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## NI Health & Social Care Inequalities Monitoring System

A Section 75 Analysis of Mortality Patterns in Northern Ireland  
*2003-2007*



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## A Section 75 Analysis of Mortality Patterns in Northern Ireland 2003-2007

Authors: Linda Keys and Bill Stewart

### **Project Support Analysis Branch, Information Analysis Directorate**

Department of Health, Social Services and Public Safety

Castle Buildings, Belfast, BT4 3SQ

Telephone: 028 9052 2043

Email: [healthinequalities@dhsspsni.gov.uk](mailto:healthinequalities@dhsspsni.gov.uk)

[http://www.dhsspsni.gov.uk/index/stats\\_research/stats-equality.htm](http://www.dhsspsni.gov.uk/index/stats_research/stats-equality.htm)

For information on other Government statistics contact:

The Northern Ireland Statistics and Research Agency (NISRA)

McAuley House, 2-14 Castle Street, Belfast, BT1 1SA

Tel: 028 9034 8100 Email: [info.nisra@dfpni.gov.uk](mailto:info.nisra@dfpni.gov.uk)

[www.nisra.gov.uk](http://www.nisra.gov.uk)

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## Executive Summary

### Policy implications

The Department is required (as with all public authorities) by Section 75 of the Northern Ireland (NI) Act 1998, when carrying out its functions to have due regard to the need to promote equality of opportunity among the nine separate equality groups. It is important therefore that the Department is aware of differences in health outcomes in order to ascertain potential adverse impacts against these different equality groups. Therefore equality analyses of health outcomes have been incorporated into the NI Health & Social Care Inequalities Monitoring System (HSCIMS).

### Background to the research

This report, the first in an ongoing series, is designed to provide robust assessments of the differences in health outcomes across the various equality groups in NI. The report concentrates on mortality and uses longitudinal data from the Northern Ireland Mortality Study. However it is hoped that eventually a wider assessment of health outcomes for the Section 75 equality groups can be completed using data from the NI Longitudinal Study. It is intended that this report will provide an important monitoring baseline which will be expanded and enhanced over time. The purpose of this report is thus to provide the Department with the support to monitor and review the progress of duties within its public health strategies as well as in the promotion of equal opportunity among the Section 75 groups.

### Key findings

- Females had lower age standardised mortality rates (ASMR) than males.
- Age and gender were the two main predictors for determining mortality.
- The greatest differences in Section 75 characteristics were seen between those with a limiting long term illness (higher ASMR) and those without (lower ASMR).
- Apart from age, gender and limiting long term illness, social deprivation had a bigger effect on mortality and life expectancy than Section 75 characteristics.
- Those from a Catholic background had a slightly elevated ASMR and lower life expectancy.
- Those that were married or co-habiting experienced lowest ASMRs and highest life expectancy.

## Acknowledgements

This report was made possible by funding supplied by the Equality and social need research programme (OFMDFM).

The help provided by the staff of the Ireland Mortality Study (NIMS) and the NILS Research Support Unit is acknowledged.

The NILS/NIMS is funded by the Health and Social Care Research and Development Division of the Public Health Agency (HSC R&D Division) and NISRA. The NILS-RSU is funded by the ESRC and the Northern Ireland Government. The authors alone are responsible for the interpretation of the data.

# 1 - Introduction

## 1.1. NI Health Inequalities

Health and well-being is largely determined by one's social, economic, physical and cultural environment. While people in general over time have been able to enjoy major social, economic and health improvements that has meant being healthier and living longer than ever before – not everyone has been able to avail fully of the benefits of this progress. Unfortunately, social inequality has endured to the extent that health outcomes for some groups remain poorer than for others with the result that smoking, obesity, misuse of drugs and alcohol, teenage conception rates and poor mental health are disproportionately concentrated amongst particular deprived groups. It is also a fact that health inequalities start in early life, lasting not only into old age but can carry forward into subsequent generations<sup>1</sup>.

Health policy historically tended to concentrate on the treatment of ill health rather than on its prevention. The Department of Health, Social Services and Public Safety (DHSSPS) sought through its Investing for Health (IfH) strategy (2002) to shift that emphasis by taking action to tackle the factors which adversely affect health and perpetuate health inequalities. Reducing health inequalities is thus a major aim of the Department which will aid in the improvement of the health, social wellbeing and safety of the people of Northern Ireland. The Health and Social Care Inequalities Monitoring System (HSCIMS) was established in 2002 in order to ensure that inequalities in health outcomes are monitored over time on a consistent basis (see section 1.3 on HSCIMS).

The Department is required (as with all public authorities) by Section 75 of the Northern Ireland (NI) Act 1998, when carrying out its functions to have due regard to the need to promote equality of opportunity among the nine separate equality groups (see section 1.2 on Section 75). It is important therefore that the Department is aware of differences in health outcomes in order to ascertain potential adverse impacts acting against these different equality groups. Therefore equality analyses of health outcomes have been incorporated into HSCIMS. Previously, the only data source for

Section 75 was the Census of Population. In order to provide updates after the Census, proxy analyses were established but this was never a completely satisfactory way of monitoring Section 75 health outcomes.

This report, the first in an ongoing series, is designed to provide a robust assessment of the differences in health outcomes across the various equality groups in NI. The report concentrates on mortality and uses longitudinal data from the Northern Ireland Mortality Study, however it is hoped that eventually a wider assessment of health outcomes for the Section 75 equality groups can be completed using linked data from the NI Longitudinal Study. It is intended that this report will provide an important monitoring baseline which will be expanded and enhanced over time. The purpose of this report is to provide the Department with monitoring information to review their progress of duties within its public health strategies as well as in the promotion of equal opportunity among the Section 75 groups.

## 1.2. Health inequalities and Section 75

Of the nine discrete Section 75 categories, only seven can currently be examined. There are no widely available individualised data on the areas of political opinion and sexual orientation. The seven equality groups that can be analysed include differences between persons of different religious belief, ethnicity, age, marital status; between men and women generally; between persons with a disability and persons without; and between persons with dependants and persons without (see appendix 1).

In general mortality rates are one of the most commonly used health statistics, due to the fact that differences can be easily quantified and measured. However, historically analysis of mortality rates in Northern Ireland was limited by the coverage of the data to analysis of just three of the nine Section 75 categories (sex, age and marital status). Wider analysis such as that discussed in this paper, is important in order to continue to meet high demand for health information relating to Section 75 groups. This is also important with regard to the equality screening of policies for potential adverse impact now being fully mainstreamed into policy development within NI.

<sup>1</sup> The Marmot review, 2010

### 1.3. Health and Social Care Inequalities Monitoring System

The Health Inequalities Monitoring System (HSCIMS) comprises a basket of indicators which are monitored over time to assess area differences in mortality, morbidity, utilisation of and access to health and social care services in Northern Ireland. The regional inequalities analyses examine the difference in health outcomes between both the 20% most deprived areas and rural areas when compared with those in Northern Ireland as a whole. Since its introduction HSCIMS has grown extensively, not only in its coverage of indicators, but also in the addition of further work streams such as the subregional version of the system (which looks at inequality gaps within HSC Trust areas), analyses of GIS accessibility to key health facilities and examining the factors which lead to gaps in life expectancy<sup>2</sup>. Another key aspect of HSCIMS is to assess differences in health outcomes for the various S75 equality groups with the long term intention to be able to cover the same health outcomes as in the regional HSCIMS.

Given the previous lack of individualised data, the approach to gauging differences in health outcomes between equality groups was assessed by using the Section 75 profile of areas from the 2001 Census of Population. Depending on the health outcome being measured, the percentage of the population which fell into each equality group in the 20% of areas with the worst outcome was compared with the overall percentage of the NI population that fell into the same equality category. This was last reported in the 2nd update bulletin of HSCIMS (2007).

The above approach was not wholly satisfactory, as the reason why an area had a particularly poor health outcome may not be unduly influenced by the proportion of its population within any one equality category but more by the social and economic characteristics of that area. Moving away from the Census, such analyses become increasingly outdated and meaningless. The small area population estimates published by the Northern Ireland Statistics and Research Agency (NISRA) in 2010 indicated that there has been quite a substantial change in the population profiles of a number of small areas since the 2001 Census.

### 1.4. The NI Longitudinal Study and the NI Mortality Study

The Northern Ireland Longitudinal Study (NILS) is a large scale, representative, data linkage study of around 28% (approximately 500,000 people) of the Northern Ireland population. The NILS has been created by linking demographic data from the Northern Ireland Health Card Registration system to the 2001 Census returns and to administrative data from various sources. These include vital events registered with the General Register Office for Northern Ireland and Health Card Registration system and migration events data.

In 2006, NISRA undertook an exercise to link all those enumerated at the Northern Ireland 2001 Census to deaths to residents in the subsequent years. This formed a study of the whole enumerated population, the NI Mortality Study (NIMS), linking 94% of all deaths occurring over this period. Details of the linkage process are described elsewhere<sup>3</sup>. NIMS has brought the potential to examine a broader range of individual, social, economic and geographical factors and their relationship with mortality rates.

<sup>2</sup> Further details on the HSCIMS can be found at [www.dhsspsni.gov.uk/index/stats\\_research/stats-equality.htm](http://www.dhsspsni.gov.uk/index/stats_research/stats-equality.htm)

<sup>3</sup> O'Reilly, D., Rosato, M., & Connolly, S. Unlinked vital events in Census based longitudinal studies can bias subsequent analysis. *Journal of Clinical Epidemiology*, in press.

## 2 - Methodology

### 2.1. Aims and objectives

This study develops and extends the analysis reported in “Differences in mortality rates in Northern Ireland 2002–2005: A Section 75 and social disadvantage perspective” (McClelland, 2008). The report examines the differences in health outcomes that are experienced by Section 75 equality groups. Not only will it report on differences but it will also examine the effect on Section 75 groupings after adjusting for social and economic status. Our intention is to further extend this analysis to encompass a broader range of health outcomes and to report them on a regular basis.

This paper describes differences in age standardised mortality rates (ASMR) (life expectancy is also briefly examined) between ‘categories of people’ along various social and economic dimensions corresponding as far as possible to: (1) those groups detailed under Section 75 of the Northern Ireland Act 1998; and (2) social and economic characteristics reflecting relative social need or disadvantage (thus complementing the area based monitoring of HSCIMS). It will also examine whether differences in mortality by Section 75 characteristics can be explained by other factors such as those relating to social and economic disadvantage. Although most of the results are presented as bivariate charts, it is acknowledged that Section 75 characteristics should not be examined in complete isolation. Age for example will impact upon marital status. Likewise community background, limiting long term illness, the presence of dependents and ethnicity are not the main predictors of death. Therefore when examining results caution should be used when making assumptions regarding individual Section 75 groups.

The specific objectives of this paper are to:

- Identify distinct differences in health outcomes, between (a) the Section 75 groups selected for analysis.
- Identify distinct differences to health outcome based on those (b) who experience social disadvantage.
- Determining the influence of (c) Section 75 characteristics on health outcomes when controlled for the impact of social disadvantage.

### 2.2. Population

The NIMS dataset that was used for this report contained all deaths occurring between 2002 and 2007 except for children who were born after the 2001 Census. Other mortality records for which Census information is unavailable relate to immigrants after the 2001 Census and people who were not enumerated in the 2001 Census. Deaths of those who were not enumerated in the Census were removed.

The approach to this research differs slightly from that used in the previous McClelland<sup>4</sup> analysis in that changes have been made to the 2001 base population (from the Census). A number of NIMS projects use a ‘closed population’ (including McClelland). However this study has been approached slightly differently and has been aligned more to the way age standardised mortality rates (ASMRs) are recorded in the HSCIMS biennial inequality reports. The population was firstly ‘aged on’ each year from 2001 to 2007 and deaths were removed. Births to NI mothers were then added and apportioned Section 75 characteristics according to the 2001 census (see figure 1 below). These added in births were assumed to encounter the same death rates as those experienced by the same age groups from actual births for that given year. This adjustment assumes that the population of each sub-group has changed by the same amount. The population base was adjusted in order to provide improve comparability with mortality indicators published in the HSCIMS. Deaths were analysed for the five year period 2003-2007, which again corresponds with the time span used for mortality analysis in the HSCIMS.

To make appropriate comparisons between groups and their respective mortality rates, the rates themselves must be adjusted to compensate for any different age structures between groups. This is necessary because the age structure of the population can affect the number of deaths and thereby the crude death rates over time may not be comparable. The common approach to this issue is to adjust or standardise the mortality rates to take account of differences between the age structures of the groups being compared.

<sup>4</sup> McClelland, A. Differences in Mortality Rates in Northern Ireland 2002-2005: A Section 75 and Social Disadvantage Perspective, NISRA occasional paper.

Age Standardised Mortality Rates (ASMR) are produced using the direct standardisation methodology. The ASMR for a group is the number of deaths, usually expressed per 100,000, that would occur in that group if the age specific death rates had occurred in the standard population.

Appendix 2 provide the respective mortality rates of the groups analysed in addition to confidence intervals around these rates.

The relationships between social disadvantage and health outcomes are well documented in a number of health studies including HSCIMS<sup>2</sup>. Whilst the factors which contribute to social disadvantage are complex and inter-related, analysis here is limited to those variables enumerated in the Census or subsequently attached and which can act as suitable proxy measures for social disadvantage. These measures include: housing tenure; accommodation type; qualifications; economic activity; socioeconomic classification and geographic area of relative multiple deprivation. Car ownership is also examined in the later section relating to regression analyses that were conducted (see 3.4). These measures of disadvantage are produced using linked response from the 2001 Census.

### 2.3. Regression

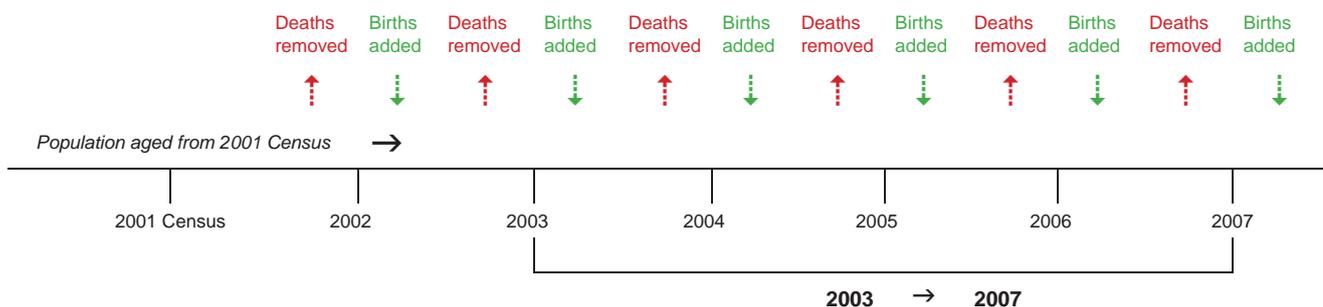
A regression analysis was used with the aim of predicting a higher or lower risk of mortality from the Section 75 variables as well as deprivation indicators.

The analysis was undertaken in two stages. Firstly a model was built that best described the individual Section 75 characteristics associated with increased risk of death. A second model was then built to determine whether or not factors relating to deprivation (social determinants of health) contributed to the risk of death, independent of the Section 75 characteristics. Further details on the regression methodology used are set out in section 3.4.

Figure 1

#### Methodology

Base population

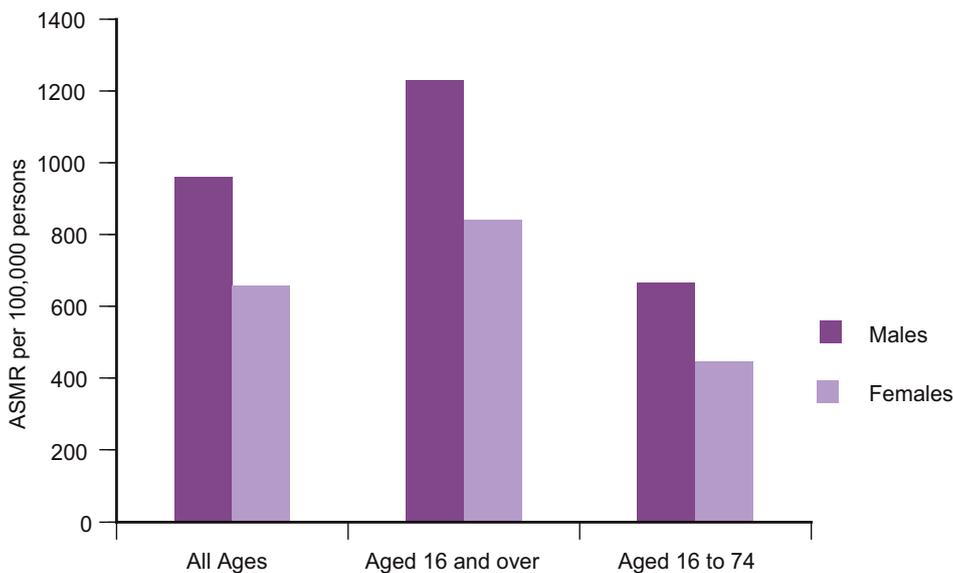


## 3 - Results

### 3.1 Mortality rates by Section 75 classification

#### 3.1.1 Age standardised mortality rates by groups and gender (2003-07)

Chart 1



Overall the male age standardised mortality rate (961 deaths per 100,000 population) was significantly higher than that for females (657 deaths per 100,000 population). This was also true for the 16 – 74 and 16 and over age bands.

#### 3.1.2 Age standardised mortality rate (aged 16 and over) by marital status and gender (2003-07)

Chart 2

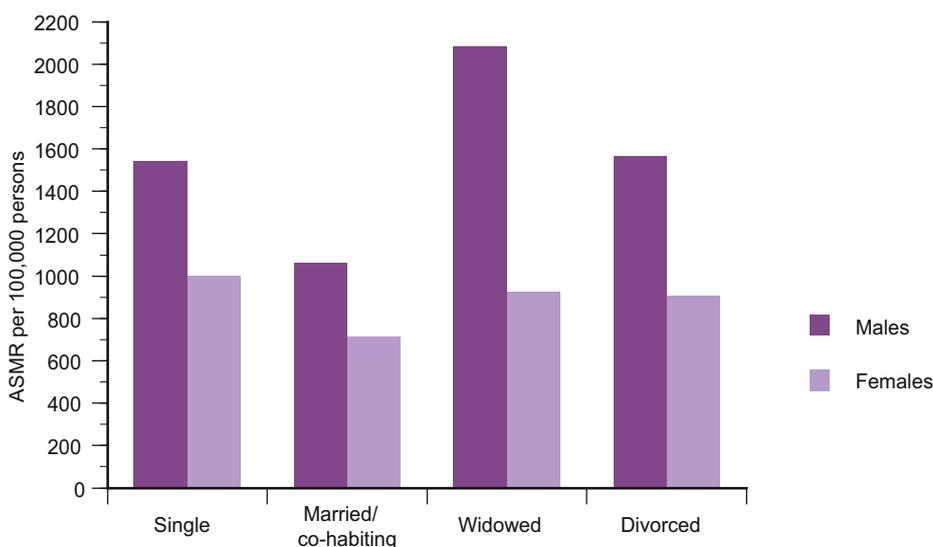
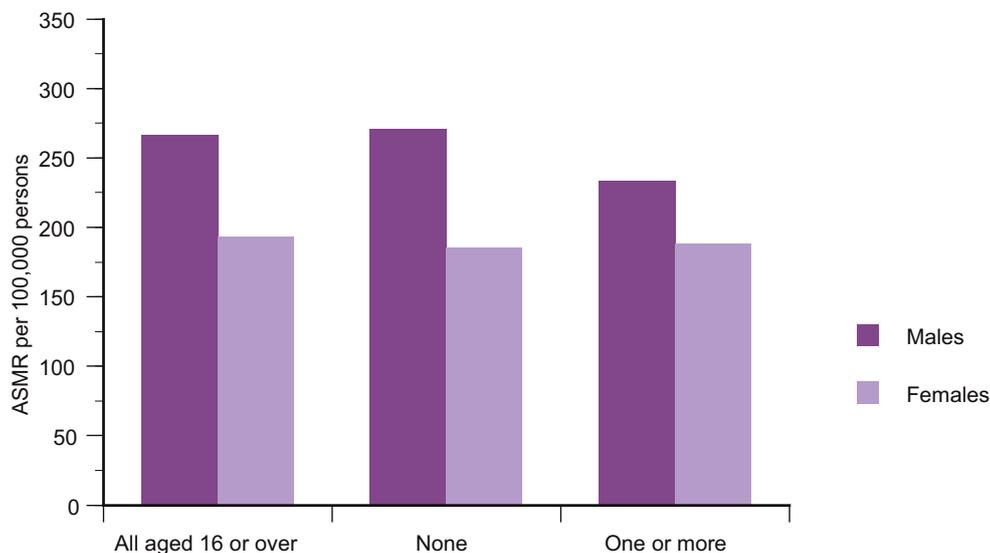


Chart 2 indicates differences in ASMR by marital status for those aged 16 and over. Given the noted variances in ASMR, marital status would seem to have a more pronounced effect on the mortality of males. For both males and females, the lowest ASMR was found amongst those who are married (1,063 and 713 deaths per 100,000 population respectively). By contrast, the highest ASMR for males was found amongst widowers (2,081 deaths per 100,000 population), approximately twice that of

married males. Differences in mortality rates between those who are single and those who are married varied by about 30% across both genders. Single females experience the highest ASMRs among women (1,001 deaths per 100,000 population); however this is still significantly lower than the lowest ASMR experienced by males (among those males who are married). In line with the previous McClelland report it was found that divorce also has a pronounced impact, with the death rate for divorced males around one and a half times the married rate. Similarly the rate among divorced females was a quarter higher than the rate for married females.

### 3.1.3 Age standardised mortality rates (16 years and over) by presence of dependent children in the household and gender (2003-07)

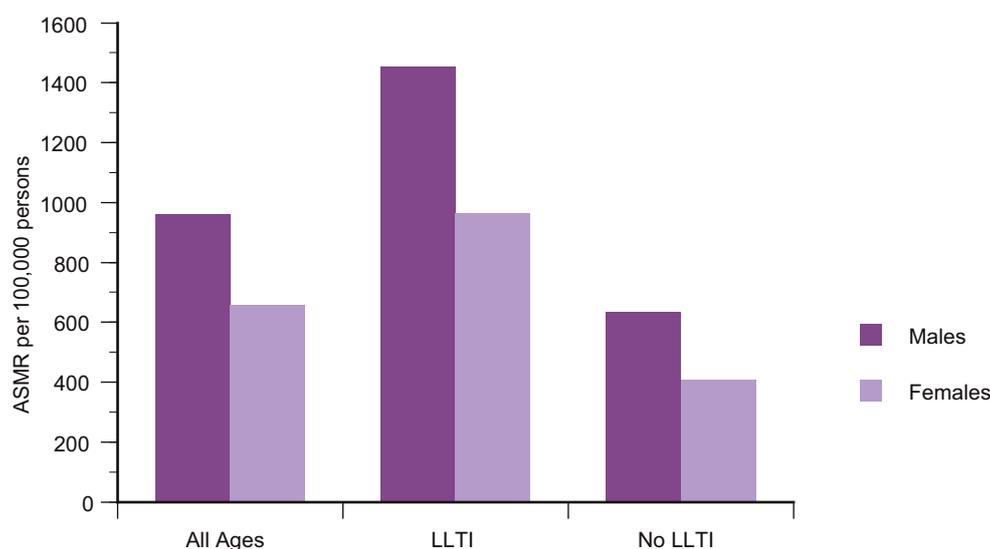
Chart 3



The ASMR for females does not differ significantly whether there are dependent children present in the household or not. By contrast, the ASMR for males with one or more dependent children (1,071 deaths per 100,000 population) was 14% lower when compared to males in households with no dependent children present. This effect might be explained to some extent by the observed differences in mortality due to marital status. Those with dependent children are perhaps more likely to belong to the married or co-habiting group.

### 3.1.4 Age standardised mortality rates (all ages) by limiting long term illness and gender (2003-07)

Chart 4



The 2001 Census contained a question relating to limiting long-term illness<sup>5</sup> which, in this context, can serve as an adequate proxy measure for disability. Chart 4 above indicates that having a limiting long-term illness is associated with a significantly elevated ASMR for both sexes (1,451 and 963 deaths per 100,000 population for males and females respectively). This represents around 130% higher ASMR for those with LLTI compared with those with no LLTI across both genders.

<sup>5</sup> The Census question was essentially a self-assessment of whether the person had a limiting long-term illness, health problem or disability which limited their daily activities or the work they could do and included problems that are due to old age.

### 3.1.5 Age standardised mortality rates (all ages) by community background and gender (2003-07)

Chart 5

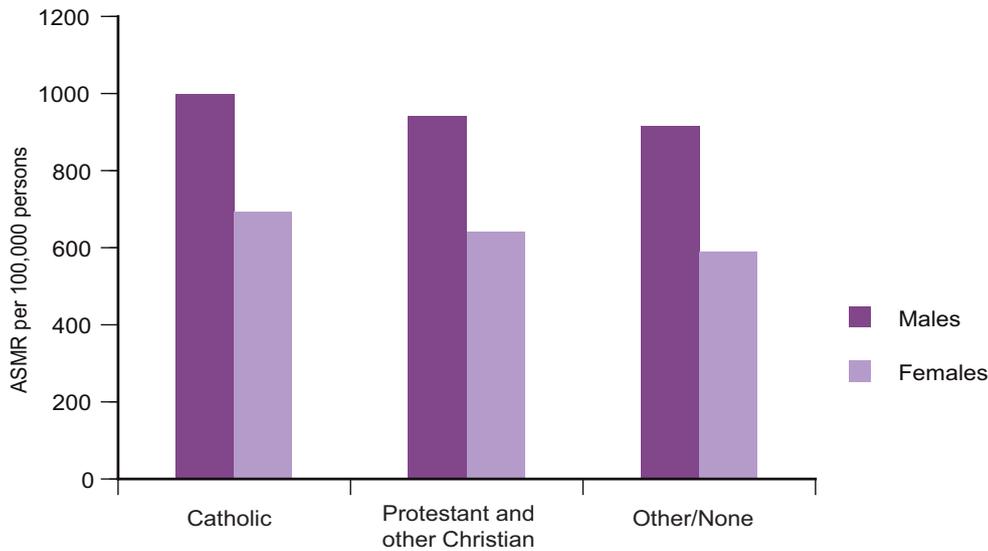
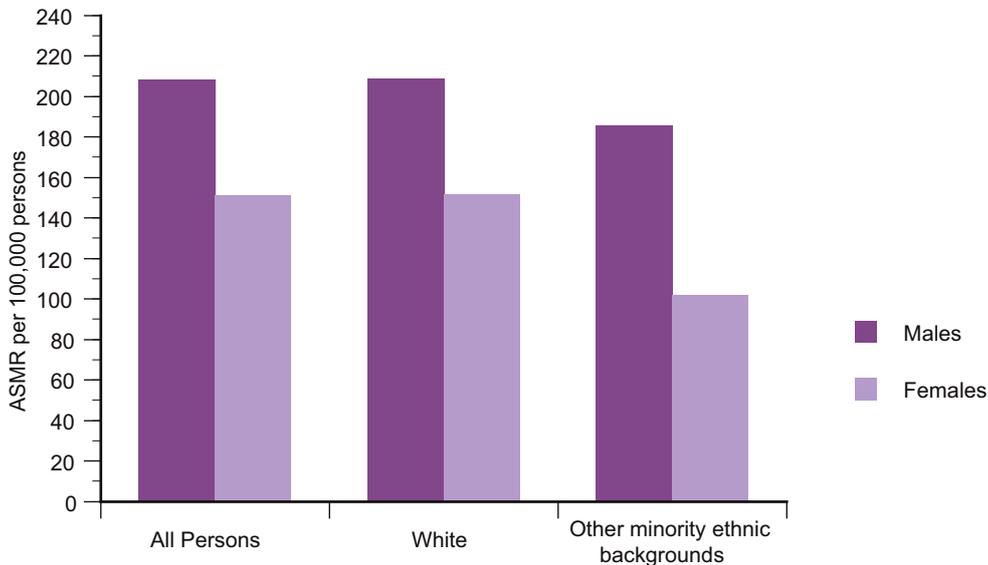


Chart 5 replicates the previous findings of O'Reilly and Rosato<sup>6</sup> that those with a Catholic community background, both males (998 deaths per 100,000 population) and females (692 deaths per 100,000 population), had the highest ASMR. The ASMR among Catholics males and females was 6.2% and 8.2% higher respectively than their counterparts in the Protestant and other Christian group. It should be noted that although the lowest ASMRs for both sexes are found amongst those with an 'other' community background, or none, this group is relatively small and these rates should be viewed with a degree of caution.

### 3.1.6 Age standardised mortality rates (all ages) by ethnicity and gender (2003-07)

Chart 6



Due to the small numbers of other minority ethnic backgrounds enumerated in the Census, it was only possible to examine ethnicity in terms of a bimodal classification of 'White' and a grouping created that was called 'Other minority ethnic backgrounds'. Those classified as 'Other minority ethnic backgrounds' had lower ASMRs across both genders than those belonging to the "white" group, however the effect was more pronounced among females (442 compared with 658 deaths per 100,000 population). While the observed difference is statistically significant, due to the relatively small numbers of people categorised as 'Other minority ethnic backgrounds' (as at the 2001 Census), these results should still be viewed with a degree of caution.

<sup>6</sup> O'Reilly, D., & Rosato, M. Religious affiliation and mortality in Northern Ireland: Beyond Catholic and Protestant. *Social Science & Medicine* 66 (2008) 1637 - 1645.

## 3.2 Mortality rate by social disadvantage classification

### 3.2.1 Age standardised mortality rates (all ages) by housing tenure and gender (2003-07)

Chart 7

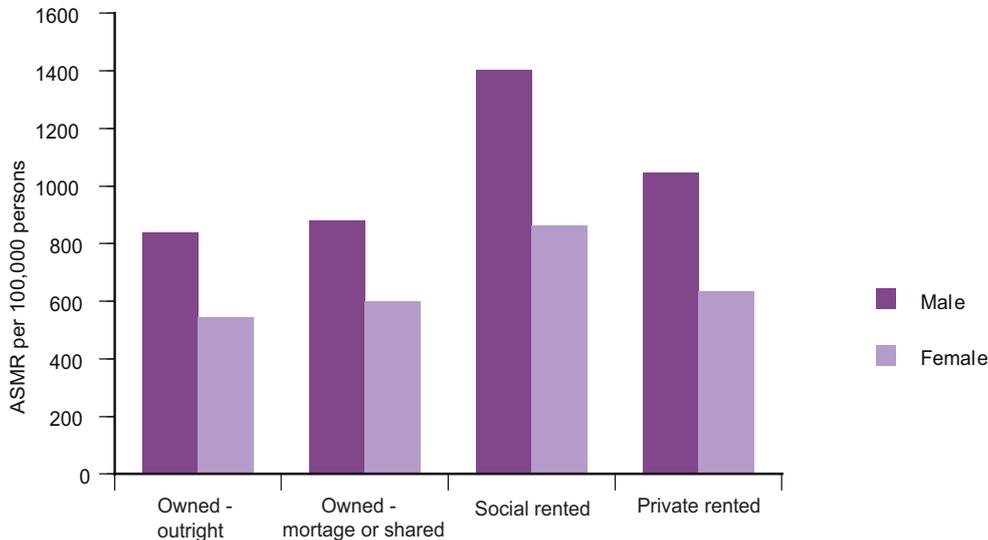
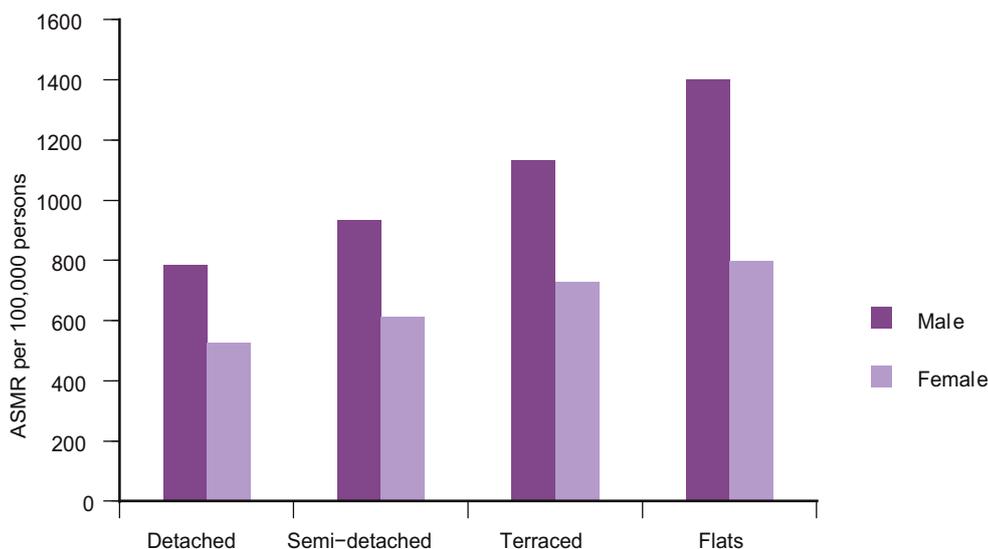


Chart 7 indicates that the lowest ASMR, for both males and females, was found amongst those living in accommodation owned outright or owned with a mortgage. By contrast, the highest ASMRs were found amongst those living in social rented housing. Among males, those who are living in homes which are owned outright (840 deaths per 100,000) had an ASMR which is 40% lower than those who are living in social rented accommodation (1,403 deaths per 100,000). This trend is also seen among females where social renters had an ASMR 58% higher than females living in a house which is owned outright (864 and 546 deaths per 100,000 population respectively).

### 3.2.2 Age standardised mortality rates (all ages) by accommodation type and gender (2003-07)

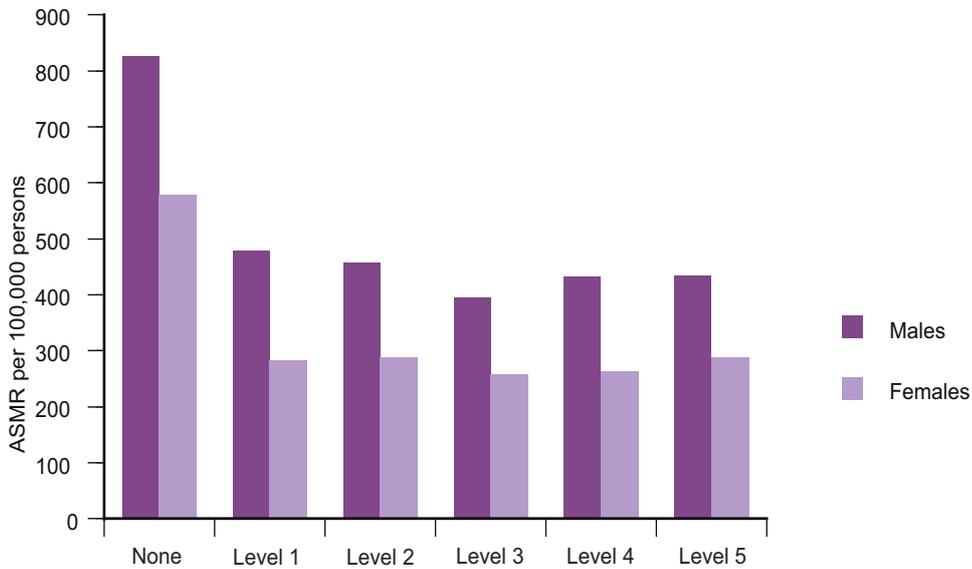
Chart 8



In terms of accommodation type, the highest ASMRs were found in those living in flats or apartments and terraced houses (see appendix 2 for details). Both males and females living in detached and semi detached houses had lower ASMR's than the average overall ASMR across both genders. This effect was slightly stronger for males, with those living in detached houses having a 44% lower death rate than those living in flats. The same trend among females produced a 34% lower rate among those living in detached houses.

### 3.2.3 Age standardised mortality rates (16-74 years) by qualification and gender (2003-07)

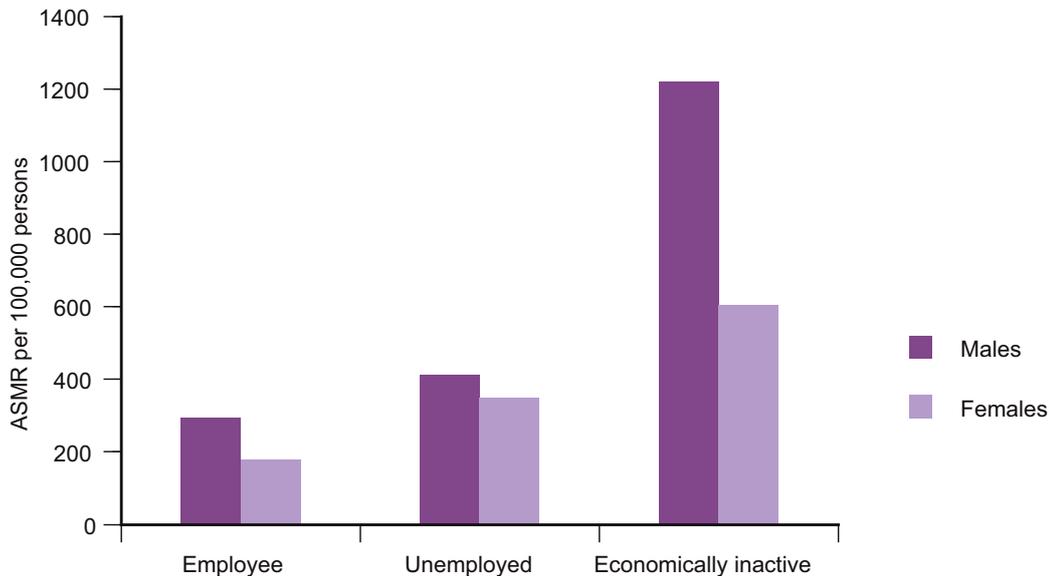
Chart 9



As chart 9 indicates, the highest mortality rates were amongst those with no qualifications (826 deaths per 100,000 population among males and 578 deaths per 100,000 population among females). The most apparent differences were observed between those with a qualification and those without. Differences in mortality were not as marked between those with a level 1 qualification or higher. The lowest mortality rates were among those with level 3 qualifications (396 and 259 deaths per 100,000 population for males and females respectively).

### 3.2.4 Age standardised mortality rate (16-74 years) by labour market status and gender (2003-07)

Chart 10



In relation to labour market status (chart 10), the lowest mortality rates were found amongst the employed whilst the highest rates were found amongst the economically inactive (1,220 deaths per 100,000 population among males and 606 deaths per 100,000 population among females). However, it should be noted that the latter category includes those who are disabled or have a long term illness. The relationship between labour market status and ASMR was more pronounced among females. Females who are unemployed had almost double the mortality rate of those in employment (350 and 179 deaths per 100,000 population respectively). Unemployed males had a 41% higher ASMR than those males in employment.

### 3.2.5 Age standardised mortality rates (16-74 years) by socio-economic classification (NSSEC) and gender (2003-07)

Chart 11

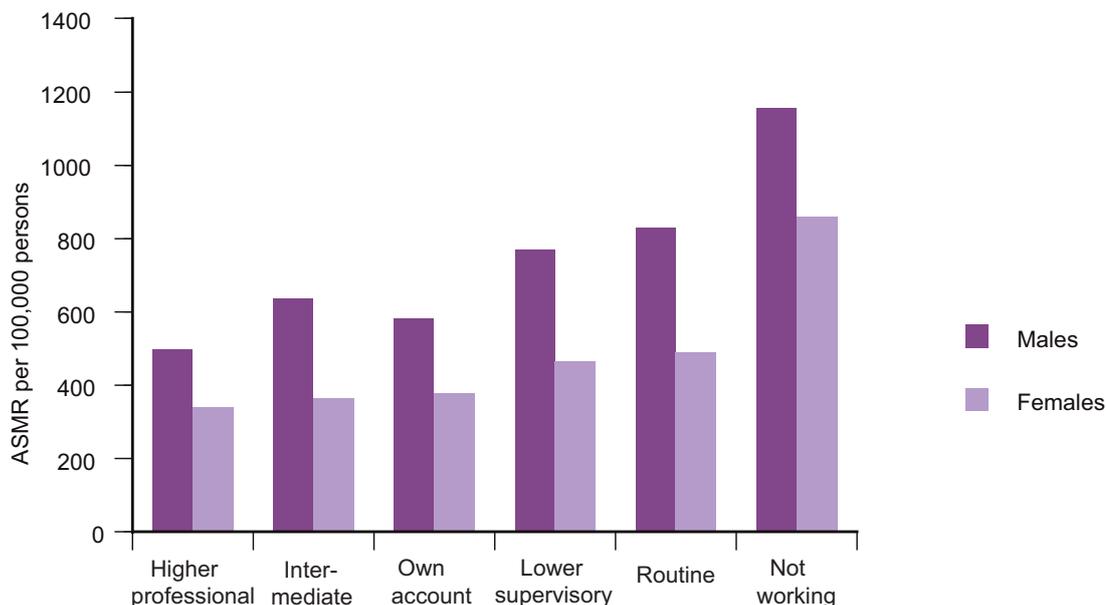
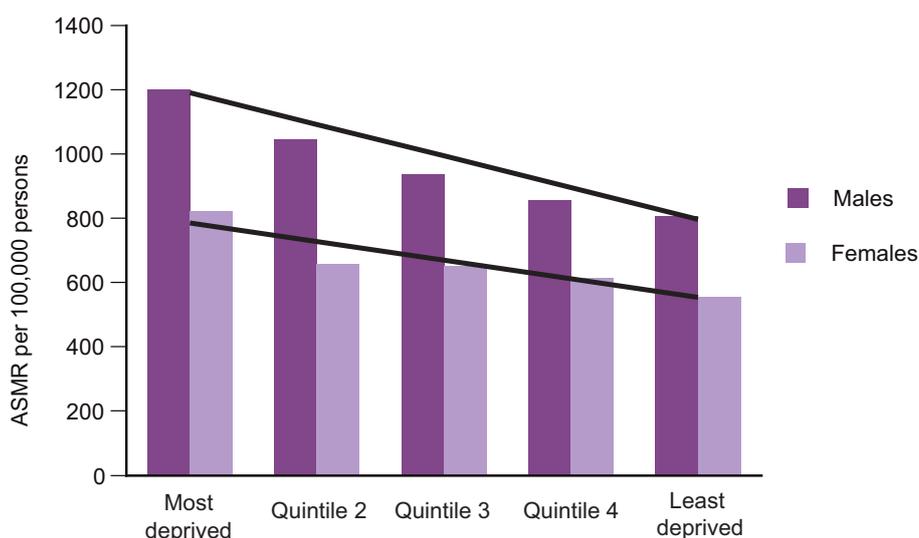


Chart 11 sets out the working population divided into six categories of socio-economic class. It indicates that the highest mortality rates were found amongst those who are not working or have routine jobs (see Appendix for details). The lowest mortality rates were found among the higher professional group for both genders. Females who are not working had a 154% higher death rate than their higher professional counterparts while males had a 132% higher rate.

### 3.2.6 Age standardised mortality rates (all ages) by quintile of multiple deprivation and gender (2003-07)

Chart 12



When mortality rates are examined on the basis of the NIMDM<sup>7</sup> ranking of Super Output Areas, the relationship between disadvantage and mortality is clearly illustrated (Chart 12). The highest mortality rates were found amongst males and females living in the 20% most deprived areas (1,201 and 821 deaths per 100,000 population for males and females respectively). By contrast, the lowest mortality rates were found amongst the population living in the 20% least deprived areas (805 and 555 deaths per 100,000 population for males and females respectively).

<sup>7</sup> The Northern Ireland Multiple Deprivation Measure (NIMDM) ranks Areas within Northern Ireland along combined dimensions of social need (NISRA, 2005).

<sup>8</sup> Male regression line:  $Y = -98.287x + 1263.5$ ,  $R^2 = 0.9594$

Female regression line:  $Y = -57.733x + 832.88$ ,  $R^2 = 0.8498$

The difference in the ASMRs between the least deprived and most deprived areas was approximately the same across both genders, with the least deprived rate around a third lower than the most deprived rate.

Chart 12 includes regression lines for the ASMR relationship across the deprivation quintiles. These regression lines<sup>9</sup> are downward sloping showing mortality to decrease as relative deprivation decreases and are both good fits for the ASMR across the deprivation quintiles.

### 3.3 Life expectancy

Table 1 sets out the main impacts on life expectancy by the Section 75 groups and social disadvantage classifications. These mainly mirror the differences in ASMR found between these groups set out in the previous sections. For details please see Appendix 3.

<b>Table 1 Main Impacts on life expectancy</b>
<ul style="list-style-type: none"> <li>Life expectancy (LE) among married men (79.6 years) and women (83.8 years) was on average higher than the overall LE among males (77.5 years) and females (81.9) aged 16+.</li> </ul>
<ul style="list-style-type: none"> <li>Life expectancy among widowers (73.8 years) and widows (80.8 years) were lower than life expectancy among the married (Male 79.6 years, Female 83.8 years).</li> </ul>
<ul style="list-style-type: none"> <li>Divorcees have lower life expectancy on average than those who are married and this effect was more pronounced among men (73.3 years). Female divorcees had a LE of 80.9 years.</li> </ul>
<ul style="list-style-type: none"> <li>Males with one or more dependents had a LE of 79.2 years compared with 77.5 years among all males aged 16+. Females with one or more dependents (82.4 years) had a slightly higher LE than the overall LE for 16+ females (81.9 years).</li> </ul>
<ul style="list-style-type: none"> <li>People living in the least deprived areas had a higher life expectancy. This effect is more pronounced in males. Males living in the most affluent areas had a LE of 79.9 years compared with 73.7 years for males in the most deprived areas (a gap of 6.2 years). Whereas the gap between females in least deprived (83.3 years) and most deprived areas (78.6 years) was lower at 4.7 years.</li> </ul>
<ul style="list-style-type: none"> <li>As might be expected those with a LLTI (Male 70.0, Female 75.3) had a lower life expectancy than those without a LLTI (Male 81.5, Female 86.9).</li> </ul>

### 3.4 Regression analysis

A logistic regression analysis was used with the aim of predicting higher or lower risk of mortality from the Section 75 variables as well as deprivation indicators.

The analysis was undertaken in two stages. Firstly a model was built that best described the individual Section 75 characteristics associated with increased risk of death. A second model was developed to determine whether or not factors relating to deprivation (social determinants of health) contributed to the risk of death independent of the Section 75 characteristics. The logistic regression model assumes the included variables (Section 75 characteristics and deprivation) are independent of each other, an assumption that might not hold if characteristics within an area were correlated which may exaggerate any associations.

Table 2 column A shows the relationship between death and the various Section 75 characteristics. This is expressed as an odds ratio which shows a measure of effect size, describing the strength of association or non-independence between two binary data values. It is used as a descriptive statistic, and plays an important role in logistic regression. Simply put, it is the ratio of the odds of something occurring in one situation to the odds of the same event occurring in a second situation. As might be expected, greater risk of death was associated with increasing age.

Those with a limiting long term illness (LLTI) were nearly three times more likely to die than those who did not report an LLTI. Those currently married or cohabiting at the time of census had the lowest risk of mortality compared with all other marital status categories, with the excess risk associated with the divorced/widowed categories. Those with one or more dependents were associated with a quarter lower risk of death than those without, even after adjustment for other factors such as age, gender and marital status. There was not much difference in the experience of risk between Protestants and Catholics and the difference was only significant when disadvantage was added, while those who reported their religion as other or none were experienced approximately 20% less risk. However, it should be noted that as this "None/Other" group was relatively small, results should be treated with caution.

The effect of ethnicity was so weak (probably due to small numbers in the non-white category) that it was excluded from the model.

For the second stage of the analysis a deprivation variable was created to provide a 10 point scale using the following variables which act as a proxy for deprivation:

1) Social class (NSSEC) ; 1) Car access ; 3) Tenure; 4) Education.

The 'deprivation index' which was created with a scale of 0 (Least deprived) to 9 (Most deprived) was used in this regression analysis as a way to generate a single variable to summarise the various dimensions normally used when analysing the effects of deprivation. It is specific to some of the papers from NILES<sup>9</sup>, and allows analysis to examine the overall effect of a generalised version deprivation, without becoming over involved with the nuance of differences between the variables.

Each variable is summarised as set out in Appendix 4, and simply accumulated. Due to the way they are recoded the lowest values form a least deprived group, and progress on a scale to the most deprived. Each of the variables used in this index carried equal weighting.

In this case the focus of interest is in the changes in the risks associated to the Section 75 indicators after the introduction of the deprivation indicator to the model.

When deprivation was added to the regression model (table 2 column B), more of the variance is explained, thus making it a better fit than the Section 75 model. The odds ratios do not change much between the models, suggesting they retain their independent effects. However, deprivation does bring slight changes to the odds ratio of Section 75 characteristics and deprivation itself was a strong predictor of increased mortality. The gradient associated with the index of deprivation (from least to most deprived) more than doubled between the least and most deprived categories. The effect reduced slightly in the most disadvantaged groups due to the small population in the catchment of the most extreme categories.

Deprivation does explain some of the variance between Section 75 characteristics and it can certainly be said to have a much greater impact on the outcome of death than other Section 75 characteristics excluding age and LLTI. This would suggest that age, LLTI and deprivation are good indicators to predict risk of mortality in Northern Ireland.

<sup>9</sup> O'Reilly, D., Rosato, M., Connolly, S., & Cardwell, C. Area factors & suicide: 5 year follow up of the Northern Ireland population. *The British Journal of Psychiatry* 192 (2008) 106 - 111.

Table 2 Regression analysis of the relationship between mortality and A) Section 75 categories and B) Section 75 categories and deprivation (age 25-74)

Individual Characteristics	Proportion of deaths % (n)	A		B	
		Adjusted for S75 Characteristics HR (95% CI)	p	Adjusted for Deprivation HR (95% CI)	p
<b>Aged 25 - 74</b>					
<b>Sex</b>					
Male	57.1 (23419)	1 (Reference)		1 (Reference)	
Female	42.9 (17608)	0.58 (0.57 - 0.60)	<0.001	0.55 (0.54 - 0.56)	<0.001
<b>Age</b>					
25-34	2.5 (1025)	1 (Reference)		1 (Reference)	
35-44	6.0 (2446)	2.53 (2.34 - 2.72)	<0.001	2.47 (2.29 - 2.66)	<0.001
45-54	13.0 (5326)	5.84 (5.44 - 6.26)	<0.001	5.91 (5.51 - 6.35)	<0.001
55-64	26.1 (10688)	11.84 (11.05 - 12.69)	<0.001	12.02 (11.22 - 12.90)	<0.001
65-74	52.4 (21452)	31.94 (29.82 - 34.19)	<0.001	32.00 (29.87 - 34.28)	<0.001
<b>Marital status</b>					
Divorced /Widowed	26.6 (10916)	1 (Reference)		1 (Reference)	
Married /co-habiting	56.3 (23110)	0.65 (0.62 - 0.67)	<0.001	0.75 (0.73 - 0.78)	<0.001
Single	17.1 (7001)	0.95 (0.91 - 0.98)	<0.001	0.94 (0.90 - 0.97)	<0.001
<b>Dependents</b>					
None	87.6 (34556)	1 (Reference)		1 (Reference)	
One or more	12.4 (4874)	0.75 (0.72 - 0.78)	<0.001	0.77 (0.74 - 0.80)	<0.001
<b>Limiting Long Term Illness (LLTI)</b>					
No LLTI	37.2 (15269)	1 (Reference)		1 (Reference)	
LLTI	62.8 (25758)	2.76 (2.70 - 2.83)	<0.001	2.51 (2.16 - 2.57)	<0.001
<b>Community Background</b>					
Protestant and other Christian	60.5 (24817)	1 (Reference)		1 (Reference)	
Catholic	38.4 (15755)	0.99 (0.97 - 1.02)	>0.05 ns	1.03 (1.00 - 1.05)	<0.05
Other / None	1.1 (455)	0.83 (0.75 - 0.92)	<0.001	0.87 (0.79 - 0.97)	<0.001
<b>Deprivation Scale</b>					
0 = Least deprived	2.2 (855)	-	-	1 (Reference)	
1	4.5 (1766)	-	-	1.31 (1.21 - 1.43)	<0.001
2	11.8 (4658)	-	-	1.41 (1.31 - 1.52)	<0.001
3	20.0 (7879)	-	-	1.59 (1.48 - 1.71)	<0.001
4	22.1 (8695)	-	-	1.82 (1.69 - 1.96)	<0.001
5	18.7 (7365)	-	-	2.22 (2.06 - 2.39)	<0.001
6	14.7 (5805)	-	-	2.61 (2.42 - 2.81)	<0.001
7	5.3 (2086)	-	-	2.91 (2.67 - 3.18)	<0.001
8	0.7 (281)	-	-	2.73 (2.35 - 3.16)	<0.001
9 = Most deprived	0.0 (15)	-	-	2.16 (1.25 - 3.71)	<0.001

## 4 - Conclusion and further work

The main findings from this report can be summarised as follows:

- Females had lower age standardised mortality rates (ASMR) than males.
- Age and gender were the two main predictors for determining mortality.
- Greatest differences in Section 75 characteristics were seen between those with a limiting long term illness (higher ASMR) and those without (lower ASMR).
- Apart from age, gender and LLTI, social deprivation had a bigger effect on mortality and life expectancy than Section 75 characteristics.
- Those from a Catholic background had a slightly elevated ASMR and lower life expectancy.
- Those who were married or co-habiting experienced lowest ASMRs and highest life expectancy.

This report builds on the paper “Differences in Mortality Rates in Northern Ireland 2002-2005: A Section 75 and Social Disadvantage Perspective” (McClelland, 2008). McClelland looked at the four year period 2002 – 05, in contrast this paper examines the five year period 2003 – 07. Bearing in mind the differences in methodology, results from the two studies were broadly comparable, with the ASMR having either decreased or remained similar between 2002 – 05 and 2003 – 07.

Comparing results from the two studies would seem to suggest that those living in the least deprived areas experienced an increase in ASMRs whereas those in the most deprived areas experienced a decrease in ASMRs. This is mirrored in other deprivation measures such as tenure, accommodation type, and labour market activity and would suggest that the relative gap between the most and least deprived areas increased.

Generally, there were no major changes in life expectancy patterns, most either increased slightly or remained broadly similar since the McClelland report.

Again it should be emphasised that although results have been presented as bivariate charts, it is acknowledged that Section 75 characteristics should not be examined in complete isolation.

Therefore when interpreting the results caution should be used when making assumptions regarding individual Section 75 groups.

It is anticipated that an ongoing monitoring system can now be established using NILS/NIMS linked data. This will be expanded upon and enhanced over time. In future reports causes of death will also be examined and monitored over time to observe any changes to mortality rates and life expectancy among Section 75 categories. It is also proposed that other linkages with NILS are explored (such as hospital admissions) in order to increase coverage and reporting of health outcomes, to include both morbidity and mortality.

## APPENDIX 1 - Section 75 categories

Section 75 category	Source	Indicator
Gender	Death records	Male / Female
Age	Death records	All ages / Aged 16+ / Aged 16-74
Marital status	Death records	Married or co-habiting / Widowed / Divorced
Community background	2001 Census	Catholic / Protestant and other Christian/ Other
Disability	2001 Census	Limiting Long Term Illness (LLTI) / No LLTI
Dependants	2001 Census	No dependents / One or more dependents
Ethnicity	2001 Census	White / Other minority ethnic groups
Political opinion	Not available	Not available
Sexual orientation	Not available	Not available

## APPENDIX 2 - Age standardised mortality rates

Number of deaths, age standardised mortality rates (ASMR) and confidence intervals (CI) by Section 75 and social disadvantage classifications and gender (2003-07)

	Males			Females		
	No deaths	ASMR	95% CI	No deaths	ASMR	95% CI
All ages	31360	960.6	951.0, 970.2	34057	657.2	650.8, 663.6
Aged 16 and over	31267	1228.7	1216.5, 1241.0	33999	840.2	831.8, 848.6
Aged 16 to 74	18595	666.2	658.2, 674.1	13925	445.2	438.9, 451.6
<b>Marital status (16 and over)</b>						
Single	5569	1540.6	1527.1, 1554.2	5212	1001.2	992.0, 1010.5
Married	18076	1062.8	1051.3, 1074.3	10316	712.9	705.2, 720.7
Widowed	5389	2081.3	2066.2, 2096.5	16851	921.5	912.7, 930.4
Divorced	2233	1565.9	1552.2, 1579.6	1620	908.5	899.7, 917.4
<b>Community background (all ages)</b>						
Catholic	10993	997.7	987.9, 1007.4	11525	692.4	685.9, 699.0
Protestant and other Christian	19988	939.4	929.9, 948.8	22332	639.5	633.2, 645.8
Other /none	379	914.3	905.0, 923.7	200	588.3	582.3, 594.4
<b>Ethnicity (all ages)</b>						
White	31239	961.1	951.5, 970.7	33981	657.8	651.4, 664.2
Non-white	121	846.8	837.8, 855.8	76	442.2	436.8, 447.6
<b>Limiting Long Term Illness (all ages)</b>						
LLTI	19892	1451.0	1439.5, 1462.5	24662	962.9	954.9, 970.8
No LLTI	11468	633.4	625.5, 641.3	9395	409.5	404.4, 414.6
<b>Dependents (16 and over)</b>						
None	26736	1246.4	1234.1, 1258.8	27530	805.7	797.6, 813.7
One or more	2954	1070.9	1059.4, 1082.4	2374	816.3	808.2, 824.5
<b>Housing tenure (all ages)</b>						
Owned - outright	14932	839.9	830.9, 848.9	14211	545.7	539.9, 551.6
Owned - mortgage or shared	5350	883.0	873.8, 892.3	4365	599.0	592.9, 605.1
Social rented	7615	1402.5	1391.1, 1413.9	9193	863.9	856.3, 871.4
Private rented	1885	1045.6	1035.6, 1055.5	2193	634.7	628.3, 641.0
<b>Accommodation type (all ages)</b>						
Detached	11095	785.7	777.0, 794.5	9637	526.5	520.8, 532.2
Semi-detached	7772	932.2	922.7, 941.6	7888	610.4	604.2, 616.6
Terraced	8331	1131.5	1121.2, 1141.8	9111	728.4	721.6, 735.2
Flats	2262	1402.6	1391.2, 1413.9	3068	795.7	788.4, 802.9

cont.

Number of deaths, age standardised mortality rates (ASMR) and confidence intervals (CI) by Section 75 and social disadvantage classifications and gender (2003-07)  
(cont.)

	Males			Females		
	No deaths	ASMR	95% CI	No deaths	ASMR	95% CI
<b>Qualifications (16-74)</b>						
None	14290	826.4	817.7, 835.2	10772	577.5	570.4, 584.6
Level 1	1106	478.9	472.2, 485.6	894	283.6	278.6, 288.6
Level 2	1247	457.7	451.1, 464.3	1172	288.1	283.0, 293.2
Level 3	427	395.6	389.4, 401.7	307	258.8	254.0, 263.7
Level 4	1029	432.2	425.8, 438.6	566	263.1	258.3, 268.0
Level 5	496	435.4	429.1, 441.7	214	288.7	283.6, 293.7
<b>Labour market status (16-74)</b>						
Employee	4417	294.1	288.9, 299.3	2012	178.7	174.7, 182.6
Unemployed	617	414.1	408.2, 420.1	156	350.2	344.6, 355.7
Economically inactive	13534	1219.8	1209.3, 1230.3	11741	606.3	598.9, 613.6
Active student	27	57.0	54.9, 59.1	16	36.8	35.1, 38.4
<b>Socio-economic class (16-74)</b>						
Professional (high level)	3897	498.1	493.3, 502.9	2242	338.6	334.7, 342.5
Intermediate	1028	635.2	629.8, 640.6	1702	365.3	361.1, 369.4
Own account	2660	581.8	576.7, 586.9	498	387.0	373.9, 382.2
Lower supervisory	2735	768.4	762.5, 774.4	800	464.2	459.6, 468.9
Routine	6619	826.9	820.8, 833.1	6328	489.1	484.3, 493.8
Not working	1546	1154.0	1146.8, 1161.1	2297	859.0	852.7, 865.2
Full time student	110	46.1	44.8, 47.4	58	46.4	45.1, 47.7
<b>Multiple Deprivation quintile (all ages)</b>						
Quintile 1 (Most deprived)	6979	1200.8	1190.2, 1211.4	7804	821.1	813.9, 828.3
Quintile 2	7099	1046.7	1036.8, 1056.7	7230	658.8	652.4, 665.2
Quintile 3	6377	935.6	926.1, 945.1	6895	650.0	643.7, 656.3
Quintile 4	5634	855.2	846.1, 864.3	6340	613.3	607.2, 619.5
Quintile 5 (least deprived)	5271	805.1	796.3, 814.0	5788	555.2	549.4, 560.9

## APPENDIX 3 - Life expectancy

Life expectancy and confidence intervals (CI) by gender (2003-07)

	Males	95% CI	Females	95% CI
All ages	76.9	76.7, 77.0	81.4	81.2, 81.5
Aged 16 and over	77.5	77.3, 77.6	81.9	81.7, 82.0
<b>Marital status</b>				
Single	73.9	73.5, 74.2	79.5	79.1, 79.9
Married	79.6	79.4, 79.8	83.8	83.4, 84.1
Widowed	73.8	72.6, 75.0	80.8	80.1, 81.4
Divorced	73.3	73.2, 74.4	80.9	80.3, 81.4
<b>Dependants</b>				
None	76.8	76.3, 77.2	82.1	81.6, 82.5
One or more	79.2	78.7, 79.7	82.4	81.9, 82.9
<b>Community background</b>				
Catholic	76.3	76.1, 76.5	80.8	80.6, 81.1
Protestant & other Christian	77.2	77.0, 77.4	81.7	81.5, 81.9
Other/ none	77.6	76.6, 78.5	82.5	81.2, 83.7
<b>Ethnicity</b>				
White	76.9	76.7, 77.0	81.4	81.2, 81.5
Non-white	79.1	77.0, 81.1	86.8	84.6, 89.1
<b>Limiting Long Term Illness (LLTI)</b>				
LLTI	70.0	69.5, 70.4	75.3	74.8, 75.8
No LLTI	81.5	81.3, 81.7	86.9	86.7, 87.1
<b>Tenure</b>				
Owned - outright	72.4	71.3, 73.6	78.5	77.4, 79.7
Owned - mortgage or shared	76.7	76.3, 77.1	81.4	81.0, 81.8
Social rented	69.4	68.8, 70.0	76.2	75.7, 76.8
Private rented	74.3	73.5, 75.1	80.6	79.8, 81.4
<b>Accommodation type</b>				
Detached	77.2	76.7, 77.6	82.1	81.6, 82.5
Semi-detached	75.5	75.0, 75.9	80.8	80.3, 81.2
Terraced	72.7	72.1, 73.2	78.5	77.9, 79.0
Flats	67.3	65.5, 69.2	75.7	73.8, 77.6
Other	73.0	71.0, 75.0	82.1	79.9, 84.3
<b>Deprivation Quintiles</b>				
Quintile 1 (Most deprived)	73.7	73.3, 74.0	78.6	78.3, 78.9
Quintile 2	75.7	75.3, 76.0	81.3	81.0, 81.6
Quintile 3	77.3	77.0, 77.6	81.5	81.2, 81.8
Quintile 4	78.3	78.0, 78.6	82.3	82.0, 82.5
Quintile 5 (Least deprived)	79.9	79.6, 80.2	83.3	83.0, 83.6

## APPENDIX 4 - 10-point deprivation index

10 point deprivation index variables and associated scores.

Variable	Score			
	0	1	2	3
Social Class	Professional	Intermediate	Routine	Other
Car Access	2+ Cars	1 Car	No car access	
Tenure	Owner occupier	Private rented	Social rented	
Education	University level	Intermediate	No qualifications	



## Also available from the Health & Social Care Inequalities Monitoring System (HSCIMS)

### HSCIMS Third Update Bulletin 2009

Regional analysis on health inequalities between the most deprived areas and Northern Ireland overall as well as between rural areas and Northern Ireland overall.

[www.dhsspsni.gov.uk/index/stats\\_research/stats-equality.htm](http://www.dhsspsni.gov.uk/index/stats_research/stats-equality.htm)

### HSCIMS Sub-regional Inequalities - HSC Trusts 2010

Sub-regional analysis at HSC Trust level examining health inequality gaps within each Trust as well as compared to the Northern Ireland average.

[www.dhsspsni.gov.uk/index/stats\\_research/stats-equality.htm](http://www.dhsspsni.gov.uk/index/stats_research/stats-equality.htm)

### Accessibility to services 2010

Average travel time to health and social care services (e.g. maternity unit, nursing home) for areas such as the most and least deprived areas, rural areas, Trusts etc. compared with the NI average.

Information available on request from [healthinequalities@dhsspsni.gov.uk](mailto:healthinequalities@dhsspsni.gov.uk)

### HSCIMS Life Expectancy Decomposition - An overview of changes in Northern Ireland life expectancy 2001-03 to 2006-08

Analysis of changes in life expectancy and life expectancy gaps by cause of death and age, for NI overall, by deprivation and rurality as well as within each Trust.

[www.dhsspsni.gov.uk/index/stats\\_research/stats-equality.htm](http://www.dhsspsni.gov.uk/index/stats_research/stats-equality.htm)

**Produced by:**

Project Support Analysis Branch, Information Analysis Directorate

Department of Health, Social Services and Public Safety

Castle Buildings, Belfast BT4 3SQ

Tel: 028 9052 2591

**Email:** [healthinequalities@dhsspsni.gov.uk](mailto:healthinequalities@dhsspsni.gov.uk)

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