

4 Non-melanoma skin cancer

4.1 Summary

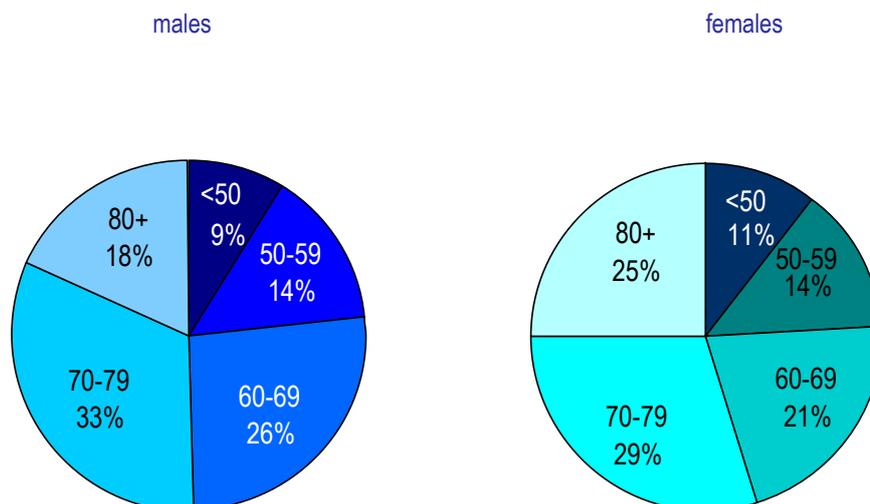
Non-melanoma skin cancer is the most commonly diagnosed cancer in Ireland, accounting for 27% of all malignant neoplasia (table 4.1). Each year, approximately 2,615 men and 2,330 women are diagnosed with a non-melanoma skin cancer. Incidence rates have remained stable during 1994-2003.

Table 4.1 Summary information for non-melanoma skin cancer in Ireland, 1994-2003

| | females | males |
|--|---------|-------|
| % of all new cancer cases | 27% | 28% |
| Average number of new cases per year | 2,330 | 2,615 |
| Average number of deaths per year | 12 | 23 |
| Age standardised incidence rate per 100,000 (European standard population) | 116.7 | 162.2 |
| Estimated annual percentage change in rate 1994-2003 | -0.2% | -1.3% |

The incidence of non-melanoma skin cancer increases with increasing age (figure 4.1). The age distribution of cases is similar for men and women. Only around 10% of cases present in those aged under 50. Around one-fifth of cases occur in males 80 years old and over, and 26% in females. The largest number of cases in both sexes is in people aged 70 to 79.

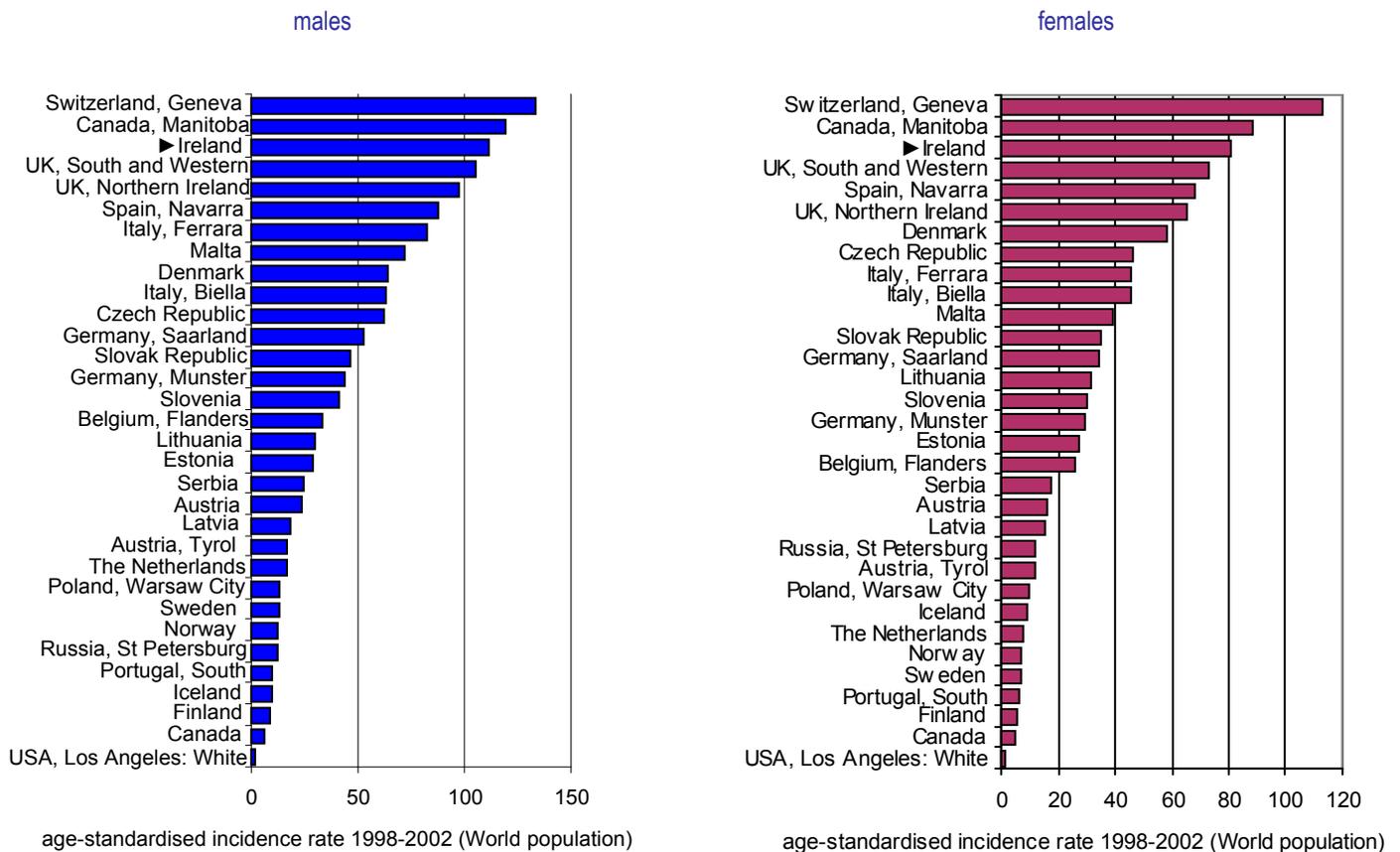
Figure 4.1 Age distribution of non-melanoma skin cancer cases, 1994-2003, males and females



4.2 International variations in incidence

Comprehensive (i.e. complete) registration of non-melanoma skin cancer is uncommon and few data are available at country level for international comparison. Figure 4.2 gives data on the incidence rate during 1998-2002 in individual cancer registries in several European and American countries. The registry with the highest incidence rate for each country is shown. The very broad range of incidence rates illustrates the wide differences in completeness of registration.

Figure 4.2 Incidence rate per 100,000 in 1998-2002 for selected cancer registries in Europe and USA: non-melanoma skin cancer



Source: Curado et al, 2007

4.3 Risk factors

Table 4.2 Risk factors for non-melanoma skin cancer, by strength of evidence

| | Increases risk | Decreases risk |
|-------------------------------|---|---|
| <i>Convincing or probable</i> | Sun exposure ^{1,2} | |
| | Skin colour ² | |
| | Inability to tan ² | |
| | Childhood freckling ² | |
| | Presence of benign sun damage in the skin ² | |
| | Sunbed/sunlamp use ³ | |
| | Immune suppression ⁴ | |
| | Arsenic in drinking water ⁵ | |
| | Ionizing radiation exposure (including X-rays) ⁶ | |
| | <i>Possible</i> | Infection with human papilloma viruses (HPV) ⁷ |

¹ International Agency for Research on Cancer, 1992; ² Armstrong and Kricger, 2001; ³ Karagas et al, 2002; ⁴ Saladi and Persaud, 2005; ⁵ World Cancer Research Fund / American Institute for Cancer Research, 2007; ⁶ Roewert-Huber et al, 2007; ⁷ International Agency for Research on Cancer, 2007a

Risk factors for non-melanoma skin cancer are summarised in table 4.2. There are two main types of non-melanoma skin cancer - squamous cell carcinoma (SCC) and basal cell carcinoma (BCC). There is convincing evidence that both types are caused by exposure to ultraviolet (UV) radiation present in sunlight. Occupational sunlight exposure has been mainly associated with SCC and recreational exposure with BCC. Individuals with a lighter skin colour, less ability to tan, and who had freckles as a child, are at increased risk, as are those with solar keratoses (benign sun damage to the skin). Independently of sun exposure, use of artificial tanning devices which emit UV radiation, such as sunbeds or sunlamps, has been associated with raised risk of BCC and, especially, SCC.

Individuals who are immune suppressed, such as organ transplant recipients or those with AIDS, have a greatly increased risk of developing skin cancer. Residues of arsenic from agriculture, mining and industrial practices can end up in drinking water. Arsenic is carcinogenic (International Agency for Research on Cancer, 1987, International Agency for Research on Cancer, 2004a) and ingestion of these residues has been associated with increased skin cancer risk. Low-dose ionizing radiation exposure (e.g. for benign skin conditions such as acne) increases risk of BCC.

Human papilloma viruses (HPV) infect mucosal and cutaneous epithelia. There is limited evidence to suggest that infection with particular HPV types (genus-beta) is causally related to SCC (International Agency for Research on Cancer, 2007a).

2.1.4 Exposure data

The authors of the SLÁN survey (Morgan et al, 2008) provided information on various aspects of socio-economic status, diet and lifestyle. This data was collected in a population survey, conducted in 2007, which involved face-to-face interviews with more than 10,000 adults across Ireland. Although available at ED level, the information was aggregated into larger geographical areas to avoid identifying respondents. The information provided was expressed as the percentage of respondents in each geographical area, and related to the following variables:

- % in social class 6
- % in quintile five (highest) of household equivalised income
- % below 60% of median equivalised income (modified OECD equivalence scale)
- % covered by private health insurance
- % who are obese (self-reported body mass index $\geq 30\text{kg/m}^2$)
- % with low fruit and vegetable intake (fewer than five helpings of fruit and vegetables daily)
- % with low fibre intake (less than 25g fibre daily)
- % with high intake of red and processed meat ($>300\text{g}$ red and processed meat per week)
- % with heavy alcohol consumption (≥ 14 units weekly)
- % who currently smoke (daily or occasionally).

As the data was sparse, and perhaps unrepresentative at the ED level, it was not formally incorporated into the analyses in this report. Instead it is used in a purely descriptive way to add some context to the disease mapping, and to aid interpretation of the geographical patterns in disease incidence. The authors of the current report mapped the data; these maps are shown in Appendix 1.

Also shown in Appendix 1 is a map of predicted radon exposure in Ireland, derived from a report by the Radiological Protection Institute of Ireland (Fennell et al, 2002).

2.1.5 International cancer incidence data

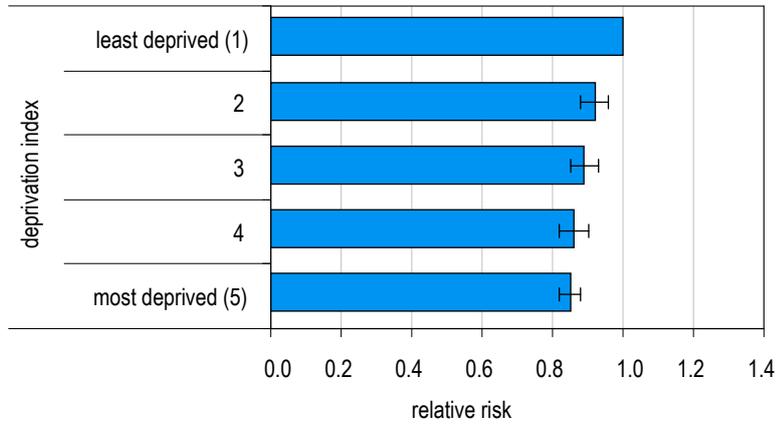
Estimates of cancer incidence in Europe and the United States of America are taken from the GLOBOCAN 2002 software package (Ferlay et al, 2004). These estimates are sometimes quite different from the actual incidence rates given in this report for 1994-2003, for two reasons: the projections of 1999 incidence rates on which they are based may not always be accurate and they are standardised to the World, rather than the European, Standard population. However, they are useful in giving a general idea of the incidence of cancer in Ireland relative to other countries.

2.2 Statistical analysis

2.2.1 Standardised incidence ratio

In comparing cancer cases between areas or over time, two important factors must be considered - the number of people at risk and their ages. The reason and method for correcting for the number of people at risk is obvious - the number of cases is divided by the number of people resident in the area during a specified period, as reported by the census, to produce an incidence rate (or mortality rate if deaths rather than cases are being considered).

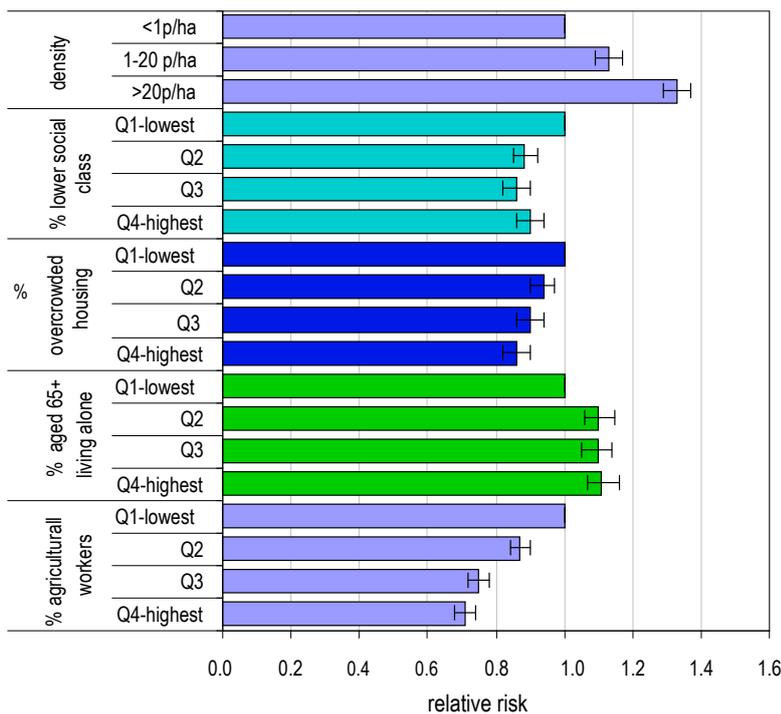
Figure 4.5 Adjusted relative risks of non-melanoma skin cancer by deprivation index: females



As with men, incidence of non-melanoma skin cancer incidence was associated with the index of deprivation (figure 4.5). Risk decreased with increasing deprivation. The most deprived areas had a 15% decrease in risk compared to the least deprived areas (RR=0.85, 95% CI 0.82-0.88).

Adjusted for population density

Figure 4.6 Adjusted relative risks of non-melanoma skin cancer by area characteristics: females



The most densely populated areas had a significantly higher risk of non-melanoma skin cancer in women than the most sparsely populated areas (figure 4.6; RR= 1.33, 95% CI 1.29-1.37). In contrast, areas with higher proportions of early school leavers, overcrowded housing or lower proportions of agricultural workers were associated with significantly lower risk. As for males, areas with the lowest proportions in social class 5 or 6 had the highest incidence in women.

Areas in the 2nd-4th quartiles of the proportion of over 65 living alone had a slightly increased risk of non-melanoma skin cancer in women.

All variables mutually adjusted except % of agricultural workers (not adjusted for density)

Socio-economic variation

The pattern of incidence by socio-demographic variables was similar for men and women. Average population exposure to UV radiation would be expected to be highest in areas with a high proportion of outdoor workers - in Ireland these would be predominantly male workers in agriculture, fishing and construction. Female outdoor

workers are much less common, and would, historically, have been almost exclusively in agriculture. The similarity between male and female patterns argues against an occupational explanation for the observed variations, as does the higher incidence in urban and more affluent areas. The patterns may be due to higher awareness and detection rates in urban communities, or to a predominance of leisure-related UV exposure over occupational. More focussed studies would be needed to elucidate this issue.

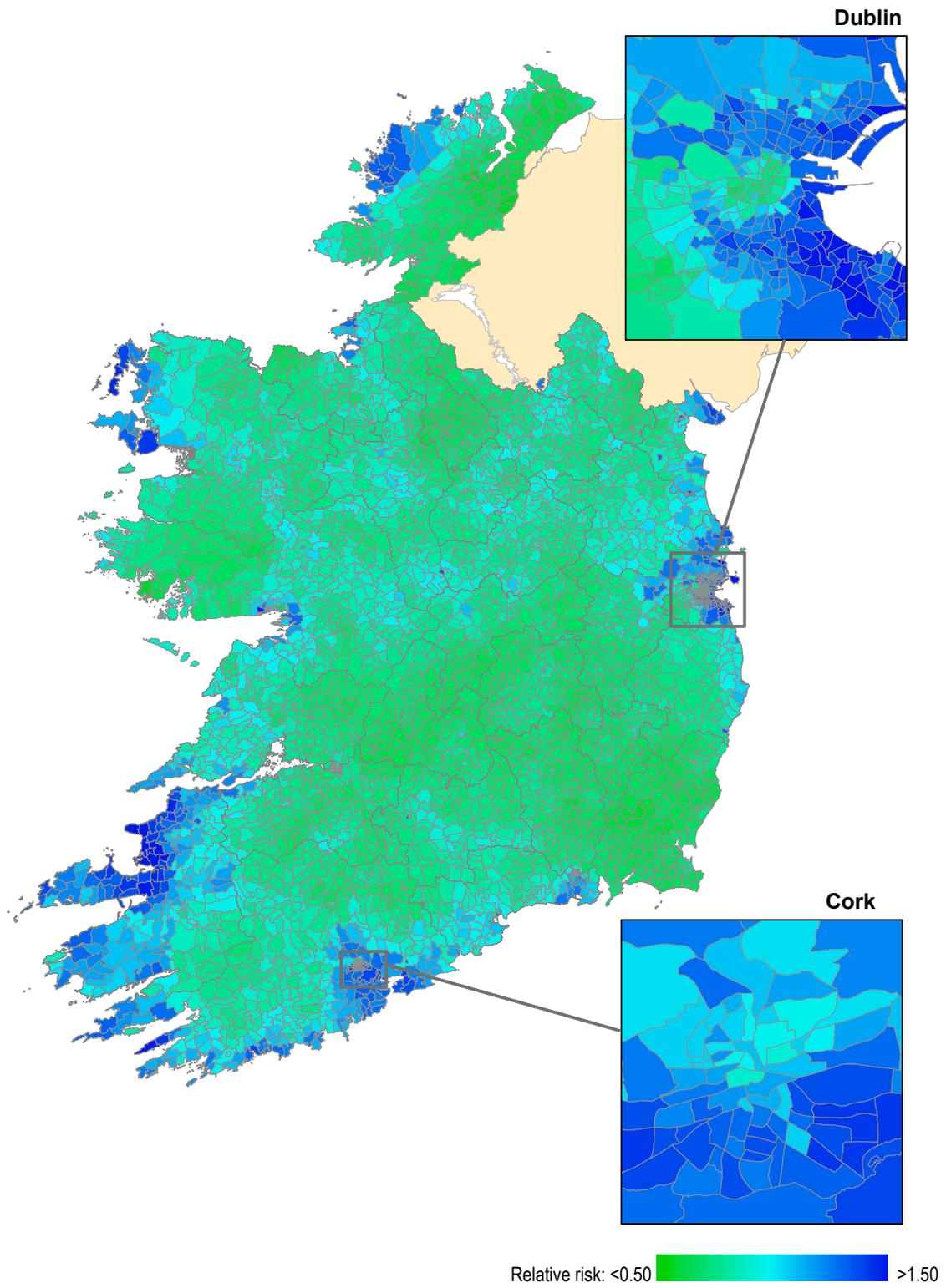
4.5 Mapping and geographical variation

Geographical variation

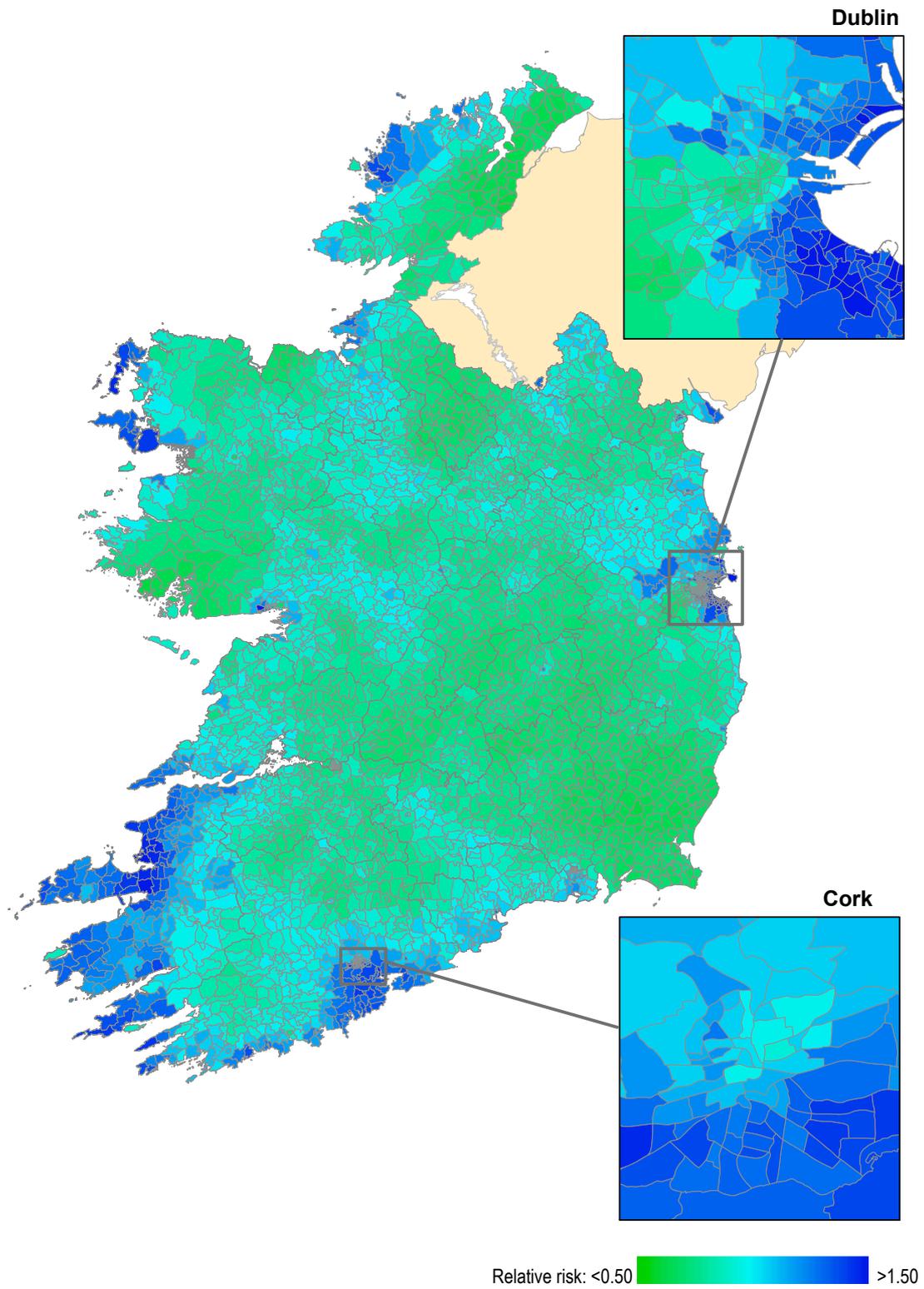
The geographical distribution of non-melanoma skin cancer was similar for men and women (maps 4.1-4.3), although the variation was somewhat more pronounced for men. Areas of high incidence were seen around the cities of Dublin, Cork, Galway and Waterford; in Cork and Dublin the areas of higher incidence were to the south and east of the cities, respectively. Outside the urban areas, regions of high incidence were observed in areas along the west coast in Donegal, Mayo, Clare, Kerry, west Cork (men) and also on the coast of Waterford (men).

Mean daily sunshine levels do not vary greatly across the country. They are highest in the southeast (an average of 4.3 hours daily at Rosslare during 1961-1990) and lowest in the west (3.0 hours daily in Claremorris). Therefore, overall population exposure to UV seems unlikely to explain the patterns seen. Although we are not aware of any studies on skin pigmentation in the Irish population, the homogeneity of the population makes it unlikely that pigmentation varies significantly from east to west. Recreational exposures and higher levels of surveillance are possible explanations for the high urban incidence. Outdoor occupations (farming, fishing and forestry) may partly explain the rural patterns in males; however, the counties with the highest percentage of males in these occupations (Roscommon, Leitrim, Tipperary and Waterford) did not have the highest observed incidence of non-melanoma skin cancer. Similarly, fewer than 3% of females listed farming, fishing or forestry as their occupation in the 2006 census, and the counties with the highest percentage of females in these outdoor occupations (Monaghan, Tipperary, Mayo and Waterford) did not have a markedly elevated incidence of non-melanoma skin cancers. However, non-melanoma skin cancer is a result of cumulative lifetime sun exposure, and occupational patterns may have been quite different in the past. Since exposures to the other putative risk factors for non-melanoma skin cancer (e.g. arsenic in drinking water) might be expected to be relatively uncommon, it seems unlikely that these could account for the geographical variations. Further study would be needed to better understand these patterns.

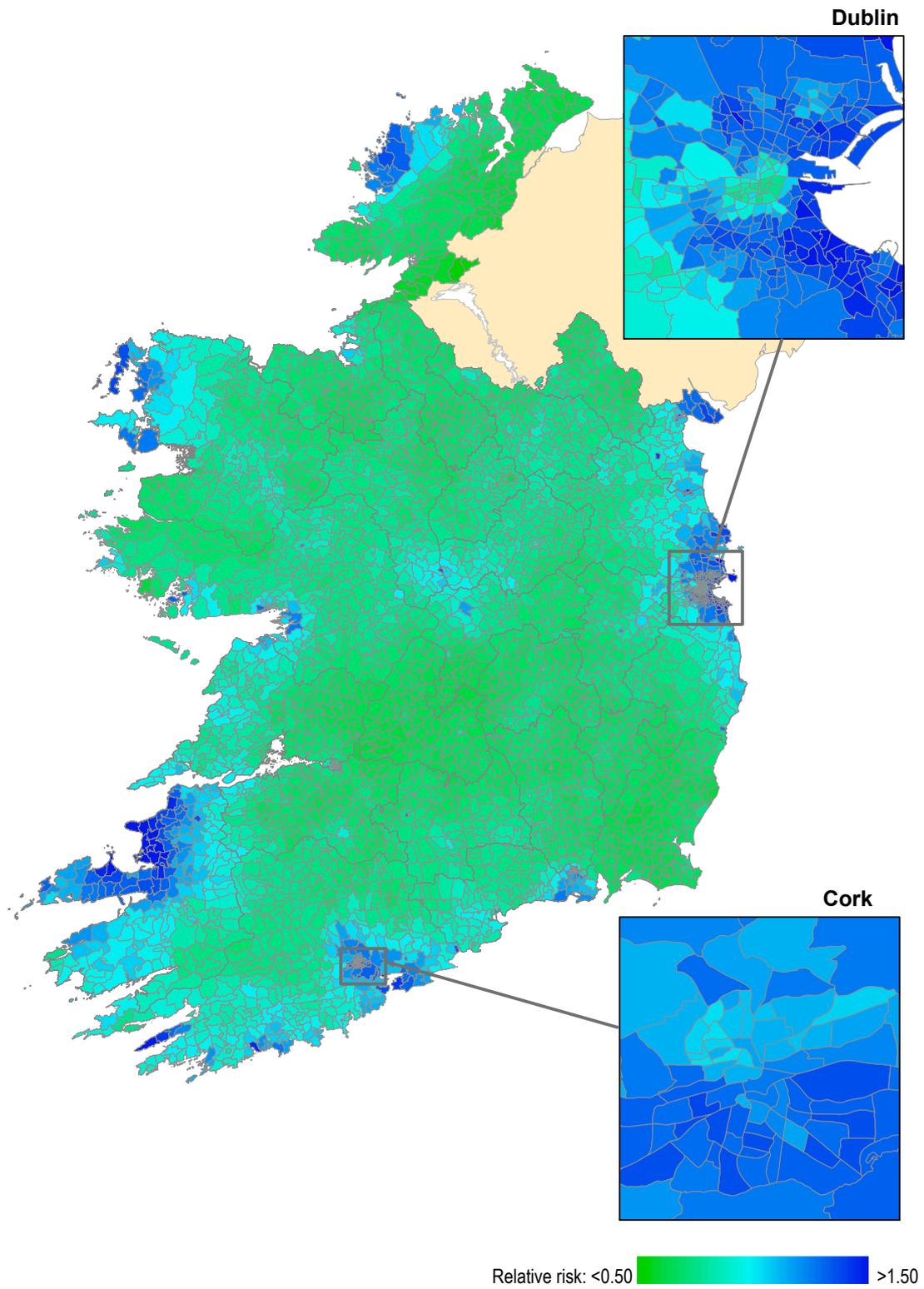
Map 4.1 Non-melanoma skin cancer, smoothed relative risks: both sexes



Map 4.2 Non-melanoma skin cancer, smoothed relative risks: males



Map 4.3 Non-melanoma skin cancer, smoothed relative risks: females



5 Breast cancer

5.1 Summary

Breast cancer accounts for 20% of all malignant neoplasms in women (table 5.1). If non-melanoma skin cancer is excluded, it is the most common cancer diagnosed in women in Ireland. Each year, approximately 1,820 women and 13 men are diagnosed with a malignant breast tumour. Incidence rates in women increased by 2.7% annually, between 1994 and 2003. Those in men changed little over time.

The remainder of this chapter relates only to breast cancer in women.

Table 5.1 Summary information for breast cancer in Ireland, 1994-2003

| | females | males |
|--|---------|-------|
| % of all new cancer cases | 20% | 0.1% |
| % of all new cancer cases excluding non-melanoma skin cancer | 28% | 0.2% |
| Average number of new cases per year | 1,820 | 13 |
| Average number of deaths per year | 640 | 5 |
| Age standardised incidence rate per 100,000 (European standard population) | 103.8 | 0.8 |
| Estimated annual percentage change in rate 1994-2003 | 2.7% | -1.4% |

The incidence of breast cancer, in common with most cancers, increases with increasing age (figure 5.1). Around 25% of cases present in those aged under 50, with a slightly larger percentage (27%) in those aged 50-59. 27% of cases occur in those aged over 70.

Figure 5.1 Age distribution of breast cancer cases, 1994-2003

