National Screening Unit

National Cervical Screening Programme

Annual report

(2008-2009)

Report prepared June 2011

Revised August 2011

Finalised January 2012

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Contents

Figures

Tables

Acknowledgments

This report was prepared by Cancer Council New South Wales in collaboration with the National Screening Unit, Ministry of Health, in particular Dr Hazel Lewis, Clinical Advisor and Dr Harold Neal, Principal Technical Specialist, of the National Screening Unit.

We would like to acknowledge the contribution from Brendon Jones and Brendon Watson for NCSP Register data extraction, Anna Maxwell for editorial support, Kimberley McGregor for assistance with report editing and proofing, Dr Mark Clements for assistance with code development and importing data for analysis, and Michelle Hooper for administrative support.

About the authors

The authors are based in the Cancer Epidemiology Unit at Cancer Council NSW (Sydney, Australia). They are part of a research group (led by A/Prof Karen Canfell) which has as its core research focus in the epidemiology of cervical cancer, cervical screening and human Papillomavirus (HPV) vaccination. This research group has established an extensive track record both in research publication and in successful completion of commissioned projects related to national cervical screening programs in New Zealand, Australia and England. Expert advisors to the group's research work include Professor Dame Valerie Beral (Director, Cancer Epidemiology Unit, University of Oxford) and Professor Bruce Armstrong (Professor of Public Health, University of Sydney). The group has extensive experience in the analysis of descriptive data from cervical cancer screening programmes. The team also has a range of related skills in the analysis of linked datasets, systematic review and meta-analysis, biostatistics, health economics, and advanced statistical modelling techniques.

1 Cancer incidence and mortality

Definition

Cancer incidence is the annual rate of new registrations of invasive cervical cancer (per 100,000 women in the New Zealand estimated resident population at the end of that year), standardised to the WHO standard population according to Ahmad et al.[1]

Cancer mortality is the annual rate of deaths due to invasive cervical cancer (per 100,000 women in the New Zealand estimated resident population at the end of that year), standardised to the WHO population.

Target

Previous targets were incidence of no more than 8.0 per 100,000 women[2], and mortality of no more than 2.5 per 100,000 women in the New Zealand population, standardised to the Segi population.

Calculation

Registrations of cancer cases (by age, ethnicity, and histological type) over the period 2005 to 2009 were obtained from the New Zealand Cancer Registry (data extracted 13 January 2011). Cervical cancer mortality data for 2005-2008 were also obtained (by age and ethnicity).

Age-specific incidence and mortality rates were calculated for each calendar year, based on the estimated resident New Zealand female population at the end of that year. Age-specific rates were then weighted using the standard WHO population to derive age-standardised rates (details of the WHO Standard population are provided in Appendix A). 95% confidence intervals were calculated according to the methods in *IARC Scientific Publication 95. Cancer Registrations: Principles & Methods (Chapter 11: Statistical Methods for Registries*)[3]. Incidence rates were calculated separately for either each ethnic group, or for each histological type. Mortality rates were calculated separately for each ethnic group. Average rates were also calculated by five-year age group as the sum of all cases over the period within that age group, divided by the sum of the estimated population within that age group in each year contributing to the average.

In the current report, the periods over which rates are reported and averages are calculated vary for each measure, due to limitations in the availability of data. Population data by age and ethnic group were available from 2006 onwards, therefore rates and averages which are reported by ethnicity were calculated starting from 2006. Cancer incidence data is available to 2009, and therefore age-standardised incidence rates and age-specific averages for incidence by ethnicity were calculated over the period 2006 to 2009. The most recent mortality data available relates to 2008, and therefore age-standardised mortality rates and age-specific averages for mortality by ethnicity were calculated over the period 2006 to 2008. Cancer incidence rates by histological sub-type required

[1] Ahmad OB, Boschi-Pinto C, Lopez AD, Murray CJL, Lozano R, Inoue M. Age standardization of rates: A new WHO standard. GPE Discussion Paper Series: No.31. 2001. Geneva, World Health Organization.

[2] Target has since been updated (2011) to 7.5 per 100,000 women, standardised to the Segi population.

[3] Available from http://com.iarc.fr/en/publications/pdfs-online/epi/sp95/sp95-chap11.pdf

only overall population data, and therefore these were calculated over the five-year period 2005 to 2009. It is envisioned that as further data becomes available, future annual reports will eventually report all of these measures over a period of five years, and on five-year averages for incidence and mortality.

Results

Cervical cancer incidence rates overall, and for each of Māori, Pacific, Asian and European/ Other women, are shown in Table 1, and with 95% confidence intervals in Figure 1a). Counts for incident cancer cases are also shown in Table 1. Rates could not be calculated for all four ethnicity groups prior to 2006 due to limitations in the availability of population data (although separate case numbers for 2005 only were available from previous Annual Monitoring Reports). Therefore cases and rates presented for "Other women" in 1996 to 2004 relate to all non- Māori women. These data were sourced from *Cancer: New Registrations and Deaths*.

Overall, between 1996 and 2009 cervical cancer incidence has declined from 10.5 to 5.4 per 100,000 for women of all ethnicities, and from 25.0 to 10.4 per 100,000 for Māori women (Table 1).

As shown in Figure 1a), there is some variation in the incidence rates by ethnicity, however the 95% confidence intervals are very wide, and the possibility that this variability is due to chance cannot be excluded. As case numbers are quite small for Pacific women and Asian women, an additional figure is included which compares rates in Māori women to rates in all women in New Zealand (Figure 1b)), to supplement the detailed information in Figure 1a). Again, the comparatively wide confidence intervals indicate the uncertainty around rates in Māori women, and the possibility that the observed difference in cancer incidence is due to chance cannot be excluded.

Cervical cancer incidence rates by histological type are shown in Figure 2 and Table 2 for the period 2005 to 2009. Squamous cell cancer remained the most commonly diagnosed type of cervical cancer over this five-year period, but in 2009 there was no longer evidence of a difference between the incidence of squamous cell cancer and adenocarcinoma (that is, the confidence intervals for squamous cell cancer incidence and adenocarcinoma incidence overlapped – see Figure 2).

Average age-specific cervical cancer incidence rates (2006-2009), by ethnicity are shown in Figure 3 and Table 3. Confidence intervals are generally very wide, so are not displayed on the chart, but are included in Table 3. Because of this, age-related trends are not straightforward to interpret, however the general trend by age appears to be similar in all ethnic groups: low incidence at younger ages, increasing by around the age of 30-40 years to reach a plateau.

Average age-specific cervical cancer incidence rates (2006-2009), by histological type are shown in Figure 4. The different histological types follow broadly similar patterns by age to each other (and to overall incidence), but the absolute rates vary, being highest for squamous cell cancer, and generally lowest for adenosquamous cancer in virtually all age groups.

Cervical cancer mortality rates overall, and for each of Māori, Pacific, Asian and European/ Other women, are shown in Table 4, and with 95% confidence intervals in Figure 5a). Counts of deaths due to cervical cancer are also shown in Table 4. Rates could not be calculated for all four ethnicity groups prior to 2006 due to limitations in the availability of population data, however separate counts for deaths were available for 2005 from previous Annual Monitoring Reports. Therefore

rates and deaths reported for "Other women" in 1996 to 2004 relate to all non- Māori women; these data were sourced from *Cancer: New Registrations and Deaths*.

Overall, between 1996 and 2008 cervical cancer mortality has declined from 3.8 to 1.8 per 100,000 for women of all ethnicities, and from 13.0 to 4.7 per 100,000 for Māori women (Table 4).

As shown in Figure 5a), there is some variation in the mortality rates by ethnicity, however the 95% confidence intervals are very wide, and the possibility that this variability is due to chance cannot be excluded. As for the incidence data, an additional figure is included which compares mortality rates in Māori women to rates in all women in New Zealand (Figure 5b)), to supplement the more detailed ethnicity information in Figure 5a). Again, the comparatively wide confidence intervals indicate the uncertainty around rates in Māori women, and the possibility that the observed difference in cancer mortality is due to chance cannot be excluded.

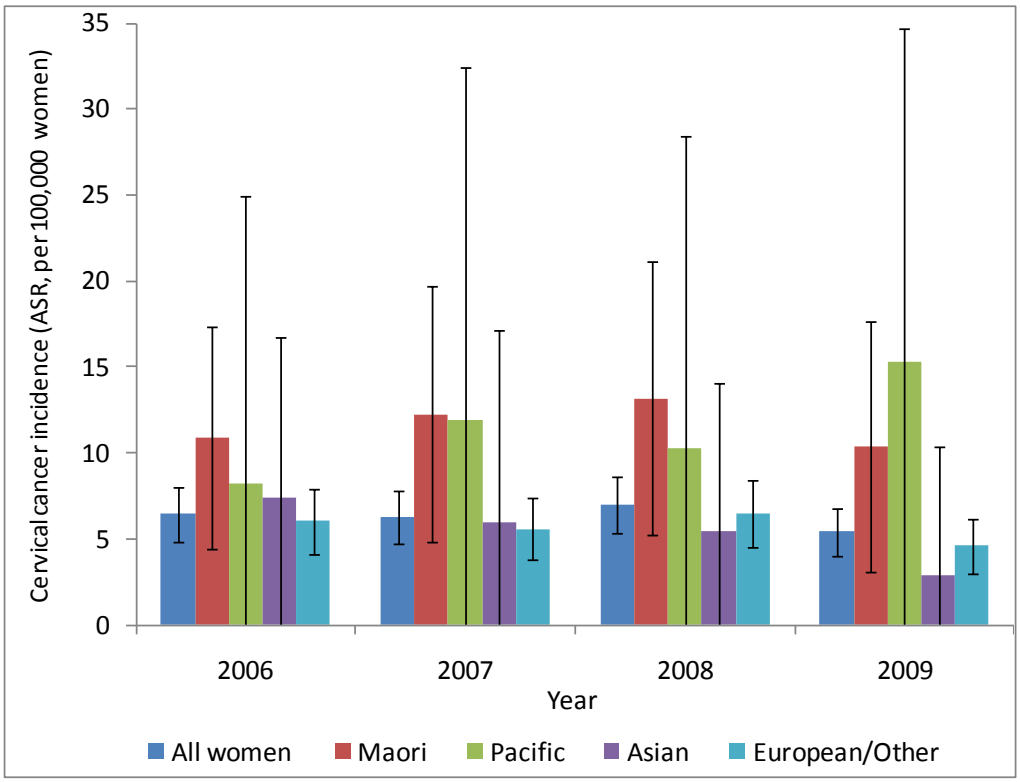
Average age-specific cervical cancer mortality rates (2006-2008), by ethnicity are shown in Figure 6. As for incidence, the associated confidence intervals are wide, making trends by age more difficult to discern, but generally there appears to be a broad increase with age.

Comments

In this report incidence and mortality rates are standardised using the WHO Standard population (see Appendix A), consistent with the population used to produce standardised rates in *Cancer: New Registrations and Deaths*. Note that previous National Cervical Screening Programme Annual Monitoring Reports reported on rates which were standardised to the Segi population, and therefore these rates are not directly comparable.

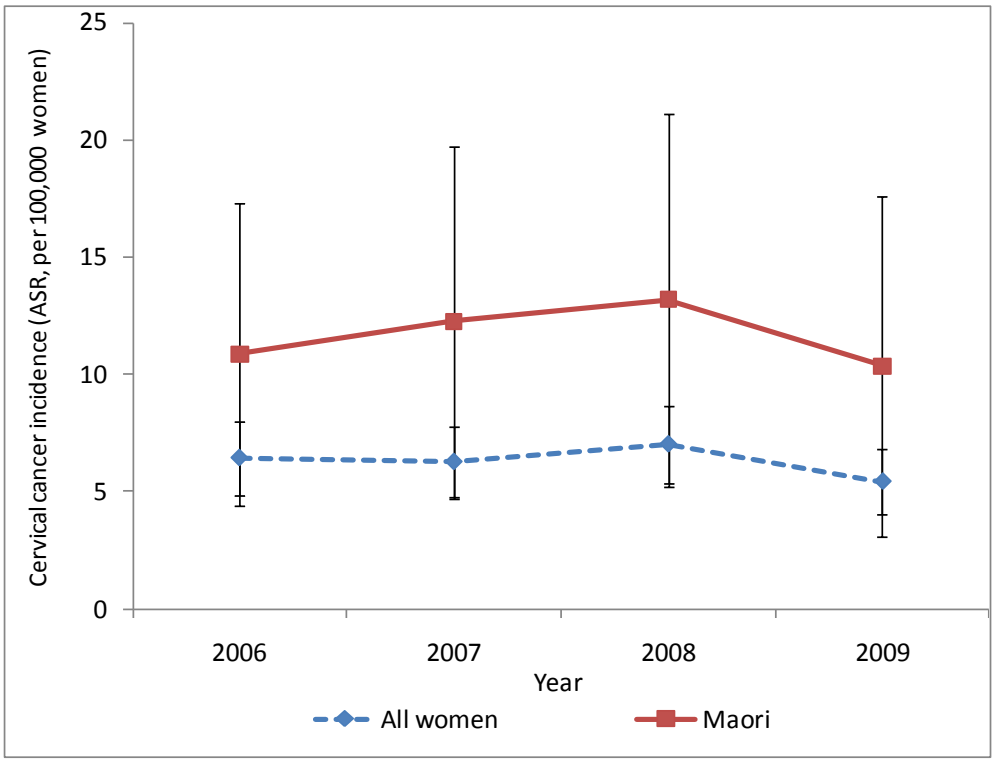
Figure 1 – Age-standardised cervical cancer incidence rates, 2006 to 2009, by ethnicity

a) All ethnic groups



Vertical bars represent 95% confidence intervals

b) Māori women, compared to All women



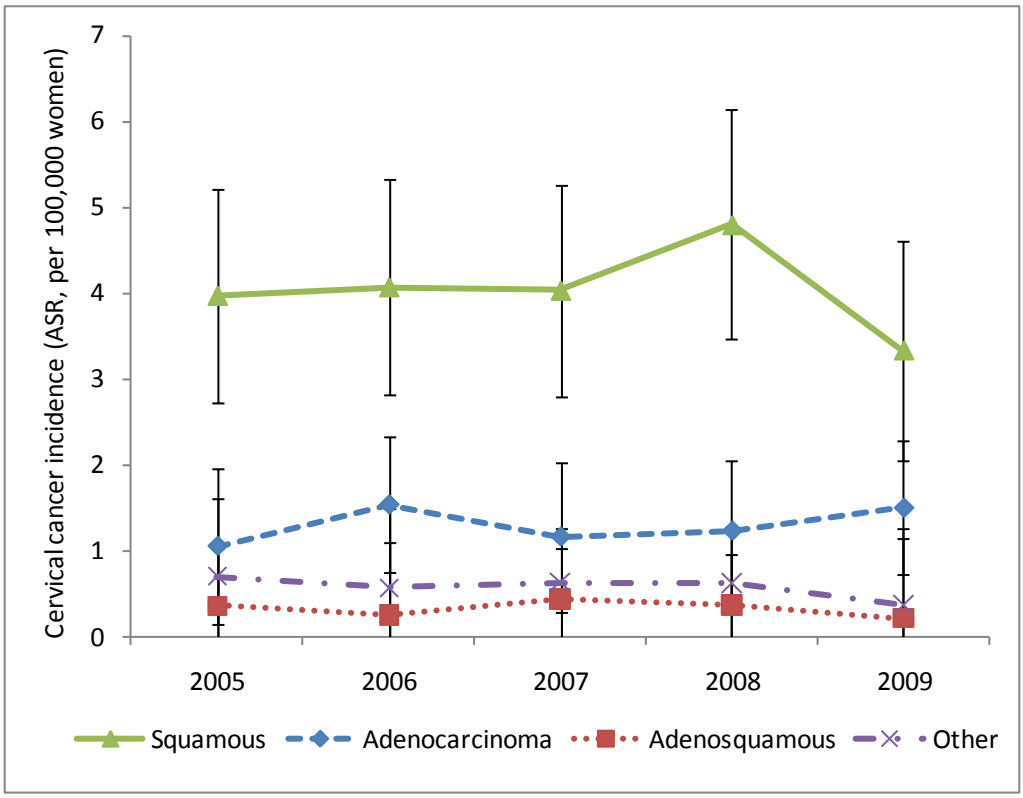
Vertical bars represent 95% confidence intervals

Table 1 – Cervical cancer incidence, 1996 to 2009, by ethnicity

	All women		Māori women		Pacific women		Asian women		Other women §	
Year†	N	Rate*	N	Rate*	N	Rate*	N	Rate*	N	Rate*
1996	211	10.5	47	25.0	NA	NA	NA	NA	*164*	*9.0*
1997	205	9.3	51	22.5	NA	NA	NA	NA	*154*	*7.6*
1998	200	9.1	36	17.7	NA	NA	NA	NA	*164*	*8.3*
1999	220	10.0	43	18.7	NA	NA	NA	NA	*177*	*8.9*
2000	204	9.4	43	16.8	NA	NA	NA	NA	*161*	*8.3*
2001	189	8.5	33	13.7	NA	NA	NA	NA	*156*	*8.0*
2002	181	7.7	33	15.1	NA	NA	NA	NA	*148*	*7.2*
2003	178	7.7	33	13.5	NA	NA	NA	NA	*145*	*7.1*
2004	157	6.6	33	14.4	NA	NA	NA	NA	*124*	*5.9*
2005	154	6.1	25	10.1	17	NA	15	NA	97	NA
2006	159	6.4	28	10.9	10	8.3	15	7.3	106	6.0
2007	159	6.3	33	12.3	12	11.9	12	6.0	102	5.6
2008	174	7.0	37	13.2	12	10.3	13	5.4	112	6.4
2009	141	5.4	29	10.4	18	15.3	7	2.8	87	4.6

† Cases and rates for 1997-2004 sourced from *Cancer: New Registrations and Deaths, 2007;* cases and rates for 1996 sourced from *Cancer: New Registrations and Deaths, 2006*. § Counts and rates for "Other women" in 1996-2004 are combined for all non- Māori women ie they also include cases in Pacific and Asian women *Rates are per 100,000 women, age-standardised to the WHO standard population (all ages) NA = not available

Figure 2 – Age-standardised cervical cancer incidence rates, 2005 to 2009, by histological type



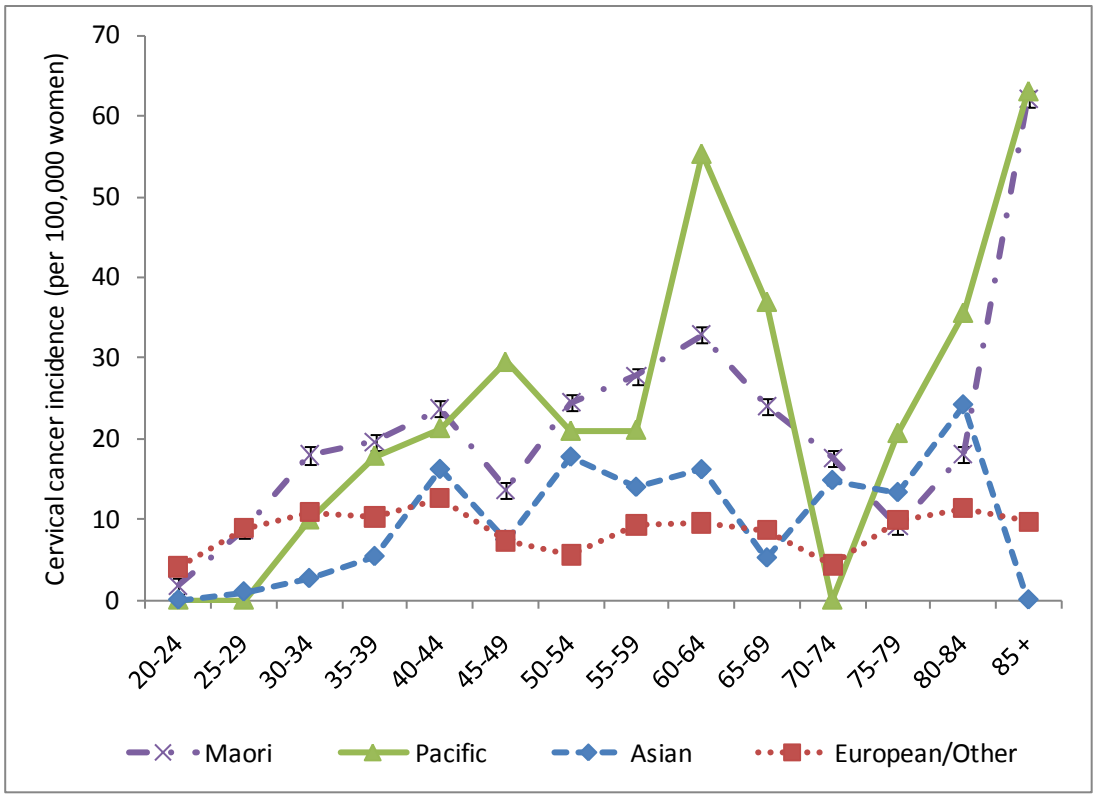
Vertical bars represent 95% confidence intervals

Table 2 – Cervical cancer incidence, 2005 to 2009, by histological type

Year	Squamous		Adenocarcinoma		Adenosquamous		Other	
	N	Rate* (per 100,000 women)	N	Rate* (per 100,000 women)	N	Rate* (per 100,000 women)	N	Rate* (per 100,000 women)
2005	97	4.0	27	1.1	8	0.4	22	0.7
2006	100	4.1	36	1.5	7	0.2	16	0.6
2007	101	4.0	30	1.2	11	0.4	17	0.6
2008	120	4.8	30	1.2	8	0.4	16	0.6
2009	86	3.3	38	1.5	5	0.2	12	0.4

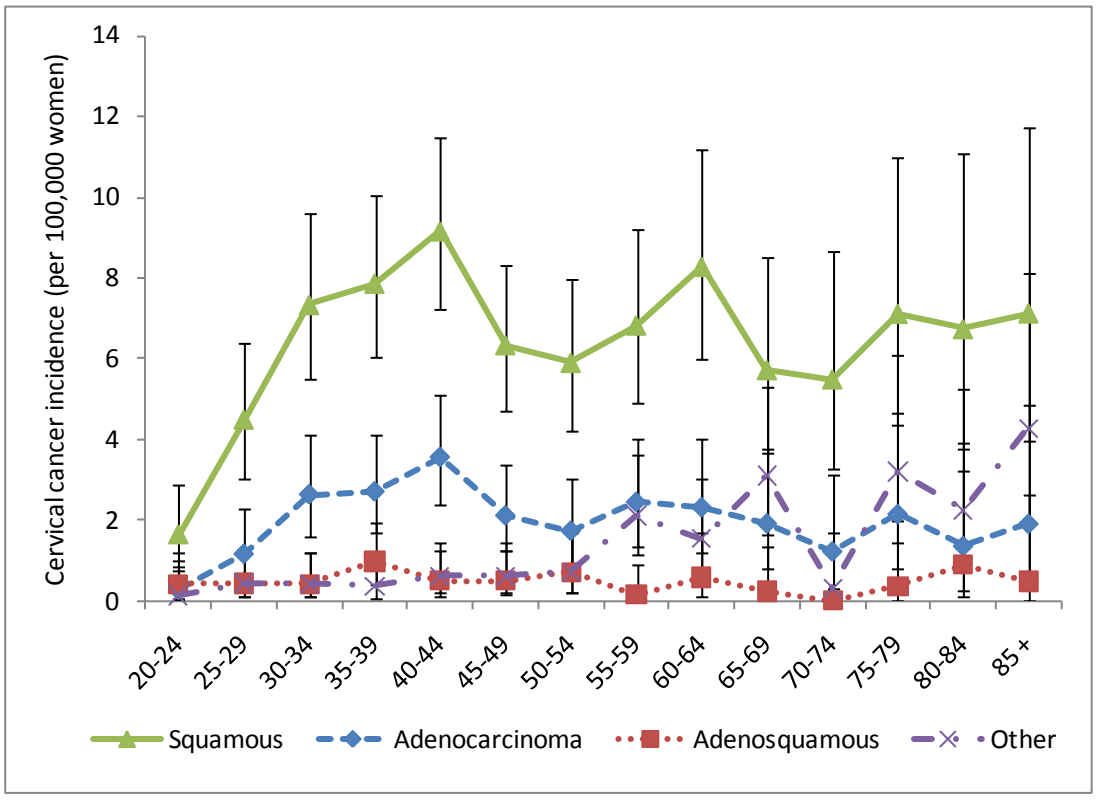
* Age-standardised to the WHO population (all ages)

Figure 3 – Four*-year average cervical cancer incidence rates (2006 to 2009), by age and ethnicity



** Five-year averages could not be calculated for this report, due to limitations in the available population data. Note that no cases were observed in Pacific women aged 70-74 years over this time period.*

Figure 4 – Five-year average cervical cancer incidence rates (2005 to 2009), by age and histological type



Vertical bars represent 95% confidence intervals

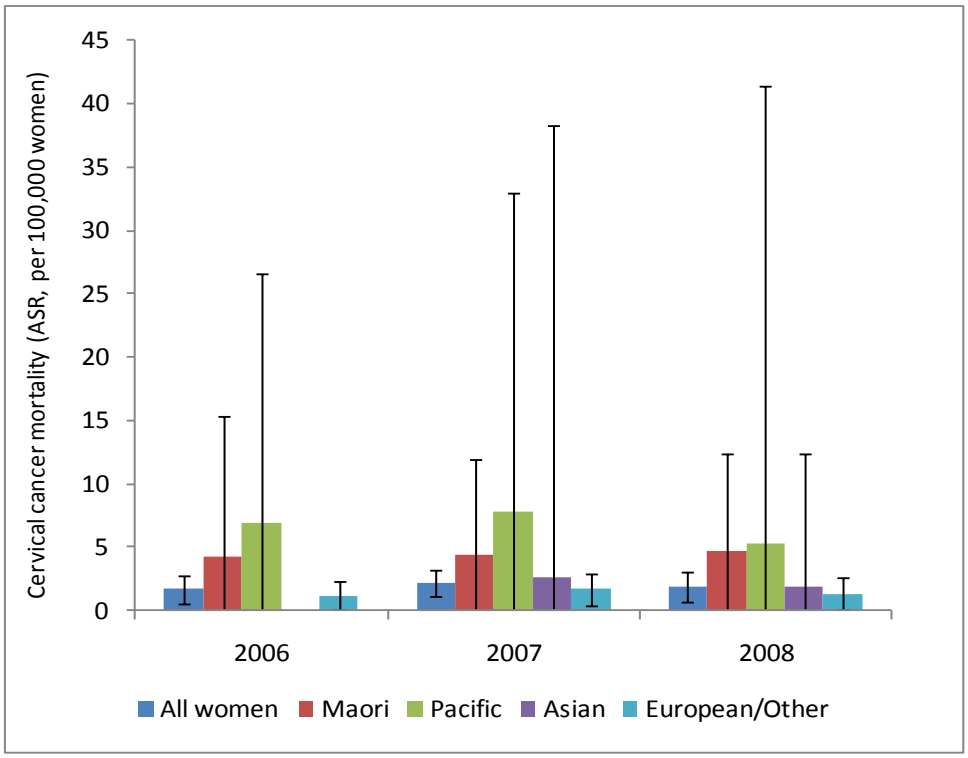
Table 3 - Average cervical cancer incidence (2006 to 2009), by age and ethnicity

	Māori women		Pacific women		Asian women		European/ Other women	
Age	**Rate**	**(95%CI)**	**Rate**	**(95%CI)**	**Rate**	**(95%CI)**	**Rate**	**(95%CI)**
20-24	1.8	(0.2 - 6.6)	-	-	-	-	4.2	(2.3 – 7.0)
25-29	8.8	(3.8 - 17.3)	-	-	1.0	(0.0 - 5.6)	8.9	(6.0 - 12.8)
30-34	18.0	(10.3 - 29.2)	10.0	(2.7 - 25.5)	2.7	(0.3 - 9.6)	10.9	(7.8 - 14.8)
35-39	19.6	(11.6 – 31.0)	17.9	(7.2 - 36.8)	5.4	(1.5 - 13.8)	10.3	(7.5 - 13.8)
40-44	23.7	(14.5 - 36.6)	21.3	(9.2 - 41.9)	16.2	(8.4 - 28.3)	12.7	(9.6 - 16.4)
45-49	13.7	(6.9 - 24.6)	29.5	(13.5 – 56.0)	7.5	(2.4 - 17.4)	7.4	(5.1 - 10.2)
50-54	24.5	(13.7 - 40.4)	21.0	(6.8 - 48.9)	17.8	(8.1 - 33.7)	5.6	(3.6 - 8.3)
55-59	27.8	(14.8 - 47.6)	21.1	(5.7 – 54.0)	14.0	(4.5 - 32.7)	9.3	(6.6 - 12.9)
60-64	33.0	(16.5 – 59.0)	55.3	(23.9 – 109.0)	16.2	(4.4 - 41.5)	9.6	(6.7 - 13.4)
65-69	24.1	(8.8 - 52.4)	37.0	(10.1 - 94.6)	5.2	(0.1 - 29.1)	8.7	(5.6 - 12.9)
70-74	17.7	(3.6 - 51.6)	-	-	14.9	(1.8 - 53.7)	4.4	(2.1 - 8.1)
75-79	9.1	(0.2 - 50.9)	20.7	(0.5 - 115.2)	13.4	(0.3 - 74.4)	9.9	(6.0 - 15.3)
80-84	18.2	(0.5 - 101.2)	35.6	(0.9 - 198.3)	24.3	(0.6 - 135.2)	11.4	(6.8 - 17.7)
85 +	62.2	(7.5 - 224.7)	63.1	(1.6 - 351.5)	-	-	9.8	(5.6 - 15.8)

'-' indicates no cases recorded

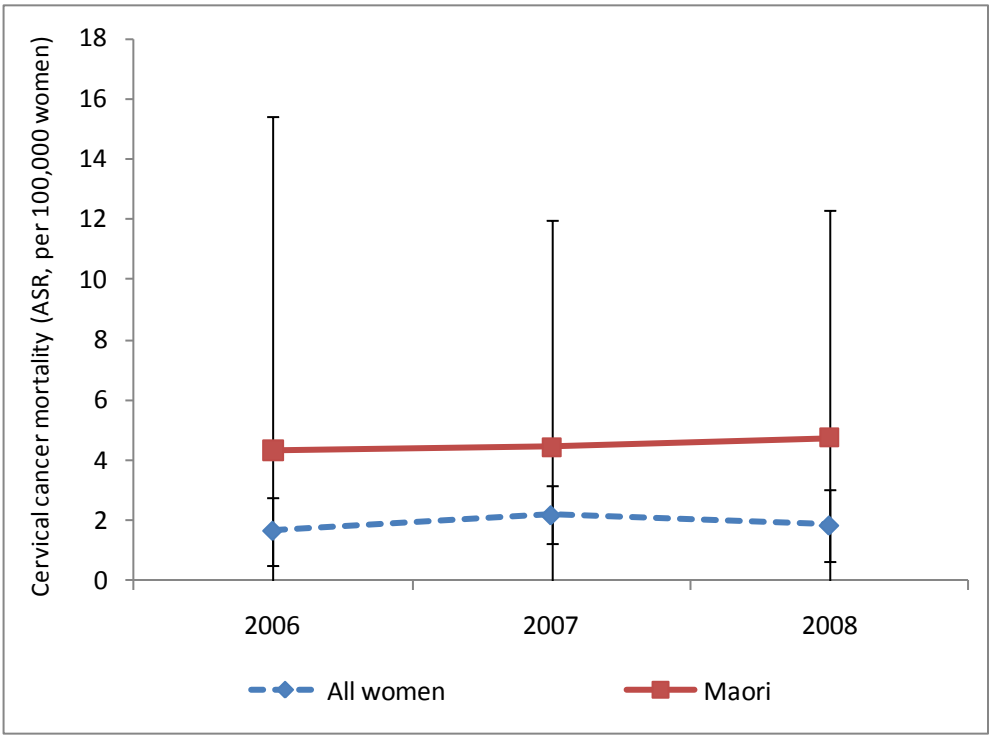
Figure 5 – Age-standardised cervical cancer mortality rates, 2006 to 2008, by ethnicity

a) All ethnic groups



Vertical bars represent 95% confidence intervals

b) Māori women, compared to All women



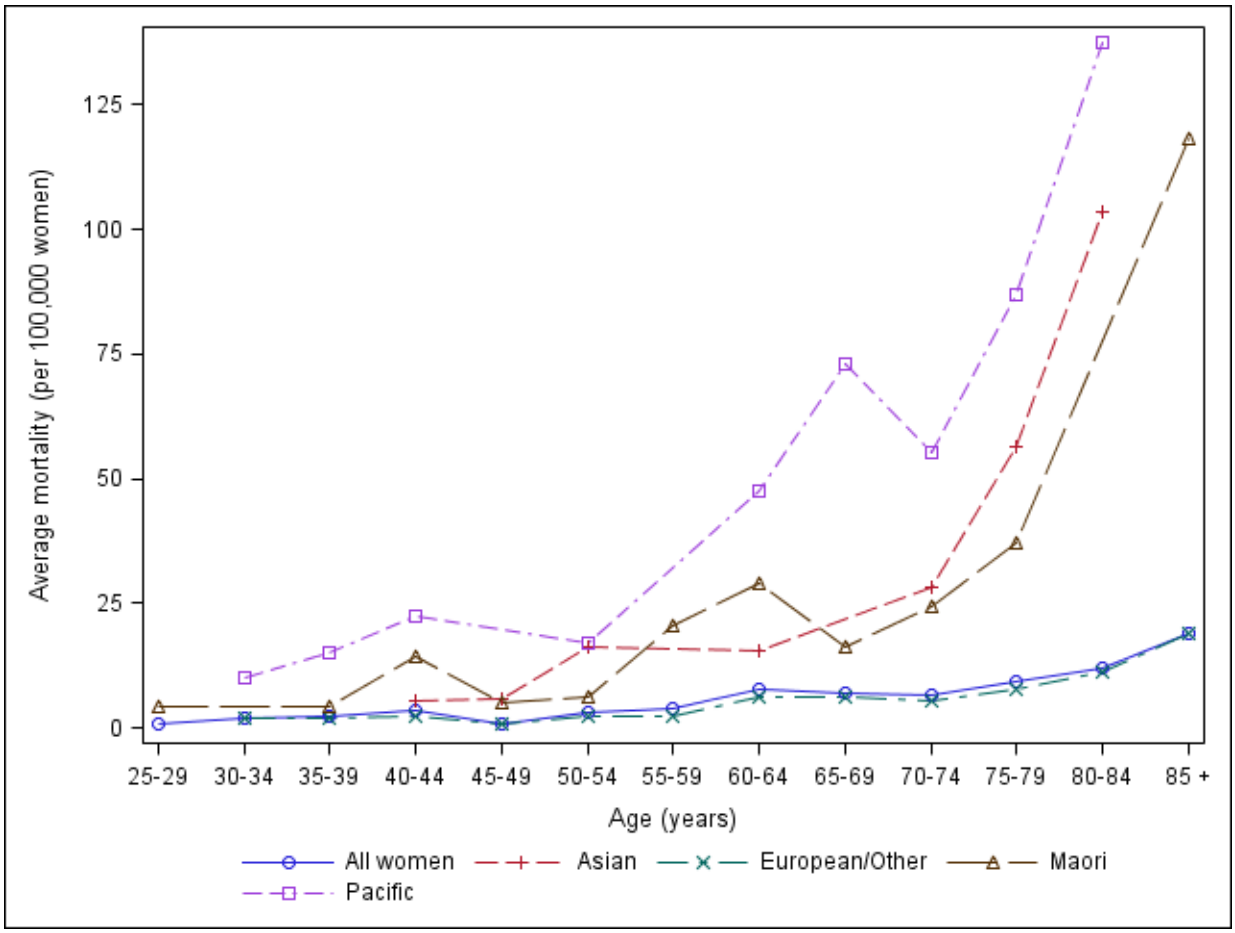
Vertical bars represent 95% confidence intervals

Table 4 – Cervical cancer mortality, 1996 to 2008, by ethnicity

	All women		Māori women		Pacific women		Asian women		Other women §	
Year†	N	Rate*	N	Rate*	N	Rate*	N	Rate*	N	Rate*
1996	82	3.8	22	13.0	3	NA	NA	NA	*60*	*2.9*
1997	73	3.2	19	8.8	2	NA	NA	NA	*54*	*2.4*
1998	77	3.2	17	10.3	4	NA	NA	NA	*60*	*2.7*
1999	71	3.0	20	10.6	7	NA	NA	NA	*51*	*2.3*
2000	66	2.7	17	8.7	3	NA	NA	NA	*49*	*2.1*
2001	63	2.4	13	7.0	1	NA	NA	NA	*50*	*2.0*
2002	65	2.4	12	5.8	2	NA	NA	NA	*53*	*2.1*
2003	58	2.1	8	3.5	5	NA	NA	NA	*50*	*2.0*
2004	71	2.7	15	5.8	4	NA	NA	NA	*56*	*2.2*
2005	54	1.9	13	6.5	6	NA	-	-	35	NA
2006	52	1.7	10	4.3	7	6.85	-	-	35	1.21
2007	65	2.2	11	4.4	8	7.87	4	2.67	42	1.68
2008	59	1.8	12	4.7	5	5.31	4	1.91	38	1.35

† Deaths and rates for 1997-2004 sourced from *Cancer: New Registrations and Deaths, 2007;* deaths and rates for 1996 sourced from *Cancer: New Registrations and Deaths, 2006.* Separate data on deaths in Pacific women were sourced from *National Cervical Screening Programme Annual Monitoring Report 2006.* § Counts and rates for "Other women" in 1996-2004 are combined for all non- Māori women ie they also include deaths in Pacific and Asian women * Rates are per 100,000 women, age-standardised to the WHO standard population (all ages) NA = not available. '-' = no cases recorded

Figure 6 – Average* cervical cancer mortality rates (2006 to 2008) by age and ethnicity



** Five-year averages could not be calculated for this report, due to limitations in the available population data*

2 Coverage

Definition

The proportion of women aged 25-69 years at the end of the calendar year who are recorded on the NCSP Register as having had a screening event (sample taken for cytology, HPV, or histology) in the previous three years.

Target

75% of eligible women within three years

Calculation

The number of women who have had a cervical sample, HPV or histology specimen taken in the previous three years ("women screened") is extracted from the NCSP Register. The eligible population is estimated as the hysterectomy-adjusted population, as at 31 December in the year for which coverage is calculated. The underlying female population is derived from New Zealand 2006 Census data, projected to the end of the year for which coverage is calculated. A hysterectomy adjustment factor was applied to New Zealand population projections from Statistics New Zealand so that estimates were obtained of the number of women in the New Zealand population (by age and ethnicity) who had not had a hysterectomy prior to the end of each calendar year for which coverage is calculated in this report (2006-2009). The hysterectomy-adjustment used in this report uses estimates of the hysterectomy prevalence (both total and partial) in the New Zealand population, modelled by the Public Health Intelligence unit of the Ministry of Health. The hysterectomy prevalence was estimated by extracting information about procedures from hospital discharge data. Central estimates of survival and hysterectomy incidence in five-year age groups and five-year periods by ethnicity were then used to determine the prevalence of hysterectomy in all age groups, ethnicities and years. Adjustors for the relevant end year are used, where available (for years 2006-2007). As hysterectomy adjustors specific to 2008 and beyond are not available, hysterectomy adjustors relating to 2007 were also used for calendar years later than 2007. Further information about the hysterectomy prevalence methodology can be found in the document '*Setting Outcome Targets for the National Cervical Screening Programme. A Report for the National Screening Unit. November 2003*' by S. Paul, M. Tobias, and C. Wright.

The analysis by ethnicity considered four groups – Māori, Pacific, Asian, or European/Other ethnic groups, based on their priority two ethnicity codes recorded on the NCSP Register. Ethnicity data in New Zealand is collected during encounters with the health system, such as registering with primary care, during an admission to hospital or during surveys. Coding of ethnicity on the NCSP Register follows the classification used by the Ministry of Health[4,5]. Women for whom ethnicity information was not available were included in the "European/Other" category. The data download used for the

[4] Ministry of Health, 2004. *Ethnicity Data Protocols for the Health and Disability Sector* Wellington; Ministry of Health. Available at http://www.moh.govt.nz

[5] Ministry of Health, 2006. *Asian Health Chart Book* Wellington, Ministry of Health. Available at http://www.moh.govt.nz

current analysis (NCSP Register data as at 1st March 2011) contained ethnicity codes for approximately 94% of women on the NCSP Register.

Age relates to the woman's age at the end of the year for which coverage is being calculated. For example, coverage estimates for 2007 for women aged 25-29 years refers to women aged 25-29 years on 31 December 2007, with a screening event in the period 1 January 2005 to 31 December 2007. Coverage is calculated for women aged 25-69 years, in order to restrict the calculation to women in five-year age groups who were in the target age range for screening (ages 20-69 years) for the full three-year period being assessed.

Results

The number of women aged 25-69 years with at least one cervical sample collected in the previous three years increased from 763,405 in 2006, to 838,299 in 2009 (Table 5). The estimated coverage rates in women aged 25-69 years over the period 2006-2009 are shown in Figure 7 and Table 5. Coverage over the four-year period increased from 70.4% in 2006 to 74.9% in 2009.

Estimated coverage varied by ethnicity (Figure 7, Table 5). The coverage target of 75% was met in European/ Other women throughout the four-year period (2006-2009), but was not met in any year during this period for Māori, Pacific, or Asian women, or for New Zealand overall. Coverage has increased in all four ethnic groups over the four-year period. The increase was greatest among Pacific women (from 47.3% in 2006 to 59.0% in 2009), and smallest among European/ Other women (from 79.5% in 2006 to 83.6% in 2009). As a result, the disparity between the groups with the highest and lowest coverage has narrowed from 32.1% in 2006 (between Pacific and European/ Other), to 29.8% in 2009 (between Asian and European/ Other).

Estimated coverage also varies by age (Figure 8a, Table 6). Coverage has increased in all age-groups over the four-year period (Figure 8b). In 2006, the 75% target was not met in any five-year age group, however by 2009 the target was being met in five of the age groups (the age groups between 35-59 years). Throughout the four-year period, coverage was consistently highest in these same age groups, and the increases in coverage were generally also greater in these age groups. In contrast, much smaller increases were generally seen in the other age groups, where coverage was lower, and therefore the disparity in coverage between age groups with the highest and lowest coverage has widened, from 14.7% in 2006 to 17.5% in 2009 (in both cases, between women aged 65-69 years and women aged 45-49 years).

Comments

Undercounting of some ethnic groups on the NCSP Register may account for some of the observed difference in coverage between various ethnic groups. Previous reports by the Health & Disability Intelligence Unit investigated potential ethnic undercounting in the NCSP Register, by comparing NCSP Register data to data from the National Health Index (NHI) and Register of Births, Deaths & Marriages (BDM). Undercounting of Māori, Pacific, and Asian women (and as a result, overcounting of European/Other ethnic groups) was found, although the degree to which this occurred varied by age-group, and has changed over time. Undercounting was estimated to be around 20% for each of the Māori, Pacific, and Asian groups in 2007 (the most recent year for which estimates of the extent

of undercounting are available). Undercounting may result in underestimates for coverage in Māori, Pacific, and Asian women, and overestimates in European/Other women.

Coverage calculations require an estimate of the population eligible for cervical screening. This is approximated by applying a hysterectomy-adjustment to the estimated New Zealand female population, to exclude women with a hysterectomy from the eligible population. This is an imperfect adjustor of the proportion of the population eligible for screening, since women with a hysterectomy may or may not require further cervical smears, depending on the type of hysterectomy that they received. In addition, while the hysterectomy prevalence estimates were the best estimates available at the time of the analysis, they are becoming outdated. Estimates are available up until the end of 2007, while this report covers a period up until the end of 2009. It is also possible that the extent to which the estimated hysterectomy-adjusted population differs from the true eligible population may vary by ethnicity, for example if the age-specific prevalence of hysterectomy has changed more in some ethnic groups than in others. In light of these limitations, coverage estimates need to be interpreted with some caution.

As previously described, the estimates used for the New Zealand female population (prior to hysterectomy-adjustment) were the 2006 Census population, projected to the end of the year for which coverage is calculated. This method differs from that in recent biannual monitoring reports covering a similar period (Reports 30-32), where the 2001 Census population, projected to 2006 was used. At the time the analyses were performed for these biannual monitoring reports, estimates were not yet available from the 2006 Census for Asian women by DHB (rather, Asian women were grouped with European/ Other women within each DHB). Use of the 2006 Census data projections has improved the estimate for the target population relating to the period 2006-2009 used in coverage calculations in this report, compared to what was used in earlier biannual reports. It should be noted, however, that this population estimate differs substantially from the previous estimate, largely due to population growth, and therefore the coverage estimates in this report differ from those in the recent biannual reports. This is due to the limitations of the population data available at the time of the previous biannual reports, as highlighted in those reports.

Calculating NCSP coverage

The methods developed for calculating the indicators used to monitor the NCSP are reviewed and revised approximately every three years, consistent with other international programmes. In addition, revisions to calculations are made in accordance with changes to New Zealand statistics, such as the population census data and ethnicity recordings. These changes reflect Statistics New Zealand modifications to methods for estimating population statistics. Any changes to methods for numerators or denominators are discussed with and supported by the NCSP Advisory Group. These changes are then approved by the National Screening Unit.

Until monitoring report 30 (1 July to 31 December 2008), coverage was calculated for women aged 20 – 69 years at the end of the monitoring period. However this includes some younger women who were not eligible for screening for the entire three years because they were aged 22 or less at the end of the three year screening period (i.e. were aged 17 – 19 years at the start of the three year period). This means that previously there may have been slightly underestimated coverage overall. Accordingly, a change to the method for measuring coverage was discussed and agreed on with the NCSP Advisory Group. The revised approach was to report coverage for women aged 25 – 69 years

at the end of the monitoring period (which therefore includes women aged 22 and over at the beginning of the three year period but excludes women aged 20 or 21 years at the beginning). This approach is consistent with what has been done in Australia and the UK.

Beginning with NCSP Monitoring Report 30 (1 July to 31 December 2008), coverage has been reported using the revised method but estimates using the old method (20-69 years at end of period) are also included for comparison.

The difference between the new (25-69 at end of period) and the old (20-69 at end of period) estimates is small (about 1-2%). However the advantage of the new method is that it provides a fairer estimate of coverage (by excluding women who are not eligible for the full three year period) and allows international benchmarking with important peer group countries, including Australia and UK.

In addition to three yearly coverage, (discussed above) we also report five yearly coverage (as is also done internationally). The change in method is even more important here as women aged 20 – 24 all need to be excluded as they are not eligible for screening for the full five years prior to the end of the assessment period. Restricting the coverage estimate to the 25-69 age group rather than the 20-69 age group is even more advantageous with respect to the five year coverage indicator than the three year coverage indicator.

As with all indicators, coverage indicators and the statistics on which they are based continue to evolve and further changes in the construction of these indicators are to be expected in the future. Changes currently in progress include better methods for hysterectomy adjustment and ethnicity identifications.

Figure 7 – Percentage of women aged 25-69 years screened in the previous three years by ethnicity, 2006 to 2009

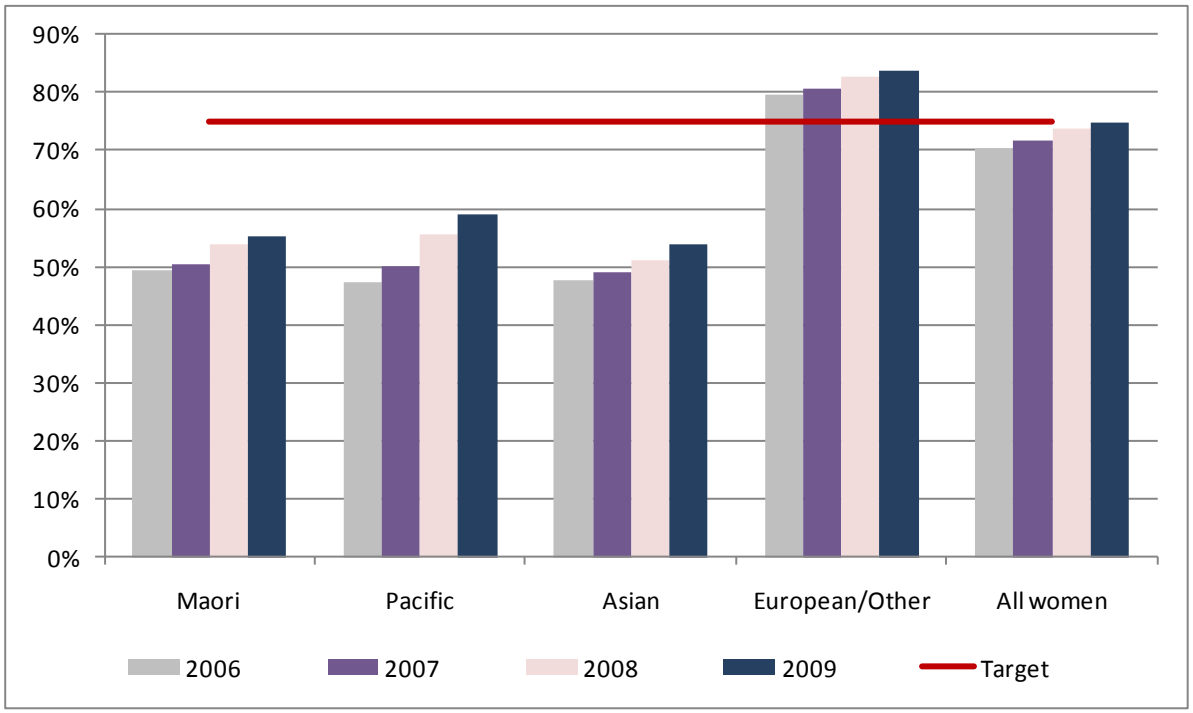


Table 5 – Women aged 25-69 years screened in the previous three years by ethnicity, 2006 to 2009

Ethnicity	2006		2007		2008		2009	
	N	%*	N	%*	N	%*	N	%*
Māori	69,309	49.4	71,662	50.5	77,172	53.7	80,426	55.2
Pacific	28,743	47.3	31,117	50.2	35,186	55.7	38,075	59.0
Asian	54,672	47.6	59,467	48.9	65,919	51.3	72,625	53.8
European/ Other	610,681	79.5	621,787	80.8	637,222	82.7	647,173	83.6
All women	**763,405**	**70.4**	**784,033**	**71.6**	**815,499**	**73.7**	**838,299**	**74.9**

* As a percentage of the hysterectomy-adjusted population (ages 25-69 years) in that year, based on projections from 2006 census population to the end of the relevant calendar year

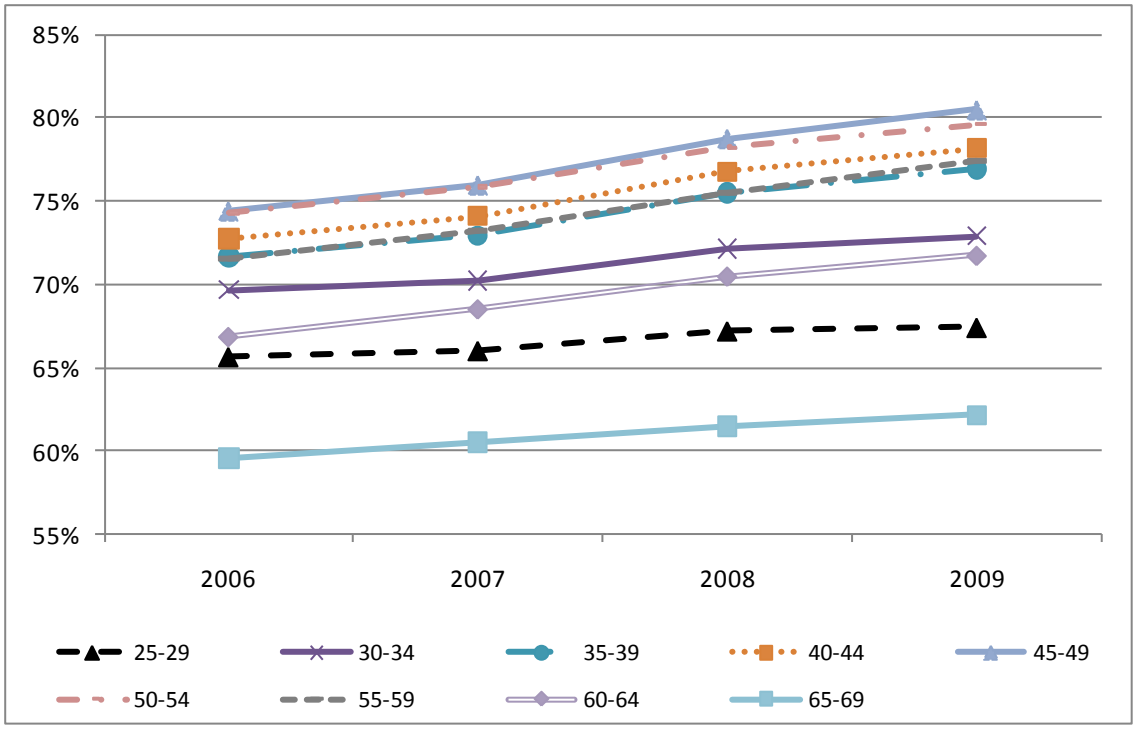
Table 6 – Women screened in the previous three years by 5-year age group, 2006 to 2009

Age group	2006		2007		2008		2009	
	N	% *	N	% *	N	% *	N	% *
25-29	88,342	65.7	90,573	66.0	94,191	67.2	96,865	67.4
30-34	102,092	69.7	99,982	70.2	100,814	72.1	101,619	72.9
35-39	115,108	71.7	117,262	73.0	120,210	75.5	120,725	76.9
40-44	113,829	72.7	114,623	74.1	117,778	76.8	120,001	78.2
45-49	105,010	74.4	110,130	76.0	116,228	78.8	119,614	80.5
50-54	83,492	74.3	87,579	75.9	92,804	78.2	97,232	79.6
55-59	68,554	71.5	70,500	73.2	73,631	75.5	76,915	77.4
60-64	49,413	66.9	53,970	68.5	58,809	70.5	62,611	71.7
65-69	37,565	59.6	39,414	60.5	41,034	61.5	42,717	62.2

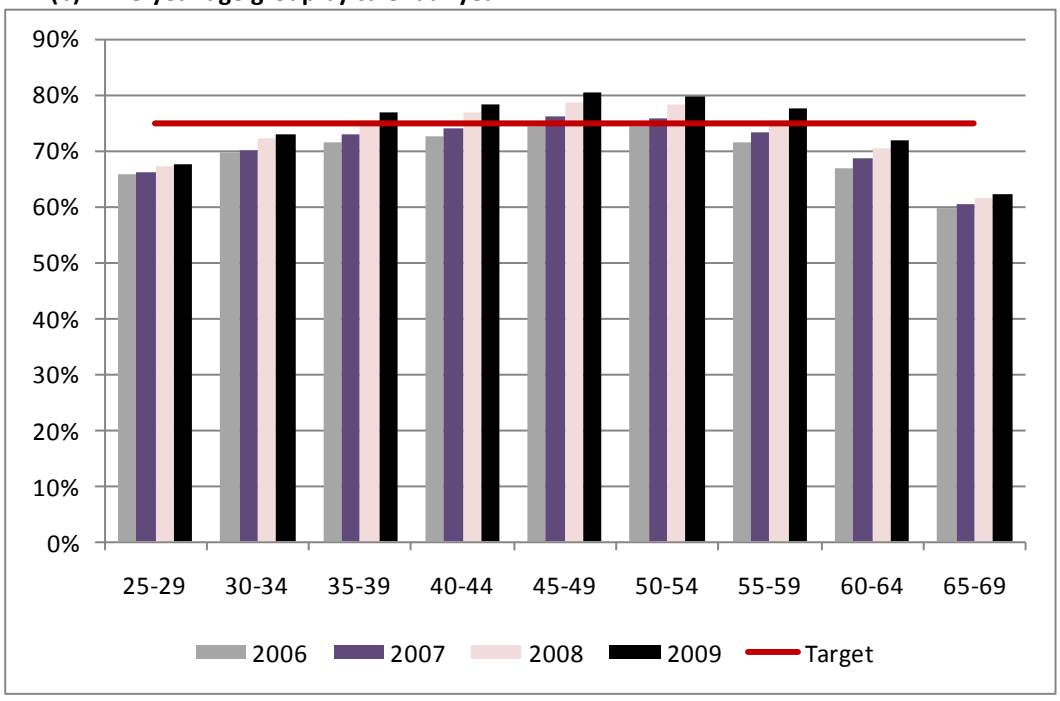
* As a percentage of the hysterectomy-adjusted population in that age-group and year, based on projections from 2006 census population to the end of the relevant calendar year

Figure 8 – Percentage of women screened in the previous three years by 5-year age group, 2006 to 2009

(a) Calendar year by five-year age group



(b) Five-year age group by calendar year



3 Programme statistics

3.1 Cytology reporting

Definition

Cytology reporting rates are calculated using results for cervical cytology specimens collected during each 12-month report period which are recorded on the NCSP Register. Rates are reported as the number of women in each cytology category, per 1,000 women screened, based on the most severe cytology result for each woman during the one-year period.

Target

None

Calculation

Records for all cytology samples which were collected during 2008 and 2009 were retrieved from the NCSP Register. Where a woman had multiple cytology results during a year, the sample with the most severe result category was used for that year.

The cytology results in each result category were expressed as rates per 1,000 women in New Zealand screened during that year, by five-year age group. Screened women were defined as those women with a cytology, histology, or HPV test sample collected during the year and recorded on the NCSP Register.

A woman's age was defined as her age at the end of the calendar year.

Results

During 2008 there were 420,439 cytology samples collected, and these related to 415,275 women, 405,280 of whom were aged 20-69 years at the end of 2008. Results for these women are shown in Table 7 (overall) and by five-year age group in Table 8.

During 2009 there were 421,242 cytology samples collected, and these related to 414,274 women, 405, 514 of whom were aged 20-69 years at the end of 2009. Results for these women are shown in Table 7 (overall) and by five-year age group in Table 9.

In both 2008 and 2009, abnormal cytology results were most common among women aged 20-24 years. Among women aged 20-39 years, LSIL was the most common type of cytological abnormality. LSIL reporting rates in women aged 20-39 years varied from 22.3 per 1,000 women screened (women aged 35-39 years) to 94.9 per 1,000 women screened (women aged 20-24 years) in 2008, and from 24.4 per 1,000 women screened (women aged 35-39 years) to 106.2 per 1,000 women screened (women aged 20-24 years) in 2009. In women aged more than 40 years, the most common type of cytological abnormality was ASC-US. Reporting rates for ASC-US in this group varied from 8.6 per 1,000 women screened (women aged 65-69 years) to 20.7 per 1,000 women screened (women

aged 40-44 years) in 2008, and from 9.7 per 1,000 women screened (women aged 65-69 years) to 20.7 per 1,000 women screened (women aged 45-49 years) in 2009.

In 2008 the rate of women with negative cytology ranged from 810.5 per 1,000 women screened (women aged 20-24 years) to 952.1 per 1,000 women screened (women aged 60-64 years). In 2009, this rate ranged from 807.8 per 1,000 women screened (in women aged 20-24 years) to 946.5 per 1,000 women screened (women aged 65-69 years).

Note that AGC and adenocarcinoma results may include a number of endometrial abnormalities. It is not possible to determine the extent of these from the NCSP Register.

Table 7 – Overall cytology case reporting and rates per 1,000 women screened, 2008 and 2009

Cytology result	2008			2009		
	Total cases (20-69 yrs)	Crude rate (20-69 yrs)	ASR (20-69 yrs)	Total cases (20-69 yrs)	Crude rate (20-69 yrs)	ASR (20-69 yrs)
Negative	377,976	907.4	903.1	377,317	907.3	903.3
ASC-US	9,217	22.1	22.8	9,255	22.3	23.0
LSIL	12,231	29.4	32.4	13,764	33.1	36.4
ASC-H	2,548	6.1	6.6	2,037	4.9	5.3
HSIL	2,844	6.8	7.4	2,761	6.6	7.2
Invasive SCC	19	<0.05	0.0	26	0.1	0.1
AGC/AIS	383	0.9	0.9	287	0.7	0.7
Adenocarcinoma	49	0.1	0.1	63	0.2	0.2
Malignant neoplasm	13	<0.05	<0.05	4	<0.05	<0.05
Total	**405,280**			**405,514**		

ASR = age–standardised rate (standardised to WHO population)

Table 8 - Age-specific cytology case reporting and rates, per 1,000 women screened (aged 20-69 years), 2008

Cytology result category	Age group																			
	20-24		25-29		30-34		35-39		40-44		45-49		50-54		55-59		60-64		65-69	
	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate
Neg	37,187	810.5	38,382	863.8	42,676	900.9	51,503	918.9	50,208	922.9	48,955	926.1	38,847	935.6	30,689	947.5	23,691	952.1	15,838	952.0
ASC-US	1,807	39.4	1,292	29.1	1,114	23.5	1,207	21.5	1,126	20.7	1,085	20.5	731	17.6	459	14.2	253	10.2	143	8.6
LSIL	4,353	94.9	2,395	53.9	1,489	31.4	1,251	22.3	973	17.9	801	15.2	463	11.2	258	8.0	155	6.2	93	5.6
ASC-H	659	14.4	512	11.5	354	7.5	260	4.6	240	4.4	191	3.6	131	3.2	100	3.1	68	2.7	33	2.0
HSIL	653	14.2	611	13.8	529	11.2	388	6.9	249	4.6	187	3.5	107	2.6	56	1.7	35	1.4	29	1.7
Invasive SCC	-	-	-	-	1	<0.05	2	<0.05	2	<0.05	1	<0.05	5	0.1	3	0.1	5	0.2	-	-
AGC/AIS	16	0.3	29	0.7	41	0.9	49	0.9	46	0.8	56	1.1	62	1.5	27	0.8	30	1.2	27	1.6
Adenocarcinoma	-	-	-	-	2	<0.05	-	-	2	<0.05	3	0.1	10	0.2	13	0.4	7	0.3	12	0.7
Malignant neoplasm	-	-	-	-	1	<0.05	1	<0.05	1	<0.05	-	-	1	<0.05	2	0.1	1	<0.05	6	0.4
Total	**44,675**		**43,221**		**46,207**		**54,661**		**52,847**		**51,279**		**40,357**		**31,607**		**24,245**		**16,181**	

Table 9 - Age-specific cytology case reporting and rates, per 1,000 women screened (aged 20-69 years), 2009

Cytology result category	Age group																			
	20-24		25-29		30-34		35-39		40-44		45-49		50-54		55-59		60-64		65-69	
	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate
Neg	37,952	807.8	38,645	868.0	41,843	907.0	50,010	921.6	49,280	925.7	48,628	924.7	39,309	933.9	30,873	941.7	24,589	946.2	16,188	946.5
ASC-US	2,028	43.2	1,288	28.9	1,042	22.6	1,110	20.5	1,097	20.6	1,086	20.7	727	17.3	438	13.4	273	10.5	166	9.7
LSIL	4,989	106.2	2,633	59.1	1,590	34.5	1,326	24.4	1,018	19.1	947	18.0	566	13.4	344	10.5	230	8.9	121	7.1
ASC-H	541	11.5	424	9.5	287	6.2	222	4.1	187	3.5	132	2.5	89	2.1	58	1.8	65	2.5	32	1.9
HSIL	659	14.0	624	14.0	491	10.6	379	7.0	213	4.0	177	3.4	100	2.4	54	1.6	43	1.7	21	1.2
Invasive SCC	-	-	-	-	1	<0.05	2	<0.05	4	0.1	5	0.1	4	0.1	3	0.1	6	0.2	1	0.1
AGC/AIS	12	0.3	16	0.4	27	0.6	41	0.8	31	0.6	39	0.7	50	1.2	35	1.1	16	0.6	20	1.2
Adenocarcinoma	-	-	-	-	2	<0.05	1	<0.05	2	<0.05	5	0.1	9	0.2	7	0.2	24	0.9	13	0.8
Malignant neoplasm	-	-	-	-	-	-	-	-	-	-	-	-	1	<0.05	1	<0.05	1	<0.05	1	0.1
Total	**46,181**		**43,630**		**45,283**		**53,091**		**51,832**		**51,019**		**40,855**		**31,813**		**25,247**		**16,563**	

3.2 Positive predictive value

Definition

Positive predictive value for i) the combination of HSIL and SC cytology, and for ii) the combination of ASC-H, HSIL and SC cytology, is the proportion of women with these cytology results, and a subsequent histology sample within six months, who are confirmed by histology as having CIN2 or worse.

Target

HSIL+SC cytology: Not less than 65%, and not greater than 85%

ASC-H+HSIL+SC cytology: No target

Calculation

Results were retrieved from the NCSP Register for all satisfactory cytology samples which were collected over a one-year period ending on 30 June in the year reported on, and which were associated with a result of ASC-H, HSIL, or SC (Bethesda codes ASH, HS1, HS2, SC). Where there was more than one cytology test for a woman which fit this criteria, the most severe result category was used for the final result. Where there were two cytology tests with result categories of identical severity, the earliest sample taken is used.

For each woman, all histology samples taken in the period from five days before to six months after the ASC-H/HSIL/SCC cytology sample were identified from the NCSP Register. Where more than one histology result was found, the most severe SNOMED category was used to determine the histology result. Women whose histology result was CIN2 or more severe were regarded as having their cytology report histologically confirmed. Details of the histology categories which were classified as CIN2 or worse are provided in Appendix B, and the relative severity rankings used for SNOMED codes are provided in Appendix C.

Results

Results were retrieved for all satisfactory cytology samples which were collected over a one-year period ending on 30 June for each year from 2006 to 2009. The number of women identified was very similar over the four years for both HSIL or SC cytology (range:2,911-2,977 women) and for women with ASC-H, HSIL or SC cytology (range: 5,485-5,531 women). The positive predictive value for HSIL+SC cytology remained within the target range over the four years, and increased from 78.8% in 2006 to 82.7% in 2009. The positive predictive value for ASC-H+HSIL+SC cytology also increased over the four years, from 63.7% in 2006 to 67.8% in 2009 (there is no target for this measure).

The proportion of women with high grade cytology for whom histology was available within six months remained quite consistent over the four year period, and was higher for HSIL+SC (range: 90.2%-91.2%) than for ASC-H+HSIL+SC (range: 83.3%-85.5%).

Comments

This estimate does not taken into account cytology predicting HSIL for which there is no histology available. Histology may be unavailable because the woman does not attend for follow-up colposcopy, or it may not be taken if the colposcopic impression is normal. When more colposcopy data is available on the NCSP Register, it may be possible to better distinguish between these two possibilities.

The calculations also do not discriminate between cytology taken as a screening or diagnostic test. Analysis separating community vs clinic-derived cytology would provide a clearer picture of positive predictive value in a screening setting.

Figure 9 – Positive predictive value, 2006 to 2009, by cytology result group

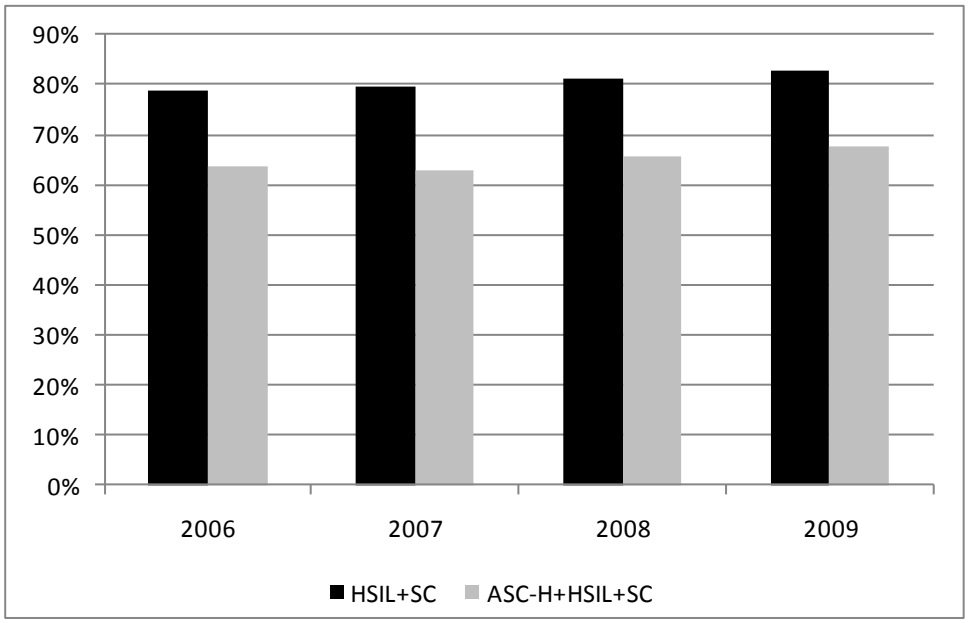


Table 10 – Positive predictive value, 2006 to 2009, by cytology result group

Year	Cytology result: HSIL + SC				Cytology result: HSIL + SC + ASC-H			
	Results	Histology available†		Confirmed as CIN2+	Results	Histology available†		Confirmed as CIN2+
	N	N	*(%)*	%*	N	N	*(%)*	%*
2006	2,977	2,697	*(90.6)*	78.8	5,511	4,631	*(84.0)*	63.7
2007	2,911	2,627	*(90.2)*	79.6	5,531	4,610	*(83.3)*	62.8
2008	2,917	2,636	*(90.4)*	81.3	5,485	4,606	*(84.0)*	65.8
2009	2,977	2,715	*(91.2)*	82.7	5,505	4,706	*(85.5)*	67.8

† Histology sample(s) collected from up to five days prior and up to six months after the cytology sample * As a percentage of women with a histology sample taken within six months of their cytology sample

3.3 Histology reporting

Definition

Histology reporting rates are calculated using results for histological specimens collected during each 12-month report period which are recorded on the NCSP Register. The Systematised Nomenclature of Medicine (SNOMED) histology codes (1986 and 1993 subsets) are used by the NCSP Register to record the histological results of vaginal and cervical histology specimens. Histology specimens include diagnostic biopsies, treatment biopsies, cervical polyps and the cervical tissue of total hysterectomy specimens. Rates are summarised into broad diagnostic categories, based on the most severe diagnosis code for each women over the calendar year.

Target

None

Calculation

In the current report, histology reporting rates are reported for 2008 and for 2009. All histology samples which were collected during 2008 and 2009 were retrieved from the NCSP Register. Where a woman had multiple histology results during the year, the sample with the most severe diagnosis code was used. SNOMED diagnosis categories were grouped into broad diagnostic categories for presentation in this current report.

The histology results in each broad diagnostic category were expressed as rates per 1,000 women in New Zealand screened during that year, by five-year age group. Screened women were defined as those with a cytology, histology, or HPV test sample collected during the year and recorded on the NCSP Register.

A woman's age was defined as her age at the end of the calendar year.

Details of the mapping between SNOMED codes and broad diagnostic category, and the relative severity ranking of the SNOMED codes which was used to determine the most severe diagnosis code for each woman in the year are provided in Appendix C.

Results

In 2008, there were 26,524 histology samples collected which were sufficient for diagnosis. These samples related to 20,866 women, 20,028 of whom were aged 20-69 years at the end of 2008. Results relating to histology in these 20,028 women aged 20-69 years are summarised in Table 11 and Table 12.

In 2009, there were 25,878 histology samples collected which were sufficient for diagnosis. These samples related to 19,543 women, 18,753 of whom were aged 20-69 years at the end of 2009. Results relating to histology in these 18,753 women aged 20-69 years are summarised in Table 11 and Table 13.

In both 2008 and 2009, the overall rate of women with histology samples taken per 1,000 women screened was highest among women aged 20-24 years (Table 12, Table 13). This reflected more disease (CIN 2+) in women of this age, as the rate of women with CIN 2+ per 1,000 women screened was also highest in this age group (Table 14). Rates of CIN 2+, CIN 3+, and the proportion of histology samples which were CIN 2+ or CIN 3+, were highest in women aged 20-24 or 25-29 years in both 2008 and 2009 (Table 14). These were also the age groups with the lowest rates of negative/ benign histology. Women with negative/ benign histology made up less than 25% of all women with histology among women aged 20-24 years or 25-29 years. In contrast, in each of the five-year age groups between 35-69 years, over half of all women with histology had negative/ benign histology.

Histology reporting by ethnicity is shown for 2008 in Table 15, and for 2009 in Table 16. Rates of negative/ benign histology were highest in European/ Other women, and lowest in Pacific women. Overall rates of high grade squamous histology (ie CIN 2, CIN 3, HSIL not otherwise specified) were highest in Māori women, and lowest among Asian women.

Trends by ethnicity in the age-standardised rate of high grade squamous (CIN 2/3) histology per 1,000 women screened are shown in Figure 10. Since 1993 the rate of histologically-confirmed CIN 2/3 per 1,000 women screened has been consistently higher in Māori women than in non- Māori women. The trends over that time period have been broadly similar in both groups, however. In both groups an increase was observed in 2000, presumably in response to the Gisborne enquiry, but since then rates have decreased and remained broadly stable over recent years.

Comments

Histology samples include diagnostic biopsies, treatment biopsies, cervical polyps and the cervical tissue of total hysterectomy specimens. Histology samples may also include samples from non-cervical sites, where there is also a cervical component in the sample, for example endometrial samples. This is likely to be contributing to the higher number of women with adenocarcinoma histology on the NCSP Register compared to the Cancer Registry.

In a number of age groups, rates of CIN 3+ per 1,000 women screened are noticeably higher in 2009 than they were in 2008. In part this appears to reflect the extent of use of the SNOMED code M67017 (HSIL not otherwise specified; or CIN2/3). This code was used far less frequently in 2009 than in 2008. For example it accounted for 74-83% of results indicating CIN2 or CIN3 in 2008 (with variation within this range by age group), compared to 31-45% of these results in 2009. Results of M67017 were not included in the calculations for CIN 3+, because this code does not distinguish between CIN 2 and CIN 3. Therefore depending on the extent to which these results harbour CIN 3, the estimate of CIN 3+ may be an underestimate. It is possible that the increase in CIN 3+ rates reflect use of more definitive diagnostic categories in 2009, compared to 2008. Histology reporting rates of CIN 2+ and the combined category of CIN 2/3 are generally comparable between 2008 and 2009.

Table 11 – Histology cases and reporting rates per 1,000 women (aged 20-69 years) screened, 2008 and 2009

Histology result category	2008		2009	
	Cases	Crude rate (ages 20-69 years)	Cases	Crude rate (ages 20-69 years)
Negative/benign (non neoplastic)	10,690	25.7	10,189	24.5
HPV	1,978	4.7	1,439	3.5
CIN1	3,035	7.3	2,748	6.6
CIN2	299	0.7	960	2.3
CIN3	722	1.7	1,635	3.9
HSIL nos	3,038	7.3	1,559	3.8
Microinvasive	7	0.0	6	0.0
Invasive SCC	100	0.2	80	0.2
Glandular dysplasia	2	0.0	2	0.0
Adenocarcinoma in situ	48	0.1	42	0.1
Invasive adenocarcinoma	82	0.2	65	0.2
Adenosquamous carcinoma	5	0.0	5	0.0
Other cancer	29	0.1	23	0.1

Table 12 - Age-specific histology reporting rates, per 1,000 women (aged 20-69 years) screened, 2008

Histology result category	Age group																			
	20-24		25-29		30-34		35-39		40-44		45-49		50-54		55-59		60-64		65-69	
	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate
Negative/benign (non neoplastic)	594	12.9	623	14.0	763	16.1	1,217	21.7	1,792	32.9	2,133	40.4	1,614	38.9	936	28.9	613	24.6	405	24.3
HPV	399	8.7	377	8.5	277	5.8	239	4.3	254	4.7	207	3.9	123	3.0	57	1.8	31	1.2	14	0.8
CIN1	831	18.1	616	13.9	402	8.5	374	6.7	309	5.7	240	4.5	123	3.0	77	2.4	43	1.7	20	1.2
CIN2	87	1.9	75	1.7	42	0.9	28	0.5	21	0.4	27	0.5	8	0.2	6	0.2	4	0.2	1	0.1
CIN3	189	4.1	164	3.7	136	2.9	101	1.8	58	1.1	32	0.6	21	0.5	9	0.3	9	0.4	3	0.2
HSIL nos	773	16.8	707	15.9	545	11.5	398	7.1	247	4.5	176	3.3	87	2.1	47	1.5	39	1.6	19	1.1
Microinvasive	2	0.0	1	<0.05	-		-		1	0.0	1	0.0	-		1	0.0	1	0.0	-	
Invasive SCC	3	0.1	4	0.1	14	0.3	16	0.3	17	0.3	9	0.2	14	0.3	12	0.4	6	0.2	5	0.3
Glandular dysplasia	-		-		-		-		-		-		-		-		-		-	
Adenocarcinoma in situ	2	<0.05	5	0.1	7	0.1	5	0.1	12	0.2	2	<0.05	4	0.1	3	0.1	6	0.2	2	0.1
Invasive adenocarcinoma	3	0.1	5	0.1	4	0.1	13	0.2	7	0.1	6	0.1	9	0.2	16	0.5	12	0.5	9	0.5
Adenosquamous carcinoma	-		-		-		-		-		-		-		-		-		-	
Other cancer	-		-		2	<0.05	1	<0.05	1	<0.05	3	0.1	3	0.1	7	0.2	5	0.2	7	0.4
Total	**2,883**	**62.8**	**2,575**	**58.0**	**2,192**	**46.3**	**2,392**	**42.7**	**2,719**	**50.0**	**2,836**	**53.7**	**2,006**	**48.3**	**1,171**	**36.2**	**769**	**30.9**	**485**	**29.2**

* HSIL nos = high grade not otherwise specified (CIN2/3, SNOMED code M67017)

Table 13 - Age-specific histology reporting rates, per 1,000 women (aged 20-69 years) screened, 2009

Histology result category	Age group																			
	20-24		25-29		30-34		35-39		40-44		45-49		50-54		55-59		60-64		65-69	
	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate	N	rate
Negative/benign (non neoplastic)	483	10.3	551	12.4	676	14.7	1,136	20.9	1,722	32.3	2,096	39.9	1,575	37.4	921	28.1	609	23.4	420	24.6
HPV	288	6.1	244	5.5	195	4.2	199	3.7	184	3.5	124	2.4	102	2.4	55	1.7	32	1.2	16	0.9
CIN1	730	15.5	566	12.7	391	8.5	335	6.2	279	5.2	230	4.4	110	2.6	47	1.4	39	1.5	21	1.2
CIN2	316	6.7	228	5.1	140	3.0	99	1.8	76	1.4	57	1.1	20	0.5	14	0.4	5	0.2	5	0.3
CIN3	377	8.0	395	8.9	304	6.6	232	4.3	128	2.4	99	1.9	50	1.2	20	0.6	22	0.8	8	0.5
HSIL nos	438	9.3	388	8.7	274	5.9	195	3.6	107	2.0	71	1.4	36	0.9	18	0.5	22	0.8	10	0.6
Microinvasive		-	1	<0.05	1	<0.05	2	<0.05		-		-	1	<0.05	1	<0.05		-		-
Invasive SCC		-	3	0.1	8	0.2	7	0.1	19	0.4	14	0.3	9	0.2	7	0.2	8	0.3	5	0.3
Glandular dysplasia		-		-		-	2	<0.05		-		-		-		-		-		-
Adenocarcinoma in situ	4	0.1	4	0.1	10	0.2	10	0.2	3	0.1	6	0.1	2	<0.05		-	2	0.1	1	0.1
Invasive adenocarcinoma	1	<0.05	1	<0.05	3	0.1	6	0.1	6	0.1	11	0.2	9	0.2	12	0.4	10	0.4	6	0.4
Adenosquamous carcinoma	-	-	-	-	-	-	2	<0.05	1	<0.05	1	<0.05	-	-	1	<0.05	-	-	-	-
Other cancer	-	-	-	-	2	<0.05	-	-	3	0.1	3	0.1	6	0.1	4	0.1	3	0.1	2	0.1
Total	**2,637**	**56.1**	**2,381**	**53.5**	**2,004**	**43.4**	**2,225**	**41.0**	**2,528**	**47.5**	**2,712**	**51.6**	**1,920**	**45.6**	**1,100**	**33.6**	**752**	**28.9**	**494**	**28.9**

* HSIL nos = high grade not otherwise specified (CIN2/3, SNOMED code M67017)

Table 14 – Summarised age-specific histology reporting rates per 1,000 women (aged 20-69 years) screened and percentage* of histology samples, 2008 and 2009

Histology result category	Year	Age group																			
		20-24		25-29		30-34		35-39		40-44		45-49		50-54		55-59		60-64		65-69	
		rate	%	rate	%	rate	%	rate	%	rate	%	rate	%	rate	%	rate	%	rate	%	rate	%
Negative/ benign	2008	12.9	20.6	14.0	24.2	16.1	34.8	21.7	50.9	32.9	65.9	40.4	75.2	38.9	80.5	28.9	79.9	24.6	79.7	24.3	83.5
	2009	10.3	18.3	12.4	23.1	14.7	33.7	20.9	51.1	32.3	68.1	39.9	77.3	37.4	82.0	28.1	83.7	23.4	81.0	24.6	85.0
HPV	2008	8.7	13.8	8.5	14.6	5.8	12.6	4.3	10.0	4.7	9.3	3.9	7.3	3.0	6.1	1.8	4.9	1.2	4.0	0.8	2.9
	2009	6.1	10.9	5.5	10.2	4.2	9.7	3.7	8.9	3.5	7.3	2.4	4.6	2.4	5.3	1.7	5.0	1.2	4.3	0.9	3.2
CIN1	2008	18.1	28.8	13.9	23.9	8.5	18.3	6.7	15.6	5.7	11.4	4.5	8.5	3.0	6.1	2.4	6.6	1.7	5.6	1.2	4.1
	2009	15.5	27.7	12.7	23.8	8.5	19.5	6.2	15.1	5.2	11.0	4.4	8.5	2.6	5.7	1.4	4.3	1.5	5.2	1.2	4.3
CIN2/3†	*2008*	*22.9*	*36.4*	*21.3*	*36.7*	*15.3*	*33.0*	*9.4*	*22.0*	*6.0*	*12.0*	*4.4*	*8.3*	*2.8*	*5.8*	*1.9*	*5.3*	*2.1*	*6.8*	*1.4*	*4.7*
	2009	*24.1*	*42.9*	*22.7*	*42.5*	*15.6*	*35.8*	*9.7*	*23.6*	*5.8*	*12.3*	*4.3*	*8.4*	*2.5*	*5.5*	*1.6*	*4.7*	*1.9*	*6.5*	*1.3*	*4.7*
CIN2+	2008	23.1	36.7	21.6	37.2	15.8	34.2	10.0	23.5	6.7	13.4	4.8	9.0	3.5	7.3	3.1	8.6	3.3	10.7	2.8	9.5
	2009	24.2	43.1	22.9	42.8	16.1	37.0	10.2	24.9	6.4	13.6	5.0	9.7	3.2	6.9	2.3	7.0	2.8	9.6	2.2	7.5
CIN3+ ‡	*2008*	*4.3*	*6.8*	*4.0*	*6.8*	*3.4*	*7.4*	*2.4*	*5.7*	*1.8*	*3.5*	*1.0*	*1.8*	*1.2*	*2.5*	*1.5*	*4.0*	*1.6*	*4.9*	*1.6*	*5.4*
	2009	*8.1*	*14.5*	*9.1*	*17.0*	*7.1*	*16.4*	*4.8*	*11.6*	*3.0*	*6.3*	*2.5*	*4.9*	*1.8*	*4.0*	*1.4*	*4.1*	*1.7*	*6.0*	*1.3*	*4.5*

* Percentage shown is the number of women whose worst histology result is in the category listed, as a percentage of the women that age with a histology sample that year

†Here CIN2/3 includes result categories for CIN2, CIN3, and also the combined category HSIL nos (SNOMED code M67017) ‡CIN3+ excludes SNOMED code M67017

Table 15 Histology cases and reporting rates per 1,000 women screened (ages 20-69 years) by ethnicity, 2008

Histology result category	Māori			Pacific			Asian			European/ Other		
	Cases	Crude rate*	ASR*	Cases	Crude rate*	ASR*	Cases	Crude rate*	ASR*	Cases	Crude rate*	ASR*
Negative/benign (non neoplastic)	1,013	24.0	24.0	308	15.9	16.4	835	24.1	22.4	8,533	26.7	25.0
HPV	228	5.4	5.1	82	4.2	4.2	175	5.0	5.0	1,493	4.7	5.1
CIN1	327	7.7	7.3	97	5.0	4.8	208	6.0	5.8	2,403	7.5	8.5
CIN2	38	0.9	0.8	7	0.4	0.4	22	0.6	0.6	232	0.7	0.8
CIN3	126	3.0	2.8	29	1.5	1.4	54	1.6	1.6	513	1.6	1.9
HSIL nos	485	11.5	10.8	94	4.9	4.7	141	4.1	4.0	2,318	7.2	8.4
Microinvasive	1	<0.05	<0.05	-	0.0	0.0	1	<0.05	0.1	5	<0.05	<0.05
Invasive SCC	23	0.5	0.6	8	0.4	0.5	5	0.1	0.1	64	0.2	0.2
Glandular dysplasia	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0
Adenocarcinoma in situ	2	<0.05	<0.05	1	0.1	0.1	4	0.1	0.1	41	0.1	0.1
Invasive adenocarcinoma	13	0.3	0.3	7	0.4	0.5	5	0.1	0.2	57	0.2	0.2
Adenosquamous carcinoma	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0
Other cancer	5	0.1	0.1	2	0.1	0.1	-	0.0	0.0	22	0.1	0.1

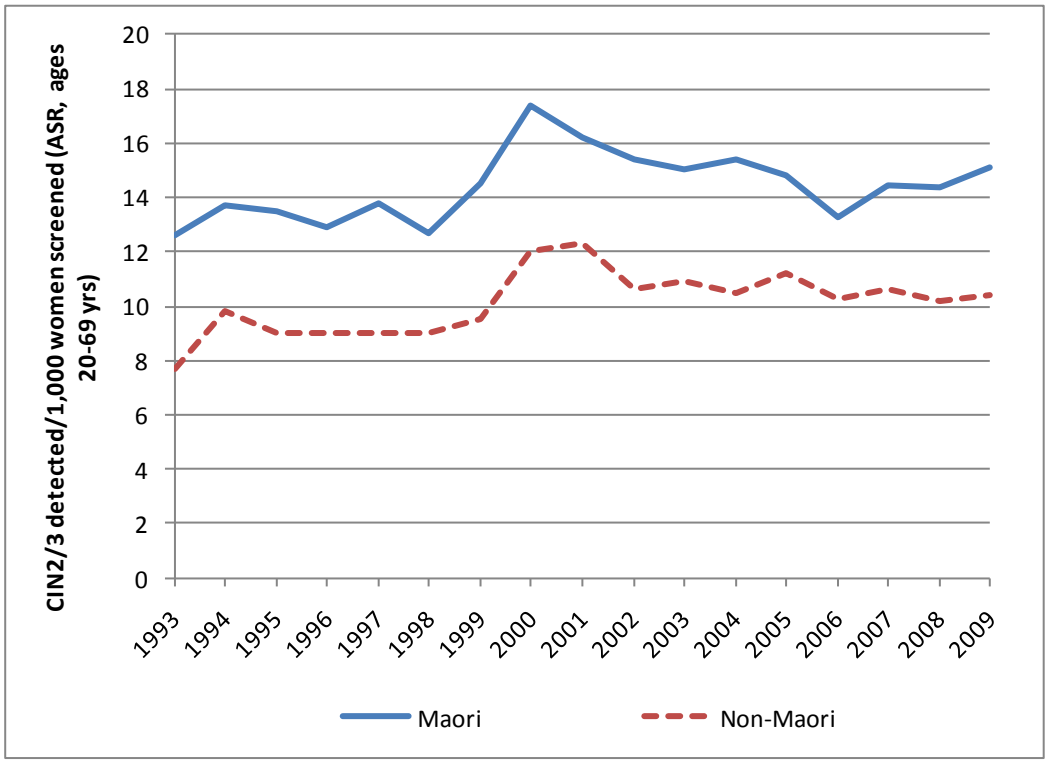
* rates are per 1,000 women screened. ASR = age-standardised rate, standardised to WHO population (ages 20-69 years); HSIL nos = high grade squamous lesion not otherwise specified (CIN2/3; SNOMED code M67017)

Table 16 - Histology cases and reporting rates per 1,000 women screened (ages 20-69 years) by ethnicity, 2009

Histology result category	Māori			Pacific			Asian			European/ Other		
	Cases	Crude rate	ASR	Cases	Crude rate	ASR	Cases	Crude rate	ASR	Cases	Crude rate	ASR
Negative/benign (non neoplastic)	970	22.9	23.2	354	18.7	19.1	781	21.1	20.0	8,084	25.5	23.7
HPV	170	4.0	3.8	48	2.5	2.5	113	3.1	3.0	1,108	3.5	3.8
CIN1	329	7.8	7.1	112	5.9	5.7	196	5.3	5.3	2,111	6.7	7.5
CIN2	151	3.6	3.2	37	2.0	1.9	55	1.5	1.5	717	2.3	2.7
CIN3	288	6.8	6.4	59	3.1	3.0	112	3.0	2.8	1,176	3.7	4.3
HSIL nos	259	6.1	5.7	25	1.3	1.2	36	1.0	1.0	1,239	3.9	4.6
Microinvasive	2	0.0	0.0	-	0.0	0.0	1	<0.05	<0.05	3	<0.05	<0.05
Invasive SCC	16	0.4	0.4	9	0.5	0.5	6	0.2	0.2	49	0.2	0.1
Glandular dysplasia	-	0.0	0.0	-	0.0	0.0	1	<0.05	<0.05	1	<0.05	<0.05
Adenocarcinoma in situ	7	0.2	0.2	2	0.1	0.1	4	0.1	0.1	29	0.1	0.1
Invasive adenocarcinoma	12	0.3	0.4	5	0.3	0.2	4	0.1	0.1	44	0.1	0.1
Adenosquamous carcinoma	2	<0.05	<0.05	2	0.1	0.1	-	0.0	0.0	1	<0.05	<0.05
Other cancer	2	<0.05	<0.05	1	0.1	0.1	-	0.0	0.0	20	0.1	0.1

* rates are per 1,000 women screened. ASR = age-standardised rate, standardised to WHO population (ages 20-69 years); HSIL nos = high grade squamous lesion not otherwise specified (CIN2/3; SNOMED code M67017)

Figure 10 – Age-standardised rates of histologically-confirmed CIN 2/3 per 1,000 women screened (1993 to 2009), by ethnicity



Appendix A – Population data

WHO Standard population

Rates for cervical cancer incidence and mortality were standardised using the WHO World Standard population according to Ahmad et al (2001)[6], as shown in Table 17.

Table 17 – WHO Standard population

Age group	N	Proportion
00-04	8,860	0.088569
05-09	8,690	0.08687
10-14	8,600	0.08597
15-19	8,470	0.08467
20-24	8,220	0.082171
25-29	7,930	0.079272
30-34	7,610	0.076073
35-39	7,150	0.071475
40-44	6,590	0.065877
45-49	6,040	0.060379
50-54	5,370	0.053681
55-59	4,550	0.045484
60-64	3,720	0.037187
65-69	2,960	0.02959
70-74	2,210	0.022092
75-79	1,520	0.015195
80-84	910	0.009097
85 +	635	0.006348
Total	**100,035**	**1**

New Zealand estimated resident population

The estimated data for New Zealand female population was based on data from Statistics New Zealand. Populations from 2006 onward are based on projections from 2006 Census data, and relate to the end-of-calendar year population. Population estimates for 2005 were based on a linear interpolation between data from the 2001 Census and 2006 Census. Population data for 2005 were not available in the four required ethnic groups, and so ethnicity-specific estimates could not be calculated for 2005 for cancer incidence, cancer mortality, or coverage.

[6] Ahmad OB, Boschi-Pinto C, Lopez AD, Murray CJL, Lozano R, Inoue M. Age standardization of rates: A new WHO standard. GPE Discussion Paper Series: No.31. 2001. Geneva, World Health Organization.

Appendix B - Positive predictive value calculations

Table 18 – Definition used for positive predictive value calculations

Histology Diagnosis	G1	Cytology interpretation code Squamous (G2)				
	G1	ASL	LS	ASH	HS1/2	SC
Negative				q	y	y
Squam-Atypia NOS				q	y	y
Squam-Low Grade/CIN1/HPV				q	y	y
Squam-High Grade/CIN2-3				p	x	x
Squam MI SCC				p	x	x
Squam-Invasive SCC				p	x	x
Gland-Benign Atypia				q	y	y
Gland-Dyplasia				p	x	x
Gland-AIS				p	x	x
Gland-Invasive Adeno				p	x	x
Other Malignant Neoplasm				p	x	x

PPV% (HSIL)= sum(x) / (sum(x)+sum(y))

PPV% (ASC-H+HSIL+SC)= (sum(p) + sum(x))/ (sum(p)+sum(q) +sum(x) + sum(y)

Appendix C – SNOMED codes and ranking

Table 19 – SNOMED codes and ranking for histology samples

Adequacy of specimen		**1986 Code**	**1993 Code**		
Insufficient or unsatisfactory material for diagnosis		M09000	M09010		
There is no code for satisfactory materials.					
Site (topography) of specimen		**1986 Code**	**1993 Code**		
Vagina		T81	T82000		
Cervix (includes endocervix and exocervix)		T83	T83200		
Summary diagnosis	**Code stored on register**	**1986 Code**	**1993 Code**	**Diagnostic category**	**Rank***
There will be a maximum of four M codes transmitted to the register.					
Negative result - normal tissue		M00100	M60000	Negative/benign	1
Inflammation		M40000	M40000	Negative/benign	2
Microglandular hyperplasia		M72480	M72480	Negative/benign	3
Squamous Metaplasia		M73000	M73000	Negative/benign	4
Atypia		M69700	M67000	CIN 1	7
HPV, koilocytosis, condyloma (NOS) Condyloma acuminatum	 M76700	M76700 M76720	M76700 M76720	HPV	9
Dysplasia / CIN NOS		M74000	M67015	CIN 1	10
CIN I (LSIL) (VAIN I when used with T81/ T82000)		M74006	M67016	CIN 1	11
CIN II (HSIL) (VAIN II when used with T81/ T82000)		M74007		CIN 2	15
CIN III (HSIL) (VAIN III when used with T81/ T82000) Carcinoma in situ		M74008 M80102 M80702	 M80102 M80702	CIN 3	16 17 18
HSIL NOS		M67017	M67017	HSIL	14
Polyp		M76800	M76800	Negative/benign	5
Other (Morphologic abnormality, not dysplastic or malignant)		M01000	M01000	Negative/benign	6
Microinvasive squamous cell carcinoma		M80765	M80763	Micro-invasive	19
Invasive squamous cell carcinoma		M80703	M80703	Invasive SCC	22
Benign glandular atypia		M81400	M67030	Negative/benign	8
Glandular dysplasia		M81401	M67031	Glandular dysplasia	12
Adenocarcinoma in situ		M81402	M81402	Adenocarc. in situ	13
Invasive adenocarcinoma		M81403	M81403	Invasive adenocarcinoma	21
Adenosquamous carcinoma		M85603	M85603	Adenosquamous carcinoma	20
Metastatic tumour		M80006	M80006	Other cancer	28
Undifferentiated carcinoma		M80203	M80203	Other cancer	23
Sarcoma		M88003	M88003	Other cancer	24

Other codes accepted	**Code stored on register**	**1986 Code**	**1993 Code**	**Diagnostic category**	**Rank***
Carcinosarcoma	M88003	M89803	M89803	Other cancer	25
Choriocarcinoma	M80003	M91003	M91003	Other cancer	26
Miscellaneous primary tumour	M80003	M80003	M80003	Other cancer	27
Small cell carcinoma	M80003	M80413	M80413	Other cancer	29
Malignant tumour, Small cell type	M80003	M80023	M80023	Other cancer	30
Melanoma	M80003	M87203	M87203	Other cancer	31
Other primary epithelial malignancy	M80003	M80103	M80103	Other cancer	32

* ranking used is equivalent to the diagnostic significance rank used within the NCSP Register