

# Chapter 6

## Cervix

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### Summary

- In the UK and Ireland in the 1990s, cancer of the cervix accounted for around 1 in 40 cases of cancer and 1 in 50 deaths from cancer in females.
- Incidence rates were high in a band across the northern part of England, parts of the west midlands and north east of England and in Scotland, and were low in the south of England and in both Northern Ireland and Ireland.
- The geographical pattern of mortality rates was broadly similar to that for incidence.
- There is a clear link between incidence and mortality rates and socio-economic deprivation, with higher rates in the more deprived areas and lower rates in the more affluent.
- The geographical patterns in incidence and mortality in the UK were not related to differences in the uptake or effectiveness of the revised cervical screening programme: the regional variation in incidence was similar in the 1970s and 1980s (although rates were much higher).

### Introduction

There were nearly half a million new cases of cervical cancer in the world in 2000, representing about 10 per cent of all cancers in women, among whom it ranked second, after breast cancer.<sup>1</sup> About 80 per cent of cases occur in developing countries, where cervical cancer is often the most common type of cancer.<sup>2</sup> In contrast, cervical cancer accounts for only around 5 per cent of cases in women in North America, Australia and western Europe. Large differences in incidence among different ethnic groups have been reported in some countries. The incidence of the disease had been falling in many developed countries since the second world war<sup>3</sup> – but not, up to the late 1980s, in the UK.<sup>4,5</sup>

### Screening

Many cases of invasive cervical cancer appear to arise after the initial development of a precursor premalignant condition – cervical intraepithelial neoplasia (CIN) – and screening for this condition has become a cornerstone of attempts to reduce

mortality. The Pap smear was developed over 50 years ago, and screening began in Great Britain, in some of the Nordic countries, and in parts of North America, in the 1960s. Although the effectiveness of cervical screening has never been properly demonstrated in randomised, controlled trials, firm evidence comes from the Nordic countries, where the implementation of widely different policies was followed by sharply contrasting trends in incidence and mortality.<sup>6</sup> Although cervical screening in England started in 1964, for over twenty years it failed to achieve sufficient coverage of women or follow-up of all women with positive smears,<sup>7</sup> and was largely ineffective.<sup>8</sup> During the 1980s, important national policy changes were made which required health districts to provide routine screening at least five-yearly for all women aged 25–64. District call and recall systems had to be in place, and uniform policy and standards were developed covering all aspects of screening and subsequent intervention. The official re-launch of this re-organised NHS cervical screening programme took place in 1988. Financial incentives were first introduced in general practitioner contracts in 1990. The recorded coverage improved dramatically from 42 per cent of the target age group in 1988 to 85 per cent in 1994, a level subsequently maintained. This entailed a workload of some 4.5 million smears annually during the 1990s.<sup>9</sup> Coverage increased in all age groups, but particularly for older women (55 to 64 years).<sup>10</sup> There was no organised cervical screening programme in Ireland during the 1990s.

### Incidence and mortality

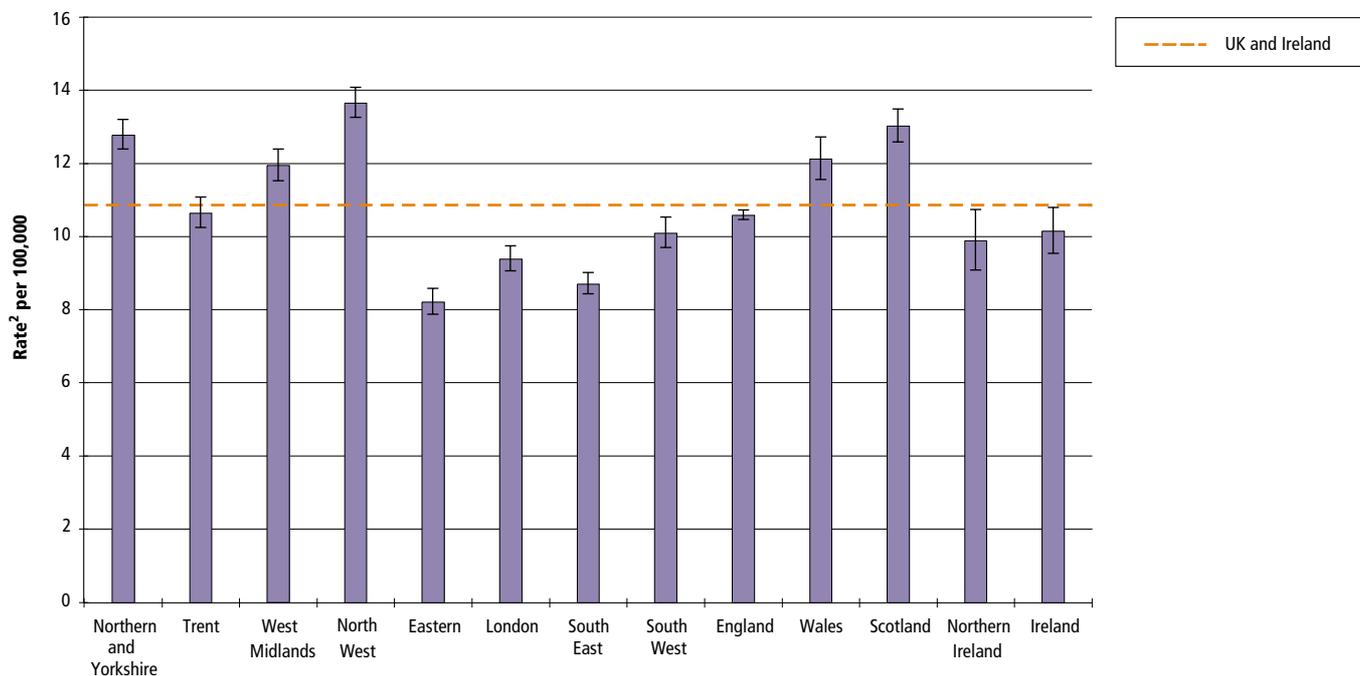
Cervical cancer always was a relatively uncommon disease. There were on average just over 3,700 new cases of cervical cancer diagnosed in the UK and Ireland in the 1990s, 2.7 per cent of all cancer cases in women, in whom it ranked ninth. The disease is rare below the age of 20, but incidence rates rise rapidly to a first peak in the 35–39 age group; there is then a slight decline in rates, followed by a rise to a second, slightly higher peak in women in their 70s. In England in 1999, cervical cancer was the second most common cancer in women aged 20–34, accounting for 17 per cent of all cancers in this age group (breast cancer was the commonest, accounting for 27 per cent).<sup>11</sup> Overall, the age-standardised incidence rate was 11 per 100,000.

There were on average 1,600 deaths each year from cervical cancer in the UK and Ireland during the 1990s; these represented 2 per cent of cancer deaths in women. Age-specific mortality did not follow the bimodal pattern seen for incidence, but rose progressively to peak in women in their 70s. Overall, the age-standardised mortality rate was 4 per 100,000, and the mortality-to-incidence ratio was 0.39.

(continued on page 76)

**Figure 6.1**

**Cervix: incidence by country, and region of England UK and Ireland 1991-99<sup>1</sup>**

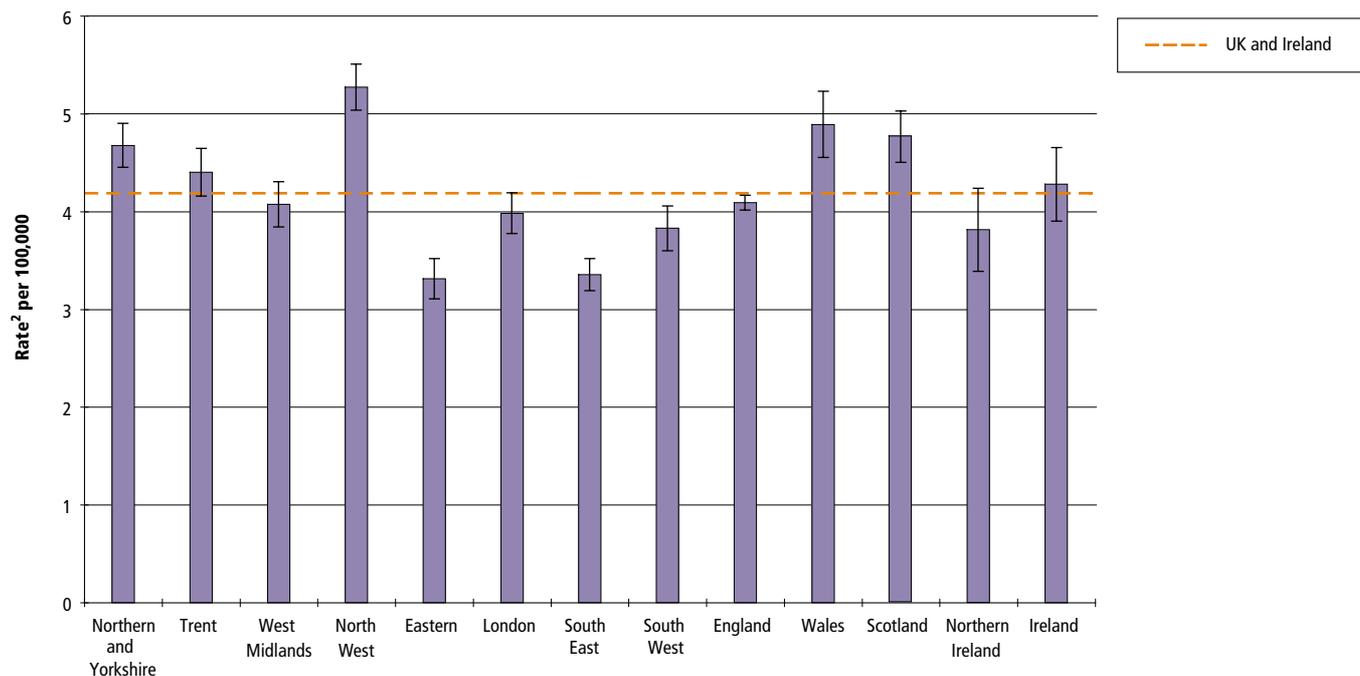


1 Northern Ireland 1993-99, Ireland 1994-99

2 Age standardised using the European standard population, with 95% confidence interval

**Figure 6.2**

**Cervix: mortality by country, and region of England UK and Ireland 1991-2000<sup>1</sup>**

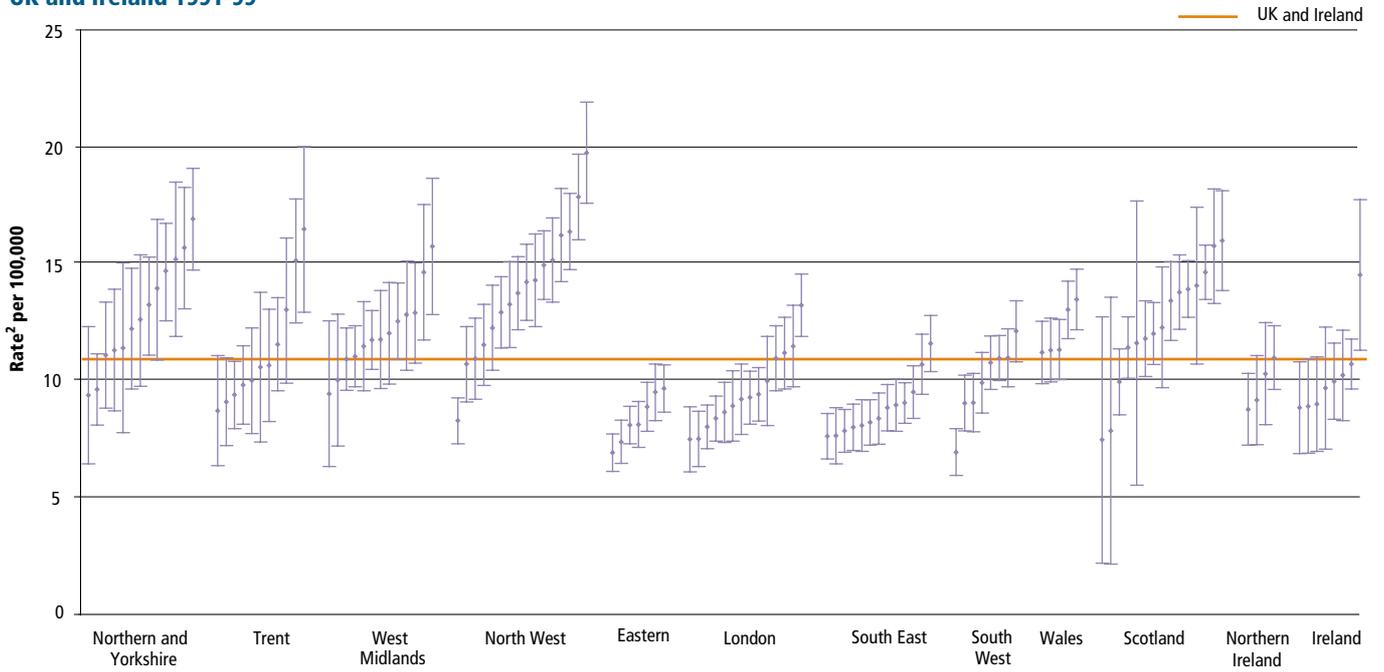


1 Scotland 1991-99, Ireland 1994-2000

2 Age standardised using the European standard population, with 95% confidence interval

Figure 6.3

Cervix: incidence by health authority within country, and region of England UK and Ireland 1991-99<sup>1</sup>

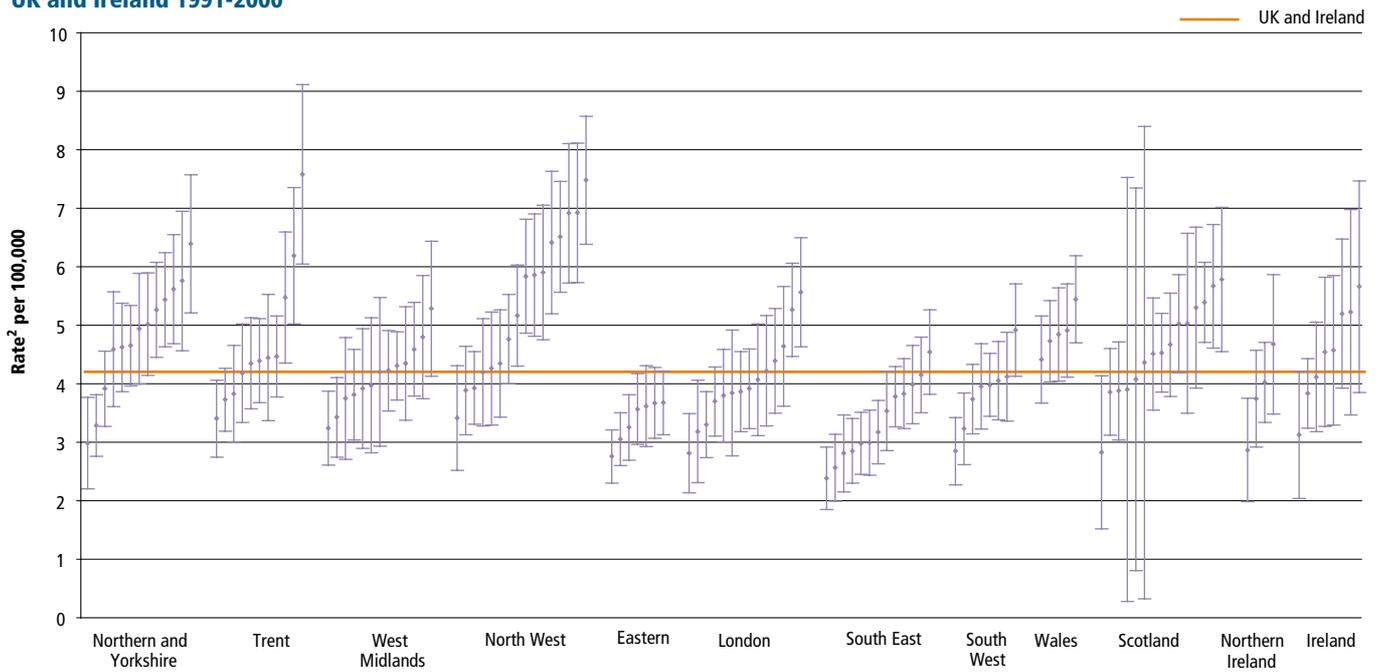


1 Northern Ireland 1993-99, Ireland 1994-99

2 Age standardised using the European standard population, with 95% confidence interval

Figure 6.4

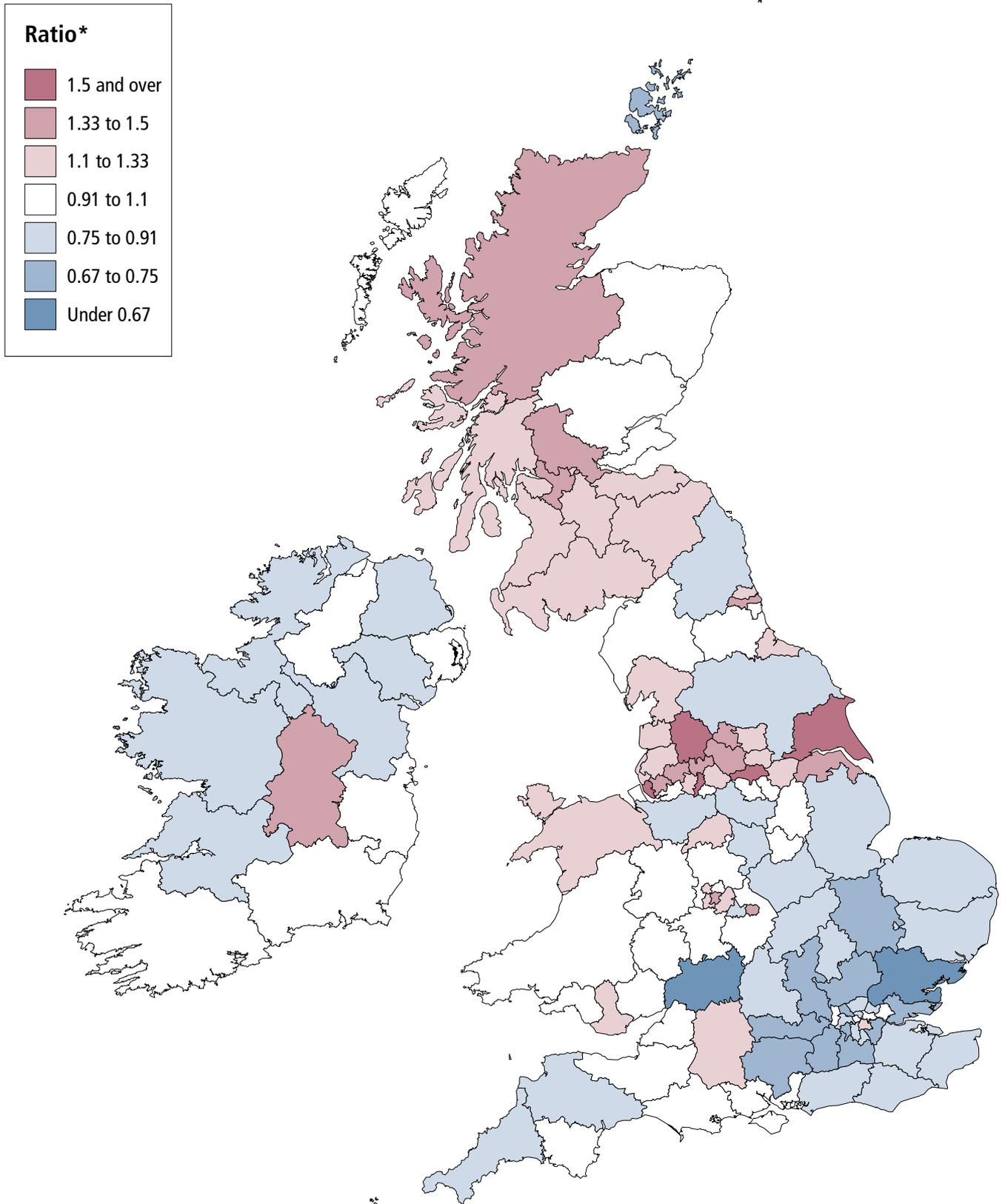
Cervix: mortality by health authority within country, and region of England UK and Ireland 1991-2000<sup>1</sup>



1 Scotland 1991-99, Ireland 1994-2000

2 Age standardised using the European standard population, with 95% confidence interval

## Map 6.1

Cervix: incidence\* by health authority  
UK and Ireland 1991-99

\*Ratio of directly age-standardised rate in health authority to UK and Ireland average



## Incidence and mortality trends

Since 1971, the numbers of registrations of *in situ* cervical cancer in England and Wales increased broadly in line with the increasing numbers of smears taken, to reach almost 80 per 100,000 (20,000 cases) in the mid-1990s.<sup>10</sup> Since 1987, the trends in registrations in women aged 20-24 and 25-29 have been continually upward, whereas in women aged 30-49 there has been no overall increase. Registrations for older groups were consistently low and declined with age.

From 1971 to the mid-1980s, the incidence of invasive cervical cancer in England and Wales remained between 14 and 16 per 100,000 (on average 3,900 cases a year).<sup>4</sup> This overall stability, however, resulted from a complex dynamic pattern in the underlying age-specific rates resulting from women who were born in different periods having widely different risks of cervical cancer: those women born in the early 1920s and the 1950s onwards have much higher risks than those born in the mid-1930s.<sup>4,12,13</sup> After 1990, incidence in England fell dramatically to just over 9 per 100,000 in 1999,<sup>11</sup> around 40 per cent lower than in the mid-1980s. In 1999, the overall pattern was similar to that in 1990, but the incidence in every age group from 30-34 to 70-74 was substantially (and statistically significantly) lower – by on average around 15 per 100,000 (190 cases).<sup>4</sup>

From 1950 to 1987, mortality from cervical cancer in England and Wales fell steadily by just over 1.5 per cent each year from 11.2 per 100,000 (2,500 deaths) to 6.1 per 100,000 (1,800 deaths).<sup>4</sup> This long-term decline in cervical cancer mortality predates the introduction of screening, and may be due to improvements in hygiene and nutrition; the shifting of childbearing patterns towards smaller family sizes, delayed childbearing and increased mean age at first birth; and a decline in sexually transmitted diseases.<sup>14</sup> Subsequently, the rate of decline trebled and by 1999 mortality had fallen to 3.3 per 100,000 – only 30 per cent of the level in 1950.<sup>4,15</sup> Age-specific mortality, however, changed in different ways in the various age groups. In the youngest women (25-34 years) mortality trebled from around 1 per 100,000 (30 deaths) in the mid-1960s to a plateau of around 3 per 100,000 (100 deaths) in the mid-1980s. Mortality in all other age groups declined, but at different times. Trends in both incidence and mortality in Scotland have been closely similar to those in England and Wales.<sup>16</sup>

## Survival

For patients diagnosed in 1986-90, survival from cervical cancer was high: one-year survival was 82 per cent and five-year survival was 61 per cent.<sup>17</sup> Survival declined steeply with

age. In 1986-90, five-year survival was around 80 per cent in the youngest age group (under 40) but only 20 per cent in the elderly (80 and over). There was little variation in survival across England and Wales. From the early 1970s to the late 1980s there was an improvement in one-year survival of 7 percentage points, and in five-year survival of 9 percentage points. Although the revised screening programme was highly successful in reducing both incidence and mortality<sup>10,13,18</sup> (see below) there were no significant improvements in the treatment of cervical cancer in the period, and five-year survival for women diagnosed in the late 1990s was unchanged at 61 per cent.<sup>19</sup>

## Geographical patterns in incidence

In the 1990s there were considerable variations in the incidence of invasive cervical cancer among the regions of England, the other countries of the UK, and Ireland (Figure 6.1). Rates were highest in the Northern and Yorkshire and North West regions of England, and Scotland; and lowest in the Eastern, South East and London regions of England. Incidence in the North West was about 70 per cent higher than in the Eastern region. There was also considerable variation in the rates in the health authorities within each region and country (Figure 6.3). The highest rates in Scotland were around 60 per cent higher than the lowest (excluding Orkney and Shetland); in the West Midlands the difference between the highest and lowest was around 70 per cent; in Northern and Yorkshire, in Trent and in London it was around 80 per cent; and in the North West it was 140 per cent. Despite the wide ranges in rates at the health authority level, there was little overlap between rates in the health authorities in the north and south of England. Of the 29 health authorities in the Northern and Yorkshire and North West regions, 17 had rates markedly above the average for the UK and Ireland, 11 were not notably different from the average, and only one was notably lower. In Scotland (excluding the Western Isles, Orkney and Shetland) six health authorities had rates that were particularly high, six were not different from the average, and none was markedly low. Of the 42 health authorities in the Eastern, London, South East, and South West regions, 30 had rates that were notably below the UK and Ireland average, 11 were not different, and only one was markedly higher (see Table B6.1).

The map of cervical cancer incidence (Map 6.1) confirms the wide variation at the health authority level, but also reveals patterns that cut across regional boundaries in England. There was a band of high incidence across the northern part of England including very high rates in: Manchester (80 per cent above the average); Liverpool (over 60 per cent higher); East Lancashire; and St Helens and Knowsley (both 50 per cent higher) in the North West; in East Riding (55 per cent higher)

and Bradford (45 per cent) in Northern and Yorkshire; and in Barnsley (50 per cent higher) and South Humber (40 per cent) in Trent. Rates were also noticeably above average in Tees and Tyneside. In these same regions, however, there were also some health authorities with relatively low rates, for example: South Cheshire, Stockport, and Wirral in the North West; North Yorkshire, and Northumberland in the Northern and Yorkshire region; and North Derbyshire, Southern Derbyshire, Leicestershire, and Lincolnshire in Trent. Unlike the rates in most of the former highly industrialised northern cities of England, that in Sheffield was not elevated. Rates were markedly lower than average in most of England below the northern band of high rates, with the main exception of a handful of higher rates in the West Midlands, including Coventry and Sandwell. Rates were above average in Scotland apart from Fife, Grampian, and Tayside on the eastern side of the country. Rates in both Northern Ireland and Ireland were generally low. The only noticeably higher than average rate in Ireland was in the Midland area, which does not include Dublin, but the rate is based on around only 13 cases each year.

### Geographical patterns in mortality

The pattern in mortality from cervical cancer at the region and country level was closely similar to that in incidence (Figure 6.2) with higher than average rates in the north of England, Wales, and Scotland and lower than average rates in the Eastern, London and South East regions of England. The patterns of mortality within regions and countries were also substantially similar to those in incidence (Figure 6.4).

The map of cervical cancer mortality (Map 6.2) shows closely similar geographical patterns to those in incidence. In England, there was a band of higher than average mortality across the north, with high rates in Tees and Tyneside and parts of the former heavily industrialised parts of the West Midlands. Mortality in much of the rest of central and southern England was well below average. The pattern in mortality in Scotland was also closely similar to that in incidence. Mortality rates in the health authorities in Northern Ireland and Ireland were on average based on fewer than 10 deaths each year, and had correspondingly wide confidence intervals: none was significantly different from the average (see Table B6.1).

### Risk factors and aetiology

The risk of developing cervical cancer is closely related to sexual behaviour. Very low rates of the disease occur in nuns. A link between cervical cancer and a sexually transmitted infection was first suggested because it was associated with women who had had many sexual partners (or whose husbands or partners had), and an early age at first intercourse.<sup>12</sup> A number of infections have been considered, including herpes simplex

virus type 2, genital warts, syphilis and gonorrhoea. Evidence of the aetiological role of human papillomavirus (HPV) has accumulated from both molecular and epidemiological studies.<sup>20</sup> The mechanism by which HPV acts is less clear, since many women with the infection do not go on to develop dysplasia, and of those who do, many do not progress to invasive cervical cancer. Other risk factors include smoking, oral contraceptives and high parity. Only the last of these appears to be a risk factor independent of HPV infection. Folate deficiency also requires further investigation for its possible explanation of the effects of parity – pregnancy is associated with the depletion of maternal folate stores. Other possible explanations are cervical trauma during childbirth and hormonal influences of pregnancy.

Changes in these risk factors over time will have affected the incidence of cervical cancer. Over the past 30 years both sexes have had a tendency to have first sexual relationships at earlier ages, and to have more sexual partners than in the past. In addition, younger cohorts of women have had greater exposure to cigarette smoking and oral contraceptives, although any increase in incidence as a result of this may have been attenuated by the reduction in parity.

### Socio-economic deprivation

In the early 1990s there was a strongly positive gradient in the incidence of cervical cancer by Carstairs deprivation category,<sup>21</sup> with the rate in the most deprived group about three and a half times that in the most affluent. The relationship, however, was not linear: incidence increased more rapidly with deprivation in categories 12 to 20.<sup>4</sup> The relationship between mortality from cervical cancer and deprivation was closely similar to that for incidence. In England and Wales as a whole, and in most of the regions, there was a significant inverse gradient in survival with deprivation.<sup>17</sup> In 1986-90, the difference in survival rates between patients living in the most affluent areas and the most deprived areas was around 4 percentage points at both one year and five years after diagnosis. For women diagnosed in the late 1990s, there was little change in the deprivation gap, with five-year survival some 5 percentage points higher in the most affluent.<sup>22</sup>

It is important to recognise that the wide geographical variation and the patterns in both the incidence of, and mortality from, cervical cancer are strongly related to deprivation – and not to differences in the effectiveness of the cervical screening programme in the UK. In England and Wales in the 1980s there was the same wide variation in incidence at the regional level as illustrated in Map 6.1 for the 1990s. Following the major changes to the screening programme in the late 1980s, incidence fell dramatically in all regions (as well as in all age groups).<sup>4,10</sup>

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