UPDATE -

News from the LS User Group

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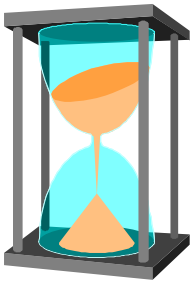
This newsletter is designed to provide information on the ONS Longitudinal Study (LS) and a forum for the exchange of users' views and comments. It is produced by the LS User Support Programme at the Social Statistics Research Unit (SSRU), City University. All comments and contributions should be sent to Rosemary Creeser, LS User Support Programme, SSRU, City University, Northampton Square, London EC1V 0AR (tel: 0171 477 8487 email: rc@ssru.city.ac.uk) Contributions on IBM-formatted floppy disk are always welcome and should be sent, clearly documented (file name, word-processing package and version used) along with a hard copy of the text.

1 Diary



This section highlights forthcoming events of interest to LS Users.

If you are arranging an event and wish to publicise it in future issues of *Update* you should send details to Dina Maher, the LS Administrative Secretary at SSRU.

LS workshop

SSRU hold regular 2-day workshops. These provide information on the study and enable researchers to gain practical hands-on experience of accessing the data.

They are also an ideal opportunity to meet members of the LS Support Team and to discuss the suitability of the LS for exploring specific research questions. The next LS Workshop will be held on Monday 6th October/Tuesday 7th October 1997. It is strongly recommended that researchers with a specific LS project in mind attend.

As part of the hands-on element of the workshop participants are able to specify a statistical analysis of their choice using a small sub-set of variables and a test data-set based on 1% of the LS data. The number of places is limited to ensure that participants get sufficient individual attention and hands-on experience. A non-refundable fee of £50 (or £20 for students) is charged to cover documentation, lunch, refreshments and administrative costs. To reserve a place contact Dina Maher immediately on 0171 477 8486 (EMAIL: dm@ssru.city.ac.uk).

2 LS User Group meeting on "Health Variations"

On Thursday 27th February over seventy individuals from academia, the voluntary sector and the NHS attended a meeting on "Health Variations", supported by the ESRC Health Variations Programme and ONS. Participants heard presentations of ongoing analyses and recently completed LS work, some of the main points of which are summarised below. The LS research article on pages 16 to 23 reports one of the speakers findings on socio-economic variation in health outcomes among older people.

Introduction to health data in the LS: Seeromanie Harding. LS Unit, ONS and Rosemary Creeser, LS Support Programme, SSRU

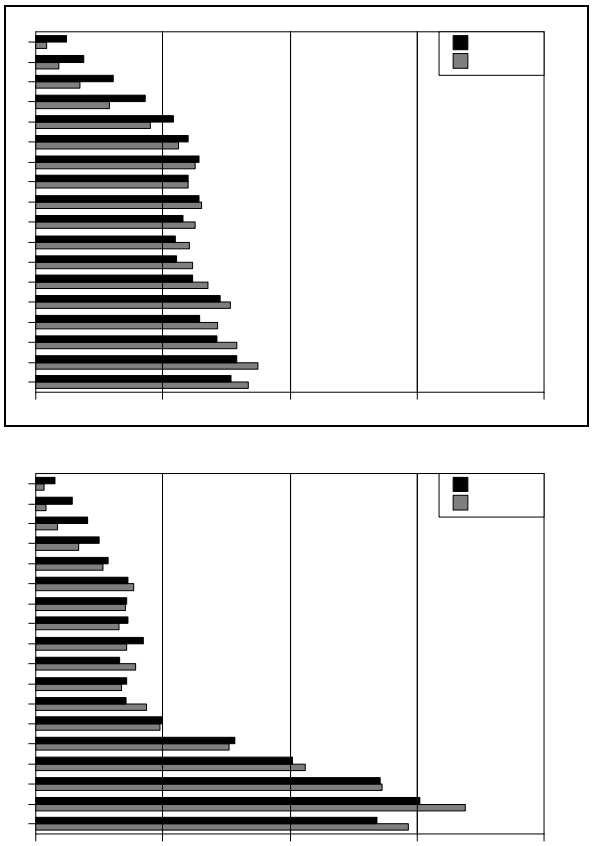
LS health data are currently being used by the LS Team at ONS for a number of "in-house" projects. These include analyses of social class trends in mortality which will be published in the decennial volume on socio-economic trends in health, and ongoing work on socio-economic differences in cancer incidence and survival.

Linked mortality data are also being used to explore patterns of mortality among the Irish - England and Wales' largest migrant group (see Harding and Balarajan, 1996[1]). The LS is ideal for researching the health of second generation Irish as it includes information on parents' country of birth, for each LS member present at the 1971 Census. However, while it is possible to identify parents born in the Republic, those born in Northern Ireland cannot be identified as the census coded them as born in the UK.

[1] Harding S and Balarajan R (1996) "Patterns of mortality in second generation Irish living in England and Wales: longitudinal study", *British Medical Journal* , **312**, pp 1389-1392

Figure 1 compares the population distributions of the second generation Irish (second graphic) with all LS members (first graphic). This shows that they are predominantly a young group. Among those aged 15 and over, 60 per cent of second generation Irish were aged 15-44 compared to 50 per cent of all LS members.

Figure 1: Population distributions of second generation Irish and all LS members



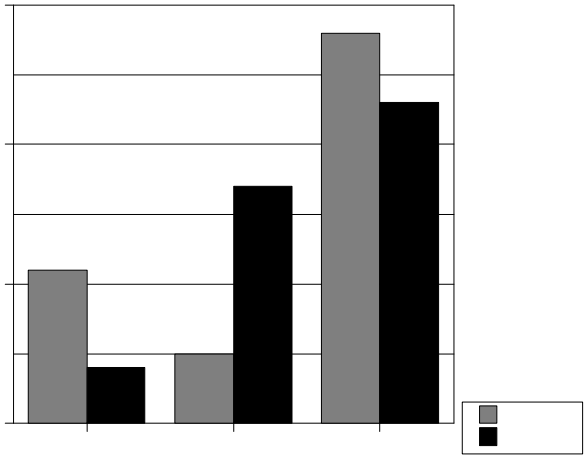
The mortality experiences of the second generation Irish are summarised in figure 2, by whether one or both parents were born in Ireland. Compared with the male LS population, Irish men with both Irish-born parents were 28 per cent more likely to die. Among the comparable group of Irish women, mortality was raised by 23 per cent. However, a test of the difference between the standardised mortality ratios for those with both Irish-born parents and those with only one was not statistically significant.

Following Harding and Balarajan's 1996 publication a conference was held jointly by the Federation of Irish Societies and the King's Fund, focusing on the Health of the Irish in England and Wales. Table 1 shows the updated findings presented at the conference.

Mortality of the second generation Irish in the period 1971-1992 is adjusted for various measures of socio-economic status. The standardised mortality ratios (SMRs) adjusted both for social class and for tenure and car access show little or no improvement over those which are only adjusted for age.

The raised mortality of the second generation Irish is very similar to the patterns reported for the first generation Irish. Many factors could be contributing towards this. Migration is associated with economic and social upheaval, the breakdown of family ties and adjustment to a new environment. These factors may continue to influence the health of second generation migrants. Lifestyle factors, such as diet, smoking and drinking are also likely to play a significant role. The research clearly highlights that special consideration should be given to the health needs of this growing group.

Figure 2: Mortality of second generation Irish by whether mother, father or both parents born in Ireland, 1971-89



Source: Harding and Balarajan (1996)

Table 1: Mortality of second generation Irish, 1971-92, adjusted for socio-economic status		
SMRs adjusted for:	**Males**	**Females**
age, follow-up	124*	126*
age, follow-up, social class	129*	134*
age, follow-up, car access, housing tenure	122*	126*
*95% confidence intervals exclude 100		
Federation of Irish Societies and King's Fund (forthcoming) *Conference proceedings on "The Health of the Irish in England and Wales"*		

The 1991 Census question on limiting long term illness

Data from the 1991 Census question on limiting long term illness (LLTI) are available for analysis, not only for LS members enumerated at the 1991 Census (approximately 500,000 individuals) but each member of the household in which they were living.

They offer considerable scope both for analysing the relationship between earlier census characteristics and LLTI, and the association between ill-health and the incidence of subsequent events (live births, still-births, cancers, deaths).

Reliability and validity

With a new indicator of health status such as this it is necessary to establish that it is both *reliable* and *valid*. Under constant conditions do repeat measures to the question yield the same results and is the question successful in measuring what it set out to measure ?

Results from the 1991 Census Validation Survey (CVS) confirm that there was a great amount of agreement between the answer given at census to this question and that recorded in the CVS interview (Smith, 1995). There is also evidence to show that positive responses to the question are associated with poor physical and mental health. A good example is a methodological study carried out in South-east of Scotland, summarised by Cohen et al (1995). A sample of approximately 6,200 individuals living in the Lothian region completed a postal questionnaire which included the limiting long-term illness question, a check-list of "illness and problems" experienced in the past year and the SF36 health survey - an instrument which has previously been shown to be reliable and valid.

Results from this research show that there is a strong association between limiting long term illness and the SF36 measures of general and physical health (see table 2). The odds of reporting a LLTI for those in the lower quartile of the "general health perception" and "physical functioning" scales are more than twice those in the upper quartile.

Table 2: Effects of age, sex and four scales from the SF36 health survey on the chance of having a limiting long term illness

Values are estimated odds ratios (95% confidence interval) from logistic regression model

General health perception - lower quartile (57) *v* upper quartile (87)	3.4 (2.9 to 3.9)
Physical functioning - lower quartile (75) *v* upper quartile (95)	2.3 (2.1 to 2.5)
Physical role limitation - lower quartile (49) *v* upper quartile (100)	1.6 (1.4 to 1.8)
Bodily pain - lower quartile (61) *v* upper quartile (100)	1.7 (1.5 to 2.0)
Age:	
45-64 *v* 16-44	1.8 (1.4 to 2.4)
65+ *v* 16-44	2.7 (2.1 to 3.6)
Sex (male *v* female)	1.8 (1.5 to 2.1)
Cohen et al (1995) "Interpreting self reported limiting long term illness", *BMJ*, **311**, pp 722-4	

The study also shows that the reported prevalence of many common illnesses such as arthritis, lower back pain and chronic bronchitis were between two and three times higher among those with limiting long-term illness (see table 3).

Table 3: Numbers (percentages) of respondents reporting specific illnesses in past year by presence or absence of limiting long term illness				
Illness	**Age 16-64 years**		**Age 65 years +**	
	With LLTI n=614	**Without LLTI n=2197**	**With LLTI n=1676**	**Without LLTI n=1382**
Arthritis/painful joints	332 (54)	417 (19)	1056 (63)	525 (38)
Low back pain/sciatica	301 (49)	517 (24)	687 (41)	332 (24)
Eyesight problems	258 (42)	527 (24)	855 (51)	415 (30)
Stomach or digestive problems	221 (36)	417 (19)	570 (34)	276 (20)
Foot problems	141 (23)	264 (12)	637 (38)	263 (19)
Hearing problems	135 (22)	220 (10)	687 (41)	359 (26)
Kidney or bladder problems	98 (16)	110 (5)	369 (22)	124 (9)
Asthma or chronic bronchitis	111 (18)	132 (6)	318 (19)	69 (5)
High blood pressure	117 (19)	132 (6)	486 (29)	263 (19)
Heart disease/angina	86 (14)	22 (1)	486 (29)	97 (7)
Diabetes	43 (7)	22 (1)	134 (8)	28 (2)
Depression	221 (36)	352 (16)	369 (22)	111 (8)
Cohen et al (1995) "Interpreting self reported limiting long term illness", *BMJ*, *311*, pp 722-4				

The influence of migration in small area studies of environment and health - migration during pregnancy: Helen Dolk, London School of Hygiene and Tropical Medicine

This presentation reported work that has been carried out jointly with colleagues at London School of Hygiene Environmental Epidemiology Unit (Paul Wilkinson and Ben Armstrong) and Simon Gleave at SSRU. The researchers hope to answer three broad questions:

- What proportion of women migrate (move house) during their pregnancy ?
- How far do the migrants move ?
- What are the characteristics of the migrants ?

Methods

The sub-group chosen for this work is female LS members who gave birth in the year immediately before and after the 1991 Census. Only women with a valid postcode at census and birth registration were chosen, as both items were necessary to calculate the distance moved between census and birth. Moves

before and after birth were aggregated into 3-month age groups - eg for moves *before* birth, the categories include moves in the last three months of pregnancy (0-3 months), in the last six months (4-6 months), moves made in the entire pregnancy (7-9 months) and in the three months before conception.

Results

Table 4 shows the distribution of moves in the 1 year period before and after birth, by three-monthly age-group. Validation work carried out as part of this project uncovered an anomaly between the number of recorded moves. According to the analysis of postcode pairs, 25 per cent of infants aged 10-12 months at the 1991 Census had moved since birth. On the other hand, results for the one-year migration question asked as part of the census suggest that the proportion is substantially less (17 per cent). There are several, possible explanations for this. Some births may have been registered at another address - eg the grandmother or partner's address. It is also known that young babies are not well recorded by the census.

Table 4: Distribution of moves in the year before and after birth

Moves before birth (n=6707)	**Total births**	**%**	**difference**
Last 3 months of pregnancy (0-3 months)	1752	13.1	
Last 6 months of pregnancy (4-6 months)	1711	19.2	6.1
Entire pregnancy (7-9 months)	1623	23.1	3.9
From 3 months before conception	1621	26.8	3.7
Moves after birth (n=6678)			
First 3 months of life	1529	11.8	
First 6 months	1676	16.7	5.0
First 9 months	1751	20.5	3.7
First year	1722	25.0	4.6

Figures 3 and 4 summarise the distances moved before and after birth, by three monthly age group. Long distance moves (20km+) were most likely to take place in the three month period before conception. The pattern for short distance moves is quite the opposite: the number of this type of move increased from just over 40% in the 3 month period before conception to just under 60% in the three month period immediately before birth.

In the forthcoming months the researchers aim to investigate the effects of the following individual and ward-level characteristics:

- Individual characteristics: single mother, age of mother, parity, social class of head of household, housing tenure, employment and ethnicity

- Ward-level characteristics: region, deprivation quintile and urban/rural status.

Figure 3: Distance moved before birth

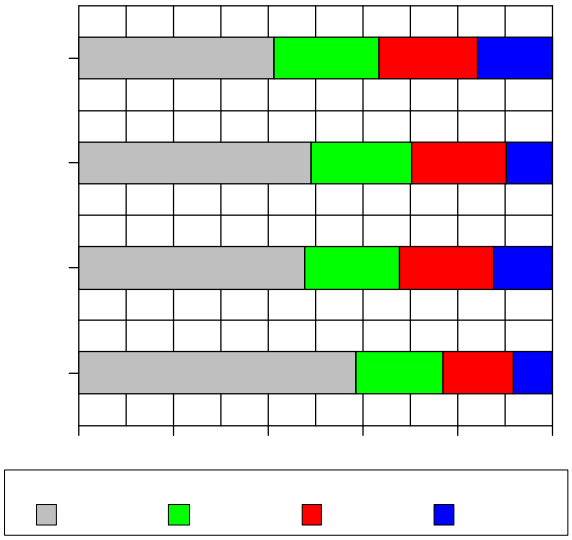
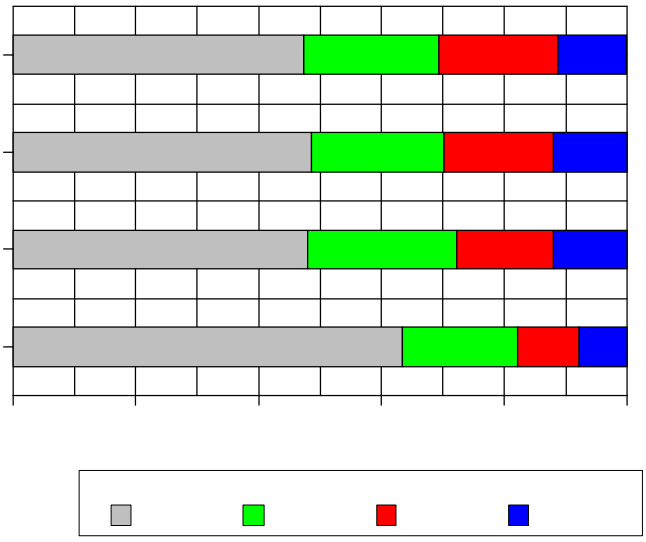


Figure 4: distance moved after birth



Policy implications

These results have implications for the provision of antenatal and postnatal services. They highlight the potential problem of following up mothers throughout pregnancy and in early infancy. Women who move during pregnancy may be at greater risk of experiencing an adverse birth outcome, such as a low birthweight baby, due to their increased exposure to environmental toxins during redecoration or recarpeting and the higher levels of stress and loneliness.

Investigating variations in suicide: Andy Sloggett, London School of Hygiene and Tropical Medicine

This presentation considered some of the problems that be may be experienced when specifying data in the form of large machine-readable tables - one of the four ways in which LS data are currently supplied. Andy used examples from two LS projects which have investigated the socio-demographic factors associated with suicide.

Table 5 illustrates how easy it is to exceed the maximum number of allowable cells (250,000 cells for tables covering two censuses and 1,000,000 for all three censuses), even if the number of variables is restricted to seven (see 1). A simple solution is to aggregate the categories of one or more of the variables. In this example," year of death" (potentially a 20-category variable) is replaced by "time of death" (a variable with three only categories) which treats the time (year) when the death occurred as one of three discrete "chunks" (1971-1976, 1977-1983, 1984-1990).

Table 5: Reducing the maximum number of allowable cells

Variable	Number of categories		Number of categories
Age	20	Age	20
Year of death	20	Time of death	3
Economic activity	5	Economic activity	5
Social class	6	Social class	6
Region	14	Region	14
Sex	2	Sex	2
Deprivation score	9	Deprivation score	9
Maximum number of cells (1)	3,024,000	Maximum number of cells (2)	453,600

The restriction on table sizes does mean that it is not really feasible to extract continuous variables, such as exact time of death, as they leave little room for other covariates. So in place of a Cox survival model it is more practical to use logistic models measuring probabilities of survival across defined time intervals. For very small intervals this model equates to a Cox model, and is usually perfectly adequate even for quite wide time intervals. It is also easier to change the values of time varying covariates when data are set up for the logistic format.

Data can quite easily be formatted to allow Poisson models too. This usually involves some collapsing or aggregating of the data which can be done using extracted tables, or directly on LS files - the collapsed Poisson type records then being extracted. This is an attractive option for questions which can only be answered by "person years at risk" (PYAR) analysis. An example of this would be "Are women less likely to commit suicide after they have had children?" To answer this one needs to accrue person years of pre- and post-motherhood, and the associated events. The formation of aggregated Poisson records, where there is a count of events, followed by a total number of person years of a particular type of exposure (the type given by the explanatory variables) allows this type of data to be analysed quite easily.

Table 6 summarises the results of a logistic regression model to investigate the probability of dying due to suicide in the period 1983 to 1992, according to the economic activity and housing tenure recorded at the previous two censuses (1971, 1981). Deaths in 1981 and 1982 were ignored to reduce any selection bias.

Table 6: Transitions 1971 to 1981: risk of suicide 1983-1992		
	Odds Ratio (95% Confidence Interval)	
	Men	**Women**
Economic activity		
Employed 1971 and 1981	1.00	1.00
Became employed	1.6 (0.8-3.2)	1.5 (0.5-4.0)
Became unemployed	2.2 (1.6-3.0)	3.7 (2.1-6.5)
Became sick	3.0 (1.7-5.3)	2.8 (1.1-7.0)
Became retired	2.2 (1.1-4.1)	0.8 (0.5-1.2)
Unemployed 1971 and 1981	3.6 (1.9-7.0)	N/S
Tenure		
Owner occupier 1971 and 1981	1.00	1.00
Became renter	1.00 (0.6-1.7)	1.6 (0.9-3.0)
Became owner occupier	1.1 (0.8-1.6)	1.2 (0.7-2.0)
Renter 1971 and 1981	1.2 (0.9-1.6)	1.0 (0.7-1.5)
Became communal	4.4 (2.4-8.0)	N/S
N/S = not investigated due to small numbers		

The results highlight that the risk of suicide among men who were unemployed at both censuses, women who became unemployed and men who became sick are all more than three times the risk for those in the reference group, who were in work at both of the censuses. The risk of suicide is also significantly increased for men moving into communal establishments.

Explaining the geographical polarization of life chances using the LS and other sources: Daniel Dorling, University of Bristol

Daniel Dorling reported results from a study of the changing levels of mortality in a set of local areas in England, Wales and Scotland, for the period 1950 onwards. The areas used were County Boroughs, and the urban and rural remainders of counties existing in 1951.

Figure 5: Standardized mortality ratios in Britain 1950-52 by sex

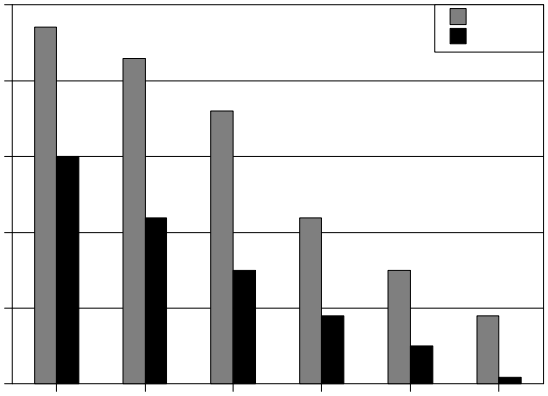
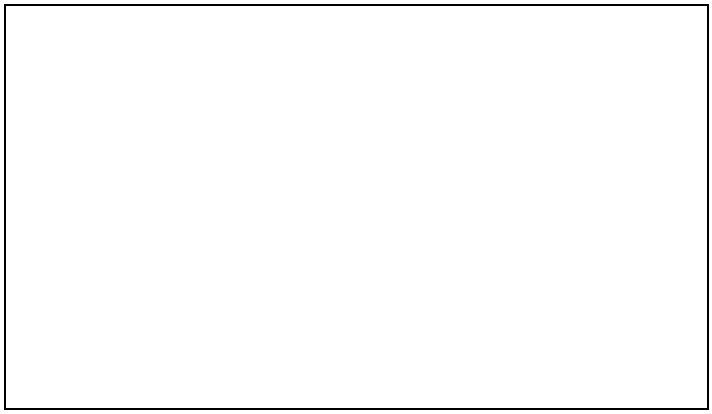


Figure 5 shows how mortality rates have fallen in the period since 1950. While this illustrates the trend for Britain as a whole, the probability of dying in a given year is still highly dependent on factors such as area of residence and employment status.

Changes over time in the relative mortality rates for six areas in England, Wales and Scotland are illustrated in figure 6.

Figure 6: Standardized mortality ratios by area



By 1992, after standardizing for age and sex, a person living in Glasgow was 66 per cent more likely to die than someone living in rural Dorset and 31 per cent more likely than a Bristol resident. At the end of the 1960s the excess probability of dying in Glasgow, compared to these two places, was much lower, at 42 per cent and 21 per cent respectively.

The places shown in figure 6 were selected to illustrate the diversity of mortality experiences in different parts of Britain. In the latest period (1990-92) the ratios in the two most extreme of the six areas can be seen to be converging slightly. However, this pattern does not appear to be happening everywhere. In the 1990s the three areas with the highest standardized mortality ratios (Oldham, Salford, Greenock) all have rates which are about a third higher than the national average. By comparison in the early fifties the mortality ratios in each of these areas were only a fifth higher than the national rate.

Inequalities by area

Another way of examining the changes which have occurred in mortality is to divide the population into ten equally sized groups. (This follows the methodology used by the Department of Health and Social Security to present data on households below average income.) These *decile groups* can be compared and the relative changes in their mortality charted over time.

Table 7 shows how the Standardized Mortality Ratios (SMRs) for each of the decile groups have changed over time. The focus is on deaths under 65 as these are mostly avoidable and mainly occur before retirement age. After correcting for differences in the population structure of each group, there appears to be a clear divergence in mortality rates.

In the most recent period (1990-92), the 10 per cent of people living in the highest mortality areas of the country have the worst recorded relative mortality rate, with an SMR of 142.3. Since 1981 the standard-ized mortality ratio of this group has risen by 7.4 percentage points, while that of the second worst decile has risen by 2.8. All other decile groups have seen their relative mortality rate fall over this period. After standardizing for age and sex, people living in the worst areas of Britain are 42.3 per cent more likely to die before age 65 than the average person. In the 1950s they were 31 per cent more likely to die than average, while those living in the best areas were 18.2 per cent better off in terms of their relative chances.

Mortality rates are now 23.8 per cent below the national average for people living in the best decile area. This illustrates that the gap between the highest and lowest mortality areas is clearly growing.

Table 7: Standardized mortality ratios for deaths at age under 65 by decile area

Population decile	1950-53	1959-63	1969-73	1981-85	1986-89	1990-92
1	131.0	135.5	131.2	135.0	139.2	142.3
2	118.1	123.0	115.6	118.6	120.9	121.4
3	112.1	116.5	112.0	114.2	113.9	111.3
4	107.0	110.7	108.1	109.8	106.9	104.9
5	102.5	104.5	103.0	102.1	102.2	99.0
6	98.6	97.4	96.9	95.7	95.6	93.5
7	93.1	90.9	91.8	91.6	91.9	90.9
8	88.7	87.6	88.9	89.3	89.1	86.5
9	85.7	83.1	87.0	84.3	83.0	80.4
10	81.8	77.1	83.0	79.2	78.1	76.2

These findings are drawn from a report on "Changing Life Chances in Britain" to be published by the Joseph Rowntree Foundation in July 1997. Researchers at Bristol are now looking at possible explanations for these geographical changes, in particular those associated with the redistribution of poverty, housing and migration during the 1980s and early 1990s.

The LS will be used as part of this study, which is funded under the ESRC Health Variations Programme, to assess the importance of selective migration in inflating levels of polarization. In-depth interviews will be undertaken with health and housing professionals in selected areas of the country, to search for possible explanations of the geographical polarization of mortality that has occurred in Britain in recent years. For further information on these aspects of the study please contact Nic Brimblecombe or Mary Shaw at the Department of Geography, University of Bristol, University Road, Bristol BS8 1SS.

Overview of LS research funded by ESRC Health Variations programme: Mel Bartley, University College London Medical School and Heather Joshi, LS Support Programme, SSRU

In this session Mel Bartley and Heather Joshi provided an overview of two LS research projects which are currently underway, funded as part of the ESRC Health Variations Programme. Details on these and other health variations research projects may be found by visiting the programme website at http://www.lancs.ac.uk/users/apsocsci/hvp.htm

Social variations in women's health: work or way of life ?

In the past the LS has been used to demonstrate the value of alternative measures of social position, such as housing tenure and car access, for understanding social variation in women's health. Recently, attention has tended to focus on social class measures such as the Cambridge scale of occupations and the schema developed by Erikson, Goldthorpe and Portocarero, which have been validated in social research.

The Cambridge scale is a continuous measure (0 to 100) of "social and material advantage". It is based upon the assumption that the major dimension of social inequality is the degree of advantage or disadvantage associated with an occupation and that social interaction on the basis of equality (friendship/marriage) tends to reflect these differentials. In this work it is used as a proxy of a "way of life".

By comparison, the Erikson-Goldthorpe-Portocarero schema defines "social class" in terms of employment conditions such as work security, career structure and the discretion that individuals have for organising their work.

This is the first project to analyse social variation in mortality and morbidity among LS women using these measures. The research team, which includes Ray Fitzpatrick and David Firth (Nuffield College, Oxford), aim to investigate the following questions:

- Are employment conditions as defined in the Erikson-Goldthorpe-Portocarero schema related to mortality in women ? *and*

- Are these different to those seen in men ?

- Are there differences in these relationships for women working full/part-time ? *and*
- If relationships are seen, are these really due to differences in "way of life" (Cambridge Scale) rather than differences in employment conditions ?

Dimensions of health over persons, time and place

This project is investigating health in terms of both social and spatial settings, combining individual level information with aggregate data describing the places where people live. The research team are using innovative statistical evidence from three large British datasets - the LS, the National Child Development Study (NCDS) and the linked Health and Lifestyle Survey (HALS).

These data will be used to explore the interplay of different levels of influence (the person, the family, the neighbourhood, the district or region) as precursors of poor health.

The project aims to answer the following questions:

- How far does the locality have an effect on its own? Do the effects of "place" apply to all inhabitants indiscriminately or depend on personal circumstances? Do they reflect the social composition of the area or other more strictly ecological features of its environment?

- In which localities is health particularly good or bad after allowing for the socio-economic characteristics of the inhabitants?

- Do the different dimensions of health have common socio-economic predictors?

- Does change, for people or places, effect the socio-economic patterns in health ?

The research team also aim to bring about important enhancements to two of the datasets. It is relevant to mention that this is the first large scale study to use multi-level modelling with the LS. The experience of using MLn with the LS should greatly benefit other researchers planning to use these statistical modelling techniques.

Preliminary findings from both of these projects will be reported in future issues of *Update*.

3 Interfaces to 2001 Census data: what do we want ?

The second in the series of ESRC/JISC workshops planning for the 2001 Census took place on 17th/18th April at the University of Manchester.

The aim of this workshop was to discuss and debate how census users can learn about, access, extract, manipulate, process and analyse data. This was a wide ranging and inspiring workshop offering both a review of current interfaces and groundwork for developing future strategies.

Prototype and existing interfaces to census data were demonstrated by academic and business information providers. The following issues were considered:

- the quality of visual, including cartographic, representation of data
- the ability to interact with data
- current and potential hardware/software performance
- improvements in on-line access to data
- future network capacity
- the confidentiality, complexity and security of data and
- the cost and registration procedures required to access data.

Sessions considering interfaces to knowledge about census data highlighted the importance of catering for a wide range in users expertise; the early availability of new metadata and the use of a wide variety of media to introduce, educate and update users. The role of the World-Wide-Web and CD-Rom and software developments to support these were recurring themes.

If you would like to receive a copy of the workshop report or have any comments on plans for interfaces to the 2001 Census please contact Phil Rees at the address on page 15.

Workshops are co-funded by ESRC award H507265031 and JISC. They are free to participants and funds are available to meet speaker expenses. If you would like to present a paper or participate in the workshops/surveys please contact Phil Rees (Director: Census Programme) or Christine Macdonald (Programme Secretary) .

The following meetings and publications are planned:

Month, Year	Activity	Subject
July-Aug-Sept 1997	Questionnaire Survey	Census Use and Views.
September 1997	**Third Workshop**	Special datasets from the 2001 Census: what do we want?
September 1997	Report on Survey	Census Use and Views: from 1991 to 2001.
October 1997	Report to ESRC/JISC	Special datasets and their dissemination.
April 1998	**Fourth Workshop**	The 2001 Census as a GIS: what do we want?
June 1998	Final Report to ESRC/JISC	A strategy for the 2001 Census.

Phil Rees, School of Geography, University of Leeds, Leeds LS2 9JT, Tel: 0113 233 3341, Fax: 0113 233 6757, email: phil@geog.leeds.ac.uk or Christine Macdonald, Tel: 0113 233 6635, Fax: 0113 233 3308, email: christin@geog.leeds.ac.uk

4 Technical issues

Downloading LS tables for spreadsheet analysis

It is now possible for us to supply LS tables in a format suitable for spreadsheet analysis. The output can be provided as a simple ASCII text file, EXCEL spreadsheet or a formatted text file (TAB delimited, CSV etc). This is achieved by re-running the mainframe tabulations procedure with most of the formatting removed (eg page headings, titles, table formatting characters) and down-loading the resulting print file for formatting by Excel.

Output from both SAS and SPSS can be exported in this way. However, SPSS only allows for an output record length of 132 characters. This can be problematic in tables with many columns as they may be "wrapped" and require more spreadsheet formatting. By comparison, SAS allows a maximum of 256 characters per output record. This will easily support 20 or more columns per table before wrapping occurs.

In most cases, where percentages were included in the original hard copy output these are dropped as they are easy to recalculate using a spreadsheet.

5 LS research

Socio-economic and demographic circumstances in middle aged and older people and subsequent health outcomes

Astrid Fletcher, Andy Sloggett, Elizabeth Breeze, Department of Epidemiology and Population Sciences, London School of Hygiene and Tropical Medicine, London WC1E 7HT

Introduction

The debate on socio-economic inequalities in health outcomes has focused mainly on premature mortality, before the age of 65 years. Less attention has been paid to older people, in part because of the difficulties of assigning socio-economic status. Other important health outcomes in older people include institutional care and chronic ill health. We used the LS to investigate the risk of people in middle age and early retirement dying, moving into institutional care or reporting a limiting long-term illness. We were also interested in whether changes in people's circumstances as they moved into retirement and through old age predicted health outcomes. Here we present the results for mortality and the risk of being in an institution.

Methods

Analyses were undertaken separately for men and women and for two age groups: those aged 55 to 64 years in 1971 and those aged 65 to 74 years in 1971. Mortality included deaths occurring throughout the follow-up period, up until the end of 1992, the most recent data at the time of analysis. Institutional residence was derived from the 1971, 1981 and 1991 Censuses. Multi-variate logistic regression was used to carry out separate analyses of the risk of mortality or institutional care. The LS census variables used as predictors were: marital status and whether living alone; housing tenure and car availability, and social class.

The results below are fully adjusted for all the above census variables and for age. In the mortality analyses the models included five year time periods. In the institutional analyses, time period was not used as the outcome could only be measured at a single point in time - ie the census. Those living in communal establishments in 1971 were included in the analyses for mortality but not for institutional risk. We also examined the risk of dying and of being in an institution in 1991 associated with intercensal changes (from 1971 to 1981) in these variables.

Results

The LS sample chosen includes 43,092 men and 50,839 women aged 55 to 74 years in 1971. 29% lived in owner occupation with a car; 34% in rented homes without a car; 6% of men and 11% of women were single; 7% of men and 26% of women were widowed; and 8% of men and 23% of women lived alone. For those who were not currently married, approximately the same proportion in each age group lived alone as did not. The exception to this were widowed women aged 65 to 74 years, of whom twice as many lived alone (24% of all women in this age group compared to 12% who were widowed and not living alone). 1% of those aged 55 to 64 and 2% of those aged 65 to 74 were living in a communal establishment. The social class of over 60% of women could not be classified either because of inadequate information or because they did not have an occupation. On the basis of this no social class analyses were undertaken for the women. 20% of men were classified to Social Class I/II; around a third were III non manual, 11% were III manual and 30% were IV/V.

Mortality risk by characteristics in 1971

By the end of 1992, 70% of men aged 55 to 64 and 93% of men aged 65 to 74 had died. The corresponding figures for women were 49% and 84%. Figure 7 shows the odds ratios for mortality risk based on housing tenure and car availability in 1971. In comparison with the reference group (owner occupiers with a car) all other groups have a significant ($p < 0.0001$) excess mortality. This is greatest for those with the least favourable socio-economic indicators - ie in rented accommodation with no car. The risk is increased by approximately 50% in both men and women and in both age groups.

Figure 7: Mortality of men and women (1971-92) by housing tenure & car availability in 1971

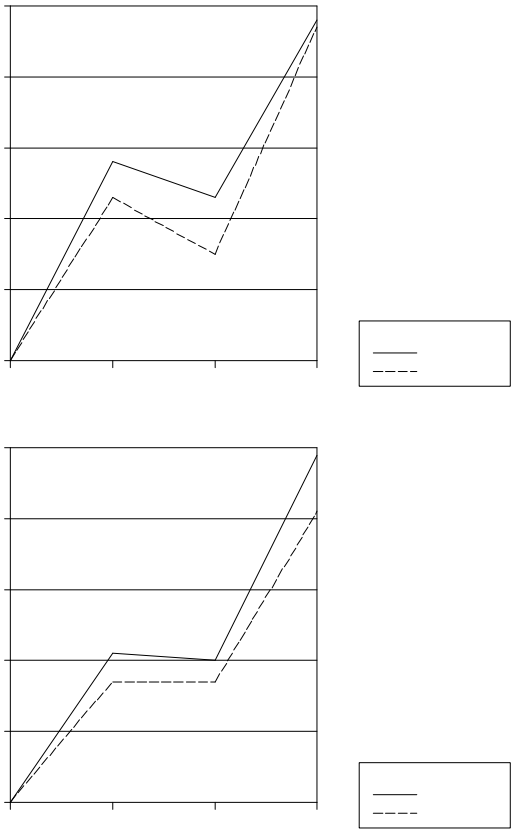
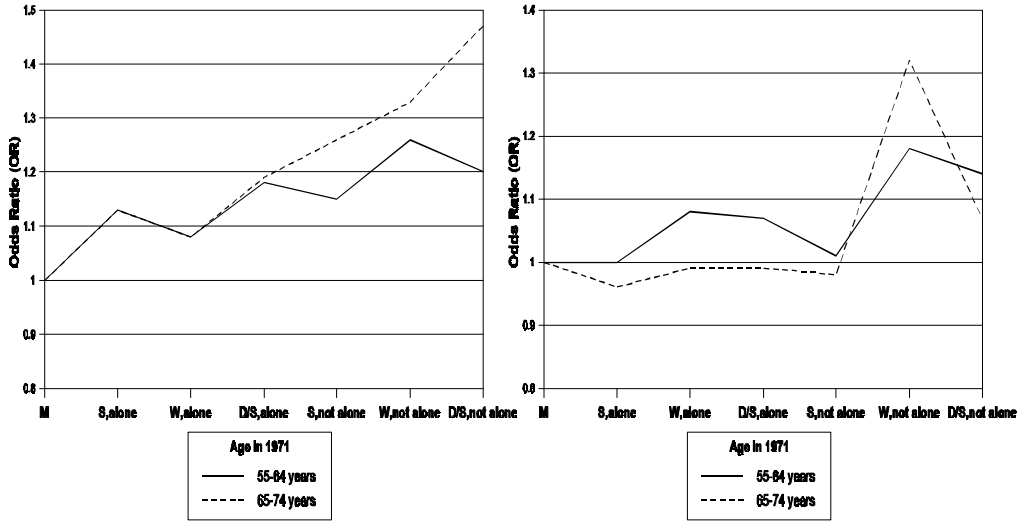


Figure 8 shows the association between the risk of dying and marital status and living arrangements in 1971.

Compared to married men all other groups have a increased mortality risk. The size of the risk varies by age group and whether or not they were living alone. For those in both age groups who were living alone, and those in the younger age group (aged 55 to 64 in 1971), the excess risk is between 10% and 20% while older men (aged 65 to 74 years in 1971) who were not living alone had higher risks with an almost 50% excess in divorced/separated men. For women the pattern was very different - only widowed women who were not living alone had significant excess mortality ($p<0.0001$).

The social class gradients of mortality risk were not particularly strong for older men. Men who could not be classified to a social class had the highest risk of dying.

Figure 8: Mortality of men and women (1971-92) by marital status and whether living



alone in 71

By 1981 40% of men and 26% of women in the 1971 LS sample had died. The mortality analyses for intercensal changes are based on 25,758 men and 37,154 women who had completed the census form in 1971 and 1981 and who were living in the community at both census points. Table 8 shows the distribution of socio-economic and demographic variables at both census points by gender and 1971 age group. 14% of men and 25% of women lost their spouse and 11% of men and 23% of women started to live alone. 2% ceased to live alone. Around 5% moved out of, and 6% moved into owner occupation. 13% lost access to a car and 6% gained access.

Table 9 shows the mortality risks for men and women aged 55 to 64 years at the 1971 Census according to several unfavourable intercensal changes. These are defined as "unfavourable" if a favourable indicator was lost between the 1971 and 1981 Censuses or if there was an unfavourable indicator at both census points. The reference group are those with the most favourable indicators at both censuses - ie in owner occupation or with car availability. For both men and women those who lost a favourable indicator had similar excess risks to those who had unfavourable indicators at both census points. Car availability was a stronger predictor of excess risk for men.

There was no evidence that men or women in either age group who were living alone at both census points, or who started living alone in the inter-censal period were at increased risk of dying. Infact, the odds ratios were significantly reduced for women in both age groups who either started living alone or were alone at both censuses (odds ratios around 0.8). A similar trend is seen for men.

Compared to people who were married at both censuses, the risk of dying was increased by between 20 and 40% for those who were single at both time points, those who lost a partner during the intercensal period or prior to the 1971 Census.

Table 8: Distribution of socio-economic and demographic variables at 1971 and 1981 Census by gender and age at 1971 Census (% in each category)				
	Men 55-64	**Men 65-74**	**Women 55-64**	**Women 65-74**
Marital status				
Married in 1971 & 1981	77	64	48	23
Formed relationship	2	2	2	1
Single throughout	5	3	8	11
Marriage ended after 1971	11	21	23	27
Marriage ended before 1971	5	10	19	37
Living arrangements				
Not alone in 1971 &1981	85	76	63	44
Ceased to be alone	1	2	2	4
Became alone	9	15	22	25
Alone in 1971 & 1981	4	7	13	27
Housing tenure				
Owner occupier in 1971 & 1981	50	52	48	47
Moved into owner occupation	7	5	6	5
Moved out of owner occupation	4	6	5	6
Renting in 1971 & 1981	40	37	41	42
Car availability				
Available in 1971 & 1981	49	30	33	17
Gained availability	6	5	6	6
Lost availability	11	13	16	13
No car in either year	34	52	45	64
N	18,426	7,332	23,609	13,545

Risk of being in an institution at 1991 Census by characteristics in 1971

These results are based on 10,464 men and 20,062 women who were enumerated at each of the three censuses (1971, 1981 and 1991) and who were living in a private household at the 1971 and 1981 Censuses. At the 1991 Census, proportionately more women than men were in institutions; 6% of women aged 55-64 in 1971 and 23% of those aged 65-74 compared with 3% and 14% of men in these age groups.

Table 9: 11-year mortality by unfavourable intercensal changes, aged 55-64 in 1971				
	Men		**Women**	
Housing tenure	**Odds Ratio**	**95% CI**	**Odds Ratio**	**95% CI**
Moved from owner occupation	1.2	1.1-1.4	1.3	1.1-1.4
Never in owner occupation	1.2	1.2-1.3	1.3	1.2-1.3
Car availability				
Lost car	1.5	1.4-1.7	1.1	1.0-1.2
Never had car	1.4	1.3-1.5	1.2	1.2-1.3

Figure 9: Risk of being in an institution at 1991 by marital status and whether living alone in 1971 (aged 55-64 in 1971)

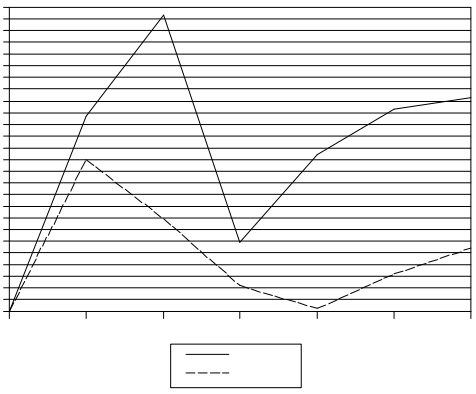
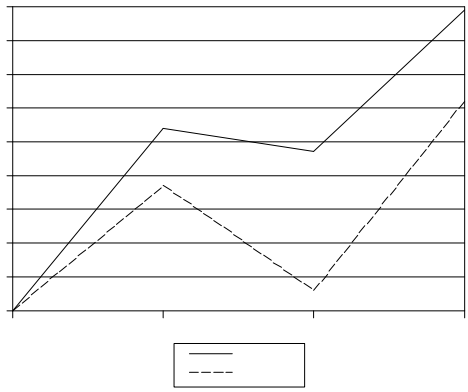


Figure 9 shows that for both men and women aged 55-64 years in 1971, being single remained an important predictor of increased long-term risk, irrespective of whether they were living alone or not. (The odds were two to three times higher than the reference group.) Divorced/separated men also had around a three fold excess risk while a smaller risk was observed for divorced/separated women (an odds ratio close to 1.5). Widowed men who were not living alone were also at increased risk (odds ratio= 2.3).

In the older age groups (65-74 years in 1971), a rather different pattern is seen. For single and widowed men, only those who were not living alone in 1971 were at increased risk while being divorced/separated had no influence. Older single women, in particular those living alone, were at increased risk (odds ratio= 1.6) while widowed women who were not living alone had a significantly reduced risk (odds ratio=0.7).

Figure 10: Risk of being in an institution by 1971 tenure and car availability (aged 55-64 in 1971)

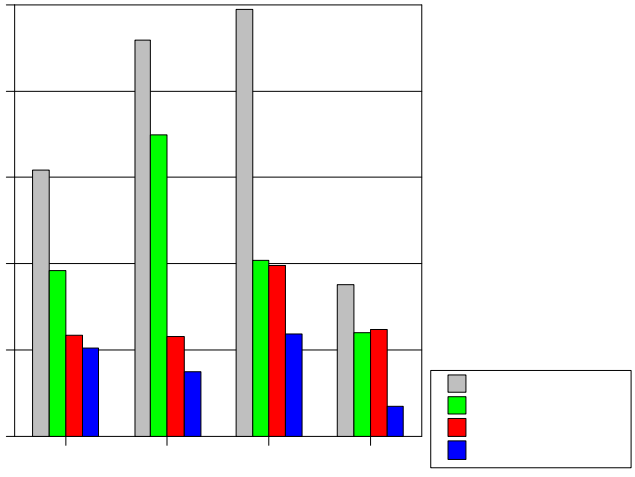


For both men and women, not having access to a car was associated with a greater chance of being in an institution both for owner occupiers and those in rented accommodation (Figure 10). The highest risks were observed in both age groups for men and women living in rented accommodation without car access. Social class in men was not an important long term predictor of institutional risk although there was some suggestion that unclassified men had higher odds ratios.

Risk of being in an institution at 1991 Census by intercensal changes

Figure 11 shows that for men the loss of a spouse was associated with a three to four fold increase in risk of being in an institution, especially for those who had lost their spouse before 1971.

Figure 11: Risk of being in an institution in 1991 by intercensal changes in marital status



For women, loss of a spouse was not a significant risk factor. However, very elderly women who married in the intercensal period had a 70% reduction in risk. Men and women in the age group 55-64 years in 1971 and who were single at both census points were at an increased risk of being in an institution. This association was strongest for men (odds ratio= 5).

Table 10 summarises the risk of being in an institution in 1991 by intercensal changes in housing tenure and car availability for those aged 55-64 in 1971.

Moving out of owner occupation into rented accommodation was a significant risk factor for women but not for men. Living in rented accommodation at both census dates was associated with an increased risk for

men and women alike. For both men and women, the lack of availability of a car at both census dates increased risk by around 50%.

Table 10: Risk of being in an institution in 1991 by intercensal changes in housing tenure and car availability for those aged 55-64 in 1971

	Men		Women	
	Odds Ratio	**95% CI**	**Odds Ratio**	**95% CI**
Housing tenure				
Moved into owner occupation	1.09	0.6-1.9	0.86	0.6-1.2
Moved out of owner occupation	1.20	0.6-2.4	1.73	1.3-2.3
In rented accommodation in 71 & 81	1.42	1.1-1.9	1.23	1.1-1.4
Car availability				
Gained availability	1.34	0.8-2.4	1.2	0.8-1.7
Lost availability	1.56	1.1-2.4	1.36	1.1-1.7
No car in 1971 or 1981	1.61	1.2-2.2	1.58	1.3-1.9

Discussion

These results show the persistence of unfavourable socio-economic indicators in middle age and early retirement on long term outcomes in old age. Moreover, the loss of favourable socio-economic indicators - owner occupation and car availability - during retirement was also associated with increased mortality and institutional risk. Being single was associated with an increased risk of institutional care in both men and women and an increased risk of mortality in men. The effects on mortality in women were of a smaller magnitude. The analyses by intercensal change permitted the exploration of the impact of changes in socio-economic status, marital status and living arrangements on mortality and institutional risk.

The “dilution” of risk estimates as a result of “random” misclassification is a well know phenomenon in epidemiological studies. Much attention has been paid to correction of risk estimates for blood pressure and cholesterol by use of repeated measurements over the follow-up period, to take account of the well known variability of these physiological measures.

Much less attention has been paid to correction of risk estimates as a result of “misclassification” of categorical variables. Here we define “misclassification” to include changes that occur over the follow-up period as well as possible misclassification at baseline. The results from the intercensal analyses suggest that the odds ratios from the 1971 classification may be an underestimate over long term follow-up since they do not take account of changes in socio-economic and demographic factors during the follow-up period.

The intercensal analyses, although biased by the mortality of those who died during the intercensal period, show higher odds ratios for those whose marriages ended before 1971, compared with the odds ratios for widowed/divorced/separated people based on the 1971 classification. It is likely that the apparent lower odds ratios are due to "misclassification" of the reference group (married), a proportion of whom became

widowed over the follow-up period. Similarly, the odds ratios for institutional risk in 1991 are increased for single and widowed men in comparison to married men in the intercensal analyses, compared with the analyses based exclusively on the 1971 classification. For women the odds ratios were comparable for both. Future analyses will explore adjusting the 1971 analyses for intercensal changes.

A problem in all epidemiological studies of elderly people is the influence of health status on the observed associations. J-shape, U-shape and even inverse associations have been observed in many studies of classic risk factors (eg blood pressure, cholesterol, and body weight),especially in very elderly people. It is likely that these associations reflects the inclusion in a "favourable" risk category of people already at high risk because of poor health. For physiological variables such as blood pressure, those with the lowest pressures may include individuals whose low pressures reflect a failing heart, or other debilitating diseases.

In the present analyses, it is likely that health selection effects are operating especially for the most elderly group and for the changes in intercensal variables. Thus "losing" car availability may reflect poor health or economic circumstances or both. Moving into owner occupation or "gaining" car availability might suggest going to live with family members due to poor health. Once marital status had been taken into account, living alone was not associated with an increased mortality risk and for women it was actually associated with reduced mortality. This suggests that this variable also reflects the ability to live alone ie good health status.

Similarly, in the intercensal analyses for risk of institutional residence only for very elderly women (aged 75 to 84 years at the 1981 census) was there any excess risk associated with having previously lived alone. A limitation of the present census data was the lack of information on health status which could throw light on these associations. The inclusion of the question on limiting long-term illness in the 1991 Census gives some insights but covers a wide range of possible disabilities. In an attempt to remove some effects of health selection the mortality analyses were run after removing the first three years of deaths. However, for most variables the odds ratios were of a similar magnitude as in the analyses including all deaths.

The analyses on institutional risk are based only on the usual address recorded at census. The LS does not include data on institutional admissions between census points and therefore individuals in institutions who die before the census are excluded. The effect of this bias on our estimates of risk is uncertain but may underestimate the odds ratios since the individuals who entered institutions and were at the highest mortality risk have been removed from the analysis.

In summary, these results demonstrate the persistence of inequalities in health related outcomes throughout old age, both in those with unfavourable circumstances in mid life but also in those who, in later life, have lost earlier advantages.

Acknowledgements

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This article is based on two papers currently submitted to journals. A third paper on limiting long-term illness is in preparation.

We welcome your views and comments on any of the articles in *Update*.