Australian Government
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# Cervical screening in Australia 2010–2011

National Cervical Screening Program

A joint Australian, State and Territory Government initiative

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*Authoritative information and statistics to promote better health and wellbeing*

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# Cervical screening in Australia 2010–2011

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# Contents

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# Abbreviations

| | |
|---|---|
| ABS | Australian Bureau of Statistics |
| ACD | Australian Cancer Database |
| ACT | Australian Capital Territory |
| AHMAC | Australian Health Ministers' Advisory Council |
| AIHW | Australian Institute of Health and Welfare |
| AMBS | Australian Modified Bethesda System |
| ARIA | Accessibility/Remoteness Index for Australia |
| AS | age-standardised |
| ASGC | Australian Standard Geographic Classification |
| CI | confidence interval |
| CIN | cervical intraepithelial neoplasia |
| Guidelines | National Health and Medical Research Council (NHMRC) *Screening to prevent cervical cancer: guidelines for the management of screen detected abnormalities in asymptomatic women* |
| HPV | human papillomavirus |
| IARC | International Agency for Research on Cancer |
| NCSP | National Cervical Screening Program |
| NHMD | National Hospital Morbidity Database |
| NHMRC | National Health and Medical Research Council |
| NHS | National Health Survey |
| NHVPR | National HPV Vaccination Program Register |
| 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 |

# 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. While the previous report covered 2009–2010, this report provides data for the 2010–2011 period of participation in the NCSP, as well as the latest available cervical cancer incidence and mortality data (from sources outside 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 631 new cases diagnosed in 2009, and 152 women died from cervical cancer in 2010. This is equivalent to 9 new cases and 2 deaths per 100,000 women, respectively.

Incidence and mortality have both halved since the NCSP was introduced in 1991, remaining at their historic lows of 9 new cases and 2 deaths per 100,000 women since 2002.

The incidence of cervical cancer in Aboriginal and Torres Strait Islander women was more than twice that of non-Indigenous women, and mortality of Aboriginal and Torres Strait Islander women was 5 times the non-Indigenous rate.

### How many women participated in the National Cervical Screening Program?

In 2010–2011, more than 3.6 million women participated in the NCSP. This was 57% of women in the target population (after adjustment to exclude those without a cervix).

Participation was similar across remoteness areas, with the highest participation of 58% in *Inner regional* and the lowest of 55% in *Remote* areas.

There were greater differences in participation across socioeconomic status of residence, and a clear trend of increasing participation with increasing socioeconomic status from 52% in areas of lowest socioeconomic status to 63% 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 2010 rescreened earlier than recommended.

Of the women sent a 27-month reminder letter by a cervical cytology register in 2010, 32% rescreened within 3 months.

### How many high-grade abnormalities were detected?

In 2011, 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.

Peak high-grade abnormality detection was for women aged 25–29, a shift from the historic age group of 20–24, as a result of a decrease in high-grade abnormalities in younger women.

# Data at a glance

The following table provides a comparison of national data against key 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.

Definitions for these performance indicators are given under each indicator in Section 2.

**Key performance indicators for the National Cervical Screening Program, women aged 20–69, previous and latest data**

| | Previous data | | Latest data | | Change |
|---|---|---|---|---|---|
| **Performance indicator** | **Reporting period** | **Statistic** | **Reporting period** | **Statistic** | |
| Participation | 2008–2009 | 58.9% | 2010–2011 | 57.2% | ▼ |
| Rescreening | | | | | |
| Early rescreening | 2009 cohort | 14.0% | 2010 cohort | 13.3% | ▲ |
| Rescreening after reminder letter | Letters sent 2009 | 31.7% | Letters sent 2010 | 31.5% | – |
| Cytology | | | | | |
| Unsatisfactory | 2010 | 2.1% | 2011 | 2.1% | – |
| Negative | 2010 | 92.6% | 2011 | 92.3% | – |
| No endocervical component | 2010 | 21.1% | 2011 | 21.4% | ▼ |
| Low-grade abnormalities | 2010 | 3.9% | 2011 | 4.1% | – |
| High-grade abnormalities | 2010 | 1.4% | 2011 | 1.5% | – |
| Histology | | | | | |
| Histology tests per 100 cytology tests | 2010 | 3.6% | 2011 | 3.7% | – |
| Low-grade abnormalities | 2010 | 17.2% | 2011 | 17.4% | – |
| High-grade abnormalities | 2010 | 25.9% | 2011 | 25.9% | – |
| High-grade abnormality detection rate | 2010 | 8.5 | 2011 | 8.4 | – |
| Correlation | | | | | |
| PPV of high-grade squamous cytology | 2009 | 70.0% | 2010 | 69.8% | – |
| PPV of high-grade endocervical cytology | 2009 | 71.2% | 2010 | 73.5% | – |
| Incidence | 2008 | 9.3 | 2009 | 8.9 | – |
| Mortality | 2009 | 1.9 | 2010 | 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 2008–2009, rather than 2009–2010.
3. Participation is the per cent of eligible women in population.
4. Early rescreening is the per cent of women with a negative cervical cytology test in February 2010 who rescreened within 21 months.
5. Rescreening after reminder letter is the per cent of women sent a reminder letter who rescreened within 3 months.
6. Cytology is per cent of all cytology tests.
7. Histology is the per cent 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.

# 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 2010–2011 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 2009 and 2010, 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 2010–2011: supplementary data tables*. These can also be downloaded for free from the AIHW website <http://www.aihw.gov.au/publications>.

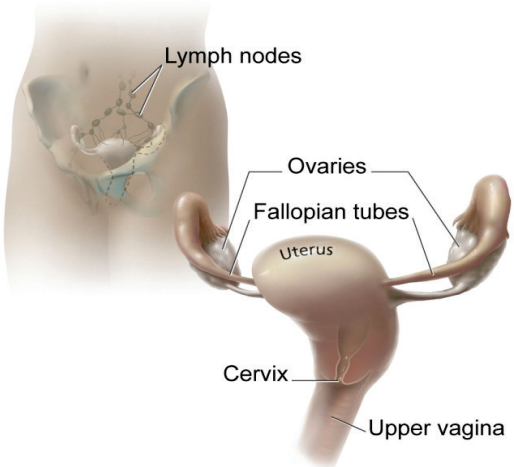
*Cervical screening in Australia 2010–2011* is part of an annual series. Earlier editions and any published subsequently can be downloaded for free from the AIHW website <http://www.aihw.gov.au/publications>. The website also includes information on ordering printed copies.

## 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.




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



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

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 2009, 65% of cervical cancers were squamous cell carcinoma and 26% were adenocarcinoma (adenosquamous and other cervical cancers made up the remainder).

## 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 2009 (the latest available data). It is also the 19th most common cause of cancer-related death, with 2 deaths per 100,000 women in 2010.

Cervical cancer incidence and mortality are both higher in Aboriginal and Torres Strait Islander women, with incidence more than twice, and mortality 5 times, that of non-Indigenous women (AIHW & AACR 2010) (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.

## 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*.

**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*.

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.

**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:* DoHA 2011a.

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 cytology registers or 'Pap test registers' that act as a 'safety net' for participating women as well as encouraging regular Pap tests.

Cervical cytology 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 cytology 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 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 2011). 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 (DoHA 2013a).

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 (DoHA 2013b).

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 (DoHA 2013b).

### 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 cytology registers. Analyses of these data allow monitoring of participation, rescreening, cytology, histology, and the cytology-histology correlation (Indicators 1–5). State and territory cervical cytology 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 cytology 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 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 cytology 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 cytology 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 of insufficient 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 2010–2011: 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 2010–2011 was found to be 56.8%). 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 2010–2011 was 57.2%).

## Statistical significance

Statistical analyses are useful tools that aid in the interpretation of data. In this report, 95% confidence intervals* were 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 does 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.

Differences that are described as 'significant' refer to a statistically significant difference. Judgment should, however, be exercised in deciding whether or not the difference is of any practical or clinical significance. This is particularly relevant to a national dataset, the analysis of which can result in statistically significant differences that may not be of any clinical significance or policy relevance.

***The use of confidence intervals for non-sample data**

The AIHW is reviewing the provision of confidence intervals when data arise from sources that provide information on all subjects rather than from a sample survey. This review will include analysis of the methods used to calculate confidence intervals, as well as the appropriateness of reporting confidence intervals for such data. It aims to ensure that statistical methods used in AIHW reports remain robust and appropriately inform understanding and decision-making.

# 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 2010–2011 reporting period.

### What the data tell us about participation

**Trend**

Participation in the NCSP was steady at 59% for all 2-year periods from 2004–2005 to 2008–2009, before a slight decrease to 58% in 2009–2010, and to 57% in the latest reporting period 2010–2011.

**2010–2011**

In 2010–2011, a total of 3,794,354 women participated in the NCSP, of whom 3,641,198 were aged 20–69.

This is 56.8% of women in the target age group, which, when age-standardised to allow analysis of trends and differentials, equates to a participation rate of 57.2% for 2010–2011.

Less than 3 percentage points separated the highest participation of 57.6% and 57.4 in *Inner regional* areas and *Major cities* from the lowest of 54.8% in *Remote* areas.

Participation showed a clear trend of increasing participation with increasing socioeconomic status, from 52.0% in areas of lowest socioeconomic status to 62.9% in areas of highest socioeconomic status.

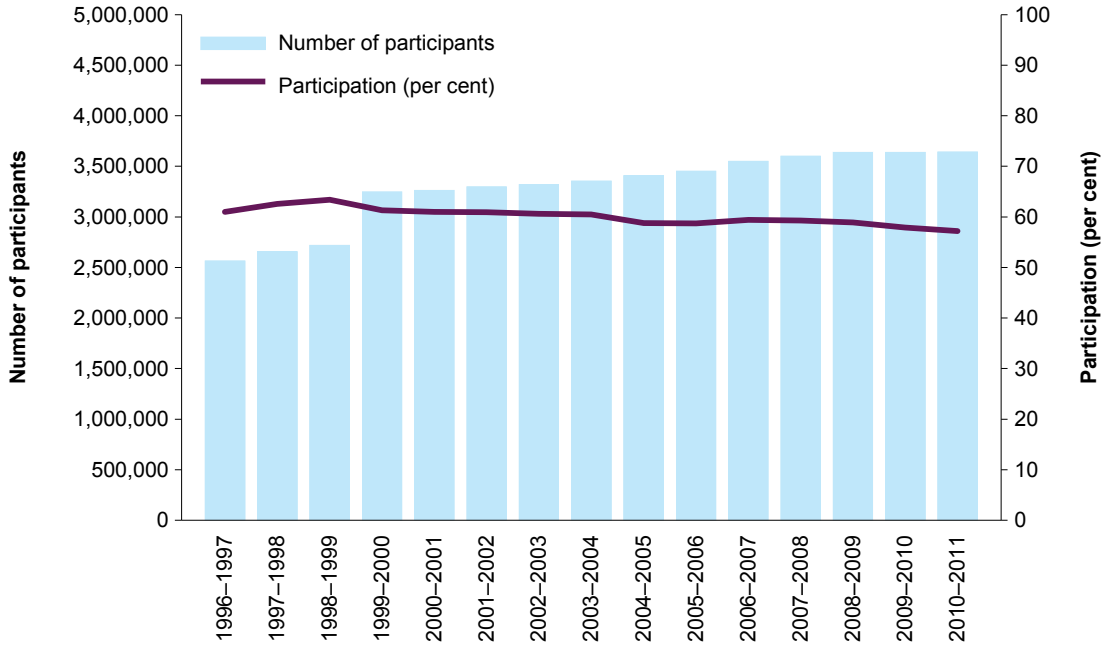
## Detailed analyses

### Participation in 2010–2011

In 2010–2011, 3,794,354 women participated in the NCSP (that is, had at least 1 cervical cytology test over the 2 years), of whom 3,641,198 were aged 20–69. These 3,641,198 women represent 56.8% of those aged 20–69 in the population with an intact cervix (the target population), which, when age-standardised to allow analysis of trends and differentials, equates to a participation rate of 57.2%.

### Participation trends

Figure 1.1 shows the trend in participation in the NCSP nationally, from 1996–1997, when reporting began, to 2010–2011, 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 cytology register data.

**Figure 1.1: Participation of women aged 20–69 in the National Cervical Screening Program, 1996–1997 to 2010–2011**

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—61% of these women participated between 1999–2000 and 2003–2004, and 59% participated between 2004–2005 and 2008–2009, with 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 57.9% and 57.2%, respectively, 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 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, but the age groups of <20, 20–24 and 25–29 (which include the ages of 12 to 26 which were the focus of the vaccination program in 2007–2009) all demonstrated a transient increase in 2007, suggesting that the latter was likely a factor in the overall participation peak in reporting periods that include the year 2007.

This decline from 58.9% in 2008–2009 to 57.2% in 2010–2011 occurred despite an increase in the number of women participating, since the concurrent 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 2010–2011**

| Reporting period | Participants[(b)] | Population[(c)] | Adjusted population[(d)] | AS rate[(e)] | 95% CI |
|---|---|---|---|---|---|
| 1996–1997[(a)] | 2,563,107 | 4,769,763 | 4,186,906 | 61.0 | 60.9–61.1 |
| 1997–1998[(a)] | 2,653,504 | 4,823,334 | 4,227,203 | 62.6 | 62.5–62.6 |
| 1998–1999[(a)] | 2,716,364 | 4,874,748 | 4,264,927 | 63.4 | 63.4–63.5 |
| 1999–2000 | 3,244,329 | 6,041,447 | 5,278,596 | 61.3 | 61.2–61.3 |
| 2000–2001 | 3,262,931 | 6,122,480 | 5,339,538 | 61.0 | 60.9–61.1 |
| 2001–2002 | 3,296,409 | 6,211,365 | 5,406,559 | 60.9 | 60.9–61.0 |
| 2002–2003 | 3,318,354 | 6,307,398 | 5,479,418 | 60.6 | 60.6–60.7 |
| 2003–2004 | 3,354,519 | 6,404,756 | 5,553,880 | 60.5 | 60.5–60.6 |
| 2004–2005 | 3,407,219 | 6,504,478 | 5,798,435 | 58.8 | 58.7–58.8 |
| 2005–2006 | 3,452,092 | 6,613,589 | 5,889,613 | 58.7 | 58.6–58.7 |
| 2006–2007 | 3,549,524 | 6,727,196 | 5,985,311 | 59.4 | 59.4–59.5 |
| 2007–2008 | 3,599,919 | 6,850,603 | 6,090,649 | 59.3 | 59.2–59.3 |
| 2008–2009 | 3,638,941 | 6,988,894 | 6,210,936 | 58.9 | 58.8–58.9 |
| 2009–2010 | 3,635,929 | 7,118,905 | 6,323,240 | 57.9 | 57.8–57.9 |
| 2010–2011 | 3,641,198 | 7,226,614 | 6,413,446 | 57.2 | 57.1–57.2 |

(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) Population is the average of the Australian Bureau of Statistics (ABS) estimated resident population for women aged 20–69 for the 2 years.

(d) Adjusted population is the average of the 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 2010–2011 use hysterectomy fractions derived from the AIHW National Hospitals Morbidity Database.

(e) 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 cytology register data.

## Participation by age

In 2010–2011, 96.0% of women participating in the NCSP were aged 20–69 (the target age group), with 2.7% under 20, and 1.3% aged 70 or over. Participation was highest for women aged 45–49 at 63.0%, followed by women aged 50–54 at 62.6% (Table 1.2).

**Table 1.2: Participation by age, 2010–2011**

| Age group | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | 50–54 | 55–59 | 60–64 | 65–69 |
|---|---|---|---|---|---|---|---|---|---|---|
| Women | 334,336 | 419,220 | 435,404 | 464,527 | 444,963 | 425,158 | 378,138 | 311,591 | 261,433 | 166,428 |
| Crude rate | 42.6 | 51.9 | 58.1 | 60.3 | 61.6 | 63.0 | 62.6 | 60.3 | 57.7 | 50.4 |

*Note:* Crude rate is the number of women screened in 2010–2011 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 cytology register data.

Note that, while participation among women aged 20–24 is both low and decreasing (falling from 45.3% in 2008–2009 to 42.6% in 2010–2011), Australia is one of the few countries that screen this age group.

## Participation by state and territory

In 2010–2011, participation across all states and territories was within 3.4 percentage points of the national average of 57.2%, ranging from 53.5% to 60.3% (Table 1.3, Figure 1.2). The decrease in national participation from 2008–2009 to 2010–2011 occurred in all states and territories.


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

**Figure 1.2: Participation of women aged 20–69, by state and territory, 2010–2011**

**Table 1.3: Participation of women aged 20–69, by state and territory, 2010–2011**

| State/territory | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| Women | 1,149,414 | 962,122 | 704,267 | 371,246 | 276,276 | 78,857 | 63,329 | 35,687 | 3,641,198 |
| AS rate | 56.1 | 60.3 | 55.3 | 55.6 | 59.7 | 55.6 | 57.6 | 53.5 | 57.2 |
| 95% CI | 56.0–56.2 | 60.2–60.4 | 55.2–55.5 | 55.4–55.7 | 59.5–60.0 | 55.2–56.0 | 57.2–58.1 | 52.9–54.1 | 57.1–57.2 |

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 2010–2011 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 cytology register data.

## Participation by location of residence

**Table 1.4: Participation of women aged 20–69, by remoteness area, 2010–2011**

| Remoteness area | Major cities | Inner regional | Outer regional | Remote | Very remote | Australia |
|---|---|---|---|---|---|---|
| Women | 2,577,444 | 677,216 | 307,989 | 49,638 | 27,421 | 3,641,198 |
| AS rate | 57.4 | 57.6 | 56.0 | 54.8 | 56.0 | 57.2 |
| 95% CI | 57.3–57.5 | 57.4–57.7 | 55.8–56.2 | 54.3–55.3 | 55.3–56.7 | 57.1–57.2 |

Notes

1. Women were allocated to a remoteness area using their residential postcode according to the Australian Standard Geographic Classification for 2006.
2. Caution is required when examining differences across remoteness area (see Appendix C).
3. Age-standardised (AS) rate is the number of women screened in 2010–2011 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.
4. Participation by remoteness area in 2010–2011 is not comparable with previous reporting periods (see Appendix C).

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

Participation in the NCSP was similar across remoteness areas (Figure 1.3A), with less than 3 percentage points separating the highest participation of 57.6% and 57.4 in *Inner regional* areas and *Major cities* from the lowest of 54.8% in *Remote* areas (Table 1.4). The relatively high participation of 56.0% in *Very remote* areas is of note.

**Table 1.5: Participation of women aged 20–69, by socioeconomic status, 2010–2011**

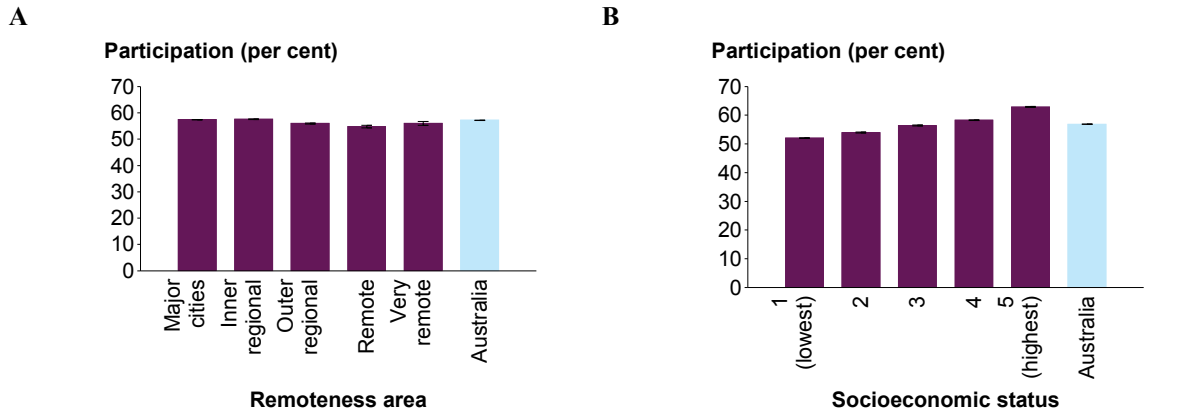
| Socioeconomic status | 1 (lowest) | 2 | 3 | 4 | 5 (highest) | Australia |
|---|---|---|---|---|---|---|
| Women | 618,974 | 671,965 | 726,038 | 773,152 | 827,984 | 3,641,198 |
| AS rate | 52.0 | 54.0 | 56.4 | 58.3 | 62.9 | 57.2 |
| 95% CI | 51.9–52.2 | 53.8–54.1 | 56.3–56.6 | 58.1–58.4 | 62.7–63.0 | 57.1–57.2 |

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 2006.
2. Caution is required when examining differences across socioeconomic status (see Appendix C).
3. Age-standardised (AS) rate is the number of women screened in 2010–2011 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.
4. Participation by socioeconomic status in 2010–2011 is not directly comparable with previous reporting periods (see Appendix C).

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

Participation showed greater differences across socioeconomic status of location of residence, and a clear trend of increasing participation with increasing socioeconomic status (Figure 1.3B), from 52.0% of women residing in areas of lowest socioeconomic status to 62.9% of women residing in areas of highest socioeconomic status (a difference of 10.9 percentage points) (Table 1.5).




*Note:* Bars on columns represent 95% confidence intervals.

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

**Figure 1.3: Participation of women aged 20–69, by remoteness area (A), and by socioeconomic status (B), 2010–2011**

## Participation of Aboriginal and Torres Strait Islander women

Participation in cervical screening cannot be measured nationally for Aboriginal and Torres Strait Islander women since, as detailed in the introduction, cervical cytology registers depend on, and are limited to, information on pathology forms, which do not currently include Indigenous status.

There is evidence, however, that Aboriginal and Torres Strait Islander women are underscreened. Coory et al. (2002) and Binns & 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 Aboriginal and Torres Strait Islander 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 Aboriginal and Torres Strait Islander women such as 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 Aboriginal and Torres Strait Islander women nationally, as well as guiding further improvements in cervical screening participation in Aboriginal and Torres Strait Islander women.

### 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 70.1% of women aged 20–69 participated in the NCSP at least once in the 3-year period 2009–2011, and 83.4% had at least one Pap test in the 5-year period 2007–2011 (Table 1.6).

**Table 1.6: Participation of women aged 20–69, by state and territory, over 2 years (2010–2011), 3 years (2009–2011) and 5 years (2007–2011)**

| State/territory | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| **2010–2011** | 56.1 | 60.3 | 55.3 | 55.6 | 59.7 | 55.6 | 57.6 | 53.5 | 57.2 |
| **2009–2011** | 69.0 | 73.3 | 68.2 | 67.8 | 73.0 | 69.2 | 71.9 | 68.1 | 70.1 |
| **2007–2011** | 83.9 | 85.2 | 81.6 | 79.3 | 84.7 | 82.2 | 88.0 | 84.4 | 83.4 |

Notes

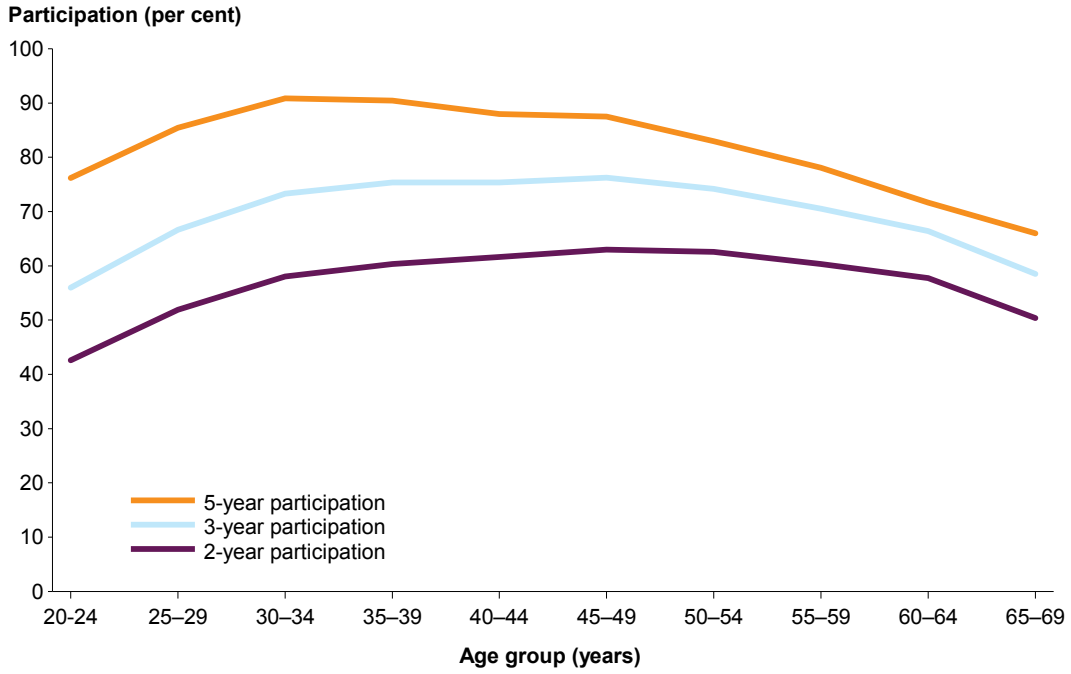
1. Direct comparisons between the states and territories of Australia are not advised due to the substantial differences that exist between the jurisdictions, including population, area, geographic structure, policies and other factors.
2. Age-standardised (AS) rate is the number of women screened as 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.
3. Confidence intervals are available in Cervical screening in 2010–2011: supplementary data tables.

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

The increase from 2-year to 3-year participation may be, in part, due to state and territory cervical cytology 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.

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 1.4).

Along with this change, the age group with the highest participation shifts from women aged 45–49 for the 2-year period 2010–2011 and the 3-year period 2009–2011 to women aged 30 to 39 for the 5-year period 2007–2011 (Figure 1.4). The age group with the lowest participation also changes from women aged 20–24 for the 2-year period 2010–2011 and the 3-year period 2009–2011 to women aged 65–69 for the 5-year period 2007–2011 (Figure 1.4).




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

**Figure 1.4: Participation of women aged 20–69, by age, over 2 years (2010–2011), 3 years (2009–2011), and 5 years (2007–2011)**

# 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 2010. 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**

The proportion of women rescreening early decreased from 14.0% for the 2009 cohort to 13.3% for the 2010 cohort, which is a positive trend.

**2010 cohort**

Of all women aged 20–69 with a negative cytology test in February 2010, 13.3% rescreened early (within 21 months).

# Detailed analyses

## Early rescreening in the 2010 cohort

Of the 155,514 women aged 20–69 who had negative cytology in February 2010 with no abnormalities in the preceding 36 months, the majority did not rescreen early, with 134,824 women (86.7%) having no repeat cytology tests within 21 months of this negative cytology test. In comparison, 20,690 women (13.3%) did rescreen early—20,026 had one repeat cytology test, 622 had two repeat cytology tests, and 42 women had three or more repeat cytology tests within 21 months of this negative cytology test (Table 2.1).

This means that 13.3% 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, 2010 cohort**

| Early rescreens | Number of women | Per cent of women |
|---|---|---|
| 0 | 134,824 | 86.7 |
| 1 | 20,026 | 12.9 |
| 2 | 622 | 0.4 |
| 3+ | 42 | 0.0 |

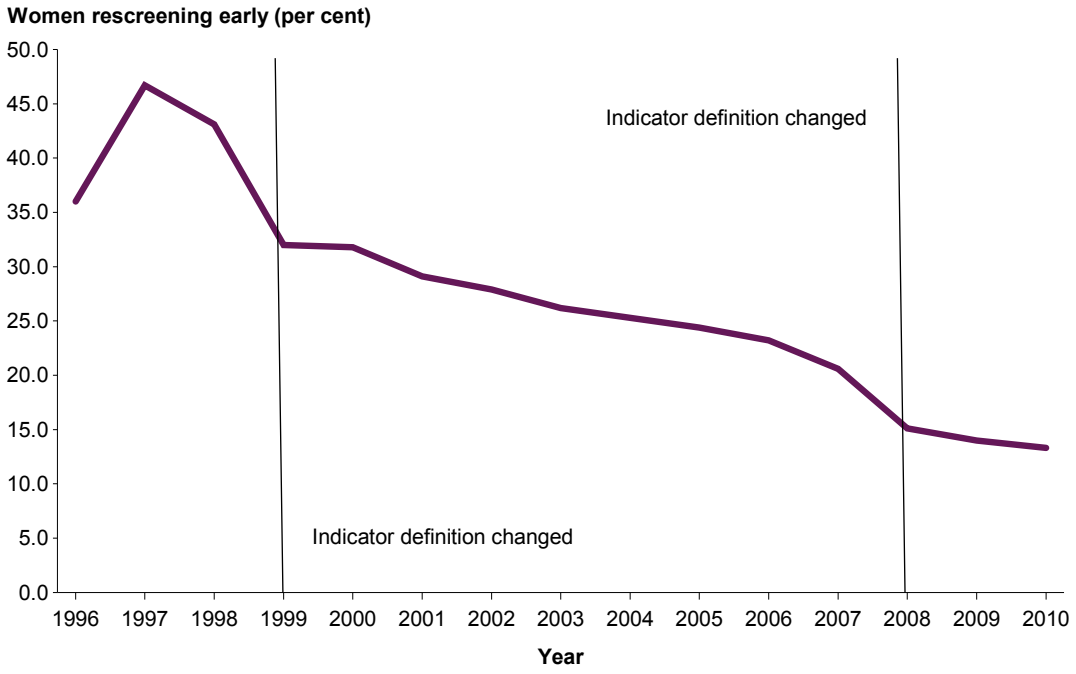
*Note:* Women with a cytological or histological abnormality in the preceding 36 months are excluded from entering the cohort; repeat cytology tests that are a valid repeat of an unsatisfactory cytology test are excluded from this count.

*Source:* AIHW analysis of state and territory cervical cytology 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 13.3%, there have been two changes to the definition of early rescreening (one for the 1999 cohort onwards and one 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 13.3% for the 2010 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 cytology register data.

**Figure 2.1: Proportion of women aged 20–69 rescreening early following a negative cervical cytology test, 1996 to 2010 cohorts**

## Early rescreening by state and territory

The proportion of women rescreening early varied across states and territories between 9.5% and 14.4% (Table 2.2).

**Table 2.2: Proportion of women aged 20–69 rescreening early following a negative cervical cytology test, by state and territory, 2010 cohort**

| State/territory | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| Per cent | 14.4 | 13.3 | 13.2 | 12.4 | 11.7 | 9.5 | 10.8 | 13.0 | 13.3 |

*Source:* AIHW analysis of state and territory cervical cytology 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 cytology 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 cytology 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 2010. 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 2009 (31.7%) and 2010 (31.5%).

**Letters sent in 2010**

31.5% of women sent a 27-month cervical cytology register reminder letter in 2010 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 2010

In 2010, 27-month cervical cytology register reminder letters were sent to 888,269 women. Of these, 280,064 women (31.5%) 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 cytology register reminder letter, by state and territory, letters sent in 2010**

| State/territory | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| No. sent letter | 318,224 | 233,945 | 195,360 | 86,687 | . . | 25,607 | 20,184 | 8,262 | 888,269 |
| No. rescreened | 93,449 | 78,310 | 65,488 | 26,643 | . . | 8,612 | 5,775 | 1,787 | 280,064 |
| Per cent | 29.4 | 33.5 | 33.5 | 30.7 | . . | 33.6 | 28.6 | 21.6 | 31.5 |

*Note:* Data are not available for South Australia, which at present does not have a 27-month cervical cytology 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 cytology 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 (21.6%) in the Northern Territory (Figure 2.2).


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

**Figure 2.2: Proportion of women aged 20–69 rescreening within 3 months of the 27-month cervical cytology register reminder letter, by state and territory, letters sent in 2010**

# 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 2011.

## What the data tell us about cytology

### Trends

The proportion of cytology tests that were unsatisfactory and negative barely changed between 2010 (2.1% and 92.6%) and 2011 (2.1% and 92.3%, respectively)

The (age-standardised) proportion of cytology tests with an endocervical component present decreased significantly each year from 82.1% in 2004 to 78.6% in 2011. This overall decrease included a slight decrease from 78.9% in 2010 to 78.6% in 2011.

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.

The increase between 2010 and 2011 appeared to be due to an increase in possible low-grade squamous intraepithelial lesions (and to a lesser extent possible high-grade squamous intraepithelial lesions), atypical endocervical cells of uncertain significance, and possible high-grade endocervical glandular lesions.

### Cytology in 2011

More than 2 million cytology tests were performed in 2011, with 2,065,618 for women aged 20–69. For these women:

- 2.1% of cytology tests were unsatisfactory
- 92.3% of cytology tests were negative
- An endocervical component was present in 78.6% of cytology tests
- A definite or possible high-grade abnormality was reported in 1.5% of cytology tests.
- An abnormality was reported in 5.6% 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.

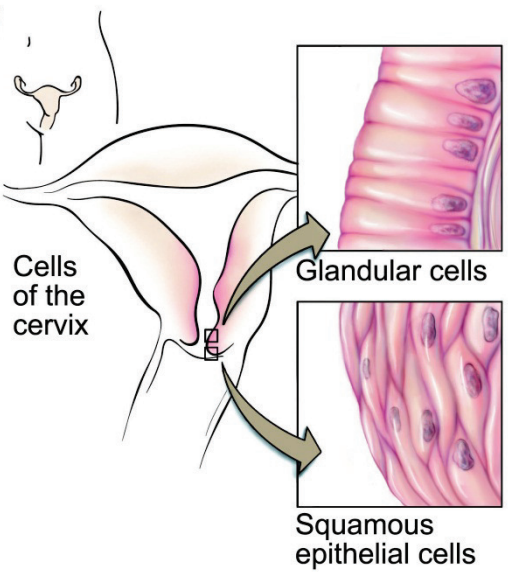



**Figure 3.1: Anatomy: cells of the cervix**



*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 2011

In 2011, there were 2,149,798 cervical cytology tests performed, 2,065,618 (96.1%) of these for women aged 20–69 (Table 3.2). Most cytology tests were performed for women aged 25–49, with a peak of 260,198 tests performed for women aged 35–39 (Figure 3.2A), this being 12.5% of all cytology tests performed in 2011.

## Cytology trends

Historically, looking at all years from 2004 to 2011, the greatest number of cytology tests was 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 2004 and 2011 (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 aged up to 30 seeing a 5.7% increase 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 to 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.

More recently, the number of cytology tests performed for women aged 20–69 increased from 2,025,860 in 2010 to 2,065,618 in 2011. This increase occurred across most age groups, being largest for women aged 60 to 69 (Table 3.2).

**Table 3.2: Number of cytology tests by age, 2004 to 2011**

| Age group (years) | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| <20 | 68,245 | 69,841 | 65,189 | 67,861 | 63,668 | 60,813 | 55,511 | 56,159 |
| 20–24 | 199,197 | 207,671 | 203,531 | 215,454 | 203,540 | 202,951 | 192,175 | 195,602 |
| 25–29 | 237,905 | 239,628 | 235,385 | 249,461 | 242,116 | 249,852 | 240,510 | 247,362 |
| 30–34 | 286,845 | 287,736 | 270,412 | 268,829 | 258,449 | 259,995 | 246,489 | 253,185 |
| 35–39 | 269,733 | 274,984 | 273,274 | 283,760 | 281,047 | 281,300 | 264,471 | 260,198 |
| 40–44 | 270,055 | 269,546 | 259,880 | 259,723 | 250,963 | 252,387 | 245,041 | 252,666 |
| 45–49 | 233,472 | 239,200 | 239,884 | 248,203 | 243,146 | 246,688 | 236,829 | 235,860 |
| 50–54 | 193,660 | 196,175 | 196,236 | 201,663 | 202,073 | 206,118 | 205,915 | 211,883 |
| 55–59 | 153,891 | 159,849 | 163,546 | 166,087 | 165,893 | 168,806 | 168,579 | 172,415 |
| 60–64 | 102,437 | 106,608 | 112,240 | 122,356 | 129,177 | 134,622 | 139,035 | 144,153 |
| 65–69 | 70,827 | 73,281 | 75,700 | 77,881 | 79,390 | 83,835 | 86,816 | 92,294 |
| 70+ | 32,321 | 31,075 | 30,188 | 29,925 | 28,353 | 28,005 | 27,750 | 28,014 |
| **All ages** | **2,118,780** | **2,155,682** | **2,125,522** | **2,191,238** | **2,147,848** | **2,175,383** | **2,109,131** | **2,149,798** |
| **Ages 20–69** | **2,018,022** | **2,054,678** | **2,030,088** | **2,093,417** | **2,055,794** | **2,086,554** | **2,025,860** | **2,065,618** |

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

## Unsatisfactory cytology in 2011

In 2011, of the 2,065,618 cytology tests performed for women aged 20–69, 42,760 (2.1%) were unsatisfactory (Table 3.4).

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 2.1% of all cytology tests for most years from 2004 to 2011 (Table 3.3).

**Table 3.3: Unsatisfactory cytology tests in women aged 20–69, 2004 to 2010**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| Number | 42,124 | 41,042 | 42,720 | 44,912 | 43,223 | 43,104 | 42,096 | 42,760 |
| Crude rate | 2.1 | 2.0 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 |
| AS rate | 2.1 | 2.0 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 |
| 95% CI | 2.1–2.1 | 2.0–2.0 | 2.1–2.1 | 2.1–2.2 | 2.1–2.1 | 2.1–2.1 | 2.1–2.1 | 2.1–2.1 |

*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 cytology 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.

**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.

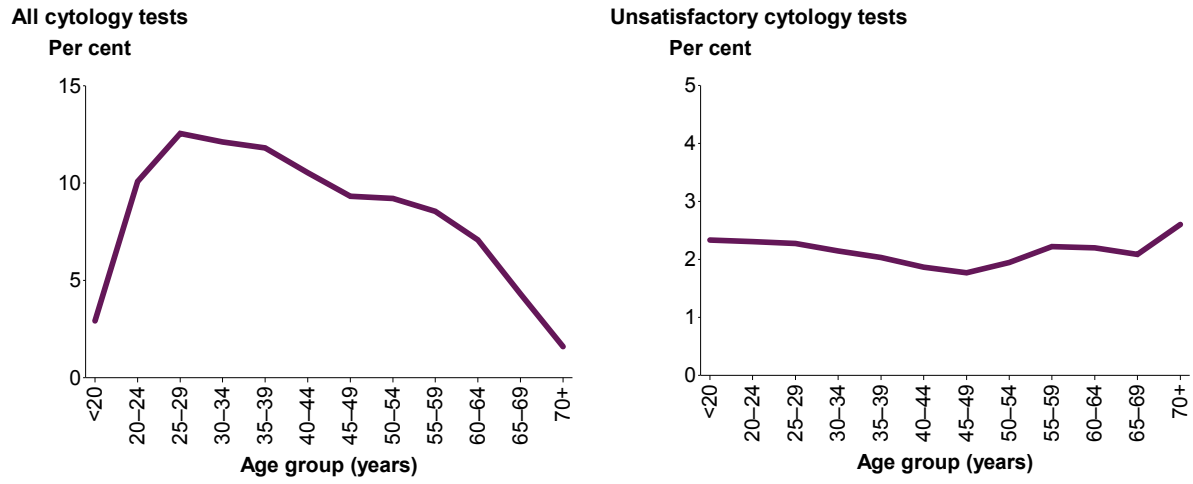
**Calculated value for 2011**

2.1%

The proportion of cytology tests that were unsatisfactory, 2.1% in 2011 (Table 3.3), falls within these benchmark standards (Box 3.1) and would therefore be considered appropriate.

## Unsatisfactory cytology by age

The proportion of cytology tests that were unsatisfactory in 2011 was around 2% for all ages 20–69. Unsatisfactory cytology tests fell from 2.3% of tests for women aged under 30 to a low of 1.8% for women aged 45–49. The proportion then increased with increasing age to a high of 2.6% for women aged 70 and over (Figure 3.2B). 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 cytology register data; data for figures are available in Table A1.

**Figure 3.2: Proportion of cytology tests, and proportion of unsatisfactory cytology tests, by age, 2011**

## Unsatisfactory cytology by state and territory

In 2011, the majority of states and territories had unsatisfactory cytology tests comprising between 2.1% and 2.4% of all cytology tests. The exceptions to this were New South Wales with 1.7%, Western Australia with 1.8%, and the Australian Capital Territory with 1.3% of all cytology tests being unsatisfactory (Table 3.4).

**Table 3.4: Unsatisfactory cytology tests in women aged 20–69, by state and territory, 2011**

| | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| Number | 11,084 | 12,346 | 9,830 | 3,893 | 3,601 | 1,078 | 440 | 488 | 42,760 |
| Crude rate | 1.7 | 2.3 | 2.4 | 1.8 | 2.3 | 2.4 | 1.3 | 2.4 | 2.1 |
| AS rate | 1.7 | 2.3 | 2.4 | 1.8 | 2.3 | 2.4 | 1.3 | 2.4 | 2.1 |
| 95% CI | 1.7–1.7 | 2.2–2.3 | 2.4–2.5 | 1.8–1.9 | 2.3–2.4 | 2.3–2.6 | 1.2–1.4 | 2.2–2.6 | 2.1–2.1 |

*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 cytology register data.

## Negative cytology in 2011

Most cervical cytology tests have a negative result, indicating that no abnormalities were detected. In 2011, of the 2,065,618 cytology tests performed for women aged 20–69, 1,908,291 (92.4%) were negative (92.3% 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

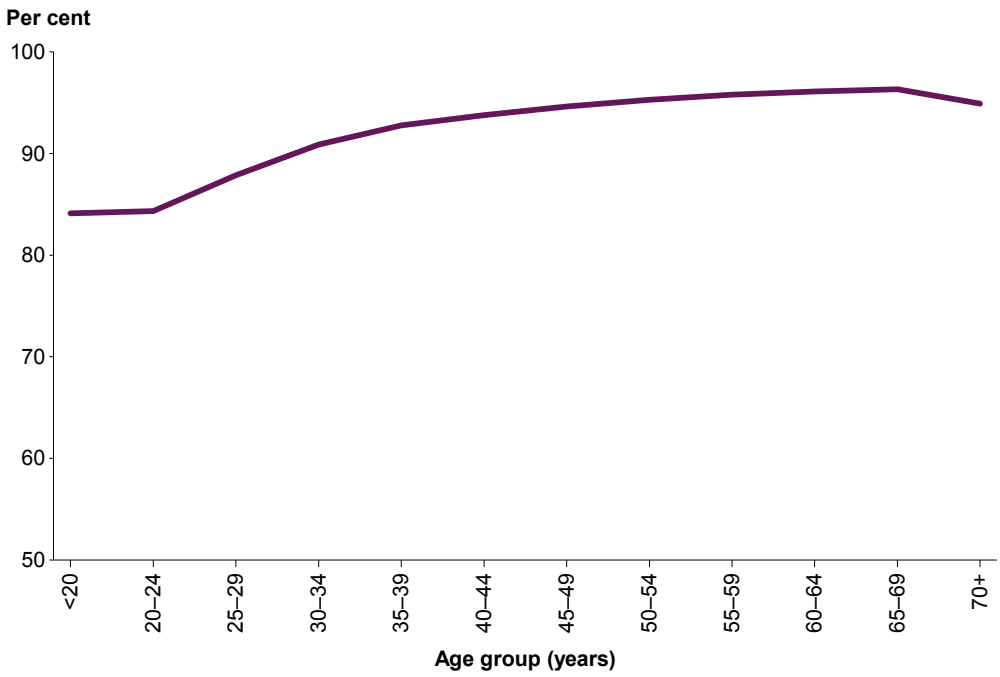
The proportion of negative cytology tests remained steady from 2006 to 2011 at between 92% and 93% of all cytology tests performed for women aged 20–69 (Table 3.5).

**Table 3.5: Negative cytology tests in women aged 20–69, 2004 to 2011**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| Number | 1,839,464 | 1,872,910 | 1,857,552 | 1,922,592 | 1,891,705 | 1,931,682 | 1,876,881 | 1,908,291 |
| Crude rate | 91.2 | 91.2 | 91.5 | 91.8 | 92.0 | 92.6 | 92.6 | 92.4 |
| AS rate | 91.3 | 91.3 | 91.6 | 91.9 | 92.1 | 92.6 | 92.6 | 92.3 |
| 95% CI | 91.1–91.4 | 91.1–91.4 | 91.4–91.7 | 91.8–92.1 | 91.9–92.2 | 92.5–92.7 | 92.5–92.7 | 92.2–92.5 |

*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 cytology register data.




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

**Figure 3.3: Proportion of cytology tests that were negative by age, 2011**

## Negative cytology by age

In 2011, the proportion of cytology tests that were negative was lowest for women under 25, at just above 84% of cytology tests, thereafter increasing with increasing age, peaking at 96.3% for women aged 65–69 (Figure 3.3).

## Negative cytology by state and territory

The proportion of cytology tests that were negative was similar across states and territories, ranging between 90.9% and 94.2% for women aged 20–69 in 2011 (Table 3.6).

**Table 3.6: Negative cytology tests in women aged 20–69, by state and territory, 2011**

| | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| Number | 608,251 | 496,477 | 373,982 | 193,564 | 144,182 | 40,876 | 32,646 | 18,313 | 1,908,291 |
| Crude rate | 93.5 | 91.1 | 92.7 | 91.3 | 93.0 | 92.4 | 94.0 | 90.7 | 92.4 |
| AS rate | 93.3 | 90.9 | 92.8 | 91.5 | 92.9 | 92.3 | 94.2 | 91.4 | 92.3 |
| 95% CI | 93.1–93.6 | 90.7–91.2 | 92.5–93.1 | 91.1–91.9 | 92.4–93.4 | 91.4–93.2 | 93.1–95.2 | 90.0–92.8 | 92.2–92.5 |

*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 cytology register data.

## No endocervical component in 2011

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 2011, of the 2,065,618 cytology tests performed for women aged 20–69, 440,411 (21.3%) had no endocervical component (21.4% 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 2004 and 2011. While the overall increase in the number of cytology tests for women aged 20–69 from 2004 to 2011 was only 2.4%, the number of cytology tests with no endocervical component increased 25.6% over the same period (from 350,670 to 440,411). This is reflected in the steady increase in the proportion of cytology tests with no endocervical component from 17.4% in 2004 to 21.3% in 2011 for women aged 20–69 (Table 3.8). This trend holds after age-standardisation—from 17.9% in 2004 to 21.4% of cytology tests in 2011 (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 2011 crude rate of 21.3%, which indicates the presence of an endocervical component in 78.7% of cytology tests, is slightly outside this desired range.

**Table 3.7: Cytology tests with no endocervical component in women aged 20–69, 2004 to 2011**

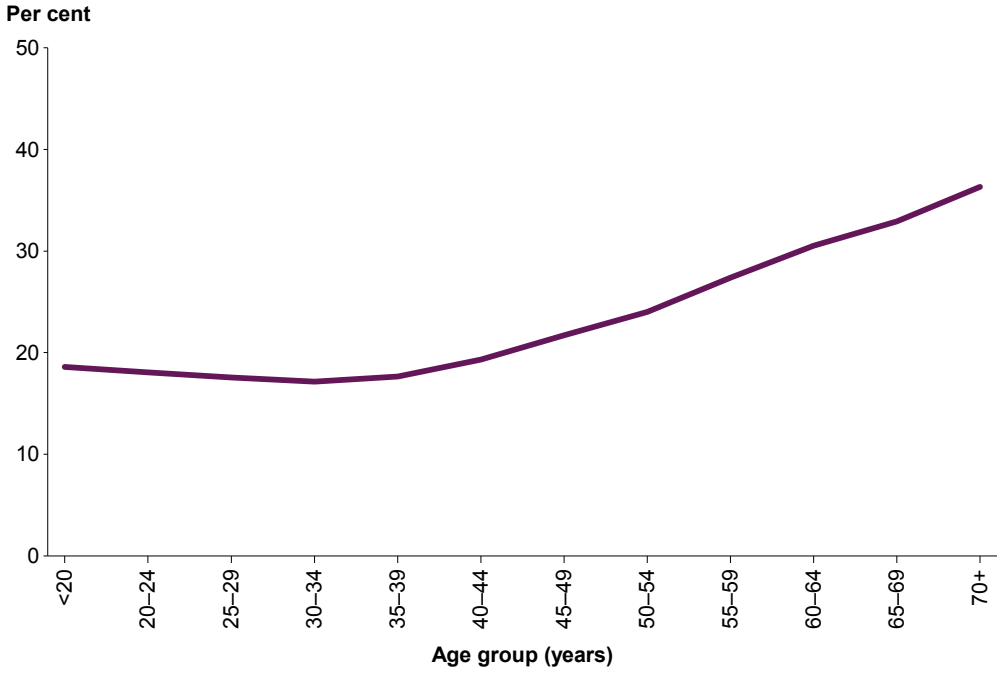
| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| Number | 350,670 | 379,531 | 387,918 | 406,736 | 407,942 | 418,527 | 424,077 | 440,411 |
| Crude rate | 17.4 | 18.5 | 19.1 | 19.4 | 19.8 | 20.1 | 20.9 | 21.3 |
| AS rate | 17.9 | 19.0 | 19.5 | 19.8 | 20.2 | 20.3 | 21.1 | 21.4 |
| 95% CI | 17.8–17.9 | 18.9–19.0 | 19.5–19.6 | 19.8–19.9 | 20.1–20.2 | 20.3–20.4 | 21.0–21.1 | 21.4–21.5 |

*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 cytology register data.

## No endocervical component by age

Younger women had a lower proportion of cytology tests with no endocervical component, with between 17.1% and 18.1% of all cytology tests performed for women aged between 20 and 39 lacking endocervical cells in 2011 (Figure 3.4). 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 3.4).




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

**Figure 3.4: Proportion of cytology tests with no endocervical component by age, 2011**

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 that a transformation zone on the ectocervix.

## No endocervical component by state and territory

In 2011, the proportion of cytology tests for which there was no endocervical component ranged considerably between 18.9% and 30.5% (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, 2011**

| | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| Number | 122,365 | 136,470 | 75,789 | 48,516 | 31,916 | 13,620 | 6,963 | 4,772 | 440,411 |
| Crude rate | 18.8 | 25.0 | 18.8 | 22.9 | 20.6 | 30.8 | 20.1 | 23.6 | 21.3 |
| AS rate | 18.9 | 25.1 | 18.9 | 23.4 | 20.4 | 30.5 | 20.3 | 24.9 | 21.4 |
| 95% CI | 18.8–19.0 | 24.9–25.2 | 18.8–19.1 | 23.1–23.6 | 20.2–20.7 | 30.0–31.0 | 19.9–20.8 | 24.2–25.7 | 21.4–21.5 |

*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 cytology register data.

## Abnormalities detected by cytology in 2011

In 2011, there were 115,026 abnormalities (low-grade, high-grade or cancer) detected in the 2,065,618 cytology tests for women aged 20–69 (5.6 abnormalities per 100 cytology tests). Of these abnormalities, 84,540 (73.5%) were low-grade and 30,253 (26.3%) 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 (a slight increase from 3.9 to 4.1 per 100 cytology tests, age-standardised) (Table 3.9).

High-grade abnormalities remained steady at 1.3 or 1.4 per 100 cytology tests for all years from 2004 to 2010, and although the increase to 1.5 in 2011 is not large, 2011 had the highest number of high-grade abnormalities detected—above 30,000 for the first time (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 to be less than 1.5:1. Although these standards were developed for a different purpose, they provide a useful benchmark.

**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 2011**

(i) 1.5%

(ii) 5.6%

Calculation of these performance measures using cytology detection data for 2011 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.

**Table 3.9: Abnormalities detected by cytology in women aged 20–69, 2004 to 2011**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| **Low-grade abnormalities** | | | | | | | | |
| Number | 109,814 | 114,257 | 103,841 | 97,916 | 92,013 | 83,933 | 78,510 | 84,540 |
| Crude rate | 5.4 | 5.6 | 5.1 | 4.7 | 4.5 | 4.0 | 3.9 | 4.1 |
| AS rate | 5.4 | 5.5 | 5.1 | 4.6 | 4.5 | 4.0 | 3.9 | 4.1 |
| 95% CI | 5.3–5.4 | 5.4–5.5 | 5.0–5.1 | 4.6–4.6 | 4.4–4.5 | 4.0–4.0 | 3.9–3.9 | 4.1–4.2 |
| **High-grade abnormalities** | | | | | | | | |
| Number | 26,975 | 26,534 | 26,165 | 28,297 | 29,176 | 28,054 | 28,491 | 30,253 |
| Crude rate | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.3 | 1.4 | 1.5 |
| AS rate | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.3 | 1.4 | 1.5 |
| 95% CI | 1.3–1.3 | 1.2–1.3 | 1.2–1.3 | 1.3–1.3 | 1.4–1.4 | 1.3–1.3 | 1.4–1.4 | 1.4–1.5 |
| **All abnormalities (low-grade, high-grade, and cancer)** | | | | | | | | |
| Number | 137,010 | 141,016 | 130,234 | 126,442 | 121,400 | 112,188 | 107,261 | 115,026 |
| Crude rate | 6.8 | 6.9 | 6.4 | 6.0 | 5.9 | 5.4 | 5.3 | 5.6 |
| AS rate | 6.7 | 6.7 | 6.3 | 5.9 | 5.9 | 5.4 | 5.3 | 5.6 |
| 95% CI | 6.6–6.7 | 6.7–6.8 | 6.3–6.4 | 5.9–6.0 | 5.8–5.9 | 5.3–5.4 | 5.3–5.4 | 5.6–5.6 |

*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 cytology 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.

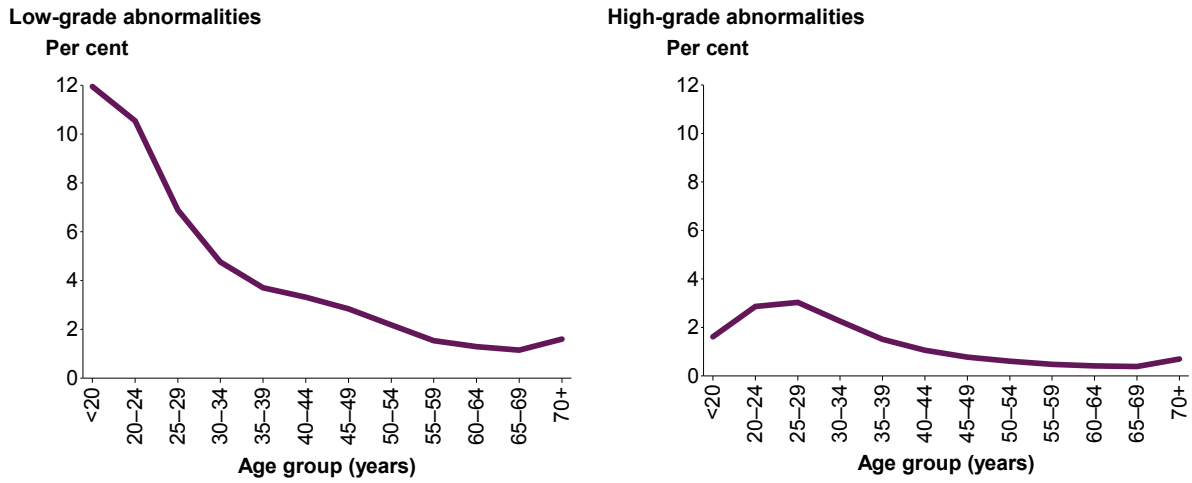
Changes to the cervical screening program can also change detection rates. Management guidelines implemented in 2006 may have resulted in changes in the detection of abnormalities, especially low-grade abnormalities, even in the absence of concurrent changes to underlying prevalence. A further factor 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 3.5 shows the age distribution of all low-grade abnormalities combined, and the age distribution of all high-grade abnormalities combined.

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 3.5), while high-grade abnormalities are relatively low in women under 20 and peak in women aged 20–29 (Figure 3.5). Detection of both low-grade and high-grade abnormalities then decreases with increasing age, only increasing slightly in women aged 70 or over (Figure 3.5).




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

**Figure 3.5: Abnormalities detected by cytology by age, 2011**

## Squamous abnormalities detected by cytology in 2011

In 2011 there were 115,026 abnormalities detected by cytology in women aged 20–69. Of these, 113,321 were squamous in origin—83,719 low-grade, 29,447 high-grade and 155 squamous cell carcinoma. This was 5.5 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 2011 were possible low-grade squamous intraepithelial lesions (S2), with 49,443 abnormalities comprising 43.6% of squamous abnormalities, followed by low-grade squamous intraepithelial lesions (S3), with 34,276 comprising 30.2%. Possible high-grade squamous intraepithelial lesions (S4) and high-grade squamous intraepithelial lesions (S5) were the next most frequent, at 11.5% and 14.2% 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 133,392 (6.5 per 100 cytology tests) in 2004 to 105,692 (5.3 per 100 cytology tests) in 2010, before increasing to 113,321 (5.5 per 100 cytology tests) in 2011 (Table 3.10).

However, this trend was not common to all squamous abnormalities. Possible low-grade squamous intraepithelial lesions (S2) decreased steadily from 2005 to 2010, increasing again in 2011, similar to the overall trend. In contrast, low-grade squamous intraepithelial lesions (S3) decreased steadily from 2004 to 2011 (although comprising a constant 1.7 per 100 cytology tests in 2009, 2010 and 2011).

**Table 3.10: Squamous abnormalities detected by cytology in women aged 20–69, by squamous category, 2004 to 2011**

| Squamous category | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| **S2 Possible low-grade squamous intraepithelial lesion** | | | | | | | | |
| Number | 55,981 | 59,788 | 55,431 | 54,262 | 51,147 | 47,290 | 43,485 | 49,443 |
| Per 100 cytology tests | 2.8 | 2.9 | 2.7 | 2.6 | 2.5 | 2.3 | 2.1 | 2.4 |
| Per cent of squamous abnormalities | 42.0 | 43.4 | 43.4 | 43.6 | 42.8 | 42.8 | 41.1 | 43.6 |
| **S3 Low-grade squamous intraepithelial lesion** | | | | | | | | |
| Number | 51,947 | 52,545 | 47,038 | 42,502 | 39,846 | 35,897 | 34,311 | 34,276 |
| Per 100 cytology tests | 2.6 | 2.6 | 2.3 | 2.0 | 1.9 | 1.7 | 1.7 | 1.7 |
| Per cent of squamous abnormalities | 38.9 | 38.1 | 36.8 | 34.2 | 33.4 | 32.5 | 32.5 | 30.2 |
| **S4 Possible high-grade squamous intraepithelial lesion** | | | | | | | | |
| Number | 9,481 | 8,679 | 9,456 | 10,727 | 11,500 | 11,494 | 12,088 | 13,020 |
| Per 100 cytology tests | 0.5 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 |
| Per cent of squamous abnormalities | 7.1 | 6.3 | 7.4 | 8.6 | 9.6 | 10.4 | 11.4 | 11.5 |
| **S5 High-grade squamous intraepithelial lesion** | | | | | | | | |
| Number | 15,407 | 16,199 | 15,342 | 16,438 | 16,491 | 15,505 | 15,317 | 16,117 |
| Per 100 cytology tests | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.8 | 0.8 |
| Per cent of squamous abnormalities | 11.6 | 11.8 | 12.0 | 13.2 | 13.8 | 14.0 | 14.5 | 14.2 |
| **S6 High-grade squamous intraepithelial lesion with possible microinvasion/ invasion** | | | | | | | | |
| Number | 422 | 447 | 318 | 316 | 290 | 287 | 313 | 310 |
| 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 | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 |
| **S7 Squamous cell carcinoma** | | | | | | | | |
| Number | 154 | 148 | 150 | 154 | 126 | 141 | 178 | 155 |
| 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 | 0.1 | 0.2 | 0.1 |
| **All squamous abnormalities** | | | | | | | | |
| Number | 133,392 | 137,806 | 127,735 | 124,399 | 119,400 | 110,614 | 105,692 | 113,321 |
| Crude rate | 6.6 | 6.7 | 6.3 | 5.9 | 5.8 | 5.3 | 5.2 | 5.5 |
| AS rate | 6.5 | 6.6 | 6.2 | 5.8 | 5.8 | 5.3 | 5.3 | 5.5 |
| 95% CI | 6.5–6.5 | 6.5–6.6 | 6.2–6.2 | 5.8–5.9 | 5.7–5.8 | 5.2–5.3 | 5.2–5.3 | 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 cytology register data.

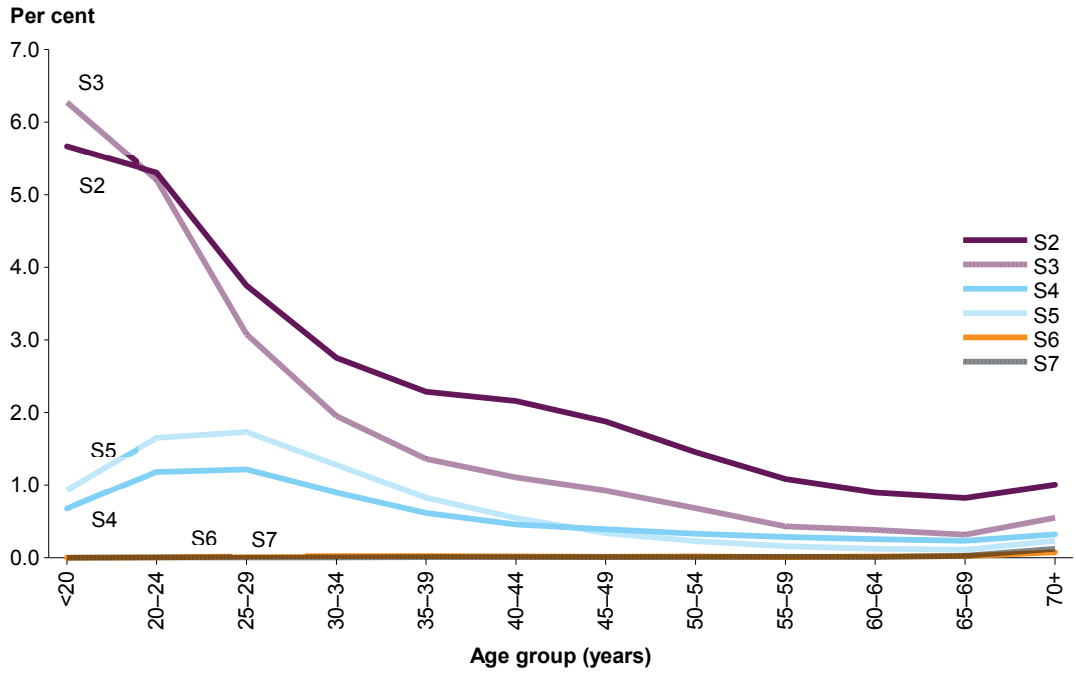
Possible high-grade squamous intraepithelial lesions (S4) increased from 2005 to 2011, although remained a constant 0.5 or 0.6 per 100 cytology tests, whereas high-grade squamous intraepithelial lesions (S5) have remained relatively steady both in number and as a per cent of cytology tests across all years from 2004 to 2011.

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 2011 was primarily driven by an increase in possible low-grade intraepithelial lesions, and to a lesser extent possible high-grade intraepithelial lesions, and has occurred despite a decrease in the number of low-grade intraepithelial lesions.

The increase in possible low-grade intraepithelial lesions in 2011 is in opposition to the trend for the years before 2011, and is an unexpected finding. Trends for individual states and territories were examined to assess how widespread this trend was—of note almost all states and territories experienced a clear increase in possible low-grade squamous intraepithelial lesions in 2011 following a decrease from 2009 to 2010. The reason for this comprehensive and sudden increase in this type of abnormality is unclear.

## Squamous abnormalities by age




*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 cytology register data.

**Figure 3.6: Squamous abnormalities detected by cytology in women by age, 2011**

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 four squamous abnormalities were at their lowest in women aged 65–69 (Figure 3.6). 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 499,123 cytology tests performed for women under 30, there were just 9 cases of squamous cell carcinoma detected).

## Endocervical abnormalities detected by cytology in 2011

In 2011, there were 115,026 abnormalities detected by cytology in women aged 20–69. Of these 1,705 were endocervical (glandular) in origin—821 atypical endocervical cells of uncertain significance, 806 high-grade, and 78 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 2011 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 48.2% of all endocervical abnormalities detected in 2011.

Possible high-grade endocervical glandular lesions (E3) and adenocarcinoma *in situ* (E4) were the next most frequent endocervical abnormalities, at 29.3% and 16.6% of endocervical abnormalities, respectively. Adenocarcinoma *in situ* with possible microinvasion/invasion (E5) was rare at 1.3%, and adenocarcinoma (E6) slightly more frequent at 4.6% of endocervical abnormalities in 2011 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 4.6% of endocervical abnormalities in 2011, compared with squamous cell carcinoma, which comprised just 0.1% of squamous abnormalities in that year.

## Endocervical abnormality trends

Similar to squamous abnormalities, and following the same trend noted for low-grade, high-grade and all abnormalities in the earlier section 'Abnormality trends', the overall number of endocervical abnormalities decreased from 3,618 in 2004 to 1,569 in 2010, before increasing to 1,705 in 2011. However, the proportion of endocervical abnormalities between 2009 and 2011 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) and possible high-grade endocervical glandular lesions (E3). Atypical endocervical cells of uncertain significance decreased from 1,886 in 2004 to 714 in 2010, and then increased to 821 in 2011 – although comprising the same per cent of cytology

tests in 2009 to 2011 (Table 3.11). A change in the management guidelines for this abnormality in 2006 may account for the overall decrease from 2006 to 2010 (current Guidelines recommend this be managed as a high-grade abnormality, whereas previous Guidelines recommended this be managed as a low-grade abnormality), but the reason for the apparent reversal of this trend in 2011 is not clear.

Similarly, possible high-grade endocervical glandular lesions decreased from 1,344 in 2004 to 435 in 2010, before increasing to 500 in 2011 (Table 3.11).

**Table 3.11: Endocervical abnormalities detected by cytology in women aged 20–69, by endocervical category, 2004 to 2011**

| Endocervical category | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| **E2 Atypical endocervical cells of uncertain significance** | | | | | | | | |
| Number | 1,886 | 1,924 | 1,372 | 1,152 | 1,020 | 746 | 714 | 821 |
| Per cent of cytology tests | 0.09 | 0.09 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.04 |
| Per cent of endocervical abnormalities | 52.1 | 59.9 | 54.9 | 56.4 | 51.0 | 47.4 | 45.5 | 48.2 |
| **E3 Possible high-grade endocervical glandular lesion** | | | | | | | | |
| Number | 1,344 | 887 | 724 | 510 | 562 | 461 | 435 | 500 |
| Per cent of cytology tests | 0.07 | 0.04 | 0.04 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 |
| Per cent of endocervical abnormalities | 37.1 | 27.6 | 29.0 | 25.0 | 28.1 | 29.3 | 27.7 | 29.3 |
| **E4 Adenocarcinoma *in situ*** | | | | | | | | |
| Number | 276 | 274 | 283 | 277 | 299 | 283 | 305 | 283 |
| Per cent of cytology tests | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 |
| Per cent of endocervical abnormalities | 7.6 | 8.5 | 11.3 | 13.6 | 15.0 | 18.0 | 19.4 | 16.6 |
| **E5 Adenocarcinoma *in situ* with possible microinvasion/invasion** | | | | | | | | |
| Number | 45 | 48 | 42 | 29 | 34 | 24 | 33 | 23 |
| 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 | 1.2 | 1.5 | 1.7 | 1.4 | 1.7 | 1.5 | 2.1 | 1.3 |
| **E6 Adenocarcinoma** | | | | | | | | |
| Number | 67 | 77 | 78 | 75 | 85 | 60 | 82 | 78 |
| 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 | 1.9 | 2.4 | 3.1 | 3.7 | 4.3 | 3.8 | 5.2 | 4.6 |
| **All endocervical abnormalities** | | | | | | | | |
| Number | 3,618 | 3,210 | 2,499 | 2,043 | 2,000 | 1,574 | 1,569 | 1,705 |
| Crude rate | 0.18 | 0.16 | 0.12 | 0.10 | 0.10 | 0.08 | 0.08 | 0.08 |
| AS rate | 0.17 | 0.15 | 0.12 | 0.10 | 0.10 | 0.07 | 0.08 | 0.08 |
| 95% CI | 0.17–0.18 | 0.15–0.16 | 0.12–0.13 | 0.09–0.10 | 0.09–0.10 | 0.07–0.08 | 0.07–0.08 | 0.08–0.09 |

*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 cytology register data.

In contrast, high-grade endocervical glandular abnormalities have remained relatively steady both in number and as a per cent of cytology tests across all years from 2004 to 2011. The rarer high-grade endocervical glandular abnormalities with possible microinvasion/ invasion (E5) and adenocarcinoma (E6) have not greatly affected the overall trends.

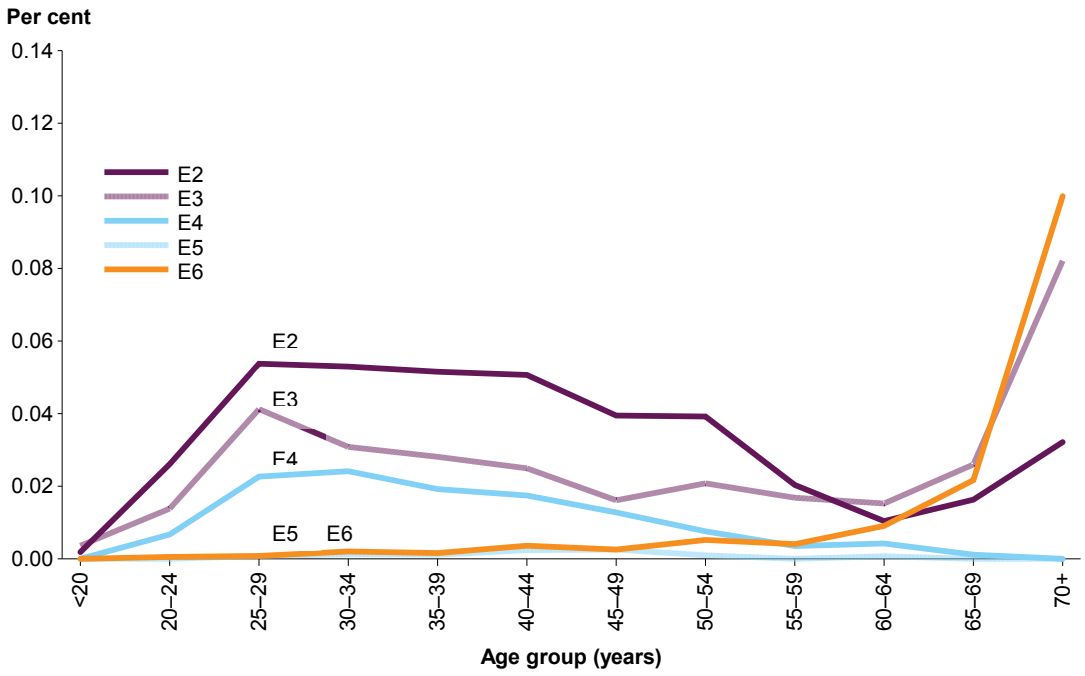
Thus it would seem that the overall increase in endocervical abnormalities between 2010 and 2011 has been primarily driven by an increase in atypical endocervical cells of uncertain significance and possible high-grade endocervical glandular lesions.

The small numbers in individual states and territories make it difficult to ascertain how widespread these trends may be nationally.

## 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. Possible high-grade glandular abnormalities (E3) also peaked at age 25–29, whereas adenocarcinoma *in situ* (E4) peaked at age 30–34 (Figure 3.7).

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 cytology register data.

**Figure 3.7: Endocervical abnormalities detected by cytology in women by age, 2011**

# 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, provide 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 2011.

## What the data tell us about histology

### Trends

Between 2010 and 2011, the (age-standardised) detection of high-grade abnormalities in women aged 20–69 decreased slightly from 8.5 to 8.4 per 1,000 women screened.

Detection in women under 20 continued to decrease between 2010 and 2011, from 7.8 to 7.1 per 1,000 women screened.

A decrease in high-grade abnormalities detected in women aged 20–24 in 2011 also contributed to a shift in the historical peak from women aged 20–24 to women aged 25–29 in 2011.

### Histology in 2011

There were 79,026 cervical histology tests performed in 2011, with 75,589 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 40.5:1 compared with the ratio of high-grade endocervical abnormalities to adenocarcinoma of 2.9:1.

## 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 cytology 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 2011

In 2011, there were 79,026 cervical histology tests performed, 75,589 (95.7%) of these for women aged 20–69 (Table 4.2). Most histology tests were performed for women aged 20 to 49, with a peak of 12,940 tests for women aged 25–29 (Figure 4.1A), this being 16.4% of all histology tests in 2011.

It is reasonable to expect an increase in the number of histology tests in 2011, since there was a marked increase in the number of abnormalities detected by cytology in that year, including the highest number of high-grade abnormalities ever detected, for which the Guidelines recommend subsequent histology to confirm the presence of high-grade disease prior to treatment.

## Histology trends

The number of cervical histology tests performed for women aged 20–69 decreased from 76,276 in 2004 to between 72,000 and 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. The number of histology tests increased between 2010 and 2011 for all age groups except for under 20 and 20–24, for which there was a decrease. The greatest increase was an 11.5% increase for women aged 40–44 (Table 4.2).

This appears to be a direct result of the increased detection of high-grade abnormalities in 2011 compared with 2010, noted in the earlier Cytology section, since the greatest increase in the number of high-grade abnormalities was also for women aged 40–44 (a 19.2% increase from 2010), and there was a also a mirroring of the decrease in women under 20 and 20–24 noted above.

**Table 4.2: Number of histology tests by year, 2004 to 2011**

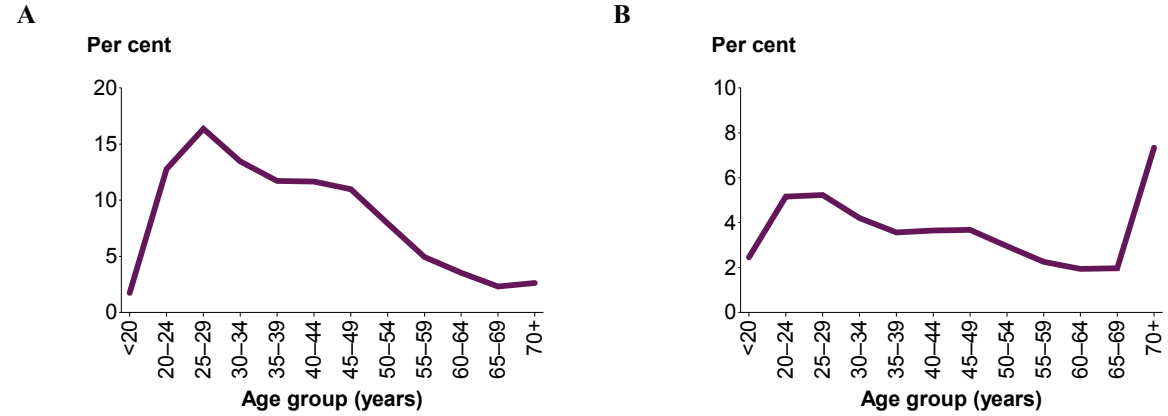
| Age group (years) | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| <20 | 3,462 | 3,386 | 2,909 | 2,296 | 2,089 | 1,689 | 1,454 | 1,380 |
| 20–24 | 13,247 | 13,572 | 12,655 | 11,967 | 12,136 | 11,187 | 10,519 | 10,089 |
| 25–29 | 12,858 | 12,854 | 12,490 | 12,364 | 12,621 | 12,625 | 12,690 | 12,940 |
| 30–34 | 11,387 | 11,224 | 10,448 | 9,975 | 9,989 | 10,009 | 9,839 | 10,635 |
| 35–39 | 9,314 | 9,056 | 8,716 | 8,819 | 9,037 | 8,985 | 8,753 | 9,259 |
| 40–44 | 9,391 | 9,017 | 8,671 | 8,309 | 8,249 | 8,280 | 8,265 | 9,218 |
| 45–49 | 8,266 | 7,998 | 7,878 | 8,107 | 8,202 | 8,348 | 8,584 | 8,681 |
| 50–54 | 5,386 | 5,226 | 5,043 | 5,290 | 5,382 | 5,623 | 5,742 | 6,259 |
| 55–59 | 3,277 | 3,249 | 3,318 | 3,271 | 3,374 | 3,441 | 3,562 | 3,892 |
| 60–64 | 1,817 | 1,921 | 1,953 | 2,102 | 2,324 | 2,395 | 2,600 | 2,802 |
| 65–69 | 1,333 | 1,253 | 1,347 | 1,397 | 1,478 | 1,501 | 1,680 | 1,814 |
| 70+ | 1,705 | 1,708 | 1,533 | 1,523 | 1,728 | 1,817 | 1,915 | 2,057 |
| **All ages** | **81,448** | **80,466** | **76,972** | **75,423** | **76,612** | **75,904** | **75,611** | **79,026** |
| **Ages 20–69** | **76,276** | **75,370** | **72,519** | **71,601** | **72,792** | **72,394** | **72,234** | **75,589** |

*Source:* AIHW analysis of state and territory cervical cytology 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 to take into account changes in the number of cytology tests when interpreting the number of histology tests.

In 2011, for all women aged 20–69, there were 3.7 histology tests for every 100 cytology tests performed. Within this age range, it was highest for women aged 20–24 and 25–29, indicating that, for every 100 cytology tests, women aged 20 to 29 had the greatest number of histology tests performed. This equated to 5.2 histology tests for every 100 cytology tests, decreasing to 3.0 histology tests for every 100 cytology tests by the time women reach 50–54, with only 2.0 histology tests for every 100 cytology tests for women aged 65–69 (Figure 4.1B).




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

**Figure 4.1: Proportion of histology tests by age (A) and histology tests per 100 cytology tests by age (B), 2011**

Histology as a proportion of cytology closely follows the detection of high-grade abnormalities by cytology, with two 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.

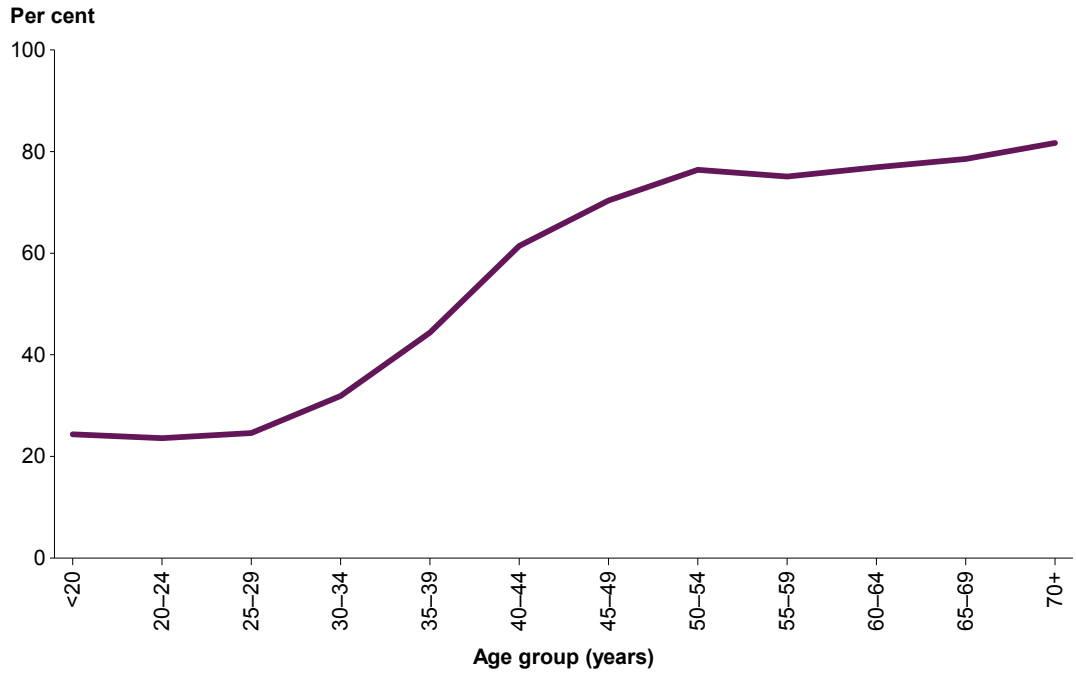
## Negative histology in 2011

In 2011, of the 75,589 histology tests performed, 36,117 (47.8%) were negative.

> 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 had the lowest proportion of histology tests that were negative (23.6%), increasing with increasing age, with 81.7% of all histology tests performed for women aged

70 and over negative (Figure 4.2). The high proportion of negative histology tests in older women is likely related to cervical histology from hysterectomies due to benign conditions, since cervical cytology registers are sent all cervical histology results, including benign conditions unrelated to abnormalities.




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

**Figure 4.2: Proportion of negative histology tests by age, 2011**

## Abnormalities detected by histology in 2011

In 2011, there were 38,122 abnormalities (low-grade, high-grade or cancer) detected in the 75,589 histology tests for women aged 20–69 (50.4 per 100 histology tests). Of these abnormalities, 14,566 (38.3%) were low-grade and 22,676 (59.6%) were high-grade, cancer making up the remainder (Table 4.3).

## Abnormality trends

Low-grade abnormalities detected by histology decreased from 20,239 in 2004 to 14,018 in 2010 for women aged 20–69 (a decrease from 23.0 to 17.2 per 100 histology tests, age-standardised), rising slightly to 14,566 in 2011, although with a similar rate of 17.4 (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 introduced in 2006 (Box 4.1), although the 2011 data suggests the trend may have stabilised following this change (2012 data are required to see if this is true).

### 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, but 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, 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, but 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 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, 2004 to 2011**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| **Low-grade abnormalities** | | | | | | | | |
| Number | 20,239 | 19,576 | 18,003 | 16,602 | 15,347 | 14,576 | 14,018 | 14,566 |
| Crude rate | 26.5 | 26.0 | 24.8 | 23.2 | 21.1 | 20.1 | 19.4 | 19.3 |
| AS rate | 23.0 | 22.2 | 21.4 | 20.2 | 18.4 | 17.6 | 17.2 | 17.4 |
| 95% CI | 22.7–23.4 | 21.9–22.6 | 21.1–21.8 | 19.9–20.6 | 18.1–18.7 | 17.3–17.9 | 16.9–17.5 | 17.1–17.7 |
| **High-grade abnormalities** | | | | | | | | |
| Number | 19,681 | 20,200 | 20,063 | 21,067 | 22,102 | 22,031 | 22,104 | 22,676 |
| Crude rate | 25.8 | 26.8 | 27.7 | 29.4 | 30.4 | 30.4 | 30.6 | 30.0 |
| AS rate | 21.2 | 22.0 | 22.9 | 24.4 | 25.2 | 25.4 | 25.9 | 25.9 |
| 95% CI | 20.9–21.5 | 21.6–22.3 | 22.6–23.3 | 24.1–24.8 | 24.8–25.5 | 25.0–25.7 | 25.6–26.3 | 25.5–26.2 |
| **All abnormalities (low-grade, high-grade and cancer)** | | | | | | | | |
| Number | 40,653 | 40,603 | 38,825 | 38,476 | 38,325 | 37,380 | 36,940 | 38,122 |
| Crude rate | 53.3 | 53.9 | 53.5 | 53.7 | 52.7 | 51.6 | 51.1 | 50.4 |
| AS rate | 45.5 | 45.8 | 45.8 | 46.2 | 45.1 | 44.4 | 44.4 | 44.6 |
| 95% CI | 45.0–46.0 | 45.3–46.2 | 45.3–46.3 | 45.7–46.7 | 44.7–45.6 | 43.9–44.9 | 44.0–44.9 | 44.1–45.0 |

*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 cytology register data.

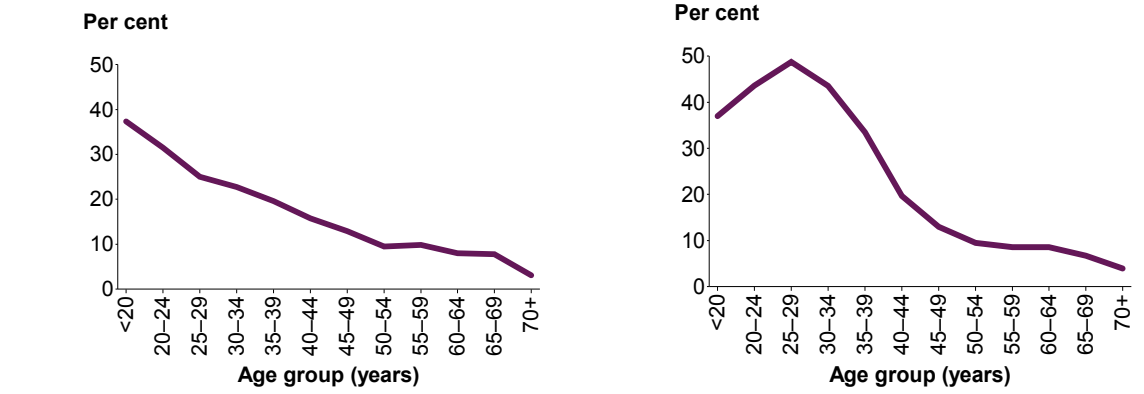
In contrast, the detection of high-grade abnormalities by histology increased from 19,681 in 2004 to 22,676 in 2011 for women aged 20–69 (an increase from 21.2 to 25.9 per 100 histology tests, age-standardised) (Table 4.3).

Although the (age-standardised) detection rate did not change between 2010 and 2011, there were differences between age groups, with an increase in the detection rate for women aged 35 and over, and a decrease in the detection of high-grade abnormalities in women aged 34 and under – with the largest decrease in women aged 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, which 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).

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

## Abnormalities by age

Figure 4.3A shows the age distribution of all low-grade abnormalities combined, and Figure 4.3B the age distribution of all high-grade abnormalities combined.




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

**Figure 4.3: Abnormalities detected by histology by age, 2011**

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 4.3A).

The age-distribution of high-grade abnormalities was different, being highest in women aged 20–34, followed by women under 20, then those aged 35–39, and thereafter decreasing sharply with increasing age (Figure 4.3B).

## High-grade abnormality detection rate in 2011

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 2011, there were 16,641 women with a high-grade abnormality detected by histology, which, when presented as a proportion of the 1,984,259 women screened in that year, equates to a high-grade abnormality detection rate of 8.4 for women aged 20–69 (Table 4.4). This means that, for every 1,000 women screened, 8.4 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, 2004 to 2011**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| <20 | 14.5 | 13.2 | 13.2 | 11.6 | 10.8 | 8.9 | 7.8 | 7.1 |
| 20–24 | 20.3 | 20.2 | 19.9 | 18.9 | 21.3 | 19.9 | 19.7 | 17.4 |
| 25–29 | 17.7 | 17.7 | 17.7 | 17.8 | 19.3 | 19.0 | 19.9 | 19.4 |
| 30–34 | 11.6 | 11.6 | 11.6 | 11.5 | 12.7 | 12.8 | 13.6 | 14.0 |
| 35–39 | 7.1 | 7.0 | 7.2 | 7.3 | 7.8 | 7.6 | 8.3 | 9.0 |
| 40–44 | 4.6 | 4.4 | 4.7 | 4.7 | 4.8 | 4.7 | 4.9 | 5.5 |
| 45–49 | 3.1 | 3.1 | 3.2 | 3.2 | 3.3 | 3.3 | 3.5 | 3.8 |
| 50–54 | 1.7 | 1.7 | 1.9 | 1.9 | 2.0 | 1.9 | 2.1 | 2.2 |
| 55–59 | 1.5 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.7 | 1.7 |
| 60–64 | 1.2 | 1.4 | 1.2 | 1.2 | 1.3 | 1.2 | 1.2 | 1.4 |
| 65–69 | 1.0 | 1.0 | 1.4 | 1.3 | 1.3 | 1.1 | 1.1 | 1.1 |
| 70+ | 3.1 | 3.0 | 2.8 | 2.4 | 2.6 | 2.6 | 3.4 | 2.7 |
| **Ages 20–69** | | | | | | | | |
| Crude rate | 7.9 | 7.9 | 7.8 | 7.8 | 8.4 | 8.1 | 8.4 | 8.4 |
| AS rate | 7.7 | 7.7 | 7.8 | 7.7 | 8.3 | 8.1 | 8.5 | 8.4 |
| 95% CI | 7.6–7.9 | 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 |

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.

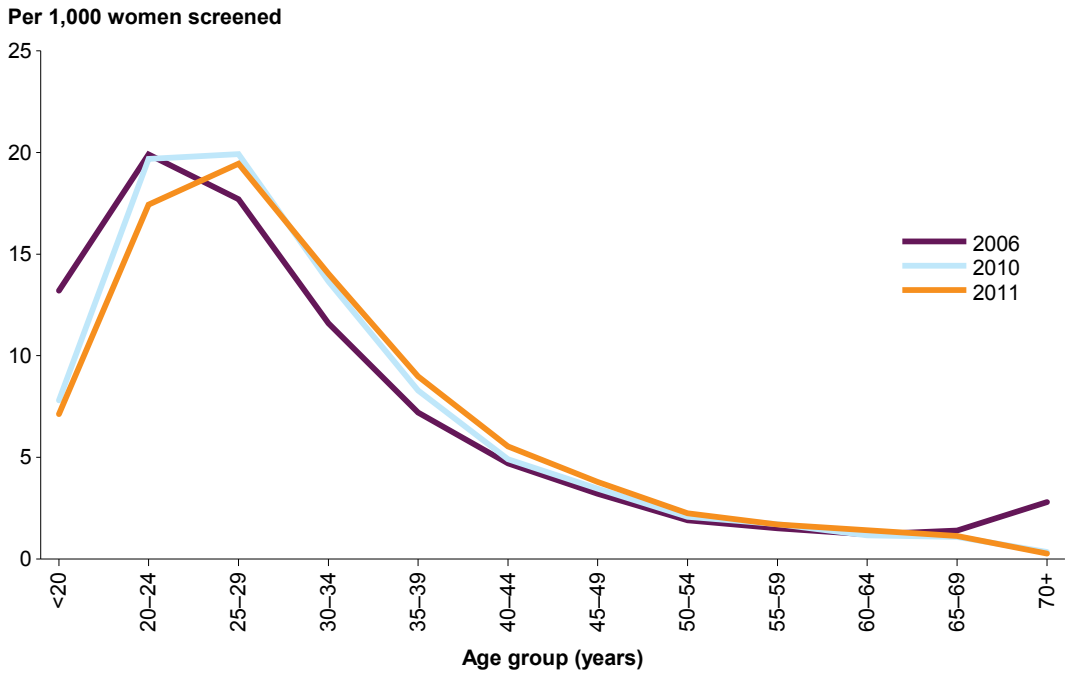
*Source:* AIHW analysis of state and territory cervical cytology register data.

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 2004 to 2007, increased to above 8 in 2008, where it remained from 2008 to 2011 (Table 4.4).

However, in contrast with the overall trend of increasing detection over time, there has been a steady decrease in high-grade abnormality detection in women under 20. Highest at 14.5 in 2004, this decreased to 7.1 women with high-grade histology per 1,000 women screened in 2011 (Table 4.4; Figure 4.4).

More recently, between 2010 and 2011, there was a decrease in high-grade abnormality detection from 7.8 to 7.1 for women under 20, and from 19.7 to 17.4 for women aged 20–24. 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. 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) 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 2011.

The decreases in the younger age groups occur despite an increase in the overall high-grade abnormality rate from 2007 to 2011, which appears to be due to an increase in the detection of high-grade abnormalities in women aged 25 to 39, a trend continued from 2010 to 2011 (Table 4.4; Figure 4.4).




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

**Figure 4.4: High-grade abnormality detection rate by age, 2006, 2010 and 2011**

## High-grade abnormality detection rate by age

In 2011, the high-grade abnormality detection rate was highest for women aged 25–29 at 19.4 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 14.0 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 2011, the high-grade abnormality detection rate varied across states and territories between 6.2 and 11.6 per 1,000 women screened (Table 4.5).

**Table 4.5: High-grade abnormality detection rate in women aged 20–69, by state and territory, 2011**

| | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| AS rate | 9.2 | 7.7 | 8.7 | 8.0 | 7.5 | 9.5 | 6.2 | 11.6 | 8.4 |
| 95% CI | 8.9–9.4 | 7.4–7.9 | 8.4–9.0 | 7.6–8.4 | 7.1–8.0 | 8.6–10.4 | 5.4–7.1 | 10.0–13.4 | 8.3–8.6 |

*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 cytology register data.

## Squamous abnormalities detected by histology in 2011

In 2011, of the 38,122 abnormalities detected by histology in women aged 20–69, 36,996 were squamous in origin—14,504 low-grade, 21,941 high-grade, and 551 squamous cell carcinoma. This was 48.9 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 39,786 in 2004 to 35,881 in 2010, before increasing to 36,996 in 2011. As a per cent of all histology tests, this was similar for all years from 2004 to 2011, decreasing only very slightly over this time (Table 4.6).

In 2011, 39.2% of squamous abnormalities were low-grade (HS02), with high-grade abnormalities (HS03)—incorporating CIN II and CIN III—the most frequent at 59.3%. Squamous cell carcinoma (HS04) was rarer at just 1.5% of all squamous abnormalities in 2011 for women aged 20–69 (Table 4.6).

Low-grade abnormalities have decreased substantially from 26.4 per 100 histology tests in 2004 to 19.2 in 2011. This is likely a direct effect of the introduction of the current NHMRC Guidelines 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.

**Table 4.6: Squamous abnormalities detected by histology in women aged 20–69, by squamous category, 2004 to 2011**

| | Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Squamous category** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** |
| **HS02 Low-grade squamous abnormality** | | | | | | | | |
| Number | 20,140 | 19,472 | 17,937 | 16,540 | 15,292 | 14,538 | 13,964 | 14,504 |
| Per 100 histology tests | 26.4 | 25.8 | 24.7 | 23.1 | 21.0 | 20.0 | 19.3 | 19.2 |
| Per cent of squamous abnormalities | 50.6 | 49.0 | 47.3 | 44.1 | 41.1 | 39.9 | 38.9 | 39.2 |
| **HS03 High-grade squamous abnormality** | | | | | | | | |
| Number | 19,176 | 19,705 | 19,508 | 20,437 | 21,411 | 21,379 | 21,389 | 21,941 |
| Per 100 histology tests | 25.1 | 26.1 | 26.9 | 28.5 | 29.4 | 29.5 | 29.6 | 29.0 |
| Per cent of squamous abnormalities | 48.2 | 49.6 | 51.5 | 54.5 | 57.5 | 58.7 | 59.6 | 59.3 |
| **HS04 Squamous cell carcinoma** | | | | | | | | |
| Number | 470 | 558 | 466 | 516 | 530 | 474 | 528 | 551 |
| Per 100 histology tests | 0.6 | 0.7 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| Per cent of squamous abnormalities | 1.2 | 1.4 | 1.2 | 1.4 | 1.4 | 1.3 | 1.5 | 1.5 |
| **All squamous abnormalities** | | | | | | | | |
| Number | 39,786 | 39,735 | 37,911 | 37,493 | 37,233 | 36,391 | 35,881 | 36,996 |
| Crude rate | 52.2 | 52.7 | 52.3 | 52.4 | 51.1 | 50.3 | 49.7 | 48.9 |
| AS rate | 44.3 | 44.5 | 44.5 | 44.7 | 43.5 | 43.0 | 43.0 | 43.1 |
| 95% CI | 43.8–44.8 | 44.0–45.0 | 44.0–45.0 | 44.2–45.2 | 43.1–44.0 | 42.5–43.4 | 42.5–43.5 | 42.6–43.5 |

*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 cytology register data.

High-grade abnormalities have increased concurrently with the decrease in low-grade abnormalities, from 25.1 to 29.0 per 100 histology tests, although 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 decreased in number, but not as a proportion of histology tests or squamous abnormalities between 2010 and 2011 (Table 4.6).

The literature advocates that the distinction between the high-grade squamous abnormalities CIN II and CIN III is important to preserve. 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 4.7).

In 2011, CIN II comprised 25.5% and CIN III 32.4% of the 16,329 squamous abnormalities in these states and territories, which equates to 11.2 and 14.2 per 100 histology tests respectively, for women aged 20–69.

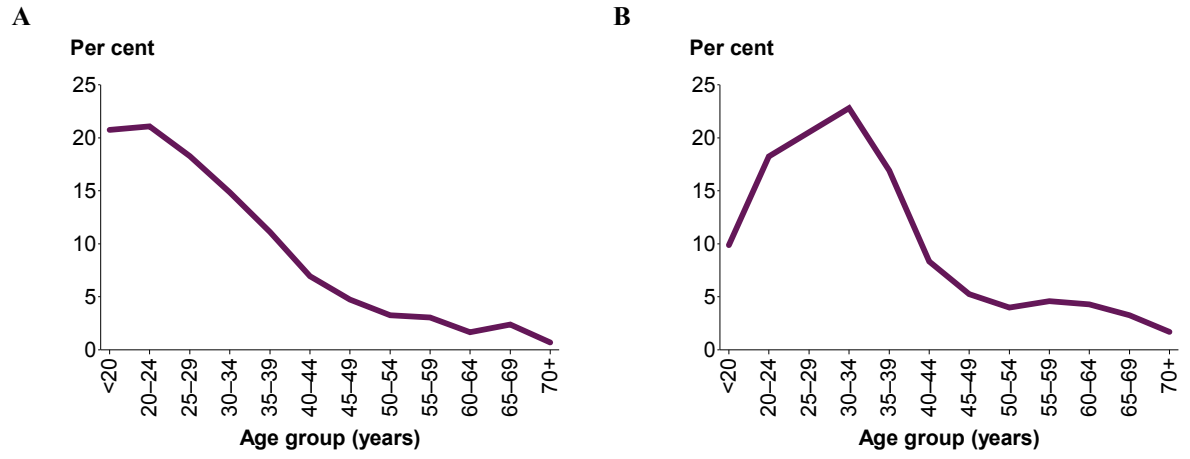
**Table 4.7: CIN II and CIN III in women aged 20–69, 2004 to 2011**

| | Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Squamous category** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** |
| **HS03.2 CIN II** | | | | | | | | |
| Number | 3,818 | 3,904 | 3,909 | 4,104 | 4,377 | 4,574 | 4,338 | 4,157 |
| Per 100 histology tests | 10.5 | 11.0 | 11.5 | 12.1 | 12.5 | 12.7 | 12.2 | 11.2 |
| Per cent of squamous abnormalities | 22.6 | 23.8 | 24.7 | 25.5 | 25.9 | 26.7 | 26.6 | 25.5 |
| **HS03.3 CIN III** | | | | | | | | |
| Number | 4,236 | 4,314 | 4,350 | 4,753 | 5,340 | 5,373 | 5,127 | 5,293 |
| Per 100 histology tests | 11.6 | 12.2 | 12.8 | 14.0 | 15.3 | 14.9 | 14.4 | 14.2 |
| Per cent of squamous abnormalities | 25.1 | 26.3 | 27.5 | 29.6 | 31.6 | 31.3 | 31.5 | 32.4 |

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

Between 2010 and 2011, there was a small decrease in the detection of CIN II from 4,338 to 4,157 or 12.2 to 11.2 per 100 histology tests (from 10.1 to 9.6 age-standardised), with this decrease mostly seen in women aged 25–29 and 30–34. While there was a small increase in the detection of CIN III from 5,127 in 2010 to 5,293 in 2011, these represented a similar number per 100 histology tests (both crude and age-standardised). Despite this, there was a clear decrease in CIN III for women under 20 from 14.6 to 9.9 per 100 histology tests, and a smaller decrease for women aged 20–24 from 19.8 to 18.2.

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




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

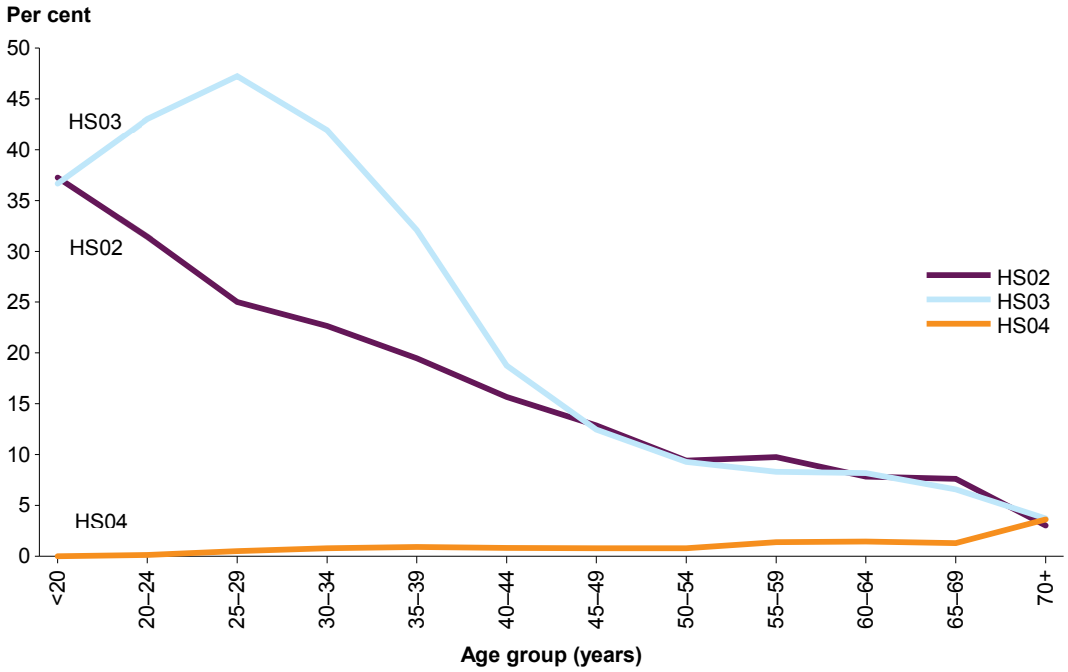
**Figure 4.5: CIN II (A) and CIN III (B) detected by histology by age, 2011**

Comparing the age distribution of CIN II and CIN III reveals that these abnormalities share similar trends, the main difference being that CIN II is most frequent in women under 25, while CIN III peaks in women aged 25–29 and is far less common in women under 25 (Figure 4.5).

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 4.5).

### 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.




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

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

**Figure 4.6: Squamous abnormalities detected by histology in women by age, 2011**

However, low-grade abnormalities peaked in women under 20, thereafter decreasing steadily with increasing age in an almost straight line, whereas high-grade abnormalities peaked in women aged 25–59, remain high in the younger age groups (including under 20) up to the age of 30–34, and thereafter fall 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 two) (Figure 4.6).

Although having far fewer occurrences, squamous cell carcinoma, rare in younger women, increased with age with a small peak from age 55–59 onwards (Figure 4.6).

## Endocervical abnormalities detected by histology in 2011

In 2011, of the 38,122 abnormalities detected by histology in women aged 20–69, 1,126 were endocervical in origin—62 atypia, 735 high-grade, 283 adenocarcinoma, 33 adenosquamous carcinoma, and 13 other carcinoma of the cervix. This was 1.5 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 867 in 2004 to 1,126 in 2011, with a concurrent increase in endocervical abnormalities per 100 histology tests from 1.23% to 1.48% (Table 4.8).

In 2011, 5.5% of endocervical abnormalities were atypia (HE02), 65.3% were high-grade abnormalities (HE03)—incorporating endocervical dysplasia and adenocarcinoma *in situ*, and 25.1% were adenocarcinoma. Adenosquamous carcinoma and other carcinoma of the cervix comprised 2.9% and 1.2% of endocervical abnormalities in 2011, respectively (Table 4.8).

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 2004 when there were 0.13 per 100 histology tests, the proportion of histology tests with the abnormality endocervical atypia in 2011 was 0.08 (Table 4.8).

In contrast, high-grade endocervical abnormalities increased from 0.66 per 100 histology tests in 2004 to 0.97 in 2011. Adenocarcinoma, adenosquamous carcinoma, and other carcinoma of the cervix all had similar detection levels between 2004 and 2011 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 older women (Figure 4.7).

Adenocarcinoma increased with age to a small peak in women aged 40–44, thereafter increasing with increasing age (Figure 4.7).

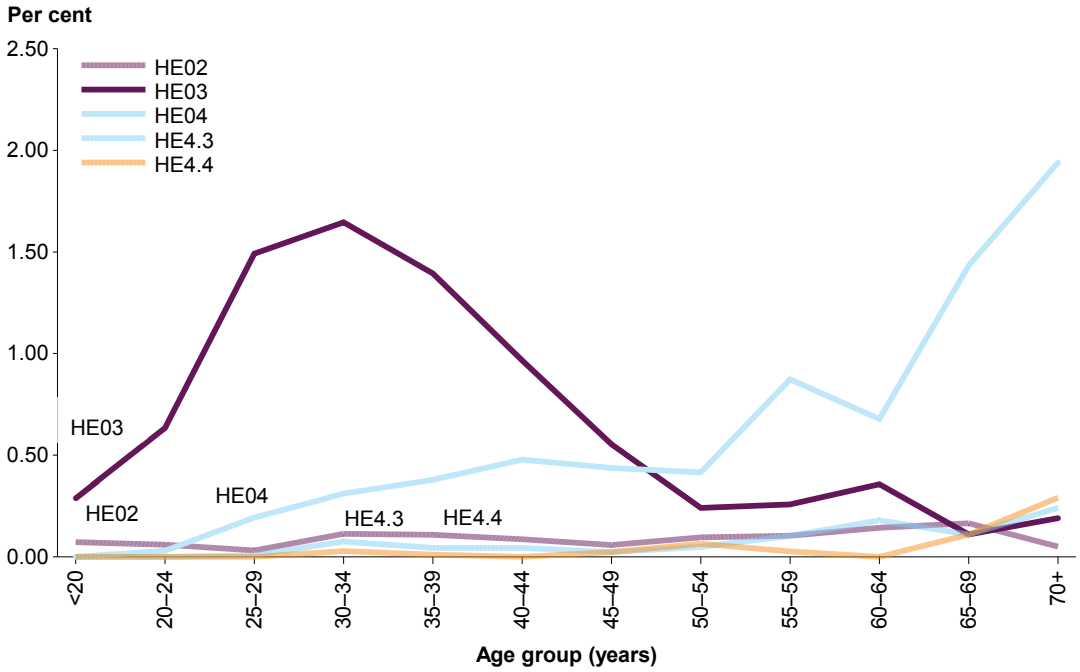
**Table 4.8: Endocervical abnormalities detected by histology in women aged 20–69, by endocervical category, 2004 to 2011**

| | Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Endocervical category** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** |
| **HE02 Endocervical atypia** | | | | | | | | |
| Number | 99 | 104 | 66 | 62 | 55 | 38 | 54 | 62 |
| Per cent of cytology tests | 0.13 | 0.14 | 0.09 | 0.09 | 0.08 | 0.05 | 0.07 | 0.08 |
| Per cent of endocervical abnormalities | 11.4 | 12.0 | 7.2 | 6.3 | 5.0 | 3.8 | 5.1 | 5.5 |
| **HE03 High-grade endocervical abnormality** | | | | | | | | |
| Number | 505 | 495 | 555 | 630 | 691 | 652 | 715 | 735 |
| Per cent of cytology tests | 0.66 | 0.66 | 0.77 | 0.88 | 0.95 | 0.90 | 0.99 | 0.97 |
| Per cent of endocervical abnormalities | 58.2 | 57.0 | 60.7 | 64.1 | 63.3 | 65.9 | 67.5 | 65.3 |
| **HE04.1 & 4.2 Adenocarcinoma** | | | | | | | | |
| Number | 229 | 235 | 257 | 245 | 311 | 263 | 248 | 283 |
| Per cent of cytology tests | 0.30 | 0.31 | 0.35 | 0.34 | 0.43 | 0.36 | 0.34 | 0.37 |
| Per cent of endocervical abnormalities | 26.4 | 27.1 | 28.1 | 24.9 | 28.5 | 26.6 | 23.4 | 25.1 |
| **HE04.3 Adenosquamous carcinoma** | | | | | | | | |
| Number | 22 | 19 | 15 | 25 | 21 | 20 | 21 | 33 |
| Per cent of cytology tests | 0.03 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 |
| Per cent of endocervical abnormalities | 2.5 | 2.2 | 1.6 | 2.5 | 1.9 | 2.0 | 2.0 | 2.9 |
| **HE04.4 Carcinoma of the cervix (other)** | | | | | | | | |
| Number | 12 | 15 | 21 | 21 | 14 | 16 | 21 | 13 |
| Per cent of cytology tests | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 | 0.02 |
| Per cent of endocervical abnormalities | 1.4 | 1.7 | 2.3 | 2.1 | 1.3 | 1.6 | 2.0 | 1.2 |
| **All endocervical abnormalities** | | | | | | | | |
| Number | 867 | 868 | 914 | 983 | 1,092 | 989 | 1,059 | 1,126 |
| Crude rate | 1.14 | 1.15 | 1.26 | 1.37 | 1.50 | 1.37 | 1.47 | 1.49 |
| AS rate | 1.23 | 1.26 | 1.35 | 1.46 | 1.59 | 1.41 | 1.50 | 1.48 |
| 95% CI | 1.14–1.32 | 1.17–1.36 | 1.26–1.46 | 1.36–1.56 | 1.49–1.70 | 1.32–1.51 | 1.40–1.60 | 1.39–1.57 |

*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 cytology register data.




*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 cytology register data.

**Figure 4.7: Endocervical abnormalities detected by histology in women by age, 2011**

# 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 2010. 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 2010 were similar to those for high-grade cytology performed in 2009—69.8% compared with 70.0% for high-grade squamous cytology, and 73.5% compared with 71.2% for high-grade endocervical cytology.

**Correlation between cytology and histology in 2010**

Of the cytology tests performed in 2010 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 69.8%

Of the cytology tests performed in 2010 that predicted adenocarcinoma *in situ*, 70.7% were confirmed to be high-grade disease on histology.

The positive predictive value of all high-grade endocervical cytology was 73.5%.

## 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 cytology 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 cytology 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 2010 for which a squamous histology result occurred within 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 2010, 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 | 7,071 | 16.3 |
| S3 Low-grade | 34,311 | 7,924 | 23.1 |
| S4 Possible high-grade | 12,088 | 8,782 | 72.7 |
| S5 High-grade | 15,317 | 13,279 | 86.7 |
| S6 High-grade plus | 313 | 276 | 88.2 |
| S7 Squamous cell carcinoma | 178 | 155 | 87.1 |

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

## Correlation between squamous cytology and squamous histology

Table 5.2 shows the correlation that exists between a squamous cytology prediction in 2010 and the squamous histology finding within 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 2010**

| | Histology finding | | |
|---|---|---|---|
| Cytology prediction | HS02 Low-grade | HS03 High-grade | HS04 Squamous cell carcinoma |
| S1 Negative | 3,241 (18.6%) | 996 (5.7%) | 36 (0.2%) |
| S2 Possible low-grade | 3,026 (42.8%) | 1,340 (19.0%) | 4 (0.1%) |
| S3 Low-grade | 4,059 (51.2%) | 1,789 (22.6%) | 1 (0.0%) |
| S4 Possible high-grade | 2,022 (23.0%) | 4,755 (54.1%) | 55 (0.6%) |
| S5 High-grade | 1,704 (12.8%) | 10,331 (77.8%) | 186 (1.4%) |
| S6 High-grade plus | 14 (5.1%) | 185 (67.0%) | 70 (25.4%) |
| S7 Squamous cell carcinoma | 2 (1.3%) | 37 (23.9%) | 111 (71.6%) |

*Notes*

1. Numbers and per cent of each squamous cytology result category 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 cytology 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 16% of possible low-grade and 23% low-grade squamous abnormalities were followed by histology (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 2010 that were followed by histology within 6 months, 14,995 predicted a low-grade squamous abnormality—7,071 possible low-grade (S2) and 7,924 low-grade (S3) (Table 5.1).

Of the 7,071 predicted possible low-grade squamous abnormalities (S2), 3,026 (42.8%) were found to be a low-grade squamous abnormality on histology; of the 7,924 predicted low-grade squamous abnormalities (S3), 4,059 (51.2%) were found to be a low-grade squamous abnormality on histology (Table 5.2).

Overall, 47.2% 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 50.4% 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 2010 that were followed by histology within 6 months, 22,337 predicted a high-grade squamous abnormality—8,782 possible high-grade (S4), 13,279 high-grade (S5) and 276 high-grade with possible microinvasion/invasion (S6) (Table 5.1).

Of the 8,782 predicted possible high-grade squamous abnormalities (S4), 4,755 (54.1%) were found to be a high-grade squamous abnormality on histology; of the 13,279 predicted high-grade squamous abnormalities (S5), 10,331 (77.8%) were found to be a high-grade squamous abnormality on histology; and of the 276 predicted high-grade squamous abnormalities with possible microinvasion/invasion (S6), 185 (67.0%) 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, 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 67.0% found to be high-grade, and 25.4% 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, 69.8% 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 68.4% were found to be a true high-grade squamous abnormality. Further, in these data squamous cytology predicted 78.6% of the true cases of high-grade squamous disease identified.

**Squamous cell carcinoma cytology**

Of all cytology tests performed in 2010 that were followed by histology within 6 months, 155 predicted squamous cell carcinoma (S7) (Table 5.1). Of these predicted abnormalities, 111 (71.6%) were found to be squamous cell carcinoma on histology (Table 5.2).

There were 352 abnormalities graded as squamous cell carcinoma on histology within 6 months of cytology predictions other than squamous cell carcinoma, with 311 after high-grade squamous abnormalities, 5 after low-grade squamous abnormalities, and 36 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, 2009 and 2010**

| | 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)** |

*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 cytology register data.

## Proportion of endocervical abnormalities followed by histology

To provide context for the endocervical correlation results, the proportion of endocervical abnormalities detected in 2010 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 2010, 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 | 714 | 219 | 30.7 |
| E3 Possible high-grade | 435 | 213 | 49.0 |
| E4 Adenocarcinoma *in situ* | 305 | 239 | 78.4 |
| E5 Adenocarcinoma *in situ* plus | 33 | 23 | 69.7 |
| E6 Adenocarcinoma | 82 | 43 | 52.4 |

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

## Correlation between endocervical cytology and endocervical histology

The correlation that exists between an endocervical cytology prediction in 2010 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.

Also important to realise when interpreting the correlation between endocervical cytology and histology is 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), all of which 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 2010**

| | Histology finding | | |
|---|---|---|---|
| **Cytology prediction** | **HE02 Endocervical atypia** | **HE03 High-grade** | **HE04.1&4.2 Adenocarcinoma** |
| E1 Negative | 50 (0.2%) | 273 (1.2%) | 94 (0.4%) |
| E2 Atypical endocervical cells of uncertain significance | 3 (1.4%) | 49 (22.4%) | 12 (5.5%) |
| E3 Possible high-grade | 2 (0.9%) | 99 (46.5%) | 21 (9.9%) |
| E4 Adenocarcinoma *in situ* | 2 (0.8%) | 169 (70.7%) | 43 (18.0%) |
| E5 Adenocarcinoma *in situ* plus | 0 (0.0%) | 8 (34.8%) | 9 (39.1%) |
| E6 Adenocarcinoma | 0 (0.0%) | 9 (20.9%) | 20 (46.5%) |

*Notes*

1. Numbers and per cent 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 cytology 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, but 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), but rather 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 714 cytology tests performed in 2010 that identified abnormal endocervical cells where the pathologist was uncertain of their significance; 219 (30.7%) 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 219 that were followed by histology within 6 months, 49 (22.4%) were found to be a high-grade endocervical abnormality on histology, and 12 (5.5%) were found to be adenocarcinoma on histology, with the majority (70.8%) 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 2010 that were followed by histology within 6 months, 475 predicted a high-grade endocervical abnormality—213 possible high-grade (E3), 239 adenocarcinoma *in situ* (E4) and 23 adenocarcinoma *in situ* with possible microinvasion/invasion (E5) (Table 5.4).

Of the 213 predicted possible high-grade endocervical abnormalities (E3), 99 (46.5%) were found to be a high-grade endocervical abnormality on histology. Of the 239 predicted adenocarcinoma *in situ* (E4), 169 (70.7%) were found to be a high-grade endocervical abnormality on histology. Of the 23 predicted adenocarcinoma *in situ* with possible microinvasion/invasion (E5), 8 (34.8%) 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 (8 found to be high-grade and 9 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, 73.5% 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 58.1% were found to be a true high-grade endocervical abnormality. Further, in these data endocervical cytology predicted 45.5% 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, 2009 and 2010**

| | 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)** |

*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 cytology register data.

### Adenocarcinoma cytology

Of all cytology tests performed in 2010 that were followed by histology within 6 months, 43 predicted adenocarcinoma (E6) (Table 5.4). Of these predicted abnormalities, 20 (46.5%) were found to be adenocarcinoma on histology (Table 5.5).

There were 179 abnormalities graded as adenocarcinoma on histology within 6 months of cytology predictions other than adenocarcinoma, with 73 after high-grade endocervical cytology and 94 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 2010**

| Cytology prediction | Adenosquamous carcinoma | Carcinoma of the cervix (other) |
|---|---|---|
| S1 Negative | 4 | 15 |
| S2 Possible low-grade | 0 | 2 |
| S3 Low-grade | 0 | 0 |
| S4 Possible high-grade | 2 | 2 |
| S5 High-grade | 6 | 0 |
| S6 High-grade with possible invasion | 4 | 1 |
| S7 Squamous cell carcinoma | 3 | 2 |
| E1 Negative | 9 | 16 |
| E2 Atypical endocervical cells of uncertain significance | 1 | 0 |
| E3 Possible high-grade | 0 | 0 |
| E4 Adenocarcinoma *in situ* | 4 | 0 |
| E5 Adenocarcinoma with possible invasion | 0 | 0 |
| E6 Adenocarcinoma | 2 | 1 |

*Source:* AIHW analysis of state and territory cervical cytology 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 (21.5% and 22.7%, respectively), with a slightly higher 29.3% of these found to be CIN III on histology.

52.9% of predicted high-grade squamous abnormalities (S5) were found to be CIN III on histology, and 59.5% of predicted high-grade squamous abnormalities with possible microinvasion/invasion (S6) were found to be CIN III on histology.

89.7% 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 2010**

| | Histology finding | | | |
|---|---|---|---|---|
| Cytology prediction | HS02 Low-grade | HS03.2 CIN II | HS03.3 CIN III | HS04 Squamous cell carcinoma |
| S1 Negative | 1,422 (19.7%) | 218 (3.0%) | 188 (2.6%) | 12 (0.2%) |
| S2 Possible low-grade | 1,708 (40.5%) | 395 (9.4%) | 286 (6.8%) | 2 (0.0%) |
| S3 Low-grade | 2,082 (50.3%) | 574 (13.9%) | 298 (7.2%) | 1 (0.0%) |
| S4 Possible high-grade | 1,024 (21.5%) | 1,077 (22.7%) | 1,393 (29.3%) | 34 (0.7%) |
| S5 High-grade | 869 (12.3%) | 1,697 (24.0%) | 3,749 (52.9%) | 99 (1.4%) |
| S6 High-grade plus | 5 (4.0%) | 1 (0.8%) | 75 (59.5%) | 43 (34.1%) |
| S7 Squamous cell carcinoma | 1 (1.5%) | 2 (2.9%) | 9 (13.2%) | 52 (76.5%) |

*Notes*

1. Numbers and per cent 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 cytology 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 87.4%, while the proportion of possible high-grade squamous abnormalities on cytology confirmed to be high-grade on histology was 54.8%, and the proportion of possible high-grade endocervical abnormalities on cytology confirmed to be high-grade on histology was 56.3%.

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 2010**

| Squamous cytology and histology | Endocervical cytology and histology |
|---|---|
| 10,772/13,555 = 79.5% | 229/262 = 87.4% |

**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 2010**

| Squamous cytology and histology | Endocervical cytology and histology |
|---|---|
| 4,810/8,782 = 54.8% | 120/213= 56.3% |

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

The most recent cervical cancer incidence data are for new cases diagnosed in 2009 (note that 2009 incidence data include estimates for NSW and the ACT).

## What the data tell us about incidence

**Trend**

Incidence of cervical cancer, after halving from 17.2 new cases per 100,000 women in 1991, has remained at around 9 new cases per 100,000 women from 2002 to 2009, for women aged 20–69.

**2009**

In 2009 there were 631 new cases of cervical cancer in women aged 20–69, the target population of the NCSP, which equates to 8.9 new cases per 100,000 women (age-standardised). There were 771 new cases, or 6.7 new cases per 100,000 women (age-standardised) in women of all ages.

**2004–2008**

The incidence of cervical cancer was higher for women residing in *Remote and very remote* areas, and lower in women residing in areas of highest socioeconomic status.

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 22.3 new cases per 100,000 women compared with the non-Indigenous rate of 8.5 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 2009 Australian Cancer Database. Note that, since 2009 incidence data include estimates for NSW and the ACT, data which require disaggregation (including by histological type) could only be presented to 2008.

## Detailed analyses

### Incidence of cervical cancer in 2009

In 2009, there were 771 new cases of cervical cancer in Australian women. This is equivalent to 7.0 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 6.7 for 2009.

Of the 771 new cases, 631 were in women aged 20–69, the target population of the NCSP. These 631 new cases represent 81.8% of all cervical cancers diagnosed in that year, and 8.9 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 8.9 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 2009, and comprised 1.5% of all cancers diagnosed in women (AIHW & AACR 2012). Further, the mean age of diagnosis was 50.2 years, and the risk of diagnosis with cervical cancer was 1 in 198 by age 75 and 1 in 162 by age 85 (AIHW & AACR 2012).

### 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 halved between 1991 and 2009 from 17.2 to 8.9 new cases per 100,000 women. This historic low of 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 895 in 1991 to 631 in 2009, a decrease of 29.5% (Table 6.1).

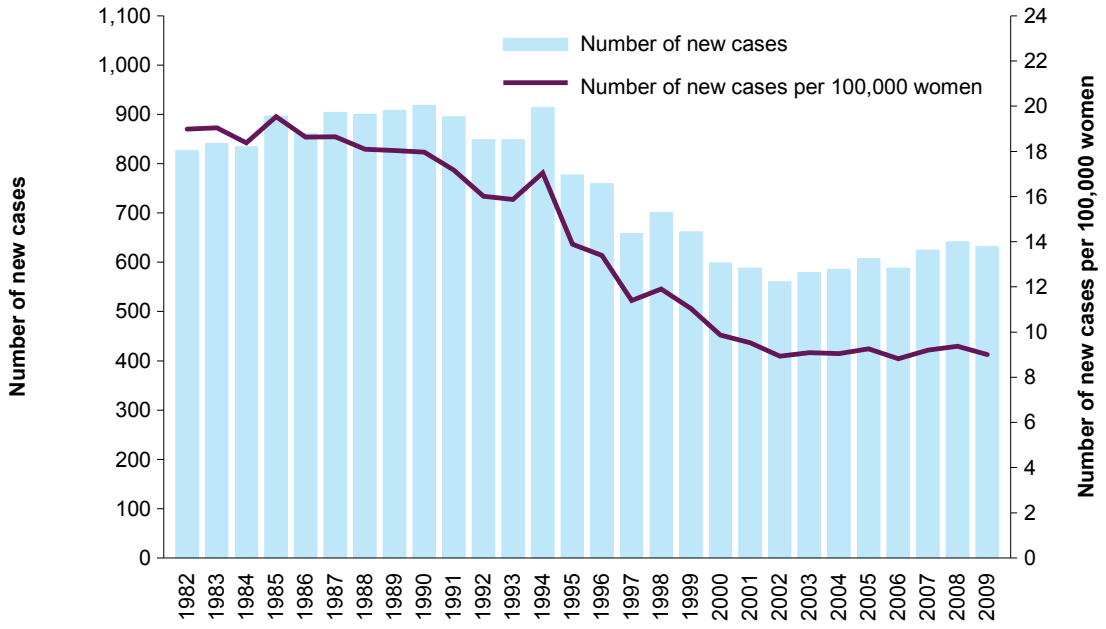
When interpreting cervical cancer incidence trends in relation to the NCSP, it is important to remember that opportunistic cervical screening occurred in Australia prior to the commencement of the national screening program in 1991, with some states trialling organised screening in the years leading 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 to 2009**

| | 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 | 1007 | 18.4 | 14.2 |
| 1985 | 896 | 1058 | 19.5 | 14.6 |
| 1986 | 861 | 1019 | 18.6 | 13.9 |
| 1987 | 904 | 1098 | 18.6 | 14.4 |
| 1988 | 900 | 1065 | 18.1 | 13.6 |
| 1989 | 908 | 1072 | 18.0 | 13.5 |
| 1990 | 918 | 1088 | 18.0 | 13.5 |
| 1991 | 895 | 1094 | 17.2 | 13.3 |
| 1992 | 848 | 1027 | 16.0 | 12.2 |
| 1993 | 848 | 1016 | 15.9 | 11.9 |
| 1994 | 936 | 1143 | 17.0 | 13.1 |
| 1995 | 777 | 962 | 13.9 | 10.7 |
| 1996 | 759 | 939 | 13.4 | 10.3 |
| 1997 | 658 | 809 | 11.4 | 8.7 |
| 1998 | 701 | 873 | 11.9 | 9.2 |
| 1999 | 661 | 800 | 11.0 | 8.3 |
| 2000 | 598 | 769 | 9.9 | 7.8 |
| 2001 | 588 | 742 | 9.5 | 7.4 |
| 2002 | 560 | 691 | 8.9 | 6.8 |
| 2003 | 579 | 730 | 9.1 | 7.1 |
| 2004 | 585 | 727 | 9.1 | 6.9 |
| 2005 | 607 | 737 | 9.3 | 6.9 |
| 2006 | 588 | 719 | 8.8 | 6.7 |
| 2007 | 624 | 752 | 9.2 | 6.9 |
| 2008 | 641 | 780 | 9.3 | 7.0 |
| 2009 | 631 | 771 | 8.9 | 6.7 |

*Note:* Age-standardised 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, by year, 1982 to 2009**

## Incidence of cervical cancer by age

In 2009, the number of new cases of cervical cancer diagnosed in women aged 20–69 comprised 81.2% of all cervical cancers. This is lower than 82.6% in 1999 and 84.5% in 1988.

Analysis of 5-year age groups between 20 and 69 reveals that, in 2009, the highest incidence of cervical cancer was in women aged 50–54, at 12.0 new cases per 100,000 women (Table 6.2). There is a second peak (not shown) of 15.1 new cases per 100,000 women for those aged 85 and over.

**Table 6.2: Incidence of cervical cancer by age, 2009**

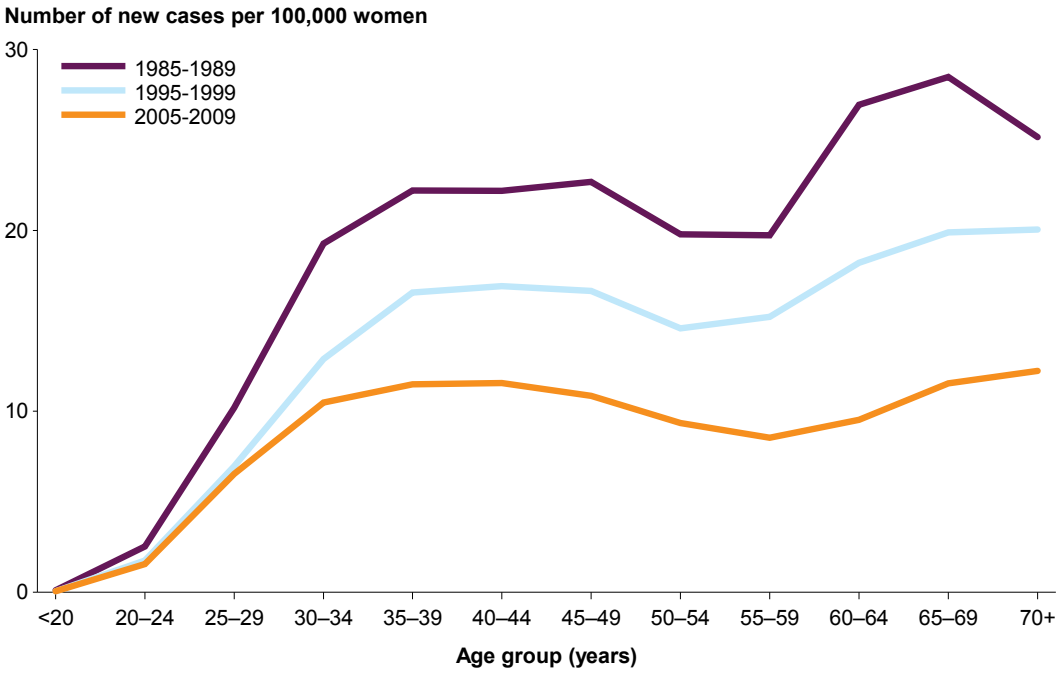
| | Age group (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **20–24** | **25–29** | **30–34** | **35–39** | **40–44** | **45–49** | **50–54** | **55–59** | **60–64** | **65–69** |
| New cases | 12 | 54 | 85 | 85 | 67 | 89 | 87 | 59 | 51 | 44 |
| Crude rate | 1.5 | 6.8 | 11.3 | 10.4 | 8.7 | 11.2 | 11.9 | 8.9 | 8.7 | 10.0 |

*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 1985–1989, 1995–1999 and 2005–2009 in Figure 6.2.

It was found that incidence was reduced across all age groups from 1985–1989 to 2005–2009. Further, in 1985–1989, before the NCSP was introduced, 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 in women, by age, 1985–1989, 1995–1999 and 2005–2009**

## 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 arise from the squamous cells that cover the outer surface of the cervix), adenocarcinoma (which arise 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, 2008**

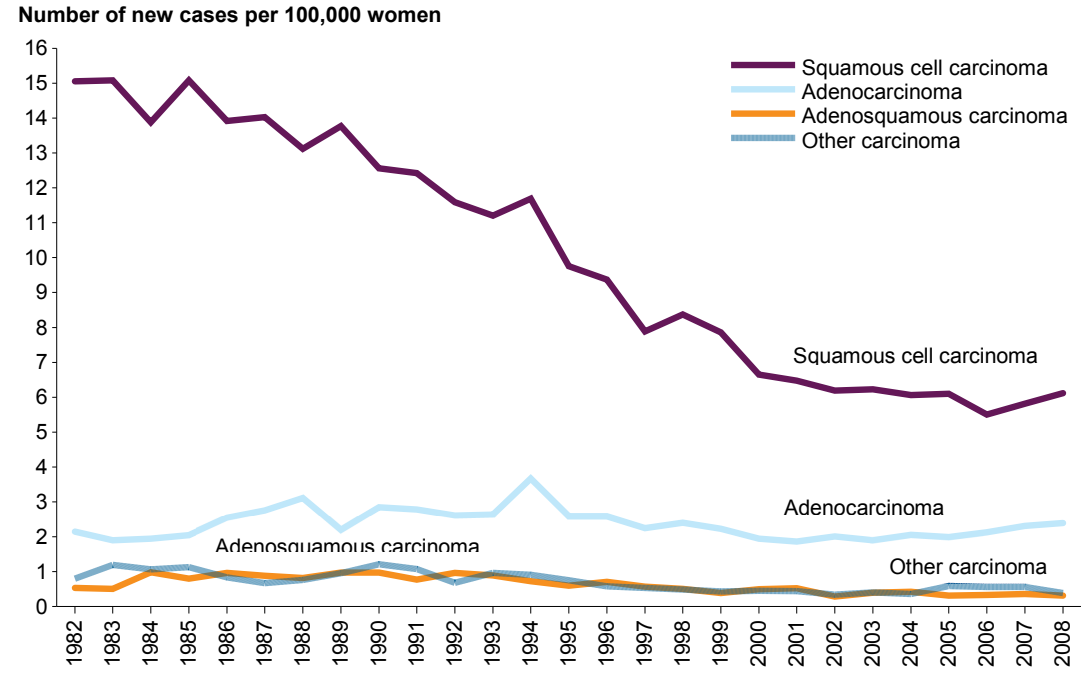
| Type of cervical cancer | New cases | AS rate | % of cervical cancers | (% of carcinomas) |
|---|---|---|---|---|
| 1: Carcinoma | 630 | 9.2 | 98.3 | (100.0) |
| *1.1: Squamous cell carcinoma* | *419* | *6.1* | *65.4* | *(66.5)* |
| *1.2: Adenocarcinoma* | *164* | *2.4* | *25.6* | *(26.0)* |
| *1.3: Adenosquamous carcinoma* | *21* | *0.3* | *3.3* | *(3.3)* |
| *1.4: Other specified and unspecified carcinoma* | *26* | *0.4* | *4.1* | *(4.1)* |
| 2: Sarcoma | 3 | 0.0 | 0.5 | . . |
| 3: Other specified and unspecified malignant neoplasm | 8 | 0.1 | 1.2 | . . |
| **Total** | **641** | **9.4** | **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 2008, of the 641 cervical cancers diagnosed in women aged 20–69, 630 (98.3%) were carcinomas, 3 (0.5%) were sarcomas, and 8 (1.2%) were classified as other and unspecified malignant neoplasms (Table 6.3). Within the carcinomas, squamous cell carcinoma comprised the greatest proportion at 65.4% of all cervical cancers, followed by adenocarcinomas at 25.6% of cervical cancers, and adenosquamous carcinomas at 3.3%, with other and unspecified carcinomas comprising 4.1% of all cervical cancers in 2008 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 carcinoma) in women aged 20–69, by year, 1982 to 2008**

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 6.1 new cases per 100,000 women in 2008 (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 & 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 2.4 new cases per 100,000 women in 2008 (Figure 6.3).

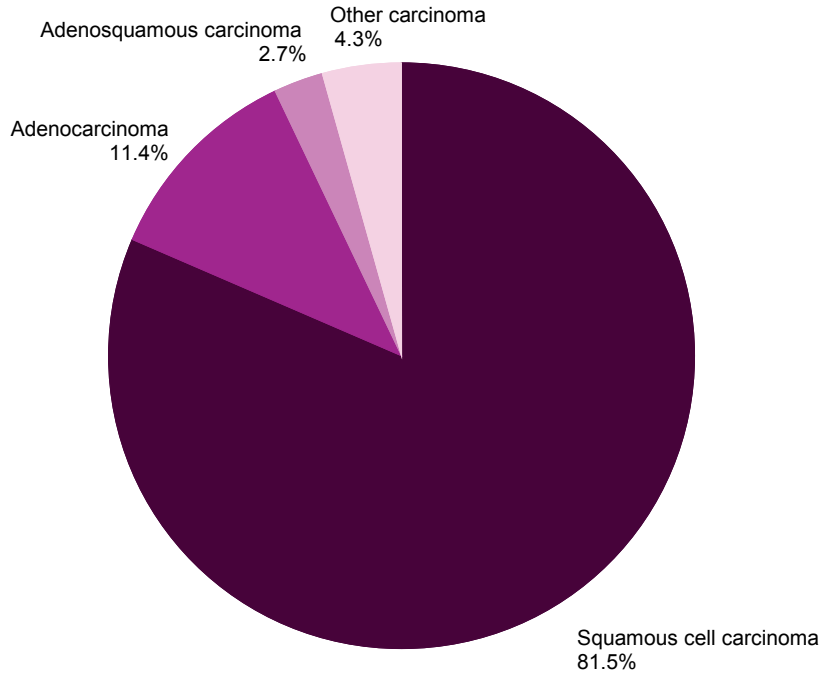
Incidence trends of adenosquamous and other carcinomas are more difficult to ascertain due to small numbers, but appear to increase around the introduction of the NCSP, thereafter decreasing to rates below these by 2008.

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 81.5% in 1982 to 66.5% in 2008. In contrast, adenocarcinomas have comprised an increasingly large proportion since cervical screening, from 11.4% in 1982 to 26.0% in 2008. 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% 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).




*Source:* AIHW Australian Cancer Database.

**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 2008**

**Table 6.4: Incidence of carcinoma of the cervix (squamous cell carcinoma, adenocarcinoma, adenosquamous carcinoma and other carcinoma) in women aged 20–69, 1982 to 2008**

| | 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 | 632 | 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 | 651 | 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 | 642 | 146 | 49 | 62 | 12.6 | 2.8 | 1.0 | 1.2 |
| 1991 | 647 | 144 | 41 | 56 | 12.4 | 2.8 | 0.8 | 1.1 |
| 1992 | 615 | 137 | 50 | 37 | 11.6 | 2.6 | 1.0 | 0.7 |
| 1993 | 595 | 143 | 48 | 52 | 11.2 | 2.6 | 0.9 | 1.0 |
| 1994 | 640 | 203 | 40 | 49 | 11.7 | 3.7 | 0.7 | 0.9 |
| 1995 | 545 | 146 | 34 | 42 | 9.8 | 2.6 | 0.6 | 0.8 |
| 1996 | 529 | 148 | 40 | 33 | 9.4 | 2.6 | 0.7 | 0.6 |
| 1997 | 454 | 130 | 33 | 31 | 7.9 | 2.2 | 0.6 | 0.5 |
| 1998 | 493 | 141 | 30 | 29 | 8.4 | 2.4 | 0.5 | 0.5 |
| 1999 | 470 | 134 | 23 | 26 | 7.9 | 2.2 | 0.4 | 0.4 |
| 2000 | 403 | 118 | 30 | 27 | 6.7 | 1.9 | 0.5 | 0.4 |
| 2001 | 400 | 115 | 32 | 27 | 6.5 | 1.9 | 0.5 | 0.4 |
| 2002 | 388 | 126 | 18 | 21 | 6.2 | 2.0 | 0.3 | 0.3 |
| 2003 | 397 | 121 | 25 | 26 | 6.2 | 1.9 | 0.4 | 0.4 |
| 2004 | 392 | 133 | 27 | 23 | 6.1 | 2.1 | 0.4 | 0.4 |
| 2005 | 399 | 131 | 20 | 39 | 6.1 | 2.0 | 0.3 | 0.6 |
| 2006 | 366 | 142 | 22 | 38 | 5.5 | 2.1 | 0.3 | 0.6 |
| 2007 | 394 | 157 | 24 | 38 | 5.8 | 2.3 | 0.4 | 0.6 |
| 2008 | 419 | 164 | 21 | 26 | 6.1 | 2.4 | 0.3 | 0.4 |

(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 2004–2008, incidence of cervical cancer for women aged 20–69 was relatively stable across states and territories, ranging between 7.9 and 14.5 new cases per 100,000 women (Table 6.5).

Trends in state and territory incidence are shown in Figure 6.5.

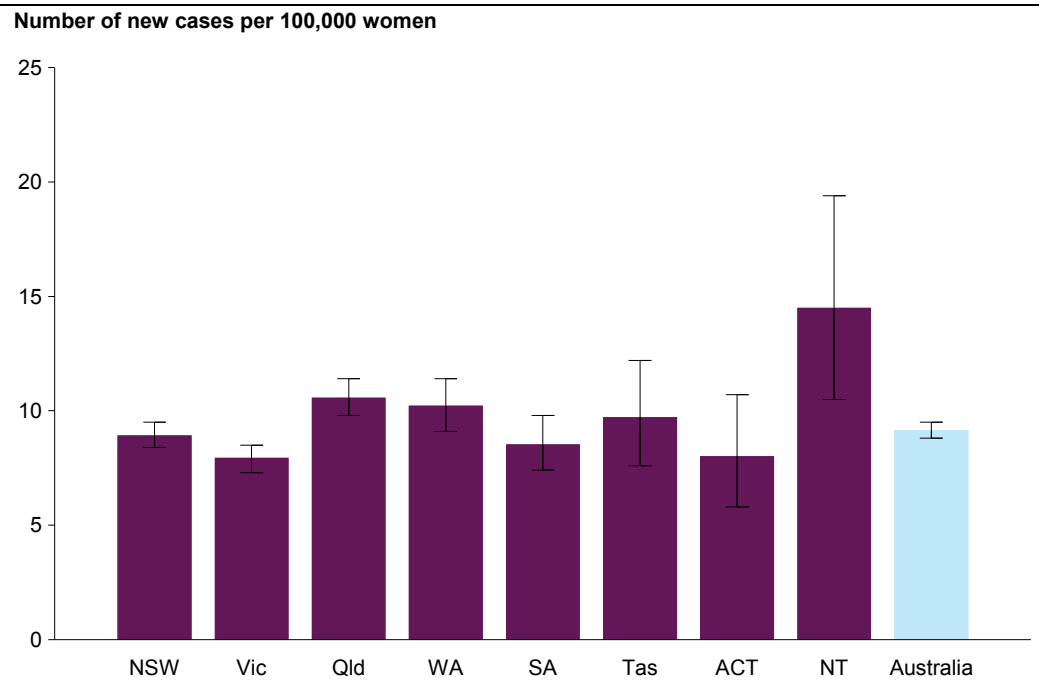
It should be noted that data for the least-populated jurisdictions are open to variation due to smaller numbers, even with 5 years of data combined.

**Table 6.5: Incidence of cervical cancer in women aged 20–69, by state and territory, 2004–2008**

| | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| New cases | 982 | 661 | 691 | 334 | 210 | 76 | 44 | 47 | 3,045 |
| AS rate | 8.9 | 7.9 | 10.6 | 10.2 | 8.5 | 9.7 | 8.0 | 14.5 | 9.1 |
| 95% CI | 8.4–9.5 | 7.3–8.5 | 9.8–11.4 | 9.1–11.4 | 7.4–9.8 | 7.6–12.2 | 5.8–10.7 | 10.5–19.4 | 8.8–9.5 |

*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.




*Notes*

1. Rates age-standardised to the Australian population as at 30 June 2001.
2. Bars on columns represent 95% confidence intervals.

*Source:* AIHW Australian Cancer Database.

**Figure 6.5: Incidence of cervical cancer in women aged 20–69, by state and territory, 2004–2008**

## 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.

Incidence of cervical cancer in 2004–2008 differed little between *Major cities* and *Inner and outer regional* areas, these being 9.1 and 8.9 new cases per 100,000 women, respectively. Incidence in *Remote and very remote* areas, although not differing significantly from *Inner regional* areas, was significantly higher than incidence in *Major cities* (Table 6.6; Figure 6.6A).

**Table 6.6: Incidence of cervical cancer in women aged 20–69, by remoteness area, 2004–2008**

| | Major cities | Inner and outer regional | Remote and very remote | Australia |
|---|---|---|---|---|
| New cases | 2,094 | 849 | 87 | 3,045 |
| Rate | 9.1 | 8.9 | 12.0 | 9.1 |
| 95% CI | 8.7–9.5 | 8.3–9.6 | 9.6–14.8 | 8.8–9.5 |

*Notes*

1. Women were allocated to a remoteness area using residential postcodes 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.

*Source:* AIHW Australian Cancer Database.

Higher incidence 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 have around twice the incidence of cervical cancer (see Figure 6.7 and Table 6.8 below). Further investigation of these incidence data found that, of all cervical cancers diagnosed in women residing in *Remote and very remote* areas, 45% were diagnosed in Aboriginal and Torres Strait Islander women, whereas only 5% of women in *Inner and Outer regional* areas diagnosed with cervical cancer were Indigenous, and 1% of those in *Major cities* were Indigenous women.

**Table 6.7: Incidence of cervical cancer in women aged 20–69, by socioeconomic status, 2004–2008**

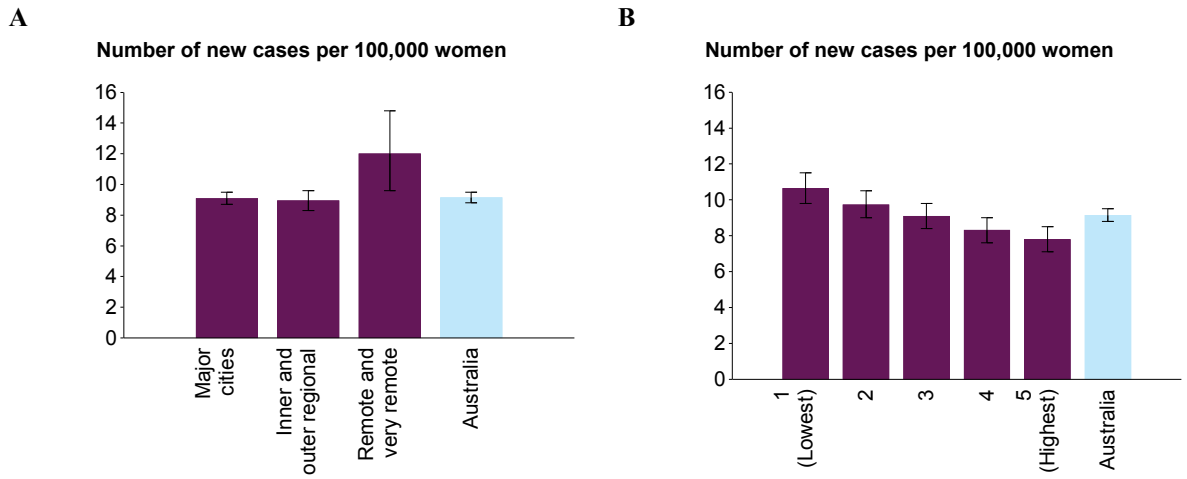
| | (lowest) 1 | 2 | 3 | 4 | (highest) 5 | Australia |
|---|---|---|---|---|---|---|
| New cases | 685 | 635 | 609 | 566 | 534 | 3,045 |
| Rate | 10.6 | 9.7 | 9.1 | 8.3 | 7.8 | 9.1 |
| 95% CI | 9.8–11.5 | 9.0–10.5 | 8.4–9.8 | 7.6–9.0 | 7.1–8.5 | 8.8–9.5 |

*Notes*

1. Women were allocated to a socioeconomic status using residential postcode according to the Australian Standard Geographic Classifications 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.
3. Australian total may not equal sum of the quintiles due to estimation of SES status variable

*Source:* AIHW Australian Cancer Database.

In 2004–2008, incidence was found to decrease with increasing socioeconomic status of residence, from 10.6 new cases per 100,000 women for women residing in areas of lowest socioeconomic status to 7.8 new cases per 100,000 women for women residing in areas of highest socioeconomic status (Table 6.7, Figure 6.6B).




*Note*: Bars on columns represent 95% confidence intervals.

*Source:* AIHW Australian Cancer Database.

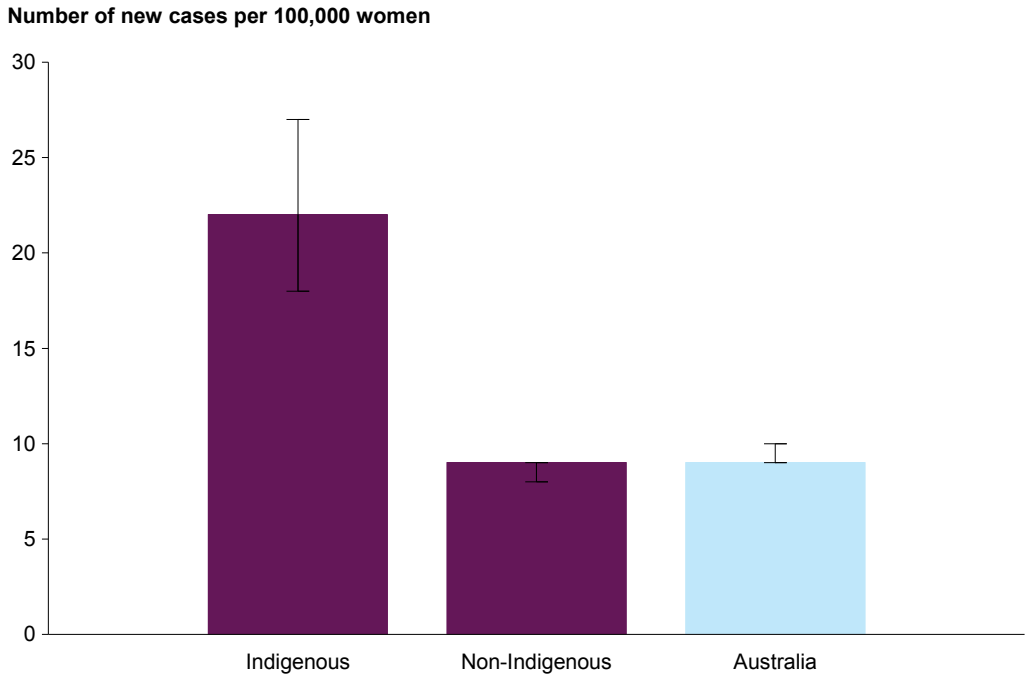
**Figure 6.6: Incidence of cervical cancer in women aged 20–69, by geographic region (A) and by socioeconomic status (B), 2004–2008**

## 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 four 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 four jurisdictions (ABS 2009), the degree to which data for these jurisdictions are representative of data for all Aboriginal and Torres Strait Islander people is unknown.

It was found that, over the 5-year period 2004–2008, Aboriginal and Torres Strait Islander women in New South Wales, Queensland, Western Australia and the Northern Territory aged 20–69 had a significantly higher incidence rate of cervical cancer compared with non-Indigenous women from these states and territories at 22.3 new cases per 100,000 women compared with the non-Indigenous rate of 8.5 new cases per 100,000 women (Table 6.8; Figure 6.7).




*Notes*

1. Rates age-standardised to the Australian population as at 30 June 2001.
2. Bars on the columns represent 95% confidence intervals.

*Source:* AIHW Australian Cancer Database.

**Figure 6.7: Incidence of cervical cancer in women aged 20–69 (New South Wales, Queensland, Western Australia, and Northern Territory), by Indigenous status, 2004–2008**

**Table 6.8: Incidence of cervical cancer in women aged 20–69 (New South Wales, Queensland, Western Australia, and Northern Territory), by Indigenous status, 2004–2008**

| | New South Wales, Queensland, Western Australia, and the Northern Territory[a] | | | Australia[c] |
|---|---|---|---|---|
| | Aboriginal and Torres Strait Islander | Non-Indigenous | Total[b] | |
| New cases | 111 | 1,769 | 2,054 | 3,045 |
| Crude rate | 20.0 | 8.6 | 9.7 | 9.1 |
| AS rate | 22.3 | 8.5 | 9.7 | 9.1 |
| 95% CI | 18.2–27.0 | 8.2–9.0 | 9.3–10.1 | 8.8–9.5 |

(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' may not equal the sum of 'Aboriginal and Torres Strait Islander 'and 'Non-Indigenous' due to the inclusion of the 'not stated' category.

(c) Data shown for 'Australia' are for New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania, the Australian Capital Territory and the Northern Territory.

*Notes*

1. Crude rate is the number of new cases of cervical cancer per 100,000 women; age-standardised rates are the number of cervical cancers detected per 100,000 women age-standardised to the Australian population at 30 June 2001.
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 National Mortality Database is the source of cervical cancer mortality data.

The most recent cervical cancer mortality data are for deaths in 2010.

## What the data tell us about mortality

**Trend**

Mortality from cervical cancer, after halving from 4.0 new cases per 100,000 women in 1991, has remained at around 2 new cases per 100,000 women from 2006 to 2010, for women aged 20–69.

**2010**

In 2010 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 232 deaths, or 1.9 deaths per 100,000 women (age-standardised) in women of all ages.

**2006–2010**

Mortality where cervical cancer was the underlying cause was significantly higher in Aboriginal and Torres Strait Islander women (10.6 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 you might find useful

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, the Australian Bureau of Statistics and the National Coroners Information System. These data are maintained at the Australian Institute of Health and Welfare 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 2010 (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, 2010 mortality data are preliminary and subject to revision.

## Detailed analyses

### Mortality from cervical cancer in 2010

In 2010, there were 232 deaths from cervical cancer in Australian women. This is equivalent to 2.1 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 1.9 for 2010.

Of the 232 deaths, 152 were in women aged 20–69, the target population of the NCSP. These deaths represented 65.5% of all cervical cancer deaths in that year, and 2.0 deaths for every 100,000 women (age-standardised).

When compared with other cancers diagnosed in 2010, it was found that deaths from cervical cancer comprised 1.3% of all cancer deaths in women. Further, the mean age of death was 62.2 years, and the risk of dying from cervical cancer was 1 in 728 by age 75 and 1 in 494 by age 85 (AIHW & AACR 2012).

### 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 2010 for women aged 20–69 (Table 7.1).

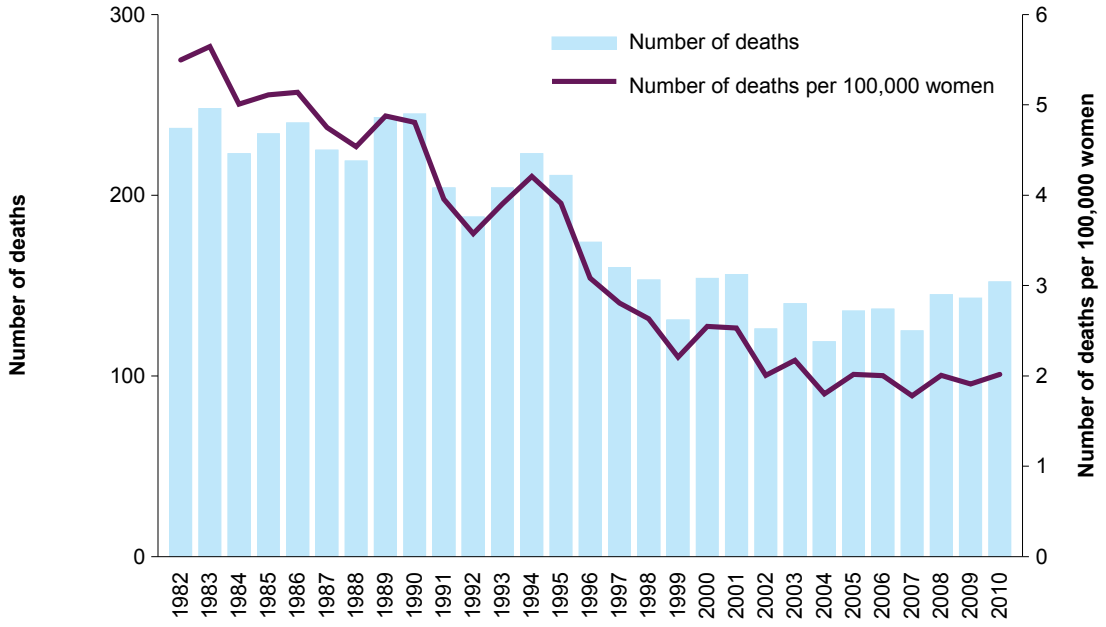
**Table 7.1: Deaths and death rates from cervical cancer, 1982 to 2010**

| | 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 | 3.9 |
| 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 | 2.5 | 2.6 |
| 2001 | 156 | 271 | 2.5 | 2.6 |
| 2002 | 126 | 217 | 2.0 | 2.0 |
| 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 | 152 | 232 | 2.0 | 1.9 |

*Notes*

1. Deaths between 1982 and 2009 were derived by year of death; deaths in 2010 were derived by year of registration of death. Mortality data for 2009 and 2010 are revised and preliminary, and are subject to further revision.
2. Age-standardised rate is number of deaths from cervical cancer per 100,000 women age-standardised to the Australian population at 30 June 2001.
3. These data have not been adjusted for the additional deaths arising from outstanding registrations of deaths in Queensland in 2010. For more detail please refer to Technical note 3 in Causes of death, Australia, 2010 (ABS Cat. no. 3303.0).

*Source:* AIHW analysis of National Mortality Database.




*Notes*:

1. Deaths between 1982 and 2009 were derived by year of death; deaths in 2010 were derived by year of registration of death. Mortality data for 2009 and 2010 are revised and preliminary, respectively, and are subject to further revision.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. These data have not been adjusted for the additional deaths arising from outstanding registrations of deaths in Queensland in 2010. For more detail please refer to Technical note 3 in Causes of death, Australia, 2010 (ABS Cat. no. 3303.0).

*Source:* AIHW analysis of National Mortality Database.

**Figure 7.1: Mortality from cervical cancer, women aged 20–69, 1982 to 2010**

## Mortality from cervical cancer by age

In 2010, analysis of 5-year age groups revealed that mortality increased with age, from less than 1 death per 100,000 women for those aged 20–24 to 10.4 deaths per 100,000 women for those aged 85 and over. Within the target age group (20-69 years), women aged 55–59 had the highest mortality (32 deaths) and mortality rate (4.8 deaths per 100,000 women) (Table 7.2).

**Table 7.2: Mortality from cervical cancer by age, 2010**

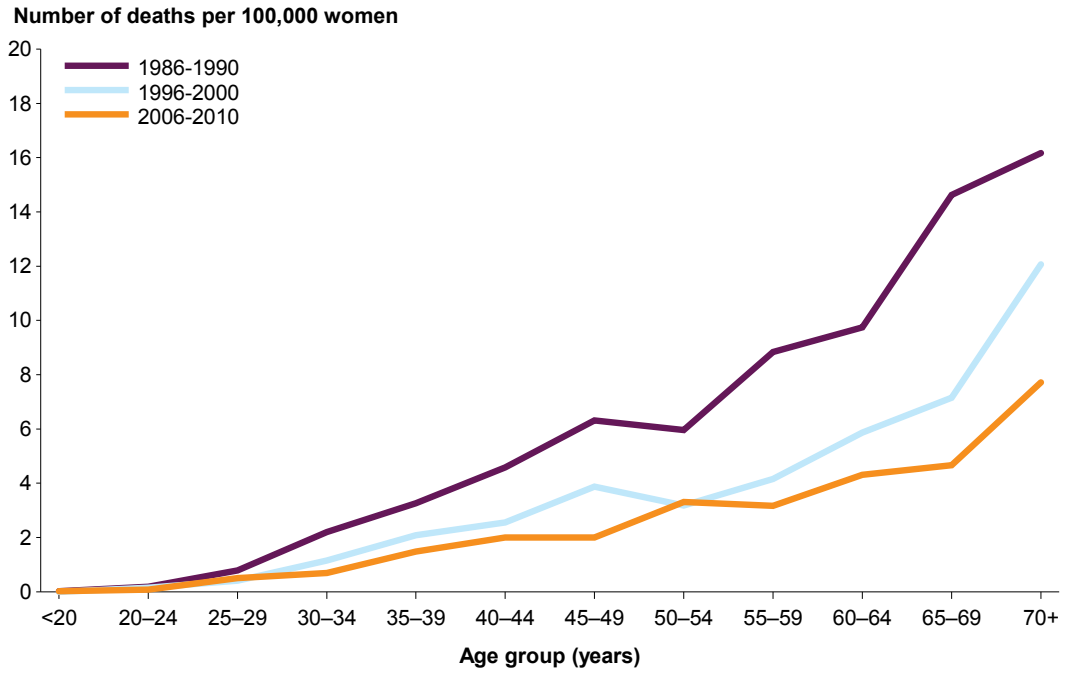
| | Age group (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **20–24** | **25–29** | **30–34** | **35–39** | **40–44** | **45–49** | **50–54** | **55–59** | **60–64** | **65–69** |
| Deaths | 0 | n.p. | n.p. | 19 | 16 | 12 | 26 | 32 | 19 | 22 |
| Crude rate | 0.0 | n.p. | n.p. | 2.3 | 2.1 | 1.5 | 3.5 | 4.8 | 3.1 | 4.8 |

*Notes*

1. Deaths in 2010 were derived using year of registration. Mortality data for 2010 are preliminary and are subject to further revision.
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.
3. These data have not been adjusted for the additional deaths arising from outstanding registrations of deaths in Queensland in 2010. For more detail please refer to Technical note 3 in Causes of death, Australia, 2010 (ABS Cat. no. 3303.0).

*Source:* AIHW analysis of 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 1986–1990 (prior to the introduction of the NCSP) to 1996–2000 (just after its introduction), with the trend continuing through to 2006–2010 (Figure 7.2).




*Notes*:

1. Deaths between 1986 and 2009 were derived by year of death; deaths in 2010 were derived by year of registration of death. Mortality data for 2009 and 2010 are revised and preliminary, respectively, and are subject to further revision.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. These data have not been adjusted for the additional deaths arising from outstanding registrations of deaths in Queensland in 2010. For more detail please refer to Technical note 3 in Causes of death, Australia, 2010 (ABS Cat. no. 3303.0).

*Source:* AIHW analysis of National Mortality Database.

**Figure 7.2: Mortality from cervical cancer by age, 1986–1990, 1996–2000 and 2006–2010**

## Mortality from cervical cancer by state and territory

In 2006–2010, the mortality rate from cervical cancer for women aged 20–69 across the states and territories were relatively similar to the national rate of 1.9 deaths per 100,000 women (Table 7.3 and Figure 7.3).

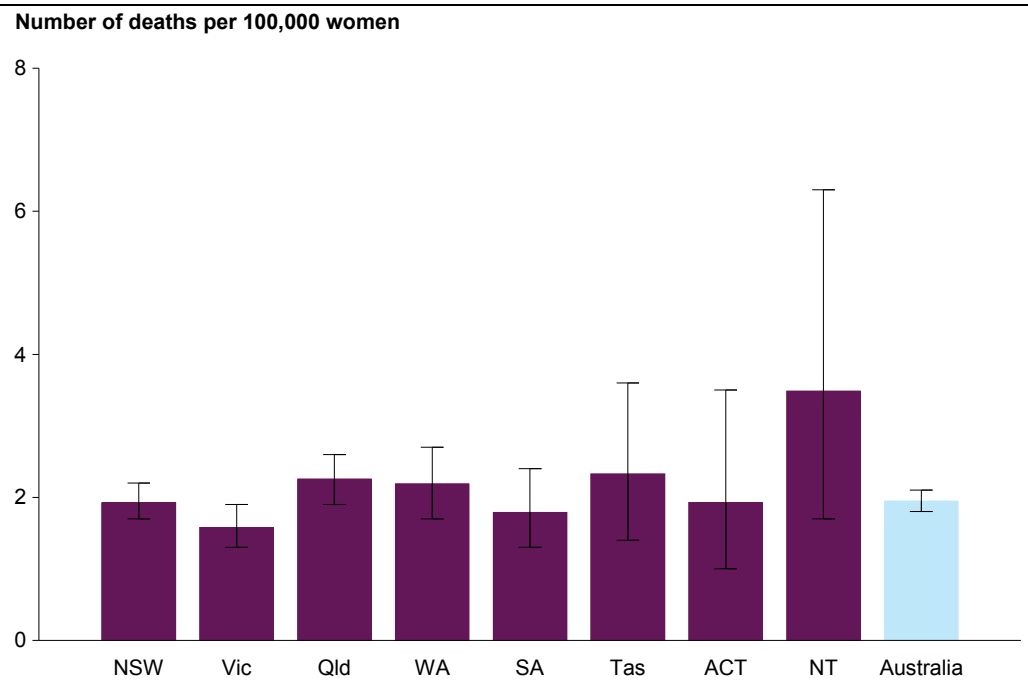
**Table 7.3: Mortality from cervical cancer in women aged 20–69, by state and territory, 2006–2010**

| | NSW | Vic | Qld | WA | SA | Tas | ACT | NT | Australia |
|---|---|---|---|---|---|---|---|---|---|
| Deaths | 226 | 142 | 163 | 78 | 50 | 21 | 11 | 11 | 702 |
| AS rate | 1.9 | 1.6 | 2.3 | 2.2 | 1.8 | 2.3 | 1.9 | 3.5 | 1.9 |
| 95% CI | 1.7–2.2 | 1.3–1.9 | 1.9–2.6 | 1.7–2.7 | 1.3–2.4 | 1.4–3.6 | 1.0–3.5 | 1.7–6.3 | 1.8–2.1 |

*Notes*

1. Deaths between 2006 and 2009 are derived from year of death; deaths in 2010 are derived from year of registration. Mortality data for 2009 and 2010 are revised and preliminary, respectively, and are subject to further revisions.
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.

*Source:* AIHW analysis of National Mortality Database.




*Notes*

1. Deaths between 2006 and 2009 were derived by year of death; deaths in 2010 were derived by year of registration of death. Mortality data for 2009 and 2010 are revised and preliminary, respectively, and are subject to further revision.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. Bars on columns represent 95% confidence intervals.
4. These data have not been adjusted for the additional deaths arising from outstanding registrations of deaths in Queensland in 2010. For more detail please refer to Technical note 3 in Causes of death, Australia, 2010 (ABS Cat. no. 3303.0).

*Source:* AIHW analysis of National Mortality Database.

**Figure 7.3: Mortality from cervical cancer in women aged 20–69, by state and territory, 2006–2010**

## 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.

Although mortality appeared to increase with increasing remoteness, mortality in *Major cities* did not differ significantly from that in *Inner and outer regional* areas (1.8 compared with 2.1 deaths per 100,000 women). Mortality in *Remote and very remote* areas was, in contrast, significantly higher than mortality in both *Major cities* and *Inner and outer regional* areas, at 6.1 deaths per 100,000 women (Table 7.4; Figure 7.4A). This death pattern is largely associated with the high proportion (45%) of Indigenous women living in remote and very remote areas compared with non-Indigenous women (2%) living in the same area.

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 far greater mortality from cervical cancer (see Figure 7.5 and Table 7.6 below). Further investigation of these mortality data found that, of all deaths from cervical cancer in women residing in *Remote and very remote* areas, 64% were Aboriginal and Torres Strait Islander women, whereas only 10% of cervical cancer deaths in *Inner and Outer regional* areas and 1% of those in *Major cities* occurred in Indigenous women.

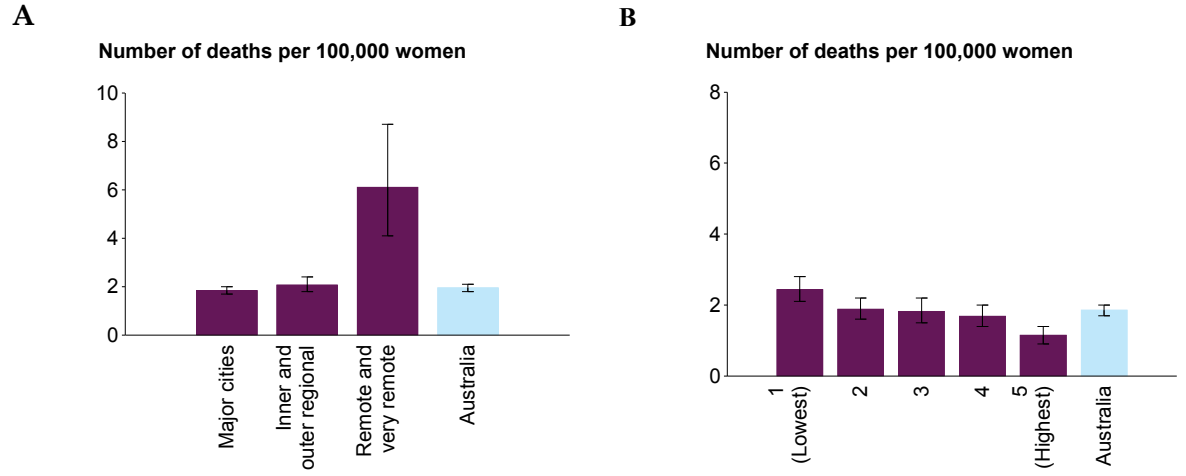
**Table 7.4: Mortality from cervical cancer in women aged 20–69, by remoteness area, 2006–2010**

| | Major cities | Inner and outer regional | Remote and very remote | Australia |
|---|---|---|---|---|
| Deaths | 448 | 221 | 30 | 702 |
| AS rate | 1.8 | 2.1 | 6.1 | 1.9 |
| 95% CI | 1.7–2.0 | 1.8–2.4 | 4.1–8.7 | 1.8–2.1 |

*Notes*

1. Women were allocated to a remoteness area using residential SLA according to the Australian Standard Geographic Classifications for 2006.
2. Deaths between 2006 and 2009 are derived from year of death; deaths in 2010 are derived from year of registration. Mortality data for 2009 and 2010 are revised and preliminary, respectively, and subject to further revisions.
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.
4. These data have not been adjusted for the additional deaths arising from outstanding registrations of deaths in Queensland in 2010. For more detail please refer to Technical note 3 in Causes of death, Australia, 2010 (ABS Cat. no. 3303.0).

*Source:* AIHW analysis of National Mortality Database.




*Note:* Bars on columns represent 95% confidence intervals.

*Source:* AIHW analysis of National Mortality Database.

**Figure 7.4: Mortality from cervical cancer in women aged 20–69, by remoteness area (A) and by socioeconomic status (B), 2006–2010**

**Table 7.5: Mortality from cervical cancer in women aged 20–69, by socioeconomic status, 2006–2010**

| | 1 (lowest) | 2 | 3 | 4 | 5 (highest) | Australia |
|---|---|---|---|---|---|---|
| Deaths | 166 | 134 | 130 | 123 | 86 | 702 |
| Rate | 2.4 | 1.9 | 1.8 | 1.7 | 1.1 | 1.9 |
| 95% CI | 2.1–2.8 | 1.6–2.2 | 1.5–2.2 | 1.4–2.0 | 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 2006 and 2009 are derived from year of death; deaths in 2010 are derived from year of registration. Mortality data for 2009 and 2010 are revised and preliminary, respectively, and subject to further revisions.
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.
4. These data have not been adjusted for the additional deaths arising from outstanding registrations of deaths in Queensland in 2010. For more detail please refer to Technical note 3 in Causes of death, Australia, 2010 (ABS Cat. no. 3303.0).

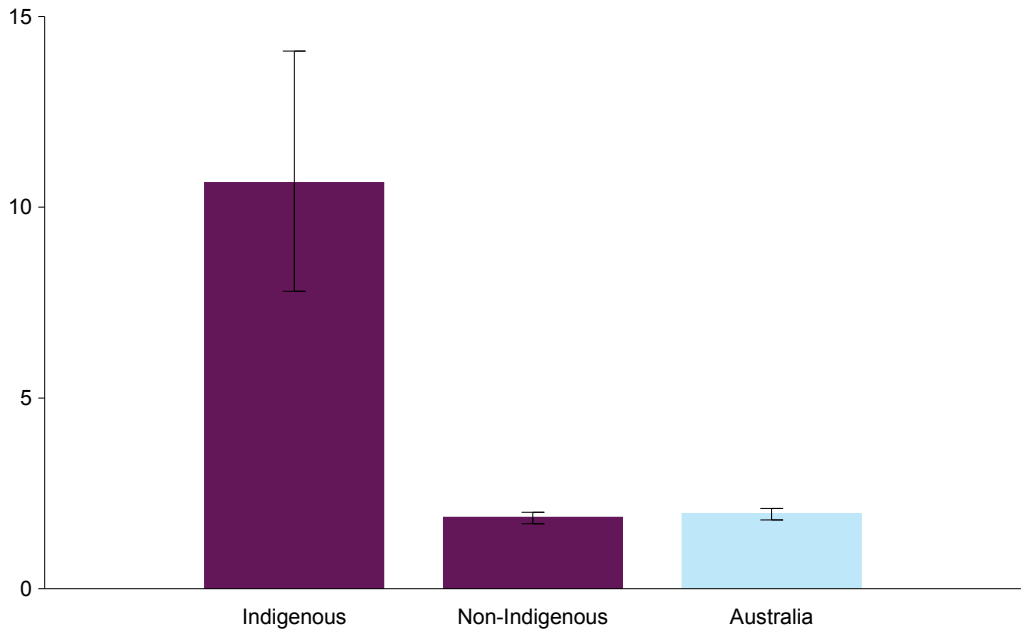
*Source:* AIHW analysis of National Mortality Database.

In 2006–2010, mortality was higher in women residing in areas of lowest socioeconomic status (2.4 deaths per 100,000 women) and lower in women residing in areas of highest socioeconomic status (at just over 1 death per 100,000 women) (Table 7.5, Figure 7.4B).

## Mortality from cervical cancer for Aboriginal and Torres Strait Islander women

Information on Indigenous status on the National Mortality Database is considered of sufficient quality for the years 2006–2010 for five 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 five jurisdictions (ABS 2009).

In 2006–2010, the mortality rate from cervical cancer was significantly higher in Aboriginal and Torres Strait Islander women in New South Wales, Queensland, Western Australia, South Australia and the Northern Territory (10.6 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 7.5). This was true for women aged 20–69, and for women of all ages. This mirrors the incidence results for Aboriginal and Torres Strait Islander women in Indicator 6.




*Notes*

1. Deaths between 2006 and 2009 are derived from year of death; deaths in 2010 are derived from year of registration. Mortality data for 2009 and 2010 are revised and preliminary, respectively, and subject to further revisions.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. Bars on columns represent 95% confidence intervals.

*Source:* AIHW analysis of National Mortality Database.

**Figure 7.5: Mortality from cervical cancer in Aboriginal and Torres Strait Islander women aged 20–69 (New South Wales, Queensland, Western Australia, South Australia and Northern Territory), 2006–2010**

**Table 7.6: Mortality from cervical cancer in Aboriginal and Torres Strait Islander women aged 20–69 (New South Wales, Queensland, Western Australia, South Australia and Northern Territory), 2006–2010**

| | New South Wales, Queensland, Western Australia, South Australia and the Northern Territory[a] | | | Australia[c] |
|---|---|---|---|---|
| | Aboriginal and Torres Strait Islander | Non-Indigenous | Total[b] | |
| Deaths | 52 | 471 | 528 | 702 |
| Crude rate | 8.3 | 2.0 | 2.1 | 2.0 |
| AS rate | 10.6 | 1.9 | 2.1 | 1.9 |
| 95% CI | 7.8–14.1 | 1.7–2.0 | 1.9–2.2 | 1.8–2.1 |

(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' may not equal the sum of 'Aboriginal and Torres Strait Islander 'and 'Non-Indigenous' due to the inclusion of the 'not stated' category.

(c) Data shown for 'Australia' are for New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania, the Australian Capital Territory and the Northern Territory.

*Notes*

1. Crude rate is the number of deaths from cervical cancer per 100,000 women; age-standardised rate is the number of deaths from cervical cancer per 100,000 women age-standardised to the Australian population at 30 June 2001.
2. Deaths between 2006 and 2009 are derived from year of death; deaths in 2010 are derived from year of registration. Mortality data for 2009 and 2010 are revised and preliminary, respectively, and subject to further revisions.

*Source:* AIHW analysis of 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 2010–2011, 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 2010–2011. 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 cytology register data.

**Figure A1: Women in the National Cervical Screening Program, 2010–2011**

**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 1.4 | 2-year participation 2010–2011[(a)] | . . | 42.6 | 51.9 | 58.1 | 60.3 | 61.6 | 63.0 | 62.6 | 60.3 | 57.7 | 50.4 | . . |
| Figure 1.4 | 3-year participation 2009–2011[(a)] | . . | 56.0 | 66.6 | 73.3 | 75.4 | 75.3 | 76.3 | 74.2 | 70.5 | 66.4 | 58.5 | . . |
| Figure 1.4 | 5-year participation 2007–2011[(a)] | . . | 76.2 | 85.4 | 90.9 | 90.5 | 88.0 | 87.5 | 83.0 | 78.1 | 71.6 | 66.0 | . . |
| Figure 3.1A | Proportion of cytology tests | 2.6 | 9.1 | 11.5 | 11.8 | 12.1 | 11.8 | 11.0 | 9.9 | 8.0 | 6.7 | 4.3 | 1.3 |
| Figure 3.1B | Unsatisfactory cytology 2011[(b)] | 2.3 | 2.3 | 2.3 | 2.1 | 2.0 | 1.9 | 1.8 | 1.9 | 2.2 | 2.2 | 2.1 | 2.6 |
| Figure 3.2A | Negative cytology 2011[(c)] | 84.1 | 84.3 | 87.9 | 90.9 | 92.8 | 93.8 | 94.6 | 95.3 | 95.8 | 96.1 | 96.3 | 94.9 |
| Figure 3.2B | No endocervical component 2011[(d)] | 18.6 | 18.1 | 17.6 | 17.1 | 17.7 | 19.3 | 21.7 | 24.0 | 27.4 | 30.5 | 32.9 | 36.3 |
| Figure 3.3A | Low-grade abnormalities detected by cytology 2011[(e)] | 11.9 | 10.5 | 6.9 | 4.8 | 3.7 | 3.3 | 2.8 | 2.2 | 1.5 | 1.3 | 1.2 | 1.6 |
| Figure 3.3B | High-grade abnormalities detected by cytology 2011[(f)] | 1.6 | 2.9 | 3.0 | 2.3 | 1.5 | 1.1 | 0.8 | 0.6 | 0.5 | 0.4 | 0.4 | 0.7 |
| Figure 4.1A | Proportion of histology tests 2011 | 1.7 | 12.8 | 16.4 | 13.5 | 11.7 | 11.7 | 11.0 | 7.9 | 4.9 | 3.5 | 2.3 | 2.6 |
| Figure 4.1B | Histology tests per 100 cytology tests 2011 | 2.5 | 5.2 | 5.2 | 4.2 | 3.6 | 3.6 | 3.7 | 3.0 | 2.3 | 1.9 | 2.0 | 7.3 |
| Figure 4.2 | Negative histology 2011[(g)] | 24.3 | 23.6 | 24.6 | 31.9 | 44.4 | 61.4 | 70.3 | 76.4 | 75.1 | 76.9 | 78.6 | 81.7 |
| Figure 4.3A | Low-grade abnormalities detected by histology 2011[(h)] | 37.3 | 31.5 | 25.0 | 22.8 | 19.6 | 15.7 | 12.9 | 9.5 | 9.8 | 8.0 | 7.8 | 3.1 |
| Figure 4.3B | High-grade abnormalities detected by histology 2011[(i)] | 37.0 | 43.6 | 48.7 | 43.6 | 33.5 | 19.7 | 13.0 | 9.5 | 8.6 | 8.5 | 6.7 | 3.9 |
| Figure 4.4A | CIN II detected by histology 2011 | 20.7 | 21.1 | 18.3 | 14.8 | 11.1 | 7.0 | 4.7 | 3.3 | 3.1 | 1.7 | 2.4 | 0.7 |
| Figure 4.4B | CIN III detected by histology 2011 | 9.9 | 18.2 | 25.3 | 22.8 | 16.9 | 8.3 | 5.3 | 4.0 | 4.6 | 4.3 | 3.3 | 1.7 |

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

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

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

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

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

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

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

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

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

*Source:* AIHW analysis of state and territory cervical cytology 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<br>Fax: (02) 8374 5700<br>Email: cervicalscreening@cancerinstitute.org.au | <http://www.csp.nsw.gov.au/> |
| **PapScreen Victoria** | |
| Tel: (03) 9635 5000<br>Fax: (03) 9635 5360<br>Email: papscreen@cancervic.org.au | <http://www.papscreen.org.au> |
| **Qld Cervical Screening Program** | |
| Tel: (07) 3328 9467<br>Fax: (07) 3328 9487<br>Email: cssb@health.gov.au | <http://www.health.qld.gov.au/cervicalscreening/> |
| **WA Cervical Cancer Prevention Program** | |
| Tel: (08) 9323 6788<br>Fax: (08) 9323 6711<br>Email: cervicalcancer@health.wa.gov.au | <http://www.health.wa.gov.au/cervical/home/> |
| **SA Cervix Screening Program** | |
| Tel: (08) 8226 8181<br>Fax: (08) 8226 8190<br>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<br>Fax: (03) 6216 4308<br>Email: canscreen@dhhs.tas.gov.au | <http://www.dhhs.tas.gov.au/cancerscreening/cervical_screening_register> |
| **ACT Cervical Screening Program** | |
| Tel: (02) 6205 1545<br>Fax: (02) 6205 5035<br>Email: pap.register@act.gov.au | <http://www.health.act.gov.au/paptest> |
| **Cervical Screen NT** | |
| Tel: (08) 8922 6444<br>Fax: (08) 8922 6455<br>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 and Ageing** | |
| 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 cytology registers |
| 2 | Rescreening | State and territory cervical cytology registers |
| 3 | Cytology | State and territory cervical cytology registers |
| 4 | Histology | State and territory cervical cytology registers |
| 5 | Cytology-histology correlation | State and territory cervical cytology 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 cytology 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 ACD 2009 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's 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 coded nationally 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 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 2010 (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).

Mortality data for 2010 are preliminary and subject to revision. 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 2009 and 2010 (2-year participation), the average for 2008, 2009 and 2010 (3-year participation) and the average of the ABS estimated resident population for 2006, 2007, 2008, 2009 and 2010 (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 C3, 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 Standard Geographic Classification (ASGC) Remoteness Structure (ABS 2006), which groups geographic areas into six categories. These categories, called Remoteness Areas (RAs), are based on Census Collection Districts and defined using the Accessibility/Remoteness Index for Australia (ARIA). ARIA is a measure of the remoteness of a location from the services provided by large towns or cities. Accessibility is judged purely on distance to one of the metropolitan centres. A higher ARIA score denotes a more remote location. The six RAs of the ASGC Remoteness Structure are listed in the table below (Table C4); the sixth 'migratory' area is not used in this report.

**Table C3: Remoteness areas for the ASGC**

| Remoteness area | Collection districts within region |
|---|---|
| Major cities of Australia | CDs with an average ARIA index value of 0 to 0.2 |
| Inner regional Australia | CDs with an average ARIA index value greater than 0.2 and less than or equal to 2.4 |
| Outer regional Australia | CDs with an average ARIA index value greater than 2.4 and less than or equal to 5.92 |
| Remote Australia | CDs with an average ARIA index value greater than 5.92 and less than or equal to 10.53 |
| Very remote Australia | CDs with an average ARIA index value greater than 10.53 |
| Migratory | Areas composed of offshore, shipping and migratory CDs |

For participation and incidence, 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 2006 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 deaths, women were allocated to a remoteness area based on their assigned statistical local area.

Note that the methodology used to allocate women to numerators and denominators was refined for 2009–2010 participation data, which effects comparability with data prior to 2009–2010.

### 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 and incidence, 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 2006 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 mortality, women were allocated to a socioeconomic status based on their assigned statistical local area.

Note that the methodology used to allocate women to numerators and denominators was refined for 2009–2010 participation data, which effects comparability with data prior to 2009–2010.

# Appendix D Data quality statement

## Data Quality Statement: Cervical screening data 2010–2011

### Summary of key issues

- All states and territories maintain a population-based cervical cytology 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 cytology 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 cytology 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 cytology 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 cytology register.

Cervical screening programs in each state and territory interrogate their own cervical cytology 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.

#### 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 cytology 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 contains all cytology and histology tests performed in 2011.

### 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 cytology 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

Where indicators include a comparison (such as between states and territories), a 95% confidence interval is 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:** a person of Aboriginal descent who identifies as an Aboriginal and is accepted as such by the community in which he or she lives.

**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*).

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

**Cervical cytology registry:** the component of each state and territory cervical screening program that maintains the *cervical cytology 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 range determined by variability in data, within which there is a specified (usually 95%) chance that the true value of a calculated parameter lies.

**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*.

**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.

**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 two 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:** a sample prepared for the study of *exfoliated* cells from the cervix. The terms Pap smear and *Pap test* are often used interchangeably.

**Pap test:** a sample prepared for the study of *exfoliated* cells from the cervix. The terms Pap test and *Pap smear* are often used interchangeably.

**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 italics are defined elsewhere in the glossary.

# References


ABS (Australian Bureau of Statistics) 2006. Statistical Geography Volume 1—Australian Standard Geographical Classification (ASGC). Canberra: ABS. Viewed 5 May 2013, <http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/BD1B52D132D130E7CA2573630012F67B?opendocument>.

ABS 2012. Deaths, Australia, 2011. Canberra: ABS. Viewed 5 May 2013, <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 5 May 2013, <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.

ABS 2010. Population by age and sex, Australian states and territories. ABS cat. no. 3201.0. 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 2011. National Cervical Cancer Prevention Dataset. Canberra: AIHW.

AIHW & AACR (Australasian Association of Cancer Registries) 2010. Cancer in Australia: an overview, 2010. Cancer series no. 60. Cat. no. CAN 56. 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.

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.

DoHA 2011a. National Cervical Screening Program: NCSP policies. Viewed 27 May 2011, <http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/NCSP-Policies-1>.

DoHA 2013a. HPV School Vaccination Program. Viewed 25 March 2013. <hpv.health.gov.au/the-program>.

DoHA 2013b. Human Papillomavirus (HPV): Information about the National Human Papillomavirus (HPV) Vaccination Program funded under the Immunise Australia Program. Viewe 25 March 2013. <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) 2011. Information for health professionals. Melbourne: Victorian Cytology Service Inc. Viewed 9 May 2011, <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.

# List of tables

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*Cervical screening in Australia 2010–2011* presents the latest national statistics monitoring the National Cervical Screening Program, which aims to reduce incidence, morbidity and mortality from cervical cancer. Around 57% of women in the target age group of 20–69 took part in the program, with more than 3.6 million women screened in 2010 and 2011.

Cervical cancer incidence in this age group remains at a historical low of 9 new cases per 100,000 women, and deaths are also low, historically and by international standards, at 2 deaths per 100,000 women.