# Appendix 13.4

# Data on Existing Health in the Community

# Baseline health status assessment for Ringsend


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## Executive summary


This is the report of a baseline health assessment of the Ringsend area, conducted as part of a wider baseline assessment before proposals for building a large municipal waste incinerator in the area are prepared.

Using routinely collected health data, gathered at the level of DEDs, we have tried to present a profile of the health of the people living in the affected area. We have compared their health, primarily, with the health of other people living in adjacent DEDs.

The DED containing most of the affected area, Pembroke East A, is significantly less affluent than most of the adjacent DEDs. The people living there also have much worse health. There is a striking excess of ill health and death related to respiratory causes in this DED. This is likely to be due to a combination of social, environmental and lifestyle factors.

When considering the impact of future developments on this population, their intrinsic vulnerability to adverse effects of development will need careful assessment.

## Background

The Department of Public Health Medicine and Epidemiology, in University College Dublin was approached by Ms. Jean Clarke, of M.C.O'Sullivan Ltd. (MCOS) in 2003. MCOS were acting as agents for Dublin Corporation. We were asked to prepare a proposal for a full Health Impact Assessment on a proposed municipal waste incinerator in Ringsend in South Dublin City.

This proposal was not acted on at the time, and we were asked instead to contribute to a baseline study as a precursor to a planning application for the incinerator. Specifically we were asked to use available routinely collected data to examine the current health status of people living near the proposed site, to place this in the context of the health of people living in surrounding areas, and to comment on this.

After discussion with colleagues in the Health Information Unit (HIU) of the Eastern Regional Health Authority we drew up a preliminary proposal which was accepted by Ms. Clarke on behalf of MCOS.

In outline, we suggested the use of some combination of available mortality data, routinely collected prescribing data, cancer incidence data, hospital admissions data, and data on congenital anomalies, analysed at the level of DED's, to compare the baseline health of the population living near the proposed site to that of their neighbours, and that of the wider population.

## Data sources

Five sources of routine data were evaluated for use in this project. These were routinely collected mortality data, derived from death certification; cancer incidence data , derived from active case ascertainment in hospitals by the cancer registry; routinely collected prescribing data collected by the GMS payments board, from prescriptions filled in pharmacies; hospital admissions data, recorded at hospital entry, and collated by the ESRI; records of the births of children affected by congenital anomalies, recorded by the Eurocat registry in Dublin.

Each of these sources of data is potentially useful, but each has substantial limitations. The main general problem is geocoding, which affects each one of these data sources in some way. For the kind of work proposed here it is essential to know where the people affected by a health event, a birth, death, hospital admission and so on actually lived at the time of the event. The process of linking a person to small area in which they live is called geocoding.

Most other EU countries have systems that permit the more or less simple linkage of a person to a specific place. The small area unit in Ireland is the District Electoral Division (DED). In England, which has some of the worst health information systems in the EU, it is possible to use postcodes to link someone's address to a small area. In Sweden there is full civil registration, so it is possible to link someone's personal number to a small area. In Ireland

this has to be done by linking written address details to small areas. This is very expensive, hard to do in cities, and often impossible in rural areas.

The major problems with each data source will be discussed in turn.

## Mortality data

Irish mortality data are collected at death registration. Registrars abstract death certificates, code the results, and send these centrally. The quality of death certification in Ireland is not known, but is probably very variable. By default, the area of residence written on the death certificates are only coded to county and city borough level. The HIU has carried out a series of special coding exercises, but despite a considerable effort, 5% of deaths cannot be linked to DED's. The data used here runs from 1994 to 1999. Data for 1999 to 2003 will be available later this year.

## Cancer incidence data

Cancer incidence data are collected by the National Cancer Registry of Ireland (NCRI), which is based in Cork. They employ specially trained nurses, who search out cases of cancer in Irish hospitals. They also link death certificate diagnoses of cancer. The quality and completeness of the Cancer Registry data have to been shown to be very high.

The NCRI code addresses to DED level in house, using special software. In Dublin just over 5% of deaths could not be linked to DEDs. Cancer data is presently available for 1994 to 2000 inclusive. Data for 2001 will become available later this year.

## Prescribing data

The GMS payments board record detailed data on prescriptions given to medical card holders. Very considerable detail is recorded, including the dose, duration and the name of the drug prescribed. These are presented for analysis in groups, derived by considering the main therapeutic indications for the particular drug.

A major limitation of this system is that it only covers medical card holders. Therefore the value of this system in comparing health states between areas with different proportions of medical card holders is limited. Against that, medical card holders are presumably some of the most vulnerable individuals in society, so measuring their usage of prescription drugs should give a useful indication of the health of an area.

Our analysis reports on drugs coded as being used to treat asthma. This includes much drug treatment of older people with chronic bronchitis, as well as specific treatment for asthma. The data presented here are for 2002.

## HIPE data

Hospital discharges are recorded by the Hospital Inpatients Enquiry System (HIPE). Each state-funded acute hospital in Ireland participates in this system. Every hospital discharge is coded by specially trained staff based in the hospital. The main source of information is the discharge letter dictated by hospital medical staff.

HIPE records are coded to county level, to county borough level, to town, and, in Dublin only, to post code. Unfortunately Dublin has only 21 postcodes (Dublin 1,2,3 etc..). These are too coarse a geographical level to be useful for our purposes. While some hospital discharge records have been geocoded to DED level by the HIU in ERHA, the records are still incomplete for the hospital closest to our study area. For this reason, HIPE records are not usable for this exercise.

## Eurocat data

Ireland is a member of the European system for recording the births of babies affected by congenital anomalies (Eurocat). Affected babies are identified, mostly, in maternity hospitals and registered. While the affected babies births are coded to DED level, there are no corresponding figures for unaffected babies.

For this reason, it is not possible to calculate rates of births of affected babies. The rate is the number of affected babies born in a DED in a year, divided by the total number of babies born in that DED in that year. This, however, is what is required for the analyses presented here, and so this data source cannot be used.

# Statistical methods

There are several difficult and technical problems that arise in analysing this type of health data from small areas. These are discussed in the appendix. After carefully considering the issues, we selected two statistical methods, indirect standardisation and Empirical Bayes (EB) smoothing for use in this project. Further details of both are contained in the Appendix.

Both methods produce estimates of the risk of the event being considered (death from a particular cause, a new diagnosis of cancer, or being prescribed a specific drug), compared with the risk in the whole ERHA area. Indirect standardisation produces, a Standardised Mortality Ratio (SMR), Standardised Incidence Ratio (SIR), or a Standardised Prescribing Ratio (SPR), for deaths, new diagnoses of cancer, and being prescribed a particular group of drugs respectively.

The EB methods produce the corresponding smoothed figures. These are more reliable estimates of the actual risk in a small area compared with the risk in the Dublin City region.

# Results

Following discussions with the HIU in ERHA it was decided to take 14 DEDs to make up the study area. The DEDs selected are those on the coast and just inland, lying north and south of the proposed site in Ringsend. The centre of interest is the Pembroke East A DED, which covers most of Ringsend, and where permission will be sought to erect a municipal waste incinerator. Table 1 lists basic features of the DEDs selected. They are also shown in Figure 1.

| DED Code | DED Name | Population | Deprivation score(1) |
|---|---|---|---|
| 42 | Clontarf East B | 6,458 | 1 |
| 43 | Clontarf East C | 3,029 | 1 |
| 44 | Clontarf East D | 2,772 | 1 |
| 48 | Clontarf West C | 3,372 | 2 |
| 49 | Clontarf West D | 2,140 | 2 |
| 108 | North Dock B | 3,628 | 4 |
| 110 | Pembroke East A | 4,304 | 4 |
| 111 | Pembroke East B | 3,595 | 1 |
| 112 | Pembroke East C | 3,900 | 1 |
| 114 | Pembroke East E | 3,337 | 1 |
| 115 | Pembroke West A | 3,241 | 2 |
| 116 | Pembroke West B | 3,140 | 1 |
| 117 | Pembroke West C | 4,188 | 1 |
| 143 | South Dock | 3,764 | 1 |

**Table 1. Names, population sizes and deprivation scores for the DEDs making up the study area**

**[Map to be got please!]**

**Figure 1. Map of Dublin, showing the study area.**

## Populations

There are fourteen DEDs in the study area (Figure 1). They had a total population in 1996 of just over 49,000 people, ranging from just over 2000 to just under 6350 people. They are divided sharply by deprivation score (1), with the Ringsend area and the North Dock area both being quite deprived, and all of the other areas being in the most affluent fifth of Dublin areas, or the second most affluent fifth.

## Mortality data

Five major groups of causes of death were examined. These were all-cause mortality, deaths due to ischaemic heart disease, deaths due to all types of cancer, deaths due to all types of respirator disease, deaths due to cerebrovascular disease (strokes) and deaths due to injury and poisoning.

Deaths were assigned to these groups using the ICD codes of the cause of death from the death certificates.

These groups were chosen because they fulfilled three criteria. They were available from existing data, they were important causes of death, and they were believed to be affected by poor external environments.

Results are presented in uniform format. Each cause of death is given as a singe table, listed in order of DED codes, with DED codes, DED names, the actual number of deaths observed, the SMR derived from indirect standardisation, the smoothed SMR smoothed using the Empirical Bayes method of Clayton and Kaldor, and 95% confidence limits for the SMR.

## All deaths

| DED Code | DED Name | Observed | SMR | Smoothed SMR | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 337 | 89 | 90 | 80 | 99 |
| 43 | Clontarf East C | 149 | 77 | 79 | 65 | 90 |
| 44 | Clontarf East D | 140 | 82 | 85 | 69 | 96 |
| 48 | Clontarf West C | 161 | 82 | 84 | 69 | 95 |
| 49 | Clontarf West D | 147 | 104 | 105 | 87 | 121 |
| 108 | North Dock B | 235 | 134 | 133 | 117 | 151 |
| **110** | **Pembroke East A** | **245** | **143** | **141** | **125** | **161** |
| 111 | Pembroke East B | 206 | 107 | 107 | 92 | 121 |
| 112 | Pembroke East C | 196 | 83 | 85 | 72 | 95 |
| 114 | Pembroke East E | 119 | 83 | 86 | 68 | 98 |
| 115 | Pembroke West A | 211 | 131 | 130 | 113 | 148 |
| 116 | Pembroke West B | 112 | 84 | 87 | 69 | 100 |
| 117 | Pembroke West C | 179 | 95 | 96 | 81 | 108 |
| 143 | South Dock | 176 | 134 | 132 | 114 | 154 |

The highest death rates are found in Pembroke East A, with raised mortality also in Pembroke West A and North Dock B. This pattern, which is closely related to the level of deprivation, is highly unlikely to be due to chance. However there are fifteen DEDs in Dublin City with higher all-cause smoothed SMRs than Pembroke East A.

## Deaths from all cancers combined

| DED Code | DED Name | Observed | SMR | Smoothed SMR | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 101 | 104 | 106 | 84 | 125 |
| 43 | Clontarf East C | 43 | 88 | 94 | 64 | 119 |
| 44 | Clontarf East D | 34 | 76 | 86 | 53 | 107 |
| 48 | Clontarf West C | 35 | 77 | 87 | 54 | 107 |
| 49 | Clontarf West D | 35 | 99 | 103 | 69 | 138 |
| 108 | North Dock B | 72 | 151 | 142 | 118 | 190 |
| **110** | **Pembroke East A** | **65** | **136** | **130** | **105** | **174** |
| 111 | Pembroke East B | 52 | 110 | 111 | 82 | 144 |
| 112 | Pembroke East C | 65 | 120 | 119 | 93 | 153 |
| 114 | Pembroke East E | 29 | 79 | 90 | 53 | 114 |
| 115 | Pembroke West A | 48 | 112 | 112 | 83 | 149 |
| 116 | Pembroke West B | 30 | 90 | 97 | 60 | 128 |
| 117 | Pembroke West C | 43 | 95 | 100 | 69 | 128 |
| 143 | South Dock | 40 | 120 | 118 | 86 | 164 |

This is similar to the previous table, showing higher death rates from cancer in North Dock and Pembroke East A. The latter is number 32 in order of decreasing cancer mortality. None of the other areas clearly shows a raised, or decreased cancer mortality.

## Deaths from respiratory disease

| DED Code | DED Name | Observed | SMR | Smoothed SMR | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 43 | 79 | 84 | 57 | 107 |
| 43 | Clontarf East C | 23 | 82 | 89 | 52 | 123 |
| 44 | Clontarf East D | 16 | 67 | 78 | 38 | 108 |
| 48 | Clontarf West C | 24 | 80 | 87 | 51 | 119 |
| 49 | Clontarf West D | 16 | 77 | 87 | 44 | 125 |
| 108 | North Dock B | 34 | 144 | 137 | 100 | 201 |
| **110** | **Pembroke East A** | **44** | **197** | **177** | **143** | **265** |
| 111 | Pembroke East B | 30 | 106 | 108 | 72 | 151 |
| 112 | Pembroke East C | 33 | 91 | 95 | 63 | 128 |
| 114 | Pembroke East E | 12 | 60 | 75 | 31 | 104 |
| 115 | Pembroke West A | 24 | 108 | 110 | 69 | 161 |
| 116 | Pembroke West B | 19 | 99 | 104 | 60 | 155 |
| 117 | Pembroke West C | 32 | 115 | 115 | 79 | 162 |
| 143 | South Dock | 28 | 153 | 142 | 102 | 221 |

Pembroke East A has the fifth highest respiratory disease mortality in Dublin City. South Dock also has modestly increased mortality from this group of diseases.

## Deaths from Heart Disease

| DED Code | DED Name | Observed | SMR | Smoothed SMR | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 81 | 92 | 94 | 73 | 114 |
| 43 | Clontarf East C | 37 | 82 | 88 | 58 | 113 |
| 44 | Clontarf East D | 35 | 88 | 93 | 61 | 122 |
| 48 | Clontarf West C | 46 | 103 | 105 | 75 | 137 |
| 49 | Clontarf West D | 32 | 97 | 101 | 66 | 137 |
| 108 | North Dock B | 55 | 134 | 130 | 101 | 175 |
| **110** | **Pembroke East A** | **52** | **131** | **128** | **98** | **172** |
| 111 | Pembroke East B | 47 | 106 | 107 | 78 | 141 |
| 112 | Pembroke East C | 45 | 84 | 89 | 61 | 112 |
| 114 | Pembroke East E | 27 | 83 | 90 | 54 | 120 |
| 115 | Pembroke West A | 55 | 147 | 140 | 111 | 191 |
| 116 | Pembroke West B | 25 | 82 | 90 | 53 | 120 |
| 117 | Pembroke West C | 47 | 110 | 111 | 81 | 146 |
| 143 | South Dock | 36 | 121 | 119 | 85 | 168 |

For heart disease, Pembroke West A, and North Dock have elevated mortality. Pembroke East A has non-significantly raised mortality, and is forty-second in order in Dublin City.

## Deaths from Stroke

| DED Code | DED Name | Observed | SMR | Smoothed SMR | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 33 | 89 | 94 | 61 | 125 |
| 43 | Clontarf East C | 12 | 63 | 83 | 33 | 110 |
| 44 | Clontarf East D | 18 | 111 | 107 | 66 | 176 |
| 48 | Clontarf West C | 5 | 25 | 62 | 8 | 57 |
| 49 | Clontarf West D | 15 | 107 | 105 | 60 | 177 |
| 108 | North Dock B | 22 | 138 | 119 | 86 | 209 |
| **110** | **Pembroke East A** | **22** | **146** | **122** | **91** | **221** |
| 111 | Pembroke East B | 17 | 89 | 96 | 52 | 143 |
| 112 | Pembroke East C | 12 | 49 | 72 | 25 | 86 |
| 114 | Pembroke East E | 12 | 88 | 97 | 46 | 154 |
| 115 | Pembroke West A | 17 | 113 | 107 | 66 | 181 |
| 116 | Pembroke West B | 14 | 109 | 105 | 59 | 182 |
| 117 | Pembroke West C | 15 | 80 | 92 | 45 | 132 |
| 143 | South Dock | 19 | 153 | 123 | 93 | 240 |

There is less variation between DEDs for stroke death rates than for the other causes of death described here. In particular there is no good evidence of increased mortality in Pembroke East A.

## Deaths due to injury and poisoning

| DED Code | DED Name | Observed | SMR | Smoothed SMR | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 6 | 54 | 73 | 20 | 118 |
| 43 | Clontarf East C | 3 | 55 | 84 | 11 | 161 |
| 44 | Clontarf East D | 5 | 102 | 110 | 33 | 240 |
| 48 | Clontarf West C | 7 | 117 | 117 | 47 | 239 |
| 49 | Clontarf West D | 7 | 175 | 143 | 71 | 365 |
| 108 | North Dock B | 5 | 86 | 100 | 28 | 201 |
| **110** | **Pembroke East A** | **11** | **167** | **146** | **83** | **299** |
| 111 | Pembroke East B | 5 | 78 | 95 | 25 | 183 |
| 112 | Pembroke East C | 10 | 135 | 128 | 65 | 248 |
| 114 | Pembroke East E | 5 | 96 | 106 | 31 | 223 |
| 115 | Pembroke West A | 4 | 70 | 92 | 19 | 180 |
| 116 | Pembroke West B | 1 | 23 | 73 | 1 | 127 |
| 117 | Pembroke West C | 2 | 27 | 64 | 3 | 100 |
| 143 | South Dock | 8 | 143 | 131 | 62 | 283 |

There is little real evidence of any substantial difference in death rates between the 14 DEDs. The pattern of SMRs, while not statistically significant, is similar to that noted previously.

# Cancer incidence data

Five groups of people newly diagnosed with cancers (incident cancers) were considered. These were diagnoses of breast cancer in women, prostate cancer in men, lung cancer, colorectal cancer and all cancers considered as one group. Cancers were coded by the National Cancer Registry, and geographical coding was done by the HIU.

These groups of cancer diagnoses were chosen because they were all relatively common, and hence, major public health problems. Little is known about the relationships between specific environmental factors and cancer incidence at this level. Lung cancer is mainly caused by smoking, but radon gas and air pollution are probably significant causes too. Breast and prostate cancer are both known to be affected by hormones.

Results are presented as for the mortality data.

## All cancers

| DED CODE | DED NAME | OBSERVED | SIR | Smoothed SIR | LR_CI | UPR_CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 210 | 97 | 98 | 85 | 111 |
| 43 | Clontarf East C | 104 | 96 | 98 | 78 | 116 |
| 44 | Clontarf East D | 88 | 86 | 91 | 69 | 106 |
| 48 | Clontarf West C | 85 | 87 | 92 | 69 | 107 |
| 49 | Clontarf West D | 73 | 95 | 98 | 75 | 120 |
| 108 | North Dock B | 118 | 109 | 107 | 90 | 131 |
| **110** | **Pembroke East A** | **124** | **110** | **108** | **91** | **131** |
| 111 | Pembroke East B | 112 | 103 | 103 | 85 | 124 |
| 112 | Pembroke East C | 130 | 108 | 107 | 90 | 129 |
| 114 | Pembroke East E | 104 | 122 | 115 | 100 | 148 |
| 115 | Pembroke West A | 118 | 118 | 114 | 98 | 142 |
| 116 | Pembroke West B | 69 | 87 | 93 | 68 | 110 |
| 117 | Pembroke West C | 109 | 103 | 103 | 84 | 124 |
| 143 | South Dock | 95 | 124 | 116 | 100 | 151 |

There is little evidence for any differences in cancer incidence between the DEDs in the study area. There is only a very weak indication of an excess risk in Pembroke West A.

## Lung cancer

| DED CODE | DED NAME | OBSERVED | SIR | Smoothed SIR | LR_CI | UPR_CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 27 | 83 | 90 | 54 | 120 |
| 43 | Clontarf East C | 9 | 54 | 75 | 25 | 103 |
| 44 | Clontarf East D | 11 | 69 | 86 | 35 | 124 |
| 48 | Clontarf West C | 13 | 91 | 102 | 48 | 155 |
| 49 | Clontarf West D | 12 | 101 | 110 | 52 | 176 |
| 108 | North Dock B | 32 | 193 | 172 | 132 | 272 |
| **110** | **Pembroke East A** | **26** | **154** | **145** | **101** | **225** |
| 111 | Pembroke East B | 11 | 69 | 86 | 34 | 123 |
| 112 | Pembroke East C | 13 | 75 | 89 | 40 | 128 |
| 114 | Pembroke East E | 14 | 112 | 116 | 61 | 188 |
| 115 | Pembroke West A | 18 | 120 | 121 | 71 | 190 |
| 116 | Pembroke West B | 12 | 103 | 111 | 53 | 179 |
| 117 | Pembroke West C | 11 | 71 | 88 | 36 | 128 |
| 143 | South Dock | 17 | 152 | 141 | 88 | 243 |

In contrast to the results for other types of cancer the incidence of lung caner is elevated in Pembroke East A. It is in the top fifth of DEDs in Dublin for this disease. Lung cancer is known to be strongly related to deprivation, probably as a consequence of smoking.

## Colorectal cancer

| DED CODE | DED NAME | OBSERVED | SIR | Smoothed SIR | LR_CI | UPR_CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 36 | 116 | 107 | 81 | 161 |
| 43 | Clontarf East C | 15 | 96 | 97 | 53 | 158 |
| 44 | Clontarf East D | 15 | 101 | 99 | 57 | 167 |
| 48 | Clontarf West C | 11 | 79 | 92 | 40 | 142 |
| 49 | Clontarf West D | 17 | 153 | 113 | 89 | 245 |
| 108 | North Dock B | 10 | 65 | 87 | 31 | 120 |
| **110** | **Pembroke East A** | **12** | **77** | **91** | **40** | **134** |
| 111 | Pembroke East B | 18 | 118 | 105 | 70 | 186 |
| 112 | Pembroke East C | 17 | 100 | 99 | 58 | 160 |
| 114 | Pembroke East E | 13 | 110 | 101 | 59 | 188 |
| 115 | Pembroke West A | 15 | 106 | 101 | 60 | 175 |
| 116 | Pembroke West B | 7 | 63 | 88 | 25 | 130 |
| 117 | Pembroke West C | 19 | 129 | 108 | 78 | 202 |
| 143 | South Dock | 10 | 94 | 97 | 45 | 173 |

There is little evidence for any variation in colorectal cancer incidence between DEDs. Pembroke East A has a relatively low incidence but this is not significantly different from the Dublin average.

## Prostate cancer

| DED CODE | DED NAME | OBSERVED | SIR | Smoothed SIR | LR_CI | UPR_CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 14 | 70 | 79 | 38 | 117 |
| 43 | Clontarf East C | 10 | 98 | 91 | 47 | 180 |
| 44 | Clontarf East D | 5 | 46 | 73 | 15 | 108 |
| 48 | Clontarf West C | 11 | 128 | 100 | 64 | 229 |
| 49 | Clontarf West D | 7 | 97 | 90 | 39 | 200 |
| 108 | North Dock B | 7 | 69 | 81 | 28 | 141 |
| **110** | **Pembroke East A** | **15** | **146** | **107** | **82** | **240** |
| 111 | Pembroke East B | 9 | 87 | 87 | 40 | 166 |
| 112 | Pembroke East C | 13 | 131 | 102 | 70 | 225 |
| 114 | Pembroke East E | 18 | 231 | 128 | 137 | 365 |
| 115 | Pembroke West A | 6 | 68 | 81 | 25 | 148 |
| 116 | Pembroke West B | 4 | 63 | 81 | 17 | 160 |
| 117 | Pembroke West C | 12 | 141 | 104 | 73 | 247 |
| 143 | South Dock | 11 | 164 | 107 | 82 | 294 |

Again there is little evidence of any substantial difference between areas. Both Pembroke East A and Pembroke East E have a high SIR for of prostate cancer, but on smoothing this falls markedly, implying that this apparent excess is unlikely to be of any significance.

## Breast cancer

| DED CODE | DED NAME | OBSERVED | SIR | Smoothed SIR | LR_CI | UPR_CI |
|---|---|---|---|---|---|---|
| 42 | Clontarf East B | 38 | 128 | 106 | 91 | 176 |
| 43 | Clontarf East C | 15 | 101 | 97 | 57 | 167 |
| 44 | Clontarf East D | 13 | 98 | 97 | 52 | 168 |
| 48 | Clontarf West C | 12 | 90 | 95 | 47 | 158 |
| 49 | Clontarf West D | 4 | 42 | 90 | 11 | 108 |
| 108 | North Dock B | 12 | 86 | 95 | 45 | 151 |
| **110** | **Pembroke East A** | **9** | **57** | **89** | **26** | **107** |
| 111 | Pembroke East B | 18 | 122 | 101 | 73 | 194 |
| 112 | Pembroke East C | 25 | 143 | 106 | 92 | 211 |
| 114 | Pembroke East E | 16 | 129 | 101 | 74 | 210 |
| 115 | Pembroke West A | 24 | 171 | 109 | 110 | 255 |
| 116 | Pembroke West B | 12 | 107 | 98 | 55 | 187 |
| 117 | Pembroke West C | 19 | 130 | 102 | 78 | 203 |
| 143 | South Dock | 10 | 99 | 97 | 47 | 182 |

There is little indication of any great variation between DEDs in this condition. Pembroke East A has a low incidence, but this rises substantially on smoothing, again suggesting that this is of no significance.

## Prescribing data

The prescribing data analysed here is of drugs coded as prescriptions for asthma. This includes many drugs used to treat chronic bronchitis and emphysema in older people, as well as asthma.

| DED | DED name | Observed | SPR | LR_CI | UPR_CI |
|---|---|---|---|---|---|
| 42 | Clontarf East B | 135 | 84 | 69 | 100 |
| 43 | Clontarf East C | 62 | 84 | 63 | 110 |
| 44 | Clontarf East D | 64 | 86 | 65 | 112 |
| 48 | Clontarf West C | 63 | 82 | 62 | 108 |
| 49 | Clontarf West D | 70 | 94 | 73 | 120 |
| 108 | North Dock B | 147 | 111 | 95 | 129 |
| **110** | **Pembroke East A** | **171** | **132** | **116** | **151** |
| 111 | Pembroke East B | 71 | 77 | 57 | 100 |
| 112 | Pembroke East C | 71 | 86 | 66 | 110 |
| 114 | Pembroke East E | 38 | 63 | 40 | 93 |
| 115 | Pembroke West A | 87 | 91 | 72 | 113 |
| 116 | Pembroke West B | 48 | 74 | 52 | 103 |
| 117 | Pembroke West C | 51 | 78 | 56 | 106 |
| 143 | South Dock | 83 | 106 | 85 | 130 |

Interpretation of prescribing data, as discussed earlier, is difficult. While Pembroke East A has a high prevalence of recorded prescriptions for anti-asthmatic drugs, it also has a very high prevalence of medical card holders, far higher than the adjacent wards. As such, what is presented here is a comparison between a small proportion of the people resident in say, Clontarf East C, against the majority of the residents of Pembroke East A.

Nonetheless it seems likely that there is some increased prescribing for asthmas in this DED. This probably reflects a higher burden of respiratory disease, and is probably also a good marker of the extent of smoking in the study DEDs.

# Conclusions

In general the results are consistent, and not unexpected. People living in Pembroke East A have worse health than residents of most of the adjoining DEDs, apart from North Dock B and (for some conditions) Pembroke West A. This is especially true for respiratory disease and lung cancer.

The remaining DEDs in Pembroke make up Sandymount and parts of Ballsbridge, while the Clontarf DEDs are mostly the seafront, and the parts of Clontarf just inland from there. North Dock B is another very deprived inner city area.

Given the high level of deprivation in the area, the poor levels of health are not especially surprising, although the excess of respiratory diseases is very striking. Poverty is the dominant factor influencing differences in health status between small areas in Ireland, as in the other countries where such analyses have been done. However, it is very possible that other factors are at work here. These could include smoking, occupation exposure to respiratory toxins, and air pollution affecting residents.

Ireland is a very unequal country, a fact reflected in poor levels of health overall, and in the concentration of ill health in deprived areas which this study has identified. The measurement of poverty chosen here is the SAHRU deprivation score (1, 2). This was developed by Alan Kelly and his colleagues in Trinity College Dublin, and has been widely used in the Irish health services.

The DED has experienced rapid social change over the last few years, partly due to gentrification of the existing housing stock, and partly due to extensive residential development in the DED. As a result the 2004 health of this population may be rather better than that presented here.

The implications of this for the proposed development are uncertain. There are many suggestions in the literature that poorer people may be more susceptible to environmental hazards than wealthier people. It is hard to come to any definitive conclusions about this, since poorer people are generally forced to live in more contaminated areas anyway. It is possible that on-going work in Britain on rural poverty, and in the United States on environmental equity might answer this question in the next few years.

This report, as such, merely documents the sad but not unexpected pattern of health inequalities in the study areas. What is not addressed in this report is differential exposure to environmental hazards (3). There is certainly an important issue of environmental equity to be addressed here, however this is work for another project.

# References

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# Appendix

## Statistical issues

Comparison of health status between small areas poses several severe statistical problems, which current, and any likely future methods, can only partly overcome (2, 4).

### MAUP

One source of these difficulties is the essentially arbitrary choice of boundaries. It has been known to geographers for many years that the choice of the boundaries into which an area is dissected has a major impact on the inferences that can be made from observations on that area (5). Put more bluntly, the choice of boundary can change the answers obtained from projects like this. The technical term for this in geography is the Modifiable Areal Unit Problem (MAUP).

There are no really satisfactory solutions to this problem. Integrity in analysis provides some defence, where the analyst chooses a set of boundaries, on either practical, or sound theoretical grounds, and sticks to them.

In our situation, there is really only one set of boundaries available, the DED's and we are using these.

### Smoothing – yes or no?

A second issue, more technically statistical, is the problem of small numbers. Briefly, the number of events in small areas is likely to follow a Poisson distribution. Especially for less common events, small differences in the number of events observed, can lead to very large differences in the estimate of the risk for small areas (4, 6, 7).

For example, the expected number of cases of leukaemia in a small area, such as a DED, might be 0.2. Thus if no case happens to occur, the estimated risk will be zero, while if only one case occurs, the estimated risk is 5 times the average risk over the whole region. Neither is likely to be very credible as an estimate of the real risk of disease in a small area.

A response to this is to avoid the use of simple estimates of risk, and to report instead estimates which reflect the degree of credibility of the estimated risk. There are several ways to do this, and the method chosen here, empirical Bayes' smoothing, has the merits of simplicity. Fully Bayesian modelling is an alternative, but it remains difficult to report the results of such models to general audiences.

In summary, the risk identified for each small area, is weighted, so that risks derived from small areas, are given less weighting, and smoothed towards the overall average risk for the whole study area, while risks derived from larger

areas are smoothed less. The degree of smoothing is related to the size of the population in each area.

### Spatial autocorrelation

The final technical issue is known as spatial autocorrelation. The problem here is simple. There is a strong tendency for areas that are close together to be similar. Most of the statistical methods that we use assume that areas are (statistically) independent of each other. This means that each additional area studied adds as much information as any other area. However, this is seldom true. For example if you are already studying Ballygall A, B and D, adding Ballygall C tells you less about health in Dublin, than adding, say Drumfinn.

There are two approaches to this issue. The first is to say that this is a non-problem. Spatial autocorrelation measures the real effect of social factors that are common between areas, and that correcting for it, in effect, removes real differences and real similarities between areas.

The second is to try and model it. This modelling involves making an assumption about the degree and extent of the autocorrelation. These assumptions are not easy to test. The modelling is also difficult, and very hard to explain to non-specialists.

The truth probably lies between these two positions. For this report, particularly as we are only considering a restricted area of the city, we have decided not to address the issue.

## Statistical methods

After consideration of these issues two methods were chosen to analyse the data for this project. These were Indirect standardisation, which compares the rate of ill health between area, after adjusting for differences in the age and sex of the people between areas. The second is Empirical Bayes smoothing of SMR's as described in the paper of Clayton and Kaldor.

### Indirect standardisation.

This is a statistical method in common use in epidemiological studies. It is intended to solve the problem of comparing health outcomes between areas with different demographics. This is a major problem because the rates of most human diseases increase steeply with age. Also, for most diseases, women have lower rates than men of the same age. Thus a map of death rates for Dublin, would mainly identify the areas where older people live.

This is not useful for most purposes, so a procedure is adopted, where the actual number of deaths (or new cases of cancer, or hospital admissions …) occurring in an area is counted. This is referred to as the Observed number of deaths (O). This is then compared to the expected number (E), the number of deaths (etc ...) which would have occurred in that area had the death rates (etc …) for the whole city applied in that area. This is a simple calculation. The

ratio of Observed to Expected (O/E) is then referred to as a standardised ratio, typically a Standardised Mortality Ratio (SMR) for deaths, a Standardised Incidence Ratio (SIR) for new cases of cancer, and so on. It is customary to multiply the ratio by 100 for presentation.

## Empirical Bayes Smoothing

The method implemented here is the algorithm presented by Clayton and Kaldor in a classic 1987 paper (6). The rationale for this procedure is simple. SMRs from small area data typically cover a very wide range of values. Figure 2, which is a plot of the prostate cancer incidence data for Dublin City at DED level, is a typical example.

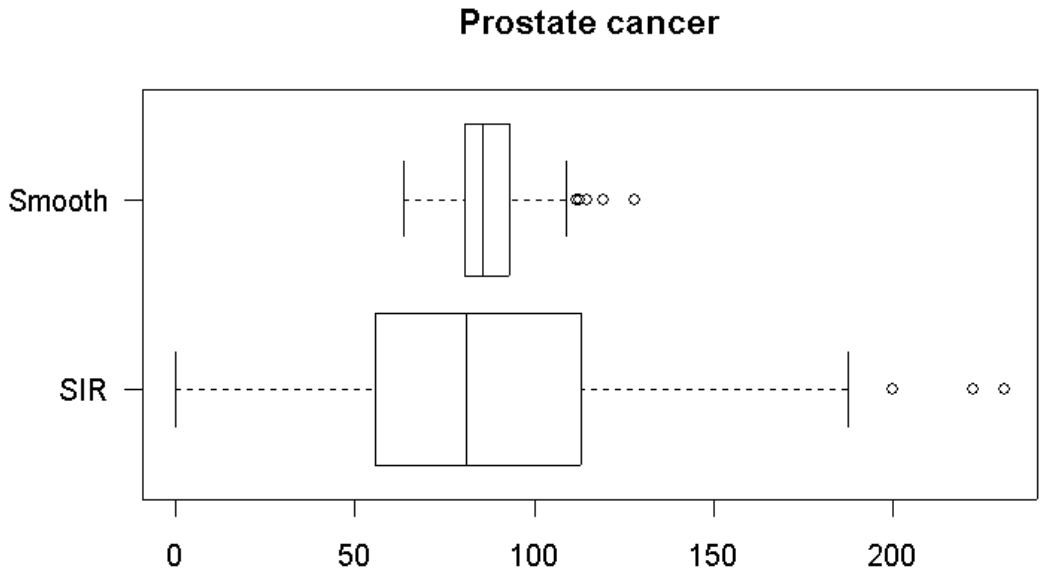


**Figure 2. Comparison of unsmoothed, and empirical Bayes smoothed SIRs for Prostate cancer.**

The very wide range of SIRs in the unsmoothed boxplot is simply not credible. It is most unlikely, that the real range of incidence of prostate cancer in Dublin runs from zero to more than twice the Dublin City average. The smoothed values are more believable.

The Clayton-Kaldor method provides a very simple implementation of a sophisticated statistical model for the true SIRs in this situation.