Australian Government
Australian Institute of Health and Welfare

Cervical screening in Australia 2011–2012

National Cervical Screening Program

A joint Australian, State and Territory Government initiative

CANCER SERIES No. 82

Australian Government
Australian Institute of Health and Welfare

Authoritative information and statistics to promote better health and wellbeing

CANCER SERIES
Number 82

Cervical screening in Australia 2011–2012

Australian Institute of Health and Welfare
Canberra
Cat. no. CAN 79

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This publication is part of the Australian Institute of Health and Welfare's Cancer series. A complete list of the Institute's publications is available from the Institute's website <www.aihw.gov.au>.

ISSN 1039-3307
ISBN 978-1-74249-560-6

Suggested citation
Australian Institute of Health and Welfare 2014. Cervical screening in Australia 2011–2012. Cancer series no.82. Cat. no. CAN 79. Canberra: AIHW.

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Published by the Australian Institute of Health and Welfare

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Acknowledgments

Alison Budd, Theresa Chau and Justin Harvey prepared this report under the direction of Lisa McGlynn.

This report was produced in collaboration with the National Cervical Screening Program, and thanks are extended to the state and territory program and data managers listed below for providing the data, expertise and overall assistance in the production of this document.

Contribution of clinical expertise by Marion Saville, Dorota Gertig and Julia Brotherton is also kindly acknowledged.

Thanks are also extended to all state and territory cancer registries, which are the source of data on cervical cancer incidence (through the Australian Cancer Database), and to the Australian Bureau of Statistics, National Coronial Information System, and state and territory Registrars of Births, Deaths and Marriages, which are the source of data on cervical cancer mortality (through the AIHW National Mortality Database).

Financial support and professional assistance provided by the Screening Section of the Australian Government Department of Health are also gratefully acknowledged.

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Abbreviations

ABS	Australian Bureau of Statistics
ACD	Australian Cancer Database
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
AMBS	Australian Modified Bethesda System
AS	age-standardised
ASGC	Australian Standard Geographic Classification
ASGS	Australian Statistical Geography Standard
CI	confidence interval
CIN	cervical intraepithelial neoplasia
Guidelines	National Health and Medical Research Council *Screening to prevent cervical cancer guidelines for the management of screen detected abnormalities in asymptomatic women*
HPV	human papillomavirus
NCSP	National Cervical Screening Program
NHMD	National Hospital Morbidity Database
NHMRC	National Health and Medical Research Council
NOS	not otherwise specified
NPAAC	National Pathology Accreditation Advisory Council
NSW	New South Wales
NT	Northern Territory
PPV	positive predictive value
Qld	Queensland
RA	remoteness area
SA	South Australia
SEIFA	Socio-Economic Indexes for Areas
Tas	Tasmania
Vic	Victoria
WA	Western Australia

Symbols

. .	not applicable
n.p.	not published
	favourable trend
	unfavourable trend
	no trend, or not applicable

Summary

The National Cervical Screening Program (NCSP) aims to reduce cervical cancer cases, as well as illness and death from cervical cancer in Australia, through an organised approach to cervical screening aimed at detecting and treating high-grade abnormalities before possible progression to cervical cancer. The target group is women aged 20–69.

This report is the latest in the *Cervical screening in Australia* series, which is published annually to provide regular monitoring of national participation and performance for the NCSP. This report provides data for the 2011–2012 period of participation in the NCSP.

The following statistics refer to the latest data available for women aged 20–69.

How many women were diagnosed with, or died from, cervical cancer?

There were 682 new cases diagnosed in 2010, and 152 women died from cervical cancer in 2011. This is equivalent to 9.6 new cases and 2.0 deaths per 100,000 women, respectively. These rates are very similar to those for 2009 and 2010.

Incidence and mortality both halved between the introduction of the NCSP in 1991 and the year 2002, and have since remained at around 9 new cases and 2 deaths per 100,000 women.

The incidence of cervical cancer in Aboriginal and Torres Strait Islander women was more than twice that of non-Indigenous women, and mortality 4 times the non-Indigenous rate.

How many women participated in the National Cervical Screening Program?

In 2011–2012, more than 3.7 million women participated in the NCSP. This was 58% of women in the target population (after adjustment to exclude those without a cervix). This is very similar to the participation rates of 58% in 2009–2010 and 57% in 2010–2011.

Participation differed across remoteness areas, with the highest participation of 59% in *Inner regional* and 58% in *Major cities,* and the lowest of 54% in *Very remote* areas.

There was a clear trend of increasing participation with increasing socioeconomic status of residence from 52% in areas of lowest socioeconomic status to 64% in areas of highest socioeconomic status.

Participation by Aboriginal and Torres Strait Islander women is not available due to Indigenous status information not being collected on pathology forms, although there is evidence that this population group is under-screened.

How many women rescreened early or after a reminder letter?

Only 13% of women with a negative Pap test in 2011 rescreened earlier than recommended.

Of the women sent a 27-month reminder letter by a cervical screening register in 2011, 32% rescreened within 3 months. These figures are both very similar to those for 2010.

How many high-grade abnormalities were detected?

In 2012, for every 1,000 women screened, 8 women had a high-grade abnormality detected by histology, providing an opportunity for treatment before possible progression to cancer. This is very similar to high-grade abnormality detection for 2011.

Peak high-grade abnormality detection was for women aged 25–29, with high-grade detection for women under 20 and for those aged 20–24 reaching historically low rates.

Data at a glance

The following table provides a comparison of national data against key National Cervical Screening Program (NCSP) performance indicators for women in the target age group, 20–69. Summary statistics for the latest reporting period are compared with those from the previous reporting period. An indication of change is also provided, illustrating whether there has been a statistically and clinically significant change, and whether this is a favourable or unfavourable trend (see list of symbols on page vii for further information).

Key performance indicators for the National Cervical Screening Program, women aged 20–69

	Previous data		Latest data		Change
Performance indicator	**Reporting period**	**Statistic**	**Reporting period**	**Statistic**	
Participation	2009–2010	58.2%	2011–2012	57.7%	
Rescreening					
Early rescreening	2010 cohort	13.3%	2011 cohort	13.0%	
Rescreening after reminder letter	Letters sent 2010	31.5%	Letters sent 2011	31.8%	
Cytology					
Unsatisfactory	2011	2.1%	2012	2.2%	
Negative	2011	92.3%	2012	92.1%	
No endocervical component	2011	21.4%	2012	21.9%	
Low-grade abnormalities	2011	4.1%	2012	4.3%	
High-grade abnormalities	2011	1.5%	2012	1.4%	
Histology					
Histology tests per 100 cytology tests	2011	3.7%	2012	3.8%	
Low-grade abnormalities	2011	17.4%	2012	17.2%	
High-grade abnormalities	2011	25.9%	2012	25.7%	
High-grade abnormality detection rate	2011	8.4	2012	8.4	
Correlation					
PPV of high-grade squamous cytology	2010	69.8%	2011	68.2%	
PPV of high-grade endocervical cytology	2010	73.5%	2011	71.4%	
Incidence	2009	9.0	2010	9.6	
Mortality	2010	2.0	2011	2.0	

Notes

1. All data are for women aged 20–69; age-standardised proportions and rates are shown where available (crude rates are shown otherwise).
2. Previous data refers to the previous *non-overlapping* reporting period, which for participation is 2009–2010, rather than 2010–2011.
3. Participation is the percentage of eligible women in population.
4. Early rescreening is the percentage of women with a negative cervical cytology test in February 2011 who rescreened within 21 months.
5. Rescreening after reminder letter is the percentage of women sent a reminder letter who rescreened within 3 months.
6. Cytology is percentage of all cytology tests.
7. Histology is the percentage of all histology tests.
8. High-grade abnormality detection rate is the number of women with a high-grade abnormality detected by histology per 1,000 women screened.
9. PPV is the positive predictive value, calculated as the proportion of cytology results of possible or definite high-grade that were confirmed on histology to be a high-grade abnormality or cervical cancer.
10. Incidence is the number of new cases per 100,000 women; mortality is the number of deaths per 100,000 women.
11. Small changes have been conservatively interpreted as no change when they were not considered both statistically and clinically significant.

Section 1— Introduction

This report

The first section of this report presents an overview of cervical cancer in Australia, and outlines the process of cervical screening and the development and management of the National Cervical Screening Program (NCSP). It also details the performance indicators used for monitoring the NCSP, and provides a brief overview of technical issues that should be considered when interpreting information in this report.

The second section of this report presents the latest national data against the seven NCSP performance indicators. Data included in this report are for the 2011–2012 period of participation in the NCSP, supplemented by cervical cancer incidence and mortality data from national databases outside the NCSP, for which the latest data available are for 2010 and 2011, respectively. To aid in interpretation of these data, the start of each performance indicator delivers a summary that includes its definition and rationale, followed by key results to provide readers with an indication of the main findings. More detailed analyses, as well as background information where appropriate, follow this summary material.

More detailed data than those shown within this report are available in *Cervical screening in Australia 2011–2012: supplementary data tables*. These can also be downloaded for free from the AIHW website <http://www.aihw.gov.au/publications>.

Cervical screening in Australia 2011–2012 is part of an annual series. Earlier editions and any published subsequently can be downloaded for free from the AIHW website <http://www.aihw.gov.au/publications>. The website also includes information on ordering printed copies.

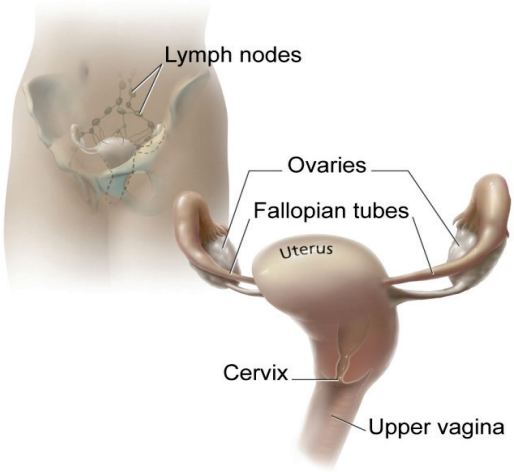
Overview

What is cervical cancer?

Cancer is a group of several hundred diseases in which abnormal cells are not destroyed naturally by the body but instead multiply and spread out of control. Cancers are distinguished from each other by the specific type of cell involved and the place in the body in which the disease began.

Cervical cancer affects the cells of the uterine cervix, which is the lower part (or 'neck') of the uterus where it joins the inner end of the vagina. Like other cancers, cervical cancer is a disease where normal cells change, begin to multiply out of control, and form a growth or tumour.

Cervical cancer may arise from the squamous cells that cover the outer surface of the cervix (known as squamous cell carcinoma) or from the glandular cells in the cervical canal (known as adenocarcinoma). In Australia in 2010, 66% of cervical cancers were squamous cell carcinoma and 21% were adenocarcinoma (adenosquamous and other cervical cancers made up the remainder).



Anatomy: the female reproductive system (cervix, ovaries, uterus)

Source: <http://visualsonline.cancer.gov>.

How common is cervical cancer in Australia?

Cervical cancer is the 12th most common cancer affecting Australian women (excluding basal and squamous cell carcinoma of the skin), with 7 new cases of cervical cancer diagnosed per 100,000 women in the population in 2010 (the latest cancer incidence data available). It is also the 19th most common cause of cancer-related death, with 2 deaths per 100,000 women in 2011 (the latest mortality data available).

Cervical cancer incidence and mortality are both higher in Aboriginal and Torres Strait Islander women, with incidence more than twice, and mortality 4 times, that of non-Indigenous women (for more details see Indicators 6 and 7).

What causes cervical cancer?

During the last decade there has been a greater understanding of the natural history of cervical cancer. It is now recognised that cervical cancer is a rare outcome of persistent infection with human papillomavirus (HPV), and that infection with a high-risk HPV type is necessary, although not sufficient, for the development of cervical cancer (Bosch et al. 2002; Walboomers et al. 1999).

Currently 15 high-risk types of HPV are recognised. HPV types 16, 18, and 45 are most predominantly associated with cervical cancer, with HPV types 16 and 18 detected in 70–80% of cases of cervical cancer in Australia (Brotherton 2008).

However, infection with one or more of the 40 genital HPV types is extremely common, with infection rates of this sexually transmitted infection peaking in women in young adulthood (the period following sexual debut). Most HPV infection is asymptomatic and cleared by the immune system within a year; however, in up to 10% of women the infection can persist, and in a very small number of women, persistent infection with high-risk HPV may eventually lead to cervical cancer.

Overview Box 1: Terminology

Incidence: the number of new cases of cervical cancer diagnosed per 100,000 women in a year.

Morbidity: illness.

Mortality: the number of deaths from cervical cancer per 100,000 women in a year.

Cytology: the examination of cells from the cervix (usually collected by a Pap test) through a microscope.

Histology: the examination of tissue from the cervix (usually collected by a biopsy) through a microscope. Histology is more accurate than cytology because it allows the examination of cells and other structures, as they would appear *in situ*.

How do we screen for cervical cancer?

Cells in the cervix exhibit changes or abnormalities before any progression to cancer occurs. These abnormalities are graded depending on how much of the lining of the cervix these abnormal cells occupy—low-grade abnormalities are contained in the top layer of the lining of the cervix while high-grade abnormalities occupy more layers.

Low-grade abnormalities are caused by acute infection with HPV and most will regress without treatment within a short period of time. High-grade abnormalities usually occur after persistent infection with HPV. The probability of a high-grade abnormality progressing to cancer increases with age and the extent of abnormality, but cancer is still a very rare outcome (NHMRC 2005)—studies suggest that only 12% of the precursor to squamous cell carcinoma of the cervix progresses to cancer (Ostor 1993). Cervical screening aims to detect and treat these precancerous abnormalities in cervical cells before their potential progression to cervical cancer, thereby reducing cervical cancer incidence as well as morbidity and mortality from this disease.

Cervical screening uses cytology from the Papanicolaou smear, or 'Pap test', as the screening tool. During a Pap test, cells are collected from the transformation zone of the cervix—the area of the cervix where the squamous cells from the outer opening of the cervix and glandular cells from the endocervical canal meet. This is the site where most cervical abnormalities and cancers are detected. For conventional cytology, these cells are transferred onto a slide, and sent to a pathology laboratory for assessment. Collected cells are then examined under a microscope to look for abnormalities.

While cervical cytology, the examination of the cells collected from the cervix, is a very useful tool, it should be stressed that it is not diagnostic (unlike cervical histology, which is the examination of tissue collected from the cervix through a biopsy to confirm the presence

of an abnormality). As a screening tool, the aim of cervical cytology is to identify those individuals who may have a cervical abnormality (as indicated by the presence of abnormal cells in the specimen collected) and therefore require further diagnostic testing. Since the Pap test collects an arbitrary sample of cells from the surface of the cervix at an arbitrary point in time, and requires a level of judgment in the interpretation of sampled cells, cervical cytology cannot accurately reveal all abnormalities that may exist in the cervical tissue *in situ*.

While the ability of cervical cytology to accurately identify those women who do not have disease (that is, the specificity) is very high—estimates range from 62% to 98% in an International Agency for Research on Cancer (IARC) review—the ability to detect disease in those women who truly have the disease (that is, the sensitivity) of a single cervical cytology test is only moderate in contrast (40–86%) (IARC 2005). The strength of cervical screening comes from repeating the cervical cytology test at agreed rescreening intervals, which allows the accurate detection of precancerous abnormalities over the long pre-invasive stage of squamous cervical cancers (Dickinson 2002). The recognition of cervical screening as a program of rescreening at regular intervals rather than as a single opportunistic test was an important distinction (Dickinson 2002).

Why screen for cervical cancer?

The initial aim of an organised approach to screening was to further reduce the incidence and mortality of cervical cancer beyond the reductions attributable to the opportunistic cervical screening available in Australia since the mid-1960s (Dickinson 2002). This aim has been realised, with an estimated 70% of squamous cell carcinomas of the cervix (around 1,200 cases) prevented in 1998 as a result of Australia's cervical screening program (Mitchell 2003), a finding supported by more recent analyses of incidence and mortality trends (Canfell 2006; Luke et al. 2007). Indeed the relatively low incidence and mortality of cervical cancer in Australia compared with other countries (Ferlay et al. 2010) has been largely attributed to Australia's cervical screening program and its successful implementation in 1991 (NHMRC 2005).

How is cervical screening managed in Australia?

In 1991, the Australian Health Ministers' Advisory Council (AHMAC) accepted recommendations made by the Screening Evaluation Steering Committee in the Australian Institute of Health report *Cervical cancer screening in Australia: options for change* (AHMAC 1991) that saw the establishment of the Organised Approach to Preventing Cancer of the Cervix, Australia's cervical screening program. Now known as the National Cervical Screening Program, it operates as a joint program of the Australian Government and state and territory governments, targeting women aged 20–69. A statement of the current national policy for cervical screening in Australia appears in the box below, while contact details for the state and territory and Australian Government components of the NCSP are provided in Appendix B.

Overview Box 2: National policy for Australia's National Cervical Screening Program

The National Cervical Screening Program recommends that all women aged 18 to 69 years, who have ever been sexually active, whether vaccinated or unvaccinated, should have cervical screening by Pap smears. Their policy states that:

'Routine screening with Pap smears should be carried out every two years for women who have no symptoms or history suggestive of cervical pathology.

All women who have ever been sexually active should start having Pap smears between the ages of 18 and 20 years, or one or two years after first having sexual intercourse, whichever is later.

Pap smears may cease at the age of 70 years for women who have had two normal Pap smears within the last five years. Women over 70 years who have never had a Pap smear, or who request a Pap smear, should be screened.'

Source: Health 2013.

Since cervical screening is not provided by a dedicated service, but is part of primary health care, all women who choose to have a Pap test through any health care provider are considered to be part of the National Cervical Screening Program. Being part of the NCSP means that there are standards for laboratories that interpret Pap test results, evidence-driven guidelines to aid in the management of women after they receive Pap test results, as well as dedicated cervical screening registers or 'Pap test registers' that act as a 'safety net' for participating women as well as encouraging regular Pap tests.

Cervical screening registers fulfil many important roles, including sending reminder letters to women overdue for screening, providing a safety net for women who have not had follow-up of an abnormal result, and providing cytology laboratories and cervical cytology providers with previous results for a woman to allow a more detailed evaluation of present findings. State and territory cervical cytology registries also provide data on the epidemiology and natural history of precancerous lesions, as well as providing data for national monitoring of the NCSP. These registers are key to the NCSP and were established along with the program in 1991.

High-quality cervical cytology in Australian pathology laboratories has also been a key component of the screening program, facilitated through the development of National Pathology Accreditation Advisory Council (NPAAC) *Performance measures for Australian laboratories reporting cervical cytology* (NPAAC 2006).

The National Health and Research Council's (NHMRC) *Screening to prevent cervical cancer: guidelines for the management of asymptomatic women with screen detected abnormalities* (NHMRC 2005) provides recommendations for the management of women with an abnormal Pap test result. They enable practitioners and clinicians to manage the abnormalities detected by Pap tests according to evidence-based information which guides best practice.

How do we monitor the National Cervical Screening Program?

Performance indicators

The effectiveness of the NCSP has been monitored since 1996–1997 using performance indicators developed to monitor what were originally defined as essential aspects of the program. Full definitions of the original performance indicators can be found in *Breast and cervical cancer screening in Australia 1996–1997* (AIHW 1998). New performance indicators were developed following a review that considered changes to both the NCSP and the cervical screening environment to ensure the NCSP continued to be monitored optimally. These new performance indicators were officially endorsed in September 2009 by the Screening Subcommittee of the Australian Population Health Development Principal Committee for use by the NCSP, and appeared for the first time in *Cervical screening in Australia 2008–2009*.

The table below lists the current performance indicators for the NCSP (more information about each indicator is available in Section 2 of this report).

Performance indicators for the National Cervical Screening Program	
1 Participation	The percentage of women aged 20–69 who have a Papanicolaou smear or 'Pap test' in a 2-year period
2 Rescreening	
2.1 Early rescreening	The proportion of women who have another Pap test within 21 months of a negative Pap test result
2.2 Rescreening after 27-month cervical screening register reminder letter	The proportion of women who have a Pap test within 3 months of being sent a 27-month reminder letter
3 Cytology	The number of Pap test results in each result category
4 Histology	The number of histology results in each result category (including the number of women with a high-grade histology for every 1,000 women screened)
5 Cytology-histology correlation	A measure of how well cytology correlates with histology performed not more than 6 months after the cytology test
6 Incidence	The number of new cases of cervical cancer
7 Mortality	The number of deaths from cervical cancer

Standards

While there are no official standards for NCSP performance indicators, in places in this report, NPAAC standards in *Performance measures for Australian laboratories reporting cervical cytology* (NPAAC 2006) have been used to provide a benchmark for the data presented. These are used as a guide to interpretation only, since this is a different purpose to that for which these standards were developed, and differences in definitions and data may exist.

What does the HPV vaccine mean for cervical screening?

What is the HPV vaccine?

Following the recognition that infection with HPV is necessary for the development of cervical cancer, HPV vaccination was introduced in Australia in April 2007 as part of the National Immunisation Program. There are currently two HPV vaccines registered for use in Australia—Gardasil® and Cervarix®, both of which are prophylactic vaccines, which means they need to be administered prior to HPV infection.

These HPV vaccines protect against high-risk HPV types 16 and 18. As noted earlier, HPV types 16 and 18 are the two main high-risk HPV types that can lead to cervical cancer, these are detected in 70–80% of cervical cancers in Australia (Brotherton 2008). Gardasil also protects against HPV types 6 and 11, which are commonly associated with genital warts in males and females. Gardasil is the HPV vaccine currently used for the National HPV Vaccination Program.

The National HPV Vaccination Program was first introduced on 1 April 2007 as a program for females; at its inception it comprised an ongoing program for females aged 12–13 administered through schools, as well as a catch-up program for females aged 13–26 between 2007 and 2009, with females aged 13–17 vaccinated through schools and females aged 18–26 vaccinated through the community (NHVPR 2014). From February 2013, the current school-based program for females aged 12–13 was extended to males aged 12–13, with a catch-up program in 2013 and 2014 for males aged 14–15 (Health 2014a).

Data on the vaccination coverage of participants in the National HPV Vaccination Program are collected and reported by the National HPV Vaccination Program Register (NHVPR), with full data on vaccination coverage estimates available online (Health 2014b).

A standard indicator proposed to measure HPV vaccine coverage trends internationally (WHO 2010), 71.2% of Australian females aged 15 in 2011 were vaccinated with three doses of HPV vaccine by age 15 (Health 2014b).

What are the expected effects of the HPV vaccine?

The National HPV Vaccination Program aims to reduce incidence of HPV-related cancers and disease, including cervical cancer. The HPV vaccine, by preventing the HPV infection that can lead to 70–80% of cervical cancer (Brotherton 2008), has the potential to reduce the incidence of cervical cancer below the already low levels that cervical screening has achieved in Australia.

Importantly, there is potential for the HPV vaccine to reduce the incidence of adenocarcinomas as well as cervical cancers in Aboriginal and Torres Strait Islander women in a way that cervical screening alone has not been able to achieve (Budd & Sturrock 2010).

This is because incidence of adenocarcinoma has not fallen to the same degree as incidence of squamous cell carcinoma, which is generally considered to be due to sampling and interpretation limitations of cervical screening for glandular lesions. As a result, this previously rare cancer now comprises around a quarter of all cervical cancers diagnosed (Blomfield & Saville 2008) (see Indicator 6). Aboriginal and Torres Strait Islander women also have a higher incidence of cervical cancer than non-Indigenous women, which is likely related to Aboriginal and Torres Strait Islander women participating to a lesser degree in cervical screening (Binns & Condon 2006; Coory 2002) (see Indicator 6).

It is important to note, however, that the HPV vaccine does not preclude the need for cervical screening. This is because the HPV vaccine only covers 2 of the high-risk HPV types, infection with which can lead to cervical cancer, and the HPV vaccine may not be effective in women exposed to HPV prior to being vaccinated. Thus cervical screening and the HPV vaccine should be seen as a two-pronged approach to the prevention of cervical cancer, and vaccinated women should either commence or continue participating in cervical screening according to the current NCSP policy (Budd & Sturrock 2010).

Data

Data sources

The main sources of data for the NCSP performance indicators are the state and territory cervical screening registers. Analyses of these data allow monitoring of participation, rescreening, cytology, histology, and the cytology-histology correlation (Indicators 1–5). State and territory cervical screening registers are 'live' registers. As such, the data within this report can only be viewed as being an accurate depiction of the data held by the registers at a particular moment in time, since any results or clinical information received by the cervical screening registers subsequent to data provision to the AIHW are unable to be captured. Data in this report can be considered accurate as at July 2012.

Additional to these sources are the AIHW Australian Cancer Database, which is the source of cervical cancer incidence data (Indicator 6), and the AIHW National Mortality Database, which is the source of cervical cancer mortality data (Indicator 7). More details on data sources and classifications are provided in Appendix C.

Note that for each performance indicator, the latest available national data are used, which differ depending on both the data source and specifications of each performance indicator.

Aboriginal and Torres Strait Islander women

Of the performance indicators used to monitor the NCSP, only incidence and mortality can be disaggregated by Indigenous status.

Cervical screening registers receive data from pathology laboratories, which means that they are limited to those data available on the pathology form accompanying the cervical sample and result. Since there is currently no national mechanism for the collection of Indigenous status on pathology forms, state and territory cervical screening registers are currently unable to collect Indigenous status. Thus participation, rescreening, cytology and histology trends specific to Aboriginal and Torres Strait Islander women cannot be monitored, and the effects of initiatives to increase their participation cannot be measured nationally.

Reporting women with symptoms

In principle, women who have symptoms that could indicate the presence of cervical cancer (such as abnormal bleeding) at the time of their cervical cytology test should be excluded from all performance indicators, since any testing of symptomatic women will be diagnostic in nature, rather than true screening.

In theory, a mechanism exists to remove symptomatic women from the data, as these women are able to be identified by the recommendation code *RS Symptomatic-Clinical management required* (included in the National Cervical Cytology Coding Sheet introduced in July 2006).

However, in 2008–2009, the proportion of women with the RS code was found to vary across states and territories from 0.02% through to 2.38% of women screened. These variations were too large to reflect any genuine differences in women with symptoms, and concluded to be due to inconsistent use of this code nationally. Thus, at this time, RS code is not of sufficient quality to exclude symptomatic women at the national level.

All data presented in this report therefore include both symptomatic and asymptomatic women.

Terminology and concepts

Reporting periods

This report presents monitoring data over 1-year, 2-year, 3-year and 5-year reporting periods. Participation data are presented over a 2-year period in line with the recommended 2-year screening interval of the NCSP, as well as over a 3-year and 5-year period. Most other data are presented for a single calendar year, with the exception of some incidence and mortality data, which are presented over a 5-year period to improve stability and comparability of rates due to small numbers.

Age groups

Data are presented for women aged 20–69 who, as the target group of the NCSP, are the primary focus of this report. Detailed data for these, as well as for women under 20 and 70 and over, can be accessed in *Cervical screening in Australia 2011–2012: supplementary data tables*.

Crude versus age-standardised

This report presents crude and age-standardised rates. Crude is the 'true' proportion or rate, and is appropriate when a single year or reporting period is reported (for example, crude participation in 2011–2012 was 57.3%). However, comparisons over time or across states/territories or population subgroups require that crude rates are age-standardised to remove the underlying differences in age-structure over time or between groups. These allow analysis of trends and differentials, and are therefore preferentially reported in these situations (for example, age-standardised participation in 2011–2012 was 57.7%).

Confidence intervals

Confidence intervals are only presented in this report where it has been deemed important to show the degree of error due to rare events in small populations to avoid potential misinterpretation of data, and/or to present data consistent with other publications. This includes the high-grade abnormality detection rate, incidence of cervical cancer and mortality from cervical cancer.

Where shown, 95% confidence intervals can be used to determine if a statistically significant difference exists between compared values: where the confidence intervals do not overlap, the difference between rates is greater than that which could be explained by chance and is regarded as statistically significant. Because overlapping confidence intervals do not imply that the difference between two rates is definitely due to chance, it can only be stated that no statistically significant differences were found, and not that no differences exist.

Judgment should be exercised in deciding whether or not any differences shown are of clinical significance.

Overview Box 3: Symbols

Symbols are used in this report at the commencement of each performance indicator to aid in interpretation of trends. Since many of the data in this report can go back for decades, only recent trends (generally the previous 3 years) are reflected by the symbol used in the trends box provided.

Symbols used in the trends boxes represent one of the following.

A favourable recent trend 

An unfavourable recent trend 

No trend, or there is a trend present but it is neither favourable or unfavourable 

Section 2 — Performance indicators

Indicator 1 Participation

What you need to know about participation

Definition: The percentage of women screened in a 2-year period for women aged 20–69.

Rationale: Through increased participation in cervical screening, more cervical abnormalities can be detected and treated that could otherwise develop into cervical cancer. Thus high participation is required for the National Cervical Screening Program (NCSP) to achieve its major objective of reducing cervical cancer incidence, morbidity and mortality.

Guide to interpretation: As the target group of the NCSP, data are predominantly reported for women aged 20–69, but some data are also shown for women under 20 and those 70 and over (although the definition of 'participation' strictly refers to women aged 20–69). Participation is measured over 2 years to align with the NCSP's recommended screening interval. Participation is based on the number of women screened, and not the number of cytology tests performed.

Participation rate calculations should, in principle, exclude women from the denominator who are unlikely to require screening. In practice, the only group that can be reliably removed are women who have had a total hysterectomy. This is achieved using national 'hysterectomy fractions' that are based on hysterectomy incidence data derived from the AIHW National Hospitals Morbidity Database (see Appendix C).

The most recent participation data are for the 2011–2012 reporting period.

What the data tell us about participation

Trend

Participation in the NCSP was steady at around 59% for all 2-year periods from 2004–2005 to 2008–2009, decreasing slightly to around 57–58% between 2009–2010 and 2011–2012.


The **recent trend** is therefore one of no substantive change.

2011–2012

In 2011–2012, a total of 3,875,467 women participated in the NCSP, of whom 3,723,738 were aged 20–69. This is 57.3% of women in the target age group, which, when age-standardised to allow analysis of trends and differentials, equates to a participation rate of 57.7% for 2011–2012.

Participation was highest in *Inner regional* and *Major cities* areas with 58.7% and 57.9%, and lowest in *Very remote* areas with 54.2%. Participation showed a clear trend of increasing participation with increasing socioeconomic status of residence, from 52.2% in areas of lowest socioeconomic status to 63.5% in areas of highest socioeconomic status.

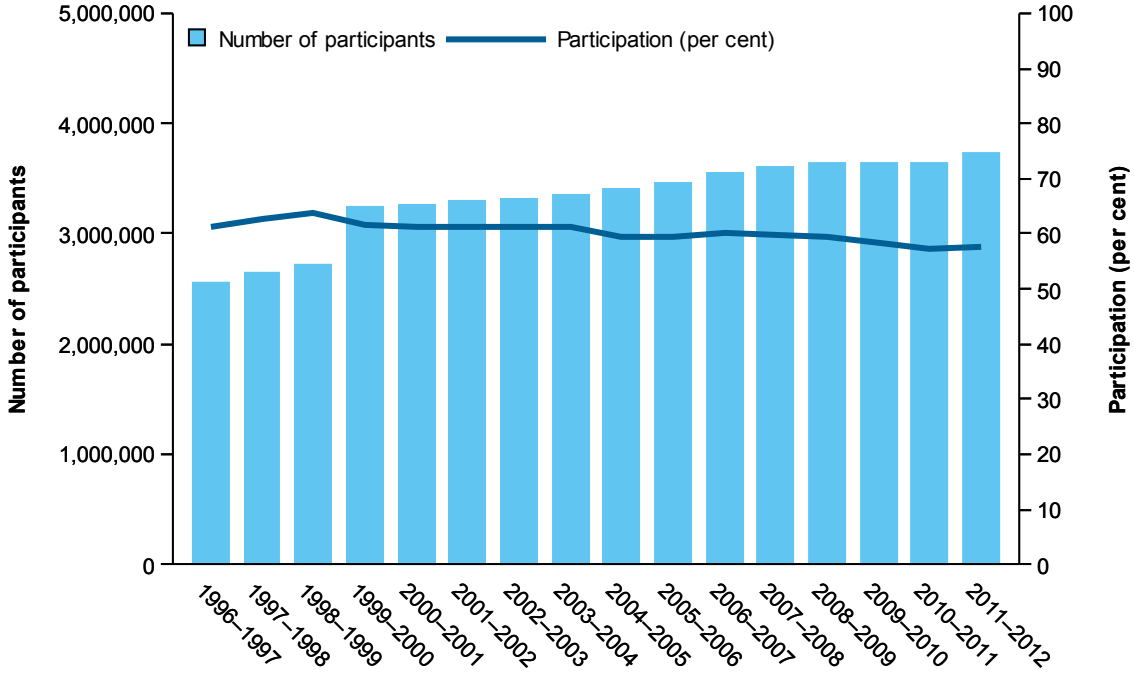
Detailed analyses

Participation in 2011–2012

In 2011–2012, 3,875,467 women participated in the NCSP (that is, had at least 1 cervical cytology test over the 2 years), of whom 3,723,738 were aged 20–69. These 3,723,738 women represent 57.3% of those aged 20–69 in the population with an intact cervix (the target population). When age-standardised to allow analysis of trends and differentials, this equates to a participation rate of 57.7%.

Participation trends

Figure 1.1 shows the trend in participation in the NCSP nationally, from 1996–1997, when reporting began, to 2011–2012, the most recent national data available. These data, and associated caveats, are provided in more detail in Table 1.1, below.



Note: Rates from before 2004–2005 should not be directly compared with those after this reporting period (see Table 1.1).

Source: AIHW analysis of state and territory cervical screening register data.

Figure 1.1: Participation of women aged 20–69 in the National Cervical Screening Program, 1996–1997 to 2011–2012

Since the reporting of truly national data began in 1999–2000 (due to the inclusion of previously unreported Queensland data in this period), participation in the NCSP by women aged 20–69 with an intact cervix has remained remarkably steady. The data show that 61–62% of these women participated between 1999–2000 and 2003–2004, and 59–60% participated between 2004–2005 and 2008–2009. This apparent 2 percentage point drop in participation due to a different method of estimating the number of women in the population with an intact cervix between 2003–2004 and 2004–2005, rather than representing a real decline.

There was a slight decline in participation in 2009–2010 and 2010–2011 to 58.2% and 57.3%, respectively, before increasing slightly in 2011–2012 to 57.7%. The decline in participation in 2009–2010 and 2010–2011 was made more conspicuous by a minor peak in participation in

the 2006–2007 and 2007–2008 reporting periods that immediately preceded these. It is reasonable to consider that this minor peak is primarily due to the introduction of the National Human Papillomavirus (HPV) Vaccination Program on 1 April 2007, which appears to have resulted in a greater number of women participating in cervical screening in 2007 in particular. Whether this was due to the vaccination program acting as a 'reminder' for women to screen, or whether this was due to opportunistic screening of women who presented to their health care provider for vaccination is not clear. However, the age groups of under 20, 20–24 and 25–29 (which include those aged 12–26, who were the focus of the vaccination program in 2007–2009) all demonstrated a transient increase in 2007, suggesting that opportunistic screening was likely a factor in the overall participation peak in reporting periods that include the year 2007.

This decline from 58.2% in 2009–2010 to 57.7% in 2011–2012 occurred despite a 2.4% increase in the number of women participating, since the 3.3% increase in the adjusted population between these 2 periods is greater (Table 1.1).

Table 1.1: Number and age-standardised rate of women aged 20–69 participating in the National Cervical Screening Program, 1996–1997 to 2011–2012

Reporting period	Participants[(b)]	Adjusted population[(c)]	AS rate[(d)]
1996–1997[(a)]	2,563,107	4,171,326	61.2
1997–1998[(a)]	2,653,504	4,210,148	62.8
1998–1999[(a)]	2,716,364	4,246,280	63.7
1999–2000	3,244,329	5,245,032	61.7
2000–2001	3,262,931	5,302,865	61.4
2001–2002	3,296,409	5,365,549	61.4
2002–2003	3,318,354	5,432,781	61.1
2003–2004	3,354,519	5,501,337	61.1
2004–2005	3,407,219	5,738,149	59.4
2005–2006	3,452,093	5,822,719	59.3
2006–2007	3,549,524	5,920,032	60.1
2007–2008	3,599,919	6,035,760	59.8
2008–2009	3,638,941	6,167,170	59.3
2009–2010	3,635,929	6,291,062	58.2
2010–2011	3,641,198	6,396,134	57.3
2011–2012	3,723,738	6,499,742	57.7

(a) Since the Queensland Health Pap Smear Register began operations in February 1999, Queensland data are excluded from both the participants and population data for the 1996–1997, 1997–1998 and 1998–1999 reporting periods.

(b) Participants are the number of women aged 20–69 screened in each 2-year reporting period. Number of women screened includes all women screened in each jurisdiction, not just those women resident in each jurisdiction, with the exception of Victoria and the Australian Capital Territory, for which only residents of the jurisdiction (and immediate border residents) are included.

(c) Adjusted population is the average of the Australian Bureau of Statistics (ABS) estimated resident population for women aged 20–69 for the 2 years, adjusted to include only women with an intact cervix using age-specific hysterectomy fractions. Reporting periods 1996–1997 to 2003–2004 use hysterectomy fractions derived from the 2001 ABS National Health Survey; reporting periods 2004–2005 to 2011–2012 use hysterectomy fractions derived from the AIHW National Hospitals Morbidity Database.

(d) Age-standardised (AS) rate is the number of women aged 20–69 screened in each 2-year reporting period as a percentage of the ABS estimated resident population for women aged 20–69, adjusted to include only women with an intact cervix as described above, age-standardised to the Australian population at 30 June 2001.

Note: Rates from 1996–1997 to 2003–2004 cannot be directly compared with rates from 2004–2005 onwards due to a different source of hysterectomy fractions used to adjust the population.

Source: AIHW analysis of state and territory cervical screening register data.

Participation by age

In 2011–2012, 96.1% of women participating in the NCSP were aged 20–69 (the target age group), with 2.6% under 20, and 1.3% aged 70 or over. Participation was highest for women aged 45–49 at 63.9%, followed by women aged 50–54 at 63.3% (Table 1.2).

Table 1.2: Participation by age, 2011–2012

Age group	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69
Women	339,106	430,035	447,873	458,225	460,431	425,213	390,561	322,080	269,357	180,857
Crude rate	42.8	52.2	58.2	60.6	61.9	63.9	63.3	61.2	59.5	51.5

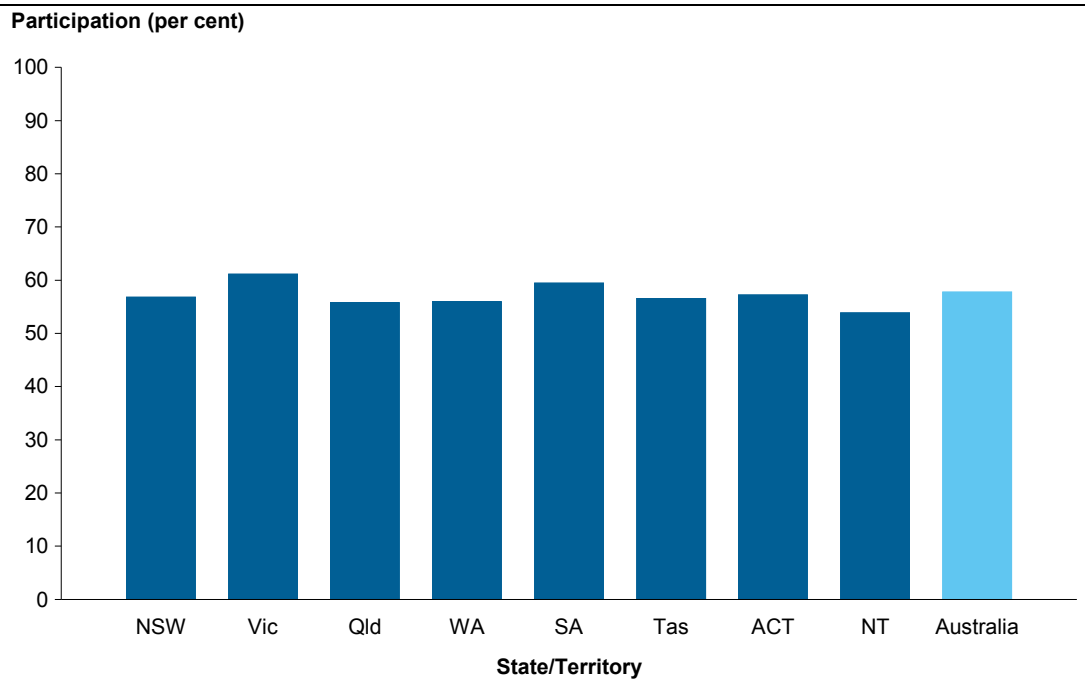
Note: Crude rate is the number of women screened in 2011–2012 as a percentage of the ABS estimated resident population for women aged 20–69, adjusted to include only women with an intact cervix using age-specific hysterectomy fractions derived from the AIHW National Hospitals Morbidity Database.

Source: AIHW analysis of state and territory cervical screening register data.

Note that, while participation among women aged 20–24 is both low and decreasing (falling from 43.6% in 2009–2010 to 42.8% in 2011–2012), Australia is one of the few countries that screens this age group.

Participation by state and territory

In 2011–2012, participation across all states and territories was within 3.9 percentage points of the national average of 57.7%, ranging from 53.8–61.1% (Table 1.3, Figure 1.2).



Source: AIHW analysis of state and territory cervical screening register data.

Figure 1.2: Participation of women aged 20–69, by state and territory, 2011–2012

Table 1.3: Participation of women aged 20–69, by state and territory, 2011–2012

State/territory	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Women	1,174,234	988,165	720,034	384,259	276,485	80,252	64,041	36,268	3,723,738
AS rate	56.8	61.1	55.8	55.9	59.4	56.6	57.2	53.8	57.7

Notes

1. Direct comparisons between the states and territories of Australia are not advised due to the substantial differences that exist between the jurisdictions, including population, area, geographic structure, policies and other factors.
2. Age-standardised (AS) rate is the number of women screened in 2011–2012 as a percentage of the ABS estimated resident population for women aged 20–69, adjusted to include only women with an intact cervix using age-specific hysterectomy fractions derived from the AIHW National Hospitals Morbidity Database, age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

Participation by location of residence

Participation in the NCSP was highest in *Major cities* (57.9%) and *Inner regional* (58.7%) areas, and lowest in *Very remote* (54.2%) areas (Table 1.4; Figure 1.3).

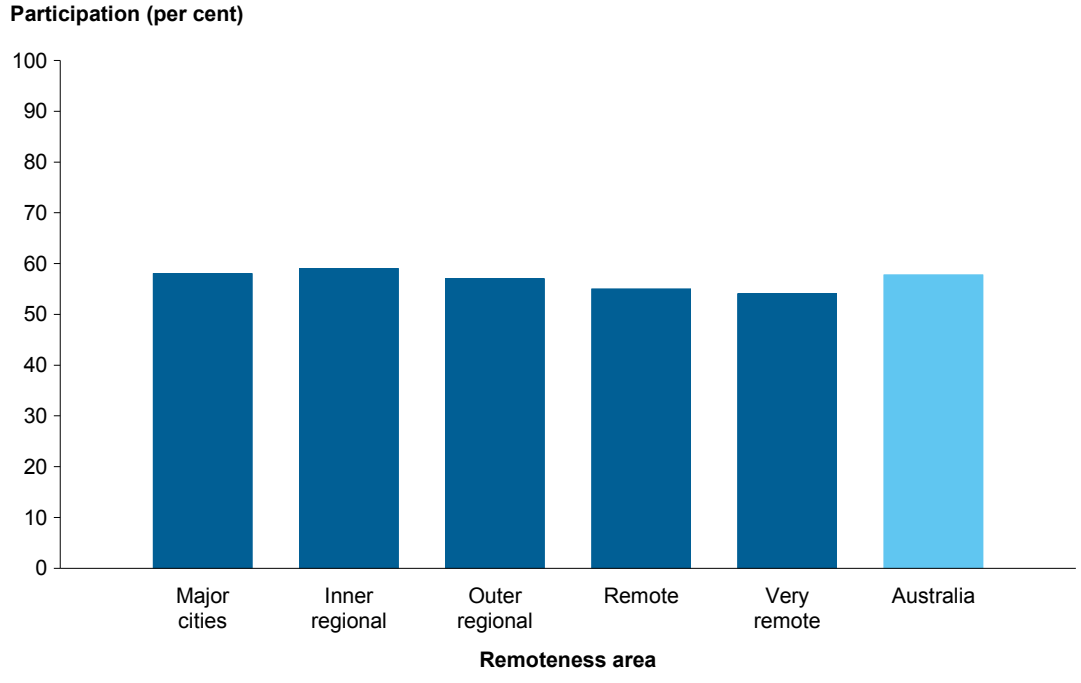
Table 1.4: Participation of women aged 20–69, by remoteness area, 2011–2012

Remoteness area	Major cities	Inner regional	Outer regional	Remote	Very remote	Australia
Women	2,676,583	657,621	313,237	47,391	28,405	3,723,738
AS rate	57.9	58.7	56.7	55.2	54.2	57.7

Notes

1. Women were allocated to a remoteness area using their residential postcode according to the Australian Statistical Geography Standard (ASGS) for 2011. Caution is required when examining differences across remoteness area (see Appendix C).
2. Age-standardised (AS) rate is the number of women screened in 2011–2012 as a percentage of the ABS estimated resident population for women aged 20–69, adjusted to include only women with an intact cervix using age-specific hysterectomy fractions derived from the AIHW National Hospitals Morbidity Database, age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.



Source: AIHW analysis of state and territory cervical screening register data.

Figure 1.3: Participation of women aged 20–69, by remoteness area, 2011–2012

Participation showed a clear trend of increasing with increasing socioeconomic status (Figure 1.4), from 52.2% of women residing in areas of lowest socioeconomic status to 63.5% of women residing in areas of highest socioeconomic status (Table 1.5).

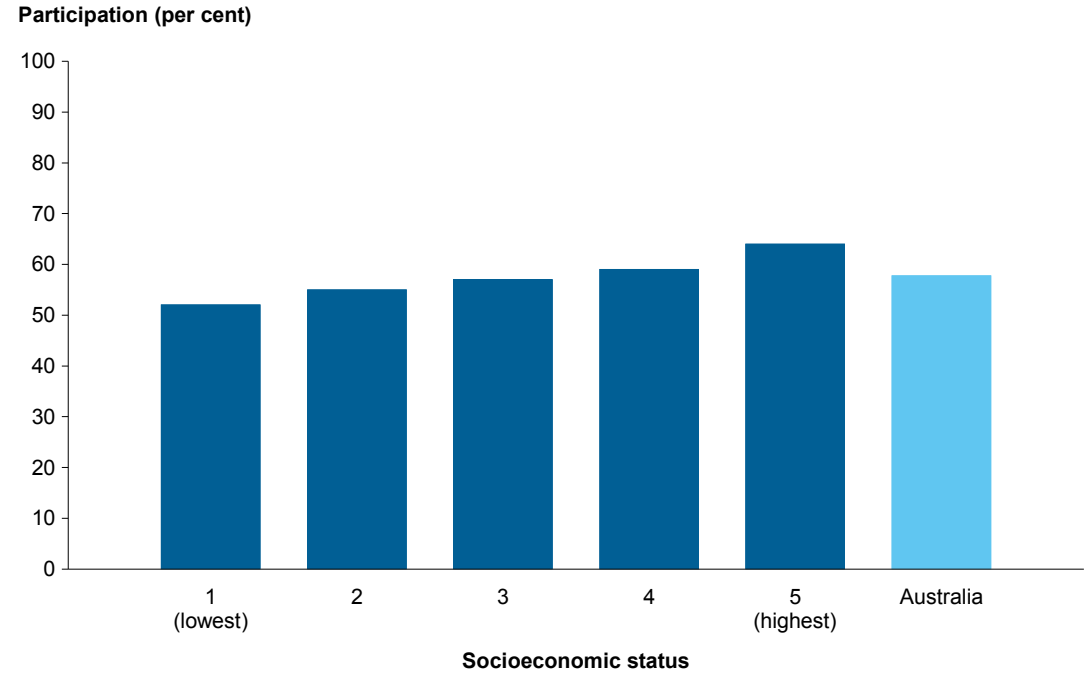
Table 1.5: Participation of women aged 20–69, by socioeconomic status, 2011–2012

Socioeconomic status	1 (lowest)	2	3	4	5 (highest)	Australia
Women	638,262	686,202	742,754	782,041	856,028	3,723,738
AS rate	52.2	55.3	56.9	58.8	63.5	57.7

Notes

1. Women were allocated to a socioeconomic status using their residential postcode according to the Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage for 2011.Caution is required when examining differences across socioeconomic status (see Appendix C).
2. Age-standardised (AS) rate is the number of women screened in 2011–2012 as a percentage of the ABS estimated resident population for women aged 20–69, adjusted to include only women with an intact cervix using age-specific hysterectomy fractions derived from the AIHW National Hospitals Morbidity Database, age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.



Source: AIHW analysis of state and territory cervical screening register data.

Figure 1.4: Participation of women aged 20–69, by socioeconomic status, 2011–2012

Participation of Aboriginal and Torres Strait Islander women

Participation in cervical screening cannot be measured nationally for Aboriginal and Torres Strait Islander women as Indigenous status is not included on pathology forms, which is the only source that provides information on participation, rescreening, cytology and histology to cervical screening registers.

Much of the evidence on the participation in cervical screening by Indigenous women is several years old, and suggest that Aboriginal and Torres Strait Islander women are underscreened. Coory et al. (2002) and Binns and Condon (2006) estimated participation in communities with high proportions of Aboriginal and Torres Strait Islander women in Queensland and the Northern Territory, respectively. These researchers found that, on average, participation by Aboriginal and Torres Strait Islander women was close to 18 percentage points below that for the respective jurisdiction, with both studies showing considerable variation between communities or regions.

It has been recognised that Indigenous women face cultural, linguistic and physical barriers to cervical screening (DoHA 2004). State and territory cervical screening programs have developed initiatives to increase participation in cervical screening by Indigenous women. Thse include the employment of Aboriginal and Torres Strait Islander Health Workers, with the Australian Government component of the NCSP supporting these through the development of principles, standards and guidelines for screening Aboriginal and Torres Strait Islander women (DoHA 2004). However, without being able to measure participation in cervical screening by Indigenous status, it is not known to what extent initiatives are reaching their desired aim.

The study above illustrates the value of an evidence base. Binns and Condon (2006) demonstrated that Northern Territory cervical screening program initiatives resulted in very high rates of participation in some regions of this jurisdiction, providing an opportunity to adapt these successful initiatives to other regions and communities. Such an evidence base, not currently available nationally, is fundamental in assessing the status of cervical screening in Indigenous women nationally, as well as guiding further improvements in cervical screening participation in Indigenous women.

The national key performance indicators (nKPI) data collection includes an indicator on women having a cervical screening at 2, 3 and 5 year intervals from primary health care services providing care for Indigenous women. As this dataset matures, it will become an increasingly useful dataset for understanding the extent of participation by Indigenous women attending these services in the NCSP.

Participation measured over greater lengths of time

Measuring participation over a 3-year and 5-year period, rather than a 2-year period, demonstrated that 70.2% of women aged 20–69 participated in the NCSP at least once in the 3-year period 2010–2012, and 83.3% had at least 1 Pap test in the 5-year period 2008–2012 (Table 1.6).

The increase from 2-year to 3-year participation may be, in part, due to state and territory cervical screening registers reminding women to rescreen 27 months after a previously negative cytology test (see Indicator 2.2 for more information), since this reminder has the potential to increase the attendance of women within 3 years of their previous cytology test (Queensland Health 2012). In this respect, 3-year participation may provide a more accurate indication of the proportion of women who participate regularly in cervical screening.

Table 1.6: Participation of women aged 20–69, by state and territory, over 2 years (2011–2012), 3 years (2010–2012) and 5 years (2008–2012)

State/territory	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
2011–2012	56.8	61.1	55.8	55.9	59.4	56.6	57.2	53.8	57.7
2010–2012	69.2	73.7	67.9	67.5	72.8	69.1	71.3	67.7	70.2
2008–2012	83.4	85.3	81.9	79.3	84.7	81.6	87.0	85.0	83.3

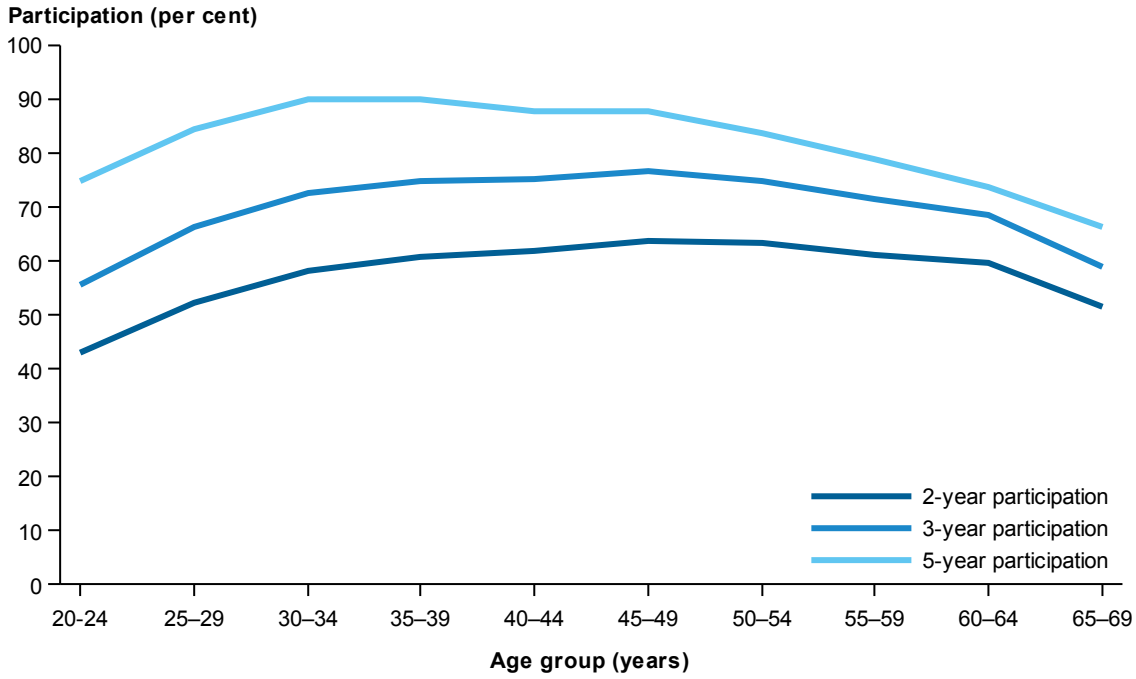
Notes

1. Direct comparisons between the states and territories of Australia are not advised due to the substantial differences that exist between the jurisdictions, including population, area, geographic structure, policies and other factors.
2. Age-standardised (AS) rate is the number of women screened as a percentage of the ABS estimated resident population for women aged 20–69, adjusted to include only women with an intact cervix using age-specific hysterectomy fractions derived from the AIHW National Hospitals Morbidity Database, age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

The age structure changes when participation is measured over greater lengths of time, with a proportionally greater number of women in the younger age groups included when participation is measured over 3 years or 5 years compared with participation measured over a 2-year period (Figure 1.5).

Along with this change, the age group with the highest participation shifts from women aged 45–49 for the 2-year period 2011–2012 and the 3-year period 2010–2012 to women aged 30–34 and 35–39 for the 5-year period 2008–2012 (Figure 1.5). The age group with the lowest participation also changes from women aged 20–24 for the 2-year period 2011–2012 and the 3-year period 2010–2012 to women aged 65–69 for the 5-year period 2008–2012 (Figure 1.5).



Source: AIHW analysis of state and territory cervical screening register data; data for figure are available in Table A1.

Figure 1.5: Participation of women aged 20–69, by age, over 2 years (2011–2012), 3 years (2010–2012), and 5 years (2008–2012)

Indicator 2.1 Early rescreening

What you need to know about early rescreening

Definition: The proportion of women rescreening, by number of rescreens, within 21 months of a negative cytology test, for women aged 20–69.

Rationale: A low proportion of women rescreening early is desirable, since compliance with the recommended screening interval is important in maintaining the cost effectiveness of the cervical screening program.

Guide to interpretation: This indicator is calculated as the proportion of a cohort of women with negative cytology in the index month of February who had a repeat cytology test of any result in the following 21 months. Women with an abnormality in the preceding 36 months are excluded, as are repeat cytology tests that are a valid repeat of an unsatisfactory cytology test.

The most recent early rescreening data are for the index month of February 2011. This small lag in data availability is because 21 months needs to have passed since a woman's last negative cytology test to know whether or not she has rescreened within this interval.

What the data tell us about early rescreening

Trend

Although the proportion of women rescreening early decreased from 13.3% for the 2010 cohort to 13.0% for the 2011 cohort, this is relatively stable after a steady decline since the 2000 cohort, for which the proportion of women rescreening early was above 30%.

 The **recent trend** is relatively small, but continues to be favourable, decreasing from 15.1% for the 2008 cohort to 13.0% for the 2011 cohort.

2011 cohort

Of all women aged 20–69 with a negative cytology test in February 2011, 13.0% rescreened early (within 21 months).

Detailed analyses

Early rescreening in the 2011 cohort

Of the 154,816 women aged 20–69 who had negative cytology in February 2011 with no abnormalities in the preceding 36 months, the majority did not rescreen early, with 134,702 women (87.0%) having no repeat cytology tests within 21 months of this negative cytology test. In comparison, 20,114 women (13.0%) did rescreen early. Of these, 19,403 had 1 repeat cytology test, 652 had 2 repeat cytology tests and 59 women had 3 or more repeat cytology tests within 21 months of this negative cytology test (Table 2.1).

This means that 13.0% of women are rescreening early unnecessarily (although some number of these women may have symptoms or another clinically valid reason that would make early rescreening appropriate).

Table 2.1: Number and proportion of women aged 20–69 rescreening early following a negative cervical cytology test, by number of early rescreens, 2011 cohort

Early rescreens	Number of women	Percentage of women
0	134,702	87.0
1	19,403	12.5
2	652	0.4
3+	59	0.0

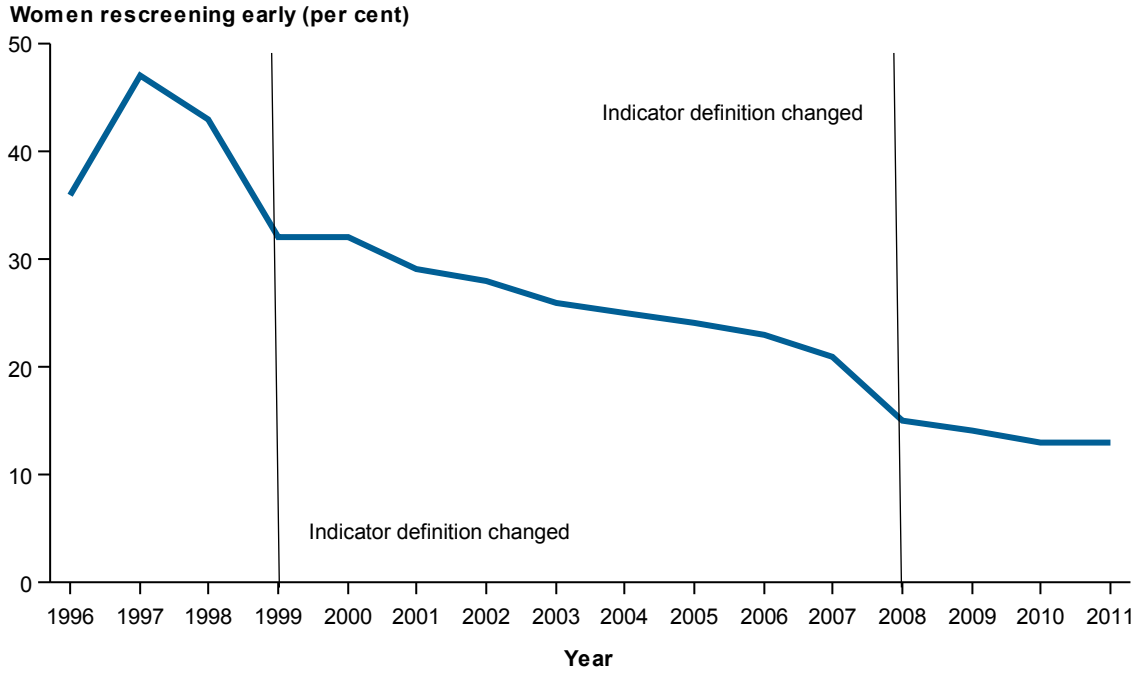
Note: Women with a cytological or histological abnormality in the preceding 36 months are excluded from entering the cohort; repeat cytology tests that are a valid repeat of an unsatisfactory cytology test are excluded from this count.

Source: AIHW analysis of state and territory cervical screening register data.

Early rescreening trends

The proportion of women rescreening early has decreased every year from the 1997 cohort through to the 2010 cohort (Figure 2.1). While overall there has been a substantial decrease from 46.7% to 13.0%, there have been 2 changes to the definition of early rescreening (1 for the 1999 cohort onwards and 1 for the 2008 cohort onwards) that affect direct comparisons.

More recently (and directly comparable since the same definition of early rescreening has been applied) the proportion of women rescreening early decreased from 15.1% for the 2008 cohort to 13.0% for the 2011 cohort. A decrease in the proportion of women rescreening early is a positive finding, since modelling has shown that a decrease in early rescreening reduces the cost of a screening program without changing its effectiveness (Creighton et al. 2010).



Source: AIHW analysis of state and territory cervical screening register data.

Figure 2.1: Proportion of women aged 20–69 rescreening early following a negative cervical cytology test, 1996–2011 cohorts

Early rescreening by state and territory

The proportion of women rescreening early varied across states and territories from 9.6% to 13.8% (Table 2.2).

Table 2.2: Proportion of women aged 20–69 rescreening early following a negative cervical cytology test, by state and territory, 2011 cohort

State/territory	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Per cent	13.8	13.6	12.9	12.2	10.8	10.4	9.6	9.8	13.0

Source: AIHW analysis of state and territory cervical screening register data.

Indicator 2.2 Rescreening after 27-month reminder letter

What you need to know about rescreening after a reminder letter

Definition: The proportion of women who are sent a 27-month cervical screening register reminder letter (a letter sent when the register has no record of a woman having had repeat cytology within 27 months of a previously negative cytology test), who rescreen within 3 months, for women aged 20–69.

Rationale: This indicator measures the effectiveness of this reminder letter in prompting women to rescreen. Thus a high proportion of women rescreening within 3 months of the 27-month cervical screening register reminder letter is desirable.

Guide to interpretation: Calculations are based on the number of women who are sent a letter, which is not necessarily the number of women who received a letter (for example, if a woman has changed address), which cannot be determined. To be counted as rescreened within 3 months, women need to have a cytology test within 3 months of being sent a reminder letter.

The most recent data are for women sent a reminder letter in 2011. This small lag in data availability is because 3 months needs to have passed since a woman was sent a 27-month reminder letter in a particular calendar year to know whether or not she has rescreened within this interval.

What the data tell us about rescreening after a reminder letter

Trend

The proportion of women sent a letter and who rescreened within 3 months barely changed between 2010 (31.5%) and 2011 (31.8%), and therefore reflects no change to the trend.

The **recent trend** is one of no change, with the data ranging only between 31.5% and 31.8% between 2008 and 2011.

Letters sent in 2011

31.8% of women sent a 27-month cervical screening register reminder letter in 2011 rescreened within 3 months of being sent this letter, indicating that this letter acts as a prompt for many women.

Detailed analyses

Rescreening after 27-month reminder letters sent in 2011

In 2011, 27-month cervical screening register reminder letters were sent to 911,282 women. Of these, 289,489 women (31.8%) rescreened within 3 months (Table 2.3). This indicates that the reminder letter acts as a prompt to rescreen for many women (although it is not possible to know from these data if barriers exist that contributed to the proportion of women who did not rescreen within 3 months).

Table 2.3: Women aged 20–69 rescreening within 3 months of 27-month cervical screening register reminder letter, by state and territory, letters sent in 2011

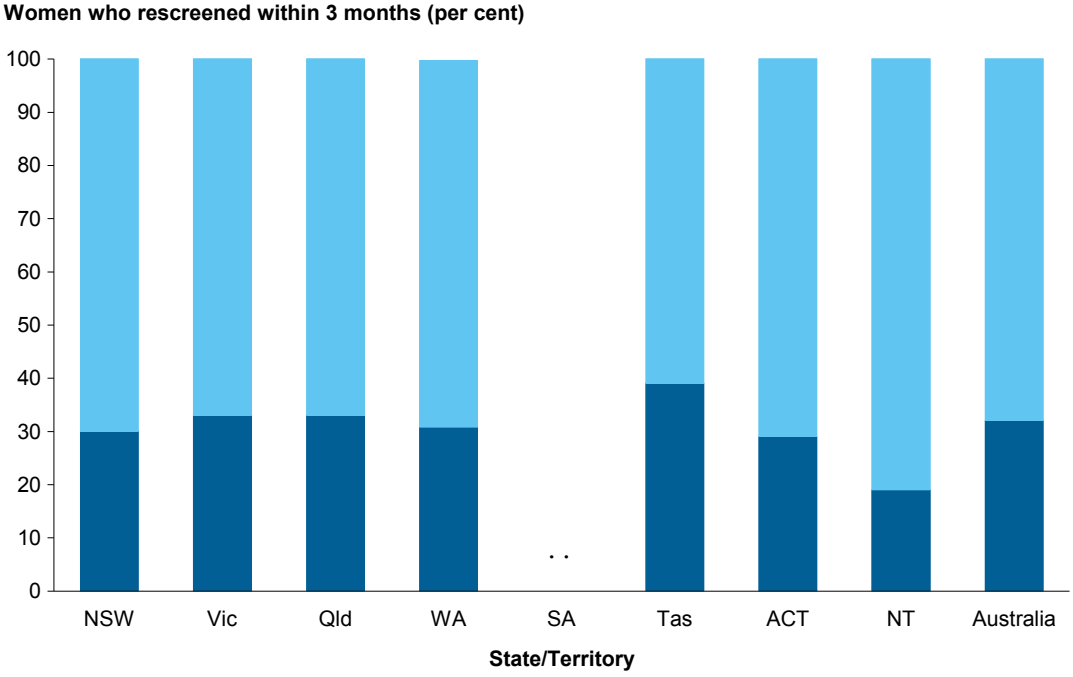
State/territory	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
No. sent letter	309,734	243,011	211,876	93,590	. .	21,428	20,505	11,138	911,282
No. rescreened	94,277	79,455	70,410	29,003	. .	8,290	5,930	2,124	289,489
Per cent	30.4	32.7	33.2	31.0	. .	38.7	28.9	19.1	31.8

Note: Data are not available for South Australia, which at present does not have a 27-month cervical screening register reminder letter sent to women. (These are sent to practitioners, with a 30-month reminder letter sent to women, neither of which are directly comparable.)

Source: AIHW analysis of state and territory cervical screening register data.

Rescreening after 27-month reminder letter by state and territory

The proportion of women who rescreened within 3 months of being sent a reminder letter was around 30% in most states and territories, although was notably lower (19.1%) in the Northern Territory (Figure 2.2).



Source: AIHW analysis of state and territory cervical screening register data.

Figure 2.2: Proportion of women aged 20–69 rescreening within 3 months of the 27-month cervical screening register reminder letter, by state and territory, letters sent in 2011

Indicator 3 Cytology

What you need to know about cytology

Cytology means 'study of cells' and, in the context of cervical screening, refers to cells from the cervix that are collected and examined for abnormalities. Cervical cytology using the conventional Papanicolaou smear ('Pap test') is the primary screening tool of the National Cervical Screening Program (NCSP).

Definition: The proportion of cytology test results that were unsatisfactory, negative, had no endocervical component, or detected an abnormality in a 12-month period.

Rationale: Annual monitoring of cytology report categories by various stratifications may reveal emerging positive or negative trends that need to be addressed. In addition, it is anticipated that the ability to monitor national trends in squamous and endocervical component report categories will allow the earliest indications possible of any effects from the human papillomavirus (HPV) vaccine introduced in 2007, which will be of relevance to the NCSP.

Guide to interpretation: The most recent cytology data are for the year 2012.

What the data tell us about cytology

Trends

The proportion of cytology tests that were unsatisfactory and negative remained stable between 2004 and 2012 at around 2% and 92%, respectively.

The proportion of cytology tests with an endocervical component present decreased significantly each year from 82.1% in 2004 to 78.1% in 2012. This overall decrease included a small decrease from 78.6% in 2011 to 78.1% in 2012.

The proportion of cytology tests reported as abnormal, after decreasing from 6.7% in 2004 to 5.3% in 2010, increased to 5.6% in 2011 and 5.8% in 2012.

Cytology in 2012

More than 2 million cytology tests were performed in 2012, with 2,108,227 for women aged 20–69. For these women:

- 2.2% of cytology tests were unsatisfactory.
- 92.1% of cytology tests were negative.
- An endocervical component was present in 78.1% of cytology tests.
- A definite or possible high-grade abnormality was reported in 1.4% of cytology tests.
- An abnormality was reported in 5.8% of cytology tests.

More information about cytology

Cervical cytology using the conventional Papanicolaou smear (Pap test) is the primary screening tool of the NCSP. Cytology means 'study of cells', and, in the context of cervical screening, refers to cells from the cervix that are collected and examined for abnormalities.

The objective of a Pap test is to sample cells from the transformation zone of the cervix (CDHSH 1993), which is the area of the cervix in which the squamous and endocervical cells (also known as glandular cells) meet (between the 'original' and 'current' squamocolumnar junctions), and the site where cervical abnormalities and cancer are usually found.

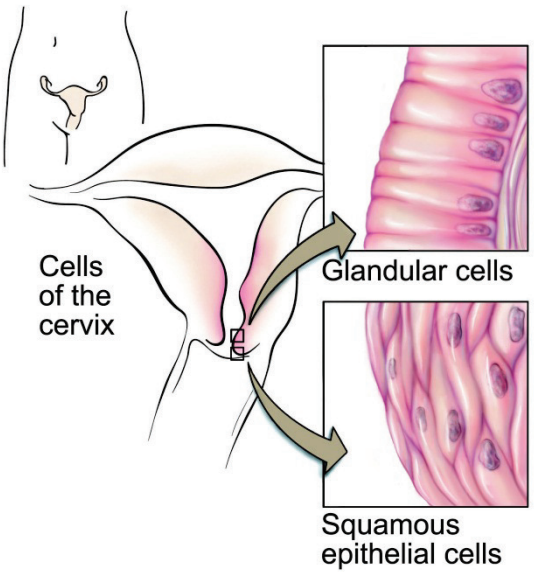


Figure 3.1: Anatomy: cells of the cervix

Source: <http://visualsonline.cancer.gov>.

The NCSP developed the National Cervical Cytology Coding Sheet based on the Australian Modified Bethesda System 2004 for reporting cervical cytology, introduced along with revised guidelines for the management of asymptomatic women with screen-detected abnormalities in July 2006 (NHMRC 2005). This coding sheet allows pathologists to report on both the squamous and endocervical components of the cervical cytology sample (as well as a third category for non-cervical abnormalities and a recommendation code that are not reported here), which together give an overall cervical cytology result. This overall cytology result may indicate a squamous abnormality, an endocervical abnormality, or (more rarely) concurrent squamous and endocervical abnormalities.

The squamous cell and endocervical component reporting categories of the National Cervical Cytology Coding Sheet are shown in Table 3.1.

Table 3.1: Cytology reporting categories of the National Cervical Screening Program

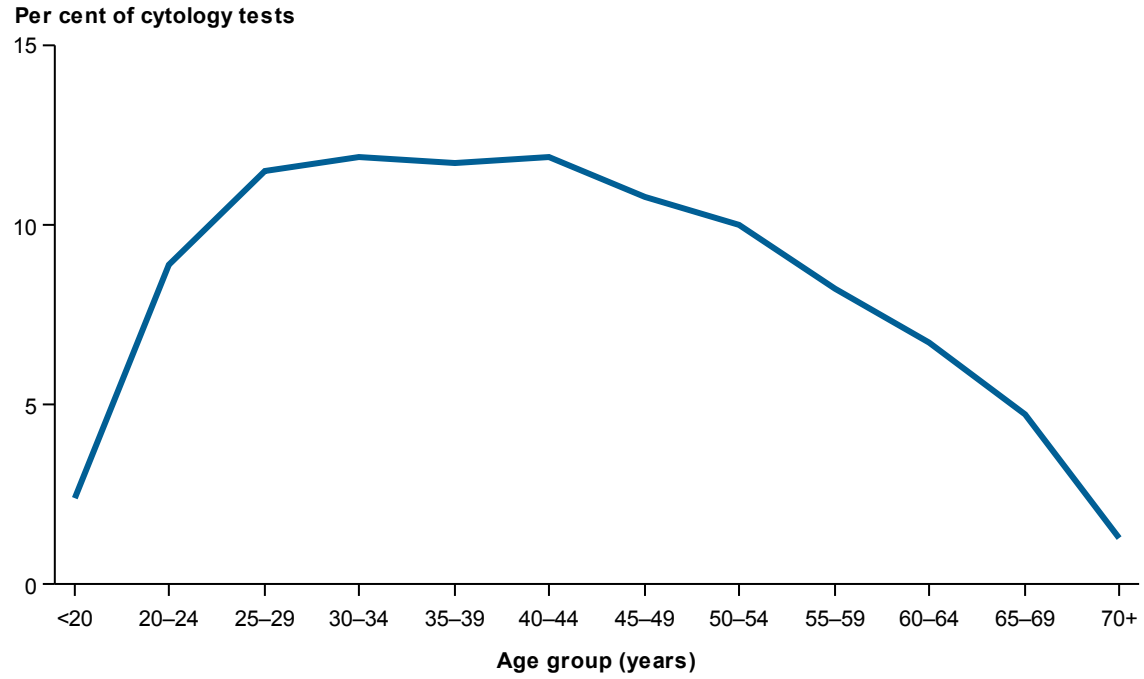
Squamous cell	Endocervical component
SU Unsatisfactory	EU Unsatisfactory
	E0 No endocervical component
S1 Negative	E1 Negative
S2 Possible low-grade squamous intraepithelial lesion	
S3 Low-grade squamous intraepithelial lesion	E2 Atypical endocervical cells of uncertain significance
S4 Possible high-grade squamous intraepithelial lesion	E3 Possible high-grade endocervical glandular lesion
S5 High-grade squamous intraepithelial lesion	E4 Adenocarcinoma *in situ*
S6 High-grade squamous intraepithelial lesion with possible microinvasion/ invasion	E5 Adenocarcinoma *in situ* with possible microinvasion/ invasion
S7 Squamous cell carcinoma	E6 Adenocarcinoma

Note: There is a further endocervical component result of E- that has been omitted since this code indicates a vaginal vault smear, which is not included in the cervical cytology results presented.

Detailed analyses

Cytology in 2012

In 2012, there were 2,189,960 cervical cytology tests performed, with 2,108,227 (96.3%) of these for women aged 20–69 (Table 3.2). Most cytology tests were performed for women aged 40–44 with a peak of 261,413 tests (Figure 3.2), this being 11.9% of all cytology tests performed in 2012.



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

Figure 3.2: Proportion of cytology tests by age, 2012

Cytology trends

Prior to 2012, of all years from 2005–2011, the greatest number of cytology tests were performed in 2007 (2,093,417 for women aged 20–69). This was a 3% increase on the number of cytology tests performed in 2006, which is the greatest year-to-year increase seen between 2005 and 2012 (Table 3.2). This is likely due to the introduction of the National HPV Vaccination Program on 1 April 2007, either acting as a 'reminder' for women to have a Pap test, or through opportunistic screening for women attending their health-care provider for immunisation. With girls and women aged up to 30 seeing a 5.7% increase in testing from 2006 to 2007, it seems likely that the latter was a factor, since the introduction of the vaccination program included a catch-up program for girls and women aged from 12–26.

In addition, there appears to be a cohort effect, whereby the number of cytology tests is relatively higher every second year, in odd years, which may be related to the 2-yearly screening interval of the NCSP (although the trend in 2012 was in opposition to this).

In 2012, the number of cytology tests performed in 2012 surpassed the 2007 peak, with 2,108,227 cytology tests performed for women aged 20–69 (Table 3.2).

Table 3.2: Number of cytology tests by age, 2005–2012

Age group (years)	2005	2006	2007	2008	2009	2010	2011	2012
<20	69,841	65,189	67,861	63,668	60,813	55,511	56,159	53,323
20–24	207,671	203,531	215,454	203,540	202,951	192,175	195,602	195,502
25–29	239,628	235,385	249,461	242,116	249,852	240,510	247,362	251,896
30–34	287,736	270,412	268,829	258,449	259,995	246,489	253,185	260,357
35–39	274,984	273,274	283,760	281,047	281,300	264,471	260,198	256,294
40–44	269,546	259,880	259,723	250,963	252,387	245,041	252,666	261,413
45–49	239,200	239,884	248,203	243,146	246,688	236,829	235,860	235,597
50–54	196,175	196,236	201,663	202,073	206,118	205,915	211,883	218,708
55–59	159,849	163,546	166,087	165,893	168,806	168,579	172,415	179,296
60–64	106,608	112,240	122,356	129,177	134,622	139,035	144,153	146,935
65–69	73,281	75,700	77,881	79,390	83,835	86,816	92,294	102,229
70+	31,075	30,188	29,925	28,353	28,005	27,750	28,014	28,402
All ages	**2,155,682**	**2,125,522**	**2,191,238**	**2,147,848**	**2,175,383**	**2,109,131**	**2,149,798**	**2,189,960**
Ages 20–69	**2,054,678**	**2,030,088**	**2,093,417**	**2,055,794**	**2,086,554**	**2,025,860**	**2,065,618**	**2,108,227**

Source: AIHW analysis of state and territory cervical screening register data.

Unsatisfactory cytology in 2012

In 2012, of the 2,108,227 cytology tests performed for women aged 20–69, 46,192 (2.2%) were unsatisfactory (Table 3.3).

Unsatisfactory cytology is defined as a cervical cytology test where the squamous result is SU Unsatisfactory and the endocervical result is EU Unsatisfactory or where the squamous result is SU Unsatisfactory and the endocervical result is either E0 No endocervical component or E1 Negative.

While not a true result *per se*, unsatisfactory cytology means that due to the unsatisfactory nature of the cells sampled, the pathologist is unable to determine a clear result. This may be due to either too few or too many cells, or the presence of blood or other factors obscuring the cells, or to poor staining or preservation. The absence of an endocervical component is not considered sufficient grounds to deem a cervical cytology sample unsatisfactory (NPAAC 2006).

Unsatisfactory cytology trends

The proportion of cervical cytology tests considered unsatisfactory remained relatively constant, at 2% of all cytology tests for all years from 2005–2012 (Table 3.3).

Table 3.3: Unsatisfactory cytology tests in women aged 20–69, 2005–2012

	2005	2006	2007	2008	2009	2010	2011	2012
Number	41,042	42,720	44,912	43,223	43,104	42,096	42,760	46,192
Crude rate	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.2
AS rate	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.2

Note: Crude rate is the number of unsatisfactory cytology tests as a proportion of the total number of cytology tests; age-standardised (AS) rate is the number of unsatisfactory cytology tests as a proportion of the total number of cytology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

The National Pathology Accreditation Advisory Council (NPAAC) *Performance measures for Australian laboratories reporting cervical cytology* (NPAAC 2006) includes a recommended standard for the proportion of specimens reported as unsatisfactory as between 0.5% and 5.0% of all specimens reported.

The proportion of cytology tests that were unsatisfactory, 2.2% in 2012 (Table 3.3), falls within these benchmark standards (Box 3.1) and would therefore be considered appropriate.

Box 3.1: National Pathology Accreditation Advisory Council (NPAAC) *Performance measures for Australian laboratories reporting cervical cytology*

Performance measure 1

Proportion of specimens reported as unsatisfactory.

Recommended standard

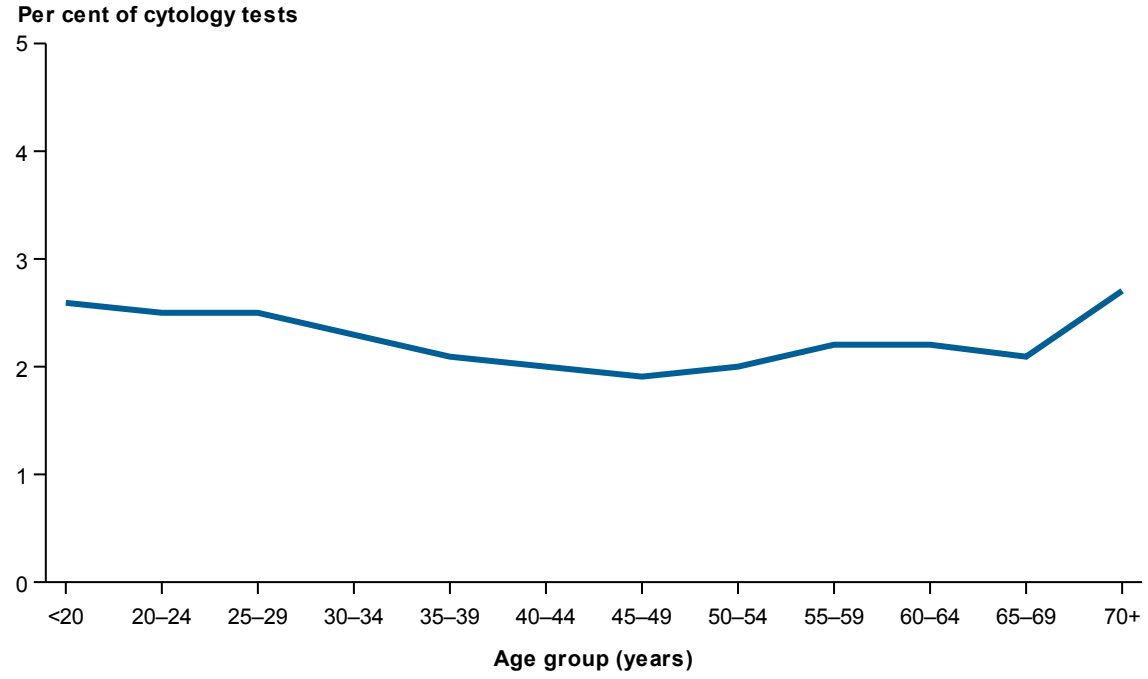
Between 0.5% and 5.0% of all specimens reported as unsatisfactory.

Calculated value for 2012

2.2%

Unsatisfactory cytology by age

The proportion of cytology tests that were unsatisfactory in 2012 was 2.6% of cytology tests for women aged under 20, 2.5% of cytology tests for those aged 20–29, and then around 2% for those aged 30–69. The proportion then increased with increasing age to a high of 2.7% for women aged 70 and over (Figure 3.3). It has been suggested that the increase in unsatisfactory tests in older women may be related to physiological changes in post-menopausal women resulting in atrophic epithelial cells in the sample (Bateson 2009).



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

Figure 3.3: Proportion of cytology tests that were unsatisfactory by age, 2012

Unsatisfactory cytology by state and territory

In 2012, the majority of states and territories had unsatisfactory cytology tests comprising 2.1–2.6% of all cytology tests. The exceptions to this were New South Wales with 1.9%, and the Australian Capital Territory with 1.5% of all cytology tests being unsatisfactory (Table 3.4).

Table 3.4: Unsatisfactory cytology tests in women aged 20–69, by state and territory, 2012

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Number	12,667	14,182	8,377	4,773	3,956	1,187	529	521	46,192
Crude rate	1.9	2.5	2.1	2.2	2.6	2.7	1.5	2.6	2.2
AS rate	1.9	2.5	2.1	2.2	2.6	2.6	1.5	2.5	2.2

Note: Crude rate is the number of unsatisfactory cytology tests as a proportion of the total number of cytology tests; age-standardised (AS) rate is the number of unsatisfactory cytology tests as a proportion of the total number of cytology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

Negative cytology in 2012

Most cervical cytology tests have a negative result, indicating that no abnormalities were detected. In 2012, of the 2,108,227 cytology tests performed for women aged 20–69, 1,943,563 (92.2%) were negative (92.1% age-standardised) (Table 3.5).

Negative cytology is defined as a cervical cytology test where the squamous result is S1 Negative and the endocervical result is either E0 No endocervical component or E1 Negative.

Negative cytology trends

The proportion of negative cytology tests remained steady from 2005–2012 at between 91% and 93% of all cytology tests performed for women aged 20–69 (Table 3.5).

Table 3.5: Negative cytology tests in women aged 20–69, 2005–2012

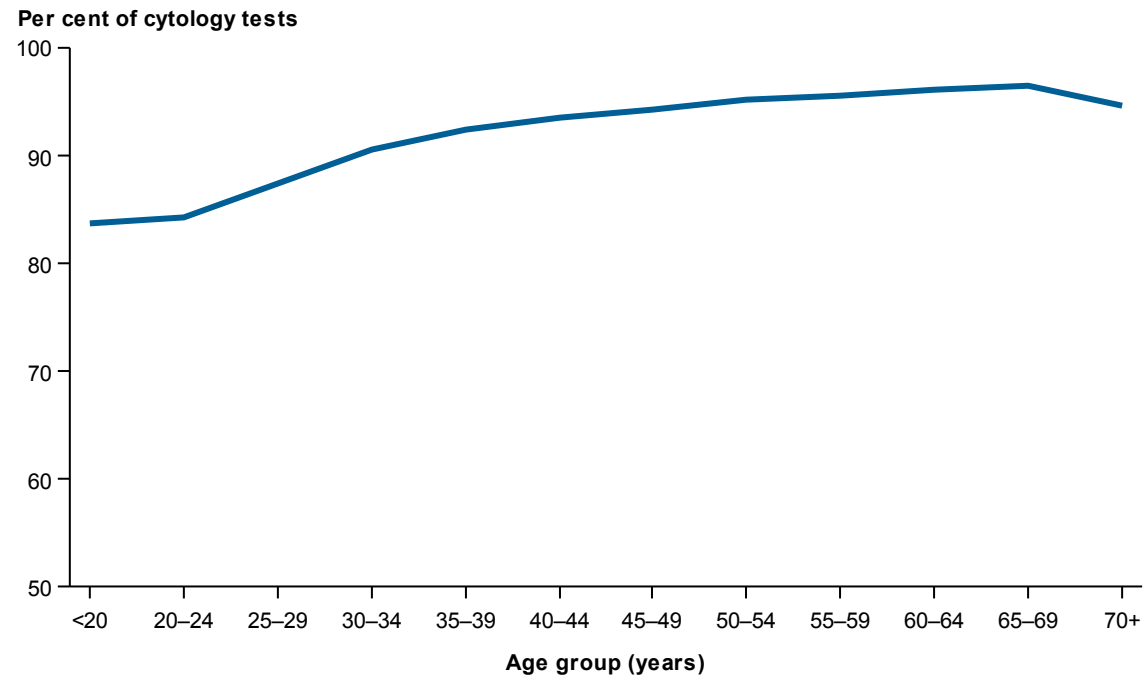
	2005	2006	2007	2008	2009	2010	2011	2012
Number	1,872,910	1,857,552	1,922,592	1,891,705	1,931,682	1,876,881	1,908,291	1,943,563
Crude rate	91.2	91.5	91.8	92.0	92.6	92.6	92.4	92.2
AS rate	91.3	91.6	91.9	92.1	92.6	92.6	92.3	92.1

Note: Crude rate is the number of negative cytology tests as a proportion of the total number of cytology tests; age-standardised (AS) rate is the number of negative cytology tests as a proportion of the total number of cytology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

Negative cytology by age

In 2012, the proportion of cytology tests that were negative was lowest for women under 25, at around 84% of cytology tests, thereafter increasing with increasing age, peaking at 96.4% for women aged 65–69 (Figure 3.4).



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

Figure 3.4: Proportion of cytology tests that were negative by age, 2012

Negative cytology by state and territory

The proportion of cytology tests that were negative was similar across states and territories, ranging from 90.7% to 93.9% for women aged 20–69 in 2012 (Table 3.6).

Table 3.6: Negative cytology tests in women aged 20–69, by state and territory, 2012

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Number	612,171	523,185	375,834	197,561	141,963	41,412	33,129	18,308	1,943,563
Crude rate	93.2	90.9	92.8	90.6	93.0	92.9	93.7	90.2	92.2
AS rate	93.0	90.7	92.9	90.9	92.9	92.7	93.9	90.9	92.1

Note: Crude rate is the number of negative cytology tests as a proportion of the total number of cytology tests; age-standardised (AS) rate is the number of negative cytology tests as a proportion of the total number of cytology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

No endocervical component in 2012

The presence of endocervical cells in a cervical cytology sample, while not required for a sample to be considered satisfactory (NPAAC 2006), indicates that the transformation zone is likely to have been sampled (the site where most cervical abnormalities and cancer are detected) (CDHSH 1993). Additionally, the presence of endocervical cells is necessary to detect endocervical abnormalities and adenocarcinoma where these are present.

In 2012, of the 2,108,227 cytology tests performed for women aged 20–69, 461,425 (21.9%) had no endocervical component (21.9% age-standardised) (Table 3.7).

> A cytology test with no endocervical component is defined as a cervical cytology test with any squamous result and an endocervical result of E0 No endocervical component, meaning that no endocervical cells are present in the sample, and thus only the squamous cells in the sample can be assessed for the presence of abnormalities or cancer.

No endocervical component trends

The number of cervical cytology tests with no endocervical component increased disproportionately to the increase in the number of cytology tests between 2005 and 2012. While the overall increase in the number of cytology tests for women aged 20–69 from 2005–2012 was 2.6%, the number of cytology tests with no endocervical component increased 21.8% over the same period (from 379,531 to 461,425). This is reflected in the steady increase in the proportion of cytology tests with no endocervical component from 18.5% in 2005 to 21.9% in 2012 for women aged 20–69 (Table 3.7). This trend holds after age-standardisation—from 19.0% in 2004 to 21.9% of cytology tests in 2012 (Table 3.7).

The 2007–2009 National Cancer Prevention Policy of Cancer Council Australia (2007) states that 'presence of an endocervical component in 80% of Pap tests is generally considered acceptable'. In this context, the 2012 crude rate of 21.9%, which indicates the presence of an endocervical component in 78.1% of cytology tests, is slightly outside this desired range.

Table 3.7: Cytology tests with no endocervical component in women aged 20–69, 2005–2012

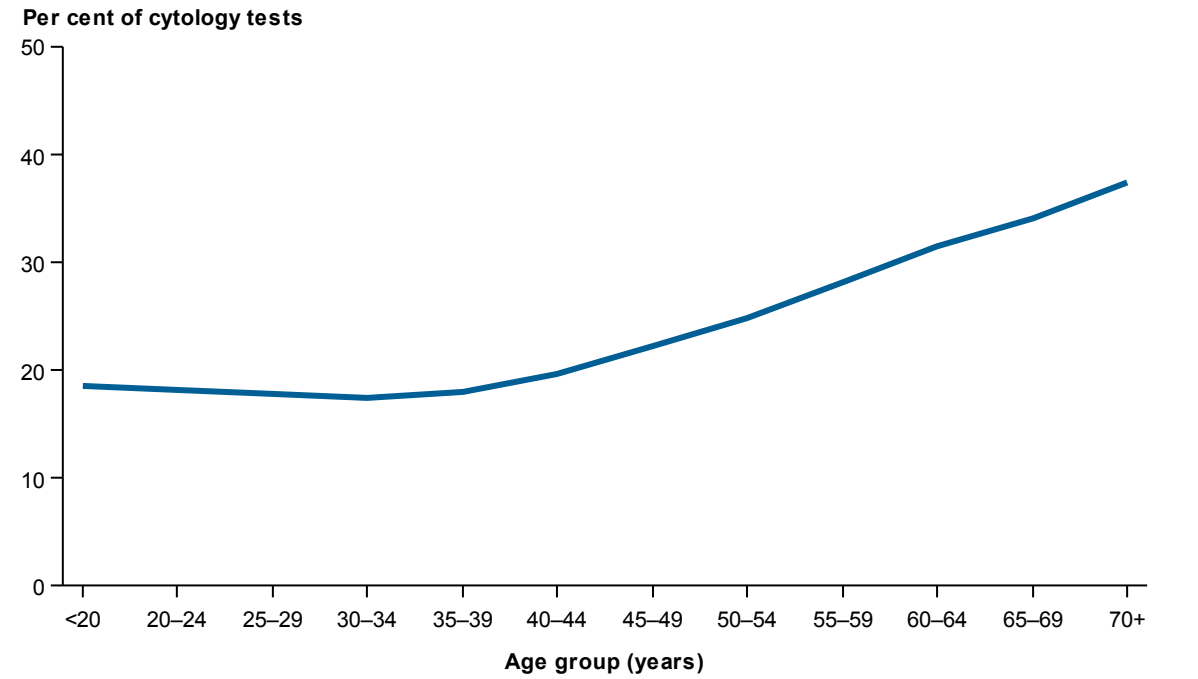
	2005	2006	2007	2008	2009	2010	2011	2012
Number	379,531	387,918	406,736	407,942	418,527	424,077	440,411	461,425
Crude rate	18.5	19.1	19.4	19.8	20.1	20.9	21.3	21.9
AS rate	19.0	19.5	19.8	20.2	20.3	21.1	21.4	21.9

Note: Crude rate is the number of cytology tests with no endocervical component as a proportion of the total number of cytology tests; Age-standardised (AS) rate is the number of cytology tests with no endocervical component as a proportion of the total number of cytology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

No endocervical component by age

Younger women had a lower proportion of cytology tests with no endocervical component, with 17.5–18.2% of all cytology tests performed for women aged 20–39 lacking endocervical cells in 2012 (Figure 3.5). In contrast, an endocervical component was absent from more than 20% of cytology tests for women aged 45–49, from 30% of cytology tests for women aged 60–64, and from 36% of cytology tests performed in women aged 70 and over (Figure 3.5).



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

Figure 3.5: Proportion of cytology tests with no endocervical component by age, 2012

This trend aligns with the movement of the transformation zone with age; the proportion of women with a transformation zone located on the ectocervix has been found to decrease from 94% of women under 25 to just 2% of women older than 64 (Autier et al. 1996). These figures hold up well with the observed data, when it is considered that sampling of the transformation zone is required for endocervical cells to be present in a cervical cytology sample, and that a transformation zone high up in the endocervical canal is likely to be more difficult to sample than a transformation zone on the ectocervix.

No endocervical component by state and territory

In 2012, the proportion of cytology tests for which there was no endocervical component ranged considerably from 18.7–30.7% (age-standardised) across states and territories for women aged 20–69 (Table 3.8).

Table 3.8: Cytology tests with no endocervical component in women aged 20–69, by state and territory, 2012

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Number	125,599	147,944	75,268	51,799	34,027	13,946	7,609	5,233	461,425
Crude rate	19.1	25.7	18.6	23.7	22.3	31.3	21.5	25.8	21.9
AS rate	19.1	25.7	18.7	24.3	22.0	30.7	21.9	26.8	21.9

Note: Crude rate is the number of cytology tests with no endocervical component as a proportion of the total number of cytology tests; age-standardised (AS) rate is the number of cytology tests with no endocervical component as a proportion of the total number of cytology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

Abnormalities detected by cytology in 2012

In 2012, there were 118,953 abnormalities (low-grade, high-grade or cancer) detected in the 2,108,227 cytology tests for women aged 20–69 (5.8 abnormalities per 100 cytology tests). Of these abnormalities, 88,845 (74.7%) were low-grade, and 29,875 (25.1%) were high-grade, cancer making up the remainder (Table 3.9).

Abnormality trends

Low-grade abnormalities decreased steadily from their peak of 114,257 in 2005 to 78,510 in 2010 for women aged 20–69 (a decrease from 5.5 to 3.9 per 100 cytology tests, age-standardised). However, in contrast to this trend, the number of low-grade abnormalities increased from 78,510 in 2010 to 84,540 in 2011 and to 88,845 in 2012 (an increase from 3.9 to 4.3 per 100 cytology tests, age-standardised) (Table 3.9).

High-grade abnormalities remained steady at 1.3–1.5 per 100 cytology tests for all years from 2005–2012 (Table 3.9).

The NPAAC *Performance measures for Australian laboratories reporting cervical cytology* (NPAAC 2006) includes recommended standards for the proportion of specimens reported as possible and definite high-grade abnormalities of at least 0.7%, and for the proportion of cytology tests reported as abnormal of less than 14.0%. It further recommends that the ratio of possible high-grade to definite high-grade abnormalities be less than 1.5:1. Although these standards were developed for a different purpose, they provide a useful benchmark.

Calculation of these performance measures using cytology detection data for 2012 gave results of 1.5%, 5.6% and 0.8:1, respectively (Box 3.2), which would all be considered within the standards set for these measures.

Box 3.2: National Pathology Accreditation Advisory Council (NPAAC)
Performance measures for Australian laboratories reporting cervical cytology

Performance measure 2b

(i) Proportion of specimens reported as definite and possible high-grade abnormality

(ii) Proportion of specimens reported as abnormal

Recommended standard

(i) Not less than 0.7% reported as definite or possible high-grade abnormality

(ii) Not more than 14.0% reported as abnormal

Calculated value for 2012

(i) 1.4%

(ii) 5.8%

Table 3.9: Abnormalities detected by cytology in women aged 20–69, 2005–2012

	2005	2006	2007	2008	2009	2010	2011	2012
Low-grade abnormalities								
Number	114,257	103,841	97,916	92,013	83,933	78,510	84,540	88,845
Crude rate	5.6	5.1	4.7	4.5	4.0	3.9	4.1	4.3
AS rate	5.5	5.1	4.6	4.5	4.0	3.9	4.1	4.3
High-grade abnormalities								
Number	26,534	26,165	28,297	29,176	28,054	28,491	30,253	29,875
Crude rate	1.3	1.3	1.4	1.4	1.3	1.4	1.5	1.4
AS rate	1.3	1.3	1.3	1.4	1.3	1.4	1.5	1.4
All abnormalities (low-grade, high-grade, and cancer)								
Number	141,016	130,234	126,442	121,400	112,188	107,261	115,026	118,953
Crude rate	6.9	6.4	6.0	5.9	5.4	5.3	5.6	5.8
AS rate	6.7	6.3	5.9	5.9	5.4	5.3	5.6	5.8

Notes

1. Low-grade abnormalities are cytology test results S2, S3 and E2; high-grade abnormalities are cytology results S4, S5, S6, E3, E4 and E5. All abnormalities are cytology results S2, S3, S4, S5, S6, S7, E2, E3, E4, E5 and E6 (see Table 3.1).
2. Crude rate is the number of low-grade, high-grade, or all abnormalities detected by cytology as a proportion of the total number of cytology tests; age-standardised (AS) rate is the number of low-grade, high-grade, or all abnormalities detected by cytology as a proportion of the total number of cytology tests age-standardised to the Australian population at 30 June 2001.
3. This is the number of abnormalities detected, not the number of abnormal cytology tests – in a small proportion of cytology tests there may be more than one abnormality detected, both of which will be counted.

Source: AIHW analysis of state and territory cervical screening register data.

Box 3.3: Detection of abnormalities

While cervical abnormalities are present in a proportion of women in the population at any one time, abnormalities can only be detected if these women have a Pap test. Thus, while data on the detection of abnormalities can reflect underlying incidence of abnormalities in the population, these data only show how many abnormalities are found through cervical screening, and not how many abnormalities are present.

Does a change in detection mean a change in occurrence of disease?

The distinction between incidence and detection is important in the context of abnormality trends, since trends in the number and proportion of abnormalities detected by cervical cytology are influenced by many factors from which incidence is sheltered.

Trends in underlying prevalence of disease certainly play a role, but because we are looking only at abnormalities detected in screened women, the number of abnormalities detected is also a function of the number of women screened, how many times they screen, and whether or not screened women are representative of women in the population generally. Further, abnormalities in women who do not have a Pap test cannot be 'seen', and so while these abnormalities contribute to the underlying prevalence of cervical disease in the population, they do not contribute to the abnormalities detected.

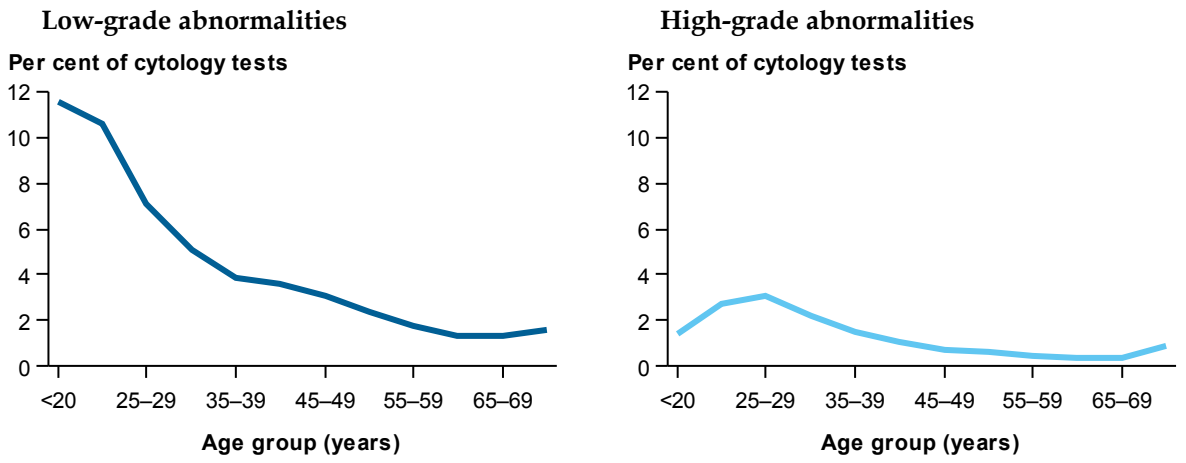
Changes to the cervical screening program can also change detection rates. Management guidelines implemented in 2006 may have resulted in changes in the detection of abnormalities, especially low-grade abnormalities, even in the absence of concurrent changes to underlying prevalence. A further factor is the vaccine against HPV introduced in 2007, which ultimately is predicted to reduce abnormalities in the underlying population (Goldie 2004).

Therefore, if fewer women have a Pap test, the 'pool' of women in which abnormalities can be detected gets smaller; likewise, if the number of women with an abnormality decreases, then the number of abnormalities detected will decrease in reflection of this underlying trend. In this way, either changes to the screening program or changes to the underlying prevalence can result in a decrease in the detection of abnormalities, but it is not always possible to know which of these may be the primary factor resulting in the change—indeed it has been acknowledged that it may be difficult to distinguish HPV vaccination effects on abnormality detection from effects related to changes in cervical screening (WHO 2010).

Abnormalities by age

Figure 3.6 shows the age distribution of all low-grade and high-grade abnormalities.

Abnormalities are most common in younger women, due to HPV infections that occur frequently after sexual debut. Low-grade abnormalities are highest in women under 20 and in those aged 20–24 (Figure 3.6), while high-grade abnormalities are relatively low in women under 20 and peak in women aged 20–29 (Figure 3.6). Detection of both low-grade and high-grade abnormalities then decreases with increasing age, only increasing slightly in women aged 70 or over (Figure 3.6).



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

Figure 3.6: Abnormalities detected by cytology by age, 2012

Squamous abnormalities detected by cytology in 2012

In 2012 there were 118,953 abnormalities detected by cytology in women aged 20–69. Of these, 117,264 were squamous in origin—88,054 low-grade, 29,057 high-grade and 153 squamous cell carcinoma. This was 5.6 squamous abnormalities per 100 cytology tests in that year (Table 3.10).

> A squamous abnormality is defined as a squamous result of S2 Possible low-grade squamous intraepithelial lesion, S3 Low-grade squamous intraepithelial lesion, S4 Possible high-grade squamous intraepithelial lesion, S5 High-grade squamous intraepithelial lesion, S6 High-grade intraepithelial lesion with possible microinvasion/invasion or S7 Squamous cell carcinoma, regardless of the corresponding endocervical result for that cytology test.

The most frequently detected squamous abnormalities in 2012 were possible low-grade squamous intraepithelial lesions (S2), with 52,007 abnormalities comprising 44.4% of squamous abnormalities, followed by low-grade squamous intraepithelial lesions (S3), with 36,047 comprising 30.7%. Possible high-grade squamous intraepithelial lesions (S4) and high-grade squamous intraepithelial lesions (S5) were the next most frequent, at 11.0% and 13.5% of squamous abnormalities, respectively. High-grade intraepithelial lesions with possible microinvasion/invasion (S6) and squamous cell carcinoma (S7) were both very rare squamous abnormalities at just 0.3% and 0.1% of squamous abnormalities, respectively, for women aged 20–69 (Table 3.10).

Squamous abnormality trends

Squamous abnormalities followed the same trend noted for low-grade, high-grade and all abnormalities in the earlier section 'Abnormality trends'. Overall, squamous abnormalities decreased from 137,806 (6.6 per 100 cytology tests) in 2005 to 105,692 (5.3 per 100 cytology tests) in 2010, before increasing to 113,321 (5.5 per 100 cytology tests) in 2011 and 117,264 (5.6 per 100 cytology tests) in 2012 (Table 3.10).

However, this trend was not common to all squamous abnormalities. Possible low-grade squamous intraepithelial lesions (S2) decreased steadily from 2005–2010, increasing again in 2011 and 2012, similar to the overall trend. In contrast, low-grade squamous intraepithelial lesions (S3) comprised a consistent 1.7 per 100 cytology tests from 2009–2012 (Table 3.10).

Table 3.10: Squamous abnormalities detected by cytology in women aged 20–69, by squamous category, 2005–2012

Squamous category	2005	2006	2007	2008	2009	2010	2011	2012
S2 Possible low-grade squamous intraepithelial lesion								
Number	55,981	59,788	55,431	54,262	51,147	47,290	43,485	52,007
Per 100 cytology tests	2.9	2.7	2.6	2.5	2.3	2.1	2.4	2.5
Per cent of squamous abnormalities	43.4	43.4	43.6	42.8	42.8	41.1	43.6	44.4
S3 Low-grade squamous intraepithelial lesion								
Number	52,545	47,038	42,502	39,846	35,897	34,311	34,276	36,047
Per 100 cytology tests	2.6	2.3	2.0	1.9	1.7	1.7	1.7	1.7
Per cent of squamous abnormalities	38.1	36.8	34.2	33.4	32.5	32.5	30.2	30.7
S4 Possible high-grade squamous intraepithelial lesion								
Number	8,679	9,456	10,727	11,500	11,494	12,088	13,020	12,848
Per 100 cytology tests	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.6
Per cent of squamous abnormalities	6.3	7.4	8.6	9.6	10.4	11.4	11.5	11.0
S5 High-grade squamous intraepithelial lesion								
Number	16,199	15,342	16,438	16,491	15,505	15,317	16,117	15,863
Per 100 cytology tests	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8
Per cent of squamous abnormalities	11.8	12.0	13.2	13.8	14.0	14.5	14.2	13.5
S6 High-grade squamous intraepithelial lesion with possible microinvasion/ invasion								
Number	447	318	316	290	287	313	310	346
Per 100 cytology tests	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Per cent of squamous abnormalities	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.3
S7 Squamous cell carcinoma								
Number	148	150	154	126	141	178	155	153
Per 100 cytology tests	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Per cent of squamous abnormalities	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
All squamous abnormalities								
Number	137,806	127,735	124,399	119,400	110,614	105,692	113,321	117,264
Crude rate	6.7	6.3	5.9	5.8	5.3	5.2	5.5	5.6
AS rate	6.6	6.2	5.8	5.8	5.3	5.3	5.5	5.6

Note: Crude rate is the number of each squamous abnormality or of all squamous abnormalities combined detected by cytology as a proportion of the total number of cytology tests; age-standardised (AS) rate is the number of all squamous abnormalities combined detected by cytology as a proportion of the total number of cytology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

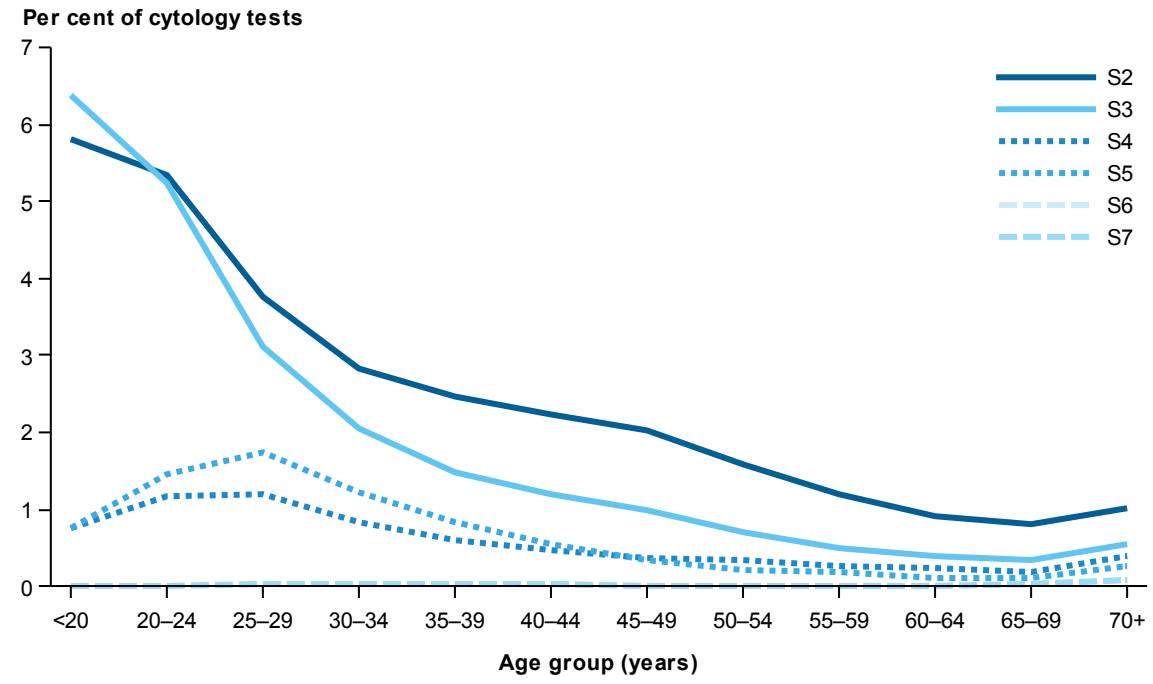
Possible high-grade squamous intraepithelial lesions (S4) remained a consistent 0.5 or 0.6 per 100 cytology tests from 2005–2012, and high-grade squamous intraepithelial lesions (S5) have remained relatively steady both in number and as a percentage of cytology tests across all years from 2005–2012.

The rarer high-grade intraepithelial lesions with possible microinvasion/invasion (S6) and squamous cell carcinoma (S7) have fluctuated, but not contributed greatly to overall trends.

Thus it would seem that the overall increase in squamous abnormalities between 2010 and 2012 was primarily driven by an increase in possible low-grade intraepithelial lesions, and has occurred despite a decrease in the number of low-grade intraepithelial lesions.

Squamous abnormalities by age

While low-grade and high-grade squamous abnormalities (both possible and definite) all peaked in younger women before decreasing sharply with increasing age, for low-grade squamous intraepithelial lesions this peak occurred in women under 20 and in those aged 20–24, whereas for high-grade intraepithelial lesions this peak occurred in women aged 20–24 and 25–29, with lower rates seen in women under 20. These 4 squamous abnormalities were at their lowest in women aged 65–69 (Figure 3.7). In contrast, detection of high-grade squamous abnormalities with possible microinvasion/invasion (S6) and squamous cell carcinoma (S7) was very rare in younger women (to illustrate, from the 500,721 cytology tests performed for women under 30, there were just 6 cases of squamous cell carcinoma detected).



Note: S2 = possible low-grade squamous intraepithelial lesion; S3 = low-grade squamous intraepithelial lesion; S4 = possible high-grade squamous intraepithelial lesion; S5 = high-grade squamous intraepithelial lesion; S6 = high-grade squamous intraepithelial lesion with possible microinvasion/invasion; S7 = squamous cell carcinoma.

Source: AIHW analysis of state and territory cervical screening register data.

Figure 3.7: Squamous abnormalities detected by cytology by age, 2012

Endocervical abnormalities detected by cytology in 2012

In 2012, there were 118,953 abnormalities detected by cytology in women aged 20–69. Of these, 1,689 were endocervical (glandular) in origin—791 atypical endocervical cells of uncertain significance, 818 high-grade, and 80 adenocarcinoma. This was 0.08 endocervical abnormalities per 100 cytology tests in that year (Table 3.11).

> An endocervical abnormality is defined as an endocervical result of E2 Atypical endocervical cells of uncertain significance, E3 Possible high-grade endocervical glandular lesion, E4 Adenocarcinoma *in situ*, E5 Adenocarcinoma *in situ* with possible microinvasion/invasion or E6 Adenocarcinoma, regardless of the corresponding squamous result for that cytology test.

The most frequently detected endocervical abnormalities in 2012 were those categorised as 'atypical endocervical cells of uncertain significance' (E2). This category represents abnormal glandular cells in a cervical cytology sample where the degree of abnormality is not sufficient for a diagnosis of adenocarcinoma *in situ* to be made (NHMRC 2005). Almost half of endocervical abnormalities were categorised in this way, comprising 46.8% of all endocervical abnormalities detected in 2012.

Possible high-grade endocervical glandular lesions (E3) and adenocarcinoma *in situ* (E4) were the next most frequent endocervical abnormalities, at 31.4% and 15.7% of endocervical abnormalities, respectively. Adenocarcinoma *in situ* with possible microinvasion/invasion (E5) was rare at 1.2%, and adenocarcinoma (E6) slightly more frequent at 4.7% of endocervical abnormalities in 2012 for women aged 20–69 (Table 3.11).

Although endocervical abnormalities are far rarer than squamous abnormalities, of the endocervical abnormalities that do occur, cervical cancer makes up a far greater proportion, with adenocarcinoma comprising 4.7% of endocervical abnormalities in 2012, compared with squamous cell carcinoma, which comprised just 0.1% of squamous abnormalities in that year.

Endocervical abnormality trends

The overall number of endocervical abnormalities decreased from 3,210 in 2005 to 1,569 in 2010, before increasing to 1,705 in 2011, and then decreasing slightly to 1,689 in 2012. The proportion of endocervical abnormalities between 2009 and 2012 was relatively stable at around 0.08 per 100 cytology tests (Table 3.11).

Of the endocervical abnormalities, this trend was common to atypical endocervical cells of uncertain significance (E2), which decreased from 1,924 in 2005 to 714 in 2010, and then increased to 821 in 2011, before decreasing slightly to 791 in 2012—although comprising the same percentage of cytology tests in 2009–2012 (Table 3.11). A change in the management guidelines for this abnormality in 2006 may account for the overall decrease from 2006–2010 (current Guidelines (NHMRC 2005) recommend this be managed as a high-grade abnormality, whereas previous Guidelines recommended this be managed as a low-grade abnormality). The cessation of this trend in 2011 and 2012 may represent a new equilibrium in atypical endocervical cells of uncertain significance.

Possible high-grade endocervical glandular lesions (E3) decreased from 887 in 2005 to 435 in 2010, before increasing to 500 in 2011 and 531 in 2012 (Table 3.11).

Table 3.11: Endocervical abnormalities detected by cytology in women aged 20–69, by endocervical category, 2005–2012

Endocervical category	2005	2006	2007	2008	2009	2010	2011	2012
E2 Atypical endocervical cells of uncertain significance								
Number	1,924	1,372	1,152	1,020	746	714	821	791
Per cent of cytology tests	0.09	0.07	0.06	0.05	0.04	0.04	0.04	0.04
Per cent of endocervical abnormalities	59.9	54.9	56.4	51.0	47.4	45.5	48.2	46.8
E3 Possible high-grade endocervical glandular lesion								
Number	887	724	510	562	461	435	500	531
Per cent of cytology tests	0.04	0.04	0.02	0.03	0.02	0.02	0.02	0.03
Per cent of endocervical abnormalities	27.6	29.0	25.0	28.1	29.3	27.7	29.3	31.4
E4 Adenocarcinoma *in situ*								
Number	274	283	277	299	283	305	283	266
Per cent of cytology tests	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01
Per cent of endocervical abnormalities	8.5	11.3	13.6	15.0	18.0	19.4	16.6	15.7
E5 Adenocarcinoma *in situ* with possible microinvasion/invasion								
Number	48	42	29	34	24	33	23	21
Per cent of cytology tests	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per cent of endocervical abnormalities	1.5	1.7	1.4	1.7	1.5	2.1	1.3	1.2
E6 Adenocarcinoma								
Number	77	78	75	85	60	82	78	80
Per cent of cytology tests	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per cent of endocervical abnormalities	2.4	3.1	3.7	4.3	3.8	5.2	4.6	4.7
All endocervical abnormalities								
Number	3,210	2,499	2,043	2,000	1,574	1,569	1,705	1,689
Crude rate	0.16	0.12	0.10	0.10	0.08	0.08	0.08	0.08
AS rate	0.15	0.12	0.10	0.10	0.07	0.08	0.08	0.08

Note: Crude rate is the number of each endocervical abnormality or of all endocervical abnormalities combined detected by cytology as a proportion of the total number of cytology tests; age-standardised (AS) rate is the number of all endocervical abnormalities combined detected by cytology as a proportion of the total number of cytology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

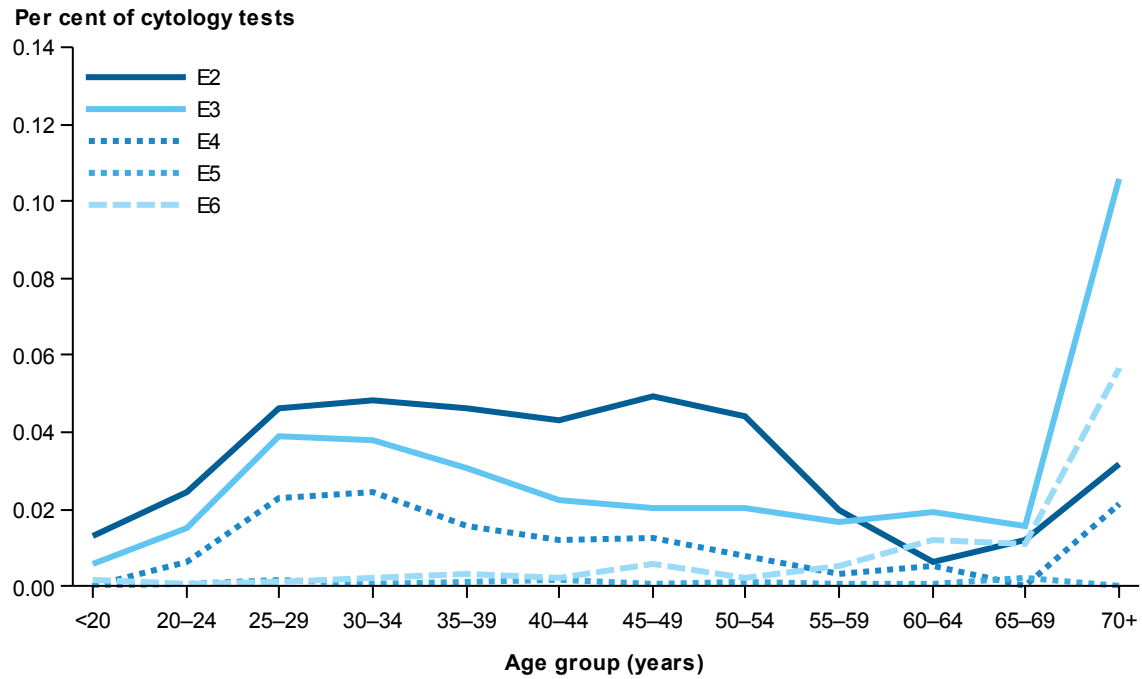
In contrast, high-grade endocervical glandular abnormalities have remained relatively steady both in number and as a percentage of cytology tests across all years from 2005–2012. The rarer high-grade endocervical glandular abnormalities with possible microinvasion/ invasion (E5) and adenocarcinoma (E6) have not greatly affected the overall trends.

Thus it would seem that the overall trend in endocervical abnormalities between 2010 and 2012 has been primarily driven by an increase in atypical endocervical cells of uncertain significance.

Endocervical abnormalities by age

Endocervical abnormalities are rarely detected in women under 20. Atypical endocervical cells of uncertain significance (E2) peaked at age 25–29 and 45–49. Possible high-grade glandular abnormalities (E3) also peaked at age 25–49, whereas adenocarcinoma *in situ* (E4) peaked at age 25–39 (Figure 3.8).

While the detection of all other endocervical abnormalities is very low in women aged 70 or over, there is a relatively large increase apparent in the detection of both possible high-grade (E3) and adenocarcinoma (E6) in this age group. However, these findings are based on a very small number of abnormalities, and so should be interpreted with caution.



Note: E2 = atypical endocervical cells of uncertain significance; E3 = possible high-grade endocervical glandular lesion; E4 = adenocarcinoma *in situ*; E5 = adenocarcinoma *in situ* with possible microinvasion/invasion; E6 = adenocarcinoma.

Source: AIHW analysis of state and territory cervical screening register data.

Figure 3.8: Endocervical abnormalities detected by cytology by age, 2012

Indicator 4 Histology

What you need to know about histology

Cervical histology is the examination of tissue from the cervix through a microscope, and is the primary diagnostic tool of the National Cervical Screening Program (NCSP).

Definition: The proportion of histology test results that were negative or detected an abnormality in a 12-month period. High-grade abnormality detection is defined as the number of women with a high-grade abnormality detected per 1,000 women screened.

Rationale: Annual monitoring of histology report categories by various stratifications may reveal emerging positive or negative trends that need to be addressed, including effects from the human papillomavirus (HPV) vaccine introduced in 2007.

In addition, the high-grade abnormality detection rate is an indicator of how well the NCSP detects high-grade abnormalities. Detection of high-grade abnormalities, which have a greater probability of progressing to invasive cancer than do low-grade abnormalities, provides an opportunity for treatment before possible progression to cervical cancer.

Guide to interpretation: High-grade abnormality detection rate is per 1,000 women screened because this measure is based on the number of women, not the number of tests.

The most recent histology data are for the year 2012.

What the data tell us about histology

Trends

Between 2004 and 2012, the (age-standardised) detection of high-grade abnormalities in women aged 20–69 was steady at just under 8 between 2004 and 2007, and ranging from 8.1 to 8.5 per 1,000 women screened for all years between 2008 and 2012.

Detection in women under 20 continued to decrease between 2011 and 2012, from 7.1 to 6.4 per 1,000 women screened.

Detection of high-grade abnormalities in women aged 20–24, which fell below that of women aged 25–29 in 2011 for the first time, continued to decrease from 17.4 in 2011 to 15.8 per 1,000 women screened in 2012.

This **recent trend** of reduced high-grade abnormality detection in younger women is favourable, as it likely indicates that these women are experiencing fewer abnormalities of this kind, and may indicate that they are protected following vaccination against HPV.

Histology in 2012

There were 81,740 cervical histology tests performed in 2012, with 78,329 for women 20–69.

For every 1,000 women screened, 8.4 women had a high-grade abnormality detected by histology, providing an opportunity for treatment before possible progression to cervical cancer.

The ratio of high-grade squamous abnormalities to squamous cell carcinoma was 35:1 compared with the ratio of high-grade endocervical abnormalities to adenocarcinoma of 3:1.

More information about histology

Histology is the primary diagnostic tool of the NCSP. Because cytology is only a screening tool, confirmation of disease is required before any treatment is initiated, both to ensure treatment is appropriate and to avoid unnecessary treatment in women where the cytology has predicted disease that is not present. While colposcopy is used as part of this process, in Australia it is considered best practice to confirm high-grade disease with histology prior to treatment (NHMRC 2005).

Because histology is used to diagnose disease, either as follow-up for screen-detected abnormalities in asymptomatic women as per the national guidelines, or because it is clinically indicated even in the absence of a cytological abnormality being detected, histology is performed for only a subset of screened women. Further, more women have histology following a cytology result of high-grade disease or cancer than following negative or low-grade cytology results. Thus, while histology can tell us much about true disease, it can only do so for the subset of women in which histology is performed.

Note that histology may also be performed for reasons other than to confirm or follow-up suspected cervical disease, and that the national guidelines introduced in July 2006 changed recommendations for the subsets of women that were recommended to have colposcopy and biopsy following a screen-detected abnormality.

Unlike cytology, which has nationally consistent reporting through the Australian Modified Bethesda System 2004 (AMBS 2004), state and territory cervical screening registers have different coding systems for histology. In order to report histology in a way that is meaningful, states and territories have worked together with the AIHW to develop a national histology coding system for the NCSP, with the individual histology codes used in each state and territory mapped to these national codes.

The squamous and endocervical reporting categories of the NCSP national histology coding system are shown in Table 4.1.

Table 4.1: Histology reporting categories of the National Cervical Screening Program

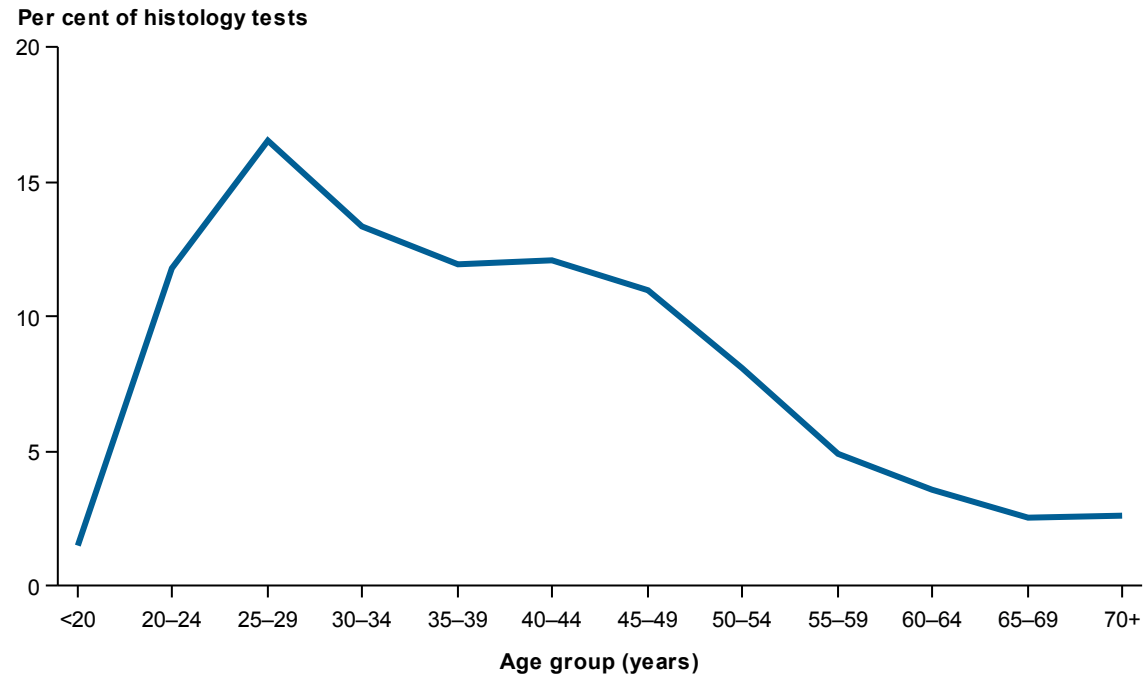
Squamous	Endocervical
HSU Unsatisfactory	HEU Unsatisfactory
HS01 Negative	HE1 Negative
HS02 Low-grade squamous abnormality	HE02 Endocervical atypia
HS03.1 High-grade squamous abnormality, cervical intraepithelial neoplasia (CIN) not otherwise specified (NOS)	HE03.1 High-grade endocervical abnormality, endocervical dysplasia
HS03.2 High-grade squamous abnormality, CIN II	HE03.2 High-grade endocervical abnormality, adenocarcinoma *in situ*
HS03.3 High-grade squamous abnormality, CIN III	
HS04.1 Squamous cell carcinoma, microinvasive	HE04.1 Adenocarcinoma, microinvasive
HS04.2 Squamous cell carcinoma, invasive	HE04.2 Adenocarcinoma, invasive
	HE04.3 Adenosquamous carcinoma
	HE04.4 Carcinoma of the cervix (other)

Note: there is a further result of HE03.3 to allow the collection of mixed high-grade histology (carcinoma *in situ*/adenocarcinoma *in situ*) that has been omitted since this category is not included in the cervical histology results presented.

Detailed analyses

Histology in 2012

In 2012, there were 81,740 cervical histology tests performed, 78,329 (95.8%) of these for women aged 20–69 (Table 4.2). Most histology tests were performed for women aged 25–29 with a peak of 13,517 tests (Figure 4.1), this being 16.5% of all histology tests in 2012.



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

Figure 4.1: Proportion of histology tests by age, 2012

Histology trends

The number of cervical histology tests performed for women aged 20–69 decreased from 75,370 in 2005 to 72,000–73,000 for most years between 2006 and 2009. However, in 2011 there was a 4.6% increase in the number of histology tests, from 72,234 in 2010 to 75,589 in 2011, followed by a 3.6% increase from 75,589 in 2011 to 78,329 in 2012. The number of histology tests increased between 2011 and 2012 for all age groups except for under 20 and 20–24, where there was a decrease (Table 4.2).

Table 4.2: Number of histology tests by age, 2005–2012

Age group (years)	2005	2006	2007	2008	2009	2010	2011	2012
<20	3,386	2,909	2,296	2,089	1,689	1,454	1,380	1,257
20–24	13,572	12,655	11,967	12,136	11,187	10,519	10,089	9,636
25–29	12,854	12,490	12,364	12,621	12,625	12,690	12,940	13,517
30–34	11,224	10,448	9,975	9,989	10,009	9,839	10,635	10,908
35–39	9,056	8,716	8,819	9,037	8,985	8,753	9,259	9,703
40–44	9,017	8,671	8,309	8,249	8,280	8,265	9,218	9,920
45–49	7,998	7,878	8,107	8,202	8,348	8,584	8,681	8,985
50–54	5,226	5,043	5,290	5,382	5,623	5,742	6,259	6,637
55–59	3,249	3,318	3,271	3,374	3,441	3,562	3,892	4,041
60–64	1,921	1,953	2,102	2,324	2,395	2,600	2,802	2,964
65–69	1,253	1,347	1,397	1,478	1,501	1,680	1,814	2,018
70+	1,708	1,533	1,523	1,728	1,817	1,915	2,057	2,154
All ages	**80,466**	**76,972**	**75,423**	**76,612**	**75,904**	**75,611**	**79,026**	**81,740**
Ages 20–69	**75,370**	**72,519**	**71,601**	**72,792**	**72,394**	**72,234**	**75,589**	**78,329**

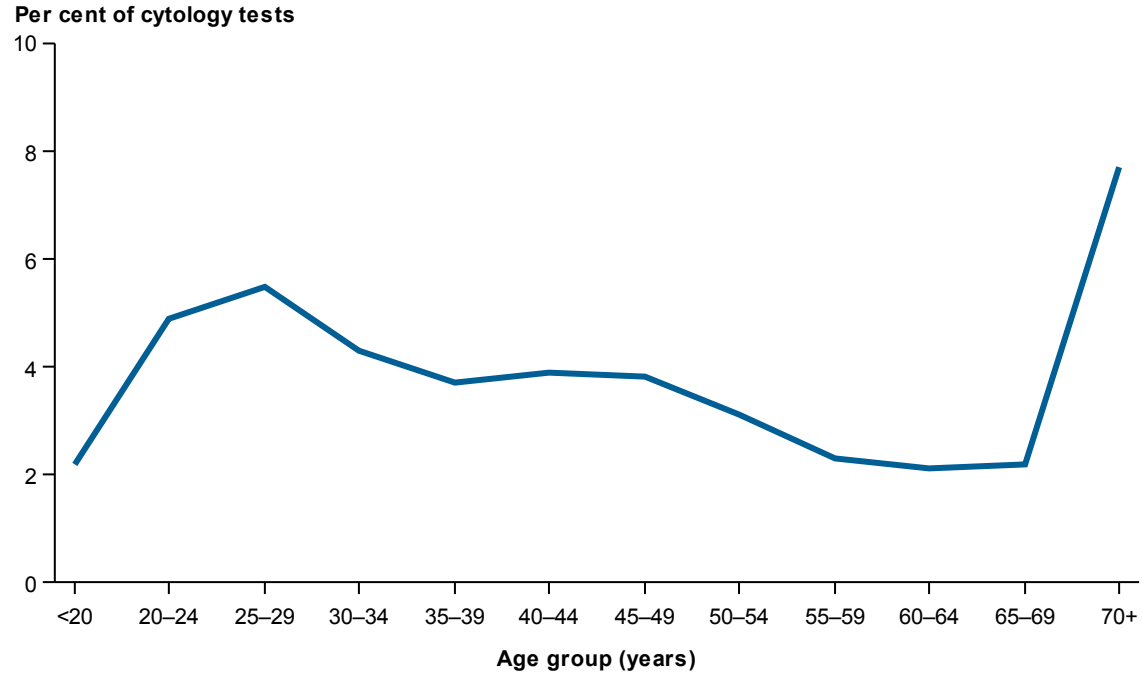
Source: AIHW analysis of state and territory cervical screening register data.

Histology as a proportion of cytology

Trends in histology are heavily dependent on cytology trends, since histology is used to diagnose abnormalities predicted by cytology. The number of histology tests per 100 cytology tests has been reported so as to take into account changes in the number of cytology tests when interpreting the number of histology tests.

In 2012, for all women aged 20–69, there were 3.8 histology tests for every 100 cytology tests performed. Within this age range, it was highest for women aged 25–29 (at 5.5 histology tests for every 100 cytology tests), indicating that women aged 25–29 are more likely to have a histology test than other age groups. This decreased to 3.1 histology tests for every 100 cytology tests by the time women reach 50–54, with only 2.2 histology tests for every 100 cytology tests for women aged 65–69 (Figure 4.2).

Histology as a proportion of cytology closely follows the detection of high-grade abnormalities by cytology, with 2 exceptions: women under 20 appear to have fewer histology tests than would be expected by the number of high-grade cytology abnormalities detected, and women aged 40–54 appear to have a greater number of histology tests than would be expected if these were solely due to follow-up of high-grade cytology. Hysterectomies for benign conditions may contribute to the latter.



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

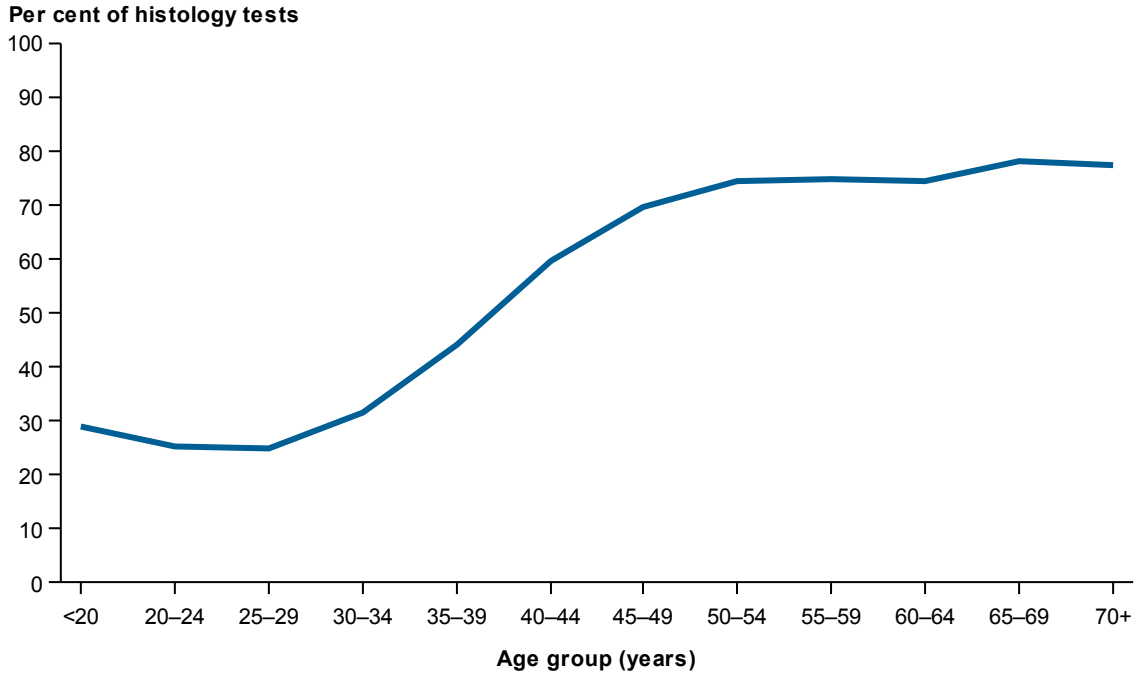
Figure 4.2: Histology as a proportion of cytology by age, 2012

Negative histology in 2012

In 2012, of the 78,329 histology tests performed, 37,459 were negative. This was 47.8% of all histology tests (55.4% age-standardised).

> A negative histology result is defined as any histology test that is not unsatisfactory and where there is no evidence of HPV infection, intraepithelial pre-neoplasia or intraepithelial neoplasia. Note that there is no requirement for both squamous and endocervical components to be sampled and to be negative; a histology result that only samples the squamous component and the squamous component is negative, or a histology result that only samples the endocervical component and the endocervical component is negative, are both counted as negative histology tests.

Women aged 20–24 and 25–29 had the lowest proportion of histology tests that were negative (at 25%), increasing with increasing age, with 77.4% of all histology tests performed for women aged 70 and over being negative (Figure 4.3). The high proportion of negative histology tests in older women is likely related to cervical histology from hysterectomies due to benign conditions, since cervical screening registers are sent all cervical histology results, including benign conditions unrelated to abnormalities.



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

Figure 4.3: Proportion of negative histology tests by age, 2012

Abnormalities detected by histology in 2012

In 2012, there were 38,984 abnormalities (low-grade, high-grade or cancer) detected in the 78,329 histology tests for women aged 20–69 (49.8 per 100 histology tests). Of these abnormalities, 14,856 (38.1%) were low-grade and 23,149 (59.3%) were high-grade, cancer making up the remainder (Table 4.3).

Abnormality trends

Low-grade abnormalities detected by histology decreased from 19,576 in 2005 to 14,018 in 2010, followed by a small increase to 14,566 in 2011 and 14,856 in 2012 for women aged 20–69. The number of low-grade abnormalities per 100 cytology tests decreased from 22.2 in 2005 to 17.2 in 2012 (age-standardised) (Table 4.3). The overall decrease, across all age groups, is in line with expected changes in detection of low-grade abnormalities resulting from changes to the recommended management of women with low-grade abnormalities as part of the current NHMRC Guidelines (NHMRC 2005) introduced in 2006 (Box 4.1), although the similar data for 2011 and 2012 suggest the trend may have stabilised following this change.

Box 4.1: Interpretation of abnormality trends

The detection of abnormalities by histology is affected by the same factors as the detection of abnormalities by cytology. However it is also influenced by the detection of abnormalities by cytology itself, since most histology occurs as a consequence of an abnormality being detected by cytology, and is thus expected to increase and decrease in line with cytological abnormality detection trends.

Prior to the introduction of the current NHMRC Guidelines (NHMRC 2005), the recommended management for women with a low-grade abnormality detected by cytology was colposcopy, which often resulted in a biopsy. The current Guidelines no longer recommend colposcopy for the majority of women with a low-grade abnormality detected by cytology, which is expected to result in a decrease in both the number of histology tests, and the proportion of histology tests with a result of low-grade abnormality.

However, cervical screening is a complex environment—factors do not exist in isolation, and pinpointing the precise cause of trends is difficult. The change in Guidelines is probably the main driving factor behind histology trends. In addition to any apparent decrease in detection of abnormalities in the screening population, there may also be a true decrease in prevalence emerging in the broader population, since the introduction of the HPV vaccine in 2007. This is expected to reduce the incidence of low-grade and high-grade abnormalities, which would be reflected in the detection of these abnormalities by cytology and histology.

Table 4.3: Abnormalities detected by histology in women aged 20–69, 2005–2012

	2005	2006	2007	2008	2009	2010	2011	2012
Low-grade abnormalities								
Number	19,576	18,003	16,602	15,347	14,576	14,018	14,566	14,856
Crude rate	26.0	24.8	23.2	21.1	20.1	19.4	19.3	19.0
AS rate	22.2	21.4	20.2	18.4	17.6	17.2	17.4	17.2
High-grade abnormalities								
Number	20,200	20,063	21,067	22,102	22,031	22,104	22,676	23,149
Crude rate	26.8	27.7	29.4	30.4	30.4	30.6	30.0	29.6
AS rate	22.0	22.9	24.4	25.2	25.4	25.9	25.9	25.7
All abnormalities (low-grade, high-grade and cancer)								
Number	40,603	38,825	38,476	38,325	37,380	36,940	38,122	38,984
Crude rate	53.9	53.5	53.7	52.7	51.6	51.1	50.4	49.8
AS rate	45.8	45.8	46.2	45.1	44.4	44.4	44.6	44.4

Notes

1. Low-grade abnormalities are histology test results HS02 and HE02; high-grade abnormalities are histology results HS03 and HE03. All abnormalities are histology test results HS02, HS03, HS04, HE02, HE03 and HE04 (see Table 4.1).
2. Crude rate is the number of low-grade, high-grade, or all abnormalities detected by histology as a proportion of the total number of histology tests; age-standardised (AS) rate is the number of low-grade, high-grade, or all abnormalities detected by histology as a proportion of the total number of histology tests age-standardised to the Australian population at 30 June 2001.
3. This is the number of abnormalities detected, not the number of abnormal histology tests – in a small proportion of histology tests there may be more than one abnormality detected, both of which will be counted.

Source: AIHW analysis of state and territory cervical screening register data.

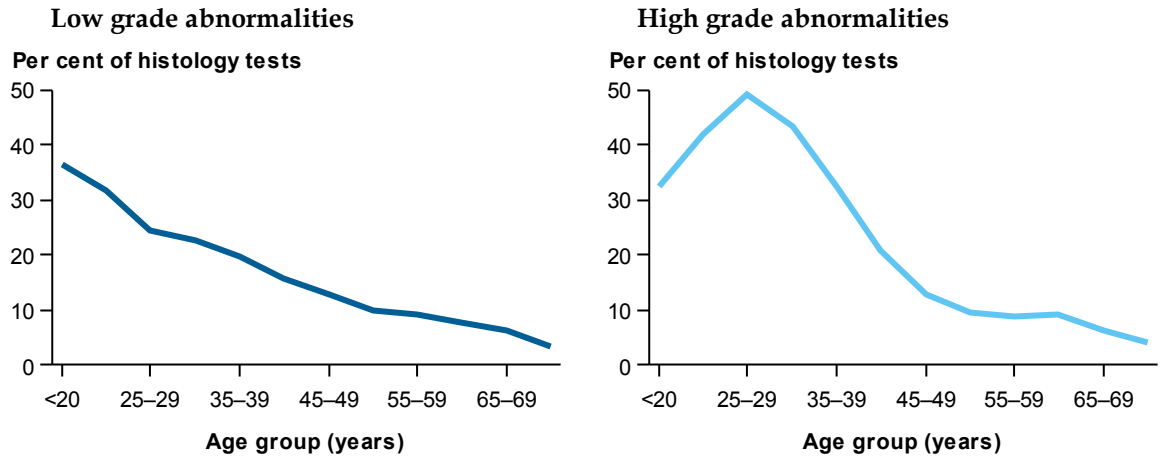
In contrast, the detection of high-grade abnormalities by histology increased from 20,200 in 2005 to 23,149 in 2012 for women aged 20–69 (an increase from 22.0 to 25.7 per 100 histology tests, age-standardised) (Table 4.3).

Although the (age-standardised) detection rate barely changed between 2010 and 2012, there were differences between age groups, with a decrease in the detection rate for women aged under 20 and 20–24. This decrease may be due to the introduction of the National HPV Vaccination Program in 2007, as demonstrated by an ecological study of Victorian Cervical Cytology Register data. This showed a decrease in incidence of histologically confirmed high-grade cervical abnormalities of 0.38% (95%CI 0.61–0.16) for women under 18 when comparing the pre- and post-vaccination periods (Brotherton et al. 2011). A more recent study also found fewer high-grade cervical abnormalities in vaccinated compared with unvaccinated girls and women eligible for school-based vaccinated in Victoria (Gertig et al. 2013), which also supports a role for vaccination in this decrease.

Age-trend data, while not shown in this report, are available in associated supplementary data tables.

Abnormalities by age

Figure 4.4 shows the age distribution of low-grade and high-grade abnormalities.



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

Figure 4.4: Abnormalities detected by histology by age, 2012

Similar to abnormalities detected by cytology, abnormalities detected by histology were most common in younger women (HPV infections occur more frequently in the first years after sexual debut). However, because low-grade cytology is not routinely followed-up with histology under the current NHMRC Guidelines (NHMRC 2005), low-grade histology occurred less frequently than high-grade histology. The age distribution of these detected abnormalities is a straight line, with low-grade abnormalities highest in women under 20, thereafter decreasing steadily with increasing age (Figure 4.4).

The age-distribution of high-grade abnormalities was different, being highest in women aged 25–29, thereafter decreasing sharply with increasing age (Figure 4.4).

High-grade abnormality detection rate in 2012

The number of women with a high-grade abnormality detected by histology per 1,000 women screened (the high-grade abnormality detection rate) is reported separately, since this is a historical rate that provides different information to the number of high-grade abnormalities detected, reported above.

High-grade abnormalities of the cervix include cervical intraepithelial neoplasia (CIN) that has been graded as moderate (CIN II) or severe (CIN III), or for which the grade has not been specified, as well as endocervical dysplasia and adenocarcinoma *in situ*. High-grade abnormalities have a greater probability of progressing to invasive cancer than do low-grade abnormalities – although it should be noted that high-grade abnormalities do not always progress, with one study suggesting that at least 80% of high-grade abnormalities regress spontaneously (Raffle et al. 2003). Detection of high-grade abnormalities provides an opportunity for treatment before cancer can develop, thus the NCSP aims to detect high-grade abnormalities in line with its broader aim to reduce the incidence of cervical cancer.

In 2012, there were 16,808 women with a high-grade abnormality detected by histology, which, equates to a high-grade abnormality detection rate of 8.3 per 1,000 women screened for women aged 20–69 (8.4 age-standardised) (Table 4.4). This means that, for every 1,000 women screened, 8 had a high-grade abnormality found, providing an opportunity for treatment before possible progression to cervical cancer.

High-grade abnormality detection rate trends

Table 4.4: High-grade abnormality detection rate by age, 2005–2012

	2005	2006	2007	2008	2009	2010	2011	2012
<20	13.2	13.2	11.6	10.8	8.9	7.8	7.1	6.4
20–24	20.2	19.9	18.9	21.3	19.9	19.7	17.4	15.8
25–29	17.7	17.7	17.8	19.3	19.0	19.9	19.4	20.0
30–34	11.6	11.6	11.5	12.7	12.8	13.6	14.0	13.8
35–39	7.0	7.2	7.3	7.8	7.6	8.3	9.0	9.2
40–44	4.4	4.7	4.7	4.8	4.7	4.9	5.5	6.0
45–49	3.1	3.2	3.2	3.3	3.3	3.5	3.8	3.7
50–54	1.7	1.9	1.9	2.0	1.9	2.1	2.2	2.4
55–59	1.6	1.5	1.4	1.3	1.3	1.7	1.7	1.6
60–64	1.4	1.2	1.2	1.3	1.2	1.2	1.4	1.5
65–69	1.0	1.4	1.3	1.3	1.1	1.1	1.1	1.1
70+	3.0	2.8	2.4	2.6	2.6	3.4	2.7	2.8
Ages 20–69								
Number	15,318	15,115	15,671	16,457	16,257	16,291	16,641	16,808
Crude rate	7.9	7.8	7.8	8.4	8.1	8.4	8.4	8.3
AS rate	7.7	7.8	7.7	8.3	8.1	8.5	8.4	8.4
95% CI	7.6–7.8	7.6–7.9	7.5–7.8	8.2–8.5	8.0–8.2	8.3–8.6	8.3–8.6	8.2–8.5

Note: Crude rate is the number of women with a high-grade abnormality detected by histology per 1,000 women screened; age-standardised (AS) rate is the number of women with a high-grade abnormality detected by histology per 1,000 women screened, age-standardised to the Australian population at 30 June 2001.

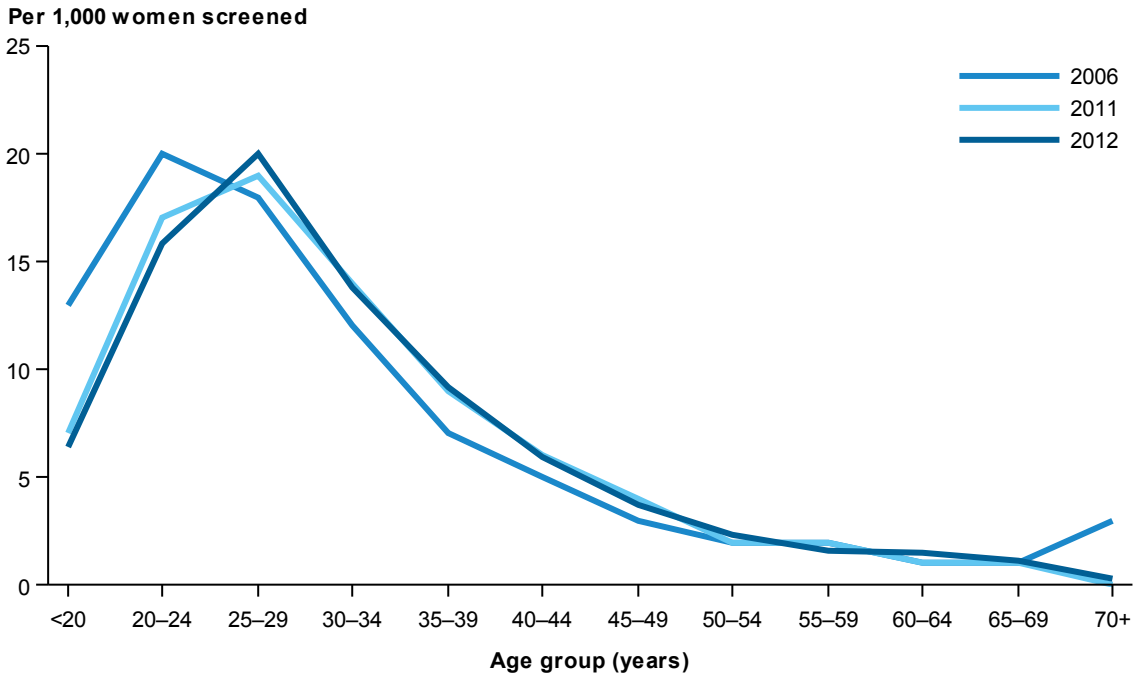
Source: AIHW analysis of state and territory cervical screening register data.

The number of women aged 20–69 with a high-grade abnormality detected by histology per 1,000 women screened, after remaining at approximately 7.7 for all years from 2005–2007, increased to above 8 in 2008, where it remained from 2008–2012 (Table 4.4).

However, in contrast with the overall trend of increasing detection over time, there has been a steady decline in high-grade abnormality detection in women under 20. Highest at 13.2 in 2005, this decreased to 6.4 women with high-grade histology per 1,000 women screened in 2012 (Table 4.4; Figure 4.5).

More recently, between 2010 and 2012, there has also been a decline in high-grade abnormality detection for women aged 20–24, from 19.7 in 2010 to 15.8 women with a high-grade abnormality detected per 1,000 women screened in 2012. This latter trend notably changed the peak age of high-grade histological abnormalities from women aged 20–24, where it has been for the life of the NCSP, to women aged 25–29 (Table 4.4; Figure 4.5).

This decrease in high-grade abnormalities in younger women is likely due to younger girls vaccinated against HPV during the 'catch-up' program in 2007–2009, who are expected to experience fewer abnormalities (a trend noted in Brotherton et al. 2011 and Gertig et al. 2013) moving into the screening age range—visible in the under 20 age group several years ago, and now clearly contributing to the 20–24 age group in 2012.



Source: AIHW analysis of state and territory cervical screening register data.

Figure 4.5: High-grade abnormality detection rate by age, 2006, 2011 and 2012

Looking in more detail at the change in the high-grade detection rate by age, using the 3 years 2004–2006 as the pre-vaccination comparator, the decrease in women aged under 20 was small but perceptible from 2007, the first year of the National HPV Vaccination Program (although the decrease in 2007 could be just natural variation), becoming larger with each passing year to reach a decrease of 6.8 by 2012, the latest data available (Table 4.5).

For women aged 20–24, this decrease begins in 2011, falling further in 2012 to reach a decrease of 3.7 (Table 4.5). Older age groups are unaffected, as sufficient time has not yet passed for girls vaccinated from 2007 to have moved into age groups beyond 20–24, although the current data would suggest that the 25–29 year age group should start to be affected in another 3–5 years.

Table 4.5: Change in high-grade abnormality detection rate since 2004–2006

Age group	2004–2006	2007	2008	2009	2010	2011	2012
<20	13.1	**–1.5**	**–2.3**	**–4.2**	**–5.3**	**–6.0**	**–6.7**
20–24	19.6	–0.7	1.7	0.3	0.1	**–2.2**	**–3.8**
25–29	17.6	0.2	1.7	1.4	2.3	1.8	2.4
30–34	11.4	0.1	1.3	1.4	2.2	2.6	2.4

Note: Change from 2004–2006 is shown for age groups <20 to 30–34. A negative symbol indicates that the change is a decrease; no symbol indicates that the change is an increase.

Source: AIHW analysis of state and territory cervical screening register data.

High-grade abnormality detection rate by age

In 2012, the high-grade abnormality detection rate was highest for women aged 25–29 at 20.0 women with high-grade histology detected per 1,000 women screened. As noted earlier, this is a change from the historical peak age of 20–24. The detection rate was lower at 13.8 for women aged 30–34, further decreasing with increasing age to be just 1.1 for women aged 65–69 (Table 4.4).

High-grade abnormality detection by state and territory

In 2012, the high-grade abnormality detection rate varied across states and territories between 6.7 and 12.4 per 1,000 women screened (age-standardised) (Table 4.6).

Table 4.6: High-grade abnormality detection rate in women aged 20–69, by state and territory, 2012

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Number	5,171	4,202	3,657	1,961	952	342	246	277	16,808
Crude rate	8.1	7.6	9.4	9.3	6.6	8.0	7.1	14.2	8.3
AS rate	8.4	7.8	9.3	8.9	6.9	8.5	6.7	12.4	8.4
95% CI	8.1–8.6	7.6–8.1	9.0–9.6	8.5–9.3	6.4–7.3	7.7–9.5	5.9–7.6	11.0–14.0	8.2–8.5

Note: Age-standardised (AS) rate is the number of women with a high-grade abnormality detected by histology per 1,000 women screened, age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

Squamous abnormalities detected by histology in 2012

In 2012, of the 38,984 abnormalities detected by histology in women aged 20–69, 37,808 were squamous in origin—14,802 low-grade, 22,365 high-grade, and 641 squamous cell carcinoma. This was 48.3 squamous abnormalities per 100 histology tests.

> A squamous abnormality is defined as a squamous result of HS02 Low-grade squamous abnormality, HS03.1 Cervical intraepithelial neoplasia (CIN) not otherwise specified (NOS), HS03.2 CIN II, HS03.3 CIN III, HS04.1 Microinvasive squamous cell carcinoma, or HS04.2 Invasive squamous cell carcinoma, regardless of any endocervical result.

Squamous abnormality trends

The overall number of squamous abnormalities decreased from 39,735 in 2005 to 35,881 in 2010, before increasing to 36,996 in 2011 and 37,808 in 2012. As a percentage of all histology tests, this decreased slightly over this time, from 44.5 in 2005 to 42.9 in 2012 (Table 4.7).

Table 4.7: Squamous abnormalities detected by histology in women aged 20–69, by squamous category, 2005–2012

	Year							
Squamous category	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
HS02 Low-grade squamous abnormality								
Number	19,472	17,937	16,540	15,292	14,538	13,964	14,504	14,802
Per 100 histology tests	25.8	24.7	23.1	21.0	20.0	19.3	19.2	18.9
Per cent of squamous abnormalities	49.0	47.3	44.1	41.1	39.9	38.9	39.2	39.2
HS03 High-grade squamous abnormality								
Number	19,705	19,508	20,437	21,411	21,379	21,389	21,941	22,365
Per 100 histology tests	26.1	26.9	28.5	29.4	29.5	29.6	29.0	28.6
Per cent of squamous abnormalities	49.6	51.5	54.5	57.5	58.7	59.6	59.3	59.2
HS04 Squamous cell carcinoma								
Number	558	466	516	530	474	528	551	641
Per 100 histology tests	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.8
Per cent of squamous abnormalities	1.4	1.2	1.4	1.4	1.3	1.5	1.5	1.7
All squamous abnormalities								
Number	39,735	37,911	37,493	37,233	36,391	35,881	36,996	37,808
Crude rate	52.7	52.3	52.4	51.1	50.3	49.7	48.9	48.3
AS rate	44.5	44.5	44.7	43.5	43.0	43.0	43.1	42.9

Notes

1. HS03 High-grade squamous abnormality combines cervical intraepithelial neoplasia (CIN) not otherwise specified (NOS), CIN II and CIN III.
2. Crude rate is the number of each squamous abnormality or all squamous abnormalities combined detected by histology as a proportion of the total number of histology tests; age-standardised (AS) rate is the number of all squamous abnormalities combined detected by histology as a proportion of the total number of histology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

In 2012, 39.2% of squamous abnormalities were low-grade (HS02), with high-grade abnormalities (HS03)—incorporating CIN II and CIN III—the most frequent at 59.2%. Squamous cell carcinoma (HS04) was rarer at just 1.7% of all squamous abnormalities in 2012 for women aged 20–69 (Table 4.7).

Low-grade abnormalities have decreased substantially from 25.8 per 100 histology tests in 2005 to 18.9 in 2012. This is likely a direct effect of the introduction of the current NHMRC Guidelines (NHMRC 2005) in 2006, which recommend repeat cytology rather than biopsy for a low-grade squamous intraepithelial lesion detected by cytology, a follow-on effect of which is likely to be a decrease in the proportion of histology tests detecting a low-grade abnormality.

High-grade abnormalities have increased concurrently with the decrease in low-grade abnormalities, from 26.1 to 28.5 per 100 histology tests. However, this may be simply an artefact since, with fewer low-grade abnormalities, high-grade abnormalities will necessarily comprise an increasing proportion of all histology tests performed.

Squamous cell carcinoma increased slightly between 2011 and 2012 (Table 4.7).

The literature advocates that it is important to preserve the distinction between the high-grade squamous abnormalities CIN II and CIN III. This is currently not possible nationally, as some states and territories receive data in a format that does not allow them to distinguish between the histology results of CIN II and CIN III. Therefore, CIN II and CIN III have been analysed separately using data only from those states and territories where these abnormalities could be distinguished (Table 4.8).

In 2012, CIN II comprised 25.0% and CIN III 34.7% of the squamous abnormalities in these states and territories, which equates to 10.8 and 15.0 per 100 histology tests respectively, for women aged 20–69 (Table 4.8).

Table 4.8: CIN II and CIN III in women aged 20–69, 2005–2012

	Year							
Squamous category	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
HS03.2 CIN II								
Number	3,904	3,909	4,104	4,377	4,574	4,338	4,157	4,236
Per 100 histology tests	11.0	11.5	12.1	12.5	12.7	12.2	11.2	10.8
Per cent of squamous abnormalities	23.8	24.7	25.5	25.9	26.7	26.6	25.5	25.0
HS03.3 CIN III								
Number	4,314	4,350	4,753	5,340	5,373	5,127	5,293	5,868
Per 100 histology tests	12.2	12.8	14.0	15.3	14.9	14.4	14.2	15.0
Per cent of squamous abnormalities	26.3	27.5	29.6	31.6	31.3	31.5	32.4	34.7

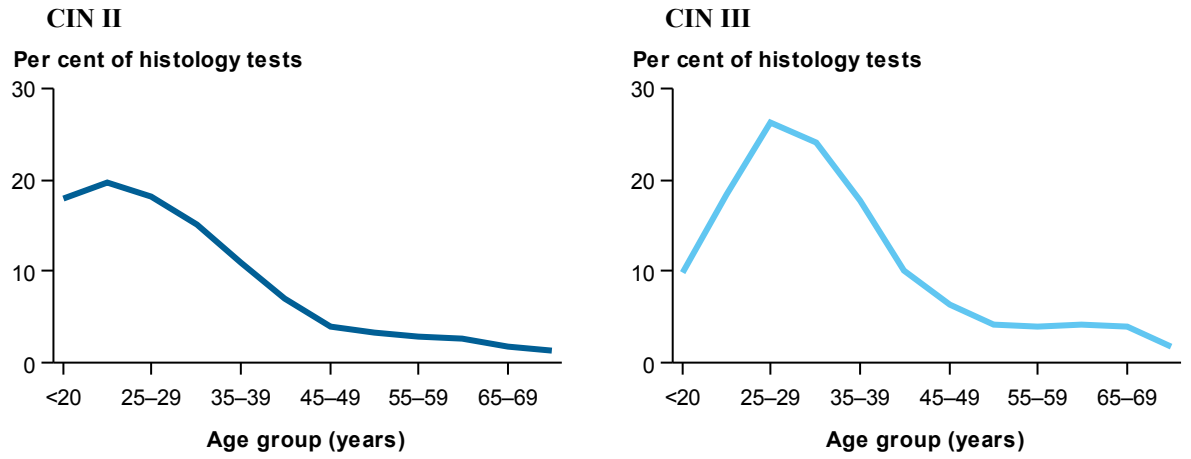
Source: AIHW analysis of state and territory cervical screening register data.

Between 2011 and 2012, there was a small increase in the detection of CIN II from 4,157 to 4,236, but a decrease from 11.2 to 10.8 per 100 histology tests (from 9.6 to 9.5 age-standardised—see *Cervical screening in Australia 2011–2012: supplementary data tables*), with this decrease mostly seen in women aged 20–24. There was also an increase in the detection of CIN III from 5,293 in 2011 to 5,868 in 2012, with a concurrent increase in the number per 100 histology tests from 14.2 to 15.0 (from 12.4 to 13.2 age-standardised—see *Cervical screening in Australia 2011–2012: supplementary data tables*).

For all years, CIN III was more frequent than CIN II.

Comparing the age distribution of CIN II and CIN III reveals that these abnormalities shared similar trends, the main difference being that CIN II was most frequent in women under 25, while CIN III peaked in women aged 25–29 and was far less common in women under 25 (Figure 4.6).

Consistent with this, CIN III was the more frequent high-grade abnormality for all age groups, apart from women under 20 and women aged 20–24, for which CIN II was more common (Figure 4.6).



Source: AIHW analysis of state and territory cervical screening register data; data for figures are available in Table A1.

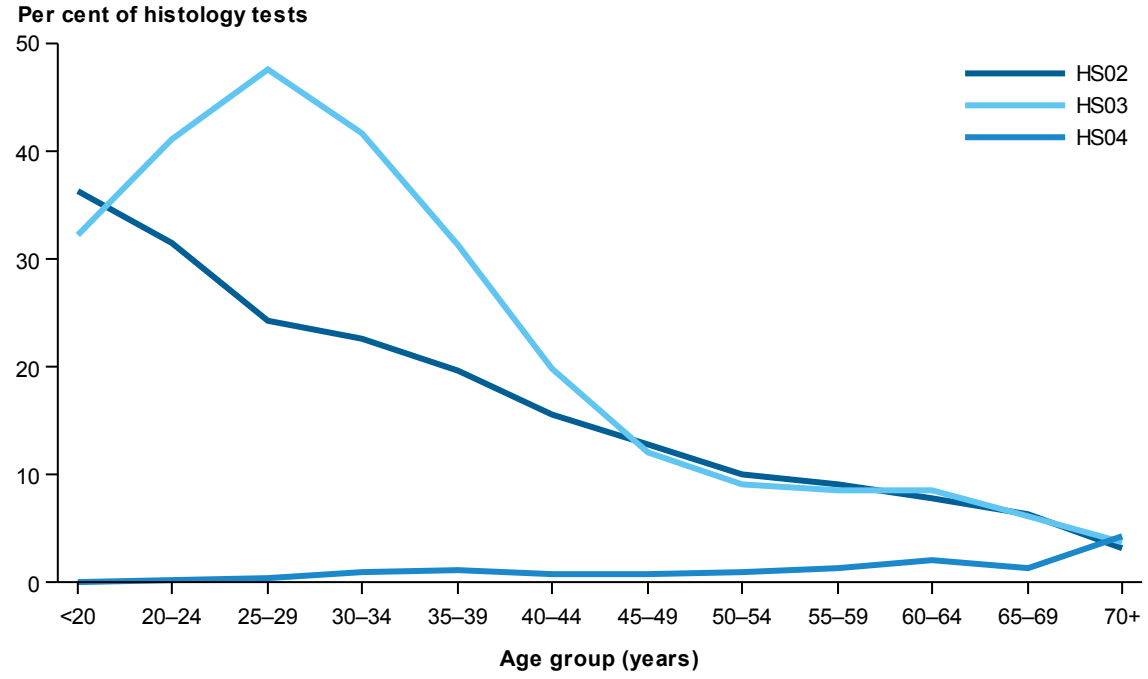
Figure 4.6: CIN II and CIN III detected by histology by age, 2012

Squamous abnormalities by age

Similar to squamous abnormalities detected by cytology, low-grade and high-grade squamous abnormalities detected by histology all peaked in younger women before decreasing with increasing age.

However, low-grade abnormalities peaked in women under 20, thereafter decreasing steadily with increasing age in an almost straight line. In contrast, high-grade abnormalities peaked in women aged 25–59, remained high in the younger age groups (including under 20) up to the age of 30–34, and thereafter fell away rapidly (although as noted above, CIN II and CIN III differ in the age at which they peak, so overall high-grade abnormalities will be a combination of these 2) (Figure 4.7).

Although having far fewer occurrences, squamous cell carcinoma, rare in younger women, increased with age with a small peak from age 60–64 onwards (Figure 4.7).



Note: HS02 = low-grade squamous abnormality; HS03 = high-grade squamous abnormality; HS04 = squamous cell carcinoma.

Source: AIHW analysis of state and territory cervical screening register data.

Figure 4.7: Squamous abnormalities detected by histology by age, 2012

Endocervical abnormalities detected by histology in 2012

In 2012, of the 38,984 abnormalities detected by histology in women aged 20–69, 1,176 were endocervical in origin—54 atypia, 784 high-grade, 284 adenocarcinoma, 23 adenosquamous carcinoma, and 31 other carcinoma of the cervix. This was 1.50 endocervical abnormalities per 100 histology tests.

> An endocervical abnormality is defined as an endocervical result of HE02 Endocervical atypia, HE03.1 Endocervical dysplasia, HE03.2 Adenocarcinoma *in situ*, HE04.1 Microinvasive adenocarcinoma, HE04.2 Invasive adenocarcinoma, HE04.3 Adenosquamous carcinoma* or HE04.4 Carcinoma of the cervix (other)* regardless of any squamous result.

*Note that HE04.3 Adenosquamous carcinoma and HE04.4 Carcinoma of the cervix (other) are included as endocervical abnormalities for data reporting purposes, but that the former is not solely of endocervical origin, and the latter category comprises rarer carcinomas of other epithelial origin.

Endocervical abnormality trends

The overall number of endocervical abnormalities increased from 868 in 2005 to 1,176 in 2012, with a concurrent increase in endocervical abnormalities per 100 histology tests from 1.26% to 1.48%(age-standardised) (Table 4.9).

In 2012, 4.6% of endocervical abnormalities were atypia (HE02), 66.7% were high-grade abnormalities (HE03)—incorporating endocervical dysplasia and adenocarcinoma *in situ*,

and 24.1% were adenocarcinoma. Adenosquamous carcinoma and other carcinoma of the cervix comprised 2.0% and 2.6% of endocervical abnormalities in 2012, respectively (Table 4.9).

Table 4.9: Endocervical abnormalities detected by histology in women aged 20–69, by endocervical category, 2005–2012

	Year							
Endocervical category	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
HE02 Endocervical atypia								
Number	104	66	62	55	38	54	62	54
Per cent of cytology tests	0.14	0.09	0.09	0.08	0.05	0.07	0.08	0.07
Per cent of endocervical abnormalities	12.0	7.2	6.3	5.0	3.8	5.1	5.5	4.6
HE03 High-grade endocervical abnormality								
Number	495	555	630	691	652	715	735	784
Per cent of cytology tests	0.66	0.77	0.88	0.95	0.90	0.99	0.97	1.00
Per cent of endocervical abnormalities	57.0	60.7	64.1	63.3	65.9	67.5	65.3	66.7
HE04.1 & 4.2 Adenocarcinoma								
Number	235	257	245	311	263	248	283	284
Per cent of cytology tests	0.31	0.35	0.34	0.43	0.36	0.34	0.37	0.36
Per cent of endocervical abnormalities	27.1	28.1	24.9	28.5	26.6	23.4	25.1	24.1
HE04.3 Adenosquamous carcinoma								
Number	19	15	25	21	20	21	33	23
Per cent of cytology tests	0.03	0.02	0.03	0.03	0.03	0.03	0.04	0.03
Per cent of endocervical abnormalities	2.2	1.6	2.5	1.9	2.0	2.0	2.9	2.0
HE04.4 Carcinoma of the cervix (other)								
Number	15	21	21	14	16	21	13	31
Per cent of cytology tests	0.02	0.03	0.03	0.02	0.02	0.03	0.02	0.04
Per cent of endocervical abnormalities	1.7	2.3	2.1	1.3	1.6	2.0	1.2	2.6
All endocervical abnormalities								
Number	868	914	983	1,092	989	1,059	1,126	1,176
Crude rate	1.15	1.26	1.37	1.50	1.37	1.47	1.49	1.50
AS rate	1.26	1.35	1.46	1.59	1.41	1.50	1.48	1.48

Notes

1. HE03 High-grade endocervical abnormality combines endocervical dysplasia and adenocarcinoma *in situ*.
2. Crude rate is the number of each endocervical abnormality or of all endocervical abnormalities combined detected by histology as a proportion of the total number of histology tests; age-standardised (AS) rate is the number of all endocervical abnormalities combined detected by histology as a proportion of the total number of histology tests age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cervical screening register data.

Endocervical atypia allows atypical endocervical cells that fall short of a high-grade abnormality to be captured (since a low-grade category for endocervical abnormalities detected by histology is not valid). However, this category is rarely used. Compared with 2005 when there were 0.14 per 100 histology tests, the proportion of histology tests with the abnormality endocervical atypia in 2012 was 0.07 (Table 4.8).

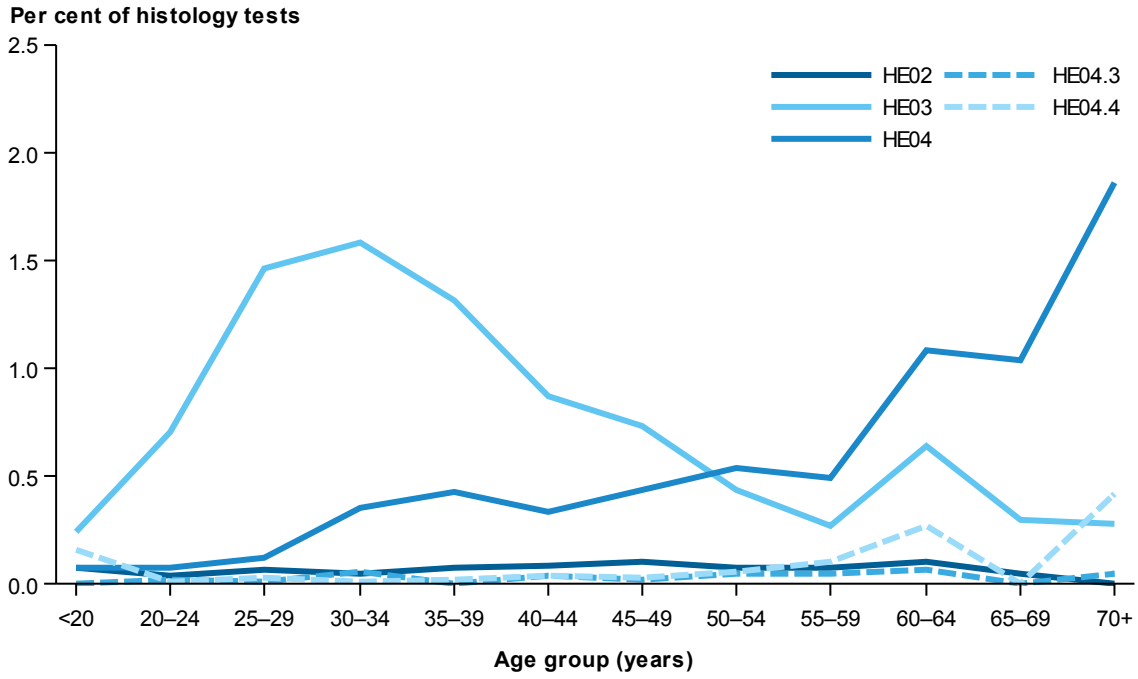
In contrast, high-grade endocervical abnormalities increased from 0.66 per 100 histology tests in 2005 to 1.00 in 2012. Adenocarcinoma, adenosquamous carcinoma, and other carcinoma of the cervix all had similar detection levels from 2005–2012 for women aged 20–69.

Endocervical abnormalities by age

Endocervical atypia, adenosquamous carcinoma and other carcinoma of the cervix are all very rare and contribute little to the overall trend in abnormalities.

High-grade endocervical abnormalities (endocervical dysplasia and adenocarcinoma *in situ* combined) peaked in women aged 30–34, thereafter decreasing with increasing age until a second, lower peak in women aged 60–64 (Figure 4.8).

Adenocarcinoma increased with age, being much more frequent in older women (Figure 4.8).



Note: HE02 = endocervical atypia; HE03 = high-grade endocervical abnormality; HE04 = Adenocarcinoma (microinvasive and invasive combined) HE04.3 = Adenosquamous carcinoma; HE04.4 = carcinoma of the cervix (other).

Source: AIHW analysis of state and territory cervical screening register data.

Figure 4.8: Endocervical abnormalities detected by histology by age, 2012

Indicator 5 Cytology-histology correlation

What you need to know about the cytology-histology correlation

Definition: The correlation between a squamous or endocervical cytology prediction and the most serious squamous or endocervical histology finding, where this histology occurs in the 6-month period following the cytology.

Rationale: Some cytology results will be followed by histology. Where this histology occurs within 6 months of cytology, a correlation between the cytology and histology result is presented as a measure of the accuracy of cytological predictions.

Guide to interpretation: Correlation data are restricted to cytology tests for which a histology test is known to have occurred within 6 months. These do not include cytology tests not followed by histology, for which we cannot know the true disease state.

Histology after a low-grade or a negative cytology test is a relatively rare occurrence, and is unlikely to be representative of negative and low-grade cytology in general.

Colposcopy data are incomplete and therefore not reported, which means that some diagnostic information is missing from the correlation.

Interpretation of data should take into consideration the counts provided.

The most recent cytology-histology correlation data are for cytology tests performed in 2011. This small lag in data availability is because sufficient time needs to have passed to ascertain if histology was performed in the 6-month period after cytology tests performed in a particular calendar year.

What the data tell us about the cytology histology correlation

Trends

The positive predictive values of high-grade cytology performed in 2011 were similar to those for high-grade cytology performed in 2010—68.2% compared with 69.8% for high-grade squamous cytology, and 71.4% compared with 73.5% for high-grade endocervical cytology.


The **recent trend** is relatively stable, with similar data for these measures for all years from 2008–2011.

Correlation between cytology and histology in 2011

Of the cytology tests performed in 2011 that predicted a definite high-grade squamous intraepithelial lesion, 77.8% were confirmed to be high-grade disease on histology.

The positive predictive value of all high-grade squamous cytology was 68.2%

Of the cytology tests performed in 2011 that predicted adenocarcinoma *in situ*, 63.8% were confirmed to be high-grade disease on histology.

The positive predictive value of all high-grade endocervical cytology was 71.4%.

More information about the cytology-histology correlation

Where cytology is followed by histology (either to confirm the presence or absence of disease as predicted by the cytology sample, or for other clinical reasons such as to investigate symptoms even in the absence of predicted disease), correlation between the cytology prediction and the histology finding allows the accuracy of cytological predictions to be assessed, to allow a better understanding of the characteristics of the NCSP screening test.

Follow-up of cytology tests should be according to the NHMRC *Screening to prevent cervical cancer: guidelines for the management of asymptomatic women with screen detected abnormalities* (NHMRC 2005), which means that most histology will occur after a cytology result of high-grade or cancer. There will be exceptions, however, and these Guidelines do not cover management of symptomatic women.

Note that a complete assessment of cytology would require all cytology results (including negative) to be followed up by histology, but this is neither feasible nor desirable. Rather, this assessment is restricted to cytology and histology results available on cervical screening registers, and is intended to provide key measures that can be monitored annually to inform the NCSP of any early indications of alterations to the predictive ability of cervical cytology.

Cautions

Under current management guidelines, negative and low-grade cytology is not routinely followed up by histology (unless the low-grade abnormality persists). Thus, histology after a low-grade or a negative cytology test result is a relatively rare occurrence, and it is likely that these are a unique subset of cytology tests and are not representative of negative and low-grade cytology as a rule, which means that these findings should not be extrapolated to low-grade and negative cytology in general.

In terms of completeness, a further consideration is the absence of colposcopy data. Colposcopy is an examination involving a special microscope that magnifies the cervix to allow the visualisation of an abnormality. A biopsy will often be taken at the time of colposcopy, which allows histological assessment. However, histology will not always result from a colposcopy—for instance if the colposcopy confirms a negative result, or if the woman is pregnant, a biopsy may not be performed. Colposcopy data are not systematically sent to cervical screening registers in the same way as histology data, which means that some diagnostic information, particularly that for negative disease state, is missing from the correlation.

Accuracy of the histology finding is also affected by the sample analysed; a biopsy may sample the wrong part of the cervix which may lead to an incorrect histology result, whereas a sample that allows the entire cervix to be assessed (for instance a hysterectomy that removes the entire cervix) is more likely to give an accurate result.

Finally, it should be noted that the results presented here are based on a single cytology test in isolation, and are not placed within the context of cervical screening. Cervical cytology, like other screening tests, is not intended to be diagnostic, but aims to identify people who are more likely to have a cervical abnormality or cervical cancer, and therefore require further investigation from diagnostic tests. Further, the NCSP is an organised program of regular screening tests, and while a single cervical cytology test is not able to predict presence or absence of disease with absolute accuracy, repeated cervical cytology tests over time generate a far greater degree of accuracy.

Detailed analyses

Proportion of squamous abnormalities followed by histology

To provide context for the squamous correlation results, the proportion of squamous abnormalities detected in 2011 for which a squamous histology result occurred within the following 6 months is shown in Table 5.1.

The correlation data included in the analyses that follow are restricted to cytology tests for which a histology test is known to have occurred within 6 months. These do not include cytology tests not followed by histology, for which we cannot know the true disease state.

Table 5.1: Number of squamous abnormalities detected in 2011, and proportion followed by squamous histology within 6 months, for women aged 20–69

Cytology prediction	Number detected	Number followed by squamous histology	Proportion followed by squamous histology (%)
S2 Possible low-grade	43,485	7,929	18.2
S3 Low-grade	34,276	7,801	22.8
S4 Possible high-grade	13,020	9,688	74.4
S5 High-grade	16,117	14,033	87.1
S6 High-grade plus	310	277	89.4
S7 Squamous cell carcinoma	155	129	83.2

Source: AIHW analysis of state and territory cervical screening register data.

Correlation between squamous cytology and squamous histology

Table 5.2 shows the correlation that exists between a squamous cytology prediction in 2011 and the squamous histology finding within the following 6 months for women aged 20–69.

Table 5.2: Correlation between squamous cytology and the most serious squamous histology within 6 months in women aged 20–69, cytology tests performed in 2011

	Histology finding		
Cytology prediction	HS02 Low-grade	HS03 High-grade	HS04 Squamous cell carcinoma
S1 Negative	3,370 (17.5%)	961 (5.0%)	32 (0.2%)
S2 Possible low-grade	3,218 (40.6%)	1,327 (16.7%)	2 (0.0%)
S3 Low-grade	4,004 (51.3%)	1,664 (21.3%)	3 (0.0%)
S4 Possible high-grade	2,297 (23.7%)	4,932 (50.9%)	67 (0.7%)
S5 High-grade	1,717 (12.2%)	10,915 (77.8%)	214 (1.5%)
S6 High-grade plus	15 (5.4%)	190 (68.6%)	60 (21.7%)
S7 Squamous cell carcinoma	2 (1.6%)	40 (31.0%)	84 (65.1%)

Notes

1. Numbers and percentage of each squamous cytology result category are shown.
2. For national consistency, the histology results of cervical intraepithelial (CIN) not otherwise specified (NOS), CIN II and CIN III are grouped together to form a broad high-grade abnormality category, and those of microinvasive and invasive squamous cell carcinoma are grouped together to form a broad squamous cell carcinoma category.

Source: AIHW analysis of state and territory cervical screening register data.

Low-grade squamous cytology

Under the current management guidelines, low-grade cytology is not routinely followed up by histology unless the abnormality persists—indeed only 18% of possible low-grade and 23% of low-grade squamous abnormalities were followed by a squamous histology result (Table 5.1). This means the following results should not be extrapolated to all low-grade cytology, since there may have been clinical reasons for performing histology within 6 months of a low-grade squamous cytology, which could bias these results towards a more serious abnormality than would be present in the majority of women with a cytology prediction of a low-grade abnormality.

Of all cytology tests performed in 2011 that were followed by histology within 6 months, 15,730 predicted a low-grade squamous abnormality—7,929 possible low-grade (S2) and 7,801 low-grade (S3) (Table 5.1).

Of the 7,929 predicted possible low-grade squamous abnormalities (S2), 3,218 (40.6%) were found to be a low-grade squamous abnormality on histology; of the 7,801 predicted low-grade squamous abnormalities (S3), 4,004 (51.3%) were found to be a low-grade squamous abnormality on histology (Table 5.2).

Overall, 45.9% of low-grade squamous abnormalities predicted by cytology were found to be a true low-grade squamous abnormality on histology (the positive predictive value of low-grade squamous cytology). Further, in these data squamous cytology predicted 49.4% of the true cases of low-grade squamous disease identified.

Of particular note, almost no predictions of possible low-grade or low-grade cytology were found to be cancer on histology (Table 5.2).

High-grade squamous cytology

Of all cytology tests performed in 2011 that were followed by histology within 6 months, 23,998 predicted a high-grade squamous abnormality—9,688 possible high-grade (S4), 14,033 high-grade (S5) and 277 high-grade with possible microinvasion/invasion (S6) (Table 5.1).

Of the 9,688 predicted possible high-grade squamous abnormalities (S4), 4,932 (50.9%) were found to be a high-grade squamous abnormality on histology; of the 14,033 predicted high-grade squamous abnormalities (S5), 10,915 (77.8%) were found to be a high-grade squamous abnormality on histology; and of the 277 predicted high-grade squamous abnormalities with possible microinvasion/invasion (S6), 190 (68.6%) were found to be a high-grade squamous abnormality on histology (Table 5.2).

While the category high-grade squamous abnormality with possible microinvasion/invasion (S6) is classified as a high-grade squamous abnormality throughout this report, for the National Pathology Accreditation Advisory Council (NPAAC) performance measure calculations (NPAAC 2006), this category is excluded from high-grades—a reflection that the majority of these are expected to be invasive malignancies, but are not coded definitively. Correlation data were considered when deciding the appropriate reporting grade for this category; with 68.6% found to be high-grade, and 21.7% found to be squamous cell carcinoma on histology, it was considered appropriate to continue to classify this category as high-grade in this report. Moving this category from high-grade to squamous cell carcinoma does not affect the overall positive predictive value of high-grade squamous cell abnormalities.

Overall, 68.2% of high-grade squamous abnormalities predicted by cytology were found to be a true high-grade squamous abnormality or squamous cell carcinoma on histology (the positive predictive value of high-grade squamous cytology—see Table 5.3), while 66.8% were found to be a true high-grade squamous abnormality. Further, in these data squamous cytology predicted 80.1% of the true cases of high-grade squamous disease identified.

Squamous cell carcinoma cytology

Of all cytology tests performed in 2011 that were followed by histology within 6 months, 155 predicted squamous cell carcinoma (S7) (Table 5.1). Of these predicted abnormalities, 84 (65.1%) were found to be squamous cell carcinoma on histology (Table 5.2).

There were 378 abnormalities graded as squamous cell carcinoma on histology within 6 months of cytology predictions other than squamous cell carcinoma, with 341 after high-grade squamous abnormalities, 5 after low-grade squamous abnormalities, and 32 after negative squamous cytology (Table 5.2).

Table 5.3: Positive predictive value (PPV) of high-grade squamous cytological abnormalities in women aged 20–69, most serious histology within 6 months of cytology performed in 2008–2011

	Cytology prediction			
	Possible high-grade S4	High-grade S5	High-grade plus S6	High-grade
2008	53.8% (4,415/8,212)	78.4% (11,111/14,165)	92.2% (237/257)	**69.6% (15,763/22,634)**
2009	55.2% (4,748/8,607)	78.9% (10,935/13,859)	90.5% (228/252)	**70.0% (15,911/22,718)**
2010	54.8% (4,810/8,782)	79.2% (10,517/13,279)	92.4% (255/276)	**69.8% (15,582/22,337)**
2011	51.6% (4,999/9,688)	79.3% (11,129/14,033)	90.3% (250/277)	**68.2% (16,378/23,998)**

Note: The positive predictive value is calculated as the proportion of squamous cytology results of possible or definite high-grade that were confirmed on histology to be a high-grade squamous abnormality or squamous cell carcinoma.

Source: AIHW analysis of state and territory cervical screening register data.

Proportion of endocervical abnormalities followed by histology

To provide context for the endocervical correlation results, the proportion of endocervical abnormalities detected in 2011 for which an endocervical histology result occurred within 6 months is shown in Table 5.4.

The correlation data included in the analyses that follow are restricted to cytology tests for which a histology test is known to have occurred within 6 months. These do not include cytology tests not followed by histology, for which we cannot know the true disease state.

Table 5.4: Number of endocervical abnormalities detected in 2011, and proportion followed by endocervical histology within 6 months, for women aged 20–69

Cytology prediction	Number of cytology tests	Number followed by histology	Proportion followed by histology (%)
E2 Atypical endocervical cells of uncertain significance	821	254	30.9
E3 Possible high-grade	500	277	55.4
E4 Adenocarcinoma *in situ*	283	265	93.6
E5 Adenocarcinoma *in situ* plus	23	17	73.9
E6 Adenocarcinoma	78	40	51.3

Source: AIHW analysis of state and territory cervical screening register data.

Correlation between endocervical cytology and endocervical histology

The correlation that exists between an endocervical cytology prediction in 2011 and the endocervical histology finding within 6 months for women aged 20–69 is shown in Table 5.5. This correlation may be affected by the recognised difficulties in sampling and interpreting endocervical cytology samples.

The majority of endocervical cytology that is followed by histology within 6 months is negative—a function of most abnormalities being squamous in origin with a concurrent negative endocervical component (since all cytology tests are allocated an 'S' and 'E' code). This means that in the majority of cases ,the histology will be investigating a cytology prediction of a squamous abnormality, and not the negative endocervical cytology.

When interpreting the correlation between endocervical cytology and histology, it is also important to realise that abnormalities preceding adenocarcinoma are less well understood than are the abnormalities preceding squamous cell carcinoma, and interpretation of endocervical cells is more difficult (as can be the adequate sampling of these cells). These points all affect the correlation between endocervical cytology and endocervical histology.

Table 5.5: Correlation between endocervical cytology and the most serious endocervical histology within 6 months in women aged 20–69, cytology tests performed in 2011

	Histology finding		
Cytology prediction	**HE02 Endocervical atypia**	**HE03 High-grade**	**HE04.1&4.2 Adenocarcinoma**
E1 Negative	49 (0.2%)	329 (1.3%)	72 (0.3%)
E2 Atypical endocervical cells of uncertain significance	2 (0.8%)	60 (23.6%)	12 (4.7%)
E3 Possible high-grade	2 (0.7%)	123 (44.4%)	31 (11.2%)
E4 Adenocarcinoma *in situ*	1 (0.4%)	169 (63.8%)	59 (22.3%)
E5 Adenocarcinoma *in situ* plus	0 (0.0%)	10 (58.8%)	7 (41.2%)
E6 Adenocarcinoma	0 (0.0%)	2 (5.0%)	24 (60.0%)

Notes

1. Numbers and percentage of each endocervical cytology result category shown.
2. For national consistency, the histology results of endocervical dysplasia and adenocarcinoma *in situ* are grouped together to form a broad high-grade abnormality category, and microinvasive and invasive adenocarcinoma are grouped to form a broad adenocarcinoma category.
3. The histology results of adenosquamous carcinoma and carcinoma of the cervix (other) are excluded, since these are neither solely squamous or endocervical in origin, and thus would not necessarily be expected to correlate with cytology results of either cell type.

Source: AIHW analysis of state and territory cervical screening register data.

Atypical endocervical cells of uncertain significance

The cytology category, 'atypical endocervical cells of uncertain significance', is classified as a low-grade cytology abnormality. However it is not appropriate to correlate this with endocervical atypia (the histology equivalent of a low-grade endocervical abnormality) since this cytology prediction is not used to indicate the predicted presence of a low-grade endocervical abnormality (which is not a valid histology category). Instead it is used to indicate that abnormal endocervical cells were identified in the sample but that the significance of these is uncertain (meaning that these could be indicative of a serious abnormality, or could be associated with a benign change such as inflammation).

There were 821 cytology tests performed in 2011 that identified abnormal endocervical cells where the pathologist was uncertain of their significance; 254 (30.9%) of these were followed

by histology (Table 5.4). This means that the majority of cytology tests in which atypical endocervical cells of uncertain significance were identified, were not followed by histology.

Of the 254 that were followed by histology within 6 months, 60 (23.6%) were found to be a high-grade endocervical abnormality on histology, and 12 (4.7%) were found to be adenocarcinoma on histology, with the majority of atypical endocervical cells of uncertain significance identified in the absence of endocervical disease (Table 5.5).

High-grade endocervical cytology

Of all cytology tests performed in 2011 that were followed by histology within 6 months, 559 predicted a high-grade endocervical abnormality—277 possible high-grade (E3), 265 adenocarcinoma *in situ* (E4) and 17 adenocarcinoma *in situ* with possible microinvasion/invasion (E5) (Table 5.4).

Of the 277 predicted possible high-grade endocervical abnormalities (E3), 123 (44.4%) were found to be a high-grade endocervical abnormality on histology. Of the 265 predicted adenocarcinoma *in situ* (E4), 169 (63.8%) were found to be a high-grade endocervical abnormality on histology. Of the 17 predicted adenocarcinoma *in situ* with possible microinvasion/invasion (E5), 10 (58.8%) were found to be a high-grade endocervical abnormality on histology (Table 5.5).

> The category adenocarcinoma *in situ* with possible microinvasion/invasion (E5) experiences similar disparity in classification to its squamous counterpart; however the very small numbers (10 found to be high-grade and 7 found to be adenocarcinoma) make qualification difficult, and thus this category will also continue to be classified as high-grade in this report. Moving this category from high-grade to adenocarcinoma does not have any great effect on the overall positive predictive values.

Overall, 71.4% of high-grade endocervical abnormalities predicted by cytology were found to be a true high-grade endocervical abnormality or adenocarcinoma on histology (the positive predictive value of a high-grade endocervical cytology result—see Table 5.6), while 54.0% were found to be a true high-grade endocervical abnormality. Further, in these data endocervical cytology predicted 43.6% of the true cases of high-grade endocervical disease identified.

Table 5.6: Positive predictive value (PPV) of high-grade endocervical cytological abnormalities in women aged 20–69, most serious histology within 6 months of cytology performed in 2008–2011

	Cytology prediction			
	Possible high-grade E3	Adenocarcinoma *in situ* E4	Adenocarcinoma *in situ* plus E5	**High-grade**
2008	49.3% (109/221)	92.2% (202/219)	96.0% (24/25)	**72.0% (335/465)**
2009	54.1% (139/257)	89.2% (214/240)	78.6% (11/14)	**71.2% (364/511)**
2010	56.3% (120/213)	88.7% (212/239)	73.9% (17/23)	**73.5% (349/475)**
2011	55.6% (154/277)	86.0% (228/265)	100% (17/17)	**71.4% (399/559)**

Note: The positive predictive value is calculated as the proportion of endocervical cytology results of possible or definite high-grade that were confirmed on histology to be a high-grade endocervical abnormality or adenocarcinoma. (These are prone to variability due to small numbers.)

Source: AIHW analysis of state and territory cervical screening register data.

Adenocarcinoma cytology

Of all cytology tests performed in 2011 that were followed by histology within 6 months, 40 predicted adenocarcinoma (E6) (Table 5.4). Of these predicted abnormalities, 24 (60.0%) were found to be adenocarcinoma on histology (Table 5.5).

There were 181 abnormalities graded as adenocarcinoma on histology within 6 months of cytology predictions other than adenocarcinoma, with 97 after high-grade endocervical cytology and 72 after negative endocervical cytology (Table 5.5).

Additional analyses

Cytology predictions preceding adenosquamous and other carcinomas of the cervix

Adenosquamous and other carcinomas of the cervix were analysed separately, since—even though they are categorised as endocervical carcinomas for coding purposes—these do not fall into the category of either squamous or endocervical carcinoma.

The cytology prediction preceding the histology finding of adenosquamous carcinoma or other carcinoma of the cervix is shown in Table 5.7.

Table 5.7: Cytology prediction preceding a histology finding of adenosquamous carcinoma or other carcinoma of the cervix in women aged 20–69, cytology performed in 2011

Cytology prediction	Adenosquamous carcinoma	Carcinoma of the cervix (other)
S1 Negative	6	5
S2 Possible low-grade	0	0
S3 Low-grade	0	0
S4 Possible high-grade	2	0
S5 High-grade	13	0
S6 High-grade with possible invasion	0	0
S7 Squamous cell carcinoma	1	2
E1 Negative	16	3
E2 Atypical endocervical cells of uncertain significance	1	0
E3 Possible high-grade	0	0
E4 Adenocarcinoma *in situ*	1	1
E5 Adenocarcinoma with possible invasion	0	0
E6 Adenocarcinoma	3	0

Source: AIHW analysis of state and territory cervical screening register data.

Cytology predictions preceding CIN II versus CIN III

The correlation between squamous cytology and squamous histology performed within 6 months has been replicated in Table 5.8, including only data from states and territories that are able to distinguish between CIN II and CIN III.

In these data, predicted possible low-grade (S2) or low-grade squamous abnormalities (S3), while both still more likely to be a low-grade squamous abnormality on histology, were more likely to be CIN II than CIN III (Table 5.8).

Predicted possible high-grade squamous abnormalities (S4) were equally likely to be low-grade squamous abnormality or CIN II on histology (21.8% and 19.5%, respectively), with a slightly higher 29.3% of these found to be CIN III on histology.

56.1% of predicted high-grade squamous abnormalities (S5) were found to be CIN III on histology, and 58.8% of predicted high-grade squamous abnormalities with possible microinvasion/invasion (S6) were found to be CIN III on histology.

89.2% of predicted squamous cell carcinoma (S7) was found on histology to be either CIN III or squamous cell carcinoma (Table 5.8).

Table 5.8: Correlation between squamous cytology and the most serious squamous histology within 6 months in women aged 20–69 showing CIN II and CIN III, cytology tests performed in 2011

	Histology finding			
Cytology prediction	HS02 Low-grade	HS03.2 CIN II	HS03.3 CIN III	HS04 Squamous cell carcinoma
S1 Negative	1,471 (16.9%)	223 (2.6%)	205 (2.4%)	15 (0.2%)
S2 Possible low-grade	1,728 (36.6%)	437 (9.2%)	289 (6.1%)	0 (0.0%)
S3 Low-grade	1,940 (50.2%)	494 (12.8%)	288 (7.5%)	0 (0.0%)
S4 Possible high-grade	1,114 (21.8%)	994 (19.5%)	1,496 (29.3%)	35 (0.7%)
S5 High-grade	800 (10.8%)	1,620 (21.9%)	4,144 (56.1%)	120 (1.6%)
S6 High-grade plus	6 (4.6%)	12 (9.2%)	77 (58.8%)	32 (24.4%)
S7 Squamous cell carcinoma	2 (3.1%)	0 (0.0%)	16 (24.6%)	42 (64.6%)

Notes

1. Numbers and percentage of each squamous cytology result category shown.
2. States and territories unable to distinguish between CIN II and CIN III were excluded from all data and calculations in this table.
3. The high-grade category CIN NOS has been excluded from this table, but is a rare histology finding.

Source: AIHW analysis of state and territory cervical screening register data.

NPAAC performance indicators

The National Pathology Accreditation Advisory Council (NPAAC) *Performance measures for Australian laboratories reporting cervical cytology* (NPAAC 2006) includes recommended standards for the proportion of cytology specimens reported as definite high-grade (3a) and possible high-grade (3b) that are confirmed on histology within 6 months as high-grade abnormalities.

Note that 'S6 High-grade squamous intraepithelial lesion with possible microinvasion/invasion' and 'E5 Adenocarcinoma *in situ* with possible microinvasion/invasion' have been included as definite high-grade intraepithelial abnormalities in the calculations for NPAAC Performance Measure 3a. Positive predictive values for 'S5 High-grade squamous intraepithelial abnormality' (Table 5.3) and 'E4 Adenocarcinoma *in situ*' (Table 5.6) can be substituted for the below calculated values if it is desirable to exclude these from Performance measure 3a.

Calculation of these performance measures using cytology-histology correlation data revealed that the proportion of definite high-grade squamous abnormalities on cytology confirmed to be high-grade or cancer on histology was 79.5% and the proportion of definite high-grade endocervical abnormalities on cytology confirmed to be high-grade or cancer on

histology was 86.9%. The proportion of possible high-grade squamous abnormalities on cytology confirmed to be high-grade on histology was 51.6%, and the proportion of possible high-grade endocervical abnormalities on cytology confirmed to be high-grade on histology was 55.6%.

Even though these were reported separately for squamous and endocervical abnormalities, which differs from the intended use of these performance measures, all of these would fall within the respective standards set for these measures (Box 5.1).

Box 5.1: National Pathology Accreditation Advisory Council (NPAAC)
Performance measures for Australian laboratories reporting cervical cytology

Performance measure 3a

Proportion of cytology specimens reported as a definite high-grade intraepithelial abnormality where cervical histology, taken within 6 months, confirms the abnormality as high-grade intraepithelial abnormality or malignancy.

Recommended standard

Not less than 65% of cytology specimens with a definite cytological prediction of a high-grade intraepithelial abnormality are confirmed on cervical histology, which is performed within 6 months, as having a high-grade intraepithelial abnormality or malignancy

Calculated values for 2011

Squamous cytology and histology	Endocervical cytology and histology
11,379/14,310 = 79.5%	245/282 = 86.9%

Performance measure 3b

Proportion of cytology specimens reported as a possible high-grade intraepithelial abnormality where cervical histology, taken within 6 months, confirms the abnormality as high-grade intraepithelial abnormality or malignancy

Recommended standard

Not less than 33% of cytology specimens with a cytological prediction of a possible high-grade intraepithelial abnormality are confirmed on cervical histology, which is performed within 6 months, as having a high-grade intraepithelial abnormality or malignancy

Calculated values for 2011

Squamous cytology and histology	Endocervical cytology and histology
4,999/9,688 = 51.6%	154/277= 55.6%

Indicator 6 Incidence

What you need to know about incidence

Definition: The number of new cases of cervical cancer per 100,000 estimated resident female population in a 12-month period.

Rationale: The National Cervical Screening Program (NCSP) aims to reduce the incidence of cervical cancer.

Guide to interpretation: These data include both screen-detected cervical cancers (through the NCSP) and cervical cancers detected outside the screening program.

Incidence of cervical cancer by state and territory, remoteness area, socioeconomic status and Indigenous status is reported over a 5-year period instead of a 12-month period to improve the stability and comparability of rates due to the small number of new cases in less populated areas and in Aboriginal and Torres Strait Islander women.

The 2010 Australian Cancer Database is the source of cervical cancer incidence data.

The most recent cervical cancer incidence data are for new cases diagnosed in 2010 (note that 2010 incidence data include estimates for NSW and the ACT).

What the data tell us about incidence

Trend

Incidence of cervical cancer for women aged 20–69, after halving from 17.2 new cases per 100,000 women in 1991, has remained at around 9 new cases per 100,000 from 2002–2010.

The **recent trend** is therefore very stable, with no real change since 2002.

2010

In 2010 there were 682 new cases of cervical cancer in women aged 20–69, the target population of the NCSP, which equates to 9.6 new cases per 100,000 women (age-standardised). There were 818 new cases, or 7.1 new cases per 100,000 women (age-standardised) in women of all ages.

Latest 5-year data (2006–2010 or 2005–2009)

In 2006–2010, the incidence of cervical cancer was higher for women residing in *Remote and very remote* areas; it was lower in women residing in areas of highest socioeconomic status.

In 2005–2009, the incidence of cervical cancer in Aboriginal and Torres Strait Islander women from New South Wales, Queensland, Western Australia and the Northern Territory was significantly higher than non-Indigenous women from these states and territories, at 21.4 new cases per 100,000 women compared with the non-Indigenous rate of 8.6 new cases per 100,000 women for women aged 20–69 (both age-standardised).

More information on incidence

Registration of cancer cases is required by law in each state and territory. Data are collected by state and territory cancer registries and compiled in a national database, the Australian Cancer Database (ACD), which is held by the Australian Institute of Health and Welfare (AIHW). The data include clinical and demographic information about people with newly diagnosed cancer.

Incidence of cervical cancer measures the number of new cases of cervical cancer diagnosed each year, sourced from the ACD. Only primary cervical cancers are included—secondary cervical cancers and cervical cancers that are a reoccurrence of a primary cervical cancer are not counted. Note that incidence data refer to the number of new cases diagnosed and not number of women diagnosed (although it is rare for a woman to be diagnosed with more than one primary cervical cancer in the same year).

The main data source for this chapter was the 2010 Australian Cancer Database.

Detailed analyses

Incidence of cervical cancer in 2010

In 2010, there were 818 new cases of cervical cancer in Australian women. This is equivalent to 7.4 new cases for every 100,000 women in the population, which, when age-standardised to allow analysis of trends and differentials, equates to an incidence rate of 7.1 for 2010.

Of the 818 new cases, 682 were in women aged 20–69, the target population of the NCSP. These 682 new cases represent 83.3% of all cervical cancers diagnosed in that year, and 9.5 new cases for every 100,000 women in the population. When age-standardised to allow analysis of trends and differentials, this equates to an incidence rate of 9.6 per 100,000 women aged 20–69.

In the broader context of cancers diagnosed in Australian women (and excluding basal cell and squamous cell carcinoma of the skin), cervical cancer was the 12th most commonly diagnosed cancer in Australian women in 2010, with a risk of diagnosis of 1 in 188 by age 75 and 1 in 155 by age 85 (AIHW 2014).

Incidence of cervical cancer trends

The incidence of cervical cancer has decreased over time. For women aged 20–69, while incidence had been slowly decreasing before the organised national screening program, this almost halved between 1991 and 2010 from 17.2 to 9.6 new cases per 100,000 women. This historic low of around 9 new cases per 100,000 women has been stable since 2002 (Figure 6.1; Table 6.1).

For women aged 20–69, the overall decrease in the number of new cases was from 896 in 1991 to 682 in 2010, a decrease of 23.9% (Table 6.1).

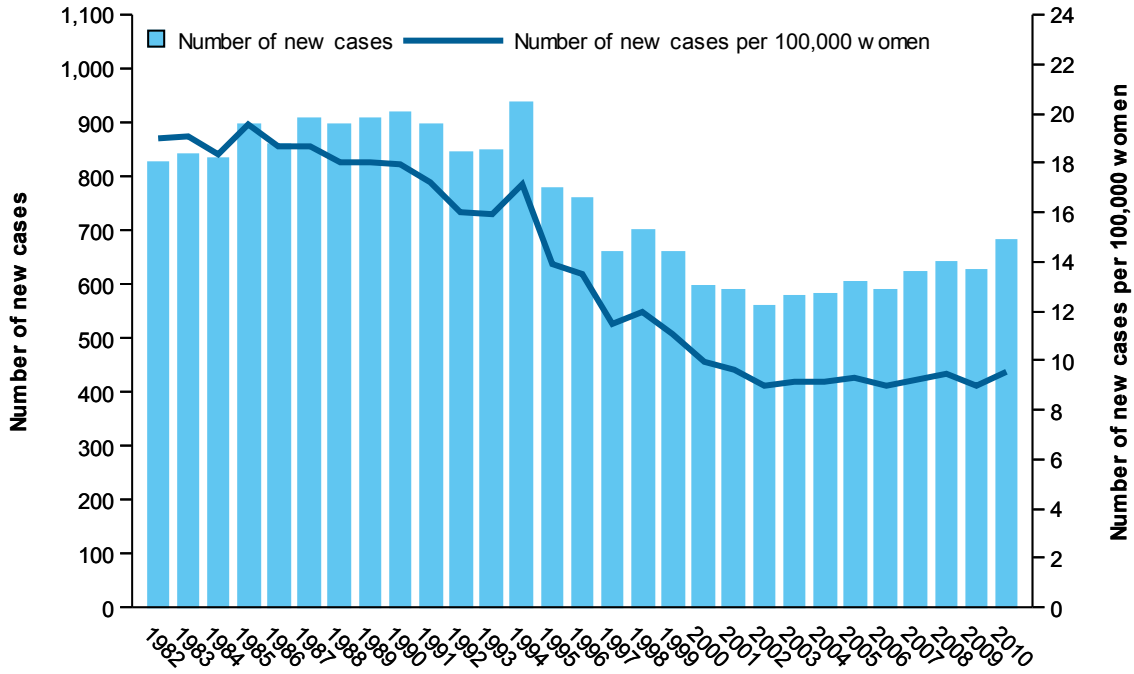
> When interpreting cervical cancer incidence trends in relation to the NCSP, it is important to remember that opportunistic cervical screening occurred in Australia prior to the commencement of the national screening program in 1991, with some states trialling organised screening in the years leading up to 1991. Therefore it would be expected that some decreases in cervical cancer incidence would be apparent before 1991, particularly from the late 1980s onwards.

Table 6.1: Incidence of cervical cancer, 1982–2010

	New cases		AS rate	
Year of diagnosis	20–69	All ages	20–69	All ages
1982	826	963	19.0	14.2
1983	841	994	19.0	14.3
1984	834	1,007	18.4	14.2
1985	897	1,059	19.6	14.7
1986	861	1,019	18.6	13.9
1987	906	1,100	18.7	14.4
1988	898	1,063	18.0	13.6
1989	909	1,073	18.1	13.5
1990	918	1,088	18.0	13.0
1991	896	1,095	17.2	12.7
1992	846	1,024	16.0	12.2
1993	848	1,016	15.9	12.0
1994	937	1,144	17.1	13.1
1995	776	961	13.9	10.8
1996	760	940	13.5	10.4
1997	658	810	11.5	8.8
1998	700	872	11.9	9.2
1999	659	798	11.1	8.3
2000	598	769	9.9	7.9
2001	588	742	9.6	7.5
2002	558	689	9.0	6.8
2003	579	730	9.2	7.1
2004	583	726	9.1	7.0
2005	604	735	9.3	7.0
2006	590	721	8.9	6.8
2007	621	748	9.2	6.9
2008	640	777	9.4	7.1
2009	626	756	9.0	6.7
2010	682	818	9.6	7.1

Note: Age-standardised (AS) rate is the number of new cases of cervical cancer per 100,000 women, age-standardised to the Australian population at 30 June 2001.

Source: AIHW Australian Cancer Database.



Note: Rates age-standardised to the Australian population as at 30 June 2001.

Source: AIHW Australian Cancer Database.

Figure 6.1: Incidence of cervical cancer in women aged 20–69, 1982–2010

Incidence of cervical cancer by age

Analysis of 5-year age groups between 20–24 and 65–69 reveals that, in 2010, the highest incidence of cervical cancer was in women aged 35–39, at 12.9 new cases per 100,000 women (Table 6.2). There is a second peak (not shown) of 14.2 new cases per 100,000 women for those aged 85 and over.

Table 6.2: Incidence of cervical cancer by age, 2010

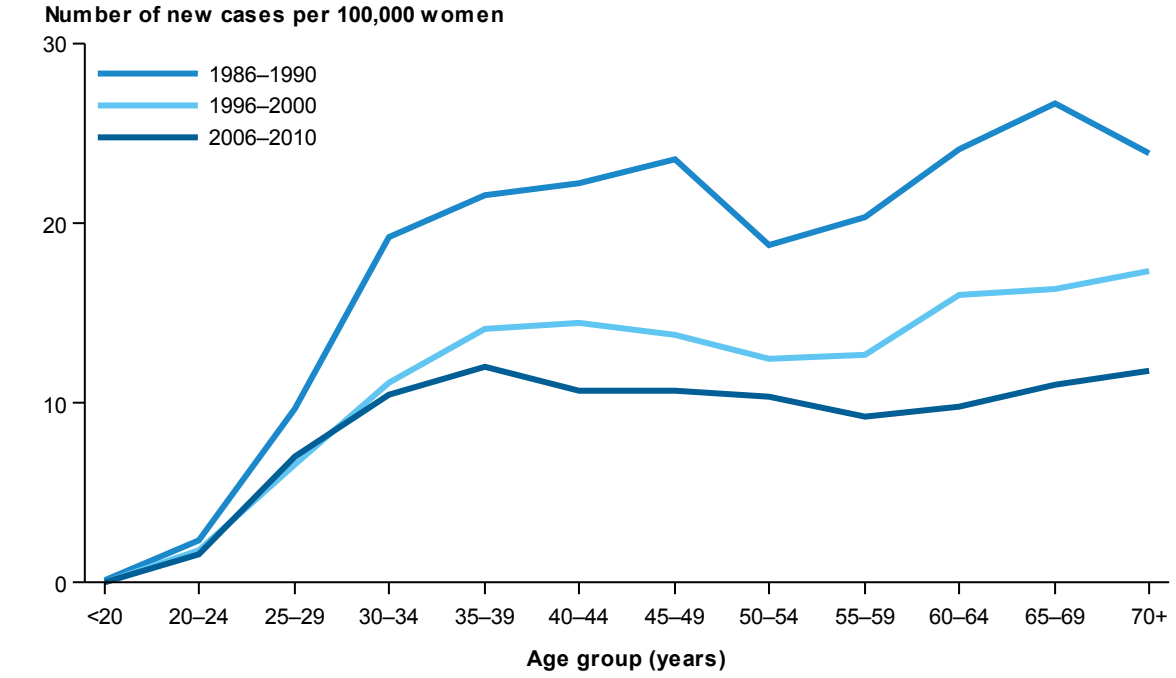
	Age group (years)									
	20–24	**25–29**	**30–34**	**35–39**	**40–44**	**45–49**	**50–54**	**55–59**	**60–64**	**65–69**
New cases	18	56	75	104	74	97	71	75	59	52
Crude rate	2.3	7.0	10.0	12.9	9.6	12.4	9.7	11.3	9.9	11.4

Note: Crude rate is the number of new cases of cervical cancer per 100,000 women; rates based on less than 20 new cases should be interpreted with caution.

Source: AIHW Australian Cancer Database.

Historical age-specific trends reveal the effect of the cervical screening program on incidence. Calculated over a 5-year period to increase stability and comparability of rates, age-specific incidence is shown for 1986–1990, 1996–2000 and 2006–2010 in Figure 6.2.

It was found that incidence was reduced across all age groups from 1986–1990 to 2006–2010. Further, in 1986–1990, before the NCSP was introduced in 1991, there was a clear second (and higher) peak in incidence in women from 60 years onwards, which has reduced (Figure 6.2).



Source: AIHW Australian Cancer Database.

Figure 6.2: Incidence of cervical cancer by age, 1986–1990, 1996–2000 and 2006–2010

Incidence of cervical cancer by histological type

While all cervical cancers share the same site code (C53 under ICD 10), there are a number of histological subtypes within the category of cervical cancer, with clear differences in clinical behaviour (Blomfield & Saville 2008). Histology codes for cancers are collected on the ACD, which allows the analysis of trends in cervical cancer incidence for different histological types. The histological types presented are based on the histological groupings for cervical cancer set out in Chapter 4 of *Cancer incidence in five continents volume IX* (Curado et al. 2007), with histological types characterised by the type of cell in which the cancer originates. Thus cervical cancer has been disaggregated into the broad histological types of carcinoma (cancers of epithelial origin), sarcoma (cancers originating in other cell types such as bone, muscle, or haematopoietic cells), and other specified and unknown malignant neoplasms (unusual cancers and cancers too poorly differentiated to be classified). Carcinoma has been further split into squamous cell carcinoma (which arises from the squamous cells that cover the outer surface of the cervix), adenocarcinoma (which arises from the glandular (columnar) cells in the cervical canal), adenosquamous carcinoma (which contains malignant squamous and glandular cells), and other carcinoma.

This table differs slightly from that presented in *Cancer incidence in five continents volume IX* (Curado et al. 2007), with other specified and unspecified carcinomas grouped together, as are other specified and unspecified malignant neoplasms. Further, adenosquamous carcinoma has been listed as a separate group under Carcinoma rather than included in 'Other specified carcinoma' as specified in *Cancer incidence in five continents volume IX* (Curado et al. 2007). The latter change is to allow the carcinoma histological groupings to match the cervical cancer types collected by the cervical cytology registries and reported under the Histology indicator.

Table 6.3: Incidence of cervical cancer in women aged 20–69, by histological type, 2010

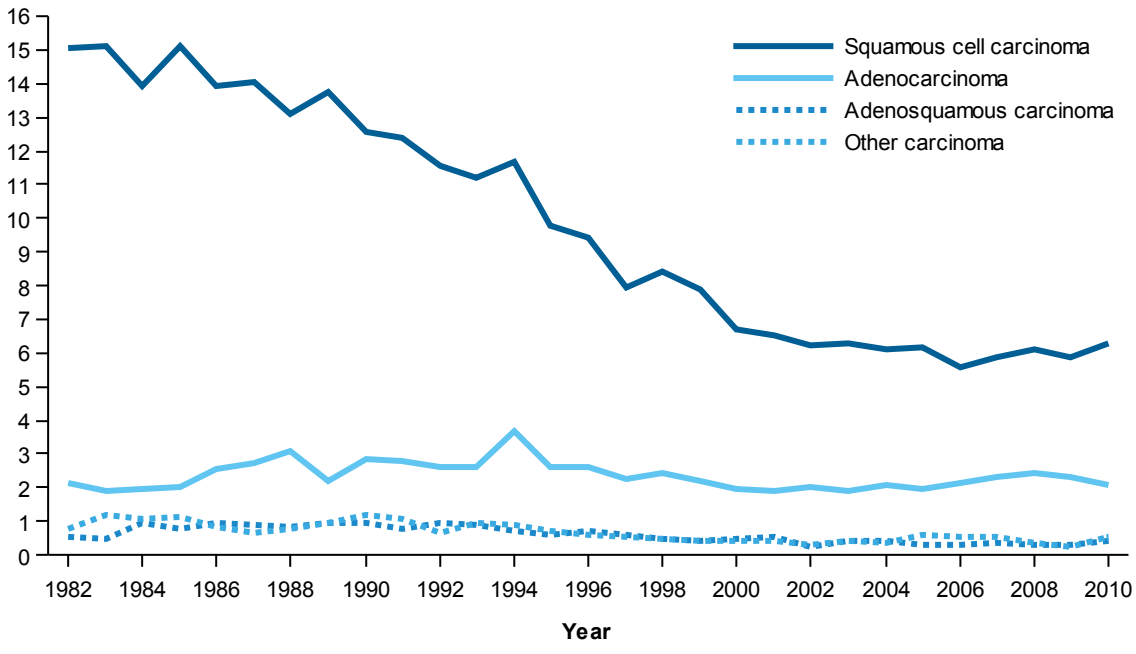
Type of cervical cancer	New cases	AS rate	% of cervical cancers	(% of carcinomas)
1: Carcinoma	664	9.3	97.3	(100.0)
1.1: Squamous cell carcinoma	*447*	*6.3*	*65.6*	*(67.4)*
1.2: Adenocarcinoma	*146*	*2.1*	*21.4*	*(22.0)*
1.3: Adenosquamous carcinoma	*30*	*0.4*	*4.4*	*(4.6)*
1.4: Other specified and unspecified carcinoma	*40*	*0.5*	*5.9*	*(6.0)*
2: Sarcoma	4	0.1	0.6	. .
3: Other specified and unspecified malignant neoplasm	14	0.2	2.1	. .
Total	**682**	**9.6**	**100.0**	**. .**

Note: Age-standardised (AS) rate is the number of new cases per 100,000 women, age-standardised to the Australian population at 30 June 2001; rates based on less than 20 new cases should be interpreted with caution.

Source: AIHW Australian Cancer Database.

In 2010, of the 682 cervical cancers diagnosed in women aged 20–69, 664 (97.3%) were carcinomas, 4 (0.6%) were sarcomas, and 14 (2.1%) were classified as other and unspecified malignant neoplasms (Table 6.3). Within the carcinomas, squamous cell carcinoma comprised the greatest proportion at 65.6% of all cervical cancers, followed by adenocarcinomas at 21.4% of cervical cancers, and adenosquamous carcinomas at 4.4%, with other and unspecified carcinomas comprising 5.9% of all cervical cancers in 2010 in women aged 20–69 (Table 6.3).

Trends in age-standardised incidence for women aged 20–69 for squamous cell carcinoma, adenocarcinoma, adenosquamous carcinoma and other carcinomas are shown in Figure 6.3.



Source: AIHW Australian Cancer Database.

Figure 6.3: Incidence of carcinoma of the cervix (squamous cell carcinoma, adenocarcinoma, adenosquamous carcinoma and other carcinomas) in women aged 20–69, 1982–2010

Squamous cell carcinoma has shown the most dramatic change over this time, decreasing from 15.1 new cases per 100,000 women in 1982 to 12.4 in 1991, thereafter halving to 6.3 new cases per 100,000 women in 2010 (Figure 6.3).

Incidence of adenocarcinoma appears to have increased in the late 1980s to around 3 new cases per 100,000 women, where it remained until a peak of 3.7 new cases per 100,000 women in 1994. This is consistent with documented trends in Canada, the United States and the United Kingdom of increased incidence of adenocarcinoma from 1970 through to the mid-1990s, thought to represent a cohort effect as a result of increased risk of adenocarcinoma for women born in the early 1960s (Blomfield & Saville 2008). Incidence of adenocarcinoma was then found to decrease from the mid-1990s in countries with organised cervical screening programs (reviewed in Blomfield and Saville 2008), a trend mirrored in these data, with incidence of adenocarcinoma decreasing from 2.8 new cases per 100,000 women in 1991 to 2.1 new cases per 100,000 women in 2010 (Figure 6.3).

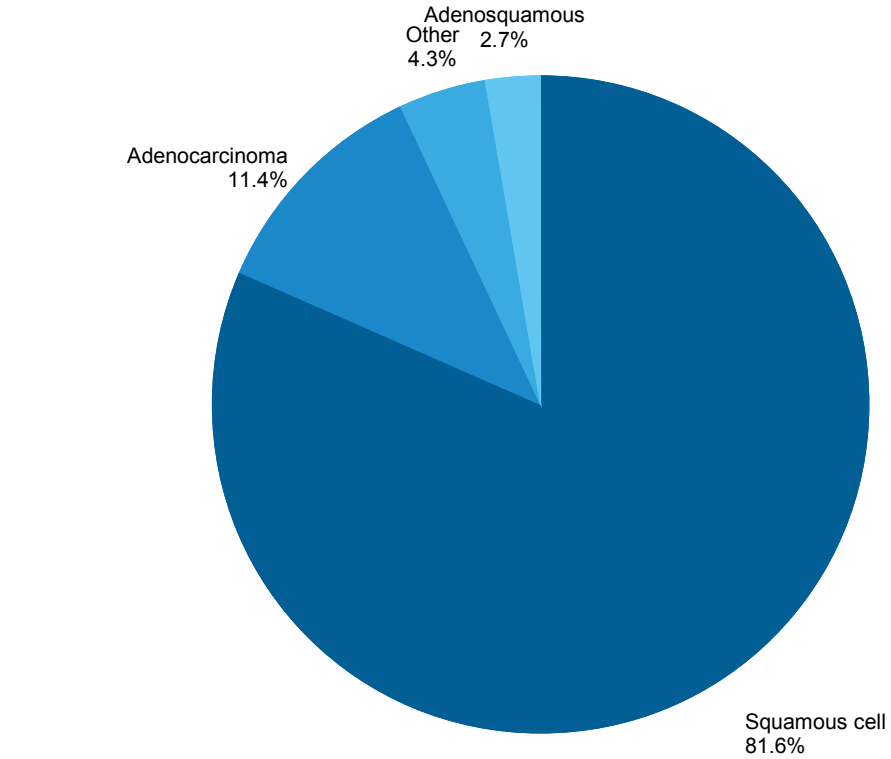
Incidence trends of adenosquamous and other carcinomas are more difficult to ascertain due to small numbers, but appear to increase around the introduction of the NCSP in 1991, thereafter decreasing to rates below these by 2010.

As a result of these changes in incidence, the proportion of all carcinomas that each histological type comprises has changed over time. The proportion of carcinomas that are squamous in origin has decreased over time, from 81.6% in 1982 to 67.4% in 2010. In contrast, adenocarcinomas have comprised an increasingly large proportion since cervical screening, from 11.4% in 1982 to 22.0% in 2010. Adenosquamous, other specified and unspecified carcinomas between them comprise the remaining carcinomas (Figure 6.4).

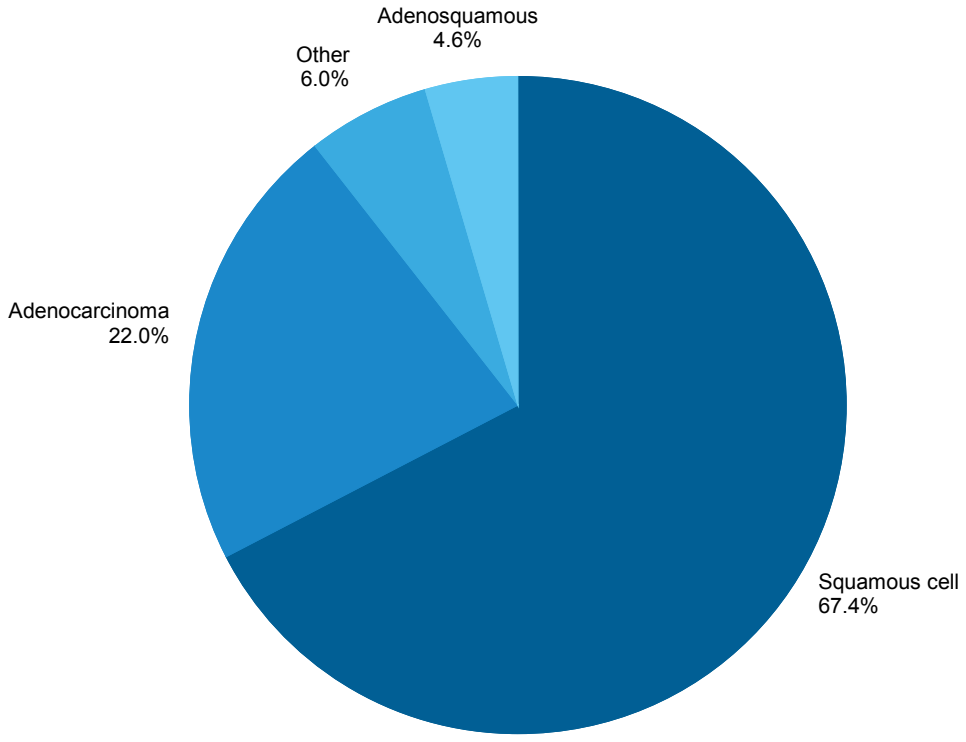
From these data it is clear that the observed decrease in cervical cancer incidence since the introduction of the NCSP in 1991 does not apply equally to all histological types of cervical cancer.

The trend in squamous cell carcinomas illustrates the success of the NCSP in preventing these histological subtypes of cervical cancer through the detection of high-grade squamous abnormalities, with these readily identified by repeated cervical cytology (Blomfield & Saville 2008). As a result, squamous cell carcinomas now comprise 65.6% of cervical cancers, much reduced from its historical proportion of 95% (Blomfield & Saville 2008).

In contrast, adenocarcinomas have not been reduced to the same degree as squamous cell carcinomas by cervical screening, with these glandular carcinomas now comprising a quarter of all cervical cancers—previously this was proportionately a rarer disease. The inability of cervical screening to reduce glandular cancers below the level reached a decade ago is recognised as a reflection of the difficulties in sampling glandular cells (Sasieni et al. 2009), with cervical cytology less effective at identifying glandular abnormalities (Blomfield & Saville 2008). Further, the cytological interpretation of abnormal glandular cells that are sampled (which occur much more infrequently than squamous abnormalities) is more difficult, and the progression from glandular abnormality to adenocarcinoma not well characterised (Sasieni et al. 2009; Wang et al. 2006).



1982



2010

Figure 6.4: Squamous cell carcinoma, adenocarcinoma, adenosquamous carcinoma and other carcinoma in women aged 20–69, as a proportion of all carcinoma of the cervix, 1982 and 2010

Table 6.4: Incidence of carcinoma of the cervix (squamous cell carcinoma, adenocarcinoma, adenosquamous carcinoma and other carcinoma) in women aged 20–69, 1982–2010

	New cases				AS rate			
Year of diagnosis	SSC[(a)]	AC[(b)]	ASC[(c)]	Other[(d)]	SSC[(a)]	AC[(b)]	ASC[(c)]	Other[(d)]
1982	656	92	22	35	15.1	2.1	0.5	0.8
1983	662	83	23	56	15.1	1.9	0.5	1.2
1984	633	87	44	49	13.9	1.9	1.0	1.1
1985	689	95	35	54	15.1	2.0	0.8	1.1
1986	645	117	42	40	13.9	2.5	1.0	0.8
1987	682	132	41	33	14.0	2.7	0.9	0.7
1988	650	156	40	40	13.1	3.1	0.8	0.8
1989	691	111	50	48	13.8	2.2	1.0	0.9
1990	643	146	49	61	12.6	2.8	1.0	1.2
1991	646	144	41	56	12.4	2.8	0.8	1.1
1992	612	137	50	37	11.5	2.6	1.0	0.7
1993	595	143	48	52	11.2	2.6	0.9	1.0
1994	639	203	40	49	11.7	3.7	0.7	0.9
1995	545	146	34	41	9.8	2.6	0.6	0.7
1996	529	148	40	33	9.4	2.6	0.7	0.6
1997	454	130	33	31	7.9	2.3	0.6	0.5
1998	492	141	30	29	8.4	2.4	0.5	0.5
1999	469	132	24	26	7.9	2.2	0.4	0.4
2000	402	118	30	27	6.7	2.0	0.5	0.4
2001	400	115	32	27	6.5	1.9	0.5	0.4
2002	388	126	17	20	6.2	2.0	0.3	0.3
2003	396	121	25	26	6.3	1.9	0.4	0.4
2004	391	133	27	22	6.1	2.1	0.4	0.3
2005	399	128	21	39	6.2	2.0	0.3	0.6
2006	366	143	22	38	5.6	2.2	0.3	0.6
2007	394	157	24	37	5.9	2.3	0.4	0.6
2008	417	165	21	25	6.1	2.4	0.3	0.4
2009	406	163	23	19	5.9	2.3	0.3	0.3
2010	447	146	30	40	6.3	2.1	0.4	0.5

(a) SSC = squamous cell carcinoma.

(b) AC = adenocarcinoma.

(c) ASC = adenosquamous carcinoma.

(d) Other = other and unspecified carcinoma.

Note: Age-standardised (AS) rate is the number of new cases of squamous cell carcinoma, adenocarcinoma, adenosquamous carcinoma and other carcinomas per 100,000 women age-standardised to the Australian population at 30 June 2001; rates based on less than 20 new cases should be interpreted with caution.

Source: AIHW Australian Cancer Database.

Incidence of cervical cancer by state and territory

In 2006–2010, incidence of cervical cancer for women aged 20–69 was relatively stable across states and territories, ranging between 7.1 and 15.4 new cases per 100,000 women (Table 6.5; Figure 6.5).

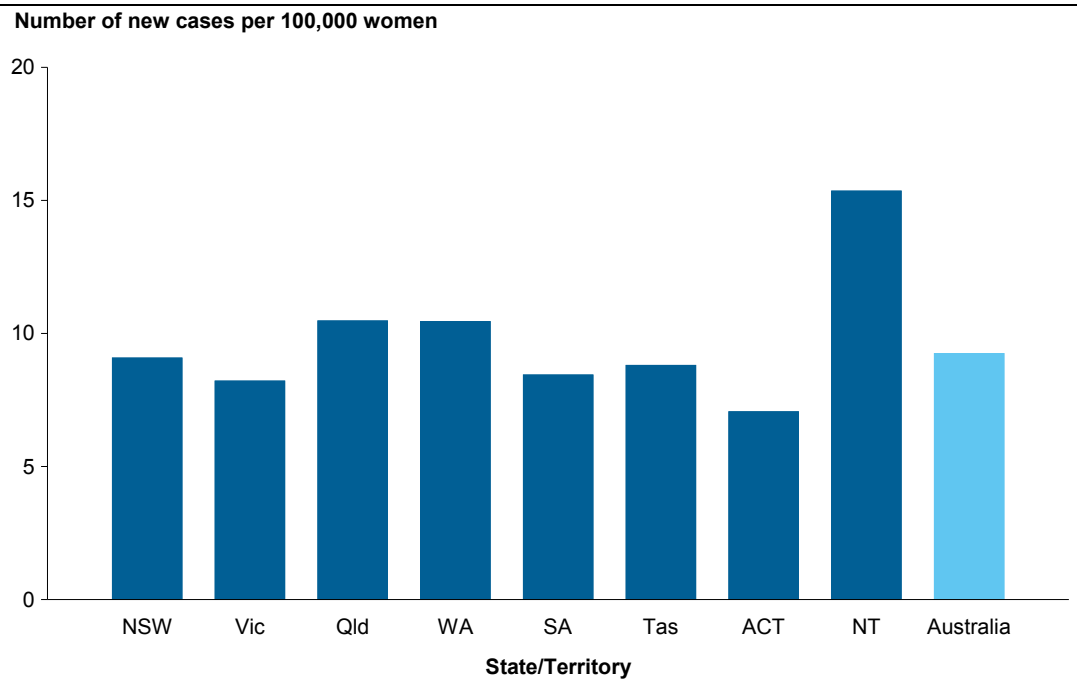
It should be noted that data for the least-populated jurisdictions are open to variation due to smaller numbers, even with 5 years of data combined.

Table 6.5: Incidence of cervical cancer in women aged 20–69, by state and territory, 2006–2010

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
New cases	1,018	701	706	360	212	69	41	52	3,159
AS rate	9.1	8.2	10.5	10.4	8.4	8.8	7.1	15.4	9.2
95% CI	8.5–9.6	7.6–8.8	9.7–11.3	9.4–11.6	7.3–9.7	6.8–11.2	5.0–9.5	11.4–20.2	8.9–9.6

Note: Age-standardised (AS) rate is the number of new cases of cervical cancer per 100,000 women age-standardised to the Australian population at 30 June 2001. 95% CI are 95% confidence intervals.

Source: AIHW Australian Cancer Database.



Notes

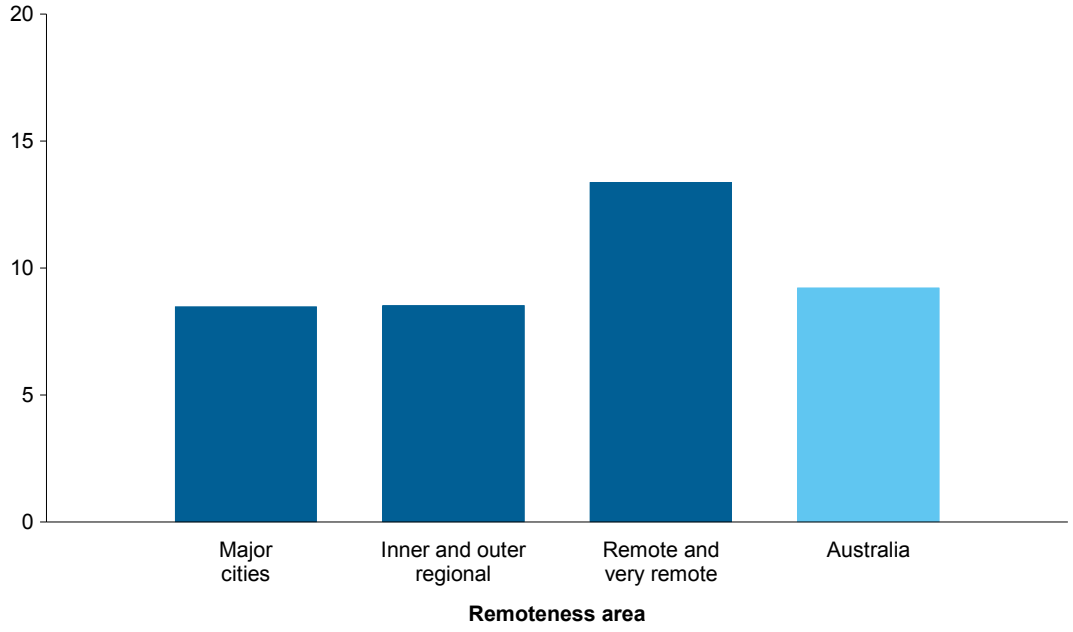
1. Rates age-standardised to the Australian population as at 30 June 2001.
2. 95% confidence intervals are shown in Table 6.5.

Source: AIHW Australian Cancer Database.

Figure 6.5: Incidence of cervical cancer in women aged 20–69, by state and territory, 2006–2010

Incidence of cervical cancer by location of residence

Incidence of cervical cancer is measured across remoteness areas and socioeconomic status of location of residence to assess any apparent differences. To increase the robustness and reliability of rates based on small numbers, incidence for *Inner regional* and *Outer regional* areas are reported together, as are *Remote* and *Very remote* areas.



Notes

1. Rates age-standardised to the Australian population as at 30 June 2001.
2. 95% confidence intervals are shown in Table 6.6.

Source: AIHW Australian Cancer Database.

Figure 6.6: Incidence of cervical cancer in women aged 20–69, by remoteness area, 2006–2010

Incidence of cervical cancer in 2006–2010 did not differ between *Major cities* and *Inner and outer regional* areas, these being 8.5 new cases per 100,000 women. Incidence in *Remote and very remote* areas was significantly higher than incidence in *Major cities* and *Inner and Outer regional* areas at 13.4 new cases per 100,000 women (Table 6.6; Figure 6.6).

Table 6.6: Incidence of cervical cancer in women aged 20–69, by remoteness area, 2006–2010

Remoteness area	Major cities	Inner and outer regional	Remote and very remote	Australia
New cases	2,019	811	96	3,159
Rate	8.5	8.5	13.4	9.2
95% CI	8.1–8.8	7.9–9.1	10.8–16.3	8.9–9.6

Notes

1. Women were allocated to a remoteness area using residential statistical local area (SLA) according to the 2006 Australian Standard Geographic Classifications.
2. Age-standardised (AS) rate is the number of new cases of cervical cancers per 100,000 women age-standardised to the Australian population at 30 June 2001. 95% CI are 95% confidence intervals.

Source: AIHW Australian Cancer Database.

Higher incidence in *Remote and very remote* areas is likely to be related to the proportionately high number of Indigenous women living in these areas, since Indigenous women have more than twice the incidence of cervical cancer (see Figure 6.8 and Table 6.8 below).

Table 6.7: Incidence of cervical cancer in women aged 20–69, by socioeconomic status, 2006–2010

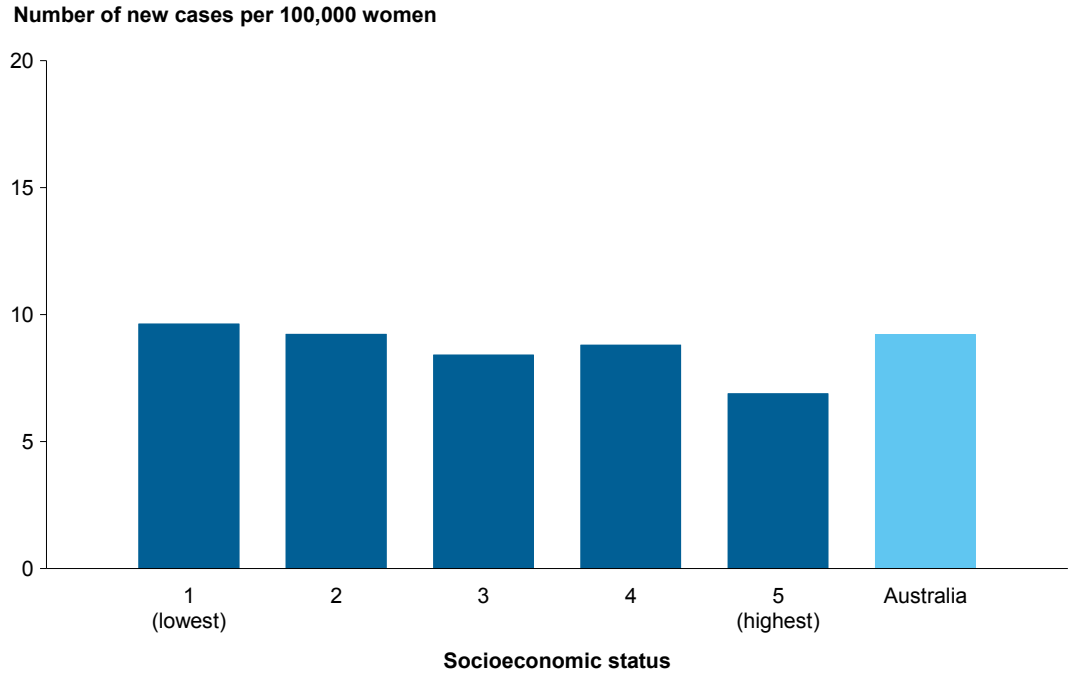
Socioeconomic status	(lowest) 1	2	3	4	(highest) 5	Australia
New cases	634	619	574	606	492	3,159
Rate	9.6	9.2	8.4	8.8	6.9	9.2
95% CI	8.9–10.4	8.5–10.0	7.7–9.1	8.1–9.5	6.3–7.5	8.9–9.6

Notes

1. Women were allocated to a socioeconomic status using residential SLA according to the Australian Bureau of Statistics Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage for 2006.
2. Age-standardised (AS) rate is the number of new cases of cervical cancers per 100,000 women age-standardised to the Australian population at 30 June 2001. 95% CI are 95% confidence intervals.
3. Australian total may not equal sum of the quintiles due to estimation of SES status variable.

Source: AIHW Australian Cancer Database.

In 2006–2010, incidence was found to decrease with increasing socioeconomic status of residence, from 9.6 new cases per 100,000 women for women residing in areas of lowest socioeconomic status to 6.9 new cases per 100,000 women for women residing in areas of highest socioeconomic status (Table 6.7, Figure 6.7).



Notes

1. Rates age-standardised to the Australian population as at 30 June 2001.
2. 95% confidence intervals are shown in Table 6.7.

Source: AIHW Australian Cancer Database.

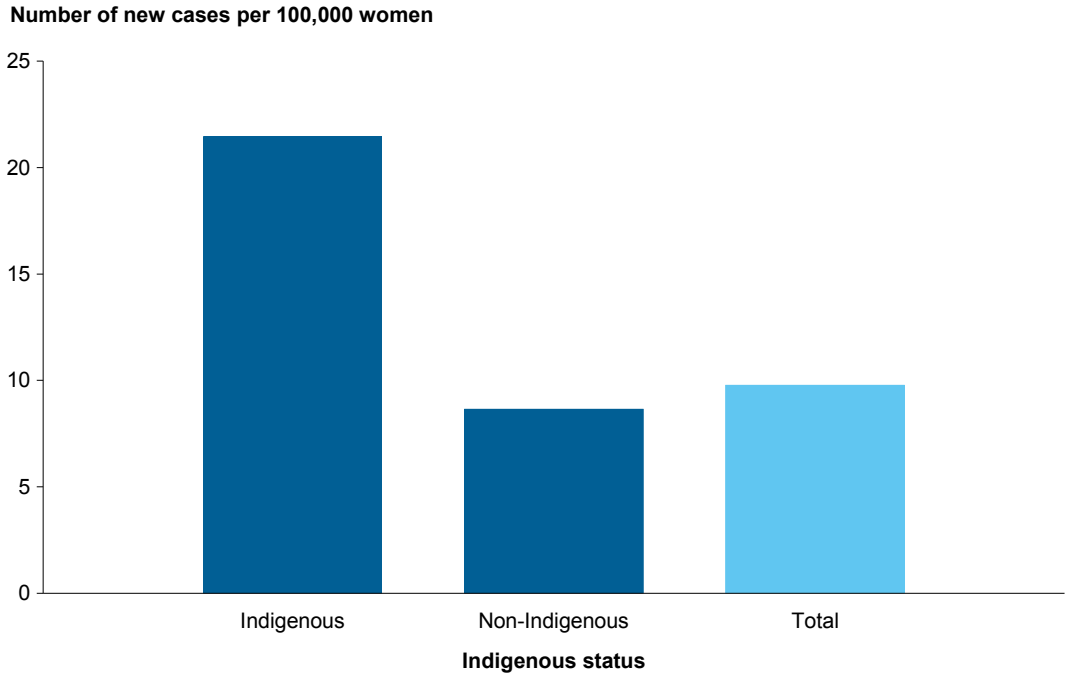
Figure 6.7: Incidence of cervical cancer in women aged 20–69, by socioeconomic status, 2006–2010

Incidence of cervical cancer by Indigenous status

The collection of reliable information by the state and territory cancer registries on the Indigenous status of individuals diagnosed with cancer is problematic, since primary cancer diagnosis information is sourced from pathology forms that do not have the capacity to record this information. The registries collect this information from additional sources such as hospital records and death records, which affect the completeness and correctness of these data.

This means that reliable national data on the incidence of cancer for Aboriginal and Torres Strait Islander Australians are not available, because in some jurisdictions the level of identification of Indigenous status is not considered sufficient to enable analysis. In this report, data for 4 states and territories—New South Wales, Queensland, Western Australia and the Northern Territory—are considered of sufficient quality, and were used to examine the incidence of cervical cancer by Indigenous status. While the majority (around 85%) of Australian Aboriginal and Torres Strait Islander people reside in these 4 jurisdictions (ABS 2009), the degree to which data for these jurisdictions are representative of all Aboriginal and Torres Strait Islander people is unknown.

Note that incidence by Indigenous status is presented for 2005–2009 rather than 2006–2010 due to the projection of 2010 data for NSW and the ACT in the 2010 Australian Cancer Database (ACD) (see Appendix C for further information).



Notes

1. Rates age-standardised to the Australian population as at 30 June 2001.
2. 95% confidence intervals are shown in Table 6.8.

Source: AIHW Australian Cancer Database.

Figure 6.8: Incidence of cervical cancer in women aged 20–69 (New South Wales, Queensland, Western Australia, and Northern Territory), by Indigenous status, 2005–2009

It was found that, over the 5-year period 2005–2009, Aboriginal and Torres Strait Islander women aged 20–69 in New South Wales, Queensland, Western Australia and the Northern Territory had a significantly higher incidence rate of cervical cancer when compared with non-Indigenous women (21.4 new cases compared with 8.6 new cases per 100,000 women respectively) (Table 6.8; Figure 6.8).

Table 6.8: Incidence of cervical cancer in women aged 20–69 (New South Wales, Queensland, Western Australia, and Northern Territory), by Indigenous status, 2005–2009

	New South Wales, Queensland, Western Australia, and the Northern Territory[a]		
	Aboriginal and Torres Strait Islander	Non-Indigenous	Total[b]
New cases	109	1,800	2,079
Crude rate	19.1	8.6	9.7
AS rate	21.4	8.6	9.8
95% CI	17.5–26.0	8.2–9.0	9.3–10.2

(a) Data shown for 'Aboriginal and Torres Strait Islander', 'Non-Indigenous' and 'Total' are for New South Wales, Queensland, Western Australia and the Northern Territory only; data from these jurisdictions were considered to have adequate levels of Indigenous identification in cancer registration data at the time this report was prepared.

(b) Total includes those whose Indigenous status is not stated.

Notes

1. Crude rate is the number of new cases of cervical cancer per 100,000 women; age-standardised (AS) rates are the number of cervical cancers detected per 100,000 women age-standardised to the Australian population at 30 June 2001. 95% CI are 95% confidence intervals.
2. Some states and territories use an imputation method for determining Indigenous cancers, which may lead to differences between these data and those shown in jurisdictional cancer incidence reports.

Source: Australian Cancer Database, AIHW.

Indicator 7 Mortality

What you need to know about mortality

Definition: The number of deaths from cervical cancer per 100,000 estimated resident female population in a 12-month period.

Rationale: The National Cervical Screening Program (NCSP) aims to reduce mortality from cervical cancer.

Guide to interpretation: These data include mortality from all cervical cancers, whether or not they were detected through the NCSP.

Mortality from cervical cancer by state and territory, remoteness area, socioeconomic status and Indigenous status is reported over a 5-year period to improve the stability and comparability of rates due to the small number of deaths in less populated areas and in Aboriginal and Torres Strait Islander women.

The AIHW National Mortality Database is the source of cervical cancer mortality data.

The most recent cervical cancer mortality data are for deaths in 2011.

What the data tell us about mortality

Trend

Mortality from cervical cancer in women aged 20–69, after halving from 4.0 deaths per 100,000 women in 1991, has remained at around 2 deaths per 100,000 from 2002–2011.

The **recent trend** is therefore very stable, with no real change since 2002.

2011

In 2011 there were 152 deaths from cervical cancer in women aged 20–69, the target population of the NCSP, which equates to 2.0 deaths per 100,000 women (age-standardised). There were 229 deaths, or 1.8 deaths per 100,000 women (age-standardised) in women of all ages.

Latest 5-year data (2007–2011)

In 2007–2011, mortality where cervical cancer was the underlying cause was significantly higher in Aboriginal and Torres Strait Islander women (9.0 deaths per 100,000) from New South Wales, Queensland, Western Australia, South Australia and the Northern Territory compared with non-Indigenous women (1.9 deaths per 100,000) from these states and territories.

More information about mortality

Mortality statistics are one of the most comprehensively collected national data sets. Registration of death is a legal requirement in Australia and, as a result, the data set is considered to have high coverage and completeness. Registration of deaths is the responsibility of the Registrar of Births, Deaths and Marriages in each state and territory. The mortality data used here were provided by the Registries of Births, Deaths and Marriages and the National Coronial Information System and coded by the ABS. These data are maintained at the AIHW in the National Mortality Database.

Mortality from cervical cancer measures the number of deaths each year for which cervical cancer was the underlying cause of death. Analyses are based on the year of death, except for 2011 (the latest year for which mortality data are available), which is based on the year of registration of death. Note that about 5% of deaths are not registered until the year following the death (ABS 2012). Further, as noted in Appendix C, deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.

Detailed analyses

Mortality from cervical cancer in 2011

In 2011, there were 229 deaths from cervical cancer in Australian women. This is equivalent to 2.0 deaths for every 100,000 women in the population. When age-standardised to allow analysis of trends and differentials, this equates to a mortality rate of 1.8 for 2011.

Of the 229 deaths, 152 were in women aged 20–69, the target population of the NCSP. These deaths represented 66.4% of all cervical cancer deaths in that year, and 2.0 deaths for every 100,000 women (age-standardised).

The risk of dying from cervical cancer in 2011 was 1 in 717 by age 75 and 1 in 523 by age 85 (AIHW 2014).

Mortality from cervical cancer trends

Mortality from cervical cancer decreased over time.

This decrease was evident prior to the introduction of the NCSP in 1991, being 5.5 deaths per 100,000 women in 1982 and 4.8 deaths per 100,000 women in 1990. With opportunistic cervical screening occurring in Australia since the 1960s, some decreases in mortality are to be expected prior to the commencement of the NCSP.

Mortality halved between 1991 and 2010, from 4.0 to 2.0 deaths per 100,000 women for women aged 20–69. This historic low of 2 deaths per 100,000 women has been stable since 2002 (Figure 7.1; Table 7.1). The decrease in this rate was accompanied by a decrease in the number of deaths from 204 in 1991 to 152 in 2011 for women aged 20–69 (Table 7.1).

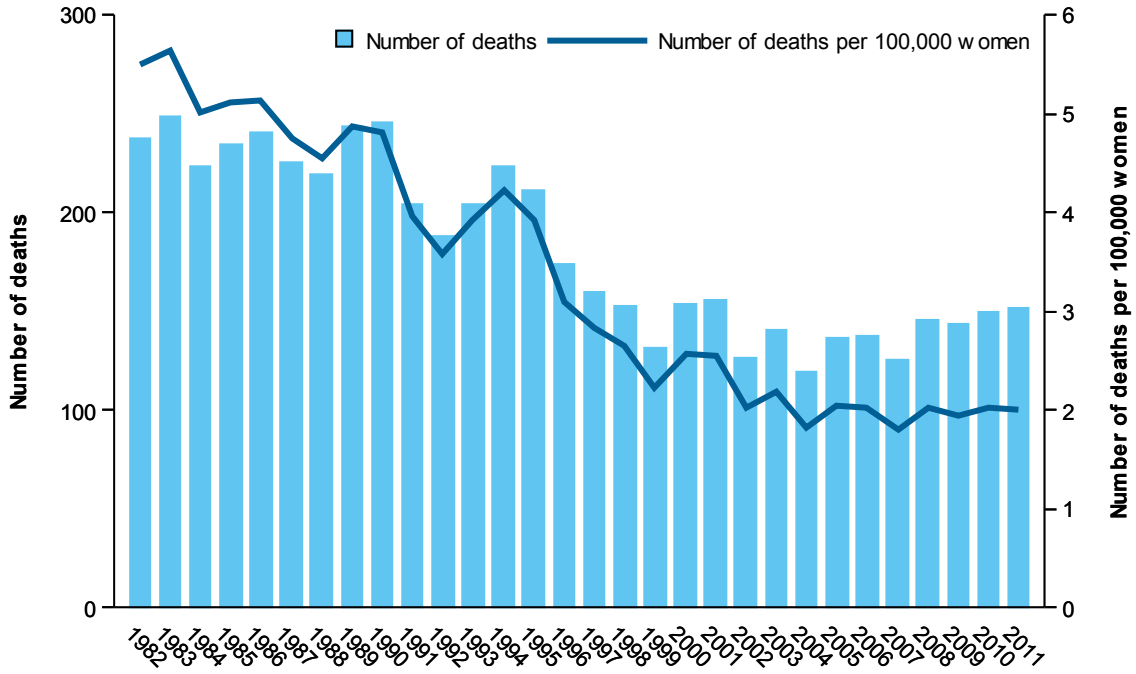
Table 7.1: Mortality from cervical cancer, 1982–2011

	Deaths		AS rate	
Year	20–69	All ages	20–69	All ages
1982	237	346	5.5	5.2
1983	248	343	5.6	5.0
1984	223	339	5.0	4.9
1985	234	363	5.1	5.1
1986	240	341	5.1	4.6
1987	225	348	4.8	4.6
1988	219	345	4.5	4.5
1989	243	369	4.9	4.7
1990	245	339	4.8	4.2
1991	204	331	4.0	4.0
1992	188	322	3.6	3.8
1993	204	318	3.9	3.7
1994	223	341	4.2	4.0
1995	211	334	3.9	3.8
1996	174	301	3.1	3.3
1997	160	285	2.8	3.0
1998	153	260	2.6	2.7
1999	131	227	2.2	2.3
2000	154	265	2.6	2.6
2001	156	271	2.5	2.6
2002	126	217	2.0	2.1
2003	140	239	2.2	2.2
2004	119	210	1.8	1.9
2005	136	221	2.0	2.0
2006	137	228	2.0	2.0
2007	125	201	1.8	1.7
2008	145	237	2.0	2.0
2009	143	241	1.9	1.9
2010	150	229	2.0	1.9
2011	152	229	2.0	1.8

Notes

1. Deaths from 1982–2010 were derived by year of death; deaths in 2011 were derived by year of registration of death. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
2. Age-standardised (AS) rate is number of deaths from cervical cancer per 100,000 women age-standardised to the Australian population at 30 June 2001.

Source: AIHW National Mortality Database.



Notes:

1. Deaths from 1982–2010 were derived by year of death; deaths in 2011 were derived by year of registration of death. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
2. Rates age-standardised to the Australian population as at 30 June 2001.

Source: AIHW National Mortality Database.

Figure 7.1: Mortality from cervical cancer in women aged 20–69, 1982–2011

Mortality from cervical cancer by age

In 2011, analysis of 5-year age groups revealed that mortality increased with age, from less than 1 death per 100,000 women for those aged under the age of 35 to 10.6 deaths per 100,000 women for those aged 85 and over. Within the target age group (20–69 years), women aged 60–64 had the highest number of deaths at 29, and the highest mortality rate at 4.7 deaths per 100,000 women (Table 7.2).

Table 7.2: Mortality from cervical cancer by age, 2011

	Age group (years)									
	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69
Deaths	n.p.	n.p.	5	15	18	20	14	27	29	19
Crude rate	n.p.	n.p.	0.7	1.9	2.2	2.6	1.9	4.0	4.7	4.0

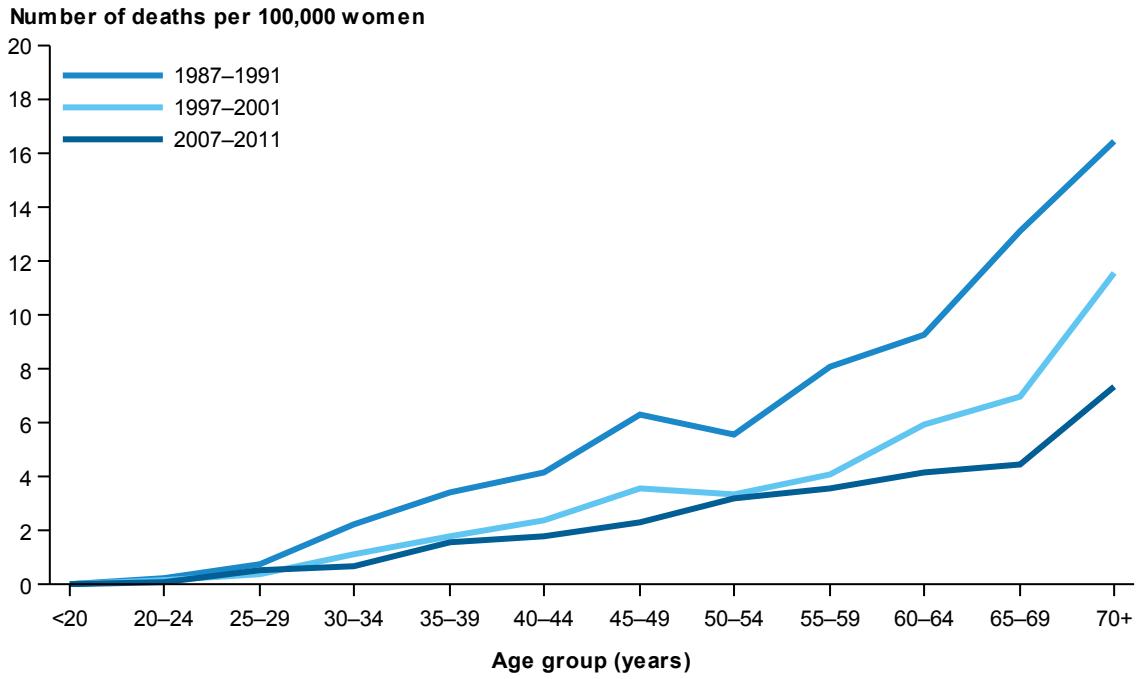
Notes

1. Deaths in 2011 were derived using year of registration. Deaths registered in 2011 are based on the preliminary version of cause of death data and are subject to further revision by the ABS.
2. Crude rate is the number of deaths from cervical cancer per 100,000 women; age-specific rates based on less than 20 deaths should be interpreted with caution.

Source: AIHW National Mortality Database.

To stabilise rate comparisons over time, age-specific mortality rates in cervical cancer are presented over a 5-year period. The trend shows that mortality from cervical cancer has decreased across all age groups from 1987–1991 (prior to the introduction of the NCSP) to

1997–2001 (just after its introduction), with the trend continuing through to 2007–2011 (Figure 7.2).



Notes:

1. Deaths from1987–2010 were derived by year of death; deaths in 2011 were derived by year of registration of death. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
2. Rates age-standardised to the Australian population as at 30 June 2001.

Source: AIHW National Mortality Database.

Figure 7.2: Mortality from cervical cancer by age, 1987–1991, 1997–2001 and 2007–2011

Mortality from cervical cancer by state and territory

In 2007–2011, the mortality rate from cervical cancer for women aged 20–69 across the states and territories were relatively similar to the national rate of 2.0 deaths per 100,000 women (Table 7.3 and Figure 7.3).

Table 7.3: Mortality from cervical cancer in women aged 20–69, by state and territory, 2007–2011

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Deaths	241	142	165	78	49	18	12	10	715
AS rate	2.0	1.6	2.3	2.2	1.8	2.1	2.1	3.1	2.0
95% CI	1.8–2.3	1.3–1.9	1.9–2.6	1.7–2.7	1.3–2.4	1.2–3.3	1.1–3.7	1.4–5.8	1.8–2.1

Notes

1. Deaths between 2007 and 2010 are derived from year of death; deaths in 2011 are derived from year of registration. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
2. Age-standardised (AS) rate is the number of deaths from cervical cancer per 100,000 women, age-standardised to the Australian population at 30 June 2001; rates based on less than 20 deaths should be interpreted with caution. 95% CI are 95% confidence intervals.

Source: AIHW National Mortality Database.

Notes

1. Deaths from 2007–2010 were derived by year of death; deaths in 2011 were derived by year of registration of death. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. 95% confidence intervals are shown in Table 7.3.

Source: AIHW National Mortality Database.

Figure 7.3: Mortality from cervical cancer in women aged 20–69, by state and territory, 2007–2011

Mortality from cervical cancer by location of residence

Mortality from cervical cancer is measured across remoteness areas and socioeconomic status of location of residence. Due to small numbers, mortality from *Inner regional* and *Outer regional* areas are reported together, as are *Remote* and *Very remote* areas.

Mortality in *Major cities* was similar to that in *Inner and outer regional* areas (1.9 and 2.0 deaths per 100,000 women, respectively), whereas mortality in *Remote and very remote* areas was higher at 3.7 deaths per 100,000 women (Table 7.4; Figure 7.4).

Similar to incidence, higher mortality in *Remote and very remote* areas is likely be related to the proportionately high number of Indigenous women living in these areas, since Indigenous women experience greater mortality from cervical cancer (see Figure 7.6 and Table 7.6 below).

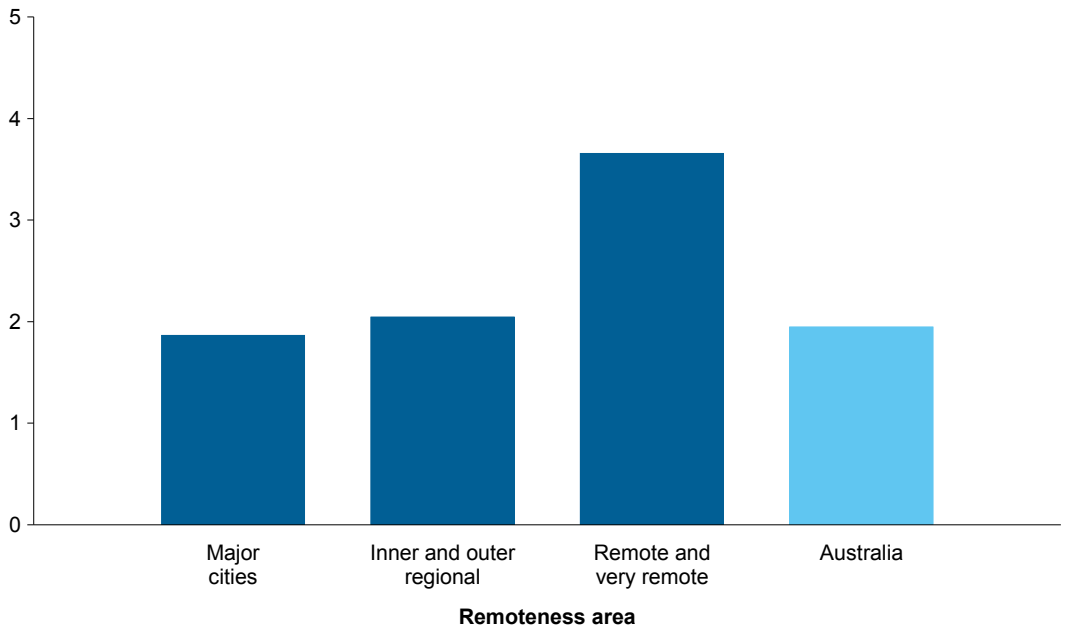
Table 7.4: Mortality from cervical cancer in women aged 20–69, by remoteness area, 2007–2011

Remoteness area	Major cities	Inner and outer regional	Remote and very remote	Australia
Deaths	463	222	27	715
AS rate	1.9	2.0	3.7	2.0
95% CI	1.7–2.0	1.8–2.3	2.4–5.3	1.8–2.1

Notes

1. Women were allocated to a remoteness area using residential statistical local area (SLA) according to the Australian Standard Geographic Classification for 2007–2010 and using residential statistical area level 2 (SA2) according to the Australian Statistical Geography Standard for 2011.
2. Deaths from 2007–2010 are derived from year of death; deaths in 2011 are derived from year of registration. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
3. Age-standardised (AS) rate is the number of deaths from cervical cancers per 100,000 women age-standardised to the Australian population at 30 June 2001. 95% CI are 95% confidence intervals.

Source: AIHW National Mortality Database.



Notes

1. Deaths from 2007–2010 were derived by year of death; deaths in 2011 were derived by year of registration of death. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. 95% confidence intervals are shown in Table 7.4.

Source: AIHW National Mortality Database.

Figure 7.4: Mortality from cervical cancer in women aged 20–69, by remoteness area, 2007–2011

In 2007–2011, mortality was higher in women residing in areas of lowest socioeconomic status (2.8 deaths per 100,000 women) and lower in women residing in areas of highest socioeconomic status (at 1.2 deaths per 100,000 women) (Table 7.5, Figure 7.5).

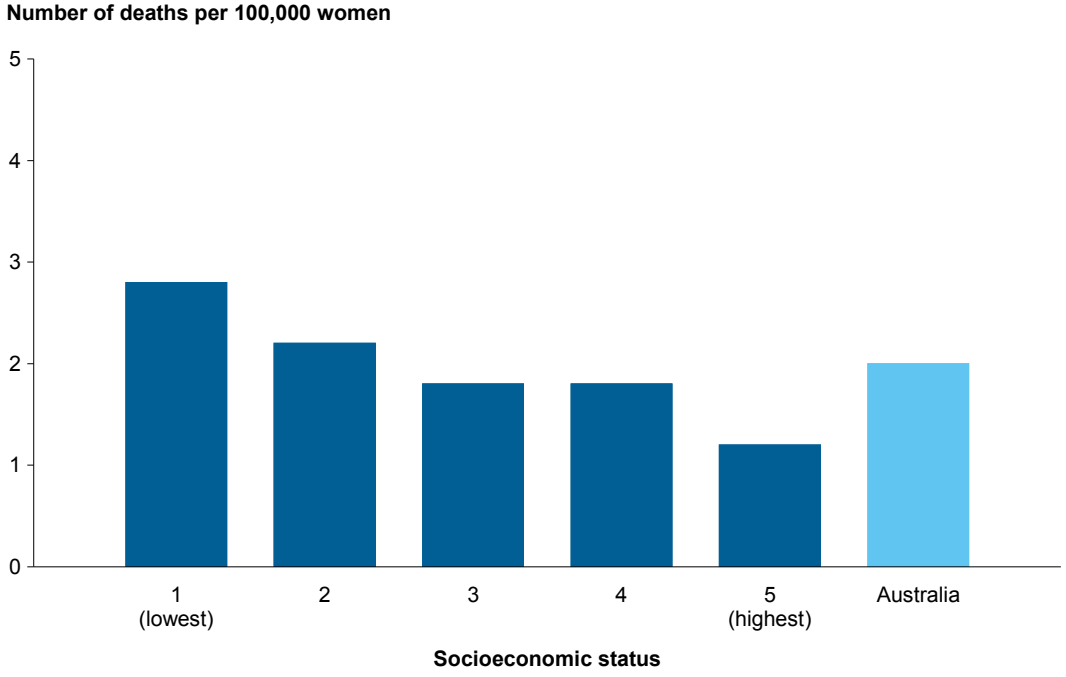
Table 7.5: Mortality from cervical cancer in women aged 20–69, by socioeconomic status, 2007–2011

Socioeconomic status	1 (lowest)	2	3	4	5 (highest)	Australia
Deaths	201	163	131	128	89	715
Rate	2.8	2.2	1.8	1.8	1.2	2.0
95% CI	2.4–3.2	1.9–2.6	1.5–2.2	1.5–2.1	0.9–1.4	1.8–2.1

Notes

1. Women were allocated to a socioeconomic status using residential SLA according to the Australian Bureau of Statistics Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage for 2006.
2. Deaths between 2007 and 2010 are derived from year of death; deaths in 2011 are derived from year of registration. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
3. Age-standardised (AS) rate is the number of deaths due to cervical cancers per 100,000 women age-standardised to the Australian population at 30 June 2001. 95% CI are 95% confidence intervals.

Source: AIHW National Mortality Database.



Notes

1. Deaths from 2007–2010 were derived by year of death; deaths in 2011 were derived by year of registration of death. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. 95% confidence intervals are shown in Table 7.5.

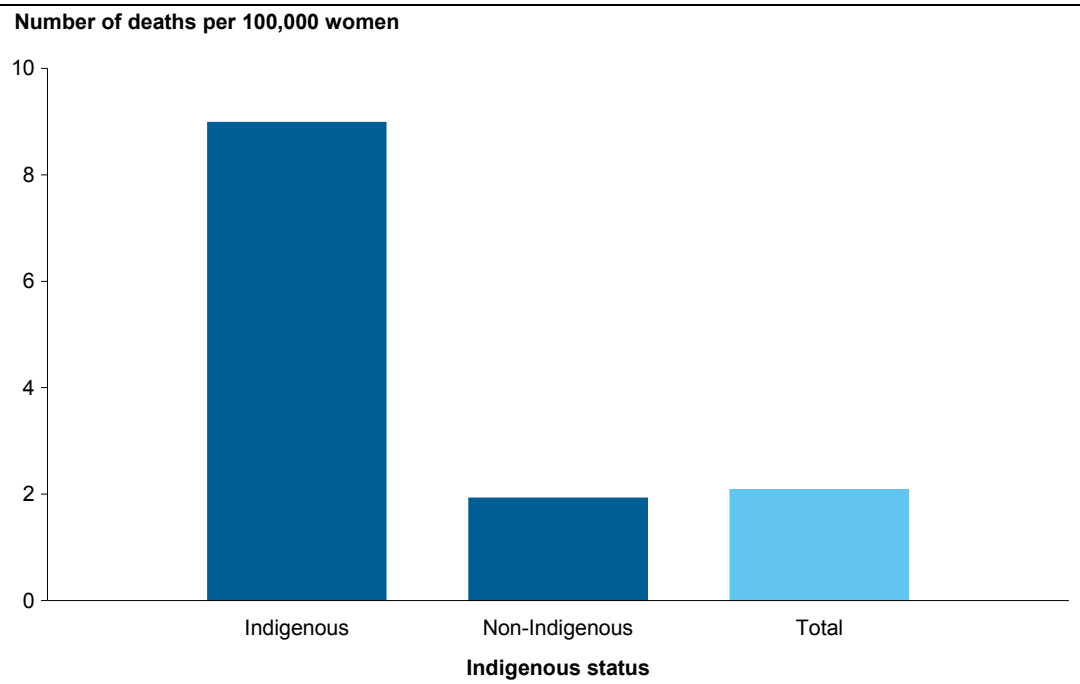
Source: AIHW National Mortality Database.

Figure 7.5: Mortality from cervical cancer in women aged 20–69, by socioeconomic status, 2007–2011

Mortality from cervical cancer for Aboriginal and Torres Strait Islander women

Information on Indigenous status on the AIHW National Mortality Database is considered of sufficient quality for the years 2007–2011 for 5 jurisdictions—New South Wales, Queensland, Western Australia, South Australia and the Northern Territory. The majority (around 90%) of Aboriginal and Torres Strait Islander people reside in these 5 jurisdictions (ABS 2009).

In 2007–2011, the mortality rate from cervical cancer was significantly higher in Aboriginal and Torres Strait Islander women aged 20–69 in New South Wales, Queensland, Western Australia, South Australia and the Northern Territory (9.0 deaths per 100,000 women) compared with non-Indigenous women from these states and territories (1.9 deaths per 100,000 women) (Table 7.6, Figure 7.6). This mirrors the incidence results for Aboriginal and Torres Strait Islander women in Indicator 6.



Notes

1. Deaths from 2007–2010 are derived from year of death; deaths in 2011 are derived from year of registration. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. 95% confidence intervals are shown in Table 7.6.

Source: AIHW National Mortality Database.

Figure 7.6: Mortality from cervical cancer in women aged 20–69 (New South Wales, Queensland, Western Australia, South Australia and Northern Territory), by Indigenous status, 2007–2011

Table 7.6: Mortality from cervical cancer in women aged 20–69 (New South Wales, Queensland, Western Australia, South Australia and Northern Territory), by Indigenous status, 2007–2011

	New South Wales, Queensland, Western Australia, South Australia and the Northern Territory[a]		
	Aboriginal and Torres Strait Islander	Non-Indigenous	Total[b]
Deaths	47	491	543
Crude rate	7.3	2.0	2.2
AS rate	9.0	1.9	2.1
95% CI	6.5–12.1	1.7–2.1	1.9–2.3

(a) Data shown for 'Aboriginal and Torres Strait Islander', 'Non-Indigenous' and 'Total' are for New South Wales, Queensland, Western Australia, South Australia and the Northern Territory only; data from these jurisdictions were considered to have adequate levels of Indigenous identification in cancer mortality data at the time this report was prepared.

(b) Total includes those whose Indigenous status is not stated.

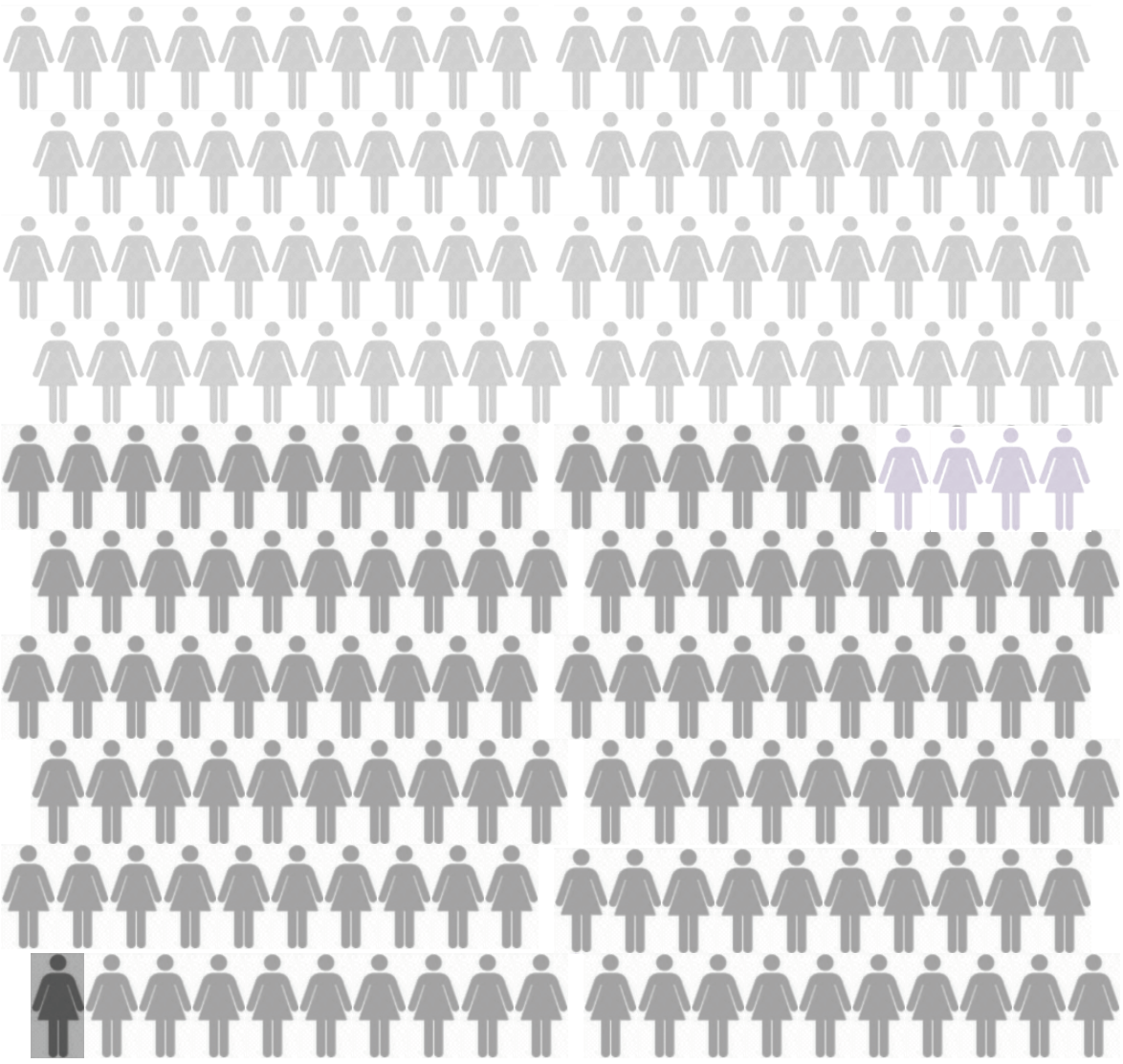
Notes

1. Crude rate is the number of deaths from cervical cancer per 100,000 women; age-standardised (AS) rate is the number of deaths from cervical cancer per 100,000 women age-standardised to the Australian population at 30 June 2001. 95% CI are 95% confidence intervals.
2. Deaths from 2007–2010 are derived from year of death; deaths in 2011 are derived from year of registration. Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS.

Source: AIHW National Mortality Database.

Appendix A Additional data

In Figure A.1, all symbols represent the average of the ABS estimated resident population for women aged 20–69 in 2011–2012, adjusted to include only women with an intact cervix using hysterectomy fractions derived from the AIHW National Hospital Morbidity Database. Darker symbols represent the proportion of women screened in 2011–2012. The single darkest symbol represents the proportion of women with a high-grade abnormality detected by histology.



Source: AIHW analysis of state and territory cervical screening register data.

Figure A1: Women in the National Cervical Screening Program, 2011–2012

Table A1: Data for performance indicators by age (to support figures in report body)

		Age group (years)											
Figure	**Data shown**	<20	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70+
Figure 1.5	2-year participation 2011–2012[(a)]	. .	42.8	52.2	58.2	60.6	61.9	63.9	63.3	61.2	59.5	51.5	. .
Figure 1.5	3-year participation 2010–2012[(a)]	. .	55.4	66.1	72.6	74.8	75.3	76.7	74.7	71.3	68.5	59.1	. .
Figure 1.5	5-year participation 2008–2012[(a)]	. .	75.0	84.6	89.9	90.1	87.8	87.9	83.5	78.8	73.7	66.3	. .
Figure 3.2	Proportion of cytology tests 2012	2.4	8.9	11.5	11.9	11.7	11.9	10.8	10.0	8.2	6.7	4.7	1.3
Figure 3.3	Unsatisfactory cytology 2012[(b)]	2.6	2.5	2.5	2.3	2.1	2.0	1.9	2.0	2.2	2.2	2.1	2.7
Figure 3.4	Negative cytology 2012[(c)]	83.7	84.2	87.5	90.6	92.4	93.5	94.3	95.1	95.5	96.1	96.4	94.7
Figure 3.5	No endocervical component 2012[(d)]	18.5	18.2	17.8	17.5	17.9	19.7	22.2	24.8	28.1	31.4	34.1	37.5
Figure 3.6	Low-grade abnormalities detected by cytology 2012[(e)]	11.6	10.6	7.1	5.1	3.9	3.6	3.1	2.4	1.8	1.3	1.3	1.6
Figure 3.6	High-grade abnormalities detected by cytology 2012[(f)]	1.4	2.7	3.1	2.2	1.5	1.1	0.7	0.6	0.5	0.4	0.4	0.9
Figure 4.1	Proportion of histology tests 2012	1.5	11.8	16.5	13.3	11.9	12.1	11.0	8.1	4.9	3.6	2.5	2.6
Figure 4.2	Histology tests per 100 cytology tests 2012	2.2	4.9	5.5	4.3	3.7	3.9	3.8	3.1	2.3	2.1	2.2	7.7
Figure 4.3	Negative histology 2012[(g)]	29.0	25.1	25.0	31.7	44.2	59.5	69.7	74.5	74.7	74.6	78.0	77.4
Figure 4.4	Low-grade abnormalities detected by histology 2012[(h)]	36.4	31.6	24.4	22.7	19.8	15.7	12.9	10.1	9.2	7.9	6.3	3.2
Figure 4.4	High-grade abnormalities detected by histology 2012[(i)]	32.5	41.9	49.1	43.3	32.6	20.7	12.7	9.6	8.8	9.1	6.4	4.0
Figure 4.6	CIN II detected by histology 2012	17.9	19.8	18.3	15.1	10.9	7.1	4.0	3.4	3.0	2.6	1.8	1.3
Figure 4.6	CIN III detected by histology 2012	9.9	18.5	26.3	24.1	17.8	10.2	6.4	4.3	4.0	4.2	4.0	1.9

(a) Number of women participating as a percentage of the population, adjusted to include only women with an intact cervix.

(b) Number of unsatisfactory cytology tests as a percentage of all cytology tests.

(c) Number of negative cytology tests as a percentage of all cytology tests.

(d) Number of cytology tests with no endocervical component as a percentage of all cytology tests.

(e) Number of low-grade (S2, S3 and E2) cytology tests as a percentage of all cytology tests.

(f) Number of high-grade (S4, S5, S6, E3, E4 and E5) cytology tests as a percentage of all cytology tests.

(g) Number of negative histology tests as a percentage of all histology tests.

(h) Number of low-grade (HS02 and HE02) histology tests as a percentage of all cytology tests.

(i) Number of high-grade (HS03 and HE03) histology tests as a percentage of all cytology tests.

Source: AIHW analysis of state and territory cervical screening register data.

Appendix B National Cervical Screening Program information

Table B1: Contacts and links for the state and territory and Australian Government components of the National Cervical Screening Program

NSW Cervical Screening Program	
Tel: (02) 8374 5757 Fax: (02) 8374 5700 Email: cervicalscreening@cancerinstitute.org.au	<http://www.csp.nsw.gov.au/>
PapScreen Victoria	
Tel: (03) 9635 5000 Fax: (03) 9635 5360 Email: papscreen@cancervic.org.au	<http://www.papscreen.org.au>
Qld Cervical Screening Program	
Tel: (07) 3328 9467 Fax: (07) 3328 9487 Email: cssb@health.gov.au	<http://www.health.qld.gov.au/cervicalscreening/>
WA Cervical Cancer Prevention Program	
Tel: (08) 9323 6788 Fax: (08) 9323 6711 Email: cervicalcancer@health.wa.gov.au	<http://www.health.wa.gov.au/cervical/home/>
SA Cervix Screening Program	
Tel: (08) 8226 8181 Fax: (08) 8226 8190 Email: cervixscreening@health.sa.gov.au	<http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+information/health+information+for+the+consumer/pap+smears>
Tasmanian Cervical Cancer Prevention Program	
Tel: (03) 6216 4300 Fax: (03) 6216 4308 Email: canscreen@dhhs.tas.gov.au	<http://www.dhhs.tas.gov.au/cancerscreening/cervical_screening_register>
ACT Cervical Screening Program	
Tel: (02) 6205 1545 Fax: (02) 6205 5035 Email: pap.register@act.gov.au	<http://www.health.act.gov.au/paptest>
Cervical Screen NT	
Tel: (08) 8922 6444 Fax: (08) 8922 6455 Email: wcpp.ths@nt.gov.au	<http://www.health.nt.gov.au/Womens_Health/Well_Womens_Cancer_Screening/index.aspx>
Australian Government Department of Health	
cancerscreening@health.gov.au	<http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/cervical-about>
Australian Institute of Health and Welfare	
screening@aihw.gov.au	<http://www.aihw.gov.au/cervical-cancer-screening/>

Appendix C Data sources and classifications

Data sources

Data used in this report are derived from multiple sources and are summarised below. All data are based on calendar years.

Table C1: Data sources for performance indicators in the *Cervical screening in Australia* report series

Indicator	Description	Data source
1	Participation in cervical screening	State and territory cervical screening registers
2	Rescreening	State and territory cervical screening registers
3	Cytology	State and territory cervical screening registers
4	Histology	State and territory cervical screening registers
5	Cytology-histology correlation	State and territory cervical screening registers
6	Incidence of cervical cancer	Australian Cancer Database, AIHW
7	Mortality from cervical cancer	National Mortality Database, AIHW

National Cervical Screening Program data

The National Cervical Screening Program (NCSP) has both national and state and territory components. Although policy is usually decided at a national level, coordination of screening activity is the responsibility of the individual state or territory. Data for participation, rescreening, cytology, histology and the cytology-histology correlation are sourced from the cervical screening register in each state and territory and then compiled into national figures to allow national monitoring of the NCSP. These data include all women screened in each jurisdiction, except for Victoria and the Australian Capital Territory, for which immediate border residents are also included.

See data quality statement for cervical screening data in Appendix D for further information.

Incidence data

Incidence data in this report come from the Australian Cancer Database (ACD, formerly the National Cancer Statistics Clearing House), a national collection of cancer statistics held and operated by the Australian Institute of Health and Welfare (AIHW). The ACD receives data from individual state and territory cancer registries on cancers diagnosed in residents of Australia and produces reports on national incidence.

The Data Quality Statement for the 2010 ACD can be found on the AIHW website at <http://meteor.aihw.gov.au/content/index.phtml/itemId/500417>.

Data have been analysed using the year of diagnosis of cancer. This is a more accurate reflection of incidence during a particular year than year of registration data.

Mortality data

Mortality data in this report come from the AIHW National Mortality Database, which is a national collection of de-identified information for all deaths in Australia. Information on the characteristics and causes of death of the deceased is provided by the Registrars of Births, Deaths and Marriages and the National Coronial Information System and coded by the Australian Bureau of Statistics (ABS). Information on the cause of death is supplied by the medical practitioner certifying the death, or by a coroner. The data are updated each calendar year.

The Data Quality Statement for the AIHW National Mortality Database can be found on the AIHW website at < http://meteor.aihw.gov.au/content/index.phtml/itemId/500078>.

Analyses are based on the year of death, except for 2011 (the latest year for which mortality data are available), which is based on year of registration of death. Note that about 5% of deaths are not registered until the year following the death (ABS 2012).

Deaths registered in 2009 and earlier are based on the final version of cause of death data; deaths registered in 2010 and 2011 are based on revised and preliminary versions, respectively and are subject to further revision by the ABS. For more information about revisions to mortality data, refer to ABS (2012) Causes of death 2010 (Catalogue number 3303.0).

Population data

The ABS estimated resident female population was used to calculate participation, incidence and mortality rates in this report.

Participation rates were calculated using the average of the estimated resident female population for the 2-year, 3-year or 5-year reporting period. Denominators for participation rates were calculated using the average of the ABS estimated resident population for 2011 and 2012 (2-year participation), the average for 2010, 2011 and 2012 (3-year participation) and the average of the ABS estimated resident population for 2008, 2009, 2010, 2011 and 2012 (5-year participation). These average populations were adjusted for the estimated proportion of women who have had a hysterectomy using national hysterectomy fractions derived from the AIHW National Hospital Morbidity Database (NHMD).

There may be some variation in published participation rates because of different sources of estimated resident population data between national reports and state and territory reports. Further, national denominators are adjusted for the estimated proportion of women who have had a hysterectomy using national hysterectomy fractions derived from the AIHW NHMD, whereas state and territory reports may use hysterectomy fractions derived from ABS National Health Surveys, or derived from health surveys conducted in their state or territory which may give more representative figures at the jurisdictional level.

Incidence and mortality rates were calculated using the estimated resident population for single-year calculations, and the aggregate of the estimated resident populations for the five relevant years for five-year calculations.

The age-standardised rates in this publication were calculated using the total estimated resident Australian population at June 2001.

Hysterectomy fractions

Hysterectomy fractions represent the proportion of women with an intact uterus (and cervix) at a particular age, and are the tool used to adjust the population for participation calculations. This is because women who have had a hysterectomy with their cervix removed are not at risk of cervical cancer and thus do not require screening, and since substantial proportions (20–30%) of middle-aged and older women in Australia do not have an intact cervix, the population is adjusted to remove these women so that true participation in cervical screening can be more accurately estimated.

Previously, the AIHW used hysterectomy fractions derived from self-reported information on hysterectomies collected in the 2001 National Health Survey (NHS) conducted by the ABS. However, hysterectomy incidence has fallen since 2001, which means the 2001 NHS hysterectomy fractions no longer allow accurate estimates. Thus the introduction of new performance indicators in the AIHW annual monitoring report, *Cervical screening in Australia 2008–2009* provided an appropriate opportunity to update the method by which hysterectomy fractions were estimated.

The National Hospital Morbidity Database (NHMD) is based on summary records of patient separations, referring to episodes of care in public and private hospitals, and allows us to view relatively complete hysterectomy numbers and rates for financial years from the mid-1990s. These data were used, with projections forward and backward where required, to generate estimates of current hysterectomy prevalence for women aged 20–69. Published hysterectomy incidence trends as well as data from the 1995, 2001 and 2004–05 NHS were drawn on to ensure accuracy in assumptions.

The results of these combined approaches are robust hysterectomy fractions that reflect both historical and current hysterectomy trends, which can be used in the calculation of participation in cervical screening for the most recent participation data.

The fractions themselves are similar to previous estimates taken from population health surveys with the proportion of women with an intact cervix remaining comparatively higher in most age groups—a reflection of the national trend of decreasing incidence of hysterectomies over time. These are shown next to the previously adopted hysterectomy fractions based on the 2001 NHS in Table C2, below.

Table C2: National hysterectomy fractions, 2011

	Percentage of women who have not had a hysterectomy	
Age group (years)	Derived from NHS 2001	Modelled on NHMD
20–24	100.0	100.0
25–29	100.0	99.7
30–34	98.9	98.8
35–39	95.6	96.2
40–44	90.6	91.6
45–49	82.5	85.9
50–54	76.5	81.0
55–59	66.2	77.2
60–64	68.9	73.6
65–69	66.8	70.6

Source: AIHW analysis of the National Hospital Morbidity Database.

The incorporation of these new hysterectomy fractions, based on lower prevalence of hysterectomy procedures, into cervical screening participation calculations results in a slight decrease in the participation rate, as would be expected, since the population at risk (and therefore eligible for cervical screening) is larger.

Classifications

Age

The data in this report are stratified by the age of the woman at the time of the specified test (for the screening data), at the time of diagnosis (for the cancer incidence data) or at the time of death (for the cancer mortality data).

State or territory

The state or territory reported is the one where screening took place (for the screening data), where the diagnosis was made (for the cancer incidence data) or the place of usual residence (for the cancer mortality data).

This means that it is possible for a woman to be double-counted in the screening data. If she was screened in one jurisdiction and then screened again less than 2 years later in another jurisdiction, both screens may be included in participation. This should, however, have a negligible effect on the reported participation.

Remoteness area

Remoteness areas are classified according to the ABS's Australian Statistical Geography Standard (ASGS) for 2011 and/or the Australian Standard Geographic Classification (ASGC) for 2006. Both remoteness structures group geographic areas into six categories. These categories, called Remoteness Areas (RAs), are listed in the table below (Table C3) (the sixth 'migratory' area is not used in this report).

Table C3: Remoteness areas for the ASGS and ASGC

Remoteness area
Major cities of Australia
Inner regional Australia
Outer regional Australia
Remote Australia
Very remote Australia
Migratory

For participation, women were allocated to a remoteness area using their residential postcode supplied at the time of screening. Caution is required when examining differences across remoteness areas. First, postcodes used to allocate women may not represent their location of residence. Second, because these are based on the 2011 census, the accuracy of remoteness area classifications diminishes due to subsequent changes in demographics. Third, some postcodes (and hence women) are unable to be allocated to a remoteness area.

For new cases and deaths, women were allocated to a remoteness area based on their assigned statistical local area or statistical area level 2.

Socioeconomic status

Socioeconomic status classifications are based on the ABS Index of Relative Socioeconomic Disadvantage (ABS 2008). Postal areas are assigned a score based on attributes such as low income, low educational attainment, high unemployment and jobs in relatively unskilled

occupations. The score does not refer to the socioeconomic situation of a particular individual but instead refers to the postal area in which a person lives. A low score means a postal area has many low-income families, people with little training and high unemployment, and may be considered disadvantaged relative to other areas. Postal areas with high index scores may be considered less disadvantaged relative to other areas.

Socioeconomic status groups based on the level of the index are used for analysis where 1 (lowest) represents the most disadvantaged and 5 (highest) the least disadvantaged.

For participation, women were allocated to a socioeconomic status using their residential postcode supplied at the time of screening. Caution is required when examining differences across socioeconomic status for several reasons. First, postcodes used to allocate women may not represent their location of residence. Second, because these are based on the 2011 census, the accuracy of socioeconomic status classifications diminishes due to subsequent changes in demographics. Third, many postcodes (and hence women) are unable to be allocated to a socioeconomic status group.

For new cases and deaths, women were allocated to a socioeconomic status based on their assigned statistical local area.

Appendix D Data quality statement

Data Quality Statement: Cervical screening data 2011–2012

Summary of key issues

- All states and territories maintain a population-based cervical screening register (also referred to as 'Pap test registers' or 'Pap smear registers') to which all cervical cytology, histology, and human papillomavirus (HPV) DNA tests are reported.
- State and territory cervical screening registers were established to support the National Cervical Screening Program (NCSP) that commenced in 1991.
- The AIHW compiles cervical screening data using aggregate data supplied from state and territory cervical screening registers in order to monitor the NCSP annually.
- Some duplication may occur where the same test is reported to the cervical cytology data in two or more jurisdictions. AIHW is unable to identify or resolve these instances, and the level of duplication is unknown, but believed to be small.
- Cervical screening register databases change every day, adding new records and improving the quality of existing records as new information becomes available.

Description

All states and territories have legislation that requires pathology laboratories to send all cervical tests to the relevant state or territory population-based cervical screening register.

Cervical screening programs in each state and territory interrogate their own cervical screening register in accordance with detailed data specifications to supply aggregate data annually to the AIHW. These data are compiled into the only repository of national cervical screening data, although because these are aggregate and not unit record data, these data do not exist in a database *per se*, and cannot be interrogated further.

Any Pap test performed in Australia, unless the woman has opted-off, will be included in NCSP data. This means that NCSP data is a virtually complete repository of all cervical screening performed in Australia.

Institutional environment

The Australian Institute of Health and Welfare (AIHW) is a major national agency set up by the Australian Government under the *Australian Institute of Health and Welfare Act* 1987 to provide reliable, regular and relevant information and statistics on Australia's health and welfare. It is an independent statutory authority established in 1987, governed by a management Board, and accountable to the Australian Parliament through the Health and Ageing portfolio.

The AIHW aims to improve the health and wellbeing of Australians through better health and welfare information and statistics. It collects and reports information on a wide range of topics and issues, ranging from health and welfare expenditure, hospitals, disease and injury, and mental health, to ageing, homelessness, disability and child protection.

The Institute also plays a role in developing and maintaining national metadata standards. This work contributes to improving the quality and consistency of national health and

welfare statistics. The Institute works closely with governments and non-government organisations to achieve greater adherence to these standards in administrative data collections to promote national consistency and comparability of data and reporting.

One of the main functions of the AIHW is to work with the states and territories to improve the quality of administrative data and, where possible, to compile national datasets based on data from each jurisdiction, to analyse these datasets and disseminate information and statistics.

The *Australian Institute of Health and Welfare Act* 1987, in conjunction with compliance to the *Privacy Act* 1988 (Cwth), ensures that the data collections managed by the AIHW are kept securely and under the strictest conditions with respect to privacy and confidentiality.

For further information see the AIHW website <www.aihw.gov.au>.

The AIHW has been receiving cervical screening data since 1989.

Timeliness

Cervical cytology data are available within about 6 months (there can be a lag of up to 6 months in the transmission of test results from pathology laboratories to cervical screening registers), and data for the previous calendar year are supplied in July each year (rescreening and correlation data lag behind, as the specifications for these require a specified period of time to pass before this can be accurately calculated).

The current cervical screening data are for cervical cytology and histology tests performed in 2011 and 2012.

Accessibility

Cervical screening data are published annually in the report *Cervical screening in Australia*, available on the AIHW website http://www.aihw.gov.au/cervical-cancer-screening/where they can be downloaded without charge. Supplementary data tables that provide more detailed data are also provided to accompany each report, and these, too, are available on the AIHW website where they can be downloaded without charge.

General enquiries about AIHW publications can be made to the Communications, Media and Marketing Unit on (02) 6244 1032 or via email to <info@aihw.gov.au>.

Interpretability

While many concepts in the report Cervical screening in Australia are easy to interpret, other concepts and statistical calculations are more complex and may be confusing to some users. All concepts are explained within the body of the report presenting these data, along with footnotes to provide further details and caveats. Appendix C provides additional detail on the data sources and classifications, and Appendix E provides details on the statistical methods used.

Relevance

Cervical screening data are highly relevant for monitoring trends in cervical screening participation and abnormality detection trends. The data are used for many purposes by policy-makers and researchers, but are supplied and analysed specifically to monitor and inform the NCSP.

Accuracy

All data provided by state and territory cervical screening programs, once analysed, are supplied back for verification.

Further, National Pathology Accreditation Advisory Council (NPAAC) *Performance measures for Australian laboratories reporting cervical cytology* exist which allow some cervical screening data compiled and reported by the AIHW to be compared with data that are also sourced from state and territory cervical screening registers for a different purpose.

Coherence

Cervical screening data are reported and published annually by the AIHW. Changes in reporting practices over time are clearly noted throughout the reports.

Appendix E Statistical methods

Comparisons and tests of statistical significance

This report includes statistical tests of the significance of comparisons of rates between population groups. Any statistical comparison applied to one variable must take account of any other potentially relevant variables. For example, any comparison of participation by state must also take account of differences in the distribution of age and sex between the states. These other variables are known as 'confounding' variables.

Crude rates

A crude rate is defined as the number of events over a specified period of time (for example, a year) divided by the total population. For example, a crude cancer incidence rate is similarly defined as the number of new cases of cancer in a specified period of time divided by the population at risk. Crude mortality rates and cancer incidence rates are expressed in this report as number of deaths or new cases per 100,000 population. Crude participation rate is expressed as a percentage.

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 percentage or a number per 1,000 or 100,000 population. This rate may be calculated for particular age and sex groupings. For example:

Age-specific cervical cancer incidence rate in females aged 50–54 years

= (New cases aged 50–54 over Female population aged 50–54) times 100,000

= (75 over 698,700) times 100,000

= 10.7 per 100,000.

Age-standardised rates (AS rates)

Rates are adjusted for age to facilitate comparisons between populations that have different age structures, for example, between youthful and ageing communities. There are two different methods commonly used to adjust for age. This publication uses direct standardisation, in which the age-specific rates are multiplied by a constant population (the 2001 Australian Standard Population unless otherwise specified). This effectively removes the influence of the age structure on the summary rate.

It important to be aware that for some data presented in this report, indirect age standardisation would be more appropriate due to small numbers (most commonly for the Australian Capital Territory and the Northern Territory), but direct age standardisation has been used for consistency. This can result in relatively large differences between crude and age-standardised rates. In these cases, crude rates should also be considered when interpreting data.

The method used for this calculation comprises that first, the age-specific rate is calculated (as shown above) for each age group. Second, the expected number of cases in each 5-year

age group is calculated by multiplying the age-specific rates by the corresponding standard population and dividing by the appropriate factor (that is, 100,000 for mortality and incidence rates, and 100 for participation). Third, to give the age-standardised rate, the expected number of cases in each group are summed, divided by the total of the standard population and multiplied by the appropriate factor (for example 100,000 for mortality and incidence rate, and 100 for participation).

Confidence intervals

Population numbers for incidence and mortality and screening have a natural level of variability for a single year above and below what might be expected in the mean over many years. The percentage variability is small for large population numbers but high for small numbers such as mortality in a young age group. One measure of the likely difference is that of standard error, which indicates the extent to which a population number might have varied by chance in only 1 year of data. In the 95% confidence interval, there are about 19 chances in 20 that the difference will be less than two standard errors.

There are several methods for calculating confidence intervals. The 95% confidence intervals (CIs) in this report were calculated using a method developed by Dobson et al. (1991). This method calculates approximate confidence intervals for a weighted sum of Poisson parameters.

Interpretation of confidence intervals

Some indicators have a 95% confidence interval presented along with the rates. This is because the observed value of a rate may vary due to chance, even where there is no variation in underlying value of the rate. The 95% confidence interval represents a range (interval) over which variation in the observed rate is consistent with this chance variation. In other words, there is a 95% confidence that the true value of the rate is somewhere within this range.

These confidence intervals can be used as a guide to whether differences in a particular rate are consistent with chance variation. Where the confidence intervals do not overlap, the difference between rates is greater than that which could be explained by chance and is regarded as statistically significant.

It is important to note that overlapping confidence intervals does not imply that the difference between two rates is definitely due to chance. Instead, an overlapping confidence interval represents a difference in rates that is too small to allow differentiation between a real difference and one that is due to chance variation. It can therefore only be stated that no statistically significant differences were found, and not that no differences exist.

The approximate comparisons presented might understate the statistical significance of some differences, but they are sufficiently accurate for the purposes of this report.

As with all statistical comparisons, care should be exercised in interpreting the results of the comparison. If two rates are statistically significantly different from each other, this means that the difference is unlikely to have arisen by chance. Judgment should, however, be exercised in deciding whether or not the difference is of any clinical significance.

Glossary

Aboriginal or Torres Strait Islander: A person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander. See also **Indigenous**.

adenocarcinoma: a carcinoma arising from the glandular cells of the endocervical canal.

adenosquamous carcinoma: a carcinoma made up of **malignant** glandular cells and **malignant** squamous cells.

age-standardised rate: a method of removing the influence of age when comparing populations with different age structures. This is usually necessary because the rates of many diseases vary strongly (usually increasing) with age. The age structures of the different populations are converted to the same 'standard' structure, which allows comparison of disease rates.

atypia: abnormality in a cell (to a lower degree than **dysplasia**).

Australian Standard Geographical Classification (ASGC): Common framework defined by the Australian Bureau of Statistics for collection and dissemination of geographically classified statistics. The ASGC was implemented in 1984 and the final release was in 2011. It has been replaced by the Australian Statistical Geography Standard (ASGS).

Australian Statistical Geography Standard (ASGS): Common framework defined by the Australian Bureau of Statistics for collection and dissemination of geographically classified statistics. The ASGS replaced the Australian Standard Geographical Classification (ASGC) in July 2011.

benign: not **malignant**.

biopsy: small sample of tissue that is taken to obtain a definitive diagnosis of an abnormality.

cancer death: a death where the **underlying cause of death** is indicated as cancer. Persons with cancer who die of other causes are not counted in the **mortality** statistics in this publication.

cancer (malignant neoplasm): a large range of diseases in which some of the body's cells become defective, and begin to multiply out of control. These cells can invade and damage the area around them, and can also spread to other parts of the body to cause further damage.

carcinoma: a cancer of cells forming part of a surface or lining of an organ of the body.

cervical cancer: this term covers all cancers specific to the uterine cervix, including **micro-invasive** cervical cancer. Types of cervical cancers include **squamous cell carcinoma**, **adenocarcinoma** (including mucoepidermoid and adenoid carcinomas), **adenosquamous**, and other and unspecified carcinomas. Other malignant neoplasms of the uterine cervix are also included in the incidence of cervical cancer data.

cervical cytology: Microscope examination of **exfoliated** cervical **epithelial** cells.

cervical screening register: a database that stores **cervical cytology** results and related test results for women in each state and territory of Australia. The term cervical screening register is often used interchangeably with the terms **Pap test** register and **Pap smear** register.

cervical cytology registry: the component of each state and territory cervical screening program that maintains the **cervical screening register**. The term cervical cytology registry is often used interchangeably with the terms **Pap test** registry and **Pap smear** registry.

cervical intraepithelial neoplasia (CIN): squamous cell carcinoma of the cervix is mostly preceded, over a period of years, by a spectrum of asymptomatic abnormalities known as cervical **neoplasia** (CIN) graded as CIN 1 (I) (mild **dysplasia**), CIN 2 (II) (moderate **dysplasia**) and CIN 3 (III) (severe **dysplasia** and carcinoma ***in situ***).

CIN: (see **Cervical intraepithelial neoplasia**).

colposcopy: a detailed examination of the lower genital tract with a magnifying instrument called a colposcope. This method of non-invasive evaluation allows the clinician to more accurately assess a cytological abnormality by focusing on the areas of greatest abnormality and by sampling them with a **biopsy** to obtain a tissue diagnosis.

confidence interval (CI): A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.

cytology: the microscope evaluation of a sample of cells obtained from a tissue (or body fluid). The sample does not permit evaluation of the underlying structure of the tissue of origin (*cf.* **histology**).

dysplasia: abnormal appearance, development or growth patterns of cells.

ectocervix: outer surface of the cervix and its covering epithelium, visible on inspection of the cervix.

endocervix: internal canal of the uterine cervix and its epithelium, not usually visible on inspection of the cervix.

epithelium: tissue lining the outer layer of a body or lining a cavity (for example, vagina or mouth).

exfoliate: to break away or remove (shed) cells. In the context of this report it refers to the removal of cells from a person for the purpose of **cervical cytology**.

high-grade abnormalities: in this report high-grade abnormalities are defined as CIN I/II, CIN II, CIN III (see **CIN)**, endocervical **dysplasia**, and adenocarcinoma ***in situ***.

histology: the microscope study of the minute and detailed structure and composition of tissues.

human papillomavirus (HPV): the virus that causes genital warts and which is linked in some cases to the development of more serious cervical cell abnormalities.

hysterectomy: refers to the surgical procedure whereby all or part of the uterus is removed.

hysterectomy fraction: the proportion of women who have not had their uterus removed by **hysterectomy**.

Indigenous: A person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander. See also **Aboriginal or Torres Strait Islander**.

ICD-10: International Classification of Diseases—a coding system used to identify the primary site of the malignancy. This classification is in its 10th revision.

***in situ*:** a Latin term meaning in place or position; undisturbed.

incidence: the number of new cases (for example, of an illness or event) occurring during a given period.

intact cervix: refers to a cervix that has not been removed by complete hysterectomy.

intraepithelial: the area within the layer of cell tissues forming the epidermis of a body cavity. These cells comprise contiguous cells having minimum intercellular substance.

invasive cancer: a **tumour** whose cells have the potential to spread to nearby healthy or normal tissue or to more distant parts of the body.

low-grade abnormalities: in this report low-grade abnormalities are defined as **atypia**, warty **atypia** (**HPV** effect), possible **CIN**, equivocal **CIN**, and **CIN** 1.

malignant: abnormalities in cells or tissues consistent with **cancer**.

metastasis: the process by which cancerous cells are transferred from one part of the body to another, for example, via the lymphatic system or the bloodstream.

micro-invasive squamous cell carcinoma (micro-invasive cancer): a lesion in which the cancer cells can be visualised with the microscope (only) to have invaded just beyond the tissue layer they arose from, for example, the **epithelium** of the cervix, but they have not yet spread to other layers or tissues.

mortality: see **Cancer death**.

neoplasia: the new and abnormal development of cells that may be harmless (**benign**) or cancerous (**malignant**).

new cancer case: a person who has a new cancer diagnosed for the first time. One person may have more than once cancer and therefore may be counted twice in **incidence** statistics if it is decided that the 2 cancers are not of the same origin. This decision is based on a series of principles set out in more detail in a publication by Jensen et al. (1991).

Pap smear: Pap smear/Pap tests: Papanicolaou smear, a procedure to detect cancer and pre-cancerous conditions of the female genital tract.

remoteness classification: each state and territory is divided into several regions based on their relative accessibility to goods and services (such as general practitioners, hospitals and specialist care) as measured by road distance. These regions are based on the Accessibility/Remoteness Index of Australia (ARIA) and defined as Remoteness Areas by either the Australian Standard Geographical Classification (before 2011) or the Australian Statistical Geographical Standard (from 2011 onwards) in each Census year.

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.

significant difference: where rates are referred to as significantly different, or one rate is deemed significantly higher or lower than another, these differences are statistically significant. Rates are deemed statistically significantly different when their **confidence intervals** do not overlap, since their difference is greater than what could be explained by chance. See 'confidence intervals' in Appendix E for more information.

squamous cells: thin and flat cells, shaped like soft fish scales. They line the outer surface of the cervix (ectocervix). They meet with columnar cells in the squamo-columnar junction. Abnormalities associated with squamous cells are the most likely abnormalities to be picked up by **Pap test**s.

squamous cell carcinoma: a **carcinoma** arising from the **squamous cells** of the cervix.

stroma: the supporting framework of on organ.

The Institute: the Australian Institute of Health and Welfare.

tumour: an abnormal growth of tissue. Can be **benign** (not a cancer) or **malignant** (a cancer).

underlying cause of death: the condition, disease or injury initiating the sequence of events leading directly to death; that is, the primary, chief, main or principal cause.

Note: Terms in **bold** are defined elsewhere in the Glossary.

References

ABS 2012. Deaths, Australia, 2011. Canberra: ABS. Viewed 4 April 2014, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/3302.0>.

ABS 2008. Information Paper: An introduction to Socio-Economic Indexes for Areas (SEIFA) 2006. Canberra: ABS. Viewed 4 April 2014, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/2039.0>.

ABS 2009. Experimental estimates and projections, Aboriginal and Torres Strait Islander Australians, 1991 to 2021. ABS cat. no. 3238.0. Canberra: ABS.

AHMAC (Australian Health Ministers' Advisory Council) 1991. Cervical Cancer Screening Evaluation Committee. Cervical screening in Australia: options for change. Australian Institute of Health: Prevention Program Evaluation Series no. 2. Canberra: Australian Government Publishing Service.

AIHW (Australian Institute of Health and Welfare) 1998. Breast and cervical cancer screening in Australia 1996–97. Cancer series no. 8. Cat. no. CAN 3. Canberra: AIHW.

AIHW 2013. Report on monitoring activities of the National Cervical Screening Program Safety Monitoring Committee. Cancer series 80. Cat. no. CAN 77. Canberra: AIHW.

AIHW 2014. Australian Cancer Incidence and Mortality (ACIM) books: Cervical cancer. Canberra: AIHW. <http://www.aihw.gov.au/acim-books>.

AIHW & AACR (Australasian Association of Cancer Registries) 2012. Cancer in Australia: an overview, 2012. Cancer series no. 74. Cat. no. CAN 70. Canberra: AIHW.

Anttila A, von Karsa L, Aasmaa A, Fender M, Patnick J, Rebolj M et al. 2009. Cervical cancer screening policies and coverage in Europe. European Journal of Cancer 45:2649–2658.

Autier P, Coibion M, Huet F & Grivegnee AR 1996. Transformation zone location and intraepithelial neoplasia of the cervix uteri. British Journal of Cancer 74:488–490.

Bateson DJ and Weisberg E 2009. An open-label randomised trial to determine the most effective regimen of vaginal estrogen to reduce the prevalence of atrophic changes reported in postmenopausal cervical smears. Menopause 16:765–769.

Binns PL & Condon JR 2006. Participation in cervical screening by Indigenous women in the Northern Territory: a longitudinal study. Medical Journal of Australia 185:490–494.

Blomfield P & Saville M 2008. Outstanding problems—glandular lesions. CancerForum 32, Volume 32, Number 2, July: 81–84.

Bosch FX, Lorincz A, Munoz N, Meijer CJ & Shah KV 2002. The causal relation between human papillomavirus and cervical cancer. Journal of Clinical Pathology 55:244–265.

Brotherton JM 2008. How much cervical cancer in Australia is vaccine preventable? A meta-analysis. Vaccine 26:250–256.

Brotherton JM, Fridman M, May CL, Chappell G, Saville AM, & Gertig DM 2011. Early effect of the HPV vaccination programme on cervical abnormalities in Victoria, Australia: an ecological study. Lancet. June 18 2011; 377 (9783): 2085–2092.

Budd AC & Sturrock CJ 2010. Cytology and cervical cancer surveillance in an era of human papillomavirus vaccination. Sexual Health 7:1–7.

Cancer Council Australia 2007. National Cancer Prevention Policy 2007–09. NSW: Cancer Council Australia.

Canfell K, Sitas F & Beral V 2006. Cervical cancer in Australia and the United Kingdom: comparison of screening policy and uptake, and cancer incidence and mortality. Medical Journal of Australia 185:482–486.

CDHSH (Commonwealth Department of Human Services and Health) 1993. Making the Pap smear better. Report of the steering group on quality assurance for the prevention of cancer of the cervix. Canberra: Australian Government Publishing Service.

Centre for Public Health Research 2008. National Cervical Screening Programme: Annual Monitoring Report 2007. Wellington, New Zealand: Massey University.

Cervical Screening Wales 2010. Cervical Screening Programme, Wales: 2009/2010. Cardiff, Wales: Cervical Screening Wales.

Coory MD, Fagan PS, Muller JM & Dunn N 2002. Participation in cervical screening by women in rural and remote Aboriginal and Torres Strait Islander communities in Queensland. Medical Journal of Australia 177:544–547.

Creighton P, Lew JB, Clements M, Smith M, Howard K, Dyer S et al. 2010. Cervical cancer screening in Australia: modelled evaluation of the impact of changing the recommended interval from two to three years. BMC Public Health 10:734.

Curado MP, Edwards B, Shin HR, Storm H, Ferlay J, Heanue M et al. (eds.) 2007. Cancer incidence in five continents. International Agency for Research on Cancer (IARC) scientific publications no. 160. Lyon, France: IARC.

Dickinson JA 2002. Cervical screening: time to change the policy. Medical Journal of Australia 176:547–550.

Dobson AJ, Kuulasma K, Eberle E & Scherer J 1991. Confidence intervals for weighted sums of Poisson parameters. Statstics in Medicine 10:457–462.

DoHA (Department of Health and Ageing) 2004. Principles of practice, standards and guidelines for providers of cervical screening services for Indigenous women. Canberra: Commonwealth of Australia.

Gertig DM, Brotherton JML, Budd AC, Drennan K, Chappell G and Saville M 2013. Impact of a population-based HPV vaccination program on cervical abnormalities: a data linkage study. BMC Medicine 2013, 11: 227.

Health (Department of Health) 2013. National Cervical Screening Program: NCSP policies. Viewed 4 April 2014, <http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/NCSP-Policies-1>.

Health 2014a. HPV School Vaccination Program. Viewed 4 April 2014. <hpv.health.gov.au/the-program>.

Health 2014b. Human Papillomavirus (HPV): Information about the National Human Papillomavirus (HPV) Vaccination Program funded under the Immunise Australia Program. Viewed 4 April 2014. <www.health.gov.au/internet/immunise/publishing.nsf/Content/immunise-hpv>.

Ferlay J, Shin HR, Bray F, Forman D, Mathers C & Parkin DM 2010. GLOBOCAN 2008: Cancer incidence and mortality worldwide: IARC CancerBase no. 10. Lyon, France: IARCPress.

Goldie SJ, Kohli M, Grima D, Weinstein MC, Wright TC, Bosch FX, et al. Projected clinical benefits and cost-effectiveness of a human papillomavirus 16/18 vaccine. Journal of the National Cancer Institute 2004; 96: 604–615.

IARC (International Agency for Research on Cancer) 2005. IARC handbooks of Cancer Prevention: Cervix cancer screening. Lyon, France: IARCPress.

ISD (Information Services Division) Scotland 2010. Scottish Cervical Screening Programme Statistics 2009/2010.

Jensen O, Parkin D, MacLennan R, Muir C & Skeet R (eds.) 1991. Cancer registration: principles and methods. IARC scientific publications no. 95. Lyon: International Agency for Research on Cancer.

Luke C, Nguyen AM, Heard A, Kenny B, Shorne L & Roder D 2007. Benchmarking epidemiological characteristics of cervical cancer in advance of change in screening practice and commencement of vaccination. Australian and New Zealand Journal of Public Health 31:149–154.

Mitchell HS 2003. How much cervical cancer is being prevented? Medical Journal of Australia 178:298.

NHMRC (National Health and Medical Research Council) 2005. Screening to prevent cervical cancer: guidelines for the management of asymptomatic women with screen detected abnormalities. Canberra: NHMRC.

NHVPR (National HPV Vaccination Program Register) 2014. Information for health professionals. Melbourne: Victorian Cytology Service Inc. Viewed 4 April 2014, <http://www.hpvregister.org.au/health-professionals.aspx>.

NPAAC (National Pathology Accreditation Advisory Council) 2006. Performance measures for Australian laboratories reporting cervical cytology. Canberra: DoHA.

Ostor AG 1993. Natural history of cervical intraepithelial neoplasia: a critical review. International Journal of Gynecological Pathology 12:186–192.

Queensland Health 2012. Queensland Cervical Screening Program Statistical report 2007–2009. Brisbane: Cancer Screening Services Branch, Queensland Health.

Raffle AE, Alden B, Quinn M, Babb PJ & Brett MT 2003. Outcomes of screening to prevent cancer: analysis of cumulative incidence of cervical abnormality and modelling of cases and deaths prevented. British Medical Journal 326:901.

Sasieni P, Castanon A & Cuzick J 2009. Screening and adenocarcinoma of the cervix. International Journal of Cancer 125:525–529.

The National Health Service Information Centre Public Health Indicators and Population Statistics team 2010. Cervical Screening Programme England: 2009–10. London, England: NHS Information Centre for Health and Social Care.

Walboomers JM, Jacobs MV, Manos MM, Bosch FX, Kummer JA, Shah KV et al. 1999. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. Journal of Pathology 189:12–19.

Wang SS, Sherman ME, Silverberg SG, Carreon JD, Lacey JV Jr., Zaino R et al. 2006. Pathological characteristics of cervical adenocarcinoma in a multi-center US-based study. Gynecologic Oncology 103:541–546.

WHO (World Health Organization) 2010. Report of the meeting of HPV Vaccine Coverage and Impact Monitoring, 16–17 November 2009. Geneva, Switzerland: WHO.

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Related publications

Cervical screening in Australia is an annual report.

This and previous Cervical screening in Australia reports and their supplementary data tables are available at <http://www.aihw.gov.au/publications/cervical-screening/>.

You may also be interested in the following related publications:

AIHW 2013. Report on monitoring activities of the National Cervical Screening Program Safety Monitoring Committee. Cancer series 80. Cat. no. CAN 77. Canberra: AIHW.

AIHW 2013. National Bowel Cancer Screening Program monitoring report: July 2011–June 2012. Cancer series no. 75. Cat. no. CAN 71. Canberra: AIHW.

AIHW 2013. BreastScreen Australia monitoring report 2010–2011. Cancer series 77. Cat. no. CAN 74. Canberra: AIHW.

AIHW & AACR (Australasian Association of Cancer Registries) 2012. Cancer in Australia: an overview, 2012. Cancer series no. 74. Cat. no. CAN 70. Canberra: AIHW.

Cervical screening in Australia 2011–2012 presents the latest national statistics monitoring the National Cervical Screening Program, which aims to reduce incidence, morbidity and mortality from cervical cancer. Around 58% of women in the target age group of 20–69 took part in the program, with more than 3.7 million women screening in 2011 and 2012.

Cervical cancer incidence for women of all ages remains at a historical low of 7 new cases per 100,000 women, and deaths are also low, historically and by international standards, at 2 deaths per 100,000 women.