged 15-54 years.

2. Rate calculated per 1,000 confinements as recorded in the National Perinatal Data Collection (Day, Sullivan & Lancaster 1999).

Source: AIHW National Hospital Morbidity Database.

Figure 36: Age-specific separation rates with a diagnosis of ectopic pregnancy, public and private hospitals, Australia, 1996

Ratio per 1,000 confinements



Notes: 1. The above table includes women aged 15-54 years.

2. Rate calculated per 1,000 confinements as recorded in the National Perinatal Data Collection (Day, Sullivan & Lancaster 1999).

Source: AIHW National Hospital Morbidity Database.

Figure 37: Ectopic pregnancy separation rates by State/Territory of admission, public and private hospitals, Australia, 1996

Data sources

- AIHW National Hospital Morbidity Database.
- Health Insurance Commission Medicare Benefits Schedule statistics (HIC 2000).
- Assisted conception database, National Perinatal Statistics Unit.

References

- Choong S 1998. Ectopic pregnancy: recent advances. Bulletin of the Australasian Society for Ultrasound in Medicine 1(2).

- Cunningham FG, MacDonald PC, Gant NF, Leveno KJ, Gilstrap LC, Hankins GDV & Clark SL (eds) 1997. Williams Obstetrics, 20th edition. Connecticut: Appleton and Lange.
- Health Insurance Commission (HIC) 2000. Medicare Benefits Schedule item reports accessible at HIC online: www.hic.gov.au/statistics.
- Hurst T, Shafir E & Lancaster P 1999. Assisted conception, Australia and New Zealand 1997. Sydney: AIHW National Perinatal Statistics Unit.

Perinatal mortality rate

Indicator

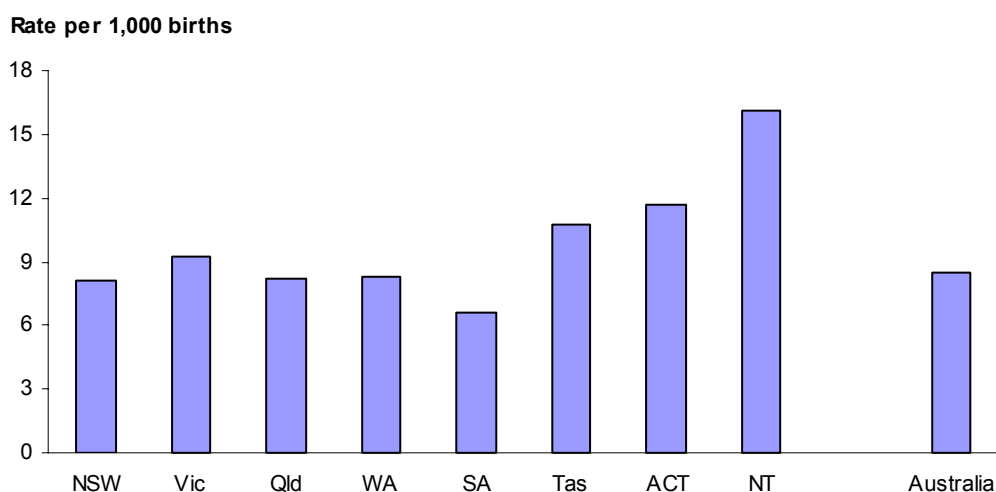
Stillbirth or neonatal death per 1,000 total births

Background information

- Perinatal deaths comprise fetal and neonatal deaths. A fetal death (stillbirth) is the delivery of a child of at least 400 g birthweight or at least 20 weeks gestation who did not breathe or show any other evidence of life, such as a heartbeat, pulsation of the umbilical cord or definite movement of voluntary muscles. A neonatal death is the death of a liveborn infant within 28 days of birth (ABS 2000).
- There are a number of variations in the definition of perinatal deaths. The Australian Bureau of Statistics (ABS) reports the registered perinatal deaths of infants of at least 400 g or 20 weeks gestation where birthweight is unknown. The World Health Organization (WHO) definition includes infants of 500 g, or 22 weeks gestation where birthweight is unknown (Nassar & Sullivan 2001).
- Respiratory conditions (hypoxia, birth asphyxia and other respiratory conditions), congenital anomalies and slow fetal growth and immaturity accounted for approximately half (52%) of all perinatal deaths in 1999. Deaths attributable to respiratory causes have decreased over the last decade from 36.7% in 1989 to 22.5% in 1999 (ABS 2000).
- Complications of the placenta, cord and membrane, hypertension and multiple pregnancy were the major maternal conditions recorded in almost two-thirds of all perinatal deaths in 1999 (ABS 2000).
- In 1999, there was no specific cause of death recorded for 35% of perinatal deaths (ABS 2000).

Current data

- There were 2,133 perinatal deaths registered in Australia in 1999, a rate of 8.5 deaths per 1,000 total births. The fetal death rate was 5.1 per 1,000 births and the neonatal death rate was 3.4 per 1,000 live births (ABS 2000).
- Perinatal mortality rates have declined dramatically in Australia during the last three decades from 22.3 per 1,000 births in 1973 to 8.5 per 1,000 births in 1999. Neonatal death rates have fallen more than the fetal death rate (Nassar & Sullivan 2001).
- The perinatal mortality rates varied between States and Territories, ranging from 6.6 per 1,000 births in South Australia to 16.1 in the Northern Territory (Figure 38) (ABS 2000).
- In 1999, mothers aged less than 20 years and 40 years and over had the highest perinatal death rates of 13.8 and 13.4 per 1,000 births, respectively (ABS 2000).
- Births to Indigenous mothers accounted for 3.2% of all births in Australia between 1996 and 1998. The perinatal death rates were considerably higher for babies of Indigenous mothers (20.7 per 1,000 births) compared with babies of non-Indigenous mothers (9.8 per 1,000 births) (ABS & AIHW 2001).
- Perinatal mortality rates increased dramatically with multiple births. Perinatal deaths were four times and eight times higher for twins and higher order multiple births, respectively, compared with singleton births (AIHW NPSU perinatal collection and ABS perinatal deaths data, 2001).



Source: ABS 2000.

Figure 38: Fetal, neonatal and perinatal mortality rates, States and Territories, 1999

Data limitations

- Over one-quarter (26%) of perinatal deaths do not have a specific cause of death recorded.
- Time lag between the occurrence of a death and the registration of the event so that some deaths which occurred late in the year are registered in the early part of the following year.
- Analysis of gestational age and birthweight are limited by the fact that not all perinatal deaths are linked to the birth record in the perinatal data collection.
- Varying definitions of perinatal death restrict international comparisons of perinatal mortality.

Indicator status

Adequate.

Data source

Australian Bureau of Statistics.

References

- Australian Bureau of Statistics (ABS) 2000. Causes of death, Australia 1999. Cat. no. 3303.0. Canberra: ABS.
- Australian Bureau of Statistics (ABS) & Australian Institute of Health and Welfare (AIHW) 2001. The health and welfare of Australia's Aboriginal and Torres Strait Islander peoples. Cat. no. 4704.0. Canberra: ABS.
- Nassar N & Sullivan EA 2001. Australia's mothers and babies 1999. AIHW cat. no. PER 19. Sydney: AIHW National Perinatal Statistics Unit.

Infant mortality rate

Indicator

Deaths of infants aged less than one year per 1,000 live births

Background information

- Infant deaths are, in general, divided into neonatal and postneonatal periods. Deaths in the neonatal period are those occurring in the first 28 days after birth (0–27 days), while postneonatal deaths are those occurring in the remainder of the first year (28 days to 364 days).
- Rates of infant mortality have tended to be used as a national indicator of standard of living and socioeconomic wellbeing.
- Socioeconomic disparities in overall rates of infant mortality are evident (Turrell & Mengerson 2000).
- Two major groups of causes accounted for 95% of all neonatal deaths during the 15-year period 1982–1996. These were: perinatal conditions (e.g. hypoxia, birth asphyxia, fetal growth problems) (62% of neonatal deaths) and congenital malformations (33%) (ABS 1998).
- Three causes accounted for 76% of all postneonatal deaths during the 15-year reference period. These were: sudden infant death syndrome (SIDS) (49%), congenital malformations (18%) and perinatal conditions (9%) (ABS 1998).
- SIDS emerged as the leading cause of death in the postneonatal period, accounting for nearly half of all postneonatal deaths (ABS 1998). Ninety-five per cent of SIDS deaths occur in the first year of life (SIDS Australia 2001).

Current data

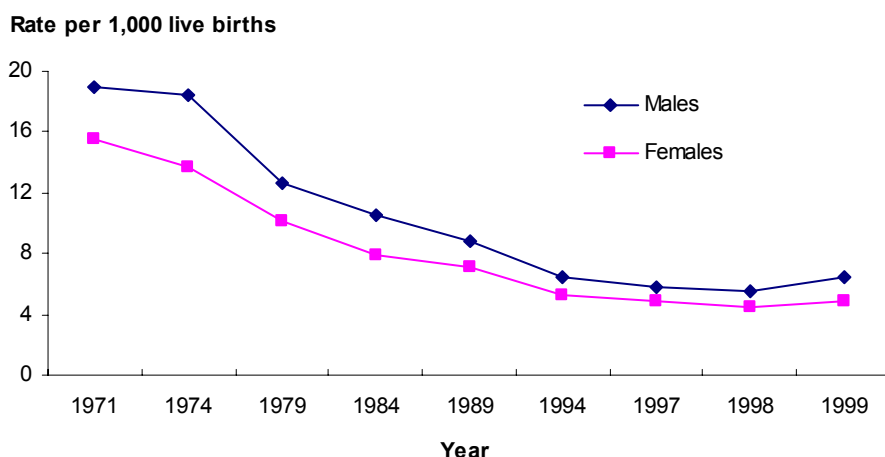
- The 1999 infant mortality rate was 5.7 deaths per 1,000 live births, a slight increase from the 1998 rate of 5.0 deaths

per 1,000 live births (ABS 2000). There was a downward trend in the infant mortality rate in Australia between 1987 and 1996 (Moon, Rahman & Bhatia 1998; ABS 2000) (Figure 39).

- Over one-third (37%) of all infant deaths in 1999 occurred within one day of birth (ABS 2000d).
- Infant deaths accounted for 65% of childhood deaths (0–14 years) in 1996 (Moon, Rahman & Bhatia 1998).
- The infant mortality rate varied between States and Territories over the period 1982–1996. Death rates were considerably higher in the Northern Territory, which particularly reflects the high proportion of Indigenous children. The Australian Capital Territory, South Australia and Victoria had the lowest infant mortality rates at the end of the period (ABS 1998).
- The 1999 infant mortality rate for Indigenous Australians was two and a half times the total Australian rate (ABS 2000).
- The highest SIDS death rate was recorded in 1986 (2.18 deaths per 1,000 live births) (SIDS Australia 2001).
- After the introduction of the 'Reducing the risks' program in 1991, the SIDS death rate dropped from 1.91 (1991) to 0.68 (1997) per 1,000 live births (SIDS Australia 2001).

Data limitations

The registration of deaths in Australia is virtually complete. However, there is a time lag between the occurrence of a death and the registration of the event so that some deaths which occurred late in the year are registered in the early part of the following year.



Source: ABS 2000.

Figure 39: Infant mortality rates, Australia, 1971–1999

Indicator status

Adequate.

Data sources

Australian Bureau of Statistics.

References

- Australian Bureau of Statistics (ABS) 1996. Australian social trends 1996: family formation: trends in fertility. Canberra: ABS.
- Australian Bureau of Statistics (ABS) 1998. Causes of infant and child deaths, 1982–96 Australia. Cat. no. 4398.0. Canberra: ABS.
- Australian Bureau of Statistics (ABS) 2000. Causes of death, Australia, 1999. Cat. no. 3302.0. Canberra: ABS.
- Moon L, Rahman N & Bhatia K 1998. Australia's children: their health and wellbeing 1998. AIHW cat. no. PHE 7. Canberra: AIHW.
- SIDS Australia 2001. Australian SIDS death rate 1979–1997. Accessible at: www.sidsaustralia.org.au
- Turrell G & Mengerson K 2000. Socioeconomic status and infant mortality in Australia: a national study of small urban areas, 1985–1989. Social Science and Medicine 50: 1209–1225.

Incidence of low birthweight births

Indicator

Proportion of all live births less than 2,500 g birthweight

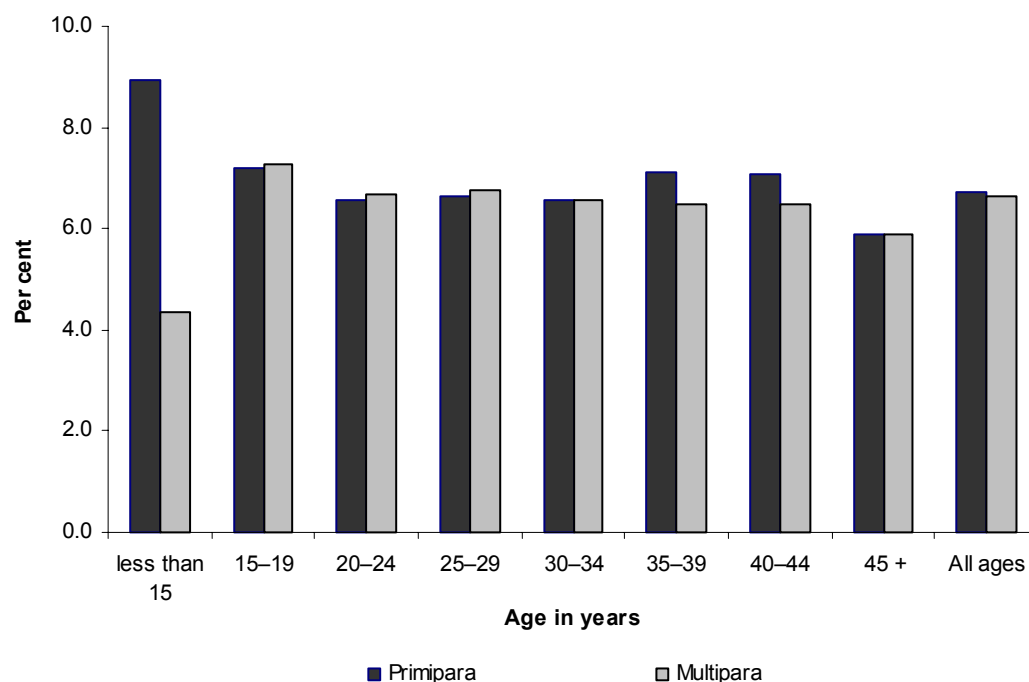
35 years in primiparous women, history of one or more spontaneous abortions, induced abortions or perinatal deaths, chronic illness, public health insurance and single marital status (Herceg, Simpson & Thompson 1994).

Background information

- The *National Health Data Dictionary* (NHDD) defines birthweight as the first weight of the fetus or baby obtained after birth. The World Health Organization (WHO) defines the following categories:
 - low birthweight: less than 2,500 g
 - very low birthweight: less than 1,500 g
 - extremely low birthweight: less than 1,000 g (AIHW 1999).
- The weight of infants at birth is a principal determinant of their chances of survival and good health. Low birthweight is a risk factor for neurological and physical disabilities, the risk of adverse outcomes increasing with decreasing birthweight.
- Low birthweight may be an indicator of inadequate fetal growth, resulting from pre-term birth or fetal growth restriction or both (Institute of Medicine 1985).
- Low birthweight is a major determinant of neonatal mortality. Infants weighing less than 2,500 g are almost 40 times more likely to die within the first 28 days than infants of normal birthweight (Institute of Medicine 1985).
- A cohort study in Victoria of 25,231 infants born with congenital malformations between 1983 and 1995 found that congenital malformations were more common in infants of multiple pregnancies and low birthweight (Riley, Halliday & Lumley al. 1998).
- In a study of low birthweight babies in the Australian Capital Territory, low birthweight infants were more likely than normal birthweight babies to have 1- and 5-minute Apgar scores of less than 7, to need resuscitation and to be transferred to other hospitals. The risk of low birthweight was associated with maternal primiparity, maternal age greater than

Current data

- In 1999, among 257,394 births in Australia, there were 17,208 (6.7%) infants of low birthweight. There were 3,782 (1.5%) very low birthweight and 2150 (0.8%) extremely low birthweight infants (Nassar & Sullivan 2001).
- The Northern Territory had the highest incidence of low birthweight infants (10.06%), and New South Wales the lowest (6.3%) (Nassar & Sullivan 2001).
- Mothers aged 30–34 years had the lowest incidence of low birthweight infants (6.1%), whereas mothers aged less than 16 years and over 40 had the highest occurrence, 13.2% and 9.2%, respectively. Mothers having their first baby were more likely than multiparous mothers to have a low birthweight baby (Figure 40) (Nassar & Sullivan 2001).
- The incidence of low birthweight babies amongst Indigenous mothers in 1999 was 13.0%, almost twice the rate of 6.5% for non-Indigenous mothers (Nassar & Sullivan 2001).
- Female babies were more likely to be of low birthweight (7.2%) than males (6.2%) (Nassar & Sullivan 2001).
- Low birthweight babies were more common amongst mothers born in India (9.5%) and the Philippines (7.4%) and least likely amongst mothers born in China (4.5%), and Lebanon (5.3%) (Nassar & Sullivan 2001).
- In 1999, approximately three-quarters of all fetal (71.40%) and neonatal (72.1%) deaths had a birthweight less than 2500 g (Nassar & Sullivan 2001).



Source: AIHW NPSU perinatal collection, 2001.

Figure 40: Proportion of low birthweight babies by maternal age, all births, Australia, 1999

Data limitations

In 1998, the infant's birthweight was not recorded in only 0.05% of all live births and stillbirths in Australia.

Indicator status

Adequate.

Data source

AIHW National Perinatal Statistics Unit (NPSU) perinatal collection.

References

- Australian Institute of Health and Welfare (AIHW) 1999. National health data dictionary. Version 8.0. AIHW cat. no. HWI 18. Canberra: AIHW.
- Herceg A, Simpson JM & Thompson JF 1994. Risk factors and outcomes associated with low birthweight delivery in the Australian Capital Territory 1989-90. *Journal of Paediatrics and Child Health* 30(4): 331-335.
- Institute of Medicine 1985. Preventing low birthweight: Summary. Committee to Study the Prevention of Low Birthweight. Division of Health Promotion and Disease Prevention. Washington DC: Institute of Medicine National Academy Press.
- Nassar N & Sullivan EA 2001. Australia's mothers and babies 1999. AIHW cat. no. PER 19. Sydney: AIHW National Perinatal Statistics Unit.
- Riley MM, Halliday JL & Lumley LM 1998. Congenital malformations in Victoria, Australia, 1983-95: an overview of infant characteristics. *Journal of Paediatrics and Child Health* 34(3): 233-240.

Sex ratio of births

Indicator

Ratio of male to female births

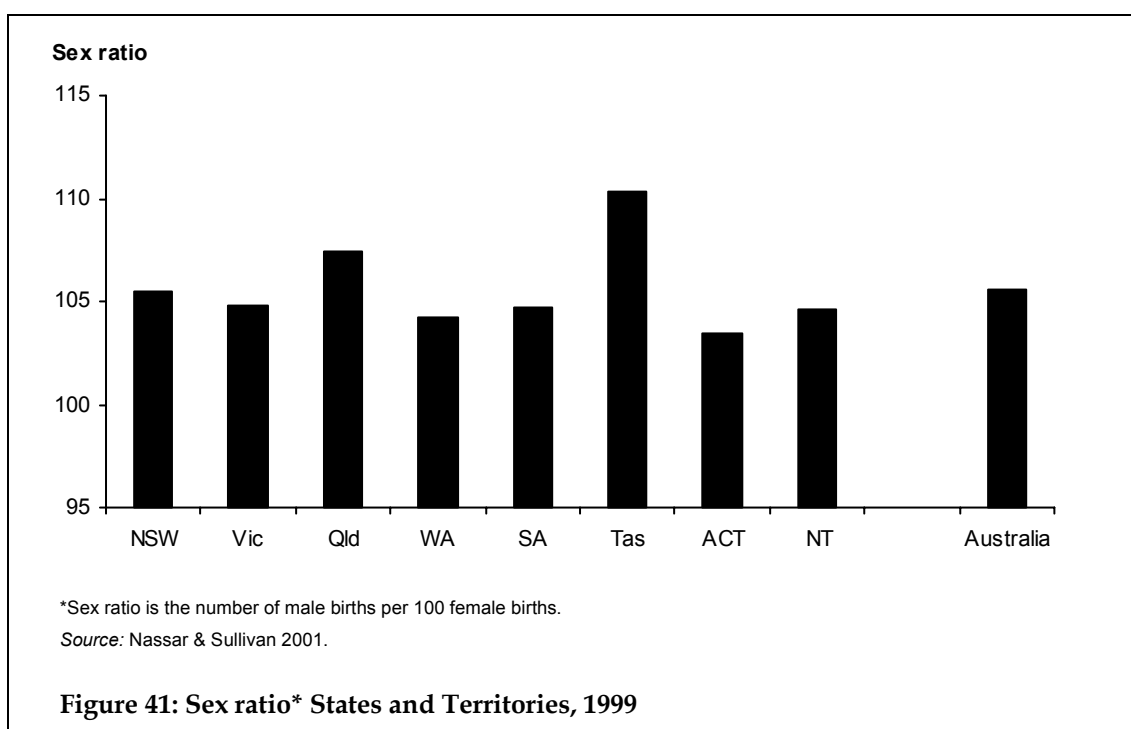
The sex ratio is the number of male births expressed per 100 female births. It may also be reported as the male proportion of total births.

Background information

- Prenatal sexual differentiation is a complex process which takes place between 6 and 9 weeks of gestation (Davis, Gottlieb & Stampnitzky 1998).
- A number of factors that may reduce the male proportion include older age of parents, stress, in-vitro fertilisation, non-Hodgkins lymphoma, hepatitis and use of fertility drugs, such as clomiphene (Davis, Gottlieb & Stampnitzky 1998).
- Studies have found that a decrease in the proportion of males born may be attributed to exposure to specific workplace and environmental contaminants such as pesticides, aluminium industry, alcohol, lead, solvents and other toxic agents (Davis, Gottlieb & Stampnitzky 1998).
- A study of children born to parents exposed to dioxin in a chemical explosion in Seveso, Italy, 1976 found higher dioxin exposure of the father decreased the likelihood of having sons compared to daughters. For those aged under 19 at the time of the accident, the sex ratio was 62 boys born for every 100 girls (Mocarelli et al. 2000).

Current data

- In 1999, among 257,394 births in Australia, the sex ratio was 105.6 male births per 100 female births (Nassar & Sullivan 2001).
- The sex ratio varied among the States and Territories. The highest sex ratio of 110.4 was in Tasmania and the lowest of 103.4 in the Australian Capital Territory (Figure 41) (Nassar & Sullivan 2001).
- The proportion of males for singleton births was 0.513 (sex ratio of 105.6), 0.511 (sex ratio of 104.7) for twins and 0.508 (sex ratio of 103.4) for other multiple births (Nassar & Sullivan 2001).
- In 1999, among 4,730 assisted conception births of at least 20 weeks gestation the sex ratio was 106.8 male births per 100 female births. The sex ratio varied amongst different methods of assisted conception, ranging from 109.0 for IVF to 105.4 for intracytoplasmic sperm injection (ICSI) (Hurst & Lancaster 2001).
- In an Australian study of the proportion of male births between 1921–1925 and 1991–1995, there was a slight, but insignificant, increase from 0.5125 to 0.5133. This finding was in contrast to the declining trends in many countries in the northern hemisphere (Lancaster & Day 1998).



Data limitations

None.

Indicator status

Adequate.

Data source

AIHW National Perinatal Statistics Unit (NPSU) perinatal collection.

- Mocarelli P, Gerthoux PM, Ferrari E, et al. 2000. Paternal concentrations of dioxin and sex ratio of offspring. The Lancet 355: 158–163.
- Nassar N & Sullivan EA 2001. Australia's mothers and babies 1999. AIHW cat. no. PER 19. Sydney: AIHW National Perinatal Statistics Unit.

References

- Davis DL, Gottlieb MB & Stampnitzky JR 1998. Reduced ratio of male to female births in several industrial countries: a sentinel health indicator? Journal of the American Medical Association 279(13): 1018–1023.
- Hurst T & Lancaster P 2001. Assisted conception Australia and New Zealand 1999 and 2000. AIHW cat. no. PER 16. Sydney: AIHW National Perinatal Statistics Unit.
- Lancaster PAL & Day PL 1998. Declines in population sex ratios at birth (letters). JAMA 280(13): 1139.

Cancer of the reproductive tract

The incidence of selected female and male reproductive tract cancers:

- Proportion of women screened for cervical cancer
- Incidence and mortality of cervical cancer
- Incidence and mortality of ovarian cancer
- Incidence and mortality of testicular cancer

Proportion of women screened for cervical cancer

Indicator

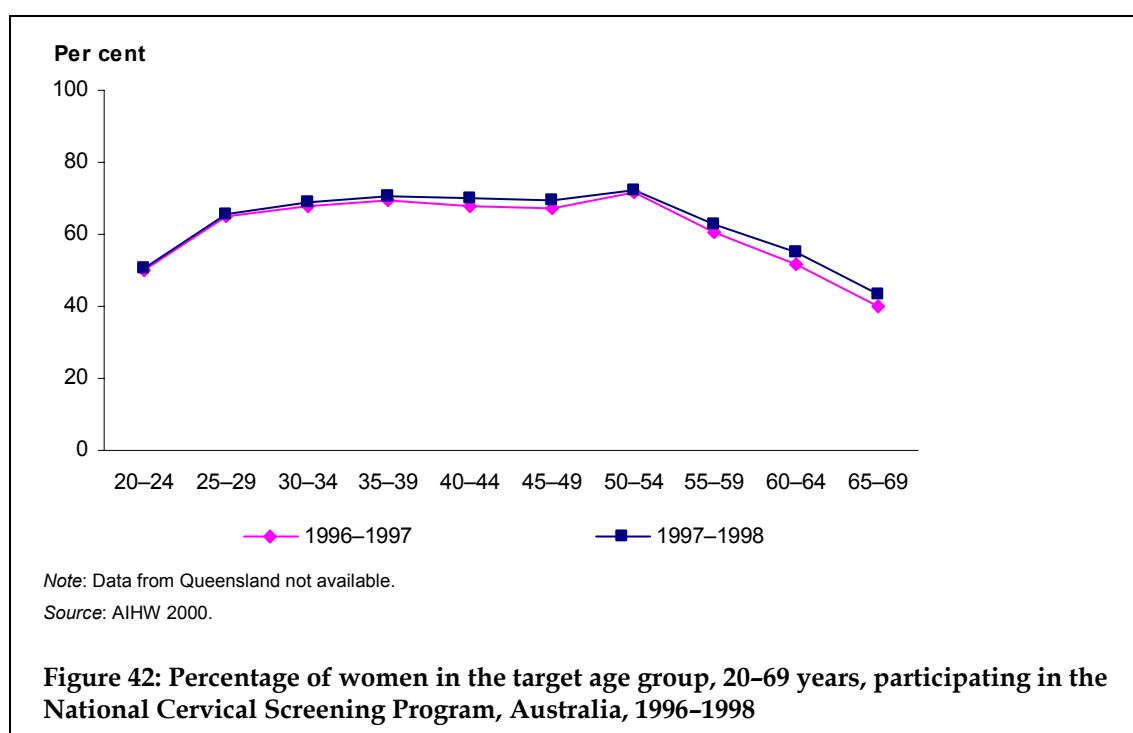
Proportion of women aged 20–69 years screened in a two-year period for cancer of the cervix

Background information

- Cervical screening has been available in Australia on an ad hoc basis since the 1960s, however, in the early 1990s an organised national approach to cervical screening was introduced.
- The major objective of the National Cervical Screening Program is to minimise the incidence of cervical cancer by detecting treatable pre-cancerous lesions before their progression to cancer (AIHW 2000).
- Women aged 20–69 years have been identified as the target population group for cervical screening. The current Australian recommendation for cervical screening is for all women in the target age group 20–69 years who have been sexually active at any stage in their lives to have a Pap smear every 2 years until the age of 70 years (AIHW 2000).
- Cervical cytology registers have been legislated and implemented in all States and Territories to provide reminder services for re-screening and follow-up for women with abnormal Pap smears.
- A number of Australian studies have found that 70% or more of women who get cervical cancer are either unscreened or under-screened (New South Wales Cervical Screening program 2000).
- Increased recruitment for cervical screening of Indigenous and older women and women from non-English-speaking backgrounds is required to improve overall participation rates (AIHW 2000).

Current data

- Cervical cancer is the 15th most common cause of cancer deaths in Australian women (AIHW 2000).
- In 1997, there were 795 new cases and 291 deaths due to cancer of the cervix (AIHW & AACR 2000).
- During the period 1997–1998, 2,653,504 (63.9%) Australian women, aged 20–69 years, were screened for cervical cancer (AIHW 2000). There was little difference in participation rates between States and Territories, ranging from 68.1% in Victoria to 60.1% in New South Wales. However, there were no data available for Queensland.
- The overall number of women, in the target age group 20–69 years, screened for cervical cancer increased by 90,396 (3.5%) between 1996–1997 and 1997–1998. Participation rates increased with age, peaking at 72.5% for women in the 50–54 year age group and then steadily decreased for women aged 55 years and over (Figure 42) (AIHW 2000).
- Responses from the 1995 National Health Survey reveal that, overall, 84% of women had had a Pap smear test in the past, the majority (68%) in the last 2 years. Women who spoke a language other than English at home were less likely to have had a Pap smear test (61%) compared to women who usually spoke English at home (86%) (ABS 1997).
- Almost half (47.9%) of the women aged 18–23 years surveyed in the Australian Longitudinal Study on Women's Health in 1996 had never had a Pap smear. However, over seven in ten (71.6%) women aged 45–49 years had had a Pap smear in the last 2 years. There was a marginal difference in screening rates with 70.8% of women from capital city/metropolitan areas screened compared to 68.4% of women from remote areas (Research Institute for Gender and Health 1997).



Data limitations

- No cervical screening participation rates are available for Queensland prior to 1999. The Queensland Health Pap Smear Register commenced in February 1999.
- No data are collected regarding Indigenous participation rates in cervical screening programs due to the difficulties and poor ascertainment of Indigenous identification in health data collections. Only cervical cancer mortality data are available for Indigenous populations and only from Western Australia, South Australia and Northern Territory where it is considered of adequate quality to be published.

Indicator status

Adequate from 1999.

Data source

Australian Institute of Health and Welfare; Australasian Association of Cancer Registries; and the Commonwealth Department of Health and Aged Care National Cervical Screening Program.

References

- Australian Bureau of Statistics (ABS) 1997. National health survey: summary of results, Australia, 1995. Cat. no. 4364.0 Canberra: ABS.
- Australian Institute of Health and Welfare (AIHW) 2000. Cervical screening in Australia 1997-1998. AIHW cat. no. CAN 9. Canberra: AIHW (Cancer Series no. 14).
- Australian Institute of Health and Welfare (AIHW) & Australasian Association of Cancer Registries (AACR) 2000. Cancer in Australia 1997: incidence and mortality data for 1997 and selected data for 1998 and 1999. AIHW cat. no. CAN 10. Canberra: AIHW (Cancer Series no. 15).
- New South Wales Cervical Screening Program 2000. Strategic plan 2000-2004. Sydney: NSW Health.
- Research Institute for Gender and Health, University of Newcastle 1997. Women's health Australia: data book for the baseline survey of the Australian longitudinal study on women's health. Newcastle: Women's Health.

Incidence and mortality of cervical cancer

Indicator

Incidence and mortality rates of cervical cancer per 100,000 female population

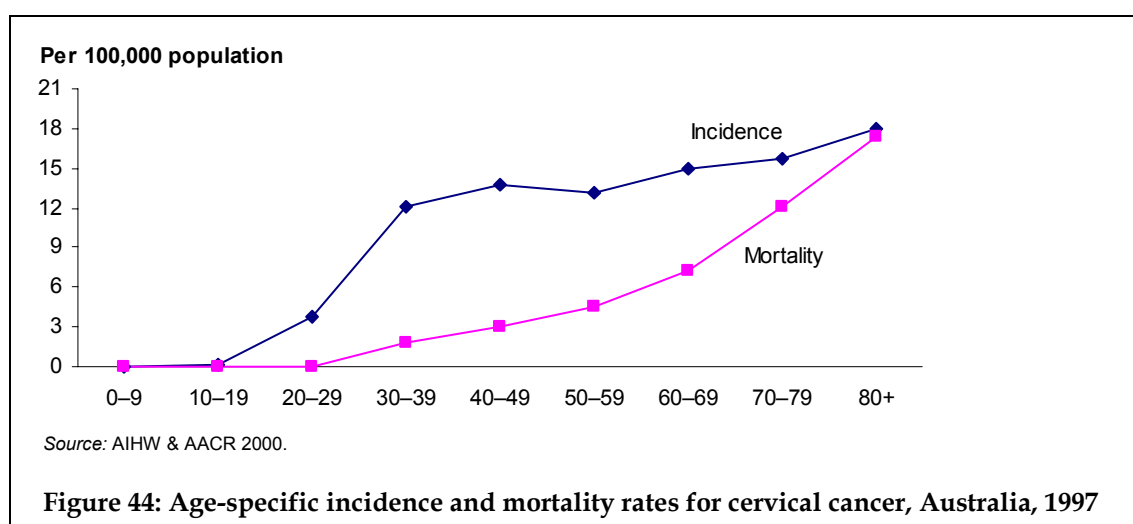
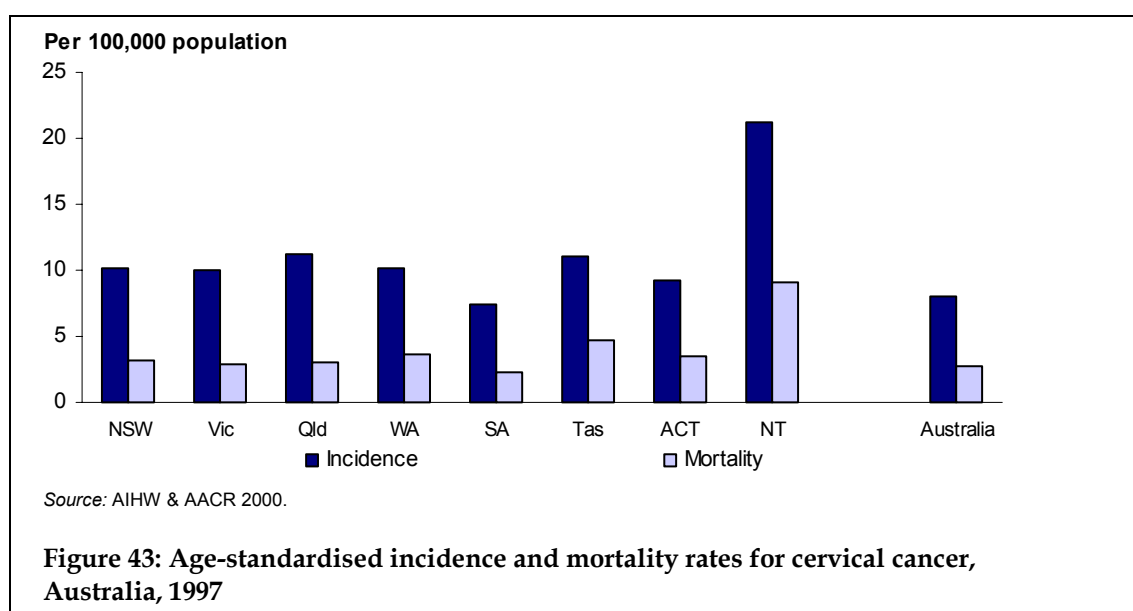
Background information

- Cancer of the cervix has been identified as one of the eight 'priority' cancers that have been targeted in the National Health Priority Area of cancer control (DHFS & AIHW 1998).
 - Cervical cancer is one of the few cancers where pre-cancerous lesions are detectable (with the Pap smear test) and treatable before they progress to cancer (DHFS & AIHW 1998).
 - In 1991, a national cervical screening program was introduced to increase recruitment and participation rates of cervical screening, particularly for older and Indigenous women and those from non-English-speaking backgrounds.
 - Women aged 20–69 years have been identified as the target population group for cervical screening. The current Australian recommendation for cervical screening is for all women in the target age group 20–69 years who have been sexually active at any stage in their lives to have a Pap smear every 2 years until the age of 70 years (AIHW & AACR 2000).
 - Infection with human papilloma virus is linked to the increased risk of developing cervical cancer. Other risk factors include age, high-risk sexual behaviour, smoking, socioeconomic status and race (DHFS & AIHW 1998).
 - It is estimated that almost 20% of cases of cervical cancer in Australian women are directly attributable to smoking (AIHW & AACR 2000).
- in Australia in 1997. The 1997 age-standardised incidence rate of cervical cancer is 8.0 per 100,000 population¹¹ (AIHW & AACR, 2000).
- The incidence rate of cervical cancer has declined by 6.3% per annum between 1992 and 1997 and mortality rates have fallen by 3.8% per year (AIHW & AACR 2000). This has been attributed (to some degree) to the population-based cervical screening.
 - Age-standardised incidence rates ranged from 7.4 per 100,000 population in South Australia to 21.1 per 100,000 population in the Northern Territory (Figure 43). These differences may partly reflect the size of the population and relative impact of screening programs in different areas (AIHW & AACR 2000). High incidence rates in the Northern Territory may also be attributable to higher rates of cervical cancer among Indigenous females (DHFS & AIHW 1998).
 - The age-specific cervical cancer incidence and mortality rates increased steadily with age, peaking at 18 per 100,000 women aged 80 years and over (Figure 44).
 - During 1995–1997, cervical cancer mortality rates for women aged 20–69 years in metropolitan, rural and remote areas were 3.0, 3.6 and 5.4 per 100,000 women, respectively (AIHW & AACR 2000).
 - A study of Australian death registries between 1986 and 1997 found that the cervical cancer mortality rate of Aboriginal women was six to eight times higher than non-Aboriginal women. The risk of death from cervical cancer for Aboriginal women (compared to non-Aboriginal women) increased by 4.3, 9.7 and 18.3 times for metropolitan, rural and remote areas, respectively (O'Brien, Bailie & Jelfs 2000).

Current data

- There were 795 new cases identified and 291 deaths due to cervical cancer

¹¹ Standardised to the 1991 Australian population.



Data limitations

No data are available for Indigenous populations due to the difficulties and poor ascertainment of Indigenous identification in health data collections. Only cervical cancer mortality data are available for Indigenous populations and only from Western Australia, South Australia and the Northern Territory where it is considered to be of adequate quality to be published.

Indicator status

Adequate.

Data source

Australian Institute of Health and Welfare (AIHW) and Australasian Association of Cancer Registries (AACR).

References

- Australian Institute of Health and Welfare (AIHW) & Australasian Association of Cancer Registries (AACR) 2000. Cancer in Australia 1997: incidence and mortality data for 1997 and selected data for 1998 and 1999. AIHW cat. no. CAN 10. Canberra: AIHW (Cancer Series no. 15).
- Department of Health and Family Services (DHFS) & Australian Institute of Health and Welfare (AIHW) 1998. National health priority areas report on cancer control 1997. AIHW cat. no. PHE 4. Canberra: DHFS and AIHW.
- O'Brien ED, Bailie RS & Jelfs PL 2000. Cervical cancer mortality in Australia: contrasting risk by Aboriginality, age and rurality. International Journal of Epidemiology 29(5): 813-816.

Incidence and mortality of ovarian cancer

Indicator

Incidence and mortality rates of ovarian cancer per 100,000 female population

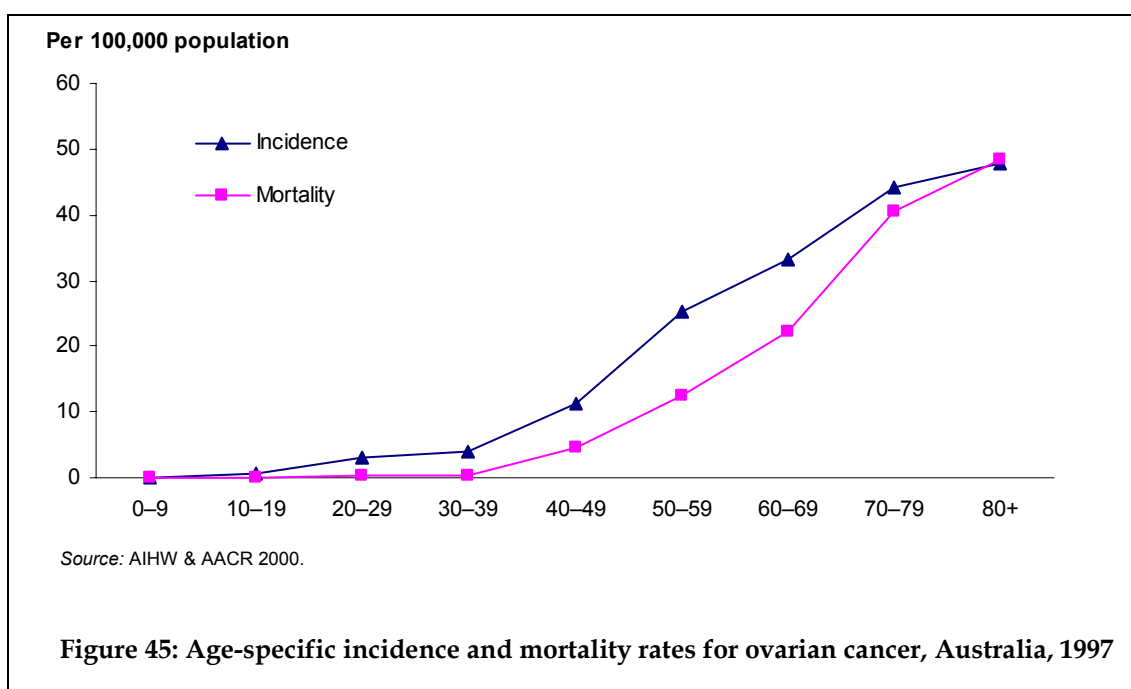
Background information

- Ovarian cancer is a malignant tumour of the ovary. Early stage ovarian cancer does not usually have any obvious symptoms and is often diagnosed in its advanced stages. Hence, proportionally more women die from ovarian cancer compared to other cancers in women (OCRf 2000).
- Nine out of ten cases occur in women over the age of 40. Most women develop ovarian cancer after menopause and 50% are older than 65 (OCRf 2000).
- A case-control study in 1990–1993 involving over 1,600 women from Queensland, New South Wales and Victoria found increasing parity, duration of use of the oral contraceptive pill, hysterectomy and tubal ligation reduced the risk of ovarian cancer (Purdie et al. 1995). No association was found between use of hormone replacement therapy and risk of ovarian cancer (Purdie et al. 1999).
- Two cohort studies, one of 10,358 Victorian women and another of 29,700 Australian women all referred for in-vitro fertilisation (IVF) found unexplained infertility was significantly associated with increased risk of ovarian cancer. However, there was no increased risk with exposure to fertility drugs (Venn et al. 1995, 1999).
- In 1997, there were 1,151 women diagnosed and 740 deaths attributable to ovarian cancer (AIHW & AARC 2000).
- The age-standardised incidence and mortality rates for cancer of the ovary in 1997 were 11.0 and 6.8 per 100,000 female population, respectively¹². These have both remained relatively constant since 1983 (AIHW & AARC 2000).
- There was a steep increase in the age-specific incidence and mortality rates of ovarian cancer with age with the highest rates in the 80–84 year age group (Figure 45) (AIHW & AARC 2000).
- Average annual rates between 1993 and 1997 varied among States and Territories. The highest age-standardised incidence and mortality rates occurred in Tasmania, with 13.7 and 8.3 per 100,000 women, respectively. The lowest rates of ovarian cancer were in the Northern Territory, with 8.9 and 3.4 cases and deaths per 100,000 women, respectively (AIHW & AARC 2000).
- The lifetime risk of a woman developing ovarian cancer before the age of 75 is 1 in 103 (AIHW and AARC 2000).

Current data

- In 1997, ovarian cancer was the sixth leading cause of cancer deaths in Australian women (AIHW & AARC 2000).

¹² Standardised to the 1991 Australian population.



Data limitations

No data are available for Indigenous populations due to the difficulties and poor ascertainment of Indigenous identification in health data collections.

Indicator status

Adequate. Australia is one of the few countries in which there is national cancer registration.

Data source

Australian Institute of Health and Welfare (AIHW) and Australasian Association of Cancer Registries (AACR).

References

- Australian Institute of Health and Welfare (AIHW) & Australasian Association of Cancer Registries (AACR) 2000. Cancer in Australia 1997: incidence and mortality data for 1997. AIHW cat. no. CAN 10. Canberra: AIHW (Cancer Series no. 15).
- Ovarian Cancer Research Foundation (OCRF) 2000. Accessed online at: www.ocrf.com.au

- Purdie D, Bain C, Siskind V, et al. 1999. Hormone replacement therapy and risk of epithelial ovarian cancer. *British Journal of Cancer* 81(3): 559-563.
- Purdie D, Green A, Bain C et al. 1995. Reproductive and other factors and risk of epithelial ovarian cancer: an Australian case-control study. *International Journal of Cancer* 62(6): 678-684.
- Venn A, Watson L, Bruinsma F, et al. 1999. Risk of cancer after use of fertility drugs with in-vitro fertilisation. *Lancet* 354(9190): 1586-1590.
- Venn A, Watson L, Lumley J, et al. 1995. Breast and ovarian cancer incidence after infertility and in-vitro fertilisation. *Lancet* 346(8981): 995-1000.

Incidence and mortality of testicular cancer

Indicator

Incidence and mortality rates of testicular cancer per 100,000 male population aged 20–69 years

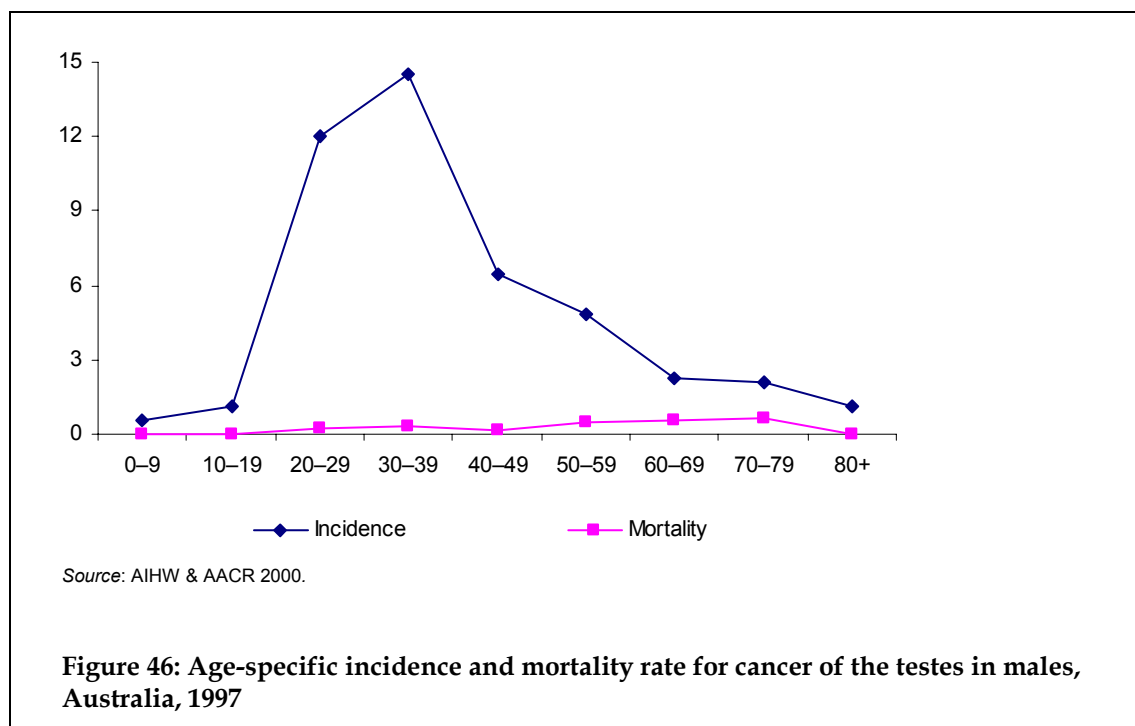
Background information

- Testicular cancer arises from an abnormal germ cell and a pre-cancerous condition, called carcinoma-in-situ, can be identified by the characteristics of these cells (Skakkebaek et al. 1987).
 - In males, the four most common registrable cancers are prostate cancer, colorectal cancer, lung cancer and melanoma, accounting for 60% of all registrable cancers in males (AIHW & AACR 2000).
 - Advances in the management of testicular cancer have meant that most men with metastatic testicular cancer are now curable (Boyer & Stockler 2001).
 - There have been changes to the toxicity of treatment of testicular cancer including (Boyer & Stockler 2001):
 - reduction in the number of cycles of chemotherapy required
 - reduction in the radiation dose and field size for early-stage seminoma treatment
 - introduction of active surveillance for stage I non-seminomatous tumours.
- being 0.2 per 100,000 population in 1997 (AIHW & AACR 2000).
- The incidence of testicular cancer declines with age after 30–34 years (Figure 46) (AIHW & AACR 2000).
 - The average age-standardised rate between 1993–1997 of cancer of the testes is highest in the Australian Capital Territory (6.8 per 100,000 population) and lowest in the Northern Territory (4.2 per 100,000 population). Due to small numbers these variations should be treated with caution.
 - A retrospective analysis of Victorian Cancer Registry cases of testicular cancer between 1988 and 1993 revealed a trend of increasing incidence, with the age-standardised incidence per 100,000 men for the six consecutive years increasing from 3.7 to 5.3, with an average annual rate of increase of 7.5% (Toner et al. 2001).

Current data

- The 1997 age-standardised rate of testicular cancer was 6.2 per 100,000 population¹³ (AIHW & AACR 2000).
- The incidence of testicular cancer has risen by an average of 2.0% each year since 1992. However the mortality rate for this type of cancer remains low,

¹³ Standardised to the 1991 Australian population



Data limitations

No data are available for Indigenous populations due to the difficulties and poor ascertainment of Indigenous identification in health data collections.

Indicator status

Adequate. Australia is one of the few countries in which there is national cancer registration.

Data source

Australian Institute of Health and Welfare (AIHW) and Australasian Association of Cancer Registries (AACR) 2000.

References

- Australian Institute of Health and Welfare (AIHW) & Australasian Association of Cancer Registries (AACR) 2000. Cancer in Australia 1997: incidence and mortality data for 1997 and selected data for 1998 and 1999. AIHW cat. no. CAN 10. Canberra: AIHW (Cancer Series no. 15).

- Boyer MJ & Stockler MR 2001. Testicular cancer management (editorial). Medical Journal of Australia 174: 320-321.
- Skakkebaek NE, Berthelsen JG, Giwercman A & Müller J 1987. Carcinoma-in-situ of the testis: possible origin from gonocytes and precursor of all types of germ cell tumours except spermatocytoma. International Journal of Andrology 10: 19-28.
- Toner GC, Neerhut GJ, Schwarz MA, Thursfield VJ, Sandeman TF, Giles GG & Snow RM for the Urology Study Committee of the Victorian Co-operative Oncology Group 2001. The management of testicular cancer in Victoria, 1988-1993. Medical Journal of Australia 174: 328-331.

Appendix: Calculation of rates

Age-specific rates

Age-specific rates are calculated by dividing the number of cases occurring in each specified age group by the corresponding population in the same age group expressed as a rate per 100,000 population. This rate may be calculated for particular age and sex groupings (AIHW and AACR, 2000).

Age-standardised rates (AS rate)

Rates are adjusted for age to facilitate comparisons between populations which have different age structures, e.g. between youthful and ageing communities. There are two different methods commonly used to adjust for age. *Direct standardisation* is the method used in this report and involves the use of age-specific rates which are multiplied against a constant population (the Australian 1991 Populations Standard or the World Standard Population). This effectively removes the influence of age structure on the summary rate which is described as the age-standardised rate. This method may be used for both incidence and mortality calculations (AIHW & AACR 2000).

Reference

Australian Institute of Health and Welfare (AIHW) & Australasian Association of Cancer Registries (AACR) 2000. Cancer in Australia 1997: incidence and mortality data for 1997 and selected data for 1998 and 1999. AIHW cat. no. CAN 10. Canberra: AIHW (Cancer Series no. 15).

Glossary

Age-specific fertility rate: the number of live births during the calendar year, according to the age or age-group of the mother, per 1,000 female resident population of the same age or age group at 30 June.

Amniocentesis: sampling of the fluid in the amniotic sac during pregnancy.

Anaemia: a condition in which the blood is deficient in red blood cells, haemoglobin or total volume.

Androgens: hormones based on the structure of testosterone and capable of developing and maintaining masculine sexual characteristics.

Augmented labour: enhances uterine contractions after labour has commenced.

Azoospermia: the absence of spermatozoa in the semen or failure of formation of spermatozoa.

Birthweight: the first weight of the baby (stillborn or liveborn) obtained after birth (usually measured to the nearest five grams and obtained within one hour of birth).

Caesarean section: operative birth through an abdominal incision.

Chorionic villus sampling (CVS): a sample of the chorionic villi obtained during pregnancy for genetic testing, particularly for chromosome abnormalities.

Clinical pregnancy: any type of pregnancy that can be confirmed by ultrasound, or verified from the products of conception. This definition includes ectopic pregnancy, blighted ovum, missed abortion, spontaneous abortion and termination of pregnancy.

Confinement: pregnancy resulting in at least one birth.

Congenital malformations: structural or anatomical abnormalities that are present at birth, usually resulting from abnormal development in the first trimester of pregnancy.

Contraception: means of avoiding pregnancy despite sexual activity.

Crude birth rate: the number of live births registered during the calendar year per 1,000 estimated resident population at 30 June of that year.

Ectopic pregnancy: a pregnancy that occurs outside the uterus.

Endometriosis: a disease in which tissue like that which lines the uterus (called endometrium) is found outside the uterus. The misplaced tissue develops into growths or lesions that can cause pain, infertility and other problems.

Erectile dysfunction: the persistent inability to achieve and/or maintain an erection sufficient for satisfactory sexual activity.

Fetal death: (stillbirth) is the delivery of a child of at least 400 g birthweight or at least 20 weeks gestation who did not breathe or show any other evidence of life, such as a heartbeat, pulsation of the umbilical cord or definite movement of voluntary muscles.

Forceps delivery: involves delivery of an infant using obstetrical forceps.

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 derived from clinical assessment during pregnancy or from examination of the baby after birth.

Hysterectomy: the surgical procedure whereby all or part of the uterus is removed.

Illicit drugs: illegal drugs, drugs and volatile substances used illicitly, and pharmaceuticals used for non-medical purposes. These may include painkillers/analgesics, tranquillisers/sleeping pills, steroids, barbiturates, amphetamines, marijuana/cannabis, heroin, methadone, cocaine, LSD/synthetic hallucinogens, ecstasy and other designer drugs.

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 labour: when an external agent is used to stimulate the onset of labour.

Infant death: death of a child under one year of age.

Infant mortality rate: the number of deaths of children under one year of age in a calendar year per 1,000 live births in the same calendar year.

International Classification of Diseases: The World Health Organization internationally accepted classification of death and disease. The 9th Revision (ICD-9) and the tenth revision, Australian Modification (ICD-10-AM) is referred to in this report.

Intrapartum fetal death: fetal death occurring during labour.

Iron deficiency: when an insufficient amount of iron is absorbed to meet the body's requirements.

Laparotomy: general term for abdominal surgery.

Late neonatal death: death of a liveborn baby after 7 completed days and before 28 completed days.

Live birth: live birth is the complete expulsion or extraction from its mother of a product of conception, irrespective of the 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 (WHO definition).

Low birthweight: birthweight of less than 2,500 g.

Maternal age: mother's age at her child's birth.

Maternal medical conditions: pre-existing maternal diseases and conditions, and other diseases, illnesses or conditions arising during pregnancy, that are not directly attributable to pregnancy but may significantly affect care during pregnancy and/or pregnancy outcome. Examples include essential hypertension, diabetes mellitus, epilepsy, cardiac disease, and chronic renal disease.

Maternal morbidity: any illness or injury (to the mother) caused by, or aggravated by, or associated with pregnancy or childbirth.

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.

Multiple pregnancy: includes twins, triplets or higher order multiple.

Neonatal death: death of a liveborn infant within 28 days of birth.

Pap smear: a test prepared for the study of exfoliated cells from the cervix.

Parity: number of previous pregnancies resulting in live births or stillbirths.

Perinatal death: is a fetal or neonatal death of an infant of at least 400 g birthweight or 20 weeks gestation.

Pre-term birth: birth before 37 completed weeks of gestation.

Primigravid/ primigravida: a woman pregnant for the first time.

RRMA: Rural, Remote and Metropolitan Area classification.

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.

Sex ratio: number of male births expressed per 100 female births.

Sexually transmissible infections (STIs): any infection characteristically transmitted by sexual contact.

Stillbirth See 'fetal death'.

Termination of pregnancy: the expulsion or removal of an embryo or fetus from the mother before it is sufficiently developed to survive outside the uterus.

Total fertility rate: the sum of age-specific fertility rates. It represents the total number of children a woman would have by the end of her reproductive period if she experienced the current age-specific fertility rates throughout her childbearing life.

Tubal occlusion: a form of female sterilisation using a surgical procedure that involves the ligation (closure) of the fallopian tubes to prevent an unsterilised egg from reaching the uterus.

Urethritis: may be either gonococcal, due to infection with *Neisseria gonorrhoeae*, or non-gonococcal (non-specific urethritis) usually caused by *Chlamydia trachomatis* or *Ureaplasma urealyticum*.

Vacuum extraction: involves the delivery of an infant using a traction cup that is attached to the infant's head.

Vasectomy: involves the surgical sterilisation of males via cutting or blocking both vasa deferentia.

Viable pregnancy: a clinical pregnancy reaching 20 weeks gestation. Viable pregnancy outcomes are recorded as either 'live birth' (if at least one baby is born alive) or 'stillborn'.

Web site links

Australian Bureau of Statistics: www.abs.gov.au

Australian Council on Healthcare Standards (ACHS): www.achs.org.au

Australian Institute of Health and Welfare (AIHW): www.aihw.gov.au

Australian Iron Status Advisory Panel: www.ironpanel.org.au

Australian Longitudinal Study of Women's Health:
www.newcastle.edu.au/centre/wha/

AIHW National Perinatal Statistics Unit: www.npsu.unsw.edu.au

Bertarelli Foundation for Reproductive Health: www.bertarelli.edu

Health Insurance Commission: www.hic.gov.au/statistics

National Centre for Disease Control: www.health.gov.au/pubhlth/cdi

National Centre in HIV Epidemiology and Clinical Research:
www.med.unsw.edu.au/nchechr

National Centre in HIV Social Research: www.arts.unsw.edu.au/nchsr

National Health and Medical Research Council: www.health.gov.au/nhmrc

National Notifiable Diseases Surveillance System/Communicable Diseases
Australia:
www.health.gov.au/pubhlth/cdi/cdihtml.htm

Ovarian Cancer Research Foundation: www.ocrf.com.au

Royal Australian and New Zealand College of Obstetricians and Gynaecologists:
www.ranzcog.edu.au

SIDS Australia: www.sidsaustralia.org.au

World Health Organization: www.who.org

Index of indicators

Cancer of the reproductive tract

- Incidence and mortality of cervical cancer, 134
- Incidence and mortality of ovarian cancer, 136
- Incidence and mortality of testicular cancer, 138
- Proportion of women screened for cervical cancer, 132

Family Planning

- Hysterectomy rate, 74
- Number of induced abortions, 76
- Prevalence of contraceptive use, 68
- Rate of vasectomy, 70
- Tubal occlusion rate, 72

Fertility

- Crude birth rate, 42
- Teenage fertility rate, 46
- Total fertility rate, 44

Pregnancy and childbirth

- Alcohol use in pregnancy, 91
- Caesarean birth rate, 107
- Ectopic pregnancy rate, 121
- Illicit drug use in pregnancy, 93
- Incidence of low birthweight births, 127
- Infant mortality rate, 125
- Maternal morbidity, 117
- Maternal mortality ratio, 119
- Multiple pregnancy rate, 101
- Obstetric service providers by rural/remote classification, 115
- Percentage of all labours which were induced or augmented, 103

Percentage of births attended by skilled health personnel, 113

Percentage of women attending antenatal care, 97

Periconceptional use of folate, 82

Perinatal mortality rate, 123

Pregnancy rates and outcomes after assisted conception, 99

Prenatal diagnostic testing, 95

Prevalence of anaemia in pregnant women, 80

Prevalence of HIV among pregnant women, 87

Prevalence of positive syphilis serology in pregnant women, 85

Prevalence of smoking in pregnancy, 89

Proportion of institutional deliveries, 105

Proportion of vaginal births after caesarean section, 109

Rate of instrumental vaginal deliveries, 111

Sex ratio of births, 129

Sexually Transmissible Infections

Knowledge of HIV-related prevention practices, 63

Prevalence of HIV among adolescents, 65

Prevalence of syphilis, chlamydia and gonorrhoea in population, 60

Subfertility

Prevalence of erectile dysfunction, 54

Prevalence of infertility in men, 52

Prevalence of infertility in women, 50

Prevalence of undescended testes, 56