

## Chapter 02:

# All cancers (C00-C96)

### KEY FINDINGS

#### INCIDENCE AND MORTALITY

- During 2000-2004 there was an average of 29,423 cases of malignant cancer diagnosed each year with the number of male cases in Ireland 6.8% higher than female cases.
- Between 2000 and 2004 in Ireland 26.9% of cancers were non-melanoma skin cancers, which are rarely fatal and are usually omitted from cancer totals. Excluding non-melanoma skin cancer there were 21,509 cases of cancer diagnosed each year.
- During 1994-2004 there were 212,860 people diagnosed with cancer (excluding NMSC) with 3.4% having two or more tumours during the 11 year period, resulting in 220,261 tumours diagnosed.
- Incidence rates for all cancers combined increased by 1.5% per year among males during 1999-2004 while female incidence rates increased by 0.6% each year during 1994-2004.
- During 2000-2004 there were 5,955 male and 5,363 female deaths from malignant cancer in Ireland.

#### NORTH/SOUTH COMPARISONS

- Incidence rates for all cancers during 2000-2004 were lower in Northern Ireland than in Republic of Ireland by 11.7% for males and 8.2% for females.
- In Northern Ireland during 1994-2004 incidence rates were almost completely static, however in Republic of Ireland incidence rates increased for males by 1.9% each year between 1999 and 2004, with no significant change prior to this point, while female incidence rates increased by 0.9% each year between 1994 and 2004.
- Mortality rates were 4.2% lower among males and 3.6% lower among females in Northern Ireland than Republic of Ireland during 2000-2004.

#### RISKS AND PREVENTION

- The major risk factors associated with different types of cancer are
  - Tobacco/Smoking;
  - Lack of balanced diet or physical activity, particularly if it leads to obesity;
  - Alcohol consumption;
  - Over-exposure to ultraviolet radiation from sunshine or sunbeds;
  - Exposure to certain chemicals and gases such as asbestos, benzene or radon gas;
  - Exposure to ionising radiation;
  - Infections such as human papillomavirus (HPV);
  - Certain treatments such as exposure to oestrogen through Hormone Replacement Therapy (HRT);
  - Late or lack of reproduction or lack of breast feeding in females;
  - History of cancer in the family.
- While most people with a particular risk factor for cancer will not contract the disease, the possibility of developing cancer can increase as exposure to a risk factor increases.

## 2.1: Incidence

The burden of cancer in Ireland can be measured using cancer registration data in several ways. The most valuable with regard to allocation of health service resources and monitoring of prevention strategies are cancer incidence levels. This refers to the number of cases of cancer diagnosed within a population during a specific period of time. Breaking it down by various factors related to cancer can provide a very revealing and informative picture of the cancer situation in both countries within Ireland.

During 2000-2004 there was an average of 29,423 cases of malignant cancer diagnosed each year with the number of male cases in Ireland 6.8% higher than female cases. This pattern differed in each country with a similar number of male and female cases each year in Northern Ireland but more male than female cases per year in Republic of Ireland. European age-standardised incidence rates (EASIR) however were higher for males than females by 25.1% ( $p < 0.001$ ) in Northern Ireland and by 30.0% ( $p < 0.001$ ) in Republic of Ireland. (Tab. 2.1)

Incidence rates for all cancers during 2000-2004 were lower in Northern Ireland than in Republic of Ireland by 11.7% ( $p < 0.001$ ) for males and 8.2% ( $p < 0.001$ ) for females. Consequently the cumulative risk of developing the disease before the age of 75 in Republic of Ireland was slightly higher than in Northern Ireland although in general the odds of developing the disease were approximately 1 in 3 throughout Ireland. (Tab. 2.1)

Table 2.1: Summary statistics for incidence of all cancers: 2000-2004

	Northern Ireland			Republic of Ireland			Ireland		
	Male	Female	All persons	Male	Female	All persons	Male	Female	All persons
Number of cases per year	4,507	4,514	9,021	10,689	9,713	20,402	15,196	14,227	29,423
Median age at diagnosis	70	69	69	69	67	68	69	68	69
Cumulative risk (Aged 0 to 74)	35.1%	29.2%	31.8%	38.8%	31.5%	35.0%	37.6%	30.8%	34.0%
Crude rate per 100,000 persons	544.0	520.2	531.8	549.2	493.2	521.1	547.7	501.5	524.3
EASIR $\pm$ 95% CI	548.2 $\pm$ 7.2	438.1 $\pm$ 6.0	480.2 $\pm$ 4.5	620.7 $\pm$ 5.2	477.4 $\pm$ 4.3	536.8 $\pm$ 3.3	597.1 $\pm$ 4.2	464.2 $\pm$ 3.5	518.0 $\pm$ 2.7
% difference (NI vs ROI) $\pm$ 95% CI (+ NI higher, - NI lower)							-11.7% $\pm$ 1.4	-8.2% $\pm$ 1.5	-10.5% $\pm$ 1.0

EASIR: European age-standardised incidence rate per 100,000 persons; CI: Confidence interval

### 2.1.1: Non-melanoma skin cancer

Of the 29,423 cancers diagnosed each year between 2000 and 2004 in Ireland 26.9% were a specific type of cancer known as non-melanoma skin cancer (NMSC) that takes the form of lesions on the skin. While it is considered a malignant cancer it is also rarely fatal and many cancer registries do not fully record incidence of this cancer. While NICR and NCRI do have good quality data on this disease it is customary to omit it from the cancer total and consider it as a separate entity. (Fig. 2.1)

Excluding non-melanoma skin cancer there were 21,509 cases of cancer diagnosed each year in Ireland between 2000 and 2004. All malignant cancer totals in this report refer to this value from chapter 3 onwards.

### 2.1.2: Multiple tumours

Analysis of incidence in this report is conducted on tumours diagnosed, but some people develop more than one tumour in their lifetime. During the time span of this report (1994-2004) there were 212,860 people diagnosed with cancer (excluding NMSC) with 3.4% having two or more tumours during the 11-year period, resulting in 220,261 tumours diagnosed. If NMSC is included this increased to 281,922 patients with 7.2% having two or more tumours resulting in 303,631 tumours diagnosed during 1994-2004. (Tab. 2.2)

Figure 2.1: Malignant cancer in Ireland and non-melanoma skin cancer: 2000-2004

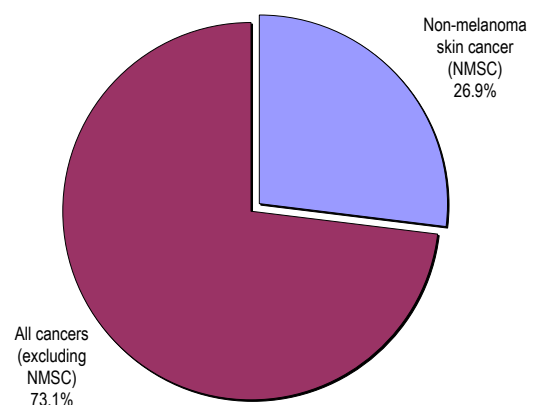


Table 2.2: Multiple tumours affecting the same person: 1994-2004

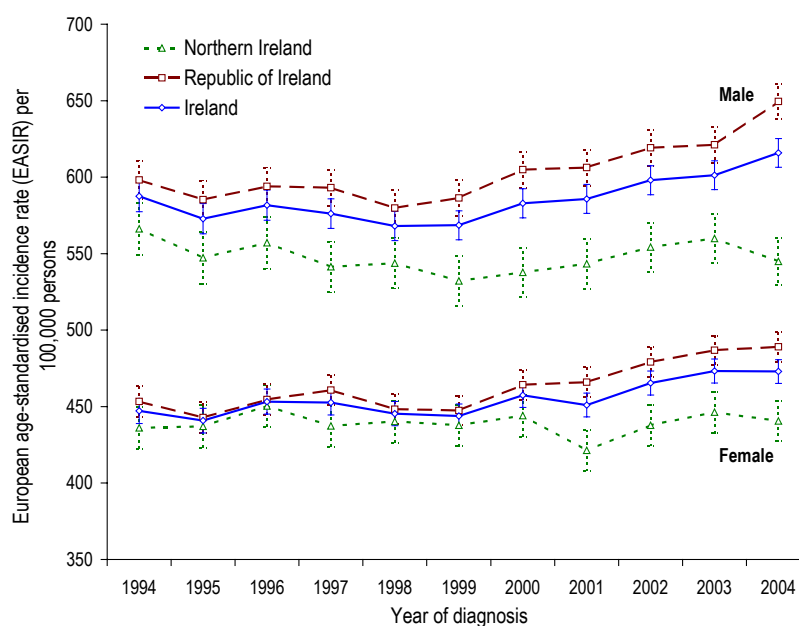
		Northern Ireland		Republic of Ireland		Ireland	
		Number of patients	Percentage of patients	Number of patients	Percentage of patients	Number of patients	Percentage of patients
Including NMSC	1 tumour	83,324	93.3%	178,410	92.6%	261,734	92.8%
	2 tumours	5,602	6.3%	13,144	6.8%	18,746	6.6%
	3 or more tumours	403	0.5%	1,039	0.5%	1,442	0.5%
	Total patients	89,329	100.0%	192,593	100.0%	281,922	100.0%
Excluding NMSC	1 tumour	66,764	96.6%	138,906	96.6%	205,670	96.6%
	2 tumours	2,292	3.3%	4,690	3.3%	6,982	3.3%
	3 or more tumours	77	0.1%	131	0.1%	208	0.1%
	Total patients	69,133	100.0%	143,727	100.0%	212,860	100.0%

NMSC: Non-melanoma skin cancer

### 2.1.3: Trends

Incidence of cancer in Ireland increased dramatically during 1994-2004 with an annual increase of 313.7 male and 270.8 female cases each year. Just over 80% of the increase in male cases and 83.6% of the increase in female cases occurred in Republic of Ireland. The main cause of this change was population growth during the period and to a lesser extent ageing of the population. Removing these factors through examination of European age-standardised rates (EASIR) illustrates that all cancers combined increased by 1.5% ( $p=0.001$ ) per year among males during 1999-2004 with static rates prior to this period as far back as 1994. Among females EASIRs increased by 0.6% ( $p=0.002$ ) each year during the 1994-2004 period. (Fig. 2.2; Tab. 2.3)

Figure 2.2: Trends in European age-standardised incidence rates (EASIR) for all cancers by sex and country: 1994-2004



In Northern Ireland during 1994-2004 EASIRs were almost completely static with annual percentage changes of -0.1% among males and 0.0% among females. The change in EASIRs in Ireland as a whole was thus driven by changes in Republic of Ireland which saw EASIRs rise for males by 1.9% ( $p=0.008$ ) each year between 1999 and 2004, with no significant change prior to this point. Female EASIRs increased by 0.9% each year between 1994 and 2004. (Fig. 2.2; Tab. 2.3)

Table 2.3: Number of cases and European age-standardised incidence rates (EASIR) for all cancers by year of diagnosis, sex and country: 1994-2004

Year	Male						Female					
	Northern Ireland		Republic of Ireland		Ireland		Northern Ireland		Republic of Ireland		Ireland	
	Cases	EASIR	Cases	EASIR	Cases	EASIR	Cases	EASIR	Cases	EASIR	Cases	EASIR
1994	4,140	566.2 ±17.3	9,063	598.2 ±12.4	13,203	587.5 ±10.1	4,132	436.0 ±14.0	8,163	453.3 ±10.2	12,295	447.2 ±8.2
1995	4,047	547.3 ±16.9	8,983	585.3 ±12.2	13,030	572.9 ±9.9	4,182	437.1 ±13.9	8,072	442.8 ±10.0	12,254	440.8 ±8.1
1996	4,195	557.2 ±16.9	9,198	594.0 ±12.2	13,393	581.7 ±9.9	4,404	450.5 ±14.0	8,393	454.7 ±10.1	12,797	453.3 ±8.2
1997	4,121	541.4 ±16.5	9,349	593.1 ±12.0	13,470	576.2 ±9.7	4,333	437.3 ±13.7	8,619	460.8 ±10.0	12,952	452.6 ±8.1
1998	4,201	543.7 ±16.4	9,300	579.8 ±11.8	13,501	568.1 ±9.6	4,350	440.3 ±13.7	8,585	448.2 ±9.8	12,935	445.4 ±7.9
1999	4,166	532.2 ±16.1	9,488	586.4 ±11.8	13,654	568.6 ±9.5	4,362	437.8 ±13.6	8,650	447.5 ±9.7	13,012	443.7 ±7.9
2000	4,257	537.8 ±16.1	9,958	604.9 ±11.8	14,215	582.9 ±9.6	4,418	444.1 ±13.6	9,116	464.3 ±9.8	13,534	457.3 ±7.9
2001	4,378	543.4 ±16.1	10,194	606.3 ±11.7	14,572	585.7 ±9.5	4,295	421.4 ±13.2	9,296	466.0 ±9.7	13,591	451.0 ±7.8
2002	4,552	554.3 ±16.1	10,647	619.3 ±11.7	15,199	598.0 ±9.5	4,552	437.8 ±13.3	9,683	479.1 ±9.8	14,235	465.5 ±7.9
2003	4,690	559.9 ±16.0	10,923	621.2 ±11.6	15,613	601.2 ±9.4	4,649	446.3 ±13.4	10,097	486.8 ±9.7	14,746	473.2 ±7.9
2004	4,660	544.9 ±15.6	11,723	649.6 ±11.7	16,383	615.8 ±9.4	4,656	440.6 ±13.2	10,371	489.1 ±9.6	15,027	472.9 ±7.8

EASIR: European age-standardised incidence rate per 100,000 persons with 95% confidence interval

## 2.2: Mortality

During 2000-2004 there were 11,318 deaths from malignant cancer in Ireland, with 5,955 among males and 5,363 among females, an 11.0% difference. Adjusting for the different size and age structure of the male and female populations in Ireland, mortality rates (European age-standardised) were 43.3% higher among males than females. The odds of dying from the disease before the age of 75, assuming the absence of other causes of death, were 1 in 7 for males and 1 in 9 for females. Half of the deaths from cancer in Ireland occurred before the age of 72 for males and 73 for females. (Tab. 2.4)

Mortality from cancer was higher in Republic of Ireland than Northern Ireland with European age-standardised mortality rates 4.2% ( $p < 0.001$ ) lower among males and 3.6% ( $p = 0.006$ ) lower among females in Northern Ireland than Republic of Ireland. (Tab. 2.4)

**Table 2.4:** Summary statistics for deaths from all cancers: 2000-2004

	Northern Ireland			Republic of Ireland			Ireland		
	Male	Female	All persons	Male	Female	All persons	Male	Female	All persons
Number of deaths per year	1,886	1,792	3,678	4,069	3,571	7,640	5,955	5,363	11,318
Median age at death	73	74	73	72	73	73	72	73	73
Cumulative risk (Aged 0 to 74)	15.0%	11.4%	13.0%	15.2%	11.6%	13.3%	15.1%	11.6%	13.2%
Crude rate per 100,000 persons	227.6	206.5	216.8	209.1	181.4	195.1	214.6	189.0	201.7
EASMR $\pm$ 95% CI	227.4 $\pm$ 4.6	159.4 $\pm$ 3.5	186.3 $\pm$ 2.8	237.4 $\pm$ 3.3	165.3 $\pm$ 2.5	194.8 $\pm$ 2.0	234.0 $\pm$ 2.7	163.3 $\pm$ 2.0	191.9 $\pm$ 1.6
% difference (NI vs ROI) $\pm$ 95% CI (+ NI higher, - NI lower)							-4.2% $\pm$ 2.4	-3.6% $\pm$ 2.6	-4.3% $\pm$ 1.7

EASMR: European age-standardised mortality rate per 100,000 persons; CI: Confidence interval

Only a small proportion of the deaths from cancer which occurred between 2000 and 2004 were a result of non-melanoma skin cancer with an annual average of 7 male and 8 female NMSC deaths per year in Northern Ireland and 27 male and 15 female NMSC deaths per year in Republic of Ireland. Despite this small number these deaths are subsequently excluded from analysis of cancer mortality in order to retain consistency with analysis of cancer incidence.

## 2.3: Discussion

Cancer is a very common disease in Ireland with approximately 29,500 cases of malignant cancer diagnosed each year (21,509 excluding NMSC), the levels of which vary by various factors such as age, gender, country, site and cell type. There are however many other factors which cancer levels vary by, some of which have a causal nature (i.e. they induce or increase the risk of developing cancer). The area of research aimed at identifying links between factors and cancer (as well as other diseases) is called epidemiology.

The development of cancer is primarily a random occurrence being initiated by alterations to genes that regulate cell growth. Once started a complex process begins in which the cells that have altered genes continue to multiply forming a tumour, which can ultimately

**Table 2.5:** Risk factors for major cancers

	Smoking & Tobacco	Obesity	Physical exercise	Healthy diet	Excessive alcohol use	Sun exposure	HPV infection	Oral contraceptives	Breast feeding	Multiparity or late childbirth	Ionising radiation	Family history
Head & Neck	R			P	R	R	R					
Oesophagus	R	R		P	R		R					
Stomach	R			P							R	R
Colorectal		R	P	P	R							R
Liver	R				R							
Pancreas	R			P								R
Lung	R											
Melanoma						R						
Breast		R	P	P	R				P	R	R	R
Cervix	R			P			R	R				
Uterus		R						P		R		R
Ovary		R	P	P				P	P	R		R
Prostate											R	R
Testes												R
Kidney	R	R		P								R
Bladder	R			P								
Brain											R	
Lymphoma												
Myeloma												
Leukaemia	R											

R – Risk factor; P – Protective factor

invade the surrounding tissue and cause damage to vital organs in the body. The initial alterations which start the process, despite being random, can be promoted or hindered by other factors, with these factors related to certain types of cancer.

Tobacco is the greatest risk factor in the development of many cancers (lung, larynx, oesophagus, stomach, pancreas, kidney, liver and bladder); the biggest being lung cancer where it is estimated that almost 90% of cases of this disease are related to cigarette smoke.<sup>12</sup>

Other factors that can influence the development of certain types of cancer include history of cancer in the family, lack of balanced diet, lack of physical activity, obesity, alcohol consumption, exposure to ultraviolet radiation from sunshine or sunbeds, exposure to certain chemicals and gases such as asbestos, benzene or radon gas, exposure to ionising radiation, infections such as human papillomavirus (HPV), treatments such as exposure to oestrogen through Hormone Replacement Therapy (HRT), late or lack of reproduction in females and lack of breast feeding in females.<sup>13,14</sup> While most people with a particular risk factor for cancer will not contract the disease, the possibility of developing cancer can increase as exposure to a risk factor increases. (Tab. 2.5)