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Further research is necessary, including a case-control study to disentangle the confounding effects of poverty, ethnicity, and age at the individual level. In addition, recent developments in DNA analysis of *Mycobacterium tuberculosis*[20] could be used to study patterns of transmission within and between ethnic groups. In the meantime, as national notification rates are 25 times higher in Asians than white people (and this inequality is widening),[3] prevention of new infection in Asians by education,[21] immunisation,[22] and prompt diagnosis and treatment of infectious cases[23] must remain a priority.

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Ecological study of social fragmentation, poverty, and suicide

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Abstract

Objectives To investigate the association between suicide and area based measures of deprivation and social fragmentation.
Design Ecological study.
Setting 633 parliamentary constituencies of Great Britain as defined in 1991.
Main outcome measures Age and sex specific mortality rates for suicide and all other causes for 1981-92.
Results Mortality from suicide and all other causes increased with increasing Townsend deprivation score, social fragmentation score, and abstention from voting in all age and sex groups. Suicide mortality was most strongly related to social fragmentation, whereas deaths from other causes were more closely associated with Townsend score. Constituencies with absolute increases in social fragmentation and Townsend scores between 1981 and 1991 tended to have greater increases in suicide rates over the same period. The relation between change in social fragmentation and suicide was largely independent of Townsend score, whereas the association with Townsend score was generally reduced after adjustment for social fragmentation.
Conclusions Suicide rates are more strongly associated with measures of social fragmentation than with poverty at a constituency level.

Introduction

The association between deprivation and mortality is well established, and for most common diseases mortality is higher in people of lower socioeconomic position. Mortality also tends to be higher in populations living in poor areas, regardless of individual socioeconomic position.[1] High risk areas have been identified by using census derived indices of poverty[2] and voting patterns.[3] Although strong associations have been found between these area based indices and mortality,[4 5] they may not fully describe the relation with area of residence for all causes of death.

Geographical studies indicate that people living in deprived areas generally have high suicide rates.[6 7] Other analyses suggest that the proportion of single

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person households in an area may be the strongest predictor of suicide.[8 9] Durkheim recognised the importance of anomie (social fragmentation) in influencing suicide,[10] and a growing body of evidence supports this view.[8 9 11–13] Congdon recently explored this association using ecological data from London.[12] He proposed a census based index of social fragmentation that predicted suicide rates as well as, or better than, the Townsend deprivation score. Abstention from voting might also indicate lack of interest in the local or national community and may provide another measure of social fragmentation.[8 14] We investigated the extent to which the characteristics of an area—that is, indices of deprivation and social fragmentation—are associated with its age and sex specific suicide rates.

Methods

We analysed the 633 parliamentary constituencies of Great Britain, defined in 1991. Age and sex specific suicide rates were calculated for 1981-92 based on deaths coded as suicide or open verdict (ICD-9: E950-E959, E980-E989).[15] We calculated Townsend deprivation scores using 1981 and 1991 census data on unemployment, car ownership, overcrowded housing, and housing tenure.[16] Congdon's social fragmentation (anomie) index was derived from census data on private renting, single person households (aged <65), unmarried persons, and mobility in the previous year. Mean abstention rates were calculated from the four general elections spanning the period of interest (1979, 1983, 1987, 1992).

We used least squares regression weighted by the constituency populations to explore changes in mortality associated with a standard deviation increase in each factor. We also examined changes in mortality (1981-5 *v* 1986-92) in relation to changes in social fragmentation and Townsend scores between 1981 and 1991. For these analyses scores in 1991 were calculated by using the 1981 census as the reference point, giving a measure of absolute change in a constituency regardless of its position relative to others.

As Congdon's index was developed using London data, we repeated analyses with these constituencies excluded. This did not affect our results, and results are presented based on data for the whole country.

Results

Table 1 shows 1981-92 mortality for suicide and all other causes combined. Rates increased with age and were consistently higher in men. The mean abstention rate across constituencies was 25% (range 16-45%). Table 2 shows the constituencies with the highest abstention rates, social fragmentation, and Townsend scores. Although there was some agreement between the measures (correlation coefficient = 0.7 ($P<0.001$) for all pairwise comparisons), there were important differences. For example, the highest social fragmentation scores were in London whereas the highest Townsend scores were centred more around Glasgow.

Higher abstention, social fragmentation, and Townsend scores were associated with higher suicide rates in all age and sex groups (table 3), and the association was greatest for social fragmentation. To assess whether abstention and social fragmentation independently predicted suicide, we fitted models including both terms. The association between suicide and abstention was non-significant after social fragmentation was adjusted for, but there was little change in the association with social fragmentation. Mortality from other causes was also positively related to all three measures, although the association with Townsend score was strongest in this case.

The association between social fragmentation and suicide was largely unaffected by adjustment for Townsend score (table 4). However, adjustment for social fragmentation greatly reduced the effect of the Townsend score, and in people aged over 65 the effect

Table 1 Mean (SD) age and sex specific death rate per 100 000 population from suicide and all other causes, 1981-92

	Age (years)			
	<25	25-44	45-64	⩾65
Suicide				
Males	7.38 (2.98)	23.12 (7.75)	23.46 (7.84)	24.16 (7.75)
Females	2.32 (1.48)	7.75 (3.48)	12.13 (4.50)	13.00 (4.89)
All other causes				
Males	82.36 (12.25)	108.67 (25.91)	1057.93 (244.76)	6890.74 (571.55)
Females	52.47 (9.96)	72.48 (11.99)	625.34 (127.06)	5336.83 (476.52)

Table 2 Ranks (out of 633) of constituencies with the ten highest average abstention rates based on 1979, 1983, 1987, and 1992 general elections; social fragmentation scores based on 1981 and 1991 censuses; and Townsend scores based on 1981 and 1991 censuses

	Abstention	Social fragmentation	Townsend
Abstention			
Peckham	1	15	11
Newham South	2	67	38
Newham North West	3	52	34
City of London and Westminster South	4	2	67
Bethnal Green and Stepney	5	21	3
Hackney South and Shoreditch	6	27	14
Chelsea	7	1	82
Manchester Central	8	14	9
Bow and Poplar	9	29	12
Hackney North and Stoke Newington	10	18	17
Social fragmentation			
Chelsea	7	1	82
City of London and Westminster South	4	2	67
Kensington	28	3	49
Westminster North	57	4	35
Hampstead and Highgate	82	5	99
Holborn and St Pancras	20	6	27
Hammersmith	94	7	39
Vauxhall	13	8	19
Islington North	23	9	32
Bristol West	140	10	245
Townsend			
Glasgow Provan	30	46	1
Glasgow Springburn	31	37	2
Bethnal Green and Stepney	5	21	3
Glasgow Garscadden	106	75	4
Birmingham Small Heath	14	68	5
Liverpool Riverside	11	12	6
Glasgow Maryhill	29	26	7
Glasgow Central	24	32	8
Manchester Central	8	14	9
Glasgow Shettleston	71	94	10

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Table 3 Difference (SE) in suicide rates and all other cause mortality per 100 000 population associated with SD increase in average abstention, social fragmentation, and Townsend scores, 1981-92

	Abstention	Social fragmentation score	Townsend score
Suicide			
Males			
<25	1.27 (0.11)	1.63 (0.10)	1.33 (0.10)*
25-44	3.77 (0.26)	4.62 (0.23)	4.38 (0.25)*
45-64	3.74 (0.27)	5.08 (0.24)	3.70 (0.28)*
⩾65	1.55 (0.31)	2.61 (0.30)	1.20 (0.32)*
Females			
<25	0.69 (0.05)	0.74 (0.05)	0.62 (0.05)*
25-44	1.43 (0.13)	2.00 (0.11)	1.52 (0.13)*
45-64	1.29 (0.18)	1.93 (0.17)	1.25 (0.18)*
⩾65	0.80 (0.20)	1.22 (0.19)	0.05 (0.20)
All other causes			
Males			
<25	5.18 (0.45)	4.62 (0.47)	6.34 (0.42)*
25-44	14.50 (0.81)	15.61 (0.74)	19.65 (0.65)*
45-64	148.16 (7.90)	116.95 (8.75)	217.85 (4.69)*
⩾65	283.82 (20.59)	225.20 (21.73)	427.62 (16.48)*
Females			
<25	4.69 (0.36)	3.74 (0.38)	5.36 (0.34)*
25-44	3.24 (0.45)	2.60 (0.44)	6.66 (0.39)*
45-64	67.29 (4.44)	49.36 (4.79)	108.39 (2.78)*
⩾65	159.19 (18.77)	152.46 (18.56)	220.53 (17.81)*

*P<0.001.

was reversed, possibly reflecting the reduced effect of unemployment in this group.[17]

Between 1981 and 1991 social fragmentation scores rose by an average 0.83 (SD 3.84) whereas Townsend scores fell by 1.42 (3.08). Areas that had increases in fragmentation or deprivation generally had increases in suicide (table 5). Reciprocal adjustment did not affect the association with social fragmentation but reduced the association with Townsend score. Associations with changes in both scores were generally more consistent in younger age groups.

Discussion

Our analyses suggest that areas characterised by high social fragmentation have higher rates of suicide and that this association is independent of deprivation. Furthermore, the areas with the greatest absolute increase in social fragmentation between 1981 and 1991 also had greater increases in suicide, again independent of deprivation. Although census based deprivation measures such as the Townsend score are often used to assess associations between poverty and mortality, our results indicate that this approach may mask stronger cause specific associations with other measures of the social condition in particular areas.

It is important to recognise the limitations of ecological studies. Although socially fragmented areas have higher suicide rates, the people who commit suicide may not share the characteristics of the populations from which they are drawn. Moreover, the direction of the association is unclear, and it may be that people at high risk of suicide choose to live in socially fragmented areas or that these areas contain more hostels for mentally ill people. In addition, other factors may influence constituency level suicide rates, and the social fragmentation index may simply be a proxy for one or more of these.

Table 4 Difference (SE) in suicide rate per 100 000 population associated with SD increase in reciprocally adjusted average social fragmentation and Townsend score, 1981-92

	Social fragmentation score	Townsend score
Males		
<25	1.32 (0.14)**	0.44 (0.14)*
25-44	3.35 (0.30)**	1.95 (0.32)**
45-64	4.81 (0.32)**	0.40 (0.33)
⩾65	3.43 (0.41)**	–1.19 (0.41)*
Females		
<25	0.60 (0.07)**	0.21 (0.07)*
25-44	1.91 (0.15)**	0.14 (0.15)
45-64	2.01 (0.23)**	–0.11 (0.23)
⩾65	2.26 (0.26)**	–1.53 (0.26)**

*P<0.01, ** P<0.001.

Table 5 Change (SE) in suicide rate per 100 000 population between 1981-5 and 1986-92 associated with SD increase in social fragmentation and Townsend score between 1981 and 1991

	Change in social fragmentation score	Change in Townsend score
Unadjusted		
Males		
<25	0.66 (0.15)**	0.62 (0.16)**
25-44	0.91 (0.31)*	0.91 (0.31)*
45-64	0.85 (0.30)*	1.28 (0.33)**
⩾65	0.66 (0.42)	0.89 (0.46)
Females		
<25	0.37 (0.08)**	0.56 (0.08)**
25-44	0.60 (0.14)**	0.61 (0.15)**
45-64	0.15 (0.21)	0.50 (0.21)*
⩾65	0.00 (0.23)	0.66 (0.25)*
Reciprocally adjusted		
Males		
<25	0.67 (0.18)**	0.02 (0.19)
25-44	0.86 (0.35)*	0.25 (0.38)
45-64	1.07 (0.35)*	–0.43 (0.40)
⩾65	0.96 (0.48)	–0.66 (0.55)
Females		
<25	0.18 (0.09)	0.42 (0.10)**
25-44	0.62 (0.16)**	–0.02 (0.18)
45-64	0.13 (0.24)	0.05 (0.27)
⩾65	0.00 (0.27)	0.05 (0.30)

*P<0.01, **P<0.001.

Despite these limitations, the ecological design was the most appropriate in this case to examine the effects of area based factors on suicide risk. Longitudinal studies with person and area based measures of social fragmentation and subsequent suicide are needed to support these findings in individuals and will help clarify the relative importance of individual and area characteristics in determining suicide risk.[18] Further research is also needed to examine why some areas experience high population turnover and social fragmentation and to inform social policy relating to these issues.

These analyses suggest that using census based measures of poverty to identify areas with high mortality may not be optimal for all causes of death. In particular, any targeting of suicide prevention may be more effective if aimed at socially fragmented rather than deprived areas. In future, the factors included in the

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Key messages

- Place of residence may affect health, and mortality from most common diseases tends to be higher in areas characterised by low socioeconomic position
- Research dating back over 100 years suggests that social fragmentation may influence suicide
- In the 1980s and 1990s, parliamentary constituencies with high levels of social fragmentation had high rates of suicide, independent of deprivation
- Constituencies with the greatest increases in social fragmentation between 1981 and 1991 also had the greatest increases in suicide rates over the same period
- Any targeting of suicide prevention may be more effective if aimed at socially fragmented rather than deprived areas

social fragmentation index[12] might be updated to reflect social trends—for example, the proportion of unmarried people could be replaced by the proportion currently divorced or separated, to reflect increasing cohabitation.

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Does publicity about cancer screening raise fear of cancer? Randomised trial of the psychological effect of information about cancer screening

Jane Wardle, Tamara Taylor, Stephen Sutton, Wendy Atkin

Critics of cancer screening have suggested that the publicity associated with it can provide people with a new health worry.[1] After a mass media heart disease campaign in Norway a national survey showed that 17% of those who had seen the campaign materials were worried about heart disease and that these people were most likely to make behaviour changes.[2] No comparable data on publicity about cancer screening are available.[3]

We evaluated the impact of publicity about a new bowel cancer screening programme, comparing a group who had been sent information about the programme with a control group who had not.

Participants, methods, and results

Participants aged 55-64 were identified from family health services authority registers and confirmed by their general practitioner to be suitable for screening for bowel cancer. This study group is part of a randomised controlled trial of flexible sigmoidoscopy for the prevention of bowel cancer.[4]

Altogether 2961 adults in Leicester were randomised on a 2:1 ratio, with computer generated random allocations, to receive brief information by post about the flexible sigmoidoscopy screening test (n=1974) or not (n=987). Couples were randomised together to avoid contamination. People in the information group were also asked whether they would be interested in having the test. All participants were sent a letter from their general practitioner requesting their cooperation with the questionnaire study and a questionnaire, which included items on worry about bowel cancer, perceived risk, minor bowel symptoms, and anxiety (shortened version of the state trait anxiety inventory). Demographic and health status items were also included (table). Participants were unaware that they were participating in a study of the effect of information. The study was powered to detect a 0.6

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