

RESEARCH REPORT

Health underachievement and overachievement in English local authorities

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Objective: To identify English local authorities that "overachieve" and "underachieve" in health terms, given their level of deprivation, sociodemographic context, and region.

Design: Cross sectional study using data from the 1991 UK census and mortality data from 2000–2.

Setting: England.

Participants: 354 local authorities (total population 49 558 000).

Main outcome measures: Life expectancy. Residual life expectancy after regression analysis.

Results: In general, the more materially deprived the population of a local authority was in 1991, the lower its life expectancy a decade later, with men being more sensitive to the effects of deprivation than women. Many local authorities, however, did not follow this general trend, and these shared common characteristics. Mining, Manufacturing and Industry, and Urban Fringe authorities collectively had lower life expectancies than predicted by their level of deprivation, as did authorities located in the north west. Outer London and Education Centres and Inner London authorities had much higher life expectancies than predicted, as did authorities located in the east, south east, and south west. Given their level of deprivation, sociodemographic context, and region, 11 local authorities significantly overachieved for male life expectancy and 10 underachieved, while 12 overachieved for female life expectancy and three underachieved.

Conclusions: Life expectancy in English local authorities is strongly associated not only with material deprivation, but with the local sociodemographic context and the region where the authority is located. Some authorities defy their contexts, however, and overachieve in health terms, while others, including some in affluent areas, underachieve.

Deprivation and ill health are intimately linked in England, being concentrated in the same geographical areas as a century ago, following patterns largely determined during the industrial revolution.^{1–5} Mining and heavy industry, in particular, created a legacy of physical and social deprivation, damaging the health of successive generations^{6–7}: today life expectancy in industrial and former industrial local authorities is three years lower than the average for England,⁸ with material poverty underlying much of this health inequality.^{9–10}

Deprivation does not, however, explain all the variation in health across different areas, nor does it affect all areas equally. The health effects of socioeconomic conditions, demographic trends, and geography can be difficult to disentangle. Even with similar levels of deprivation and socioeconomic characteristics, some areas fare much better than others in terms of health.⁸ In psychology literature "resilience" describes the process whereby people avoid the negative outcomes associated with risks.¹¹ Related processes may operate at the population level, with some deprived communities resisting the detrimental health effects of adverse socioeconomic conditions, while others succumb. Despite having generally better health outcomes, affluent communities exhibit similar variations, which may be attributable to the same factors underlying resilience in deprived communities, or to alternative processes yet to be explored.

The central question remains: what causes communities to "overachieve" or "underachieve" in health terms, given their level of deprivation? The first step in answering this question is to identify the relevant communities. In this paper the search is performed at the level of local authorities, the administrative units of local government, as these deliver a range of services and social resources to their local

populations that have an impact on health, including: housing, education, social services, and leisure facilities. This study therefore explores the health achievement of the populations of English local authorities in relation to their levels of material deprivation, and seeks to answer three important questions:

- Are there particular sociodemographic area characteristics that foster overachievement or underachievement?
- Are there geographical patterns to health achievement, for example, by region?
- Which local authorities overachieve and underachieve, given their level of deprivation, sociodemographic context and region?

METHODS

Unit of analysis

Local authorities in England were chosen as the unit of analysis, as these are the administrative units of local government, with responsibility for local services including housing, education, social services, transport, planning, economic development, public health, and leisure facilities. The 354 local authorities have populations ranging from 2500 to 990 000. Two unusually small local authorities, City of London and Isles of Scilly, were combined with neighbouring authorities (Westminster and Penwith, respectively) for analysis. Data based on 1991 populations were geographically rebased to 1998 areas to take account of local authority boundary changes during the 1990s.

Measure of deprivation

The Townsend index (1991) was used to measure material deprivation. This index is an update of the original 1981

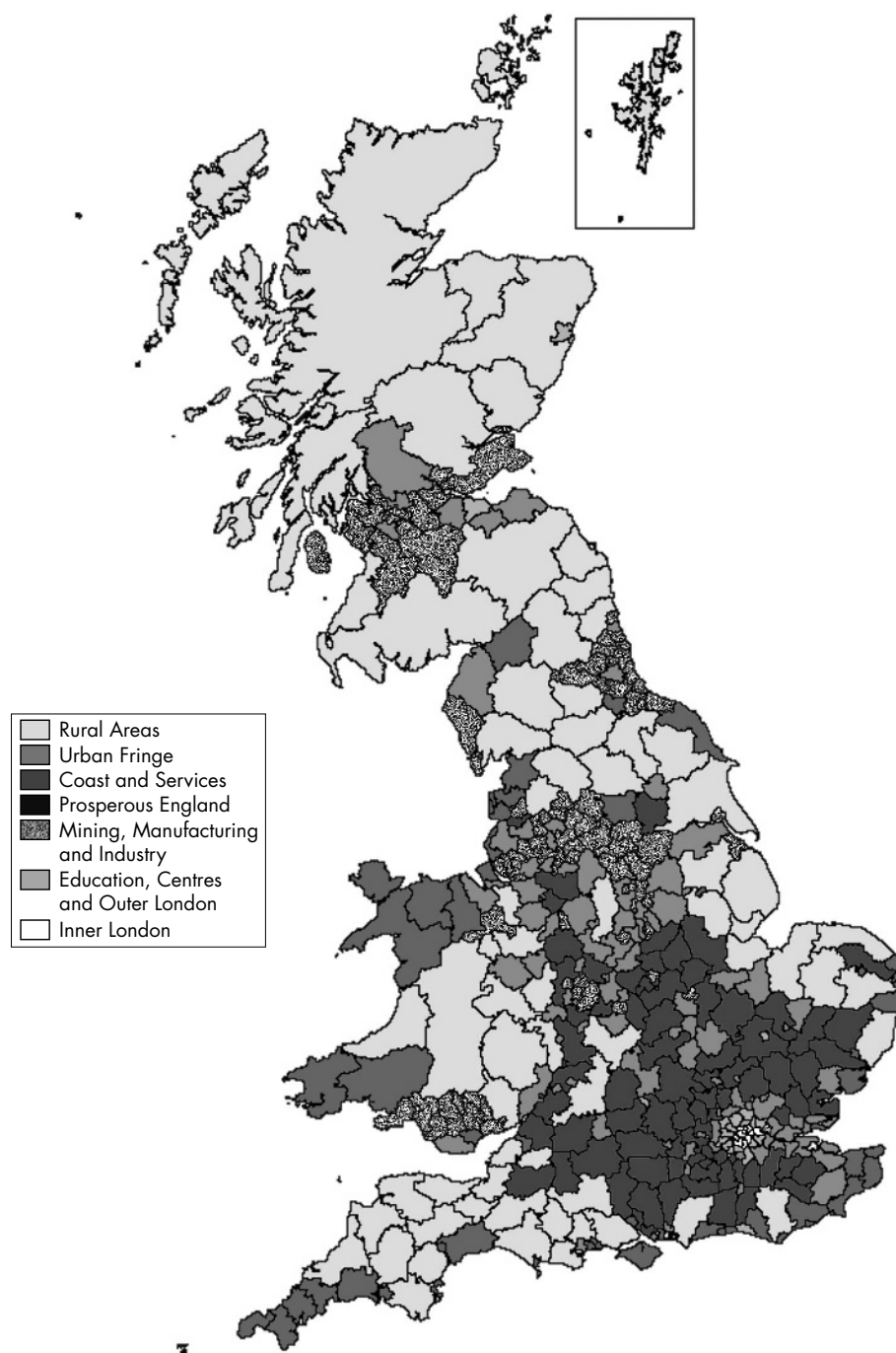


Figure 1 The seven families of the ONS *Classification of Local Authorities of Great Britain, 1999 revision*.¹³ Crown Copyright.

index developed by Townsend to measure area deprivation,¹² and is derived from data from the 1991 census. It is based on the proportion of: economically active population who were unemployed; households without access to a car; overcrowded households; and households not owner occupied.

Socioeconomic and demographic context

The industrial experience, degree of urbanisation/rurality, and sociodemographic composition of local authorities was measured using the Office for National Statistics' *Classification of Local and Health Authorities of Great Britain (1999 revision)* (fig 1).¹³ This provides a simple indicator of area characteristics, summarising 37 variables from the 1991 census in four domains: demographic structure and household composition; housing; employment; and socioeconomic characteristics.

The classification aggregates broadly similar local authorities into seven "families" (table 1).

Although the ONS classification results in some geographical clustering, physical location is not part of the clustering methodology.

Region

The location of the local authorities within the country was determined using the nine English administrative regions.

Health outcome

The health outcome was life expectancy, defined as the average number of years a newborn baby can expect to live if past mortality patterns continue. This summarises the experiences of the population across the whole age range.

Table 1 Local authority seven “families” as aggregated by the Office for National Statistics’ *Classification of Local and Health Authorities of Great Britain (1999 revision)*

Family	Reference name	Number of authorities
I	Rural England	55
II	Urban Fringe	85
III	Coast and Services	44
IV	Prosperous England	82
V	Mining, Manufacturing, and Industry	57
VI	Educational Centres and Outer London	18
VII	Inner London	11

To account for the time lag between exposure and outcome, life expectancy was measured for 2000–2002, using a three year average to adjust for annual fluctuations.

Data

Life expectancy and population data (mid-year estimates) for local authorities were derived from the Office for National Statistics, using the September and October 2004 revisions.^{14 15} Townsend scores were also derived within the ONS (personal communication).

Statistical analysis

Simple correlations were calculated using Spearman’s rank correlation coefficient for non-normally distributed data. The relation between deprivation, socioeconomic, and geographical factors and life expectancy was modelled through simple and multiple linear regression analyses, weighted for population size. Multiple regression models were constructed by hierarchical methods, taking deprivation as the most important predictor. Further predictors were included using the forward method. Mixed models were constructed with Townsend score treated as a continuous variable and ONS Family and Region as categorical variables.

Statistical analyses were performed in SPSS version 12.0.1.

RESULTS

The effect of material deprivation on life expectancy Deprivation in English local authorities

Townsend scores (1991) ranged from –6.01 for Wokingham, the most affluent local authority, to 14.64 for Tower Hamlets, the most deprived (mean: –0.03, SD: 3.55, median: –0.80, interquartile range: –2.62 to 1.83). The distribution was highly positively skewed (skewness: 1.2) with only 38 local authorities (10.8%) having Townsend scores in the top half of the range.

Life expectancy in English local authorities

Male life expectancy (2000–02) ranged from 71.4 years in Manchester to 79.5 years in Hart, East Dorset, and Rutland (mean: 76.36, SD: 1.54, median: 76.5, interquartile range: 75.2–77.5). Female life expectancy ranged from 77.5 in Manchester to 84.1 in Kensington and Chelsea (mean: 80.91, SD: 1.24, median: 81.0, interquartile range: 80.1–81.9). In every local authority female life expectancy exceeded male, ranging from 2.0 years in Crawley to 6.7 years in Blackpool (mean difference 4.56, SD: 0.71, median: 4.50, interquartile range: 4.10–5.00). The difference was positively linearly correlated with Townsend score: Spearman’s ρ $r = +0.63$ (95%CI: +0.540 to +0.706). That is, the greater the deprivation, the larger the gap in life expectancy between men and women.

Relation between deprivation and life expectancy

There was a strong negative linear correlation between the Townsend score (1991) and male life expectancy (2000–2002) for English local authorities (fig 2A). After weighting for population, the Spearman’s ρ correlation coefficient was $r = -0.83$ (95%CI: –0.791 to –0.857). A similar, though weaker, correlation existed for female life expectancy: $r = -0.71$ (95%CI: –0.658 to –0.761). The general relation between Townsend score and life expectancy can be quantified through linear regression:

- Male life expectancy (years) = 76.32 – (Townsend score \times 0.324)
- Female life expectancy (years) = 80.88 – (Townsend score \times 0.207)

Male life expectancy is therefore not only generally lower than female, but also more sensitive to the effects of deprivation.

Socioeconomic and demographic context

For both sexes, local authorities from the different ONS families conformed to clear patterns within the overall distribution (fig 2A). Rural Areas and Prosperous England authorities were concentrated in the top left quadrant of the distribution, having low levels of deprivation and high life expectancies. Urban Fringe and Coast and Services authorities principally occupied the central part of the distribution, while the Mining, Manufacturing and Industry authorities were concentrated around the bottom right of the distribution, having high levels of deprivation and low life expectancy. Education Centres and Outer London authorities were widely dispersed, with comparatively high life expectancies given their level of deprivation. Inner London authorities had life expectancies ranging from high to low despite all being located at the deprived end of the distribution.

Regional variations

Figure 2A was re-plotted by region (fig 2B). Local authorities in the South West, South East, and East Regions were concentrated in the top left quadrant (low-medium deprivation, high life expectancy). Yorkshire and Humberside, East Midlands, and West Midlands authorities were mainly scattered around the middle of the distribution. Most authorities in the bottom right quadrant (high deprivation, low life expectancy) were from the North West, North East, and London. These three regions, however, also had authorities in the top left quadrant. Given their levels of deprivation, life expectancy tended to be low in North West authorities and high in London authorities.

Modelling the effects of deprivation, socioeconomic, and region on life expectancy

Multiple regression models

The effects of deprivation, sociodemographic context, and region on life expectancy were explored through multiple regression modelling (table 2). For these models the Mining, Manufacturing and Industry family and the North West Region, which had the lowest coefficients in simple regression modelling, were the reference groups.

Of the three individual predictor variables, deprivation was the most powerful predictor of male life expectancy and region the weakest (models 1–3). ONS family was almost as powerful a predictor as deprivation, however, and was a more powerful predictor of female life expectancy. Deprivation combined with either ONS family or region was a more powerful predictor than deprivation alone (models 4–5), with deprivation and region being the most powerful combination.

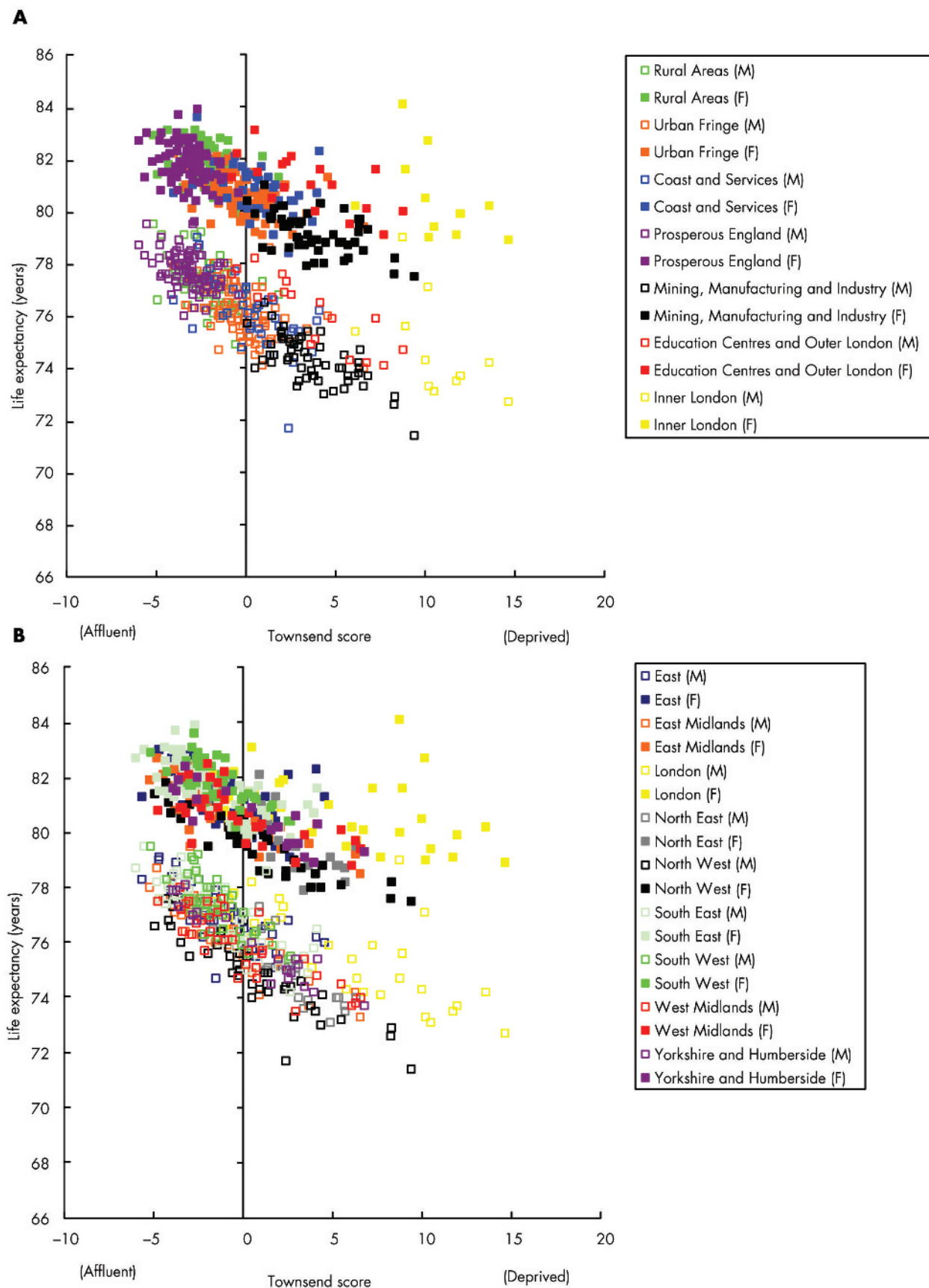


Figure 2 (A) Correlation between deprivation (Townsend score 1991) and life expectancy (2000–2002) for men (M) and women (F) in English local authorities, by ONS family. (B) Correlation between deprivation (Townsend score 1991) and life expectancy (2000–2002) for men (M) and women (F) in English local authorities, by region.

Table 2 Multiple regression models—life expectancy 2000–2002 regressed on deprivation (Townsend score 1991), ONS family* and region†

Model‡	Male life expectancy						Female life expectancy					
	1	2	3	4	5	6	1	2	3	4	5	6
	Deprivation	ONS family	Region	Deprivation and ONS family	Deprivation and region	Deprivation and ONS family and region	Deprivation	ONS family	Region	Deprivation and ONS family	Deprivation and region	Deprivation and ONS family and region
Constant	76.321	74.200	74.488	75.695	75.137	75.124	80.882	79.206	79.364	80.127	79.778	79.647
Coefficients:												
Townsend score	–0.324			–0.350	–0.339	–0.351	–0.207			–0.215	–0.216	–0.222
ONS family												
Rural Areas		3.186		0.853		0.370		2.653		1.217		0.730
Urban Fringe		1.981		0.388		–0.001		1.457		0.476		0.100
Coast and Services		1.607		0.456		0.010		1.490		0.781		0.362
Prosperous England		3.489		0.896		0.319		2.600		1.003		0.433
Mining, Manufacturing and Industry		0.0		0.0		0.0		0.0		0.0		0.0
Education Centres and Outer London		1.925		1.694		0.745		1.785		1.643		0.931
Inner London		0.362		2.550		1.580		1.153		2.500		1.828
Region												
East			2.520		1.461	1.282			2.040		1.366	1.140
East Midlands			1.550		0.811	0.701			1.147		0.676	0.569
London			1.237		2.360	1.554			1.414		2.130	1.223
North East			0.231		0.615	0.636			0.120		0.365	0.439
North West			0.0		0.0	0.0			0.0		0.0	0.0
South East			2.633		1.532	1.325			2.130		1.428	1.170
South West			2.595		1.575	1.383			2.263		1.613	1.262
West Midlands			0.894		0.845	0.792			0.948		0.917	0.885
Yorkshire and Humberside			0.899		0.943	0.919			0.785		0.813	0.776
R ²	0.623	0.614	0.350	0.773	0.808	0.833	0.413	0.563	0.377	0.660	0.678	0.737

*Mining, Manufacturing and Industry family is the reference family. †North West is the reference region. ‡Regression models for each factor in isolation (models 1–3), and for deprivation with ONS family and/or region (models 4–6).

The most powerful model overall combined all three factors (model 6), explaining 83% of the variation in life expectancy across local authorities for men and 74% for women. The effect of each factor in this complete model is discussed below.

Deprivation

The effect of deprivation remains comparatively stable across all models. In model 6, each point of deprivation reduced male life expectancy by four months and female life expectancy by three months. Over the range of Townsend scores this equates to 7.3 years for men and 4.6 years for women.

Socioeconomic and demographic context

The ONS families can be broadly divided into three groups for life expectancy. The first includes the Mining, Manufacturing and Industry, Urban Fringe, and Coast and Services families, which had the lowest life expectancies. The second group includes the Prosperous England, Rural Areas, and Education Centres, and Outer London families, with life expectancies up to a year greater than the Mining, Manufacturing and Industry family. The third “group” is Inner London, with life expectancy 19 months (men) and 22 months (women) greater than the Mining, Manufacturing and Industry family.

Regional variations

The regions can similarly be divided into three groups. The North West is effectively alone, having by far the lowest life expectancy. The second group, consisting of the North East, East Midlands, West Midlands, and Yorkshire and Humberside, had substantially greater life expectancy. The third group (the East, South East, South West, and London) had life expectancy over a year greater than the North West.

Overachieving and underachieving local authorities

Outliers—that is local authorities with significantly higher or lower life expectancies than predicted—can be identified from the regression models (tables 3 and 4). For men, deviation from predicted life expectancy ranged from 3.8 years above for Kensington and Chelsea to 2.6 years below for Blackpool. For female life expectancy, the deviation ranged from 3.3 years above for Kensington and Chelsea to 2.0 years below for Lichfield. Four local authorities (Kensington and Chelsea, Westminster, Christchurch, and Alnwick) were positive outliers for both sexes and one (Newham) was a negative outlier.

DISCUSSION

This study provides further evidence of the strong relation between deprivation and poor health: the more deprived the population of a local authority was at the time of the 1991 census, the lower its life expectancy a decade later. Several local authorities, however, did not follow this general trend, and many of these share common characteristics. It is worth noting that our study compared average levels of deprivation between local authorities. Variation in deprivation within local authorities, which is independently related to premature mortality,¹⁶ did not explain the findings (data not shown).

Sex clearly influenced the relation between material deprivation and life expectancy, with men being more sensitive to the effects of deprivation than women. The greater spread of life expectancies for men (8.1 years compared with 6.6 years for women) was attributable to extremely low male life expectancy in the most deprived local authorities, resulting in a wider sex gap at the low end compared with the high end of the deprivation range. While it is possible that the measured aspects of deprivation are less appropriate for women,¹⁷ there are alternative explanations. Women, for example, may be less

Table 3 Identifying overachieving and underachieving communities: local authorities with the highest and lowest standardised residuals for male life expectancy (based on model 6), 2000–2002

Local authority	Standardised residual	Residual (years)	Townsend score	ONS family	Region	Life expectancy (years)
Overachievers (highest standardised residuals)						
Kensington and Chelsea	5.75	+3.8	8.74	Inner London	London	79.0
Crawley	3.94	+2.6	1.30	Urban Fringe	South East	78.6
Westminster	3.63	+2.4	10.14	Inner London	London	77.1
Rutland	3.50	+2.3	-2.96	Prosperous England	East Midlands	79.5
Ellesmere Port and Neston	2.55	+1.7	0.04	Urban Fringe	North West	76.8
Christchurch	2.30	+1.5	-2.74	Coast and Services	South West	79.0
Redditch	2.26	+1.5	0.89	Urban Fringe	West Midlands	77.1
Alnwick	2.25	+1.5	0.91	Rural Areas	North East	77.3
Purbeck	2.17	+1.4	-2.53	Rural Areas	South West	79.2
Lewes	2.00	+1.3	-2.62	Coast and Services	South West	78.7
Berwick upon Tweed	1.97	+1.3	1.81	Rural Areas	North East	76.8
Warwick	1.90	+1.3	-1.22	Urban Fringe	West Midlands	77.6
North Dorset	1.84	+1.2	-2.86	Rural Areas	South West	79.1
Norwich	1.84	+1.2	4.08	Coast and Services	East	76.2
Ashford	1.82	+1.2	-0.99	Urban Fringe	South East	78.0
Underachievers (lowest standardised residuals)						
North East Lincolnshire	-1.50	-1.0	1.56	Mining, Manufacturing and Industry	Yorkshire and Humberside	74.5
Brighton and Hove	-1.55	-1.0	3.62	Education Centres and Outer London	South East	74.9
Waltham Forest	-1.66	-1.1	5.77	Education Centres and Outer London	London	74.3
East Staffordshire	-1.98	-1.3	-0.28	Urban Fringe	West Midlands	74.7
South Bedfordshire	-1.98	-1.3	-2.25	Prosperous England	East	76.2
Torridge	-2.02	-1.3	-2.16	Rural Areas	South West	76.3
Hastings	-2.02	-1.3	2.63	Coast and Services	South East	74.2
North Shropshire	-2.02	-1.3	-2.16	Rural Areas	West Midlands	75.7
Medway	-2.08	-1.4	0.20	Urban Fringe	South West	75.0
Newham	-2.09	-1.4	10.19	Inner London	London	73.3
Stoke on Trent	-2.09	-1.4	2.94	Mining, Manufacturing and Industry	West Midlands	73.5
Ashfield	-2.13	-1.4	0.89	Urban Fringe	East Midlands	74.1
Lambeth	-2.23	-1.5	10.49	Inner London	London	73.1
Fenland	-3.39	-2.2	-1.53	Urban Fringe	East	74.7
Blackpool	-3.92	-2.6	2.38	Coast and Services	North West	71.7

Local authorities in **bold** are statistical outliers (standardised residuals of greater magnitude than ± 1.96).

What this study adds

- The strong relation between material deprivation and ill health is well known, and levels of deprivation influence resource allocation and policy decisions across the health and social fields.
- This study looked beyond material deprivation to examine the influence of sociodemographic context and location within the country on the health achievement of English local authorities.
- The relation between material deprivation and ill health is not uniform across communities. For example, the comparatively poor health of communities in and around industrial cities, and in the north west of England, is not entirely explained by material deprivation. Conversely, many authorities in the capital have much higher life expectancies than predicted by their levels of deprivation, as do authorities located in the east, south east, and south west regions.
- Certain local authorities defy their sociodemographic and regional contexts to achieve comparatively good health. Others have comparatively poor health outcomes despite advantageous socioeconomic circumstances.

exposed to the most severe aspects of deprivation¹⁸ or they may be more resilient to its effects than men.

The effect of deprivation on health also varied according to the sociodemographic characteristics of the local authorities as measured by the ONS area classification, for example, demographic structures, employment sectors, levels of education, etc. Mining, Manufacturing and Industry authorities, for example, had even lower life expectancies than predicted by their high levels of deprivation. While it is possible that Townsend score underestimates deprivation in Mining, Manufacturing and Industry authorities, where non-employed people are more likely to be registered as permanently sick, the characteristics of these authorities

Policy implications

- Policymakers should be aware that the relation between material deprivation and ill health, although strong, is not straightforward.
- It is possible that policies implemented at the local government level will influence health overachievement and underachievement, as these policies drive the delivery of community services that are powerful determinants of health.

Table 4 Identifying overachieving and underachieving communities: local authorities with the highest and lowest standardised residuals for female life expectancy (based on model 6), 2000–2002

Local authority	Standardised residual	Residual (years)	Townsend score	ONS family	Region	Life expectancy (years)
Overachievers (highest standardised residuals)						
Kensington and Chelsea	5.12	+3.3	8.74	Inner London	London	84.1
Westminster	3.46	+2.3	10.14	Inner London	London	82.7
Norwich	3.15	+2.1	4.08	Coast and Services	East	82.3
Guildford	3.13	+2.0	-2.71	Prosperous England	South East	83.9
Christchurch	2.63	+1.7	-2.74	Coast and Services	South West	83.6
Epsom and Ewell	2.46	+1.6	-3.79	Prosperous England	South East	83.7
Alnwick	2.28	+1.5	0.91	Rural Areas	North East	82.1
Harlow	2.18	+1.4	4.55	Urban Fringe	East	81.3
Harrow	2.16	+1.4	0.48	Education Centres and Outer London	London	83.1
Brent	2.16	+1.4	7.23	Education Centres and Outer London	London	81.6
Rutland	1.68	+1.1	-2.96	Prosperous England	East Midlands	82.4
Welwyn Hatfield	1.63	+1.1	-0.68	Urban Fringe	East	82.1
Blaby	1.50	+1.0	-4.83	Prosperous England	East Midlands	82.7
Shrewsbury	1.47	+1.0	-1.83	Urban Fringe	West Midlands	82.0
Underachievers (lowest standardised residuals)						
Waltham Forest	-1.56	-1.0	5.77	Education Centres and Outer London	London	79.5
Torridge	-1.56	-1.0	-2.16	Rural Areas	South West	81.1
Swale	-1.63	-1.1	0.26	Urban Fringe	South East	79.8
Dover	-1.63	-1.1	0.08	Coast and Services	South East	80.1
Blackpool	-1.66	-1.1	2.38	Coast and Services	North West	78.4
Selby	-1.66	-1.1	-2.81	Prosperous England	Yorkshire and Humberside	80.4
Malvern Hills	-1.75	-1.1	-3.52	Rural Areas	West Midlands	80.9
Wandsworth	-1.75	-1.1	6.09	Inner London	London	80.2
Braintree	-1.78	-1.2	-1.53	Prosperous England	East	80.4
Broadland	-1.81	-1.2	-5.66	Prosperous England	East	81.3
Luton	-1.86	-1.2	2.59	Urban Fringe	East	79.1
Bromsgrove	-1.88	-1.2	-4.77	Prosperous England	West Midlands	80.8
Newham	-2.20	-1.4	10.19	Inner London	London	79.0
Wansbeck	-2.20	-1.4	3.37	Mining, Manufacturing and Industry	North East	77.9
Lichfield	-3.07	-2.0	-2.87	Prosperous England	West Midlands	79.6

Local authorities in **bold** are statistical outliers (standardised residuals of greater magnitude than ± 1.96).

(inner city with high levels of: unemployment; dense and poor quality housing; low educational attainment; manual workers in manufacturing and mining sectors¹³) seem to predispose them to underachievement in health. More surprisingly, Urban Fringe authorities, located on the peripheries of large urban centres and broadly having average levels of deprivation and average values for most variables in the ONS area classification, also underachieved. Are “average” local authorities therefore unhealthy places to live? Migration may have an important role in this: for both the above “families” there was a net drop in the population during the 1990s, which may have been partly because of healthier residents moving away.

Comparatively high life expectancies were found in the Education Centres and Outer London and the Inner London families. The latter family is characterised by a large black and Asian ethnic minority population, and high levels of unemployment, overcrowding, renting, carlessness, and lone parenthood.¹³ Such characteristics are frequently associated with poor health, which makes Inner London local authorities unusual: life expectancy is not as low as predicted given their levels of deprivation and certain of their sociodemographic characteristics. It is possible that the Townsend score overestimates deprivation in Inner London authorities, where many affluent residents do not possess a car, property prices are historically high, and a comparatively high proportion of non-owner occupiers are affluent private renters. Consequently, the correlation of material deprivation with car ownership, overcrowding, and housing tenure is weaker there than elsewhere in the country.^{19–20}

Inner London authorities remain overachievers, however, when alternative measures of deprivation, including Carstairs index, Breadline Britain index,²¹ and index of deprivation 2000⁸ are used, and historically have unusually low mortality rates for ischaemic heart disease, a leading cause of death.^{22–23} There are also plausible reasons for genuine overachievement. The concentration of the nation’s cultural and financial resources is likely to have a uniquely beneficial effect on residents, and attracts young, healthy people into the capital while making life less affordable for older, sicker people, who are obliged to move out.^{20–24} Compared with other ONS families, Inner London has more students, and the population is more likely to be highly qualified, employed in the finance and service sectors, and to belong to social classes I and II; characteristics also possessed to a lesser extent by the Education Centres and Outer London family.

Regional patterns were also clearly evident: local authorities in the north west collectively underachieved in health terms, while authorities in the east, south east, south west, and London overachieved. The north/south divide in health has been described in many studies,^{25–26} and variously attributed to the effects of deprivation,¹⁰ social composition,²⁷ contextual factors,^{28–29} or a complex interaction of all three.^{30–31} This study supports the view that deprivation is only part of the explanation, and that there are additional benefits in terms of longevity to living in the south and east of England, which will have social, cultural, and environmental explanations. It also supports Reid and Harding’s finding that deprivation is more detrimental to health in the north, where it is more likely to be long term,³² and Dorling

and Thomas's finding that greater distance from the capital is associated with poorer health.²⁴

Overachieving and underachieving local authorities

Deprivation, sociodemographic context, and region are powerful determinants of life expectancy for local authorities, but some authorities, identified as outliers in tables 3 and 4, defy these contexts. Some outlying authorities may be atypical for their "family", for example: Kensington and Chelsea, which has unique sociodemographic characteristics that render it difficult to classify. Others may be atypical for their region, for example: Alnwick and Berwick, which share characteristics with neighbouring Scottish local authorities.

Most outliers are not atypical, however, and there must be further unmeasured factors that explain their overachievement or underachievement. For example, exposure to occupational and environmental hazards is known to partly mediate the poorer health of deprived communities,^{33–35} and this may underlie not only the lower life expectancy of the north west and north east regions, and the Mining, Manufacturing and Industry and Urban Fringe families, but also the underachievement and overachievement of outlier local authorities.

A limited number of studies have investigated resilient communities—that is, deprived communities that have overachieved. Our study suggests, however, that both overachievers and underachievers across the spectrum of deprivation warrant further investigation. For example, why is life expectancy in Norwich so much higher (by 4.5 years for men and 3.9 years for women) than in Blackpool, a similarly sized and deprived Coast and Services authority? Blackpool's location in the north west does not entirely explain this gap. Is the population of Norwich more resilient to the effects of deprivation? At the affluent end of the scale, Epsom and Lichfield are similar Prosperous England authorities, yet life expectancy in Epsom is higher by 1.3 years for men and 4.1 years for women. As the generally affluent population of Epsom is not suffering material adversity it could not accurately be described as resilient, so do different processes explain overachievement in deprived Norwich and affluent Epsom? Although even affluent authorities contain areas of deprivation, it is unlikely that resilience among deprived communities within otherwise affluent authorities will entirely explain their comparatively high life expectancies.

It is possible that the policies and activities of local authorities themselves may provide part of the explanation, as they influence the delivery of community services that are powerful determinants of health. Resilience is certainly influenced by social, cultural, and political context (for example, social support, ethnographic history, and local economic policy),^{31–36–37} with good community resources, such as schools, libraries, recreation centres, and social services, being particularly important.³⁸ Further work in the outlier local authorities identified in this study would discover if such resources are stronger in overachieving authorities, and weaker in underachieving authorities, across the spectrum of deprivation.

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