

CHAPTER 1. INTRODUCTION

Background

The British Nuclear Fuels Limited (BNFL) installation at Sellafield in Cumbria is a source of concern for many people in Ireland, but it is a source of particular concern to people living in the Cooley Peninsula in County Louth. Not only is Cooley the nearest point to Sellafield within the Republic, but the fact that it is a peninsula maximises its exposure to any contamination which may be present in the Irish Sea. Whilst the potential threat of a major industrial accident, similar to those in Three Mile Island (1979) or Chernobyl (1986), must remain the major concern, the perception that the number of people in Cooley who have contracted cancer in recent years has increased raises concerns that discharges from Sellafield may already be having an unacceptable impact on the health of people in Cooley. The author was therefore asked by the Cooley Environment and Health Group to investigate the statistical evidence on cancer morbidity and mortality in an attempt to assess to what extent these concerns may be justified. This report contains the principal findings.¹

Data Sources And Limitations

This study analyses both morbidity data (i.e. information on people diagnosed as having cancer) and mortality data (i.e. people for whom cancer was recorded as the principal cause of death).

Most of the information on the number of deaths from cancer is taken from the annual *Report on Vital Statistics*. To minimise the effects of possible distortions caused by stochastic variations (i.e. random variations from one year to the next), this study examines deaths over a 30 year period (1970 to 1999). This also facilitates the analysis of trends over time. No information was available at the time of analysis from the *Report on Vital Statistics* for the period since 1999.

It is important to note some possible limitations in the mortality data:

- (1) The *Report on Vital Statistics* classifies the cause of death according to information recorded on the death certificate. If this information is not correctly recorded, then the data will be inaccurate.
- (2) The *Report on Vital Statistics* attempts to classify deaths by the patients' normal home address. However, there is a possibility that some patients who died whilst living away from home may not have been correctly allocated to the correct address.
- (3) The *Report on Vital Statistics* provides little information on areas smaller than counties. Thus, whilst the mortality data may be used to make comparisons between Louth and the rest of the country, it does not readily facilitate comparisons between Cooley and other areas. The *Report on Vital Statistics* did, however, provide information on the total number of cancer deaths in some of the principal towns until 1995. Whilst there is no information on the age or sex breakdown of these deaths, the fact that Louth contains two of these towns (Drogheda and Dundalk) does at least permit some comparisons to be made between these two towns and the rest of the county (including Cooley).

It should be noted that mortality data only takes account of people who died from cancer and may therefore

¹ The author would like to acknowledge the many helpful comments provided by Harry Comber on an earlier draft of this report. The author, however, takes full responsibility for the views expressed herein.

understate the full extent of the problem. For example, it does not take account of people who survive the disease, nor does it take account of cancer patients who died from other causes.

The morbidity data used in this study was provided by the National Cancer Registry in Cork. Each case is geocoded by District Electoral Division (DED), thereby permitting variations in incidence and prevalence to be examined at a sub-county level.²

The National Cancer Registry data are not without problems. The main limitations are:

- (1) Data at the time of analysis were available for only five years (1994-1998). The number of cases is therefore quite small and conclusions consequently need to be treated with caution, especially when expressed as rates for small areas such as DEDs.
- (2) Some cases may not have been reported to the Registry. The information in the National Cancer Registry is compiled by eighteen specially trained nurses employed by the Registry as Tumour Registration Officers (TROs).³ Each Tumour Registration Officer is responsible for collecting information from a variety of sources in a designated geographical area. Information is also collated from other sources. However, reporting to the Registry is voluntary rather than mandatory, so coverage will obviously depend upon the degree of cooperation provided by the hospitals and other sources. Some degree of underreporting is therefore probable. However, the National Cancer Registry goes to considerable lengths to ensure that the information is as complete and as accurate as possible. This problem is believed to be minimal and the Registry coverage has been confirmed as being more than 96 per cent complete.⁴
- (3) The geocoding of the reported cases is incomplete. It was not possible for the National Cancer Registry to allocate every case to a DED due to missing or inaccurate address information, therefore these cases cannot be used for mapping. They can, however, be used for other types of analysis.
- (4) There is also a possibility that some cases may have been assigned to the wrong DED. However, the majority of cases used in the analysis are believed to have been correctly geocoded.

In addition to data on cancer morbidity and mortality, this study also requires estimates of the population at risk (i.e. the total population in each area). This information is extracted from the 1971, 1981, 1986, 1991, 1996 and 2002 Censuses of Population. This information is available for both counties and DEDs. In the absence of a reliable count of the population in non-census years, the populations for the intervening years are estimated by interpolation. These estimates used here were made by the author, but they are very similar to those made by the Department of Health and Children as reported in the *Public Health Information System*. The Department of Health and Children described the method which it used as a 'linear interpolation ... with a pro rata adjustment to ensure that national totals by age group and sex are constrained to agree with CSO intercensal estimates'.⁵ This is a reasonable description for the method used

² DEDs are the smallest areas for which Census data are routinely published. They are larger than townlands, but smaller than rural districts or counties. There are 42 DEDs in Louth, but data for the 3 DEDs in Drogheda and the 4 DEDs in Dundalk are sometimes aggregated, thereby reducing the total number of areas to 37.

³ National Cancer Registry Board (2000) *Cancer In Ireland 1977. Incidence And Mortality. Report Of The National Cancer Registry*. National Cancer Registry, Cork.

⁴ Personal correspondence to the author.

⁵ Information Management Unit, Department of Health and Children (2003) *Public Health Information System*, Version 6.

by the author, although it is not known if the method used was exactly the same.

The Spatial Framework

The following chapters report on the differences found in the mortality or morbidity rates in different types of area. Ideally one would like to compare as small areas as possible to get a more detailed picture (although this can create additional statistical problems due to the small numbers that may be involved), but in reality the choice of area is constrained by the form in which the data are made available. In practice this means that most of the comparisons of mortality data are at county level. However, a more detailed spatial analysis is possible using the morbidity data which are available for DEDs.

The Republic is currently divided for administrative purposes into 29 Counties and 5 County Boroughs (i.e. cities). However, 3 of the Counties (Dun Laoghaire Rathdown, Fingal and South Dublin) and 1 County Borough (Galway C.B.) only came into existence in the mid-1980s. To facilitate direct comparisons with earlier periods, Dun Laoghaire Rathdown, Fingal and South Dublin are therefore treated in this study as a single entity (referred to as Dublin County). Likewise, Galway County and County Borough are treated as a single unit (referred to as Galway County). The country may therefore be regarded as divided for analytical purposes into 31 areas: 27 counties (Tipperary, which is divided into a North Riding and a South Riding, provides the 'extra' County) plus 4 County Boroughs (Dublin, Cork, Limerick and Waterford).

The Republic is divided into approximately 3,500 DEDs (now referred to simply as EDs - Electoral Divisions). The total number of DEDs defined for statistical purposes has tended to fluctuate over the period since 1970, mainly due to boundary changes within cities and subdivisions of DEDs on the edges of expanding towns. However, the number of DEDs within Louth, and their boundaries, has remained fairly static.

Parts of Chapters 2 and 3 also make comparisons between Drogheda, Dundalk and the rest of County Louth. Drogheda in these comparisons refers to the area of the Municipal Borough and Dundalk to the area of the Urban District.

Methodology

When comparing cancer rates in different areas, it is important to control for differences in the age structure of their populations. This generally entails calculating either age standardised or age specific rates. Further information is provided within the text and in more detail in Appendix A.

Chapter Structure

The findings of the study are reported throughout in a question and answer format. It is hoped that this may make the report more intelligible.

The remainder of this report is divided into 5 chapters. Chapter 2 examines spatial variations in cancer mortality between counties to assess whether the evidence supports popular conceptions that Louth has a higher rate of cancer mortality than other counties. A variety of different measures of mortality are used to try to develop a fuller understanding of the situation. There is very little information available on cancer deaths for areas smaller than counties, but a tentative attempt is made in the final section to compare cancer mortality in Drogheda, Dundalk and the rest of County Louth.

The popular perception is that cancer mortality has been increasing in Louth. Chapter 3 therefore explores temporal trends in cancer mortality to assess whether cancer mortality did in fact increase in the period

1970 to 1999, and if so whether it increased at a faster or slower rate than elsewhere. The analysis uses the similar measures to those used in Chapter 2.

Spatial variations in cancer morbidity are examined in Chapter 4 using data provided by the National Cancer Registry. This chapter compares Louth with the rest of the country before looking at more localised variations within Louth.

Chapter 5 examines whether the types of cancer (i.e. cancer sites) diagnosed in Louth are similar or different to those found in other parts of the country. This chapter again draws on the incidence data provided by the National Cancer Registry.

Finally, Chapter 6 provides a summary of the main conclusions and discusses how they might be interpreted.