

Are cities becoming more unhealthy? An analysis of mortality rates in Belfast and Dublin between 1981 and 1991 to illustrate a methodological difficulty with ecological studies

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Ecological studies are increasingly being used to monitor changes in status over time or as a way of evaluating area based policy interventions¹ and as a method of examining for widening inequalities in health.² The principle is to apply the same assessment instruments to the same areas at two points in time and to compare the changes. However, most of these studies ignore the possible contribution of population change.³ This paper aims to compare the inter-censal changes in the mortality experience of the two capital cities in the North and South of Ireland with the rest of the country to see if these changes are related to population movement.

Methods

Each country was divided into three areas; capital city, hinterland and the rest of the country. For the South of Ireland the first two of these were respectively Dublin City Borough (which is nested within Dublin County) and the remainder of Dublin County. The equivalent divisions for Northern Ireland were Belfast City (defined by the Belfast Local Authority boundary) and the Belfast hinterland, formed by banding together the five local government districts contiguous with Belfast. The Townsend index was used to assess the relative deprivation of the areas in the North and the SAHRU (Small Area Health Research Unit) index⁴ was used in the South.

Deaths for the three years spanning the 1981 and the 1991 censuses in Northern Ireland and for each census year in the Republic of Ireland

were directly standardised for each of the six geographical areas using the World Health Organisation standard population. Intercensal changes in the standardised death rates were estimated using standardised rate ratios.

Results

Approximately two thirds of the electoral wards in Belfast City and half of those in Dublin city Borough were classified as "deprived" or "most deprived". Over half of the wards comprising the Belfast hinterland and three quarters of those surrounding Dublin were "affluent" or "most affluent". The remaining parts of the two countries were less economically polarised.

Table 1 show the changes in death rates for the separate areas in each country. In 1981, both capital cities had higher standardised death rates than all of the combined remainder of the country. The standardised rate ratios for Belfast City versus the rest of the North and for Dublin City Borough versus the rest of the South were 1.06 (99% confidence intervals (CI) 1.02, 1.09) and 1.03 (99%CI 1.01, 1.06) respectively. The hinterland of Belfast experienced similar death rates to the rest of Northern Ireland while the areas surrounding Dublin had rates lower than the rest of the South, standardised rate ratio 0.87 (99%CI 0.84, 0.94). Between 1981 and 1991 death rates had fallen in all areas but not uniformly so. Death rates declined by 34% and 21% respectively for the Belfast hinterland and the rest of Dublin County compared with 16% and 9% for Belfast and Dublin cities. Consequently the

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Table 1 A comparison of the standardised death rates (SDR) for the capital city, the hinterland and the rest of the country for the North and South of Ireland, in 1981 and in 1991

	North of Ireland		
	Belfast SDR (95% CI)	Belfast Hinterland SDR (95% CI)	Remainder of Northern Ireland SDR (95% CI)
1981	499.6 (5.2)	472.0 (5.1)	473.7 (3.1)
Std rate ratio (99% CI)		1.00 (0.97, 1.03)	
1991	409.1 (4.8)	305.3 (3.6)	369.5 (2.7)
Std rate ratio (99% CI)		0.83 (0.80, 0.86)	
	South of Ireland		
	Dublin County Borough SDR (95% CI)	Rest of Dublin County SDR (95% CI)	Rest of South of Ireland SDR (95% CI)
1981	453.0 (4.1)	388.1 (4.7)	445.4 (1.8)
Std rate ratio (99% CI)		0.87 (0.84, 0.90)	
1991	412.3 (3.9)	302.3 (3.7)	368.0 (1.7)
Std rate ratio (99% CI)		0.82 (0.80, 0.85)	

99% Confidence intervals have been used for the standardised rate ratios because of the large number of possible comparisons.

difference in the mortality experience between the cities and the surrounding areas increased over the decade to 34% in the South and 36% in the North. There was a close relation between the decline in standardised death rates and the net population change between 1981 and 1991 (Pearson correlation -0.845 , $p = 0.034$).

Discussion

The paper suggests that selective migration has played a significant part in explaining the changing patterns of health around these cities. In the recent past there has been a net emigration from the deprived areas within cities⁵ towards the more affluent areas of the hinterland, with resultant residualisation and increasing geographical polarisation. It is possible this exodus may be reversed in the future, as inner cities are revitalised, with an equally selective influx of a younger, wealthier and probably healthier population. In any event the nature of population movement will have implications for how we should monitor change in society and about our ability to link effect with cause.

Profiles of cities and Health Action Zones are useful for identifying problems and problem areas, for proposing scope for improvement and for stimulating action. However, as the populations at the two time periods are not

the same, there are difficulties in using ecological analysis for assessing change or for evaluating interventions. Perhaps it is time to rethink how these initiatives should be assessed and whether there is a need for the detailed and expensive baseline health surveys that usually accompany them. There are no easy solutions. One possibility would be to ignore the boundaries and concentrate on people, though this is only possible where there are means for prospectively monitoring on an individual basis. Alternatively Healthy Cities or Health Action Zones could cease striving to monitor health outcomes and be content with ensuring that the correct structures are in place and processes operating.

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- 1 Jacobson B, Yen L. Health action zones. *BMJ* 1998;**316**:164.
- 2 McLoone P; Boddy FA. Deprivation and mortality in Scotland, 1981 and 1991. *BMJ* 1994;**309**:1465–70.
- 3 O'Reilly D. Migration from deprived areas may be a factor. *BMJ* 1994;**309**:57–8.
- 4 Kelly A. *A national deprivation index for health and health services research. The Small Area Health Research Unit.* Dublin: Trinity College Dublin, Department of Community Health and General Practice, 1997.
- 5 Fielding T. Migration and poverty: a longitudinal study of the relationship between migration and social mobility in England and Wales. *IDS Bulletin* 1997;**28**:48–57.