Widening life expectancy inequalities across small areas of England

Published Online
October 12, 2021
https://doi.org/10.1016/
S2468-2667(21)00227-9

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The UK has a long tradition of investigating geographical differences in mortality going back to the middle of the 19th century. William Farr, the 19th century pioneer of scientific analysis of vital statistics data, regarded identification and investigation of unhealthy districts as a way to help inform policies to reduce social inequalities in mortality.[1] The persistence of pronounced geographical inequalities in the UK and their widening over the past 30–40 years has been noted on many occasions.[2–4] In *The Lancet Public Health,* Majid Ezzati and colleagues are the latest to contribute to this line of research.[5] They used annual data by age and sex on populations and deaths occurring over the period 2002–19 to estimate life expectancy (probabilities of death at different ages) for each of 6791 middle-layer super output areas (MSOAs) in England. Although Public Health England have an easy to use public website that allows anyone to generate maps and tabulations of mortality for recent years for these same small areas,[6] the real contribution of this Article by Ezzati and colleagues is the rigorous statistical approach they take, which allows them to paint a broad and convincing picture of important trends and differences.

MSOAs are small areas with populations of between 5000 and 15 000 people. A conventional approach to handling these routine data would struggle with the fact that estimates of mortality for such small populations inevitably have a lot of random noise. Ezzati's team at Imperial College London have been at the forefront of using Bayesian modelling approaches to deal with this type of uncertainty. Its application in small area analyses has a strong methodological basis.[7] Although some of the fine-grain variation in rates by area and year might be missed due to smoothing, the approach reliably captures the overall extent of spatial and temporal mortality variation.

These analyses clarify what underlies the well documented stalling of UK life expectancy over the past decade.[8] What is seen for the first time, using elegant graphical presentations, is that in England at least, this national trend is driven by the entire distribution of life expectancy changes within small areas moving downwards from 2010. This trend results in some MSOAs showing a decline in life expectancy. Although in the period 2002–10, there were almost no MSOAs that showed declines, between 2014 and 2019, life expectancy was estimated to have declined in 1270 (18·7%) MSOAs for women and 784 (11·5%) for men. What is particularly shocking is that the small areas that had the lowest life expectancy a decade ago are the ones that have shown the smallest increases in life expectancy in subsequent years, whereas those that had the highest life expectancy, saw the largest increases. As a consequence, the life expectancy gap between the best and worst areas has increased, an effect that is much more pronounced for women than men.

Socioeconomic deprivation is intimately connected with these trends. Ezzati and colleagues show that, on average, gains in life expectancy were smallest in the most socioeconomically deprived areas and largest in those areas that were least deprived. They also speculate about the contribution of changes in wealth and resources available to local authorities. However, changes in wealth and resources are more convincingly addressed by a recent Article in *The Lancet Public Health*, which concludes that at the level of local authorities, reduced funding to local government is associated with smaller improvements in life expectancy.[9] Findings from these two articles are mutually reinforcing despite differences in the level of spatial resolution at which they were conducted.

The sophistication of the statistical methods used in the Article by Ezzati and colleagues[5] might go beyond what many public health professionals feel comfortable with. Nevertheless, the authors are suitably self-critical about some of the limitations and problems with their approach. However, their choice of life expectancy as the main focus together with the oldest age group being 85 years and older raises some concerns due to the higher sensitivity of this measure (compared with age-standardised death rates or standardised mortality ratios) to mortality patterns at ages beyond 85 years. Moreover, although acknowledged in the Article, there remains the concern that intercensal estimates of population could be incorrect. More fundamentally, in the absence of census-linked microdata that ensures a

fully reliable correspondence between area of residence for deaths and populations, numerator-denominator bias cannot be excluded.

Public health in England is the responsibility of local authorities. From a policy perspective, mortality analyses at the level of local authorities has an obvious rationale. Moreover, much of the emphasis on the role of government-imposed austerity in driving negative mortality trends has focused on inadequate funding of local authorities by central government.[9] However, within many local authorities there are large differences in deprivation level between MSOAs, and these are indeed reflected in differences in health and mortality, as can be seen in the Public Health England fingertips profiles.[10] It would therefore be of great policy relevance to distinguish the extent of inequality across MSOAs that can be accounted for by between local authority effects compared with within local authority effects. Quantifying these using measures from the Gini-coefficient family of measures would be a step forward.

Ezzati and colleagues conclude that "regular reporting of life expectancy with high granularity is essential to identify places in need of intervention and to measure the effects of policies." This conclusion has echoes of Farr's interest in unhealthy districts. The analyses of between and within local authority effects should help identify the balance between targeting interventions at struggling small areas, compared with interventions at the level of local authorities or even regions. This question has been given an even greater salience by the COVID-19 pandemic, which has revealed stark variations in susceptibility across communities.

We declare no competing interests.

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