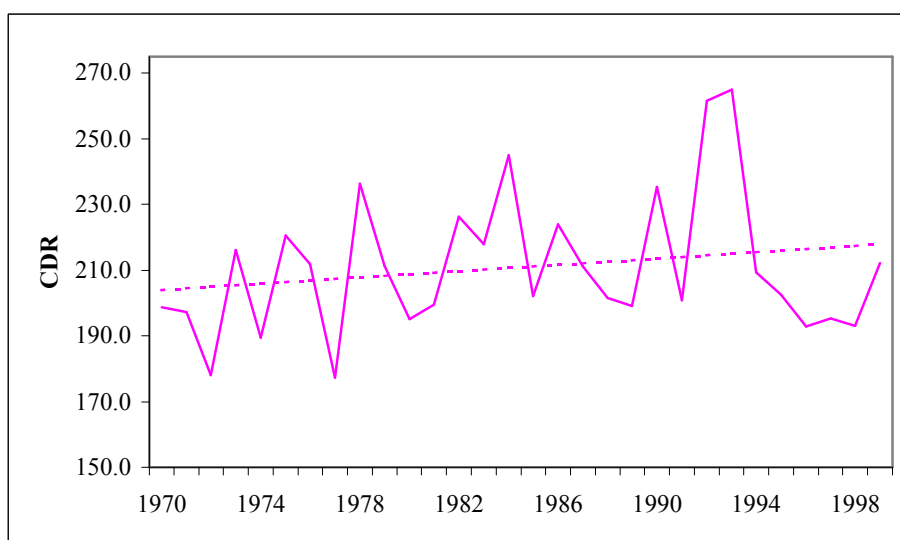


### CHAPTER 3. TEMPORAL TRENDS IN CANCER MORTALITY

There is a perception that Louth not only has a high prevalence of cancer, but that cancer rates in recent years have been increasing. The present chapter analyses whether cancer mortality in Louth has increased over the period between 1970 and 1999 and, if so, whether it has been increasing more rapidly than in other areas. The methods used are similar to those in Chapter 2.

#### Are The Crude Death Rates For Cancer In Louth Increasing?

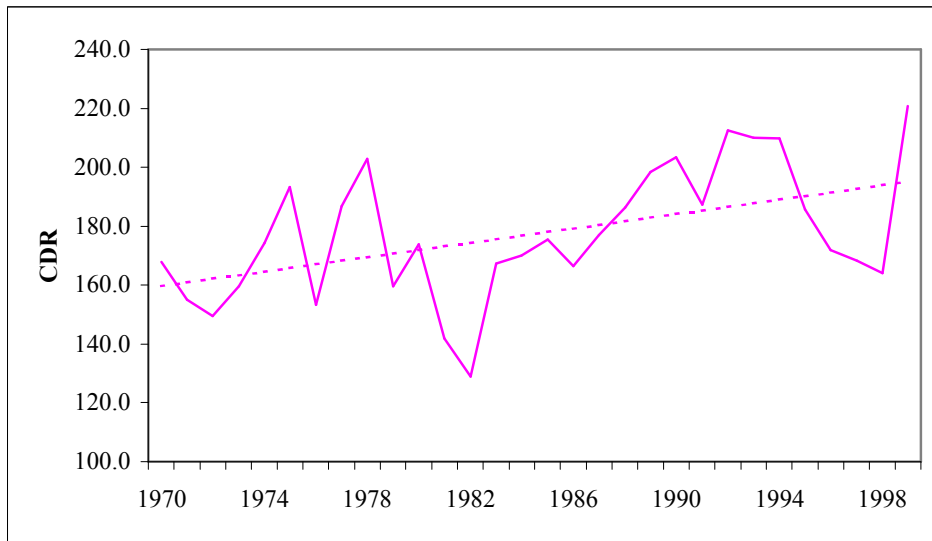
Figure 5 shows the crude death rate from cancer in Louth for males for each year since 1970. The first point to note is that it is very difficult to say anything about the trends over time because the rates fluctuate considerably from one year to the next. This is a function of the relatively small numbers of deaths (on average about 92) each year. A relatively small number of deaths extra or less in any given year can make a large percentage difference, resulting in major variations in the crude death rate from one year to the next.



**Figure 5. Male CDRs (Per 100,000) For Cancer In County Louth, 1970-99.**

The straight dashed line on the graph is a regression line. This is the line which passes as close to all the points as possible. It may therefore be regarded as providing the best summary of the trends in the crude death rate over time. It will be noted that this line slopes upwards from left to right, indicating that there was a tendency for the death rates to increase over time by approximately 5 deaths per 100,000 each decade. (See Appendix A for further details on the method of calculation).

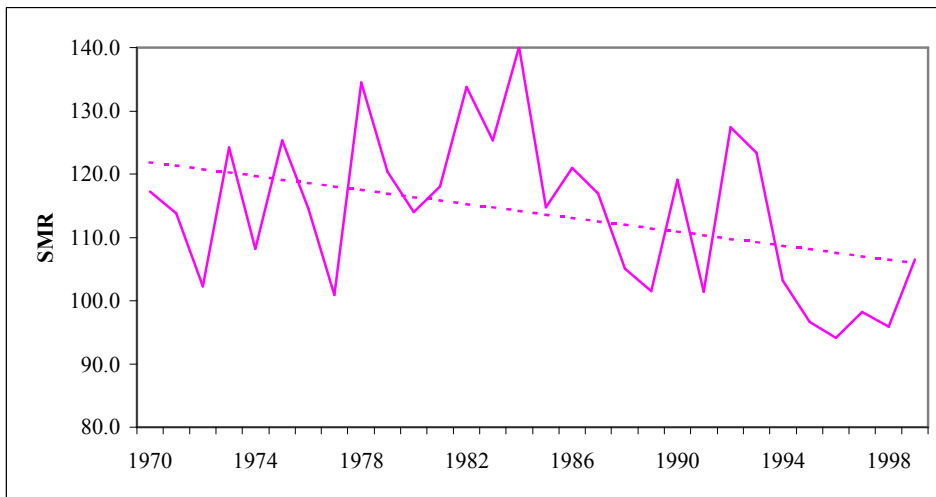
The crude death rates for females tend to be much lower, but they show a similar tendency - i.e. although the crude death rates for females also fluctuate considerably from year to year, the overall trend is again towards an overall increase (Figure 6). Indeed, the rate of increase for females - approximately 12 deaths per 100,000 each decade - is steeper than it is for males.



**Figure 6. Female CDRs (Per 100,000) For Cancer In Louth, 1970-99.**

### **Are Standardised Mortality Ratios For Louth Increasing?**

The upward trend in the crude death rates might be interpreted as a cause for concern, but given that the mean age of the population of Louth increased over the study period, and given that the risk of cancer increases with age, an increase in the crude death rate does not necessarily indicate a deteriorating situation. Age standardised mortality ratios therefore provide a better indicator. Standardised mortality ratios were calculated for each year relative to the European Standard Population defined by the World health Organization using the direct method. As in the previous chapter, deaths over the age of 74 were excluded from the analysis.

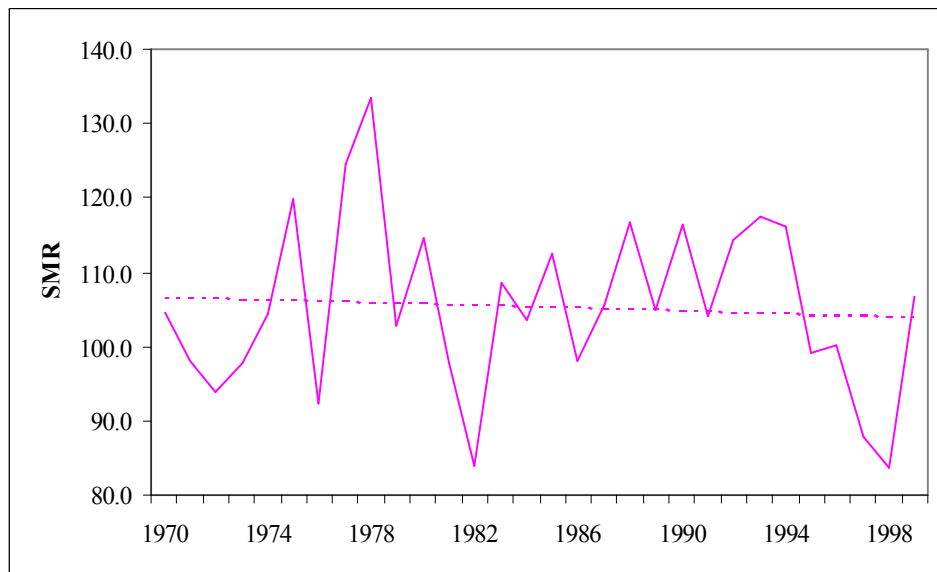


**Figure 7. Male SMRs For Cancer In County Louth, 1970-99.**

Figure 7 shows the SMRs for males graphed against time. The predominant impression is once again one of considerable fluctuations from one year to the next due to the relatively small numbers, but the underlying trend in the SMRs (as identified by the regression line) is downward - by about 5.5 per cent per decade - which is a very significant decline. The regression line probably disguises two quite separate trends - one of increasing SMRs in the period from 1970 to the mid-1980s, followed by one of a marked decline in the period after 1984. Indeed for 4 of 5 years in the late 1990s the age standardized mortality for males in Louth was actually fell below the national average (i.e. 100).

The trend for females is quite different (Figure 8). The regression line again suggests a downward trend in the SMRs, but the improvement (if it exists at all) is very slight - in the order of about 1 per cent per decade. There are considerable fluctuations from year to year, making it difficult to say anything about broader trends with any certainty, but most of this improvement would seem to have taken place in two phases: the first was from 1978 to 1982 and the second was between 1994 and 1998. The two periods of improvement were separated by a period of general disimprovement. The more recent phase of improvement, roughly corresponding with a similar trend for males, is obviously encouraging, but it may prove to be temporary.

Overall, the SMR for females was above the national average in 20 of the 30 years examined. The 10 years in which the Louth SMR fell below the national average (i.e. 100) are more or less evenly spread between the three decades - 4 years in the 1970s, and 3 in each of the 1980s and 1990s. The general pattern would therefore be one in which mortality rates fluctuate, without any obvious long-term trend. They also display a tendency to be above the national average 2 years out of every 3.



**Figure 8. Female SMRs For Cancer In County Louth, 1970-99.**

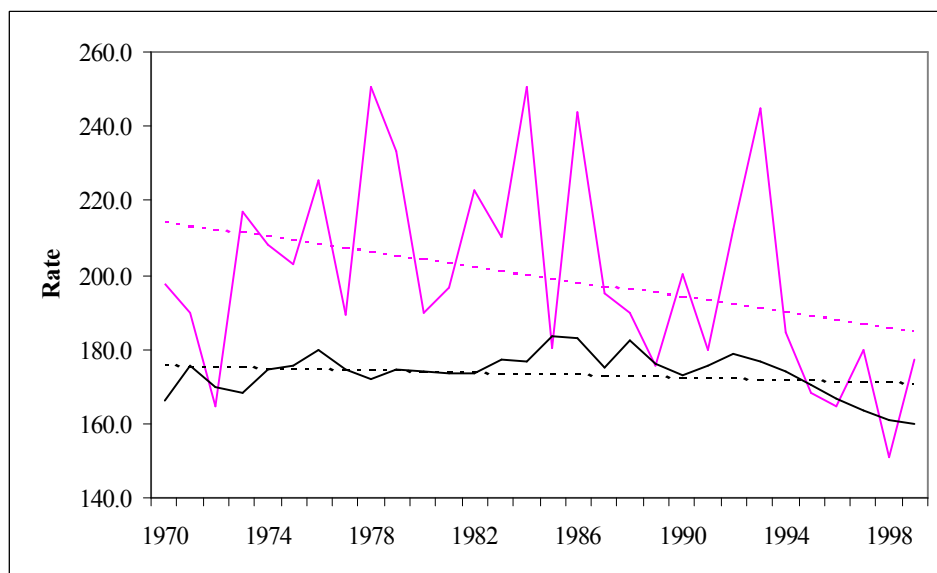
### **Are Age Standardised Death Rates For Louth Increasing?**

The SMR values for males in Louth, if maybe not for females, have generally declined since 1970. This indicate that the situation has improved for males in Louth relative to other areas, but it does not necessarily mean that the situation has improved in absolute terms. Standardised mortality ratios compare the mortality in a selected area (e.g. Louth) in a given year with that in other areas in the same year - i.e. a SMR of 110 for Louth indicates that its death rate is 10 per cent higher than the national average if all areas had the

same age structure. It is possible that the situation for males in Louth could improved relative to other areas, yet disimproved in absolute terms (i.e. the chances of a male of a given age dying from cancer may have increased, but at a slower rate than for males in the country as a whole). This possibility is explored using age standardised death rates.

Standardised death rates are calculated in a similar manner to standardised mortality ratios, but they express the deaths in a given area as the number of deaths per 100,000 which would have occurred if the area had the same age structure as the standard population. (See Appendix A for a more detailed explanation of the method of calculation). By using a fixed standard population, such as the European Standard Population, the rates for one year can be directly compared with those for other years.

The standardised rates for males are shown in Figure 9. The upper jagged line shows the rates in Louth, whilst the straight line shows the regression line for Louth. The rates clearly fluctuate considerably from year to year, but the overall trend, as represented by the regression line is downward, indicating that the age standardised mortality rate for males in Louth has shown a long-term tendency to fall. This improvement has been in the order of about 10 deaths per 100,000 per decade.



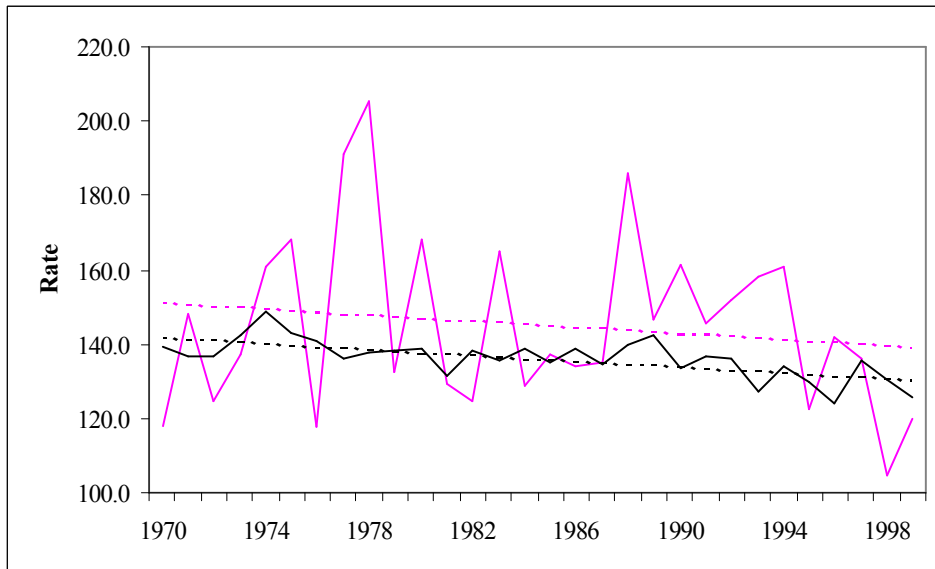
**Figure 9. Male Standardised Rates (Per 100,000) For Cancer, 1970-99.**

Figure 9 also shows the age standardised death rate from cancer for the whole country (represented by the lower solid line) and its regression line. It will be noted that the regression line for the whole country shows only a very slight downward trend (in the order of only 1-2 deaths per 100,000 per decade). However, although there is a long-trend towards a convergence in the two regression lines, suggesting that Louth is improving much more rapidly than the country as a whole, the rate for Louth remained higher than the national rate for most years in the study.

The age standardised rates for females are shown in Figure 10. Their regression line for the females in Louth shows a general downward trend, although not as marked as for males. The improvement for females was approximately 4 deaths per 100,000 per decade, compared with 10 per 100,000 for males. However, it might be argued that there was less need for improvement. The standardised rates for females in Louth (as elsewhere) have always been much lower than those for males. Also, whilst there is a general tendency for the female rates in Louth to be higher than the national average, the difference between Louth and the rest

of the country is less marked for females.

It will also be noted that the long-term trend to lower standardised rates for females in Louth was matched almost identically by a similar trend at the national level (i.e. about 4 per 100,000). Thus, although the situation is improving in absolute terms for women in Louth, they do not appear to be either improving or disimproving in relative terms compared with the rest of the country - i.e. the decline in cancer mortality in Louth is keeping pace with the rest of the country, but there does not appear to be any narrowing of the gap.



**Figure 10. Female Standardised Rates (Per 100,000) For Cancer, 1970-99.**

### **Are Age Specific Death Rates In Louth Increasing For All Ages?**

The age standardised death rates suggest that the situation has improved since 1970 for both males and females. Analysis of age specific death rates allows us to identify whether these improvements have occurred at all ages, or whether the improvements have been confined to only selected ages. Age specific death rates were calculated for each age group for each year, and a regression model (i.e. a straight line similar to those in Figures 5-10) was fitted for each age group. The gradient of these lines indicates whether the age specific death rates have tended to increase or decrease. The results are summarised in Table 6. The changes are expressed as deaths per 100,000 per decade. A negative value, indicating a decrease in the death rate, represents an improvement.

It is probably best not to read too much into figures for age groups below the age of 35, even at national level, because of the relatively small numbers used in the calculations. However, it will be noted that at national level the regression gradients are all negative, indicating a long-term tendency towards lower death rates. The same is probably true of Louth, despite two positive coefficients. Indeed, the improvement for males aged 25-34 is quite striking, and is well above the national average.

Improvements were also recorded at national level for males aged 35-44, 45-54 and 55-64. In each instance the improvement for males in Louth was better than the national average. This was especially the case for males aged 55-64.

| Age   | Males  |          | Females |          |
|-------|--------|----------|---------|----------|
|       | Louth  | National | Louth   | National |
| 0-4   | -1.95  | -2.44    | -1.3    | -1.6     |
| 4-14  | -1.02  | -1.14    | -1.1    | -1.2     |
| 15-24 | 1.39   | -1.50    | -1.7    | -1.1     |
| 25-34 | -8.86  | -3.16    | 1.2     | -2.0     |
| 35-44 | -10.49 | -8.46    | 12.6    | -6.3     |
| 45-54 | -21.77 | -17.25   | -19.5   | -19.6    |
| 55-64 | -75.93 | -10.75   | -12.4   | -13.2    |
| 65-74 | 64.17  | 60.05    | -17.7   | 28.8     |
| 75 +  | 164.74 | 273.92   | 91.7    | 134.7    |

**Table 6. Mean Change In ASDR (Per 100,000) For Cancer Per Decade, 1970-99.**

Table 6 indicates a reversal in the trends towards improvement at national level for males in the two oldest age groups (i.e. 65-74 and 75 or above). The positive sign indicates an increase in the age specific death rates for both groups. The same is true for males in Louth, although the disimprovement was only slightly worse than the national average for the 65-74 year olds, and considerably less than the national average for those aged 75 or more.

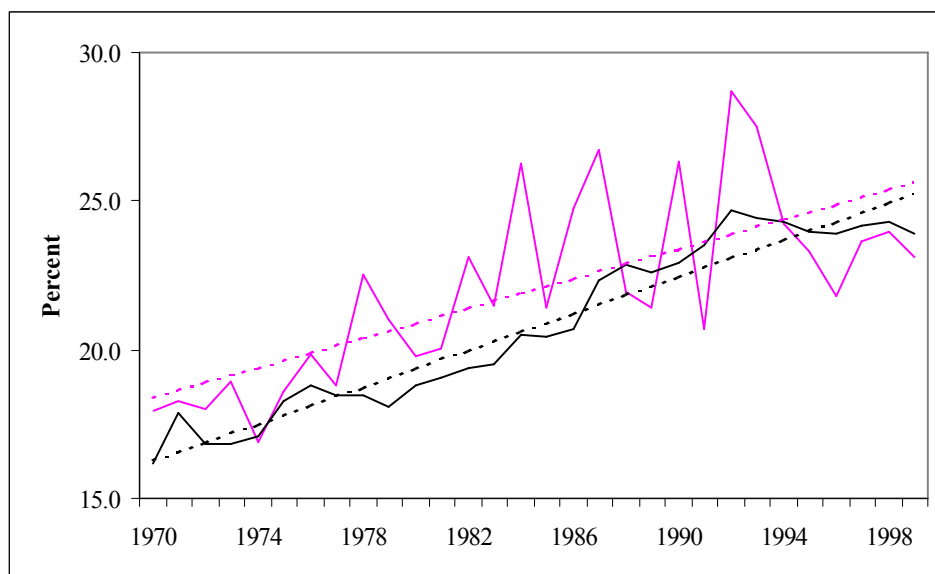
The females rates show a similar trend towards improvement at national level in the 35-44, 45-54 and 55-64 age groups, and a trend towards disimprovement in the two oldest age groups. However, women in Louth aged 35-44 (and, to a lesser extent, those aged 25-34) recorded a disturbing counter trend towards increased mortality (although, it will be remembered from Table 3 that women in Louth aged 35-44 had a lower age specific rate than the national average). The improvements in the 45-54 and 55-64 age groups were similar in magnitude to the national average (although given that the rates in Louth in these age groups, as indicated in Table 3, is higher than the national average, one would have hoped for some narrowing of the gap).

On a more positive note, the age specific death rate for women in Louth aged 65-74 showed a tendency to decline, whereas it increased nationally. The age specific death rate increased for women aged 75 or more, but it was at a slower rate than that recorded nationally.

### **Is The Percentage Of Deaths Caused By Cancer Increasing?**

It was noted in the previous chapter that the percentage of deaths attributable to cancer is slightly higher than the country as a whole. There is also a perception that the percentage of deaths due to cancer has been increasing. This section looks at changes in the percentage of deaths attributed to cancer between 1970 and 1999.

Figure 11 shows the percentage of male deaths attributable to cancer in Louth and the country as a whole between 1970 and 1999. The percentages for Louth fluctuate considerably from year to year because of the relatively small numbers involved in their calculation, but the overall trend represented by the regression line is upwards, corresponding to an increase of approximately 2.5 per cent per decade. This would appear to confirm the popular perception that more deaths are due to cancer is in fact correct.

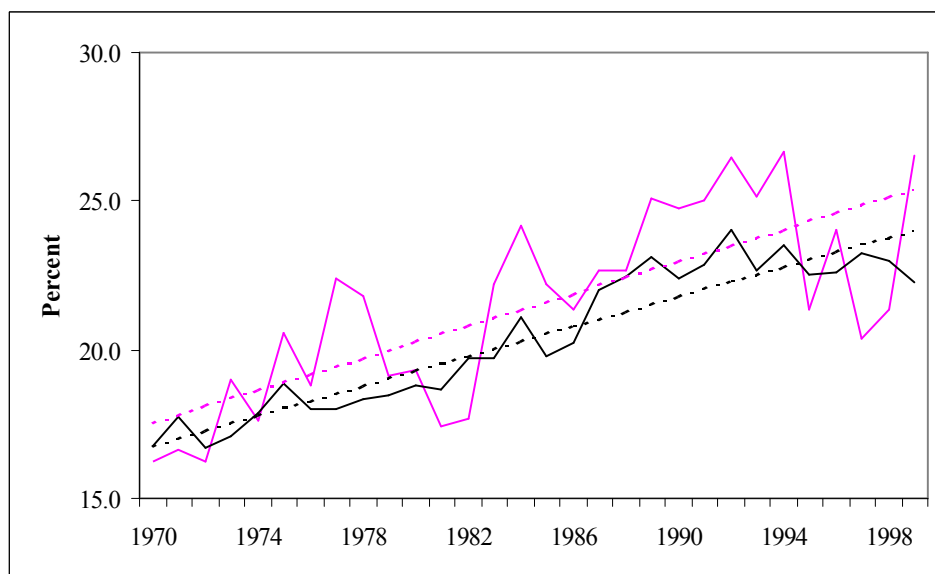


**Figure 11. Percentage Of Male Deaths Caused By Cancer, 1970-99.**

There are two qualifying points to be made. The first is that the percentage of male deaths attributable to cancer in the country as a whole, represented by the lower line, has been increasing at an even faster rate (i.e. approximately 3 per cent per decade over the 30 year period). The gap between the two trend lines (represented by the dashed lines) had virtually disappeared in 1999, whilst the actual percentages (represented by the solid lines) were actually lower in Louth than the country as a whole each year since 1994.

This brings us to the second qualifying point. The simple regression line for Louth possibly disguises two (or possibly three) sub-trends. It is difficult to be precise, given the large year to year fluctuations, but the percentages for Louth would appear to have increased at more or less the same rate as the national percentages until the mid-1980s, after which they fluctuated considerably, but showed no long-term tendency to further increase. Indeed, since peaking in 1992, the percentages in both Louth and nationally have generally tended to decline. Thus, although the evidence supports the popular perception that the percentage of deaths caused by cancer increased since 1970, most of this increase occurred before the mid-1980s. Also, over the entire study period it was less significant for males in Louth than elsewhere.

Figure 12 shows the percentage of female deaths attributed to cancer from 1970 to 1999. There are a few noteworthy differences between the male and female trends. First, the female percentages in Louth increased at a slightly faster rate than for males (i.e. by about 2.7 per cent per decade compared with 2.5 per cent for males), whereas nationally the females percentages increased at a slower rate than for males (i.e. about 2.5 per cent per decade compared with 3.0 per cent for males). Second, the Louth percentages for females increased at a faster rate than those nationally, so the perception that an increasing percentage of deaths were caused by cancer was even more true of Louth than elsewhere. Thirdly, the 'evening out' effect observed for males in the mid-1980s is not evident for females. The female percentages continued to increase, both in Louth and nationally, throughout the 1980s, but they subsequently appear to have started to decline at some point in the early to mid 1990s similar to the percentages for males.



**Figure 12. Percentage Of Female Deaths Caused By Cancer, 1970-99.**

Thus, to summarise for females, the perception that cancer was responsible for a growing percentage of deaths is supported by the statistics for the 1970s, 1980s and early 1990s. This is also true for the country as a whole, but the rate of the increase in the percentage of deaths due to cancer was greater in Louth than elsewhere. However, since the early 1990s, the percentage of deaths attributable to cancer has been declining both in Louth and elsewhere.

The above discussion considers the percentages of deaths at all ages. However, people generally live longer now than they did 30 years ago so, given that the cause of death tends to vary by age, one might expect changes in the percentage of deaths caused by cancer to be influenced by changes in the mean age at death. The above analysis was therefore repeated using only deaths under the age of 75. The percentages of deaths attributed to cancer were generally higher (especially for females) reflecting the fact that other causes become proportionately more significant as one gets older, but the general conclusions reported above were largely unaffected.

Finally, it should be noted that the increase in the 1970s and 1980s in the percentage of deaths attributable to cancer does not necessarily indicate a deteriorating situation with regard to cancer. An increase in the percentage dying from cancer may simply reflect a decrease in deaths from other causes. There was a very encouraging decline during the study period in the number of deaths from cardiovascular diseases, consequently the increase in the percentage of deaths from cancer may to some extent simply reflect the fact that everyone dies from something. If cardiovascular disease (still Ireland's major cause of death) is killing fewer people, then the percentage of deaths attributable to other causes, including cancer, will tend to increase. One must also take account of the age at which people die. If people are contracting cancer later and/or are surviving longer (possibly due to better medical treatment), then an increase in percentage of deaths attributable to cancer may actually disguise what is actually an improving situation. Age specific death rates provide a better indication of trends. As noted above these have generally been declining, both in Louth and nationally, at every age under the age of 65, but they have been increasing in those aged 65 or over. The increase in the age specific cancer death rates for the older age groups may reflect a decline in deaths from other causes at earlier ages (i.e. more people may be living long enough to succumb to cancer).

## Are There Changes In The Spatial Variations In Cancer Mortality Within Louth?

It was noted in the previous chapter that the mean SMRs for Dundalk and, more especially, Drogheda were considerably higher than the rest of the county. This section explores whether this pattern persisted through the study period.

Table 7 shows the mean SMRs for the whole of Louth, Drogheda, Dundalk and the rest of Louth (i.e. all of Louth except Drogheda and Dundalk) for five 5-year time periods.<sup>7</sup> The SMRs were calculated using the indirect method and standardising for both age and sex as data were not available separately for males and females.

|                | <b>Louth</b> | <b>Drogheda</b> | <b>Dundalk</b> | <b>Rest of Louth</b> |
|----------------|--------------|-----------------|----------------|----------------------|
| <b>1971-75</b> | 109.5        | 130.0           | 105.7          | 101.8                |
| <b>1976-80</b> | 115.5        | 136.3           | 121.0          | 106.2                |
| <b>1981-85</b> | 113.9        | 131.0           | 120.5          | 101.2                |
| <b>1986-90</b> | 110.3        | 127.9           | 114.2          | 98.7                 |
| <b>1991-95</b> | 112.2        | 119.8           | 130.2          | 97.5                 |

**Table 7. Changes In SMRs For Cancer Within Louth, 1971-1995.**

Louth disimproved relative to the rest of the country in the late 1970s and early 1980s, but was generally about 10 per cent above the national average. However, there was a marked difference between the two towns and the rest of the county.

Cancer mortality in Drogheda was more than 30 per cent higher than the national average in the first three time periods, but has fallen since 1985. Nevertheless, it was still almost 20 per cent above the national average in the early 1990s. The SMRs for Dundalk are more varied, but although well above the national average they were generally much lower than for Drogheda until the early 1990s when there was an alarming increase in the Dundalk SMRs.

The picture for the rest of the county (including Cooley) is more reassuring. The SMRs for the rest of the county peaked in the late 1970s and have been declining ever since. However, with the exception of the late 1970s they were more or less in line with the national average. Indeed, since the mid 1980s the SMRs would suggest that the rest of Louth has fared better than the country as a whole.

It should be noted that the SMRs are relative measures which indicate how mortality in a given area compares with the national rates. The fact that the SMRs have generally tended to fall since the early 1980s, at a time when age standardised rates at the national level were improving, is therefore especially significant, as it indicates that the improvement in Louth was taking place at an even faster rate than elsewhere. However, the SMRs in Drogheda and Dundalk still remained well above the national average. Also, Dundalk's reversal in the early 1990s was caused by an absolute increase in cancer mortality rather than simply a failure to keep pace with improvements at the national level.

The sudden reversal in the SMRs in Dundalk in the early 1990s is striking. Closer examination shows it was caused by a sudden increase in the number of cancer deaths in 1992 (to approximately 60 deaths per year), followed by another jump in 1995 (to 81 deaths). The number of deaths in 1988 and 1990 were similar to the numbers in 1992-1994, although they were separated by years with lower numbers (i.e. around 50 deaths). These jumps may indicate a real increase in the risk of cancer in Dundalk (reflecting

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<sup>7</sup> No data were available for Drogheda and Dundalk after 1995. Deaths in 1970 were omitted from this analysis so that each of the time periods would be equal in length.

events that may have occurred possibly 20 years previously), or they may reflect changes in the other factors which could affect the number of deaths recorded for Dundalk (e.g. a change in the Urban District boundaries, or a change in medical practice resulting in more cancer patients being treated in Dundalk and subsequently counted as being normally resident in the town). The author lacks the local knowledge to gauge whether the observed increase in Dundalk was real or spurious, so any information which readers may have would be especially welcome.

## Summary

It is possibly misleading to draw too many conclusions about the long term trends in cancer mortality in County Louth because such trends tend to be very minor in comparison with the oscillations which occur from one year to the next. Any trends which do exist are slow and gradual, but they do not support the perception that there has been a growing risk of dying from cancer over the period examined, although it is easy to see how this perception might have arisen. The crude death rate for cancer and the percentage of deaths attributed to cancer (as opposed to other causes) increased over the study period for both males and females. In other words, the number of people dying from cancer increased, and cancer was increasingly the primary cause of death.

These crude statistics overlook the fact that these deaths increasingly occurred amongst older people. The age specific death rates for cancer declined for males at almost every age under the age of 65 and for females at most ages under the age of 75, although there was an increase in the mortality rates for females aged 24-34 and, more especially, those aged 35-44 (despite a decline in mortality for these ages at the national level). The main reason for the increase in the crude death rates was an increase in the age specific rates for males aged 65 and over and females aged 75 and over (coupled with an increase in the percentage of people in these age groups as the population generally aged).<sup>8</sup>

The trends in Louth generally paralleled similar trends at the national level. The crude death rate for cancer and the percentage of deaths attributed to cancer increased at the national level for both males and females (creating similar perceptions of a cancer 'epidemic' in many parts of the country). Indeed, if anything, these trends were even more pronounced than in other areas, especially for males. The increase in the percentage of deaths attributed to cancer was slower for males in Louth than at the national level. More tellingly, the rate of improvement in the age specific death rates was faster at all ages under 65 for males in Louth than at the national level, whilst the rate of increase in the death rate for those aged 75 or over was slower in Louth.

The picture is more mixed for females. The rate of increase in the percentage of deaths attributed to cancer was slightly faster for females in Louth than elsewhere. Also the improvements in the age specific death rates for females were similar in Louth for most age groups, although the rates for females in Louth aged 65-74 declined whereas they increased nationally, and they increased at a slower rate for Louth females aged 75 or over. On the other hand, as noted above, the situation disimproved in Louth for women aged 25-34 and 35-44 despite improvements at the national level.

Overall, mortality rates remain much higher for males in Louth than elsewhere, but the situation seems to have improved at a faster rate in Louth than elsewhere, resulting in a narrowing of the gap. On the other hand, mortality rates for female are much closer to, although still higher than, the national average, but there does not appear to have been a significant narrowing of the gap. Indeed, for females in the 25-34 and 35-44 age groups, the trend was in the wrong direction.

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<sup>8</sup> There is possibly a tendency to over-state the impact of improved life expectancy upon overall population structure. The major change during the study period was a sharp decline in the percentage of people in the youngest ages, resulting in a corresponding increase in the percentages in each of the other age groups.

The data do not permit much to be said about trends in mortality within Louth, but it would appear that Drogheda and Dundalk persistently had higher mortality rates than the rest of Louth throughout the study period. Also, whilst the situation would appear to have improved in Drogheda since the mid-1980s, there was a disturbing increase in cancer mortality in Dundalk in the early to mid 1990s, although whether this reflects an increase risk of cancer or other more spurious factors would require further investigation.