Towards a geography of health inequalities in Ireland

Jan Rigby, Mark Boyle, Martin Charlton, Danny Dorling, Walter French, Dennis Pringle

Abstract

That there exists a relationship between health inequalities and social disadvantage is well established, but less is known about spatial variations in health. Most geographical studies of health in Ireland have been conducted at a county level. Counties are too large to identify more localised pockets of poor health, whereas electoral districts (EDs) can be too small to permit stable estimates of the underlying rates, due to the small number of deaths each year. This paper reports the findings of an analysis of deaths in 2006 using a new set of areas intermediate in size between counties and EDs. The areas having the lowest and the highest age standardised death rates were mostly in Dublin and the other larger cities, but further modelling is required to establish whether this simply reflects the geography of social status, and whether it is consistent over subsequent years.

Introduction

There is a large body of literature in other countries demonstrating a relationship between socio-economic inequalities and health. Numerous authors[1-5] have demonstrated that those in the lower socio-economic groups endure appreciably greater levels of illness and die earlier. The social determinants of health in more affluent countries are now well-established[6].

Similar socio-economic inequalities in health have long been reported in Ireland[7-9], whilst Balanda and Wilde[10] produced a very persuasive report identifying inequalities from mortality data across socio-economic groups for a wide range of causes for all Ireland, and comparatively for Northern Ireland and the Republic. O'Shea[8], focusing on males, found that the gap in the years of potential life lost by socio-economic group had widened between 1981 and 1991. Farrell et al.[11],and more recently Burke and Pentony[12] have made proposals for policy to address these growing inequalities based on an examination of the social determinants of health in the Irish context.

There is also a large body of literature in other countries reporting spatial inequalities in health, i.e. the idea that one's health and life expectancy may depend upon where one lives[13]. Social inequalities express themselves spatially and because there is a place effect, or a neighbourhood effect, place acts to amplify differences.

Deprivation indices are often used to identify where health and well-being may be poor, but the relationship is not consistent in that areas that can be identified as the most deprived do not necessarily have the worst health outcomes[14]. In many cases, an area may be disadvantaged by factors other than social inequalities (e.g. environmental factors, access to services, local cultures). Effective policy formulation therefore needs to be evidence-based, taking account of all the factors that may impact upon health.

Although there is a long history of studies of spatial disparities in mortality in Ireland[15-17], these studies, with only a few exceptions[18,19], were confined to inter-county comparisons. More recently, Smyth[20]

demonstrated that socio-economic inequalities in mortality increased significantly during the period 2000-2006, but again the analysis was restricted to county level. Such a level of aggregation hides smaller areas of very poor health which may exist, even in a county which overall may have generally favourable outcomes. To get a more complete picture, and in particular to monitor the outcome of policy changes, it is necessary to analyse the outcomes at a more sensitive scale (i.e. using smaller areas).

A case can be made for collecting mortality and other health outcome data for Electoral Divisions (EDs), however EDs are not suitable for analytical purposes as their populations are sometimes too small (in 2006 ED populations ranged from 76 to 32288). Hence rates calculated for EDs will tend to be unstable because of the low numbers of deaths. Therefore what is required is a set of spatial units intermediate in size between EDs and counties.

This paper reports the results of two sets of mortality rates for 2006 calculated for specially-designed Intermediate Areas. 2006 is the first year for which mortality data in digital form are available nationally. Age standardised rates were calculated by the direct method for all deaths and for premature deaths, defined here as deaths under 75 years of age. Work is underway to produce comparative rates for subsequent years.

Methods

The research team here took an innovative approach and devised a new intermediate area geography, consisting of areas with an approximately equal-sized population of 10,000 people. These Intermediate Areas (IAs) were defined by aggregating EDs, or the new small areas produced for 2011 census dissemination, and can be viewed at www.chg.ie. Population totals for 5-year age bands in 2006 were generated for each IA in conjunction with CSO and Pobol.

Mortality records for 2006 were obtained from GRO/CSO. Records of deaths of visitors to Ireland, deaths in hospitals where there was no other locational information, deaths which were otherwise incomplete (no address information), or deaths which were duplicated in the file were removed, leaving 27,681 deaths. The deceased persons' home addresses were then georeferenced using a geocoder developed in-house. Manual validation checks were conducted on the results. The records were then allocated by 5-year age bands to the appropriate Intermediate Area.

Death rates were calculated by the direct method, standardising to the European Standard Population, for both (i) all ages and (ii) under-75s (representing 'premature' mortality). Using the European Standard Population will permit direct comparisons with similar rates calculated subsequently for other years. The rates were divided into deciles for mapping.

Results

The directly age-standardised mortality rates (per 100,000 population) for 2006 suggest there are substantial inequalities in health in Ireland. The all-age mortality rates range from 80.3 to 1489.4 (Standardised Mortality Ratios (SMRs) go from 48.4 to 189.3); whilst the rates for the under-75s range from 81.9 to 655.0 (with SMRs from 33.3 to 228.9). This would suggest an 8-fold difference in premature

mortality between the worst and best areas, but it must be stressed that the rates are based on deaths in a single year. If we remove the 5% most extreme values (the 20 areas with the highest or lowest rates), the rates of premature mortality range from 139.8 to 515.7, which remains a stark differential. Given the relatively small number of deaths in a few areas, the estimated rates will tend to be more extreme than they would be over a longer period. The true extent of the extremes will only become clear when the 2006 data are supplemented with the data for subsequent years. This work is underway.

20 IAs with highest U75 mortality rates:	20 IAs with lowest U75 mort rates	20 IAs with highest all-age mortality rates	20 IAs with lowest all-age mortality rates
Dublin City (10): Arran Quay Ballymun East Cherry Orchard Crumlin East Finglas South Finglas North Merchants Quay N Mountjoy North Docks Ushers South **South Dublin (3):** Clondalkin N Clondalkin W Fettercairn Belgard **Cork City (2):** Cork Urban NW The Glen **Limerick City:** Limerick Urban South **Waterford City:** Ballytruckle Grange **Co Kildare:** Kildare Urban **Fingal:** Blanchardstown N **Co Wicklow:** Bray East	**Dun Laoghaire-Rathdown (4):** Blackrock N Clonskeagh E Stillorgan N Dundrum South Foxrock S Cabinteely SW **Dublin City (3):** Clontarf E Pembroke West W Rathfarnum N Rathmines West S **Fingal (2):** Blakestown NW Lucan N Castleknock SW **South Dublin** Knocklyon Ballyboden Lucan Central **County Kildare:** Kildare NE Naas North **Co Cork:** Ovens Innishannon **Co Donegal:** Inishowen N **Co Meath:** Navan South **Co Westmeath:** Glassan Moate **Co Wicklow:** Wicklow W **Waterford City:** Waterford Urban E **Galway City:** Bearna	**Dublin City (11):** Arran Quay Ballybough Croke Park Ballymun East Cabra North Crumlin East Finglas South Finglas North Kilmore W- Priorswood E Kylemore - Kilmainham W Merchants Quay N Priorswood W **Cork City (4):** Cork Urban NW Cork Urban S Cork Urban W The Glen **South Dublin (3):** Clondalkin N Clondalkin W Jobstown **Limerick City (1):** Limerick Urban S **Waterford City (1):** Waterford Urban W	**Fingal (4):** Abbotstown Castleknock N Blakestown NW Lucan N Castleknock SW Malahide E **South Dublin (3):** Lucan E Knocklyon Ballyboden Templeogue W St James **Dun Laoghaire – Rathdown (2)** Blackrock N Glencullen **Dublin City (2):** Pembroke East S Pembroke West W **Co Meath (2)** Navan South St Mary's **Cork County (2)** Douglas E Rathcooney- Riverstown **Co Clare (1):** Ennis N **Co Kerry (1):** Killarney Urban **Co Kildare (1):** Kildare NE **Co Rosscommon (1):** Roscommon Central **Waterford City(1):** Waterford Urban E

Table 1: Areas with the highest and lowest mortality rates, 2006.

Figure 1 shows the spatial distribution of rates for all-age mortality in 2006. There does not appear a clear spatial pattern, again due in part to possible instability in the estimated rates due to the relatively small number of cases. However, there would appear to be a cluster of generally low mortality areas (represented by the lighter shading) extending from east Galway across the midlands as far as Westmeath and Laois. There may also be a band of generally high mortality extending from Mayo eastwards as far as east Cavan, plus a cluster of generally high mortality rates covering a large part of north Munster.

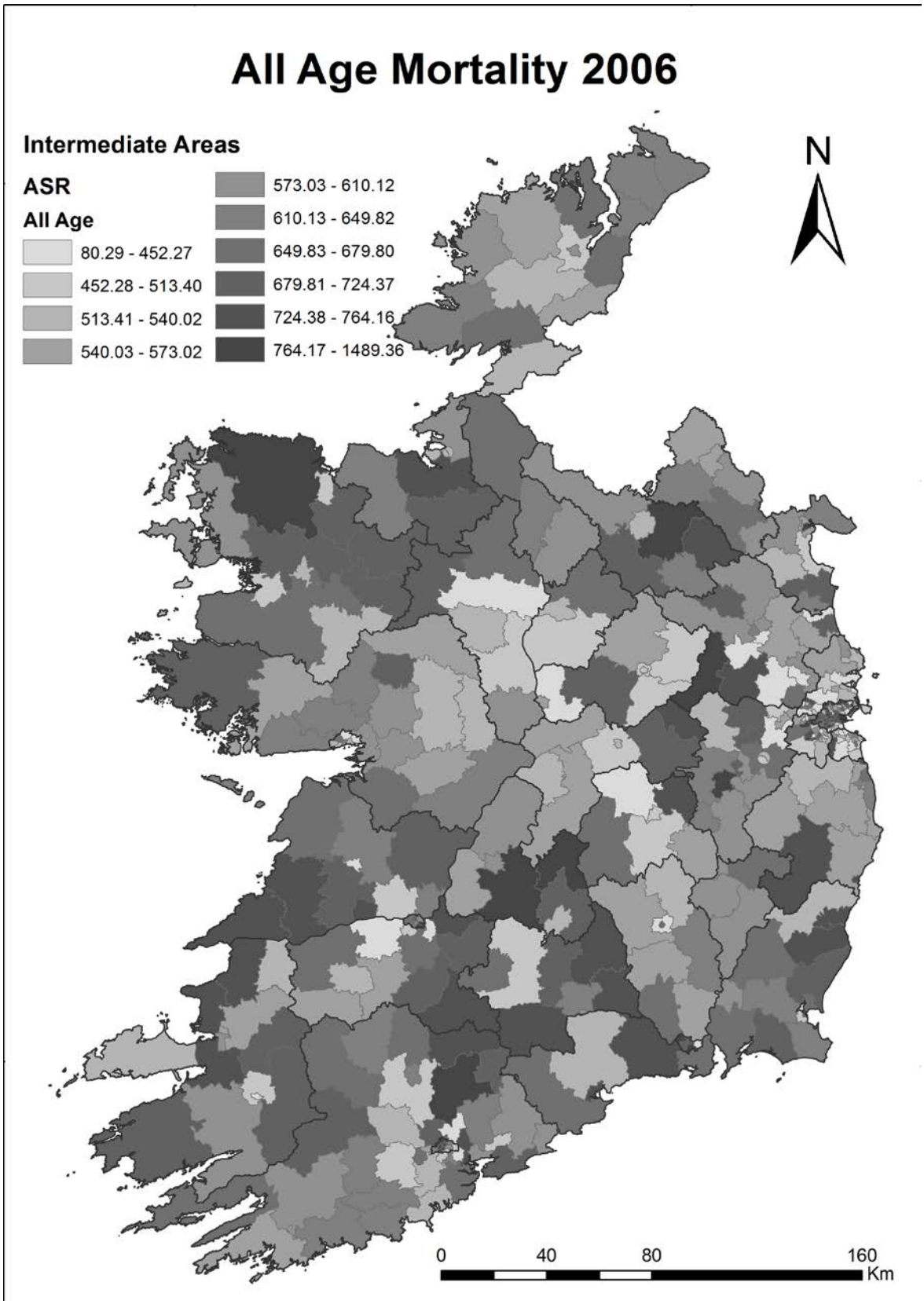

Figure 1 All age mortality, Ireland, 2006

The cluster of generally low mortality areas in the midlands is more pronounced in the map of premature mortality (Figure 2). The band of generally high mortality extending from Mayo is still apparent, but the cluster in north Munster is now less obvious. It should perhaps be noted that areas with very low mortality are in some cases directly adjacent to areas of very high mortality. If mapped at a county level, these extremes would tend to cancel each other out creating an impression of 'medium mortality', illustrating how small pockets of high mortality could easily be overlooked.

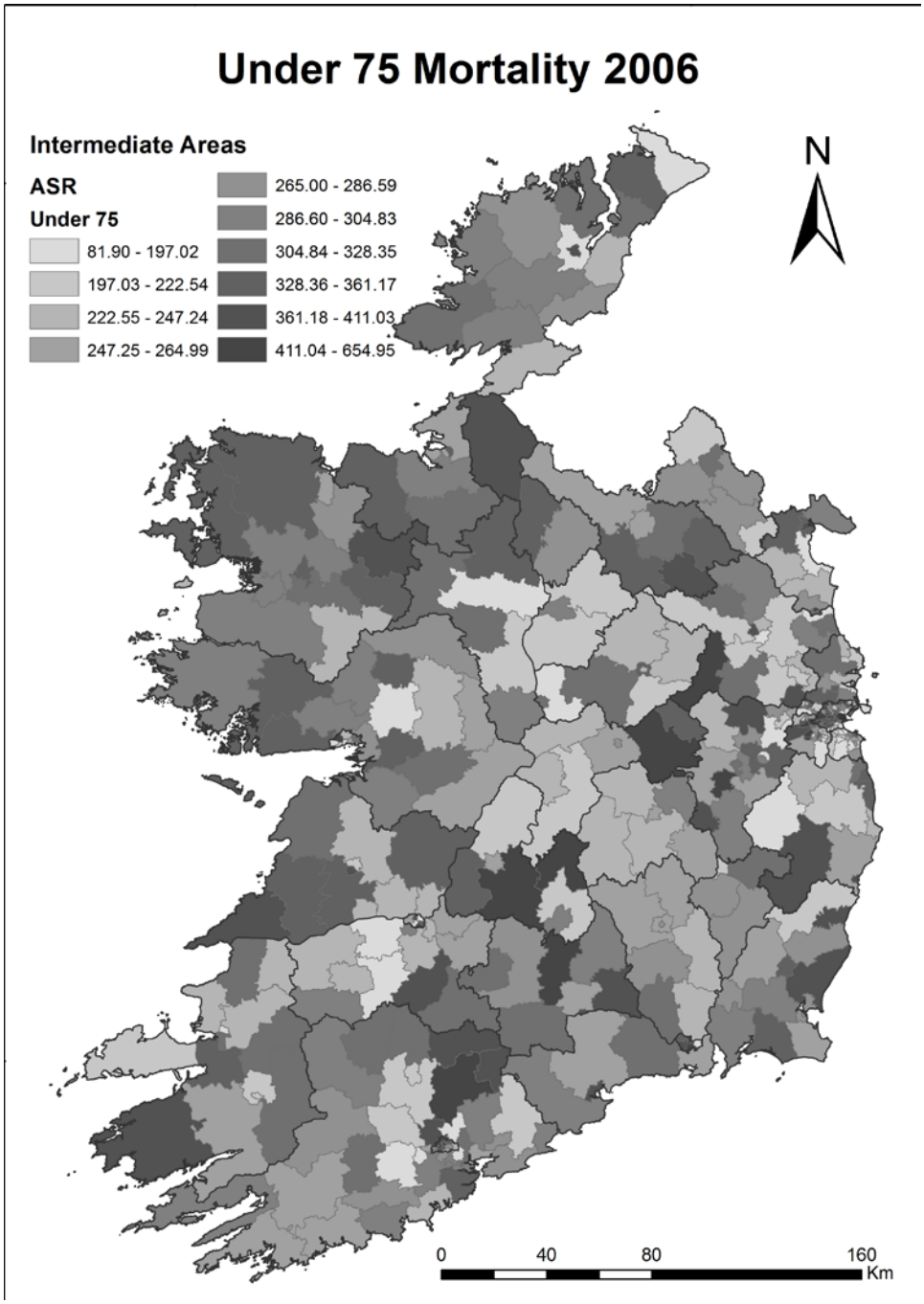

Figure 2: Premature mortality, Ireland, 2006

Traditional maps can be very misleading as the eye can see patterns that do not actually exist. A quite different impression arises if one examines the areas with both the highest and the lowest mortality rates (Table 1). Almost all of the areas in this table (high and low) are located in greater Dublin or the other major cities. However, they tend to be overlooked in Figures 1 and 2 because, although similar in population size, they are smaller in area and therefore almost invisible. Techniques exist to overcome this (e.g. cartograms), but can be more difficult to interpret and are not employed here.

Figure 3 shows the all-age mortality rates for the greater Dublin region. This very clearly brings out the northside/southside social divide in the city (which in reality tends to be more a northwest/southeast divide with relatively affluent areas such as Clontarf and Howth in the east north of the Liffey, and mostly working class areas in the west of the city south of the river, plus their extensions in parts of Tallaght, Clondalkin and Blanchardstown).

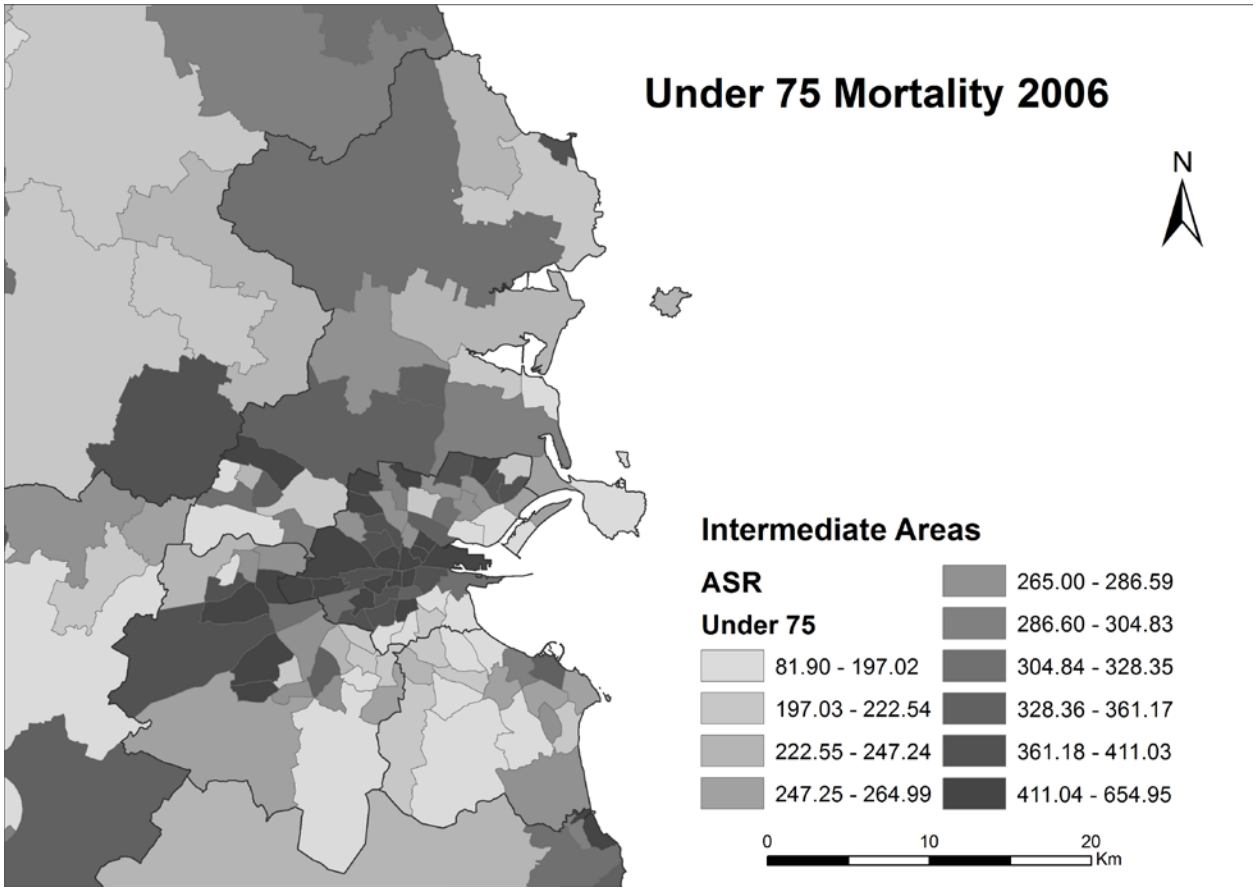

Figure 3: Premature Morality in the Dublin area

Discussion

"Where you live and what you work at has an impact on your health. If you work at an unskilled job and live in a deprived area, you are more likely to die earlier than a professional worker living in an affluent area" [12v]. It should be noted that where health inequalities exist, policy should aim to narrow the gap by raising the worst outcomes up to the standard of the highest, and not to move both extremes towards the 'average'.

The findings here demonstrate that the extent of geographical inequalities in mortality rates across Ireland are substantial. This study has produced rates at a finer geographical scale than heretofore. Further, the Intermediate Areas developed here should remain suitable for comparisons for the next decade or two, enabling temporal trends in the absolute rates for each area and the widening or narrowing of the disparities between areas to be identified. However, it should be noted that interventions to address health inequalities may not be reflected in mortality rates for several years, potentially an entire generation. This can produce a tension between the need for sustained, long-term policy measures and a desire for rapid change to support political campaigns.

Research is underway to model the 2006 data. One key question that we hope to address is whether the geographical patterns depicted in the maps simply reflect the geography of social disadvantage, or whether people living in some areas are disadvantaged (or privileged) in ways not directly related to social status. Rates for 2007 and subsequent years are in production. All rates will eventually be released for research purposes. Additional years will provide more stable estimates of the underlying rates and also enable the geography of mortality to be broken down by major categories of cause of death.

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References

1. Benzeval M, Judge K, Whitehead M (1995) Tackling Inequalities in Health: An Agenda for Action. London: Kings Fund.
2. Davey Smith G ed (2003) Health Inequalities. Bristol: Policy Press
3. Kawachi I, Kennedy BP (2002) The Health of Nations. New York: The New Press.
4. Shaw M, Dorling D, Gordon D, Davey Smith G (1999) The Widening Gap. Bristol: The Policy Press.
5. Townsend P, Davidson N, Whitehead M eds (1988) Inequalities in health: The Black Report and The Health Divide London: Penguin Books.
6. Marmot M, Wilkinson R (eds) (2006) Social determinants of health (2nd edition) Oxford: OUP
7. Nolan B (1990) Socio-economic mortality differentials in Ireland. Economic and Social Review 21(2): 193-208.
8. O'Shea E (1997) Male mortality differentials by socio-economic group in Ireland. Social Science and Medicine, 45(6): 803-809.
9. O'Shea E (2003) Social gradients in years of potential life lost in Ireland. European Journal of Public Health, 13: 327-333.
10. Balanda K, Wilde J (2001) Inequalities in Mortality 1989-1998: A Report on All Ireland Mortality Data, Dublin/Belfast: Institute of Public Health in Ireland.
11. Farrell C, McAvoy H, Wilde J, Combat Poverty Agency (2008) Tackling Health Inequalities. Dublin: Combat Poverty Agency.

12. Burke S, Petony S (2011) Eliminating Health Inequalities – A Matter Of Life And Death. Dublin: TASC.
13. Macintyre S, Ellaway A, Cummins S (2002) Place effects on health: how can we conceptualise, operationalise and measure them? Social Science and Medicine 55: 125-139.
14. Sridharan S, Tunstall H, Lawder R, Mitchell R (2007) An exploratory spatial data analysis approach to understanding the relationship between deprivation and mortality in Scotland. Social Science & Medicine 65: 1942–1952.
15. Pringle DG (1982) Regional Disparities In The Quantity Of Life: The Republic Of Ireland, 1971-7. Irish Geography 15: 22-3.
16. Pringle DG (1986a) Premature Mortality In The Republic Of Ireland, 1971-1981. Irish Geography 19: 33-40.
17. Pringle DG (1986b) Disaggregating Regional Variations In Mortality By Cause Of Death: A Case Study Of The Republic Of Ireland. Social Science and Medicine 23(10): 919-28.
18. Barry J, Sinclair H, Kelly A, O'Loughlin R, Handy D, O'Dowd T (2001) Inequalities in Health in Ireland – Hard Facts. Dublin: Department of Community Health and General Practics, Trinity College Dublin
19. Pringle DG (1987) Health inequalities in Dublin, in Horner AA, Parker AJ eds. Geographical Perspectives On The Dublin Region. Dublin: Geographical Society of Ireland.
**19. Kelly A, Teljeur C (2007) The National Deprivation Index for Health & Health Services Research. Small Area Health Research Unit, Technical Report, December 2007, Dublin: Trinity College Dublin.
20. Smyth B (2009) Mortality Inequalities in Ireland 2000-2006 Unpublished PhD Thesis NUI Galway.