Investigating the effect of immigration on trends in cervical cancer in young women

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INTRODUCTION

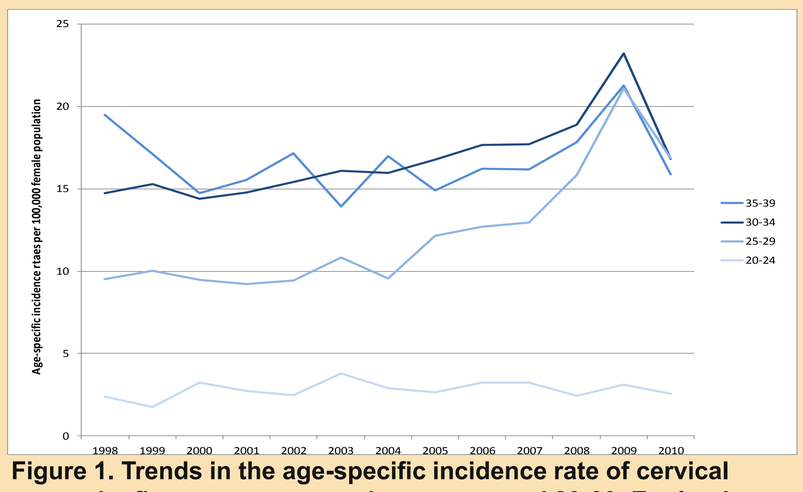

Figure 1. Trends in the age-specific incidence rate of cervical cancer by five year age group in women aged 20-39, England, 1999 to 2010

The incidence of cervical cancer has been increasing in women aged under 40 since the early 2000s (Figure 1). There have been several explanations for this rising trend, including; a downward trend in cervical screening coverage in women of this age [1] and generational changes in sexual activity resulting in a greater risk of infection with HPV and other sexually transmitted disease [2]. This analysis investigates whether immigration may also be causing an increase in incidence in women of working age, as anecdotal evidence suggests there may be increasing numbers of women of Eastern European origin being treated for cervical cancer in England.

Since around 2006, citizens of the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia, plus Cyprus and Malta have been able to work freely in the UK since these Accession countries joined the EU in 2004. Bulgaria and Romania also joined the EU in 2007 with working restrictions due to be lifted in 2014. Annual Population Survey (APS) data shows that Poland is one of the five most common countries of birth for those taking residency in the UK population since 2006 [3].

It is thought that less effective screening programmes in the Accession countries may mean that women immigrating to the UK are at an increased risk of developing cervical cancer. Indeed, the incidence rate in Eastern Europe compared to the UK is 15 per 100,000 compared to less than 13 per 100,000 female population, respectively [4]. Of the Accession countries, rates range from 12 per 100,000 female population in Poland and Latvia to 24 per 100,000 female population in Romania [4].

Quantifying the effect that immigrant women may have on rising cervical cancer rates may help in understanding how screening services and cervical cancer treatment services can impact on the disease among this group of women.

METHODS

Two approaches were taken:

Patient Level: A dataset of patient level cervical cancer registrations was created using the NCDR 2010. This dataset included women diagnosed with cervical cancer (ICD C53) under the age of 40 in England between 1998 and 2010 (n=11,477). There is no country of origin data readily available in the cancer registration dataset so this information was created using Mosaic Origins software. This software uses the first and surname of each person in the dataset to assign a country of origin. The software was deemed suitable for this purpose as accuracy rates are in excess of 90% in identifying South Asians, 70% in identifying black Africans and people from East and South East Europe. However, lower accuracy rates are achieved with people of Nordic or French origin or those from black Caribbean background. Such techniques have been used since the 1950's in epidemiological and genetic studies to subdivide populations [5]. Once a country of origin was assigned, cases were grouped according to immigration trends and/or region of the world so that other immigrant groups that could be effecting cervical cancer incidence rates could be identified.

Ecological: A dataset of Local Authority (LA) (n=324) level data was created using a variety of different variables associated with cervical cancer incidence. These variables were then modelled to quantify the explanatory relationship to the change in the incidence rates between 2004-2006 and 2008-2010. Incidence rates were calculated using the most recently published LA population figures based on the Census 2011 re-estimation of populations from 2001 to 2011. The *regress* command in STATA was used to fit a model of these variables onto the change in incidence rates using linear regression. The model was also tested for interactions between these variables. The variables were:

- % of population that are Accession country born [6]
- % of population that are of Asian ethnicity [7] - Asian communities are a lower risk group [8]
- % increase in screening coverage trends between 2007-2008 and 2009-2010 to account for increasing incidence due to the 'Jade Goody Effect'
- Teenage pregnancy and STI rates [9] - both indicators of sexual behavior that increase exposure to HPV
- Quintile of Deprivation, Income Domain of the 2010 Index of Multiple Deprivation [10] - associated with poorer coverage rates and increased risk
- Government Office Region

RESULTS

Patient Level: (Results presented in Figure 2)

- In Accession country women the number of cases remained below 10 per year until around 2005, after which cases rose sharply. In 2010, 5% of all cervical cancer cases were in Accession born women.
- Cervical cancer cases among women whose country of origin is 'India & Pakistan' are consistently low across the time period analysed. Cases are also low in the 'African New Commonwealth' group.
- There was some variation in the number of cases in the 'Other EU' group with the number increasing in recent years to around the same level as in the 1998. In 2010, these cases account for 4%.
- There was also some variation in the number of cases in the 'Other' group, increasing to 5% of all cervical cancers in 2010.
- The spike in cases in 2009 and subsequent fall in 2010 are evident in 'UK & Ireland' and 'Other EU' groups. This pattern, a result of the 'Jade Goody' effect on cervical screening, is not seen in the 'Accession' country group, or the 'Other' group.

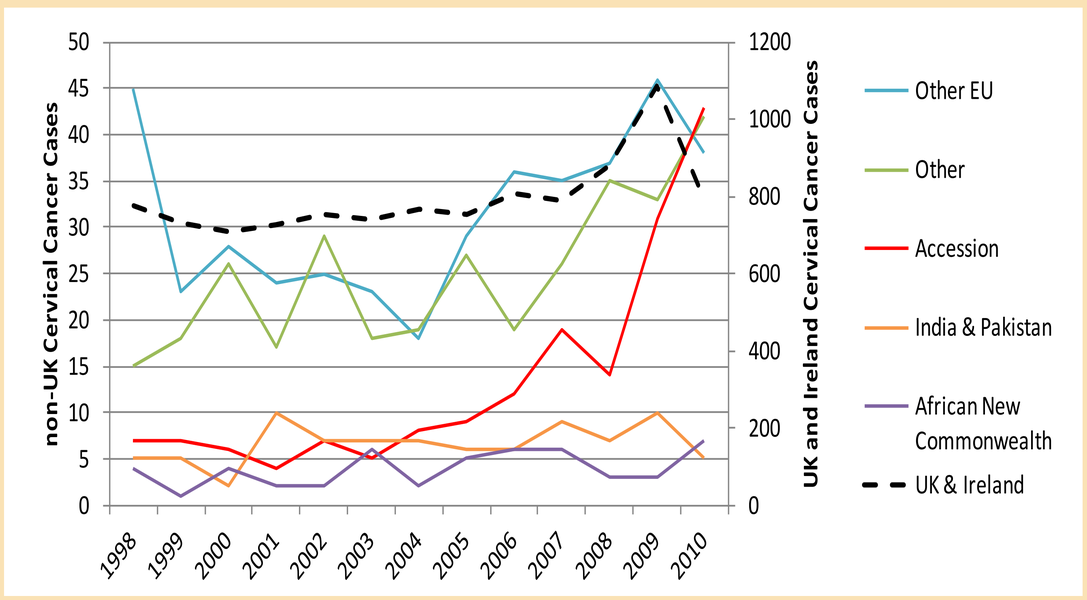

Figure 2. Number of cervical cancers by country of origin group, England 1998 to 2010

Ecological:

For the statistical model including all English LAs, although the group with the highest proportion of Accession born population (4%-11%, n=21) had a higher average change in the cervical cancer rate than the lowest proportion of Accession born population (<1.33%, n=162), this result was not statistically significant. However, when the 32 LAs in the London region were removed from the model, this result was statistically significant (p=0.02). These model results are presented in Figure 3. The model excluding London suggests that, on comparing the cervical cancer incidence rates between 2004-06 and 2008-10, there was a rate difference of 6.5 (per 100,000 female population) between those LAs with a high versus below average proportion of Accession born population.

The region results in the model also indicate a significantly higher increase in the incidence rate in both the North East and North West, after adjusting for all other factors. This may warrant further investigation.

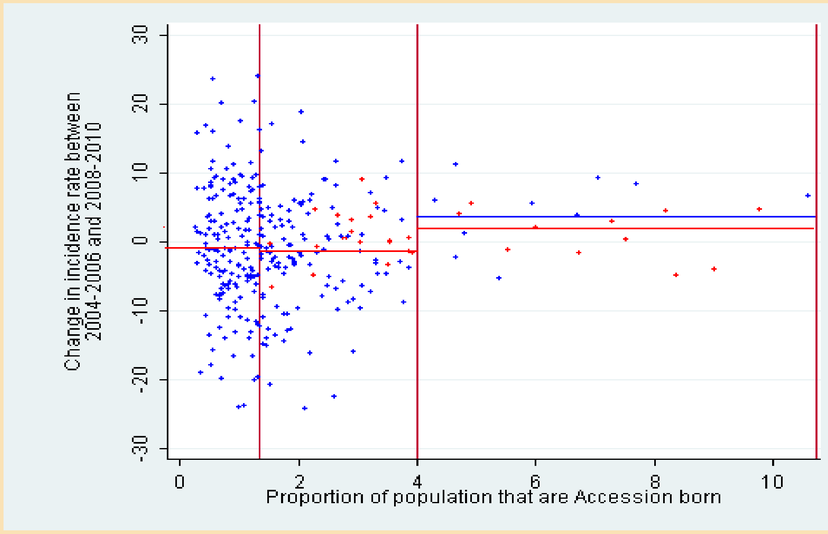

Figure 3. Scatter plot of the proportion of the LA population that are Accession born against the change in age-standardised incidence rate between 2004-2006 and 2008-2010

Figure 3 shows the scatter of all English LAs according to the proportion of their LA population that are Accession born against the change in incidence rate. The red dots are the values for the London LAs, and the blue dots for the rest of England. The two vertical lines indicate the three Accession population groups used in the analyses. The red horizontal lines represent the average change in rates for the three Accession groups resulting from the model with London included. The blue horizontal line represents the model result with London excluded, virtually the same for the first two Accession groups.

DISCUSSION

Caution should be taken when interpreting these results for several reasons:

- The use of the Mosaics Origins software in attributing country of origin is not exact and therefore the number of cases in each group may be under or over estimated.
- Although country of origin may be somewhat accurate for Eastern European women, it still does not tell us when the patient entered the UK and therefore how much of an effect poorer screening programmes in the country of origin may have had on increasing risk of developing cervical cancer.
- The ecological study only shows significant results when LAs in London are removed from the model. This means that the effect of immigration on increasing cervical cancer rates can only be posited for LAs elsewhere in England.
- Immigration may only be a small factor in increasing incidence rates. Screening coverage is decreasing in young English women and the number of cases has steadily increased since the late1990s.
- Although trends are increasing in immigrant populations, rates may not be increasing to any greater degree than in the general population.

There are also several interesting results that are consistent with other research and information:

- Low numbers in women from 'India & Pakistan' are consistent with research that posits a lower risk of cervical cancer in these groups [8].
- The increasing trends in cases in women from 'Accession' countries reflects increasing immigration figures from ONS [3]. The increasing trends do not appear to reflect the 'Jade Goody' effect seen in other populations that may be more aware of British media.
- Several studies of cervical cancer have repeated results with London areas removed from the analysis as the screening characteristics of the population are so different to elsewhere in the country [8]. Indeed, in the group of LAs with the highest proportion of Accession born population, only those LAs within the London region have decreasing incidence rates over the time period analysed.

The results suggest the need for further investigation and 'surveillance' of the effect of immigration on cervical cancer incidence rates as immigration trends change over time. Emphasis needs to be placed on understanding the characteristics of screening and treatment in these populations using linked treatment and cervical screening data.

CONCLUSIONS

Both the ecological and the patient level analysis show for the first time that increasing incidence rates may be influenced by young, female immigrants of working age from countries with poorer screening programmes or increased exposure to risk factors

Further Patient level analysis is planned to explore any differences in treatment and screening amongst groups of women using additional data sources.

ACKNOWLEDGEMENTS

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