

Socio-economic Mortality Differentials in Ireland

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Abstract: Differences in mortality rates between socio-economic groups for Ireland are analysed, using the standard methodology which has been extensively applied in other countries. This involves relating data on deaths by socio-economic group, gathered at time of death, to the total population in each group as shown in the Census of Population. Based on 1981 data for men aged 15-64, significant differentials in standardised mortality rates are found between professional/managerial occupational groups and semi-skilled or unskilled manual categories. Problems which arise due to the nature of the data are discussed, drawing on British experience.

INTRODUCTION

Differences in death rates between socio-economic groups have been the focus of a great deal of attention internationally. In the UK, for example, these differences have been studied for over a century, and interest in the topic was given new impetus by the Black Report (DHSS, 1980). It not only pointed to very large differences in death rates between occupational classes in Britain, but suggested that these differences had increased rather than decreased from the early 1930s to 1971. Partly as a result of this report, a substantial body of research on the interpretation of the available British data and its limitations, and on the causal factors at work, has been produced.¹

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1. A follow-up report by the Health Education Council (Whitehead, 1987) further fuelled the debate, suggesting that mortality differentials between manual and non-manual groups widened from 1971 to 1981.

Clearly, socio-economic mortality differentials generate such interest not only because they are of great significance in themselves, but also because they are taken to be indicators of wider social and economic differences. As Wilkinson (1986) puts it, in so far as the shortening of life is associated with poor social and economic circumstances, class differences in health represent a double injustice: life is short where its quality is poor.

Despite their importance, until recently very little has been known about socio-economic mortality differences in Ireland. Some small-scale local studies had been done but no statistics had been published at a national level. In 1987 the Department of Health published data on perinatal deaths in 1984 classified, *inter alia*, by father's occupation, revealing substantial differences across socio-economic groups. Apart from these limited data, no other information on mortality by socio-economic background for the State as a whole has been published.

This is despite the fact that, just as Britain, information on occupation forms part of the details obtained routinely at time of death. While not without problems — here as elsewhere — these data represent a very important, apparently hitherto unused, source for the analysis of this critical issue. Here we make use of data on deaths classified by age, sex and socio-economic group for 1981, together with Census data for that year, to take a first look at aggregate Irish socio-economic mortality differentials for men.

The paper is structured as follows. Section II describes the data employed. Section III presents the main results. Section IV compares these with the results of the same methodology for England and Wales, published by the British Office of Population Censuses and Surveys (OPCS). Section V discusses the problems which arise due to the nature of the data and assesses the reliability of the results, in particular in the light of the British Longitudinal Study which is based on a quite different methodology. Section VI brings together the conclusions.

II DATA AND COVERAGE

The original interest in mortality differences by occupational group in Britain focused directly on the influence of the actual occupations themselves on mortality. Over time, though, there was a shift of attention towards broader aggregates and the influence of general socio-economic environment on mortality. Thus, differentials between socio-economic groups and social classes have been intensively researched in recent years. For the most part, this has involved the traditional approach of calculating death rates on the basis of mortality information gathered at the time of death and population totals from the Census.

In Ireland, as in Britain, when a death is registered a statistical form must

be completed. This seeks information on the place and date of death, the name, age, sex, address, occupation and marital status of the deceased, and the cause of death. The question on occupation looks for "full detail", and gives examples such as farmer, farm labourer, foreman in hosiery factory, insurance clerk, and so on. Where the deceased was under 14 years of age the occupation of parent or guardian is sought. Where retired, the instruction is to state "retired" and give previous occupation. For a married or widowed woman, the husband's occupation is also sought.

The form is forwarded to the CSO and the data entered on computer tape. In doing so, the occupation itself is not entered; rather, the responses are coded into the 12-category Socio-economic Group (SEG) classification used by the CSO. Thus it is only possible at present to analyse mortality differentials across SEGs: it is not possible either to look at more detailed occupational breakdowns, or to look at social classes rather than socio-economic groups. The CSO has recently introduced an Irish social class scale for use in the 1986 Census; which would provide the denominator needed to derive death rates by class. However, the death statistics themselves are not currently coded on this basis, and in certain cases the information available at present from this source would not allow this to be done.²

Death certificate information on occupation of this type is known to be subject to particular problems.³ Obviously the circumstances in which the information is sought are difficult. The person providing the information is usually a close relative but may not always have a clear or accurate picture of the work actually done. The information given may also be less than desired – such as just "factory worker", for example. When the deceased was retired, the response may be particularly prone to inaccuracy/imprecision or may refer to the last job rather than the principal occupation during the person's working life.

Due to these factors, the occupation recorded at time of death may not always correspond to what would be reflected in the Census. This gives rise to what are termed "numerator-denominator biases" in constructing death rates on the basis of data from the two sources. Inaccurate occupational descriptions at either death certificate or Census could give rise to a considerable mismatch. This could be purely random: however, more systematic biases may arise, if for example next of kin tend to "promote the dead".

2. For example, size of farm is required in the categorisation of farmers by social class.

3. Prior (1985) provides a useful discussion of the nature and processing of the data provided at death registration, based on Northern Ireland experience. Dean and Mulvihill (1972) and Dean and McLoughlin (1980) looked at the registration of deaths in the West of Ireland, focusing on the extent of under-registration rather than the quality of the data provided.

These problems may have inhibited researchers from using the Irish mortality data. However, the same problems have been encountered in Britain and considerable progress has been made there in quantifying the likely size and direction of any biases introduced. In this regard, the results appearing from the Longitudinal Study of a 1 per cent sample from the 1971 Census for England and Wales have been particularly valuable. It is therefore worth examining what the Irish data show, and assessing the results in the light of what has been learnt elsewhere about the nature of these data sources.

The analysis is limited at this stage to men aged between 15 and 64. Others are excluded for a variety of reasons. Women are coded in the death certificates, as in the Census, on the basis of their own occupation, or by their husband's if this is not available. In analysing mortality differentials, it is questionable whether some married women are best classified on the basis of their own or their husband's socio-economic group. If the interest were purely in occupational effects *per se* then clearly the woman's own occupation is the relevant one. Where wider effects of socio-economic background are concerned, though, the husband's situation may often be considered to determine that of the family as a whole. On this basis, for example, British analyses of mortality have frequently focused on single women classified by their own occupation and married women classified by that of their husband. There may also be particular data problems with respect to married women's occupations. For these reasons, the analysis at this stage has been confined to men.

The occupational data for the retired is also known to be particularly subject to problems. This is partly because last job may not correspond to principal occupation during the person's career, and partly because the information is more often imprecise or missing. For this reason the British analyses based on the death certificate data have again tended to confine their attention to persons under 65 (though the Longitudinal Study has looked at the mortality of older age groups).

Mortality of children by family socio-economic background is, of course, of considerable interest. The analysis of perinatal deaths (i.e., still births or deaths within the first week) recently published by the Department of Health is a valuable first step in this regard. This was based on information on the Notification of Births forms: for older children, data from the death certificate on parental occupation could form the basis for a similar analysis. A preliminary examination of these data have been carried out, but the numbers in a given year are small and a high proportion are in the "unknown" SEG. Since child mortality represents a distinct area of interest in any case, this will be pursued separately.

We use data for 1981, because of the availability of published Census of Population data giving a breakdown of the population by age, sex and SEG,

which provides the necessary denominator for the mortality analysis. Data on deaths by age, sex and SEG for the same year were provided by the CSO from their coding of the death certificates.⁴

III IRISH MORTALITY DIFFERENTIALS BY SOCIO-ECONOMIC GROUP FOR MEN AGED 15-64

The data on which we base the analysis of mortality by socio-economic group for Irish men are shown in Table 1: the number of men aged 15-64 in the population in 1981, and deaths of such men in that year, classified by age range and socio-economic group. Combining the two sets of figures, the death rates (expressed per 1,000 population) for each age/SEG category are readily calculated, and also shown in Table 1. Focusing on particular age groups, there are marked differences between SEGs. For example, for the 55-64 age range the death rate for those in the "higher professionals" groups is 13 per 1,000, compared with 22 for those in the semi-skilled and 32 for those in the unskilled manual worker groups.

The aggregate death rates for each SEG for the entire 15-64 group will obviously be influenced not only by differences between SEGs in death rates within age ranges, but also by the different age composition of the SEGs. One convenient summary measure which takes this into account and is frequently used in this context is the Standardised Mortality Ratio (SMR). This standardises for differing age composition by calculating what the *expected* number of deaths for a particular SEG would be if the actual population in that SEG in each age range experienced the *average* death rate over all SEGs for that age range. The actual total of deaths for that SEG is then expressed as a percentage of the expected deaths. An SMR over 100 thus means that the SEG has had more deaths than would be expected on the basis of average age-specific death rates and the SEG's actual age composition.

"Expected" deaths and SMRs calculated in this manner for men aged 15-64 are shown for the 12 SEGs in Table 2. The SMRs range from 55 for the higher professional group to 163 for the unskilled manual group and 174 for the residual category – to which we will return. For the farmers, farm relatives assisting, and farm workers groups the SMRs are below 100. For the "intermediate" groups of non-manual wage-earners the SMRs are about 100.

4. One difficulty arises with the categorisation of individuals by SEG in the Census versus the death certificates. Students are classified by the occupation of the family "principal earner" in the Census but by their own status ("not gainfully occupied") in the death statistics. The treatment we adopt is to exclude the "not gainfully occupied" from the deaths figures in the 15-19 age group and exclude those "not in the labour force" in the Census population figures for the same age group. Some mismatch may remain for older students but it is likely to be small.

Table 1: *Population, Deaths and Death Rates (per 1,000 Population) by Age and Socio-economic Group, Ireland 1981*

Age	Farmers	Farm Labourers	Higher Professional	Lower Professional	Employers & Managers	Salaried Employees	Non-manual Wage Earners - "White Collar"	Non-manual Wage Earners - Other	Skilled Manual Workers	Semi-skilled Manual Workers	Unskilled Manual Workers	Unknown	Total
15-19^a													
population	7,124	3,313	560	669	831	816	15,068	6,908	28,428	6,962	7,093	3,453	81,225
deaths	3	7	—	1	2	1	13	12	22	12	16	13	102
death rate	0.421	2.113	—	1.495	2.407	1.225	0.863	1.737	0.774	1.724	2.256	3.765	1.256
20-24													
population	10,442	4,996	5,440	5,263	4,850	3,264	23,421	12,496	38,964	9,309	11,575	10,426	140,446
deaths	13	6	1	8	3	25	22	41	15	21	21	29	187
death rate	1.245	1.201	0.184	1.520	0.619	0.919	1.067	1.761	1.052	1.611	1.814	2.782	1.331
25-34													
population	22,331	7,925	14,480	13,030	16,384	6,957	28,891	25,297	63,987	13,924	20,675	8,784	242,665
deaths	18	10	4	6	8	4	31	30	44	15	31	60	261
death rate	0.806	1.262	0.276	0.460	0.488	0.575	1.073	1.186	0.688	1.077	1.499	6.831	1.076
35-44													
population	25,533	5,823	9,526	7,955	18,477	5,335	16,306	23,209	41,244	9,319	14,338	7,541	184,606
deaths	36	18	8	11	23	8	39	47	77	28	49	51	395
death rate	1.410	3.091	0.840	1.383	1.245	1.500	2.392	2.025	1.867	3.005	3.417	6.763	2.140
45-54													
population	32,395	5,692	6,630	4,542	13,326	3,926	12,218	16,988	28,518	7,506	12,535	8,825	153,101
deaths	183	26	23	25	60	14	95	105	177	54	134	118	1,014
death rate	5.649	4.568	3.469	5.504	4.502	3.566	7.775	6.181	6.207	7.194	10.690	13.371	6.623
55-64													
population	37,307	6,792	5,091	3,134	8,673	3,096	11,072	14,161	20,378	6,153	11,996	13,414	141,267
deaths	553	103	65	50	101	47	224	285	381	136	379	48	2,672
death rate	14.823	15.165	12.768	15.954	11.645	15.181	20.231	20.126	18.697	22.103	31.594	25.943	18.914
All ages													
population	135,132	34,541	41,727	34,593	62,541	23,394	106,976	99,059	221,519	53,173	78,212	52,433	943,310
deaths	806	170	101	101	197	77	427	501	742	260	630	619	4,631
death rate	5.964	4.922	2.420	2.920	3.150	3.291	3.992	5.058	3.350	4.890	8.055	11.803	4.909

^aPopulation excludes those "not in labour force", deaths exclude "not gainfully occupied", for this age category only (see text for discussion).

Source: Population: Census of Ireland 1981, Vol. 7, Table 16.

Deaths: supplied by CSO.

For higher and lower professional groups, employers and managers and salaried employees the SMRs are well below 100. For skilled manual workers the figure is also below 100, while semi-skilled and particularly unskilled manual workers and the unknown are the only groups with SMRs substantially above 100.

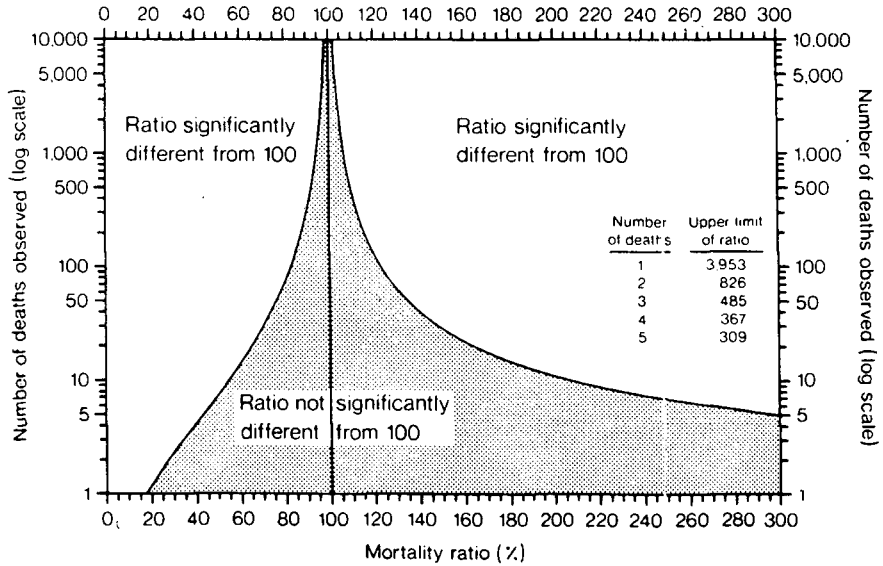
Table 2. *Standardised Mortality Ratios (SMRs) for Men Aged 15-64 by Socio-economic Group, Ireland 1981*

<i>Socio-economic Group</i>	<i>Actual Deaths</i>	<i>"Expected" Deaths</i>	<i>SMR</i> <i>= (Actual/Predicted)</i> <i>X 100</i>
(0) Farmers, etc.	806	1,022	79 ^a
(1) Farm labourers & fishermen	170	198	86 ^a
(2) Higher professional	101	184	55 ^a
(3) Lower professional	101	128	79 ^a
(4) Employers & managers	197	317	62 ^a
(5) Salaried employers non-manual wage earners	77	109	71 ^a
(6) – White collar	427	406	105
(7) – Other	501	482	104
(8) Skilled manual	742	819	91 ^a
(9) Semi-skilled manual	260	222	117 ^a
(X) Unskilled manual	630	387	163 ^a
(Y) Unknown	619	356	174 ^a

^aSignificantly different from 100 at 95% confidence level.

The number of deaths on which these figures are based is in most cases quite large – as many as 600-700 for some groups. For several SEGs the figure is about 100 or less, though. It is therefore important to assess the statistical significance of the results. Various tests from a simple chi-squared to more powerful ones designed specifically for small numbers have been applied in this context. A useful test of whether an SMR differs significantly from 100, based for small numbers on the Poisson distribution as derived by Bailar and Ederer (1964) and for larger numbers on the chi-squared distribution, is presented in graphical form in the OPCS Occupational Mortality Decennial Supplement 1970-72. This is reproduced as Figure 1 here, and may be applied to the SMRs, and the number of deaths on which they are based, shown in Table 2. On this basis the only ones which are not significantly different (at the 95 per cent level) from 100 are the two which are almost exactly 100 – for non-manual wage earners. Those for the farm labourers and semi-skilled manual workers are on the borderline for significance below/above 100 respectively, while the remainder all differ significantly from 100.

Figure 1: A Test of the Statistical Significance of a Mortality Ratio: 95 Per Cent Confidence Limits around 100 in Relation to the Number of Deaths Observed



Clearly the high SMR for the “unknown” category merits careful consideration. Before dealing with this in detail, it is useful to first present a comparison of the results for Ireland with those for Britain. Not only will this provide some basis on which to assess the plausibility of the Irish results, it will also allow us to discuss the in-depth studies of the numerator/denominator bias, the importance of the “unknown” groups, and other issues of data quality which have been carried out for the British data.

IV A COMPARISON WITH MORTALITY DIFFERENTIALS ACROSS SOCIO-ECONOMIC GROUPS IN ENGLAND AND WALES

The mortality analyses published by the British Office of Population Censuses and Surveys refer to England and Wales. The most recent detailed analysis of occupational mortality are presented in Decennial Supplements for 1970-72 and 1979-80/1982-83 (OPCS, 1978 and 1986). Mortality rates are calculated for 6 social classes, 17 socio-economic groups, 27 occupation orders, and 223 occupation units. Here the categorisation most relevant for comparison with the Irish results is socio-economic group. While the British classification distinguishes 17 SEGs compared with the Irish 12, the grouping method is conceptually similar and broad conclusions can be reached by comparing the two.

The mortality rates are calculated by taking deaths in a number of years centred on the Census year, and comparing these with a 10 per cent sample from the Census. Thus the data for deaths in 1970-72 form the numerator, and the 1971 Census data the denominator, for the 1970-72 mortality rates and SMRs. Deaths over a period rather than for one year provide a firmer basis on which to disaggregate down to occupation level and also to investigate different causes of death in detail, which can involve using quite small numbers. The information on occupation gathered on the death certificates and in the Census corresponds quite closely to the Irish equivalents. One important difference, in the analysis, though, is that the main British figures refer to occupied or retired men only, excluding the unoccupied. SMRs by SEG are compared in Table 3, using the 1970-72 death rates for England and Wales rather than those for 1979-80/1982-83 because the former are thought to be more reliable.⁵ While the individual SEG categories are not directly comparable, we have grouped them into what appear to be broadly comparable categories.

Clearly in both cases the unskilled manual groups have relatively high SMRs and the professional and managerial ones relatively low SMRs. For England and Wales the only group with a higher SMR than "unskilled manual" is "members of the armed forces" and this is believed to be artificially inflated for a number of reasons. Compared with the Irish figure, though, the unskilled manual group are not as far above the average in England and Wales. Likewise for the professional and managerial groups, though the pattern is not entirely consistent, the Irish SMRs do appear for the most part to be somewhat lower. The pattern between the unskilled manual and the professional/managerial groups is thus very much the same in the two cases, but with a wider differential in Ireland.

For other groups, the semi-skilled manual category has a similar SMR in the two cases, while the skilled manual group has an above average SMR in England and Wales but is below average in Ireland. Farmers and farm labourers are obviously far less important in England and Wales, but are at or below the average as in Ireland. For other groups the different categorisations make any exact comparison impossible.

Without putting too much weight on the comparative results in terms of particular occupational backgrounds, it can be concluded at a minimum that the results for Ireland certainly look quite plausible when compared with those for England and Wales. In assessing their reliability, though, one obvious contrast is between the relatively high SMR for the "unknown" group in Ireland and the quite low figure for the "inadequately described" for England and Wales. This and other aspects of the reliability of the data are discussed in the next section.

5. See footnote 8.

Table 3: *Comparison of Irish and English SMRs for Men Aged 15-64 by SEG*

<i>Ireland 1981^a</i>			<i>England and Wales 1970-72^b</i>		
<i>SEG</i>	<i>% of Pop.</i>	<i>SMR</i>	<i>SEG</i>	<i>% of Pop.</i>	<i>SMR</i>
(0) Farmers, farm managers relatives assisting	14	79	(13) Farmers – employers & managers	½	99
			(14) Farmers – own account	½	61
(1) Farm labourers, fishermen	4	86	(15) Agric. workers	1	103
(2) Higher professional	4	55	(3) Professional self empl.	1	69
(3) Lower professional	4	79	(4) Professional – employees	4	79
(4) Employers & managers (incl. shopkeepers)	7	62	(1/2) Employers	2	102
			(1/2) Managers	9	80
(5) Salaried employees	3	71	(5.2) Foremen & supervisors – non-manual	1	67
(6) Non-manual – white collar	11	105	(6) Junior Non-Manual	11	106
			(7) Personal service workers	1	134
(7) Non-manual – other	10	104	(8) Foremen and super- visors – manual	4	79
			(12) Own account workers	4	77
			(16) Members of armed forces	1	147
(8) Skilled manual	23	91	(9) Skilled manual	28	113
(9) Semi-skilled manual	6	117	(10) Semi-skilled manual	12	115
(X) Unskilled manual	8	163	(11) Unskilled manual	6	139
(Y) Unknown	6	174	(17) Inadequately described	2	86

^aAll men except unoccupied aged 15-19.

^bOccupied and retired only.

V THE RELIABILITY OF THE DATA USED

We look first at the size of the “unknown” group in the Irish data and its implications. The SMR for this group is so high because while 6½ per cent of the men aged 15-64 had to be classified to this SEG in the Census, this was the case for 14 per cent of deaths. The SMR cannot be directly compared with that for the “inadequately described” group in the England/Wales data, because the unoccupied are excluded from the latter. On the basis of background information presented by the Longitudinal Study, though, it would appear that there is not a dramatic difference between the two Censuses in

the proportion of men who could not be classified by occupational group.⁶ In the deaths statistics for England and Wales, though, only about 2 per cent of men aged 15-64 were classified as unoccupied (principally the disabled and students), with a further 1.3 per cent "inadequately described". So the Irish deaths data have a substantially larger proportion for which insufficient data were gathered to allow classification by socio-economic group.

We can explore the composition of the "unknown" element in the Irish deaths data on the basis of the categorisation used by the CSO in coding the figures. Table 4 shows the breakdown of the deaths in the residual SEG by age range, distinguishing between the gainfully occupied, retired, and not gainfully occupied. Those identified on the basis of the limited information provided as gainfully occupied account for 32 per cent and the retired for 9 per cent. The remaining 59 per cent are classified as "unoccupied" (though some of these in fact have no information at all on occupation and are more properly considered as missing). In each case, the older age groups are the most important, and the "not gainfully occupied" aged between 45 and 64 account for 46 per cent of all the "unknown" deaths.

Table 4: *Composition of Deaths of Men Aged 15-64 in the "Unknown" SEG, Ireland 1981*

Age	% of All Deaths in "Unknown" SEG ^a			Total
	Gainfully Occupied	Retired	Not Gainfully Occupied ^b	
15-19	2.1	—	—	2.1
20-24	1.4	—	3.2	4.6
25-34	3.7	—	6.0	9.7
35-44	4.7	—	3.6	8.3
45-54	8.7	1.1	9.2	19.0
55-64	11.8	7.6	36.8	56.2
Total	32.5	8.7	58.8	100

^aTotal number of deaths = 619.

^bIncludes those for whom no information was available.

Since the unoccupied appear to make up a major part of the unknown in the deaths data, one possible approach would be to exclude them from the mortality by SEG analysis, as is done for England and Wales. This would require appropriate data from the Census to form the denominator, i.e., the

6. About 7½ per cent of men aged 15-64 in the Census for England and Wales were classified as "unoccupied", and 1.8 per cent were "inadequately described". However, this treats all students as "unoccupied", whereas in the Irish Census they are classified by the occupation of the family principal earner where possible.

gainfully employed plus retired classified by SEG.⁷ This would reduce the size of the unknown SEG in the analysis very substantially. Excluding those classified as unoccupied from the deaths data would reduce the percentage of deaths in the unknown SEG by almost 60 per cent, to about 6 per cent of all deaths. While still greater than the 1.3 per cent falling into the “inadequately described” SEG for England and Wales, this would clearly be considerably more satisfactory.

Compared with the results presented here, the main impact of the exclusion of the unoccupied from the analysis would probably be on the SMR for the “unknown” SEG itself, not greatly affecting the relativities between the other groups. In the analysis presented here, all the unoccupied in the Irish deaths data fall automatically into the unknown SEG. It is probable that many of the unoccupied men in the Census also fall into that SEG, where it proves impossible to classify them by the occupation of a family principal earner. (Three-quarters of the men in the unknown SEG are not in the labour force: not all of these would count as unoccupied, since some would be retired, but it does indicate the probable location of most of the unoccupied.) Thus, the SMRs for other SEGs appear likely to be largely unaffected.

Even having excluded the unoccupied, though, the “unknown” or residual group in the Irish deaths data would be greater than in England and Wales, and is a source of concern. (The true “unoccupied” might also be overstated by this exclusion.) Further, other numerator/denominator biases not related to the “unknown” category may exist — that is, persons may be classified into a different “known” SEG at death than in the Census, for a variety of reasons. The Longitudinal Study being carried out by the OPCS in Britain is intended to throw light on precisely these possible biases. This study took a sample of about 1 per cent from the 1971 Census for England and Wales, of people born on any of four birthdays during the year. These people were then traced through time, so death rates for occupations, etc., can be based entirely on the data on occupations reported in the Census.

Overall, the results currently available from the Longitudinal Study have confirmed the estimates of mortality differentials by social class from the 1970-72 Decennial Supplement, (see Fox, *et al.*, 1985b; OPCS, 1986). The SMRs by social class produced by the two are not identical. Rather, those produced by the Longitudinal Study were in general lower (once the sample had been followed through to 1976-81). However, the *gradient* between the classes is very similar in the two studies. Significant numerator/denominator biases for particular occupations and social classes were found, with a substantial proportion classified to a different social class by the Census than

7. The published Census classification distinguishes those in/not in the labour force: the latter includes not only the unoccupied but also the retired.

when the death was registered (see OPCS, 1978, Chapter 3). However, there was no consistent tendency to either "promote" or "demote" when registering the deaths of men aged 15-64. Thus, despite mismatches in the classification, no substantial bias in the differentials between social classes was found.⁸

VI CONCLUSIONS AND IMPLICATIONS

This paper has taken a first look at Irish mortality differentials across socio-economic groups for men aged 15-64. The conventional methodology, widely used in Britain and elsewhere, was applied. This involves relating data on deaths by socio-economic group, gathered at time of death, to the total population in these groups as shown in the Census. Data for 1981 was used, with deaths by SEG provided by the CSO forming the numerator and 1981 Census figures the denominator in calculating death rates. A number of different age ranges were distinguished, and overall mortality ratios standardising for age composition calculated for each of the 12 SEGs used by the CSO.

The results showed significant differentials in standardised mortality rates between those in professional/managerial occupational groups and those in semi-skilled or unskilled manual occupational groups. When compared with the results produced by the same methodology applied to data for England and Wales in 1970-72 the Irish differentials showed a similar general pattern, with perhaps a somewhat steeper gradient between these groups.

The problems which arise due to the nature of the data used in this exercise, which have been explored in some depth in Britain, were discussed in detail. The number of deaths which were not allocated to an identified socio-economic group were relatively high in the Irish figures (even when differences in the treatment of the "unoccupied" are taken into account). This, and the possibility of other numerator-denominator biases due to mismatches between allocations in the two data sources, must be kept in mind in assessing the reliability of the results. Any improvements in the data collection at registration of death which allowed the "unknown" and other mismatches to be reduced would be extremely valuable and would serve to increase confidence in the results. The Longitudinal Study underway in Britain has however demonstrated that the existence of these problems *per se* does not necessarily introduce substantial biases into the results of applying the standard methodology, in terms of the mortality differentials produced.

Having presented the first results of an analysis of socio-economic mortality differentials for Ireland, and leaving aside the issues of data reliability, etc.,

8. For the later Decennial Supplement analysis using deaths in 1979/80 and 1982/83, some biases have been identified, apparently because of changes in Census procedures and classifications (see OPCS, 1986; Wilkinson, 1986). For this reason we have used the earlier 1970-72 results for comparison with Irish data.

what implications are to be drawn when significant differentials across such groups are identified? This is an extremely complex and controversial issue, which will not be addressed in any detail here, but it may be useful in concluding to outline the main themes of the arguments which have been put forward in this debate.

In Britain, the Black Report attributed such mortality differentials – as well as similar ones in morbidity – to a range of factors, but emphasised the effects of poverty, deprivation and work conditions on health. Some have argued, though, that these differentials are largely a product of social selection and mobility (notably Illsley, 1955; Stern, 1983), with the healthy moving up and the unhealthy moving down the social scale. The recent results of the Longitudinal Study have not supported the latter argument (see Fox, *et al.*, 1985a; Fox, *et al.*, 1985b). A recent review of this and other British evidence concluded that the health differences associated with socio-economic disparities are if anything understated by the results of the standard Decennial Supplement methodology (Wilkinson, 1986, p. 12 – useful reviews are also provided by Hart, 1986, and Carr-Hill, 1987). The factors which could work to produce such differentials and their implications are extremely difficult to measure and assess.

It is particularly hard to obtain an overview of how such factors may operate and interact – the Black Report, for example, while emphasising socio-economic influences, is somewhat unconvincing in specifying the channels through which these may actually have their effects. Drawing on a range of sources, largely from Britain, Table 5 sets out some of the suggested channels of influence. These include first the hazards associated with particular occupations themselves (which is, of course, where the interest in mortality differentials began). What we may term “direct” effects of low income/poverty include the impact of poor maternal health – through for example low birth-weight and its long-term implications – poor nutrition and poor housing conditions. Less direct effects include stress and associated physical and psychological health problems, a higher exposure to environmental pollution, and a high incidence of accidents. Differences in style of living which influence health are also evident – from relatively heavy consumption of tobacco and alcohol, to drug usage, less healthy eating patterns and less awareness of the value of exercise. Finally, there may also be differences in the health care received across socio-economic groups. This could reflect both variations in the quality of care available, and differences in the readiness or ability of individuals to avail of such care.

Table 5: *Suggested Socio-economic Influences on Health/Mortality*

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- (1) Occupational hazards
 - (2) Poverty affects health directly through
 - maternal health (birthweight)
 - nutrition
 - housing conditions
 - (3) "Indirect" effects include
 - stress
 - environmental factors -- pollution
 - accidents/violence
 - (4) "Lifestyle"
 - tobacco & alcohol
 - drugs
 - eating patterns
 - exercise
 - (5) Health care
 - quality of care
 - readiness/ability to avail of care
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The interpretation of trends over time in mortality differentials has if anything aroused even more controversy than their significance at a point in time. This is enormously complicated by changes in the actual classifications of occupations, etc., used over time, and by major shifts in the importance of particular occupations (see, for example, Wilkinson (1986)). For Ireland there is obviously some way to go before changes over time in socio-economic mortality differentials become the major issue. The priority must be to obtain estimates of these differentials at a point in time which are as reliable as possible. The present paper is intended to begin this process, by drawing attention to the available data, the results of a first analysis, and the nature of the problems which arise. Extensions of the analysis will include looking at the impact of excluding the unoccupied group, and combining deaths data from a number of years. The latter would not only allow overall differentials across socio-economic groups to be estimated with more precision, but also the major causes of death and their pattern by socio-economic background could be analysed. The possibility of extending the coding of deaths by SEG to include the new social class categories may also be worth exploring with the CSO. Clearly any improvements in the underlying data at point of regis-

tration would be extremely valuable: only if they are used is this likely to be given priority.⁹

REFERENCES

- BAILAR, J.C., and F. EDERER, 1964. "Significance Factors for the Ratio of a Poisson Variable to its Expectation", *Biometrics*, 20, pp. 639-643.
- CARR-HILL, R., 1987. "The Inequalities in Health Debate: A Critical Review of the Issues", *Journal of Social Policy*, Vol. 16, Part 4, pp. 509-542.
- CENTRAL STATISTICS OFFICE, 1986. *Census of Population of Ireland 1981 Volume 7 Occupations*, Dublin: Stationery Office.
- DEAN, G., and H. McLOUGHLIN, 1980. "The Registration and Certification of Deaths in the West of Ireland: A Follow-up Survey", *Journal of the Irish Medical Association*, Vol. 73, No. 7, pp. 269-270.
- DEAN, G., and C.J. MULVIHILL, 1972. "The Registration of Births and Deaths in Ireland", *Journal of the Irish Medical Association*, Vol. 65, No. 5, pp. 101-105.
- DEPARTMENT OF HEALTH, 1987. *Perinatal Statistics 1984*, Dublin: Stationery Office.
- DEPARTMENT OF HEALTH AND SOCIAL SECURITY, 1980. *Inequalities in Health: Report of a Research Working Group Chaired by Sir Douglas Black*, London: DHSS.
- FOX, A.J., P.O. GOLDBLATT and D.R. JONES, 1985a. "Social Class Mortality Differentials: Artefact, Selection or Life Circumstances?", *Journal of Epidemiology and Community Health*, Vol. 39, pp. 1-8.
- FOX, A.J., D. JONES, K. MOSER and P. GOLDBLATT, 1985b. "Socio-Demographic Differentials in Mortality 1971-81", *Population Trends*, 40, pp. 10-16.
- HART, N., 1986. "Inequalities in Health: The Individual versus the Environment", *Journal of the Royal Statistical Society, Series A*, Vol. 19, Part 3, pp. 228-246.
- ILLSLEY, R., 1955. "Social Class Selection and Class Differences in Relation to Stillbirths and Infant Deaths", *British Medical Journal*, 2, pp. 1520-24.
- JOHNSON, Z., and P. DACK, 1989. "Small Area Mortality Patterns", *Irish Medical Journal*, Vol. 82, No. 3, September, pp. 105-108.
- OFFICE OF POPULATION CENSUSES AND SURVEYS, 1978. *Occupational Mortality: The Registrar General's Decennial Supplement for England and Wales 1970-72*, Series DS 1, London: HMSO.
- OFFICE OF POPULATION CENSUSES AND SURVEYS, 1982. *Longitudinal Study: Socio-Demographic Mortality Differentials 1971-75*, by A.J. Fox and P.O. Goldblatt, Series LS No. 1, London: HMSO.
- OFFICE OF POPULATION CENSUSES AND SURVEYS, 1985. *Occupation Mortality Decennial Supplement 1979-80, 1982-83*, Part 1: Commentary, Series DS No. 6, London: HMSO.
- PRIOR, L., 1985. "Making Sense of Mortality", *Sociology of Health and Illness*, Vol. 7, No. 2, pp. 167-190.
- STERN, J., 1983. "Social Mobility and the Interpretation of Social Class Mortality Differentials", *Journal of Social Policy*, Vol. 12, No. 1, pp. 27-49.
- WHITEHEAD, M., 1987. *The Health Divide: Inequalities in Health in the 1980s*, London: Health Education Council.
- WILKINSON, R.G. (ed.), 1986. *Class and Health: Research and Longitudinal Data*, London: Tavistock.

9. The deaths data have recently been used to look at mortality differentials across areas of Dublin (Johnson and Dack, 1989), another illustration of the value of the information.