

# Cervical Cancer in New Zealand

Globally, cervical cancer is the fourth most prevalent cancer in women, and has the fourth highest cancer mortality rate.<sup>1, 2</sup> However this is far too simplistic a picture to be of any relevance to New Zealand, as there is an enormous disparity between developed and underdeveloped nations. In more developed countries, cervical cancer doesn't make it into the top ten most prevalent cancers and comes in with the ninth highest mortality rate, while in underdeveloped nations cervical cancer has the second highest prevalence and third highest mortality rates. According to WHO, and based on data from 2012, Australia and New Zealand have the second lowest rate of incidence in the world (behind Western Asia) and the lowest mortality rate.<sup>3</sup>

Torre *et al.* write that "Geographic variation in the burden and trends in cervical cancer incidence reflect differences in availability of screening, which can prevent the development of cancer through the identification and removal of precancerous lesions, and the prevalence of cervical HPV infection. In several HICs [high income countries], cervical cancer incidence rates have decreased by as much as 80% over the past four decades since the advent of the Pap test."<sup>1</sup>

New Zealand's National Cervical Screening Programme was introduced in 1990;<sup>4</sup> it has been and is currently a cytology-based screening programme, although it is planned that the screening programme will change to primary HPV screening in 2021 (see article page 3).

Smith *et al.* describe the New Zealand programme as well-established, successful and one with a conscious focus on equity.

They write that "since its inception, the National Cervical Screening Programme (NCSP) has recommended three-yearly cytology-based screening for women aged 20–69 years. Three-yearly coverage increased quickly after the establishment of the NCSP to over 70% by 1995, and has remained between approximately 70 and 80% since that time."<sup>4</sup>

Smith, Edwards and Canfell analysed cervical cancer incidence data over the period from 1985 (five years prior to the introduction of the NCSP) to 2013. Incidence data were provided by the Ministry of Health and population data by Statistics New Zealand. As well as considering the overall change in incidence, Smith *et al.* reviewed incidence specifically in Māori women, and also by age group. Following statistical analysis they compared two five year periods; 1985-1989 (pre-NCSP) and 2009-2013. They found that the overall incidence was 56% lower in 2009-2013 than in 1985-1989, with very similar reductions in non-Māori and Māori (58% and 55% respectively) and that statistically significant reductions were observed in all age groups 25 years and over.<sup>4</sup> However, the analysis showed an increase in cervical cancer in the 20 to 24 year old age group in both non-Māori and Māori.

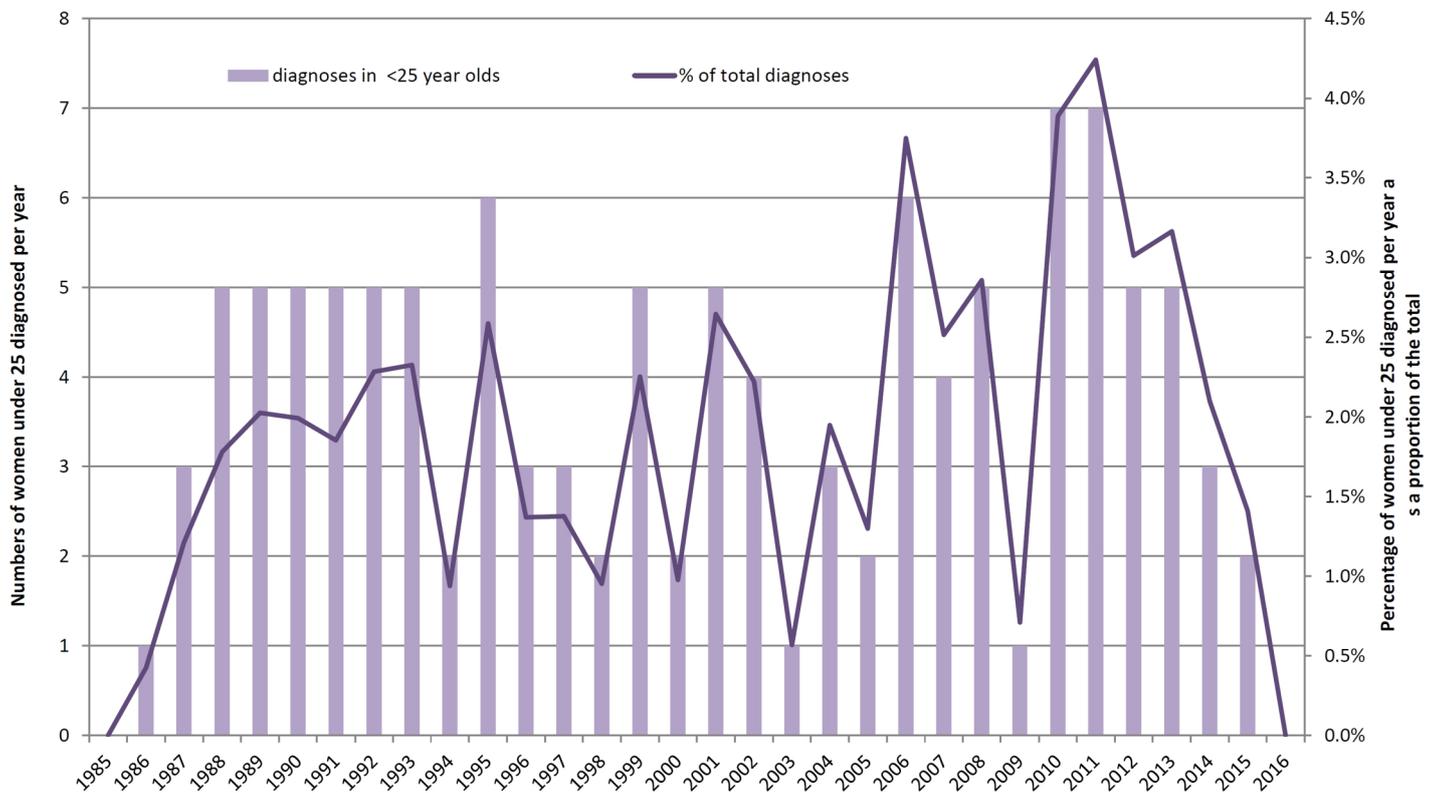
The researchers could not state with any certainty the reasons for increases in incidence in the 20-24 year age group. They considered changes in sexual behaviour in younger birth cohorts, and possible lowering of the age of first sexual activity; however, they believed that such a change would have to have been very substantial and concluded this was not an

adequate explanation.<sup>4</sup> Instead they conclude that the "NCSP, has likely had very limited, or no, impact on cervical cancer in women aged 20–24 in New Zealand, and it has not prevented the observed increase in invasive cervical cancer in this age group since the programme"<sup>4</sup> thus concurring with international research<sup>5, 6, 7</sup> which suggests that screening of women under 25 has uncertain benefit and a greater potential for harm. These harms include overdiagnosis, overtreatment, increased stress and anxiety associated with additional tests and treatments and unnecessary colposcopy.

However, as would be expected for a disease that can take years to develop, the numbers in under 24 year olds are very low compared with other age-groups, representing between 0% and 4.2% of total diagnoses in any one year. Since the publication of the Smith, Edwards and Canfell research in 2017, we have three further years' worth of data to consider, and since 2011 the proportion of women under 24 being diagnosed with cervical cancer has steadily dropped from 4.2% of total diagnoses in 2011 to 0% in 2016 (see Figure 1)<sup>8</sup>. The data suggests a gradual increase in diagnoses in under-25s over time, but there are significant peaks and troughs, and the last five years of data suggest a drop. With such small numbers of diagnoses and a rising population it is difficult to determine if there is any real increase in diagnoses at a young age and it may take many more years of data to see how real any apparent trend is in this age group.\*

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\* Comprehensive age-standardised data for age at diagnosis was not available for all years considered and thus it was not possible to correct for increasing population.



**Figure 1 Total numbers of cervical cancer diagnoses in under 25 year olds from 1985 to 2016 and the percentage of total diagnoses for each year.<sup>8</sup>**

While reductions overall between non-Māori and Māori are similar, Māori women started with much higher incidence rates (32.53 per 100,000 compared with 15.65 per 100,000 among non-Māori).<sup>4</sup> It is also interesting to note that while ethnicity data is collected for women screened, disability data is not. Overseas research indicates that screening rates for women with physical disabilities are relatively low,<sup>9, 10</sup> and screening uptake among women with a learning disability is also poor.<sup>11</sup>

### More Recent Incidence Data

It is useful to review the data over the entire period from the introduction of the NCSP to include the most recent data. The research published by Smith *et al.* only considered incidence data up until 2013. The availability of data on cancer incidence and mortality is always several years in arrears; the latest data on new diagnoses of all cancers is available to 2015<sup>12</sup> (published in December 2017) and cancer mortality is available

up to 2013. For selected cancers, incidence/new registration data is available in a set of Excel tables up to 2016<sup>13</sup>; those selected cancers include cervical cancer.

In 2016 there were 180 new cervical cancers diagnosed (age-standardised rate of 6.7 per 100,000 women); 146 among non-Māori (ASR = 6.2/100,000) and 34 among Māori (ASR = 10.6/100,000).

Figure 2 shows the age standardised\*\* incidence of cervical cancer per 100,000 women from 1991 to 2016.<sup>8</sup> ASR data for Māori and non-Māori was not held within the available documents for the years 1991-1994.

### Cervical Cancer Mortality

Death rates from cervical cancer have dropped as dramatically as incidence since the introduction of the NCSP. In 1988, 99 women died from cervical cancer rising to a peak of 105 in 1991<sup>14</sup>; the age-standardised death rates per 100,000 women for these two years were also the highest at 4.8 and

5.0 respectively.<sup>13, 15, 16</sup> By 2014, the latest year with complete data, the number of deaths had declined to 46 and the ASR to 1.4 per 100,000 women.

Figure 3 shows the absolute number of deaths per year, ASR and female population for the years 1988 to 2014 inclusive.

Since the introduction of the NCSP, the mortality rate from cervical cancer has dropped by 72%.

Compared with other cancers, in 2015 cervical cancer was the 17<sup>th</sup> highest cause of cancer mortality in New Zealand women (see Figure 4), responsible for only 1.2% of all cancer deaths in women that year. In 2005 cervical cancer was the 16<sup>th</sup> highest cause of cancer

\*\* Age-standardised rates – usually of incidence or mortality – adjust for differences in population age distribution by applying the observed age-specific rates for each population to a standard population. ASRs allows accurate comparison year by year based not only on the actual and changing population of women in NZ, but the changing and varying populations in different age-groups.

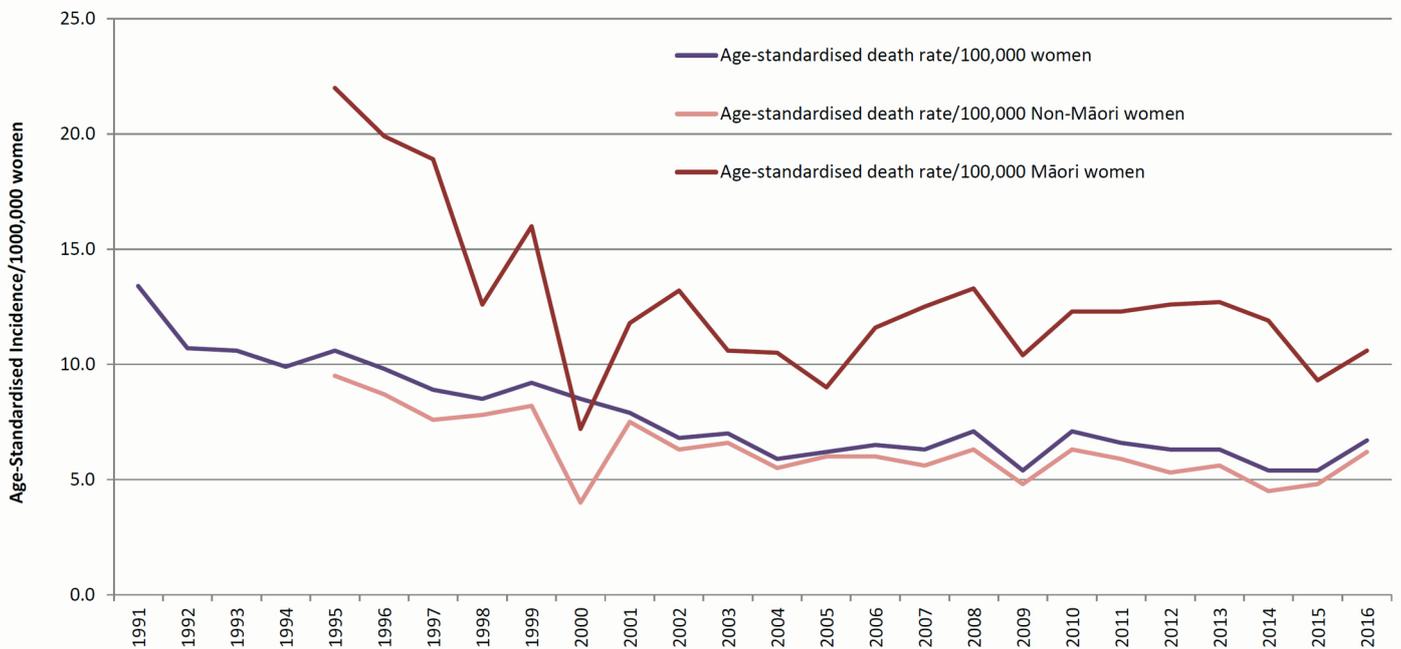


Figure 2: Age-standardised incidence of cervical cancer for all New Zealand women, Māori and non-Māori women.<sup>8</sup>

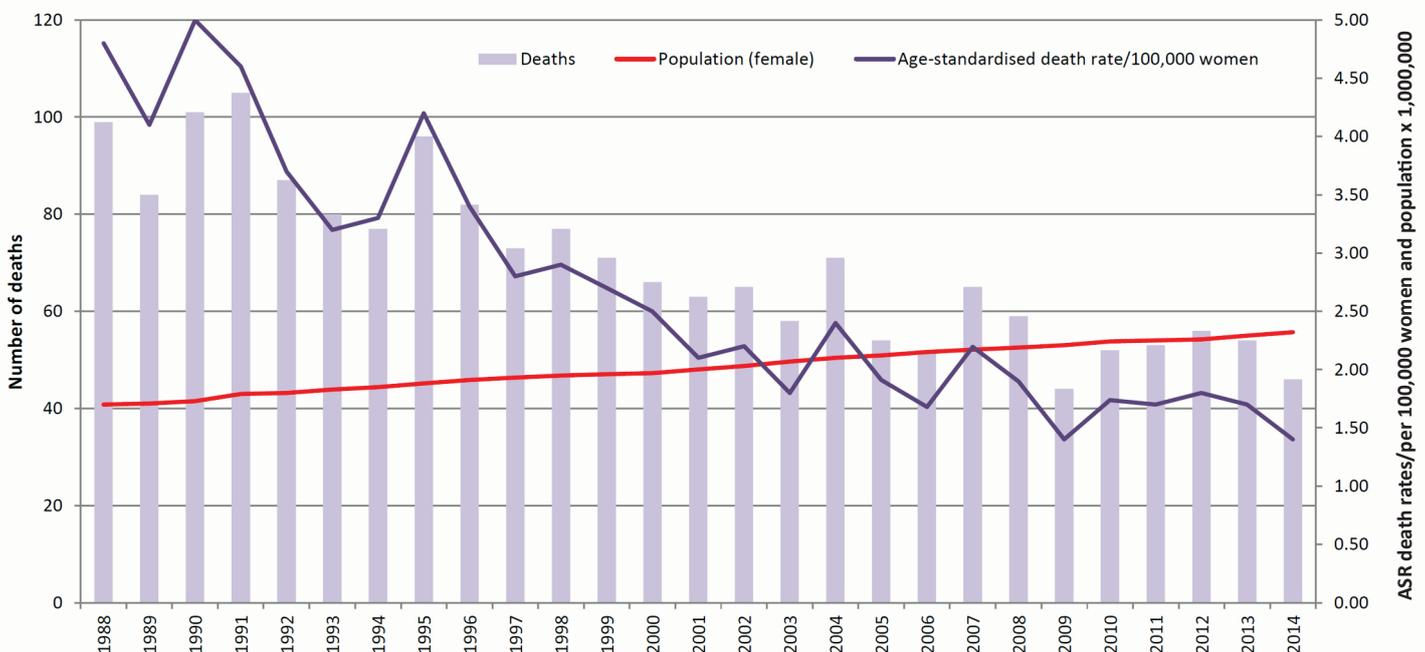


Figure 3: Number of actual deaths from cervical cancer<sup>14</sup>, age-standardised death rate<sup>8, 15, 16</sup> and the female population of New Zealand<sup>17</sup> from 1988 to 2014.

death responsible for only 1.4% of all cancer deaths in women that year; in 1995 it was ninth for 2.7% of all cancer deaths in women; and in 1988 before the NCSP was introduced it was eighth for 3.3% of all cancer deaths in women.<sup>14</sup>

As an overall cause of death, cervical cancer was the 35<sup>th</sup> highest cause of death among women in 2015 with 53 deaths, behind the major causes of death (cardiovascular disease - 3099;

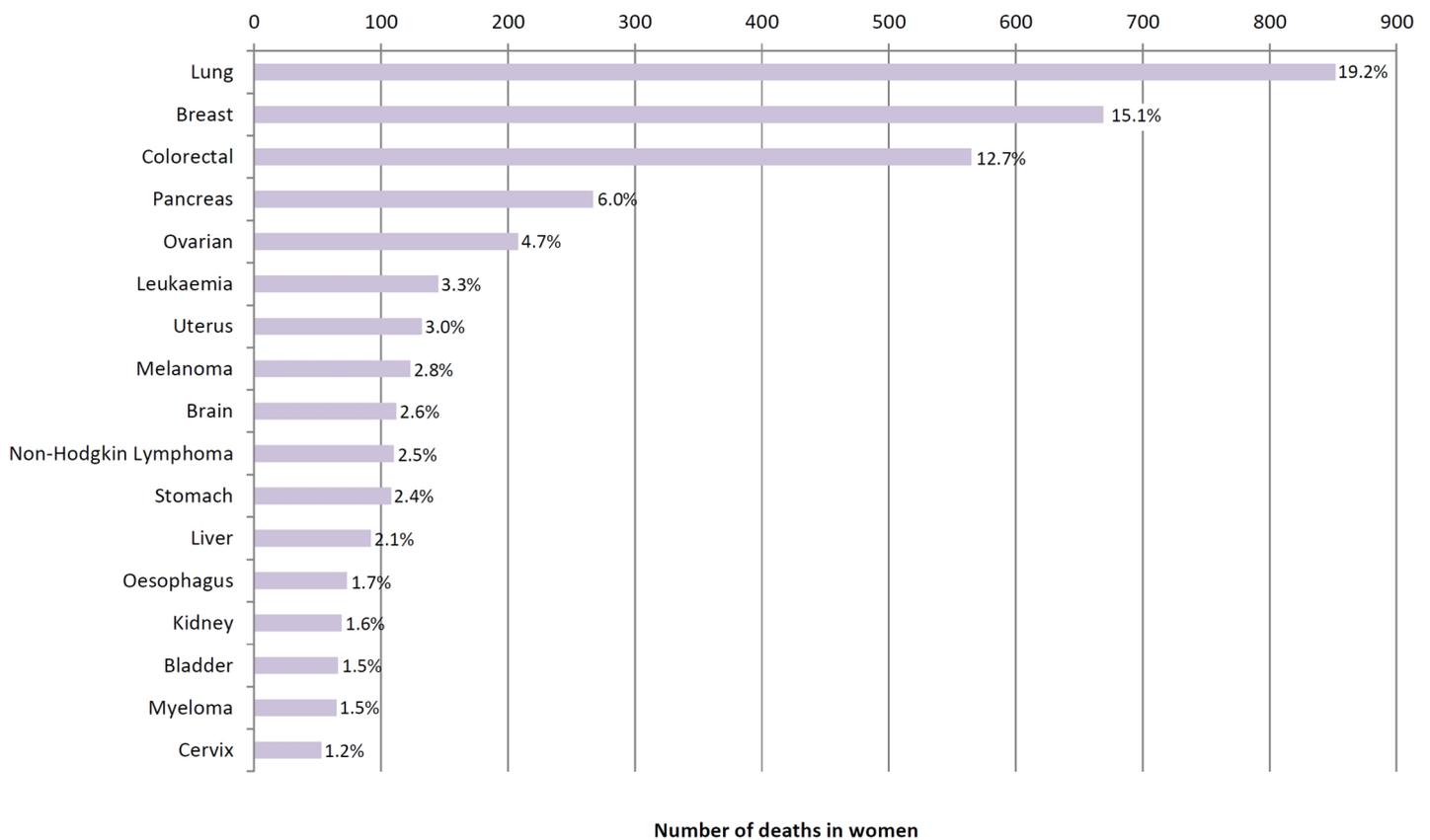
Alzheimer's and other forms of dementia - 1615; cerebrovascular disease including stroke - 1466) and other lesser causes of death, such as type II diabetes (382); falls (315); intentional self-harm (155); vehicle and transport accidents (81).<sup>14</sup>

### Cervical Cancer, Ethnicity and Deprivation

As is the case with many other cancers, there are ongoing

concerns about ethnic disparities in the incidence of and mortality from cervical cancer, especially between Māori and non-Māori women.

In a paper published in the *New Zealand Medical Journal* in 2018, Hider *et al* write that, between 2008 and 2012, while the proportion of women screened was stable at about 76%, coverage rates were lower among Māori, Pasifika and Asian women.<sup>18</sup> They go on to



**Figure 4: Major causes of cancer death in women in 2015<sup>14</sup>. Percentage figures represent the percentage of women who died from the listed cancer as a proportion of all cancer deaths in women in 2015.**

say that reviews of women with cervical cancer in New Zealand have concluded “over 80% of women with cervical cancer were inadequately screened.”

Hider *et al* undertook a review – commissioned by the NCSP – of women diagnosed with cervical cancer in New Zealand between 2008 and 2012. Their analysis of 772 cases found that “twenty-two percent were among women/wahine who recorded Māori as at least one of their ethnicities and 27% were in the most deprived sociodemographic quintile.” They also found that only 13% of the 644 women aged between 25 and 69 years at diagnosis had an adequate<sup>†</sup> screening history.<sup>18</sup> The research found that this was even lower among Māori women and those who live in areas with higher levels of socioeconomic deprivation.

As was seen in Figure 2, which shows the ASR incidence for all women diagnosed between 1991 and 2016 and for Māori and

non-Māori women between 1995 and 2016, there is a significant and consistent disparity in the incidence of cervical cancer between Māori and non-Māori women, with the incidence per 100,000 women much higher in Māori women. For example, in 2016 the ASR of cervical cancer was 10.6 per 100,000 Māori women and 6.7 per 100,000 non-Māori women.

If the deprivation status of women diagnosed with cervical cancer is considered, recent data<sup>††</sup> show that more women diagnosed are in higher deprivation quintiles than lower deprivation quintiles (Figure 5).<sup>8</sup> The New Zealand Index of Deprivation (NZDep)<sup>19</sup> is an area-based measure of socioeconomic deprivation in New Zealand based on nine census variables, where Quintile 1 represents people living in the least deprived 20 percent of small areas and Quintile 5 represents people living in the most deprived 20 percent of small areas.

While there are some variations in the overall trend from year to year, over the four years for which we have data, there appears to be a significant correlation between deprivation quintile and cervical cancer diagnoses, with women residing in areas with the lowest level of deprivation (quintile 1) having a reduced risk of cervical cancer compared with women residing in areas with the highest level of deprivation (quintile 5).

Robson, Purdie and Cormack write in *Unequal Impact II: Māori and Non-Māori Cancer Statistics by Deprivation and Rural-Urban Status, 2002–2006* that “In New Zealand, as in other countries, markers of socioeconomic position (such as income, employment, living standards and deprivation)

<sup>†</sup> adequate screening is defined such that there is no between-screen interval of three calendar years or more in six to less than 84 months prior to diagnosis<sup>13</sup>

<sup>††</sup> Deprivation data specifically for cervical cancer diagnoses is only available for the years 2012-2015.

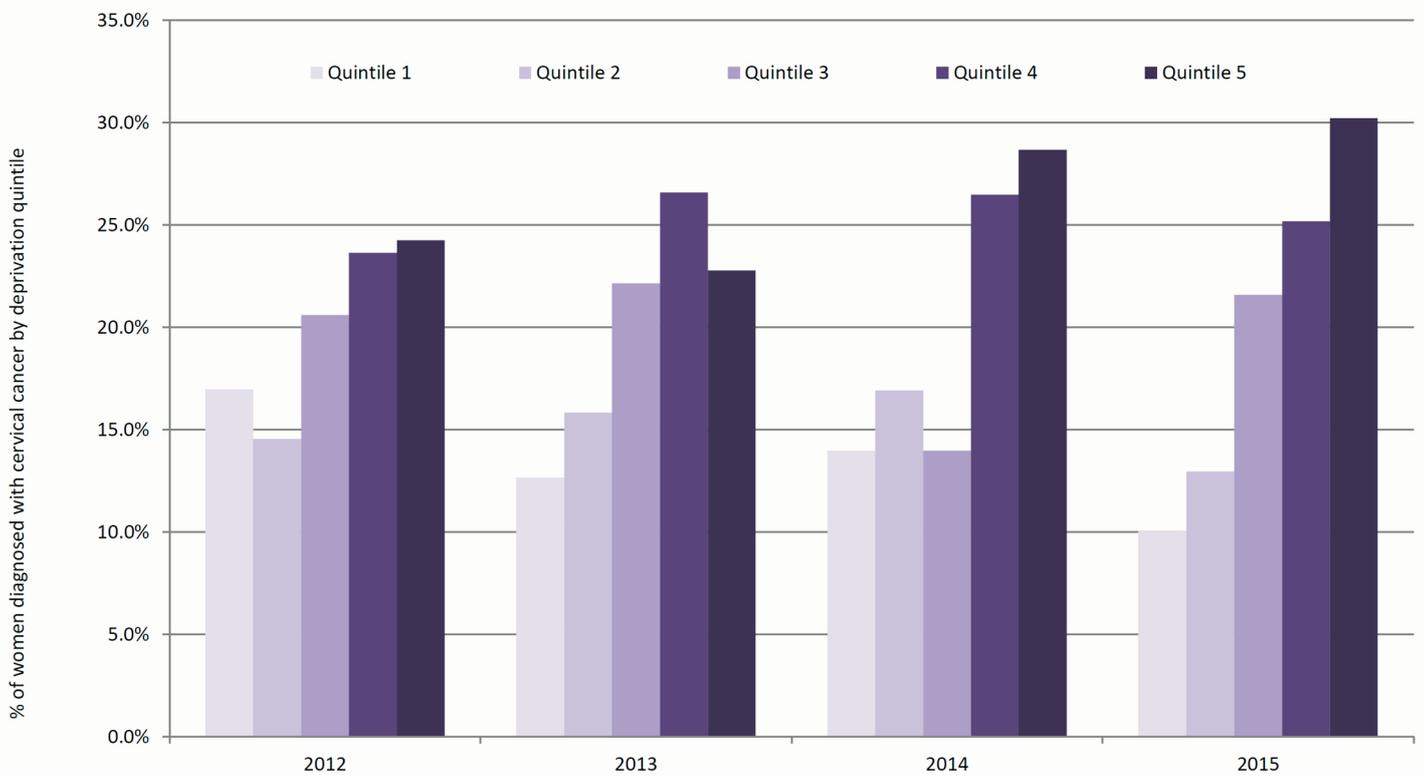


Figure 5: Diagnoses in each deprivation quintile as a percentage of the total diagnoses for the years 2012 to 2015.<sup>8</sup>

and geographical distribution of the population are patterned by ethnicity.”<sup>20</sup> Thus, Māori women are over represented in higher deprivation quintiles and in age-standardised rates of cervical cancer.

They go on to say that “an increased risk of overall cancer incidence and mortality has been found to be associated with lower socioeconomic status, a pattern that is particularly pronounced for some specific types of cancer”;<sup>20</sup> cervical cancer is one of those. In addition, among cervical and other cancers, women with higher levels of deprivation are also more likely to be diagnosed at a later stage than women from areas of higher affluence.<sup>20</sup>

In their analysis of New Zealand cancer incidence and mortality data from 2002 to 2006 they investigated the relationship between deprivation quintile and incidence and mortality for Māori and non-Māori. Their deprivation data is provided in Figure 6 and Figure 7, and it shows that, while for Māori women both incidence of and mortality from cervical cancer rises significantly as the level of deprivation increases, the impact of deprivation on incidence and mortality in non-Māori is substantially lower and the relationship with deprivation status isn’t entirely linear.

New Zealand data on the relationship between deprivation status and both incidence of and mortality from cervical cancer is consistent with international data. Incidence and mortality is highest in developing countries that, as a whole, carry “a disproportionate share of the disease burden, accounting for 86%

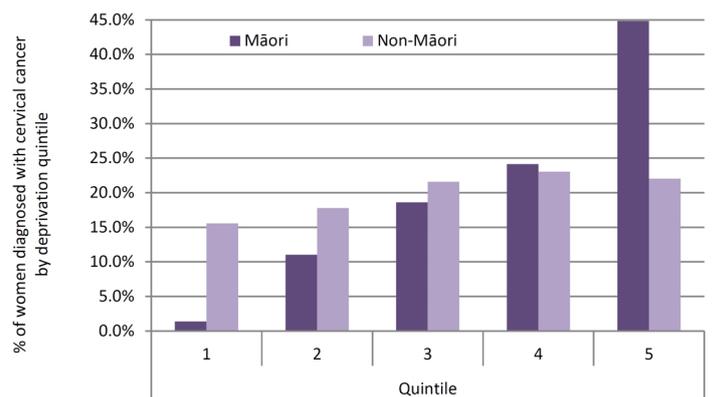


Figure 6: Diagnoses in each deprivation quintile as a percentage of the total diagnoses for Māori and non-Māori for the years 2002-2006 combined.<sup>20</sup>

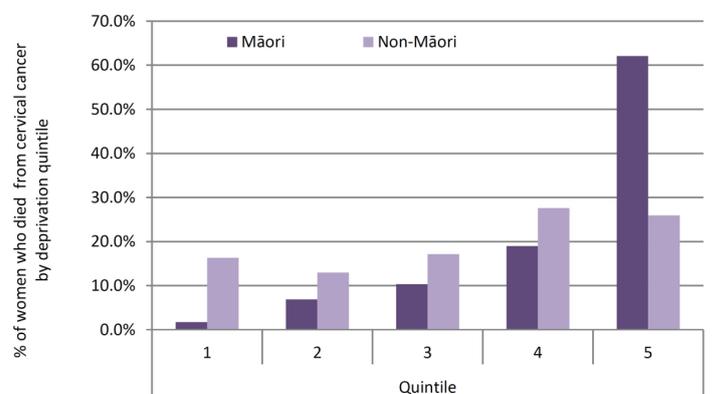


Figure 7: Deaths in each deprivation quintile as a percentage of the total deaths for Māori and non-Māori for the years 2002-2006 combined.<sup>20</sup>

of all cervical cancer cases and 88% of all cervical cancer deaths worldwide".<sup>21</sup> However, while industrialised nations have a much lower incidence and mortality, with marked declines over the past several decades, within the richer nations, the burden is carried by the women in the most deprived group. Singh *et al* write that "those in more deprived groups or lower socioeconomic strata [have a] 2-3 fold higher risk of cervical cancer than their affluent counterparts."<sup>21</sup>

In addition, they found that "cervical cancer incidence and mortality rates increased by 7.1 and 5.9 points, respectively, for every 0.2 unit increase in GII [Gender Inequality Index\*\*\*]. The risk of a cervical cancer diagnosis increased by 24% and of cervical cancer death by 42% for a 0.2 unit increase in GII. GII explained approximately 24% and 33% of the global variance in incidence and mortality rates, respectively."<sup>21</sup>

Compared with many countries New Zealand ranks highly in the GII, but still sits at 34<sup>th</sup> behind Switzerland, Denmark and the Netherlands (1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup>), and Canada, Australia and the United Kingdom (18<sup>th</sup>, 24<sup>th</sup> and 28<sup>th</sup> respectively).<sup>22</sup>

However, data suggests that ethnicity and deprivation plays a greater role in disparities in cervical cancer incidence and mortality in New Zealand than gender inequality. This is evidenced by similar disparities between Māori men and non-Māori men for both

gender specific and gender non-specific cancers.<sup>14</sup> In an analysis of 2002 to 2006 data, Robson *et al*,<sup>20</sup> found that Māori men have a higher age-standardised incidence of cancer in 15 out of 23 cancers, and higher mortality in the same 15 out of 23 cancers. This compares with Māori women who have a higher age-standardised incidence of cancer in 17 out of 25 cancers, and higher mortality in 19 out of 25 cancers.

Robson *et al*. found that the "higher levels of deprivation in the Māori population accounted for approximately 27% of the incidence disparity and 15% of the mortality disparity."<sup>20</sup>

## Conclusion

New Zealand has seen a dramatic reduction in both the incidence of and mortality from cervical cancer since the introduction of the National Cervical Screening Programme in 1990 (excluding women in the under 25 age group), with reductions of 56% in incidence to 2013 and 72% in mortality to 2014. Cervical cancer dropped from eighth to 17<sup>th</sup> highest cause of cancer mortality in women between 1988 and 2015.

Based on 2012 data, Australia and New Zealand have the second lowest rate of incidence of cervical cancer in the world and the lowest mortality rate. However, we still have significant disparities between Māori and non-Māori women and also between our most affluent and least affluent women.

It is also significant that as few as 13% of women diagnosed with cervical cancer had an adequate screening history, and this is a strong indication that with adequate screening we could see both incidence and mortality fall even further in women 25 years and over.

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\*\*\* The GII measures gender inequalities in three important aspects of human development — reproductive health, measured by maternal mortality ratio and adolescent birth rates; empowerment, measured by proportion of parliamentary seats occupied by females and proportion of adult females and males aged 25 years and older with at least some secondary education; and economic status, expressed as labour market participation and measured by labour force participation rate of female and male populations aged 15 years and older.

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