

CHAPTER 2. SPATIAL VARIATIONS IN CANCER MORTALITY

This chapter analyses the mortality data to establish whether Louth has a higher cancer mortality rate than the rest of the country. The mortality data available do not permit comparisons to be made between Cooley and other areas, but an attempt is made to draw some tentative conclusions about the distribution of cancer mortality within County Louth in the final section.

When comparing cancer mortality in different areas it is obviously important to take account of differences in the size of their populations. For example, if area A has twice as many people as area B, then it would be expected to have about twice as many cases of cancer. To state that area A has twice as many cancer cases without noting that it also contains twice as many people would obviously be very misleading. It is therefore normal to express the number of cases as a *rate*. A rate may be interpreted as an indicator of *risk* (i.e. the probability of a person selected at random having cancer).

The simplest rate is the crude death rate. This is calculated by dividing the total number of deaths by the total population. The answer is often multiplied by 100,000 (i.e. expressed as deaths per 100,000) to make the numbers easier to comprehend. However, although frequently reported in official publications, the crude death rate can be very misleading when used to make comparisons either between areas or over time due to differences or changes in age structure. This chapter begins with a comparison of the crude death rates in Louth and the rest of the country, but this is mainly to serve as a warning. The main sections in the chapter use alternative and preferable age standardised and age specific measures for reasons which are explained in more detail below.

Does Co. Louth Have A High Crude Death Rate For Cancer?

A total of 2,756 males and 2,350 females in Co. Louth died from cancer between 1970 and 1999. The crude death rate was calculated for each county in the Republic for each year 1970 to 1999. Table 1 shows the arithmetic mean (i.e. average) of the 30 rates calculated for each county for both males and females.⁶

The mean annual crude death rate in Louth was 210.9 deaths per 100,000 for males and 177.4 per 100,000 for females. The national crude death rate was 212.5 per 100,000 for males and 179.5 per 100,000 for females. The Louth crude death rate was therefore slightly lower than, although very close to, the national average for both males and females.

Of 31 areas studied (27 Counties and 4 County Boroughs), Louth had the 19th highest crude death rate for males and the 18th highest crude death rate for females. First impressions would therefore suggest that Co. Louth does not have either an exceptionally high or an exceptionally low death rate from cancer for either sex.

⁶ It is normal statistical practice to calculate confidence intervals around all point estimates – i.e. instead of calculating a specific value for death rate in each county, the death rates would be expressed as lying within a band of values with, say, 95 per cent confidence. In other words, allowing for stochastic variations, one would be 95 per cent confident that the true value was within the specified range. Confidence intervals are not included in this report in the interests of clarity, but it should be noted that this might result in misleading interpretations. The lower limit of some of the higher estimates may overlap the upper band of some of the lower estimates, so there is a degree of uncertainty as to whether areas with the higher values actually have a higher rate of mortality. The degree of uncertainty (i.e. the width of the confidence intervals) varies between counties. Counties with a relatively small population, such as Louth, will have wider confidence intervals than larger counties.

	Males		Females	
	CDR	Rank	CDR	Rank
Carlow	208.6	22	179.8	17
Dublin C.B.	261.8	5	227.4	2
Dublin Co.	134.4	31	125.1	31
Kildare	159.4	30	138.7	30
Kilkenny	200.6	24	163.1	26
Laois	210.5	20	169.8	22
Longford	233.0	10	182.1	16
Louth	210.9	19	177.4	18
Meath	181.3	29	145.4	29
Offaly	197.3	27	164.9	25
Westmeath	208.8	21	171.7	21
Wexford	215.3	16	188.9	12
Wicklow	197.4	26	169.7	23
Clare	207.9	23	161.1	27
Cork C.B.	233.6	8	211.5	4
Cork Co.	216.6	15	183.9	14
Kerry	228.1	11	186.3	13
Limerick C.B.	218.1	14	189.5	11
Limerick Co.	196.0	28	172.8	20
Tipperary N.R.	233.4	9	198.8	9
Tipperary S.R.	223.6	13	194.8	10
Waterford C.B.	199.6	25	173.0	19
Waterford Co.	237.7	7	199.9	6
Galway	211.3	18	160.1	28
Leitrim	313.9	1	251.5	1
Mayo	266.6	2	199.1	8
Roscommon	255.0	6	199.9	7
Sligo	265.0	4	222.1	3
Cavan	265.1	3	200.2	5
Donegal	224.9	12	182.4	15
Monaghan	211.8	17	167.8	24
National	212.5		179.5	

Table 1. Mean Crude Death Rates For Cancer By County, 1970-99.

Crude death rates do not take any account of the age structure of the population. The death rate from cancer increases with age, consequently if an area has a predominantly elderly population then the absolute number of deaths (and hence the crude death rate) will tend to be higher than in an area with a similar risk but with a younger population. County Louth has a higher percentage of people in each age group under the age of 40 than the country as a whole, so the crude death rates will consequently tend to underestimate the extent of the problem relative to other areas. It is therefore necessary to take account of age structure to produce more meaningful comparisons.

Does Co. Louth Have A High Age Standardised Mortality Ratio For Cancer?

Standardised mortality ratios (SMRs) provide a suitable basis for making comparisons areas with different

age compositions. SMRs calculate the number of deaths which would be expected if each area had the same age structure as a standard population. The expected number of deaths is then expressed as a 'percentage' of the number of deaths which would be expected in the standard population, giving a figure with a value around 100. Values greater than 100 indicate that an area has more deaths than it should have relative to the rest of the study area, whereas values less than 100 indicate an areas has fewer deaths than might be expected. (See Appendix A for a more detailed explanation of the method of calculation).

The are two main methods of calculation (referred to as the *direct* method and the *indirect* method). It is also possible to chose different populations to be used as the standard. Decisions made with regard to either the method or the choice of standard population could arbitrarily influence the results, so the analysis was repeated using both the direct and indirect methods, and using both the Irish national population and the European Standard Population (as defined by the World Health Organisation) as alternative standards. The results in all cases were virtually identical. The text reports only the results using the direct method and the European Standard Population. The analysis is based only on deaths below the age of 75 for reasons explained in more detail in Appendix A.

	Males		Females	
	SMR	Rank	SMR	Rank
Carlow	103.9	6	108.6	3
Dublin C.B.	131.9	1	116.1	1
Dublin Co.	98.5	9	95.7	20
Kildare	103.1	7	104.9	6
Kilkenny	88.0	25	92.8	22
Laois	88.2	24	91.8	24
Longford	92.6	19	96.2	18
Louth	115.1	4	106.4	5
Meath	96.7	12	96.0	19
Offaly	90.3	23	99.3	15
Westmeath	94.7	17	99.3	14
Wexford	96.0	14	101.6	9
Wicklow	102.9	8	100.2	13
Clare	83.4	28	88.0	28
Cork C.B.	125.4	2	113.6	2
Cork Co.	96.3	13	97.6	17
Kerry	87.6	26	92.5	23
Limerick C.B.	122.4	3	108.1	4
Limerick Co.	91.4	20	94.7	21
Tipperary N.R.	95.3	16	104.2	8
Tipperary S.R.	97.4	11	100.8	12
Waterford C.B.	114.3	5	104.5	7
Waterford Co.	94.3	18	101.5	10
Galway	81.3	31	87.0	29
Leitrim	95.6	15	101.4	11
Mayo	87.5	27	86.4	30
Roscommon	82.0	29	86.2	31
Sligo	97.7	10	99.1	16
Cavan	90.8	22	91.1	25
Donegal	82.0	30	89.6	27
Monaghan	90.9	21	89.7	26

Table 2. Mean Standardised Mortality Ratios For Cancer By County, 1970-99.

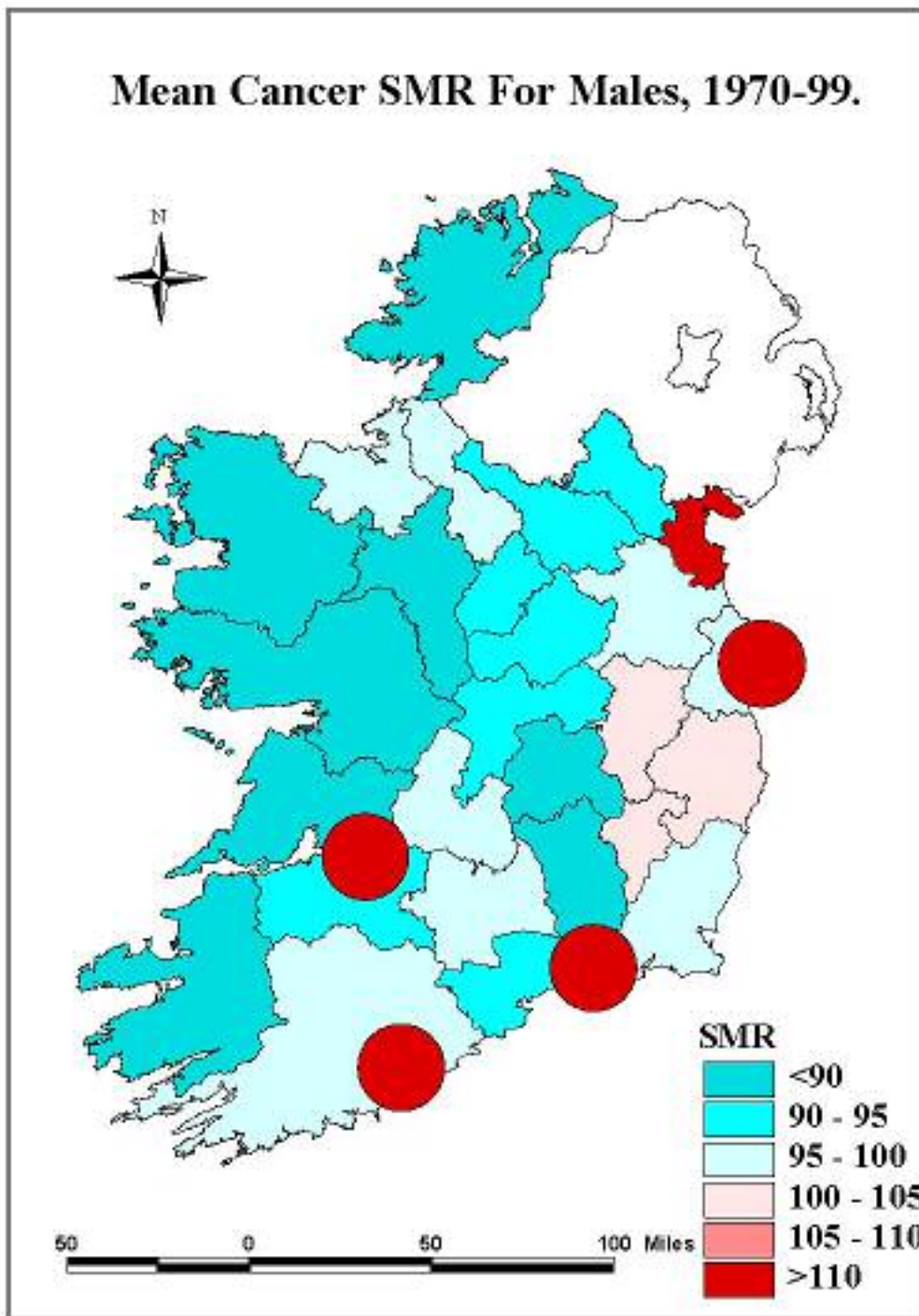


Figure 1. Mean Standardised Mortality Ratios For Cancer For Males, 1970-99.

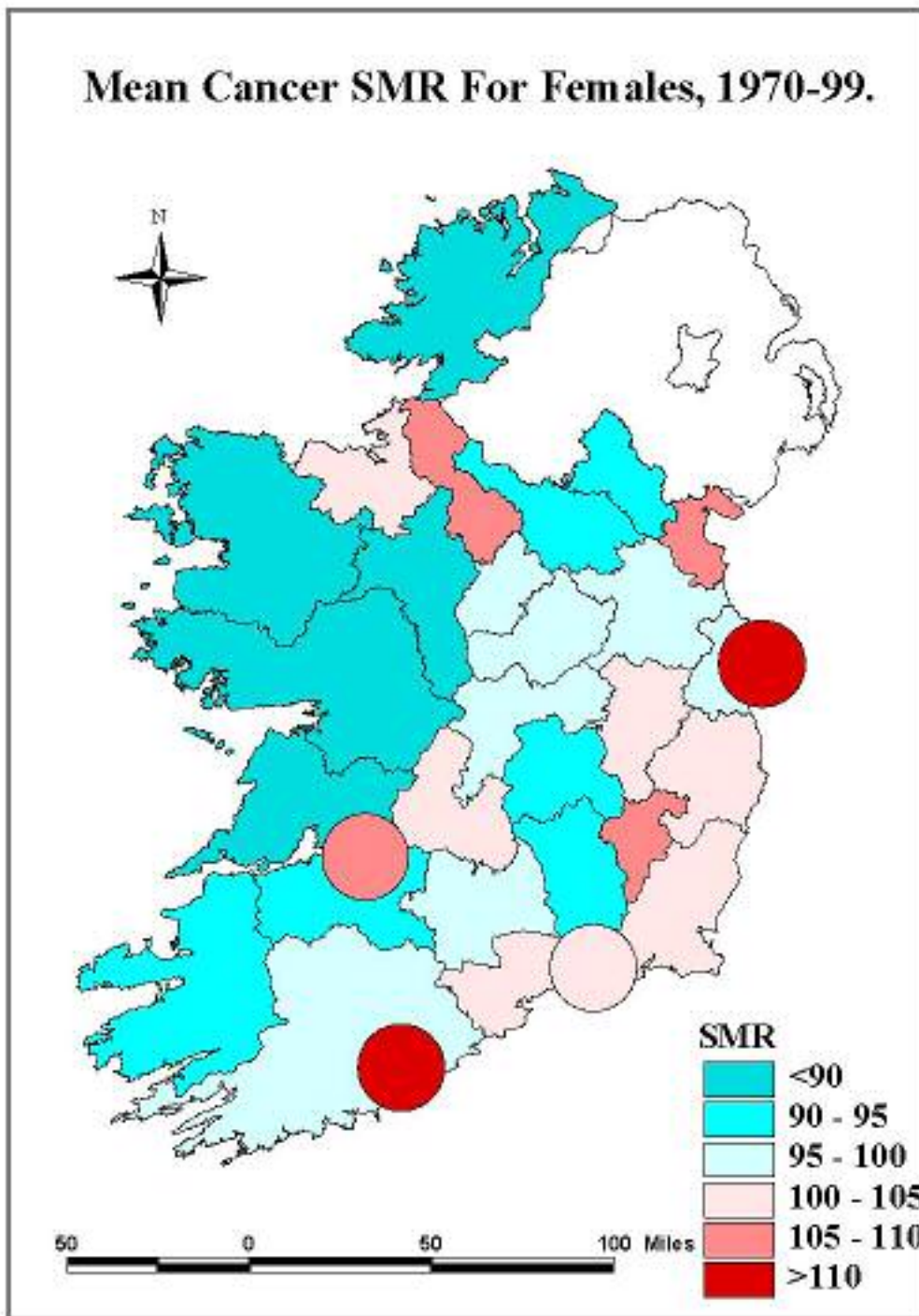


Figure 2. Mean Standardised Mortality Ratios For Cancer For Females, 1970-99.

Standardised mortality ratios were calculated for each county for each year between 1970 and 1999. Table 2 shows the mean SMR for each county over the 30 year period. The spatial distribution is shown for males and females in Figure 1 and Figure 2 respectively.

Louth was found to have the 4th highest SMR for males (after Dublin, Cork and Limerick County Boroughs). The SMR for Louth (115.1) indicates that if Louth had the same age structure as the rest of the country, it would have approximately 15.1 per cent more male cancer deaths than would be expected relative to the national average.

Louth was also found to have the 5th highest SMR for females (after Dublin, Cork and Limerick County Boroughs, and Carlow). The SMR value (106.4) indicates that the percentage of excess deaths for females in Louth (6.4 per cent) is lower than for males. However, the SMRs for females do not in tend to vary between counties as much as they do for males, so a 6.4 per cent excess may be regarded as significant.

The standardised mortality ratios indicate that Louth is not the worst place in the country for cancer mortality - it is quite a long way behind Dublin County Borough for both males and females - but its cancer mortality rates are substantially above the national average for both males and females.

Does Co. Louth Have A High Cancer Death Rate At Every Age?

A high standardised mortality ratio indicates excess deaths. However, it does not indicate whether these deaths are confined to one particular age group or whether there is a higher risk at all ages. This question may be investigated by calculating age specific death rates (i.e. deaths amongst people within a given age group). Table 3 shows the mean age specific death rate between 1970 and 1999 for Louth and the country as a whole each age group. (See Appendix A for details on the method of calculation).

Age	Males		Females	
	Louth	National	Louth	National
0-4	7.0	5.5	5.0	4.2
5-14	2.6	4.4	3.5	3.5
15-24	7.7	7.5	8.7	5.4
25-34	20.0	14.8	19.1	14.6
35-44	51.0	41.1	54.7	58.2
45-54	173.6	158.3	194.5	183.8
55-64	567.1	493.6	454.5	392.0
65-74	1,332.4	1,145.8	712.8	715.8
75 +	2,373.5	2,133.1	1,335.6	1,306.7

Table 3. Mean Age Specific Death Rates For Cancer (Per 100,000), 1970-99.

It will be noted that the age specific death rates for males in Louth is higher than the national rate for every age group except one - 5-14 year olds (Figure 3). However, there are very few cancer deaths at this age, so 4 extra deaths in Louth over the 30 year period would have brought it into line with the national average. The fact that the Louth death rate exceeds the national average at every other age (by as much as 35 per cent for the 25-34 year olds) is much more significant.

The situation for females is slightly different (Figure 4). The age specific death rates for Louth are lower than the national average for females for two age-groups, namely 35-44 year olds and 65-74 year olds. The Louth rates are higher than the national average for the other age-groups, but most of the excess deaths are concentrated into two age groups (i.e. 25-34 and 55-64), in contrast to males who had a substantial excess at almost every age.

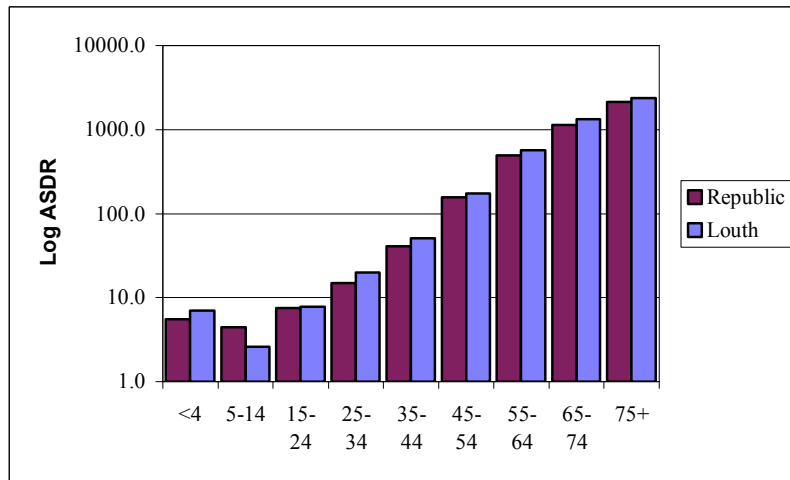


Figure 3. Mean Age Specific Death Rates For Cancer For Males, 1970-99.

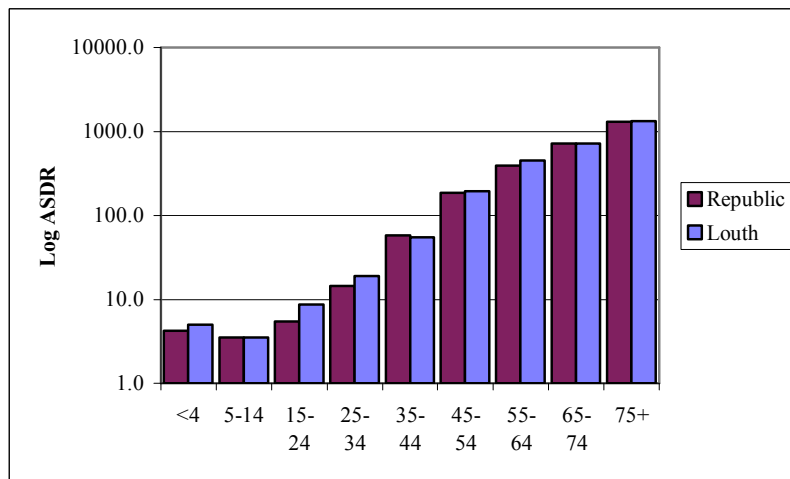


Figure 4. Mean Age Specific Death Rates For Cancer For Females, 1970-99.

The fact that the age specific death rate for women aged 35-44 in Louth is about 6 per cent below the national average is noteworthy, although this must be seen in the context of a death rate approximately 31 per cent above the national average for the next younger age group (i.e. 25-34 year olds). Although the rates are smaller, the absolute number of ‘excess’ deaths in the 25-34 year age group exceeds the ‘deficit’ in the 35-44 age group - i.e. taking the two age groups together, the death rate for young adult females in Louth exceeds the national average.

Louth women experience a second ‘peak’ of excess mortality in the 55-64 age group. The age specific death rate in this age group is approximately 16 per cent above the national average, which given the larger numbers involved is quite substantial. This is partly compensated by an age specific death rate below the national average in the next oldest age group (i.e. 65-74 year olds), although it is only slightly less than the national average.

Does Cancer Account For A Higher Percentage Of Deaths In Co. Louth Than Elsewhere?

There is a perception that cancer causes a higher percentage of deaths in Co. Louth than in other parts of the country. This perception would appear to be supported by official statistics. Between 1970 and 1999 there was a total of 528,321 male deaths and 451,455 female deaths from all causes in the state as a whole. 109,115 (20.7 per cent) of the male deaths and 92,084 (20.4 per cent) of the female deaths were attributed to cancer. Over the same period there was a total of 12,541 male deaths and 10,921 female deaths from all causes in Co. Louth of which 2,756 (22.0 per cent) male deaths and 2,350 (21.5 per cent) female deaths were attributed to cancer. Cancer therefore accounted for a slightly higher percentage of deaths in Co. Louth than in the country as a whole for both males and females.

Of the 31 areas examined, Louth had the 5th highest percentage of deaths attributed to cancer for both males and females. The areas with a higher percentages of males death attributed to cancer were Dublin C.B. (25.1 per cent), Dublin Co (24.5 per cent), Cork C.B. (23.4 per cent), and Waterford C.B. (23.1 per cent). For females the highest percentages attributed to cancer were Dublin Co. (23.9 per cent), Dublin C.B. (22.9 per cent), Kildare (22.3 per cent) and Cork C.B. (21.8 per cent).

Does Cancer Cause A Higher Percentage Of Deaths In Co. Louth At Every Age?

People tend to die from different causes at different ages, therefore the percentage of deaths attributed to any particular cause in an area will tend to be influenced by the age composition of the people living in that area. To guard against possible misleading impressions, the exercise in the previous section was therefore repeated for each age group separately. The results are summarised in Table 4.

Age	Males		Females	
	Louth	National	Louth	National
0-4	2.2	1.9	2.0	1.8
5-14	6.9	14.3	16.4	18.7
15-24	5.5	7.6	17.8	15.2
25-34	12.7	12.5	29.7	28.4
35-44	22.1	20.3	42.4	47.1
45-54	27.6	27.1	51.7	49.4
55-64	30.3	28.3	42.3	39.4
65-74	27.3	25.1	26.5	27.0
75 +	17.4	16.5	13.4	12.8
All Ages	22.0	20.7	21.5	20.4

Table 4. Percentage Of Deaths Attributed To Cancer By Age-Group.

It will be noted that the percentage of deaths attributed to cancer in Co. Louth was higher than the national average for every male age-group above the age of 25, but it was lower than the national average for males aged between 5 and 24. Females exhibit a more irregular pattern, being above the national average rate in some age groups but below average in others. As with the age specific death rates (shown in Table 3), Louth is above average in 25-34 age group, below average in 35-44 age group, and then above average again in the 45-54 and 55-64 age groups. It will be noted that the very high percentage of deaths amongst females attributed to cancer in Louth in the 35-44, 45-54 and 55-64 age bands parallels the very high percentages found nationally, although the percentages in Louth are even higher in the latter two groups.

Are There Spatial Variations In Cancer Mortality Within County Louth?

It is difficult to answer this question given that most mortality data are published at a county, rather than a sub-county, level. However, the annual *Report on Vital Statistics* provided counts of the total number of cancer deaths in each of the major towns in the country, including Drogheda M.B. and Dundalk U.D. each year until 1995. By subtracting the figures for the two towns from the total for Louth as a whole, it is a simple matter to calculate the number of cancer deaths in the rest of Louth.

The figures provided in the *Report on Vital Statistics* are simple totals, and provide no indication of either the age or sex of the deceased. It is therefore not possible to standardise using the direct method. However, given that the age and sex composition of the populations in Drogheda, Dundalk and the rest of the county can be ascertained from the Small Area Population Statistics (SAPS) calculated for each census by the Central Statistics Office, it is possible to calculate standardised mortality ratios using the indirect method. (See Appendix A for details of the indirect method). Whilst less than ideal, this does at least provide some indication of possible spatial variations within the county.

The SAPS data were used to provide estimates of the population in each of the three areas in each age group for both males and females for each year other than a census year. The national age specific death rates for cancer were then used to estimate the expected number of cancer deaths that might be expected at each age for both males and females in each area. These were summed to give the total number of deaths (males and females combined) that would be expected in each area each year. The actual number of deaths was then divided by the expected number of deaths to give a SMR for each area for each year from 1970 to 1995. These were then used to calculate a mean SMR over the entire period (Table 5).

	SMR
Drogheda M.B.	126.0
Dundalk U.D.	119.4
Rest of Louth	100.4

Table 5. Standardised Mortality Ratios For Cancer Within County Louth.

The figures in Table 5 suggest that the two urban areas fare much worse than the rest of the county. Indeed, bearing in mind that the figures are standardised relative to the rates for the country as a whole, the figure for the Rest of Louth would indicate that its death rate is more or less the same as the national average. The excess deaths in Louth reported in the previous sections would therefore appear to be accounted for by Dundalk and, more especially, Drogheda.

Whilst strongly suggestive of a higher risk in urban areas, the figures in Table 5 need to be treated with caution. It is possible that some of the deaths attributed to either Dundalk or Drogheda may have occurred to people normally resident outside the areas used to estimate the population of the towns (and hence their expected number of deaths). The SMRs for the towns may therefore be artificially inflated. Also, the SMRs are based on deaths at all ages, including the elderly. The impact that this might have is difficult to gauge.

Summary

The risk of a person dying from cancer in the period 1970 to 1999, as indicated by the age specific death rates, was higher in Louth than in the country as a whole for each male age-group above the age of 25 and for several female age groups, most notably the 25-34 and 55-64 age groups. The likelihood of cancer being the cause of death in these age groups (as opposed to another cause) was also higher in Louth than in the country as a whole. Louth is by no means the worst area for cancer in the country, but it is amongst a small group of counties with cancer rates substantially higher than the national average. Although the data

must be treated with caution, there are indications that the problem of excess cancer mortality may be largely confined to the two largest urban areas.