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Original Research

How robust is the calculation of health inequality trends by educational attainment in England and Wales using the Longitudinal Study?

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ABSTRACT

Background and objectives: Inequalities in mortality by educational attainment are wider in Eastern Europe than in West and Central Europe, but have thus far been largely limited to cross-sectional analyses. This study explored the potential to use the Longitudinal Study to describe trends in mortality inequality by educational attainment in England and Wales from 1971 to 2009 and the limitations in the available data.

Study design: Comparison of cohort studies.

Methods: Data from the Office for National Statistics Longitudinal Study were used which takes a sample of respondees from each Census (1971–2001) and links them to death certification. Age-standardized mortality was calculated by educational attainment for those aged 25–69 years as was the Relative Index of Inequality and Slope Index of Inequality for men and women for each time period.

Results: Overall mortality declined in all categories of educational attainment for men and women from 1971. Limited data were collected on educational attainment in the Censuses prior to 2001, combined with the high proportion of respondents with missing data or reporting ‘no education’, meant that estimates of inequalities for the period 1971 to 2000 were very imprecise and likely to be misleading. For 2001–2009, the slope index of inequality was 268 (95% CI 57–478) and relative index of inequality was 0.61 (95% CI 0.13–1.10) for the total population; 354 (95% CI 72–636) and 0.67 (95% CI 0.14–1.21) respectively for men; and 231 (95% CI 72–389) and 0.66 (95% CI 0.21–1.11) respectively for women.

Conclusions: Limited educational data in the Censuses prior to 2001 makes calculation of mortality inequalities by educational attainment in England and Wales imprecise and potentially misleading. International comparisons and time trend analyses using these data prior to 2001 should be done with great caution.

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Introduction

Health inequalities across the social scale within countries represent one of the most important public health problems of the current era. By definition, health inequalities (more precisely defined as health inequities¹) are unfair and result in substantial unnecessary mortality and morbidity.²

Numerous reviews of the evidence are available that detail the policy and practice actions which are most likely to be effective at reducing health inequalities.^{3–8} Where the balance of the policy direction has been in concert with these recent recommendations, in particular where income inequalities have declined, there is some evidence to suggest that health inequalities have declined.^{9–11}

Trend data on health inequalities are required to monitor progress (or lack thereof) in reducing health inequalities, and also help understand the policy contexts between countries which are more or less conducive to a reduction.^{11,12} There are numerous markers of social position which can be used in descriptions of health inequalities, but the measures most commonly available in the UK (area deprivation, occupational grade and social class) are not widely used elsewhere, which limits the ability to compare trends internationally. Educational attainment has however been used widely in continental Europe to measure health inequalities,^{13,14} and there is a need to use available data to the maximum to facilitate comparisons between countries and over time. To date, data have been published on educational health inequalities in the UK for the period 1991–2000¹⁴ and 2000–2006¹⁴ for England and Wales, and 1991–1999¹⁵ and 2001–2006 for Scotland.¹⁴

This study explored the potential to use the Longitudinal Study to describe trends in mortality inequality by educational attainment in England and Wales from 1971 to 2009 and the limitations in the available data.

Methods

Data

The data used in this study were drawn from the Office for National Statistics (ONS) Longitudinal Study (LS) which is described in detail elsewhere.¹⁶ Briefly, it is a 1% sample of people in England and Wales based on completed census forms and linked to vital registration systems. The original LS sample was taken from the 1971 census for people born on one of four annual dates. Information on these individuals was then updated in 1981, 1991 and 2001. Throughout this time people with one of these four dates of birth could enter into the LS either at the time of the next census or by registering with the National Health Service (NHS) between census years. Individuals stayed within the study population as long as they could be identified in subsequent census rounds, although their data on educational attainment was updated at each census. Similarly, people could leave the study if they emigrated or if they died. Participants in the LS were linked to mortality records by the ONS.

These linked data for LS participants for 1971, 1981, 1991 and 2001 were used to calculate the number of deaths by five

year age group by the highest level of education recorded and age on the date of the census. Births, deaths, emigrations and immigrations from the study were then taken into account between census years to create four time periods from 1971 to 1980, 1981–1990, 1991–2000 and 2001–2009. The number of person years at risk was calculated for study members within each time period using the census date, dates of death and dates of embarkation from the LS. Each study member could therefore attain a maximum number of 10 years 'at risk' within each group during each of the 1971–1980, 1981–1990 and 1991–2000 time periods and a maximum of nine years in 2001–2009. It is likely that the same individuals were allocated to different educational attainment categories during the different time periods because of the ways in which the question was asked at different census rounds.

Educational attainment was categorized using the following International Standard Classification of Education 1997 (ISCED) levels: two (education at lower secondary level), three (education at upper secondary level), four (education at postsecondary level, i.e. predegree foundation courses or short vocational programmes), five (education equivalent to university programmes or technical or occupational skills for direct entry into the labour market), and six (advanced research programmes equivalent to PhD programmes).¹⁷ Study participants with missing education data were excluded from the analyses. The authors did not use the educational attainment from subsequent censuses to reduce the quantity of missing data for individuals because that level of education may not have been obtained at the earlier period and would have led to substantial misclassification. The age of the population included was restricted to the population aged 25–69 years to reduce misclassification of educational attainment due to the higher proportion of under 25 year olds still within the educational system. A sensitivity analysis was performed to include a wider age range (20–69 years) although to maintain consistency this range was restricted to the age of the respondents being asked questions on education across all censuses (i.e. data could not be included for those aged 70 years or more). Study members with age, date of birth or date of death discrepancies between census years were excluded from the analysis.

Analysis

European age standardized mortality rates were calculated by ISCED level in each time period for adults aged 25–69 years and then separately for men and women. A sensitivity analysis was performed for an extended age range (20–69 years). The appropriate ISCED level was assigned for each time period using the education level recorded in the corresponding census.

Mortality rates were calculated using the (1976) European standard population and direct standardization. The slope index of inequality (SII) was calculated using linear regression for each time period (a means of assessing the absolute inequality across educational categories which takes account of the proportion of the population in each group; where the SII value represents the difference in age-standardized mortality between the notional top and bottom of the educational scale) and the relative index of inequality (RII) was calculated by dividing the SII by the population mean (as a means of assessing relative inequality; where zero represents complete

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