A descriptive study of the decline in cervical screening coverage rates in the North East and Yorkshire and the Humber Regions of the UK from 1995 to 2005

Bruce J. Willoughby¹, K. Faulkner², E. C. Stamp², C. J. Whitaker²

¹Public Health Group, Government Office for the North East, 7th Floor, Citygate, Gallowgate, Newcastle upon Tyne NE1 4WH, UK
²Quality Assurance Reference Centre, North East, Yorkshire and The Humber, Unit 9, Kingfisher Way, Silverlink Business Park, Wallsend, Tyne & Wear NE28 9ND, UK

ABSTRACT

Since the mid-1990s, there has been a steady decline in coverage rates for cervical screening in the target age group (25–64 years) across England. This article describes the rate of decline from 1995 to 2005 in the old health authority areas of the North East and the Yorkshire and the Humber (NEYH) regions in relation to age group, deprivation, ethnicity and religion. The results show that the rate of decline is faster in these northern regions than that in England as a whole, with a very strong correlation between age and rate of change of coverage rates. Younger age groups experience the fastest rate of decline, and those over 55 years show an increase in coverage rates. There is an association between the deprivation of the old health authority areas and the rate of change of coverage rates, with weaker evidence that areas with high proportions of Black or Mixed ethnicity may have a faster decline. However, the rate of decline is not associated with other ethnic groups or religions. Therefore, interventions could be targeted at younger women and those who live in deprived areas to prevent the widening of inequalities.

Keywords cervical cancer, public health, screening

Background

The National Health Service (NHS) Cervical Screening Programme has proved a major success, with 3.6 million women being screened in England during 2004–05.¹ The death rate from cervical cancer for women <65 years in England and Wales has halved since the national call–recall system began, contributing to preventing an epidemic that would have killed one in 65 of all British women born since 1950.²

However, since its peak in 1995, there has been a steady decline in coverage rates of cervical screening in the target age group (25–64 years) across England. The North East and the Yorkshire and the Humber (NEYH) regions have experienced this steady decline in coverage rates, and there is real concern that these rates will continue to fall below the national minimum target of 80% coverage.

Although there are known differences in attendance rates for cervical screening by age,³–⁵ ethnicity,⁶,⁷ deprivation⁸ and possibly religion,⁹ it is not known whether these factors help to explain the decline in coverage rates. This article describes the rate of decline over the last 10 years (1995–2005) in the NEYH regions by these population characteristics in an attempt to understand the decline.

Methods

Since 1995, coverage rates have reported the percentage of eligible women who have had an adequate smear in the last 5 years. All women between the ages of 25 and 64 years are eligible for a cervical smear test every 3–5 years. In this report, the trends in coverage rates have been examined since 1995 for the target group of 25–64-year-old women.

The geographical unit chosen to compare trends for the report is the old health authority areas (n = 17). This was for three reasons: first, the data for primary care trusts (PCTs) (n = 50) can be combined easily into the old areas; second, this unit allows comparisons before PCTs existed and, third, the number of units to examine is manageable across the NEYH regions. Local screening offices generated returns of coverage rates from 1994–95 to 2004–05, in the same format as that sent to the Department of Health (KC53 returns). These were
used to calculate all the regional and local coverage rates for this report.

Super output areas (SOAs) are geographical areas with an approximate population of 1000 used by the Office of National Statistics to describe population characteristics. They take into account mutual proximity and social homogeneity. The percentage of the population in each old health authority area, who live in the 20% most deprived SOAs in England (as measured by the 2004 Index of Multiple Deprivation), has been used as a proxy for deprivation scores in this article. The deprivation status of each old health authority area is summarized in Table 1.

The 2001 UK Census data for the old health authority areas were used to measure the ethnicity and religious status of the populations in the areas. An assumption was made that the relative proportions have not changed in the areas over the 10-year period.

To examine the change in rates over the 10-year period, we have used the median of the year on year percentage point difference in annual coverage rates for the geographical areas. The median was chosen over the mean as some areas did not have a normal distribution of the year on year differences in coverage rates. When the rate of change was examined by ethnicity, religion and deprivation status, standardized coverage rates were used. Direct age standardization was performed in the target age group for areas under study from 1995 to 2005 against the 2005 English eligible population for cervical screening. Statistical analysis was conducted using MINITAB™, and significance was taken as a P-value <0.05. The coefficient of determination (\(R^2\)) was adjusted for the degrees of freedom to give \(R^2(adj)\).

**Results**

For the period 2004–05, the NEYH Government Office Regions had higher coverage rates than England as a whole (81.7, 81.8 and 80.3%, respectively). However, 2 of the 17 (12%) old health authority areas within the two regions were below the 80% national target. The rates of decline for England, the Yorkshire and the Humber region and the North East region are shown in Fig. 1. This shows that the rate of decline was greatest in the Yorkshire and the Humber, and the North East regions than that in England as a whole [\(-0.40\% \text{ per year (inter-quartile range, IQR} -0.59 \text{ to } -0.24\%)\), \(-0.33\% \text{ per year (IQR} -0.53 \text{ to } -0.31\%)\) and \(-0.25\% \text{ per year (IQR} -0.37 \text{ to } -0.03\%)\) respectively]. Thirteen of the 17 (76%) old health authority areas in the two regions have rates of decline greater than England as a whole.

### Table 1 Rates of change in cervical screening coverage rates for old Health Authority areas in the North East and the Yorkshire and the Humber (NEYH) regions, by deprivation

<table>
<thead>
<tr>
<th>Old health authority area</th>
<th>Rate of change in coverage rates (median % point difference per year)</th>
<th>Population living in 20% most deprived super output areas (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crude</td>
<td>Directly age standardized</td>
</tr>
<tr>
<td>Bamsley</td>
<td>-0.42</td>
<td>-0.45</td>
</tr>
<tr>
<td>Bradford</td>
<td>-0.49</td>
<td>-0.43</td>
</tr>
<tr>
<td>Calderdale and Kirklees</td>
<td>-0.36</td>
<td>-0.37</td>
</tr>
<tr>
<td>County Durham and Darlington</td>
<td>-0.33</td>
<td>-0.38</td>
</tr>
<tr>
<td>Doncaster</td>
<td>-0.53</td>
<td>-0.56</td>
</tr>
<tr>
<td>East Riding and Hull</td>
<td>-0.13</td>
<td>-0.17</td>
</tr>
<tr>
<td>Gateshead and South Tyneside</td>
<td>-0.57</td>
<td>-0.59</td>
</tr>
<tr>
<td>Leeds</td>
<td>-0.64</td>
<td>-0.61</td>
</tr>
<tr>
<td>Newcastle and North Tyneside</td>
<td>-0.08</td>
<td>-0.11</td>
</tr>
<tr>
<td>North Yorkshire</td>
<td>-0.27</td>
<td>-0.33</td>
</tr>
<tr>
<td>Northumberland</td>
<td>0.00</td>
<td>-0.03</td>
</tr>
<tr>
<td>Rotherham</td>
<td>-0.29</td>
<td>-0.32</td>
</tr>
<tr>
<td>Sheffield</td>
<td>-0.66</td>
<td>-0.66</td>
</tr>
<tr>
<td>South Humber</td>
<td>-0.16</td>
<td>-0.16</td>
</tr>
<tr>
<td>Sunderland</td>
<td>-0.39</td>
<td>-0.42</td>
</tr>
<tr>
<td>Tees</td>
<td>-0.70</td>
<td>-0.72</td>
</tr>
<tr>
<td>Wakefield</td>
<td>-0.31</td>
<td>-0.33</td>
</tr>
</tbody>
</table>
 DECLINE IN CERVICAL SCREENING COVERAGE RATES 357

Age

When the crude coverage rates for the NEYH regions are stratified into 5-year age bands, the rate of decline in coverage rates is greater in younger ages (Fig. 2). Older age groups (>55 years) have a positive rate of change, i.e., an increase in coverage. The rate of change is highly correlated with age bands and has high statistical significance $R^2_{\text{adj}} = 96.0\%, P < 0.001$. This pattern of younger age bands having a high rate of decline and older age band rates increasing is repeated in all old health authority areas under study, but with some variation in the size of the effect and the point at which the linear trend line crosses zero (data not shown).

Deprivation

The deprivation levels of the old Heath Authority areas and their corresponding rates of change of coverage rates are summarized in Table 1. Figure 3 shows that when the age-standardized rate of change in coverage rates is plotted against deprivation status, there is a demonstrable association between the rate of change and the level of deprivation. Those old health authority areas with a population who live in more deprived areas have a higher rate of decline than those in less-deprived areas $[R^2_{\text{adj}} = 18.8\%, P = 0.047]$. These results are statistically significant. This correlation between level of deprivation and rate of decline is repeated for each age group, with no suggestion of any age-related differences in the level of correlation (data not shown).

Ethnicity and religion

The proportions of ethnic groups and religions in the old health authority areas are summarized in Table 2. When the rate of change in crude coverage rates for each area is plotted against ethnicity, there is a statistically significant association between the rate of decline in coverage rates and the proportion of Black $[R^2_{\text{adj}} = 22.6\%, P = 0.031]$ and Mixed $[R^2_{\text{adj}} = 18.9\%, P = 0.046]$ ethnic groups. However, when the age differences are taken into account and the directly age-standardized coverage rates are used, this statistical significance is lost, and the size of the effect is diminished $[R^2_{\text{adj}} = 15.3$ and 10.2%, respectively]. There was found to be no significant association between the proportion of various religions in the old health authority areas and the rates of decline in either the crude or the age-standardized coverage rates.

Discussion

Main finding of this study

The rate of decline of cervical screening coverage rates is faster in the NEYH regions than that in England as a whole. There is a very strong correlation between the age and the rate of change of coverage rates, with younger age groups experiencing the fastest rate of decline and older age groups (>55 years) actually exhibiting an increase in coverage rates. The rate of decline also appears to be associated with the deprivation status of the old health authority areas. In addition, there are indications of an association between the proportion of Black and Mixed ethnic groups in the population and the rate of decline in coverage rates, but this did not reach statistical significance. This was not found for other ethnic groups or religions.
What is already known on this topic?

Inequalities in the coverage of cervical screening have been previously investigated. A retrospective time–trend analysis of screening coverage examined the differences in attainment of the 80% threshold in old health authority areas by deprivation scores from 1991 to 1999 using the Townsend Deprivation Index. More deprived areas were less likely to reach the 80% coverage target threshold. Also, the rate of...
improvement in the level of achievement over this period was much slower than in the least deprived areas. This study was conducted during a period when there was general improvement in attaining the 80% target threshold, even though the overall coverage rates had started to decline.

Opportunistic screening may explain the lower coverage rates in older age groups 10 years ago. Before the organization of the call and recall systems into the National Screening Programme in the late 1980s, many general practitioners (GPs) took smears opportunistically during contraceptive or obstetric consultations. Postmenopausal women were therefore often overlooked.3 Uncertainty as to whether the smear test is appropriate for their age group has also been cited for postmenopausal women. However, in a cross-sectional survey which used a questionnaire to study differences in attitudes and knowledge across 650 randomly selected women aged between 15 and 78 years, younger women were more likely to find the test embarrassing or painful than older women.4 In another evaluation of a screening programme, age was a factor in attendance rates, with women <35 years or >50 years being more likely to not attend.5

A Manchester-based cross-sectional study examined the uptake of cervical screening by ethnicity and place of birth.6 This study concluded that the rate of uptake in South Asian women was not as low as expected from previous research and that practice- and area-level confounding effects (such as deprivation, transience and GP practice structures) could explain much of the difference. Other ethnic groups however had low rates. Many Black and minority ethnic women in East London have been shown to be unaware of the screening service, had misconceptions about the test and were fearful or embarrassed.7 Previous negative experiences inhibited initial or repeat attendance for screening.

**What this study adds**

This study is the first to examine the rates of change in coverage rates for the NHS Cervical Screening Programme in the NEYH region over a 10-year period with relation to age, deprivation, ethnicity and religion.

This study clearly demonstrates that the previously high rates of younger women attending for smears are declining at a faster rate compared with older age groups. This raises the question whether the national screening programme has become a ‘victim of its own success’. Mortality rates for cervical screening are decreasing because of both the effectiveness of screening in preventing the development of cervical cancer and the improvement in cancer treatments. The overall decline in the rate of cervical cancer has the effect of reducing the exposure women have to friends or relatives who have suffered from the disease. Using the Health Belief Model,10 women are less likely to attend for smears if they have a decreased perception of the importance of the disease. Conversely, the previous low rates in the older age groups have increased. This may be partly explained by the cohort effect, as women who have previously engaged with the screening programme become older.

The results from this study also suggest that if the current rate of decline continues, then areas with high levels of deprivation will decline at a faster rate than those with lower levels. There is also weaker evidence that this may also happen in areas with higher proportions of Black or Mixed ethnicity. Such effects may widen the health inequality gap between these and other communities.

The way that deprivation may play a part in the differences in coverage rates will be multifactorial. Possible reasons may include differences in changes in attitudes and knowledge between women with different socioeconomic status, differential access to health care and differential time preferences.

**Limitations of this study**

This study has many important limitations. The rate of decline in coverage rates was not linear. The median of the percentage point differences in annual coverage rates was used as a measure of the rate of change rather than the mean because the distribution of the differences was not normal. However, the effect of some interventions or confounding factors throughout the 10-year period will have been lost because of the smoothing effect of using the median. Also, the geographical unit of old Health Authorities is quite large, meaning that local pockets of deprivation are masked. It is not known whether the association between rates of decline in coverage rates and age and deprivation will persist at ward or SOA level.

The study also made the assumptions that the relative deprivation, ethnicity and religion proportions were constant throughout the 10-year period. The measure used to establish the proportions of different ethnicities and religions, i.e. the 2001 UK Census, was conducted halfway through our period of study. Owing to changes in the Census questions, we were unable to directly compare the results of the 2001 UK Census with those of the 1991 UK Census to confirm any changes in ethnicity or religion. In addition, the NEYH region is not as ethnically or religiously diverse as other areas of England, which may mean the effect ethnicity and religion have on the decline in coverage rates may be masked, compared to other areas of England.

**Conclusions**

The rate of decline in cervical screening coverage in the NEYH regions is faster in areas with greater levels of deprivation and in the younger population. Interventions to
reduce or halt the decline in cervical screening coverage rates should be targeted at younger women and those who live in deprived areas to prevent health inequalities getting worse. There is weaker evidence that areas with high proportions of Black or Mixed ethnicity may have a greater decline than other communities. Further research is needed to fully understand the causes of this decline and the effectiveness of different types of intervention.

Acknowledgements

The authors thank Lisa Edwards for help in obtaining the data, Simon Orange for obtaining the deprivation statistics and Nigel Unwin for helpful comments on the article.

References


