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The combined impact of rural residence and socio-economic status on premature mortality

Natalia R. Jones *, Iain R. Lake

School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK

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ABSTRACT

The health of rural and urban populations differs, with rural areas appearing healthier. However, it is unknown whether the benefit of living in rural areas is felt by individuals in all levels of deprivation, or whether some suffer a disadvantage of rural residence. For England and Wales 2001–2003 premature mortality rates were calculated, subdivided by individual deprivation and gender, for areas with differing rurality characteristics. Premature mortality data (age 50-retirement) and a measure of the individual's deprivation (National Statistics Socio-economic Classification 1–7) was obtained from death certificates. Overall premature mortality was examined as well as premature mortality subdivided by major cause. Male premature mortality rates (age 50–64) fell with increasing rurality for individuals in all socio-economic status classifications. The most deprived individuals benefitted most from residence in increasingly rural areas. Similar trends were observed when premature mortality was subdivided by the major causes of death. Female premature mortality rates (age 50–59) demonstrated similar trends but the differences between urban and rural areas were less marked.

1. Introduction

There is widespread evidence that the worst health in developed nations is concentrated in socially deprived parts of cities and that rural populations, in comparison, appear to be relatively healthy (e.g., Netherlands; Van Hooijdonk et al., 2008, US; House et al., 2000, Spain; Reher, 2001). In England, male life expectancy at birth in 2007–2009 was 79.4 years in the most rural local authorities compared to 77.5 years in the most urban local authorities (DEFRA, 2011a). In women the difference between rural and urban areas was less, with a life expectancy of 83.1 years in rural areas compared to 82.0 years in urban areas (DEFRA, 2011a). Similar findings have been reported for other parts of the UK (Wales; Wales Centre for Health, 2008, Scotland; Scottish Public Health Observatory, 2011, Northern Ireland; Rodgers and Stewart, 2011).

One major reason for these urban–rural differences is that individuals living in rural areas tend to be less deprived than urban residents (Senior et al., 2000; Sloggett and Joshi, 1998) and it is widely known that that less deprived individuals enjoy better health (Acheson, 1997; Marmot, 2011). In addition to these socio-economic explanations, rural populations may experience superior air quality, lower stress and reduced fear of crime (O'Reilly et al., 2007). Social networks might be stronger in rural areas and there may be lower levels of drug and alcohol abuse, although a counter argument is that these issues are more hidden in a rural setting (O'Reilly et al., 2007). Rural general practices may also provide better care due to, amongst other things, the lower turnover of residents in rural areas compared with some urban areas (Wright et al., 2006).

However, there are a number of other factors that may disadvantage health in rural areas. One particular problem could be difficulties in accessing healthcare facilities such as hospitals and GPs, and previous studies have provided evidence of rural disadvantage in terms of health care uptake, treatment received and final outcome (Bentham and Haynes, 1985; Lake et al., 2011; Jones et al., 2008a, 2008b). Other issues that may affect the health of those living in rural areas include poor employment opportunities and lack of affordable housing (Barnett et al., 2001). It seems likely that these issues will be felt most by more deprived individuals as, for example, in England, over 25% of low paid individuals (often more deprived) do not have access to a car in remote rural areas (Commission for Rural Communities, 2006) potential limiting access to health care. Rural poverty is an important issue as around one in six pensioners and nearly one in four children live in rural poverty in the UK (DEFRA, 2011b; CRC, 2011).

So the key question to be addressed by this paper is whether the overall benefit of rural residence is felt by all individuals or whether certain individuals, most likely deprived individuals, experience an overall disadvantage from rural residence.

The hypothesis that for those individuals who are more deprived there may be an overall negative effect of rural residence has so far proved difficult to test, because most studies are based on aggregate or ecological data. These rely on averages calculated for populations in small areas, such as census output areas, rather than individual

* Corresponding author. Tel.: +44 1603 592559; fax: +44 1603 591327.
E-mail address: n.jones@uea.ac.uk (N.R. Jones).

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data. In urban areas, large tracts of similar housing ensure that such areas are more homogeneous in terms of the social characteristics of their residents. This is not the case in rural parts of England and Wales, where rich and poor live interspersed. Therefore, considerable social and economic diversity is hidden by average values. Research has concluded that ecological studies in rural areas are unable to reveal the effects of social disadvantage which may only be felt by a minority of individuals within a particular area (Haynes and Gale, 2000). A recent ecological study investigating urban–rural differences in mortality found that most of the variation between mortality in rural and urban areas can be accounted for by deprivation (Gartner et al., 2011). However, this study used an area based measure of mortality and, as the authors acknowledge, this did not allow them to examine the impacts of deprivation at the individual level.

At the individual level deprivation can be measured by socio-economic status. Currently the National Statistics socio-economic classification (NS-SEC) is the primary socio-economic status classification used in the UK. This is based on occupation, incorporating both employment relations and conditions of occupation (ONS, 2010). NS-SEC has seven occupation categories, plus an eighth category for those who have never worked or are long time unemployed. These are presented in Table 1.

In this paper we examined whether individuals from more deprived backgrounds, measured using NS-SEC, are additionally disadvantaged in terms of health outcomes by residence in rural locations. Using two measures of rurality—the commonly used urban–rural classification (Bibby and Shepherd, 2001) and travel time to nearest large hospital—we investigated whether the benefits of rural residence are distributed evenly across different classes of NS-SEC. All-cause mortality for premature death, provides an objective and unambiguous outcome. We examined whether the often-reported lower mortality in rural compared with urban areas is the same for individuals in each of the categories of the NS-SEC. The hypothesis tested was:

> More deprived individuals (highest NS-SEC number) who live in rural areas have higher premature mortality rates than similar people living in urban areas

In addition to examining all-cause mortality for premature death, we also examined mortality from the major causes of premature death. This is because if factors such as limited healthcare accessibility are leading to elevated mortality for deprived individuals in rural areas, then we might see a stronger effect for causes that require regular access to healthcare as opposed to those that do not (e.g., cancer vs. heart disease).

2. Methods

To link individual mortality data to measures of rurality for individuals' homes, the first stage of the analysis involved dividing England and Wales into a number of areas with varying rurality. Across these areas individual mortality, categorised by socio-economic status (NS-SEC), could be compared. Rurality was assessed at the level of the Lower Super Output Area (LSOA) for a number of reasons. Firstly these areas are relatively small with an average population of 1500 residents (ONS, 2011) and were also designed to have a compact shape. Within such areas there are unlikely to be large differences in the rural characteristics of the area. Therefore it is reasonable to assume that most individuals living within an LSOA have similar rurality characteristics. LSOA's were also chosen because a number of measures of rurality already exist for these areas.

Two measures of the level of rurality in each area were chosen. The first measure “urban–rural” was the commonly used urban–rural classification (Bibby and Shepherd, 2001) which divides LSOAs into one of three categories: Urban; Town and Fringe; and Village, Hamlet and Isolated Dwellings. This was obtained from the Office for National Statistics (ONS, 2009).

The second “access to hospital” was designed to capture accessibility to wider healthcare facilities, and the road travel time was calculated from each LSOA to the nearest large general hospital. Specifically, from the Hospital Estates and Facilities Statistics (NHS Information Centre, 2009) we obtained a list of all NHS hospitals in 2002 and the number of beds in each hospital. From this list we selected all general acute and multi-service hospitals, which were not specialist mental health hospitals and which had 300 or more beds, resulting in 209 hospitals. Based on their postcodes, the hospitals were geocoded. Using a digital road network we calculated the road travel time from the population weighted centre of each LSOA to its nearest hospital in a GIS (ArcGIS 9.2). Access to hospital was expressed in octiles.

A third measure “access to GP”, designed to capture accessibility to local healthcare facilities, was also calculated. However, as the findings were comparable with the two other measures the results are not presented here.

Table 2 shows the two different rurality measures and the categorisation of these into more urban and more rural areas. Within both measures of rurality the number of categories was chosen to provide the maximum differentiation in rurality while at the same time ensuring that problems of disclosure were avoided.

The Office for National Statistics (ONS) collates mortality data based on death certificates collected by the General Register Office. For each individual death the cause, sex, age of the deceased and where they lived is recorded. A measure of socio-economic status (NS-SEC), is also available. This analysis focused upon mortality for the years 2001–2003 in England and Wales, because NS-SEC has only been recorded on death certificates since 2001 and 2001–2003 is close in time to the 2001 census which was used to supply denominator data. A three year time period was chosen to reduce the variability around the mortality rates calculated. The study also focused upon premature mortality defined as deaths from age 50 to retirement (males 50–64 and females aged 50–59), which was

Table 1
NS-SEC and total premature mortality (aged 50 to retirement).

NS-SEC group	Number of deaths	Death rate per 100,000
(1) Higher managerial and professional occupations	9971	1402.73
(2) Lower managerial and professional occupations	21,186	1350.55
(3) Intermediate occupations (clerical, sales, service)	9905	1448.18
(4) Small employers and own account workers	17,008	1910.52
(5) Lower supervisory and technical occupations	16,990	2642.40
(6) Semi-routine occupations	19,943	1990.30
(7) Routine occupations	27,166	3131.98
(8) Never worked, long-term unemployed, students, and not classified[a]		

[a] Excluded from the analysis. See text for further details.