Stroke death and unemployment in London

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Abstract

Study objective—The aim was to investigate the relationship between social factors and stroke mortality in men and women aged between 45 and 74 years using census and mortality data from 32 London boroughs in 1971 and 1981.

Design—Census data from 1971 and 1981 on type of accommodation, density of room occupation, male unemployment rate, and proportion of households without a car were linked with stroke mortality available for each London borough.

Setting—32 London boroughs excluding the City of London.

Measurements and main results—The main outcome measures were the association between age adjusted mortality from stroke and the proportion of households with no car, non-ownership of home, in council housing or rented accommodation, male unemployment rate, and living density of more than 1.5 people per room. There was no strong correlation between social variables and stroke mortality in 1971, but strong correlations were found for male stroke mortality in 1981. The highest correlation was with male unemployment ($r=0.64$, $p<0.001$) even after adjusting for the proportion of the population born in the Caribbean and Africa ($r=0.56$, $p<0.01$). Other social variables were also highly correlated with male stroke mortality: households without a car ($r=0.63$, $p<0.001$), living density of more than 1.5 people per room ($r=0.053$, $p<0.001$), council housing ($r=0.45$, $p=0.01$), and rented accommodation ($r=0.36$, $p=0.05$). After regressing male mortality on unemployment rate the other social variables were no longer significantly correlated with male stroke mortality. In women, the only significant correlation was found in 1981 between stroke mortality and the proportion of families living in council housing ($r=0.34$, $p=0.05$).

Conclusions—Social factors are important indicators of stroke mortality. The major increases in unemployment over the decade may explain the generally stronger association in 1981 compared with 1971. Male stroke mortality increased by 0.062/1000 for every one percent increase in male unemployment (0.054/1000 after adjusting for place of birth).

There have been many studies investigating risk factors in cerebrovascular mortality. The Framingham study¹ identified systolic blood pressure, serum cholesterol, glucose intolerance, smoking, and obesity. Other studies have shown differences in stroke mortality according to race and class as well as geographical location.²⁻⁵ The purpose of this study was to describe the relationship between social factors and stroke mortality in the London boroughs in both 1971 and 1981 in men and women aged between 45 and 74, and to compare changes in social conditions with changes in stroke mortality over this 10 year period.

Methods

Information was taken for 32 London boroughs. The City of London was excluded because of its small population. Stroke mortality data were obtained from the Office of Population, Censuses and Surveys (ICD 430-432). Death rates were calculated for men and women aged between 45 and 74 and age standardised using the direct method to the population of England and Wales in 1981. Social variables were taken from small area statistics of the census in the two years 1971 and 1981.

Four socioeconomic indicators were identified as being particularly relevant to social deprivation in the London population. These measures identify groups that differ in terms of their living and working conditions, attitudes, and behaviour. The indicators were (a) type of accommodation, (b) unemployment rate, (c) proportion of household who did not own a car, and (d) living density of more than 1.5 people per room.

Accommodation was categorised as the proportion of families living in rented accommodation, living in council housing, and the proportion living in housing not owned by themselves. Unemployment rates were calculated on the number of people seeking work. This excluded people who may have retired from work early on health grounds.

Analysis was performed using Pearson correlation coefficients, assigning equal weights to each borough. In addition multiple regression techniques were employed to determine whether the social variables were acting independently of each other. Since the high prevalence of hypertension in blacks could have confounded the analyses, an adjustment of stroke mortality was made for the proportion of persons born in Africa or the Caribbean.

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Results

Age standardised stroke mortality rates (45–74 years) were different between the sexes and varied widely across the boroughs in both years. The range was from 0.6 deaths per 1000 women in Kingston upon Thames in 1981, to 2.1 per 1000 men in Greenwich (1971). The stroke rate averaged 1.7 per 1000 in men and 1.5 per 1000 in women in 1971 (giving equal weight to each borough). In 1981 the rates were reduced to 1.4 per 1000 men and 1.2 per 1000 women. Table I gives the stroke mortality rates for each London borough, together with some of the social variables used for analysis.

Male unemployment ranged from 1.9–6.2% of men in 1971 (average 3.7%) and from 3.9–13.4% in 1981 (average 7.4%). In 1971 female unemployment ranged from 2.4–5.0% (average 3.4%) and from 1.4–5.0% in 1981 (average 3.0%).

The percentage of families living in Council housing ranged from 8–69% in 1971 (average 25.5%) and 13–82% in 1981 (average 31.6%). Other rented accommodation averaged 33.3% in 1971 and 15.4% in 1981 and non-ownership of home averaged 59.5% in 1971 and 52.8% in 1981. Households with room occupancy of more than 1.5 persons averaged 2.9 in 1971 and 1.4 in 1981. The average proportion of households without a car was 54% in 1971 and 46% in 1981.

In 1971 there were weak correlations between social variables and both male and female stroke mortality. The highest correlation was between male mortality and male unemployment ($r=0.29$, $p=0.11$). In 1981, however, there were significant correlations between all the social variables analysed and male stroke mortality rates (table II). The highest correlation was found for male unemployment ($r=0.64$, $p<0.001$). After adjusting for the proportion of the population

born in Africa and the Caribbean the correlation was $+0.56$, $p<0.01$. Male stroke mortality increased by 0.062/1000 for every one per cent increase in male unemployment (0.054/1000 after adjusting for place of birth).

The only significant correlation for women was the proportion of families living in council housing ($r=0.34$, $p=0.05$).

Table II shows that the social variables were all highly intercorrelated. A stepwise regression was performed with stroke mortality as the dependent variable. After adjustment for unemployment rate in men, none of the other social variables reached the 5% level of significance.

Discussion

The mortality from stroke in London fell between 1971 and 1981. Over the decade the population of London became more affluent in terms of an increase in home and car ownership and there was a reduction in overcrowding in the home. The proportion of the population living in non-council rented accommodation fell and the proportion living in council housing rose, but the total not owning their own home decreased. Against these markers of prosperity the male unemployment rate doubled from 3.7% to 7.4%. The male unemployment rate was the best predictor of male stroke mortality both in 1971 and 1981.

In 1981 unemployment was different from that in 1971. It was generally of a much longer duration, with less prospect of re-employment. Approximately 80% of men who were unemployed in 1981 had been in employment 10 years earlier. Of the unemployed in 1981 about 85% were married, 35% never recorded as owner-occupiers in 1971 and 60% had been in manual or semiskilled occupation in 1971.^{6–10} This change from short to long term

Table 1 Total population of London boroughs, standardised stroke death rates 45–74 years (per 1000), unemployment (%), and council housing (%)

	1971					1981				
	Total popn. × 10 ⁵	Stroke death		Unemployment		Total popn. × 10 ⁵	Stroke death		Unemployment	
		men	women	men	women		men	women	men	women
Barking and Dagenham	1.6	1.8	1.5	3.9	3.3	69	1.5	1.3	1.3	8.2
Barnet	3.1	1.5	1.3	2.5	3.4	17	3.0	1.3	1.0	4.8
Bexley	2.2	2.0	1.6	2.9	2.9	18	2.1	1.4	1.0	4.9
Brent	2.8	1.9	1.6	3.6	3.7	13	2.5	1.3	1.0	8.0
Bromley	3.0	1.5	1.6	2.5	2.9	18	3.0	1.1	1.3	4.3
Camden	2.0	1.3	1.4	5.0	3.8	24	1.7	1.4	0.7	9.5
Croydon	3.3	1.7	2.1	2.4	3.0	17	3.2	1.5	1.7	5.2
Ealing	3.0	1.8	1.6	2.9	3.5	16	2.8	1.8	0.9	6.7
Enfield	2.7	1.8	1.4	2.4	2.7	20	2.6	1.3	1.3	5.6
Greenwich	2.2	2.1	1.3	4.1	3.4	39	2.1	1.2	1.0	8.4
Hackney	2.2	1.9	1.6	4.8	4.0	43	1.8	1.7	1.5	12.6
Hammersmith & Fulham	1.9	1.9	1.5	5.3	3.7	19	1.5	1.4	0.9	4.4
Haringey	2.4	1.3	1.7	3.9	3.8	18	2.0	1.9	1.1	8.8
Harrow	2.0	1.6	1.2	2.1	2.0	11	2.0	1.0	0.9	4.2
Havering	2.5	2.0	1.5	2.5	2.8	23	2.4	1.2	1.4	5.3
Hillingdon	2.3	1.3	1.6	2.0	2.8	26	2.3	1.0	0.9	4.6
Hounslow	2.1	1.8	1.9	2.8	3.1	24	2.0	1.3	1.2	5.7
Islington	2.0	1.7	1.9	3.2	4.5	29	1.6	1.5	1.2	11.0
Kensington & Chelsea	1.9	1.9	1.5	5.7	5.0	7	1.4	1.7	1.1	8.3
Kingston upon Thames	1.4	1.5	1.5	2.1	2.4	13	1.3	0.6	0.6	4.0
Lambeth	3.1	2.0	1.4	5.7	3.9	30	2.5	1.5	1.2	10.9
Lewisham	2.7	1.8	1.6	4.4	3.4	34	2.3	1.6	1.1	8.8
Merton	1.8	1.6	1.3	2.8	3.1	19	1.7	1.3	1.2	4.8
Newham	2.4	1.4	1.1	4.9	3.9	29	2.1	1.4	1.5	10.2
Redbridge	2.4	1.8	1.4	2.6	2.8	15	2.3	1.1	0.8	5.2
Richmond upon Thames	1.7	1.9	1.6	2.7	3.2	13	1.6	1.4	1.1	4.2
Southwark	2.6	1.5	1.6	5.3	3.3	50	2.1	1.7	1.4	11.1
Sutton	1.7	1.4	1.5	1.9	2.4	19	1.7	1.3	1.4	3.9
Tower Hamlets	1.6	2.0	1.5	6.2	3.4	67	1.4	1.8	1.4	13.4
Waltham Forest	2.3	1.7	1.3	3.2	3.1	21	2.1	1.4	1.1	7.3
Wandsworth	3.0	2.1	1.5	4.9	3.7	27	2.5	1.7	1.2	8.4
Westminster	2.4	1.5	1.5	4.5	4.2	20	1.9	1.4	1.6	8.4

Table II Pearson correlation coefficients between stroke mortality and social variables for men in 1981. Asterisks indicate a statistically significant correlation.

	Male stroke	Male unemployment	Rented accommodation	Council housing	No car	Non-ownership of home
Male unemployment	0.64*					
Rented accommodation	0.36*	0.34*				
Council housing	0.45*	0.83*	0.12			
No car	0.63*	0.94*	0.58*	0.71*		
Non-ownership of home	0.60*	0.93*	0.45*	0.83*	0.96*	
Room occupancy > 1.5 per room	0.53*	0.67*	0.77*	0.29	0.77*	0.69*

unemployment and the inevitable changes in socioeconomic status that this must bring may explain the high correlation between male stroke mortality and unemployment in 1981.

Our results may be compared with those of the OPCS longitudinal study.⁷⁻⁹ After adjustment for age and social class it was found that the unemployed had a 20% excess mortality when compared with those in employment. A 10 year follow up of men aged 45-64 years seeking work from 1971 showed a slightly raised standardised mortality ratio (SMR) of 110 (95% confidence intervals, 91-131) for all circulatory disease, with a high mortality among younger men with an SMR of 186 (95% CI, 114-287) during the same period.

It is understandable that a fall in income due to unemployment would lead to inadequate heating, dietary change, and stress. The same risk factors are involved in the relationship between ischaemic heart disease mortality and social class. Marmot and McDowell³ found that the pattern of ischaemic heart disease has reversed in Britain and now shows an inverse gradient, with lower social classes at high risk of death. They attributed some of the reversal to increases in smoking and sugar consumption and decreases in the quality of food. They agreed that unemployment may play an important role in this and should be explored.

The present analysis has concentrated on unemployment. While not having a car was almost an equally good indicator of male stroke mortality, it appeared reasonable to concentrate on a social variable that could affect known and suspected risk factors for stroke. Not having a car, non-ownership of a home, and overcrowding are good indicators of income, but not having a car may lead to more exercise which may be good for you, and unemployment may be more closely limited to diet and stress than, say, overcrowding. Nevertheless, unemployment was very closely correlated with the other social variables and the general conclusion can only be that a social or income related factor links unemployment to stroke mortality.

While the poor have consistently been overrepresented in the private rented sector in the early 70s, the decline of that sector is a factor in increasing the proportion of the poor in the public rented sector.¹⁰ The General Household Survey showed a decrease in the proportion of households headed by an unskilled manual worker living in privately rented unfurnished accommodation between 1972 and 1976. This decrease (from 20% to 12%) has been matched by an increase in the proportion of the same group in local authority housing from 57% to 65%. Professional and managerial workers are more likely to be owner-occupiers than tenants. In contrast, skilled, semiskilled, and unskilled manual workers are

most likely to be tenants even when their incomes are high. Social class exerts a stronger influence on housing status than do factors of deprivation, such as low income.^{11 12}

From the longitudinal study it appears that housing tenure identifies groups of women with different levels of mortality during the period from 1971 to 1981, with a clear differential between the "extreme" groups of women in owner-occupied accommodation with a car, who appear to have a considerable advantage over women in local authority housing. Despite these considerations it appears that social factors are more closely related to stroke mortality in men than women. However, unemployment rates were much lower in women in 1981 and this may explain the difference.

The decline in stroke mortality in Britain¹³ seems largely to be the results of a decrease in the incidence of the disease rather than a reduction in case fatality. By gaining a better understanding of host and environmental factors in the disease, further preventative measures may be promulgated as a matter of public health.

In the present study, the indicators of deprivation such as unemployment and house tenure were good predictors of stroke. The known excess of stroke mortality in blacks¹⁴ did not explain the association between stroke mortality and unemployment in 1981. The mechanisms linking social factors and stroke mortality have yet to be identified.

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