

# Deprivation and Cancer Survival in Scotland: Methods

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## Introduction

Net Survival in the twenty most commonly diagnosed cancers in Scotland<sup>1</sup> were analysed by deprivation<sup>2</sup> to see if there was a significant difference between the most and least deprived groups by cancer site. Multivariate techniques<sup>3</sup> were then applied to the relevant cancer sites<sup>4</sup> to further explore other factors that may or may not be driving these differences. Part of this additional analysis looked at the excess risk of death from the cancer in question and compared this excess risk of death in the least deprived group with all other groups after adjusting for various factors.

## Data sources and Sample

Data were extracted from the Scottish Cancer Registry and National Records of Scotland (NRS) for patients diagnosed with a primary cancer within the five-year period 2004-2008<sup>5</sup> and used to calculate one and five year net survival by deprivation. For the multivariate analysis, information relating to the cancer and additional information on NHS Scotland inpatient and day case records (SMR01)<sup>6</sup> were linked. Scottish life tables<sup>7</sup> provided an estimate of background mortality (rates of death irrespective of cause).

## Net survival

Net survival produces disease-specific estimates, and calculates the survival of cancer patients as if there were no other causes of death other than the cancer in question.

## Age-standardisation

A technique used to enable metrics derived for different populations to be robustly compared even when the populations are different in terms of their age profiles. Age-standardised rates also allow for more robust comparisons between males and females, years, and geographical areas.

## 95% confidence interval

A measure of the uncertainty around an estimate. Confidence intervals (CI) provide a range of values which contain the true population parameter with a 95% level of confidence and therefore gives an indication of the amount of variability around the estimate. The wider the CI, the less robust the estimate.

## Excess Risk of Death or Excess Hazard Ratio

Excess hazard ratio of death (or excess mortality) is a measure of the mortality due to the cancer in question over and above the expected mortality. Expected mortality was derived from population life tables constructed by single year of age (0–99 years) and single calendar year, sex and deprivation category, for the entire population of Scotland.

**Table of factors included for each cancer**

<b>Cancer</b>	<b>Trachea, bronchus and lung</b>	<b>Female Breast</b>	<b>Colorectal</b>	<b>Prostate</b>	<b>Head and neck</b>	<b>Liver</b>
<b>ICD-10 Code</b>	C33 - C34	C50	C18-C20	C61	C00-C14, C30-C32	C22
<b>Cases included</b>	23835	19917	17630	13818	5162	1765
<b>Personal Characteristics</b>						
Gender	X		X		X	X
Age (average)	72	67	75	75	67	72
Charlson index of co-morbidity	X	X	X	X	X	X
Inpatient bed days	X	X	X	X	X	X
<b>Tumour-related</b>						
Grade of differentiation	X	X	X		X	X
TNM Stage	X	X				
Dukes' stage			X			
Gleason Score				X		
Clinical Extent	X					
Metastases within 4 months				X	X	X
ER Status		X				
Small Cell	X					
Tumour morphology		X	X			X
Site/Subsite					X	X
<b>Health service-related</b>						
Screen-detected		X	X			
Clinical trial		X				
Surgery	X	X	X	X	X	X
Radiotherapy	X	X	X	X	X	
Chemotherapy	X	X	X		X	X
Hormonal Therapy		X		X		

Further details on the methods used can be found in the Technical Report:

<http://www.macmillan.org.uk/about-us/what-we-do/evidence/research-funding/our-partnerships/information-services-division-scotland.html#271894>

**Notes**

<sup>1</sup> Selection was based on 2013 incidence rates (<https://www.isdscotland.org/Health-Topics/Cancer/Publications/2015-04-28/2015-04-28-Cancer-Incidence-Summary.pdf?15774172545>)

<sup>2</sup> Scottish Index of Multiple Deprivation (SIMD) 2009 (<http://www.gov.scot/Topics/Statistics/SIMD/Background-Data-2009>)

<sup>3</sup> Multivariate analysis allow two or more variables to be analysed at once and to explore the impact of these variables on an outcome of interest. For example, when thinking about the relationship between survival and deprivation in cancer, it is likely that age will have an effect. The age structure in the most and least deprived areas may differ but it is the relationship between survival and deprivation that is of interest so we need to remove the effect of this potential variation in age structure and we do this by applying multivariate techniques.

<sup>4</sup> The six cancer sites shown in the Table above were found to have significant differences in survival by deprivation. Oesophageal cancer and Malignant melanoma of the skin showed borderline significance but when more sophisticated univariate analysis was carried out, this significance was no longer apparent.

<sup>5</sup> 2009-2013 one year survival was also produced and is available in the associated technical report

<sup>6</sup> SMR1 data was used to obtain information on metastases within 4 months of diagnosis and comorbidities

<sup>7</sup> Life tables shows trends regarding the average number of years that people in Scotland will live beyond their current age by age, sex and deprivation. The life tables (2001-2011) were provided to ISD by LSHTM and the 2011 values were applied to the years 2012 and 2013.