7 Lung cancer

7.1 Summary

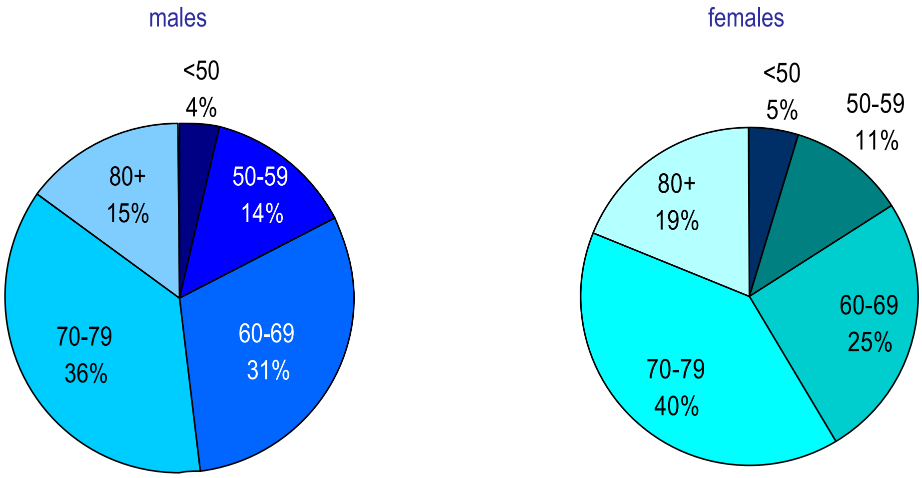
Lung cancer is the third most common cancer in Ireland, accounting for 15% of cancers in men and 9% in women, if non-melanoma skin cancer is excluded (table 7.1). Each year, approximately 1,025 men and 585 women are diagnosed with a lung tumour. In women, the incidence rate rose significantly during 1994 and 2003, by 2.2% per annum, whereas in men it fell slightly (1.0% per annum).

Table 7.1 Summary information for lung cancer in Ireland, 1994-2003

	females	males
% of all new cancer cases	7%	10%
% of all new cancer cases excluding non-melanoma skin cancer	9%	15%
Average number of new cases per year	585	1,025
Average number of deaths per year	541	963
Age standardised incidence rate per 100,000 (European standard population)	29.4	63.4
Estimated annual percentage change in rate 1994-2003	2.2%	-1.0%

The majority of those diagnosed with lung cancer were aged 70 and over (figure 7.1). Less than 5% of cases presented in those aged under 50. Male lung cancer patients were younger on average than females - 48% were under 70, compared to 41% of females.

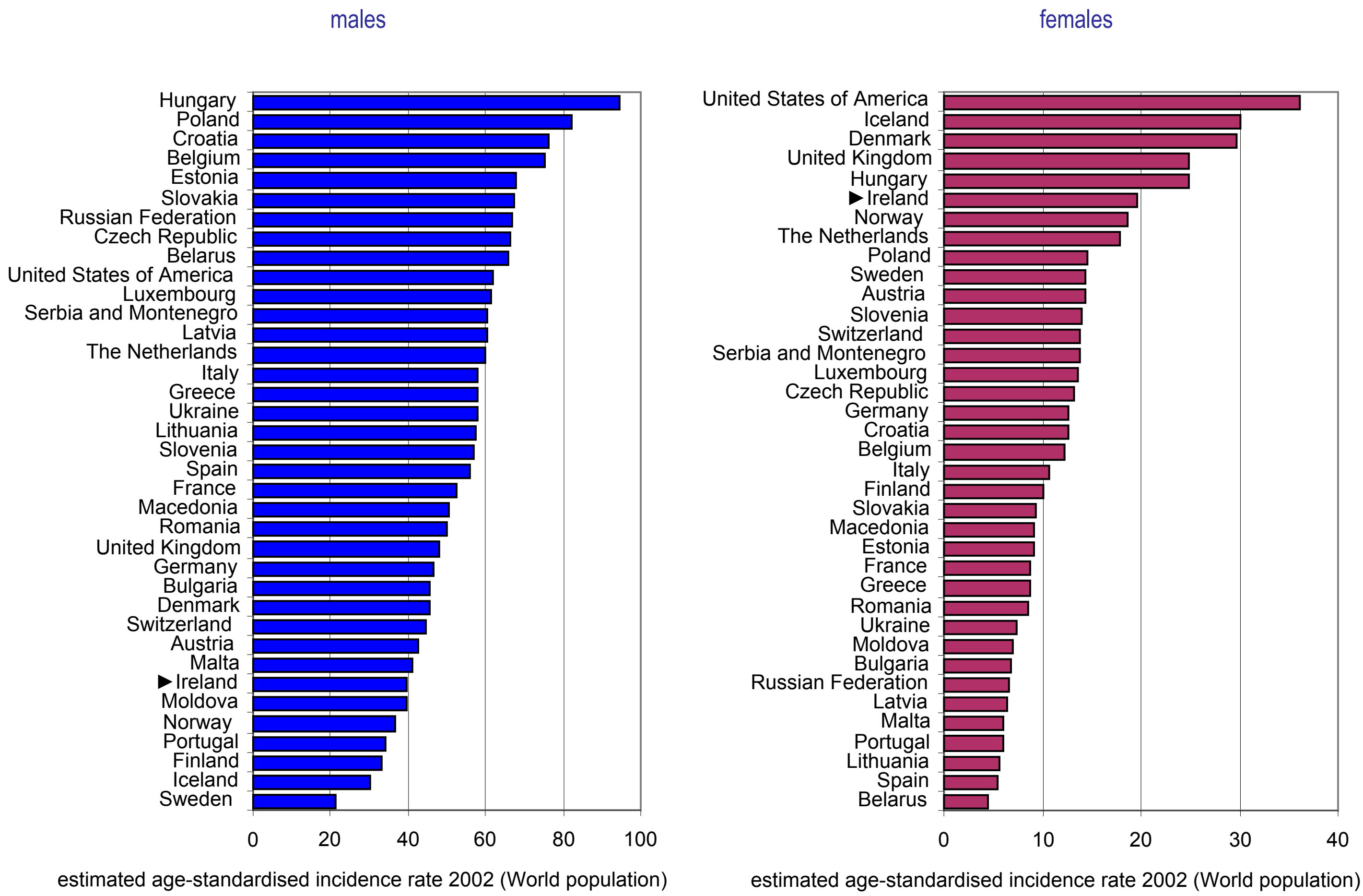
Figure 7.1 Age distribution of lung cancer cases, 1994-2003, males and females



7.2 International variations in incidence

The lung cancer incidence rate in women in Ireland in 2002 was one of the highest in Europe (figure 7.2). In contrast, incidence rates in men were among the lowest. A similar pattern of incidence can be seen in Denmark, the UK and Iceland, while Hungary and the USA have high incidence rates for both sexes. The differences between countries, and between men and women, are almost entirely a result of different trends in tobacco use in different populations (see section 7.3).

Figure 7.2 Estimated incidence rate per 100,000 in 2002 for Europe and USA: lung cancer



Source: GLOBOCAN 2002 (Ferlay et al, 2004)

7.3 Risk factors

Table 7.2 Risk factors for lung cancer, by strength of evidence

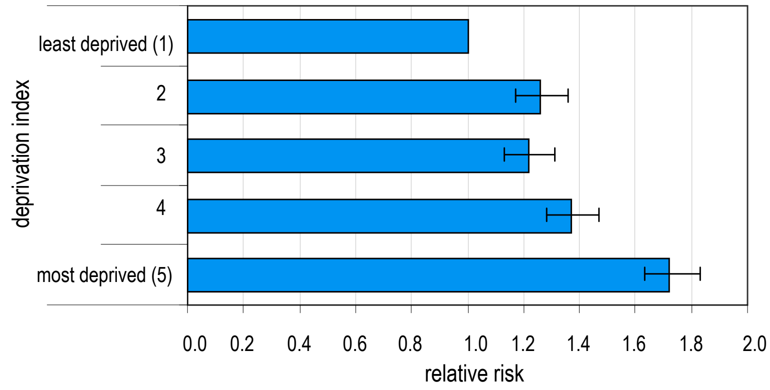
	Increases risk	Decreases risk
Convincing or probable	Tobacco smoking[1]	Fruit[5]
	Involuntary (passive) smoking[1]	Foods containing carotenoids[5,8]
	Asbestos exposure[2]	
	Radon exposure[2]	
	Ionizing radiation exposure (including X-rays and gamma radiation)[2]	
	Family history of lung cancer[3,4]	
	Arsenic in drinking water[5]	
	Beta-carotene supplements (in current smokers)[5]	
	Low socio-economic status[6]	
Possible	Alcohol[7]	Physical activity[5,9]
	Low body fatness[5]	Non-starchy vegetables[5,10]
		Aspirin and other non-steroidal anti-inflammatory drugs[11]

[1] International Agency for Research on Cancer, 2004b; [2] US Department of Health and Human Services, 2005; [3] First degree relative(s) with lung cancer; [4] Matakidou et al, 2005; [5] World Cancer Research Fund / American Institute for Cancer Research, 2007; [6] Faggiano et al, 1997; [7] International Agency for Research on Cancer, in press; [8] carotenoids are found in vegetables, particularly those which are red and orange; [9] International Agency for Research on Cancer, 2002; [10] International Agency for Research on Cancer, 2003; [11] Bosetti et al, 2006

Smoking is the principal cause of lung cancer (table 7.2). In populations with prolonged cigarette use, 90% of lung cancer cases are due to cigarette smoking (International Agency for Research on Cancer, 2004b). Duration of smoking is the strongest determinant of risk among smokers; the earlier the starting age or the longer the period of smoking, the higher the risk. Stopping smoking, at any age but particularly so before middle age, avoids most of the subsequent risk (Peto et al, 2000). Involuntary exposure to tobacco smoke (passive smoking) is a cause of lung cancer in those who have never smoked. Genome-wide association studies have identified a specific candidate locus but it not clear whether this confers susceptibility to lung cancer or to aspects of smoking behaviour (Easton and Eeles, 2008). Lung cancer risk has consistently been found to be higher in those of low socio-economic status, probably reflecting social class variations in tobacco exposure. Recent systematic reviews suggest that increased consumption of fruit and foods containing carotenoids (generally vegetables, particularly those which are red or orange) is associated with decreased lung cancer risk, even after adjusting for smoking status. In contrast, randomised controlled trials suggest that, in smokers, taking beta-carotene supplements is associated with increased disease risk. Various other lifestyle factors (such as alcohol intake, and physical activity) may be related to lung cancer, but the evidence is inconsistent and it is not always possible to rule out the possibility that the findings are due to some residual effect of smoking. The chances of developing lung cancer are increased in those exposed to asbestos, radon, ionizing radiation and arsenic in drinking water.

7.4 Electoral district characteristics and cancer incidence

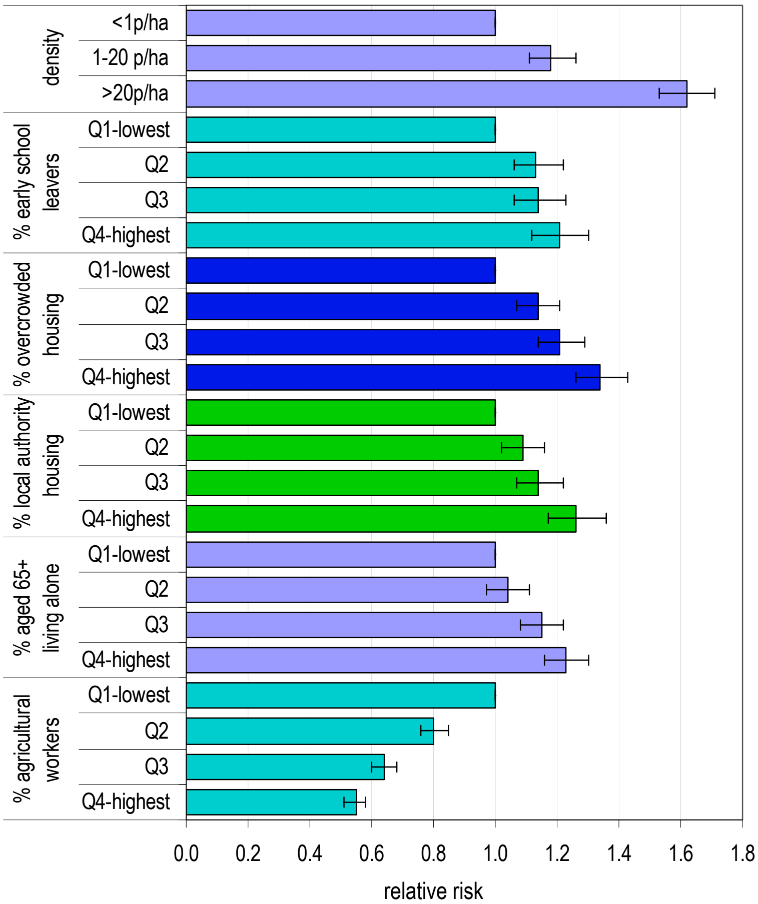
Figure 7.3 Adjusted relative risks of lung cancer by deprivation index: males



Adjusted for population density

Lung cancer incidence in men was strongly associated with the deprivation index of their area of residence (figure 7.3). The risk in areas of highest deprivation was more than 70% higher than in the least deprived (RR=1.72, 95% CI 1.63-1.83). There was no statistically significant difference in incidence between the areas of intermediate deprivation.

Figure 7.4 Adjusted relative risks of lung cancer by area characteristics: males

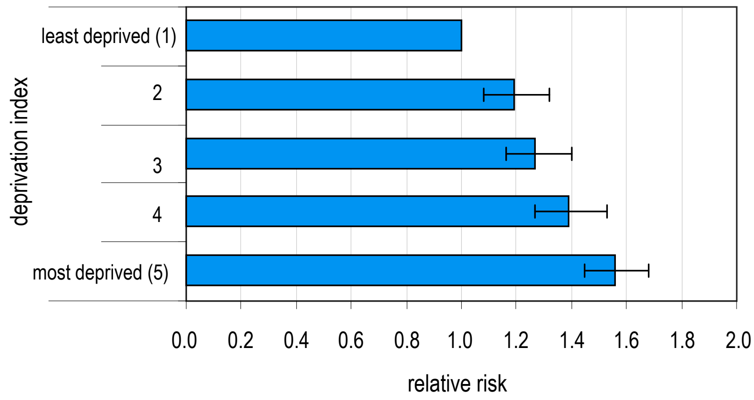


All variables mutually adjusted except % of agricultural workers (not adjusted for density)

There was a strong relationship between lung cancer risk and urban residence in men (figure 7.4). Lung cancer incidence in the most densely populated areas was more than 60% higher than in the least populated areas (RR=1.62, 95% CI 1.53-1.71). As would be expected from this finding, areas with a low percentage of agricultural workers also had a high risk.

Several other area characteristics were also positively associated with higher incidence of lung cancer in men, including a high proportion of early school leavers, more overcrowded housing, more local authority accommodation, and a higher proportion of people over 65 living alone.

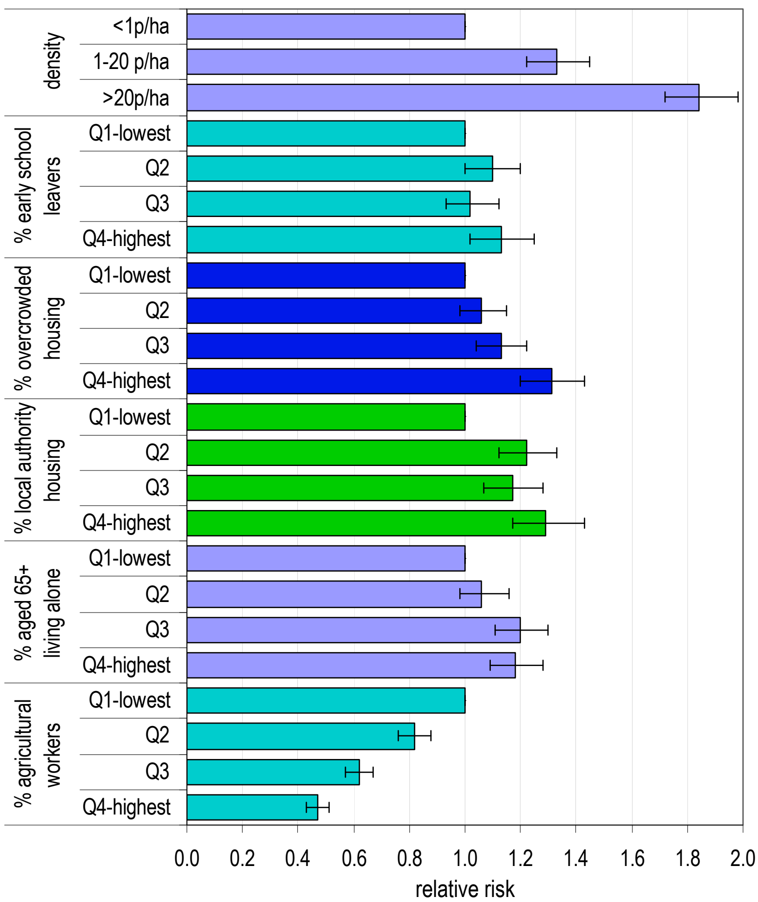
Figure 7.5 Adjusted relative risks of lung cancer by deprivation index: females



Adjusted for population density

As with men, the deprivation index of the area of residence was strongly associated with lung cancer risk in women (figure 7.5). There was a clear linear trend of increasing risk with increasing deprivation. Incidence in most deprived areas was more than 50% higher than that in the least deprived areas (RR=1.56, 95% CI 1.45-1.68).

Figure 7.6 Adjusted relative risks of lung cancer by area characteristics: females



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

Compared to women resident in the most rural areas (<1p/ha), those in most urban areas had almost double the incidence of lung cancer (RR=1.84, 95% CI 1.172-1.98 figure 7.6). A strong reciprocal relationship was seen with the proportion of agricultural workers.

Other area characteristics positively associated with higher lung cancer incidence in women were high proportions of early school leavers, local authority housing, overcrowding and people over 65 living alone.

Socio-economic variation

The composite index of deprivation and several individual measures, including education and housing, were independently associated with lung cancer risk. These variations, and the strong association with population density, probably reflect geographical and socio-demographic patterns in smoking habits. At the individual level in Ireland, smoking is strongly related to both social class and urban residence (Office of Tobacco Control, 2009).

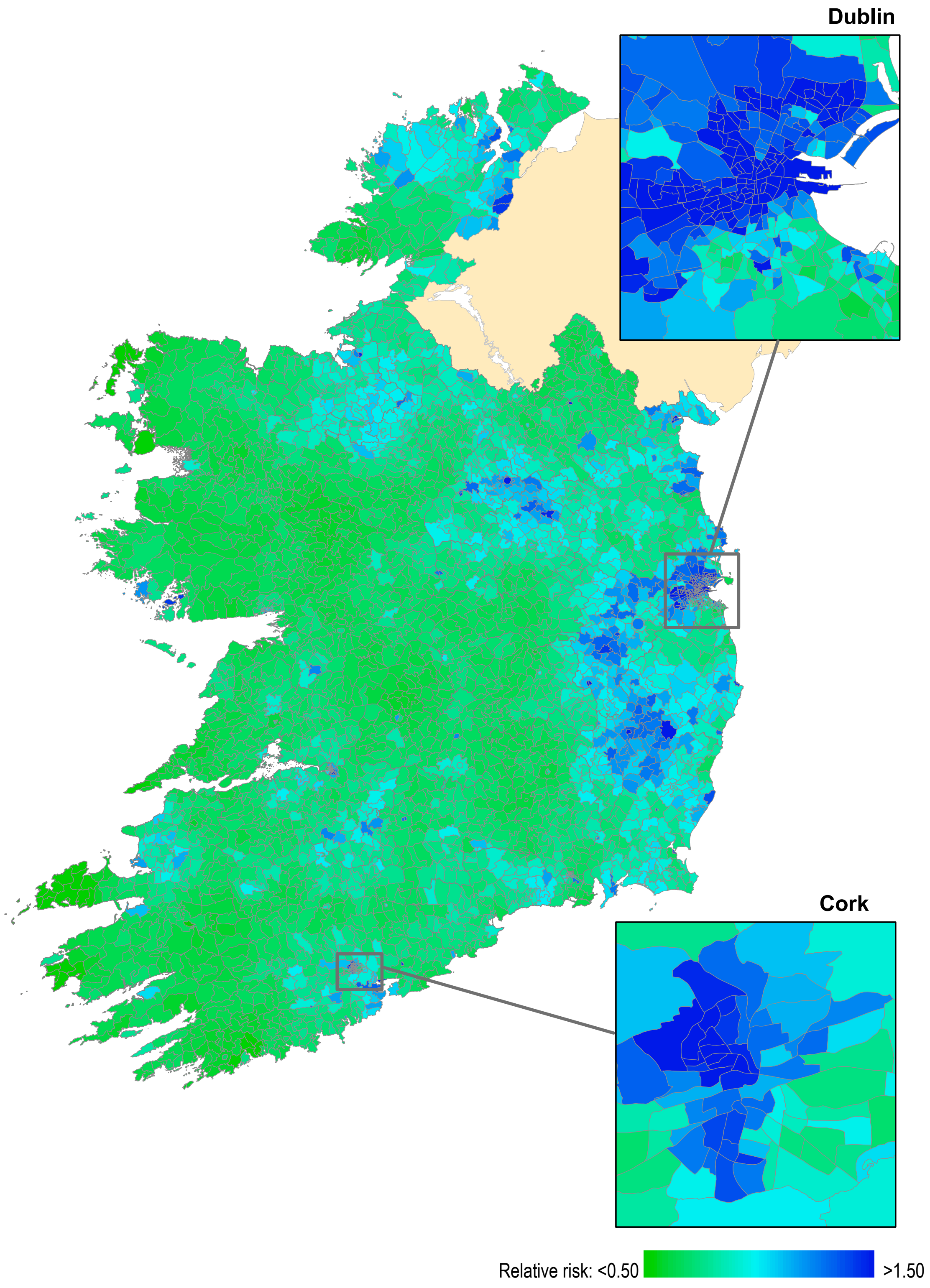
7.5 Mapping and geographical variation

Geographical variation

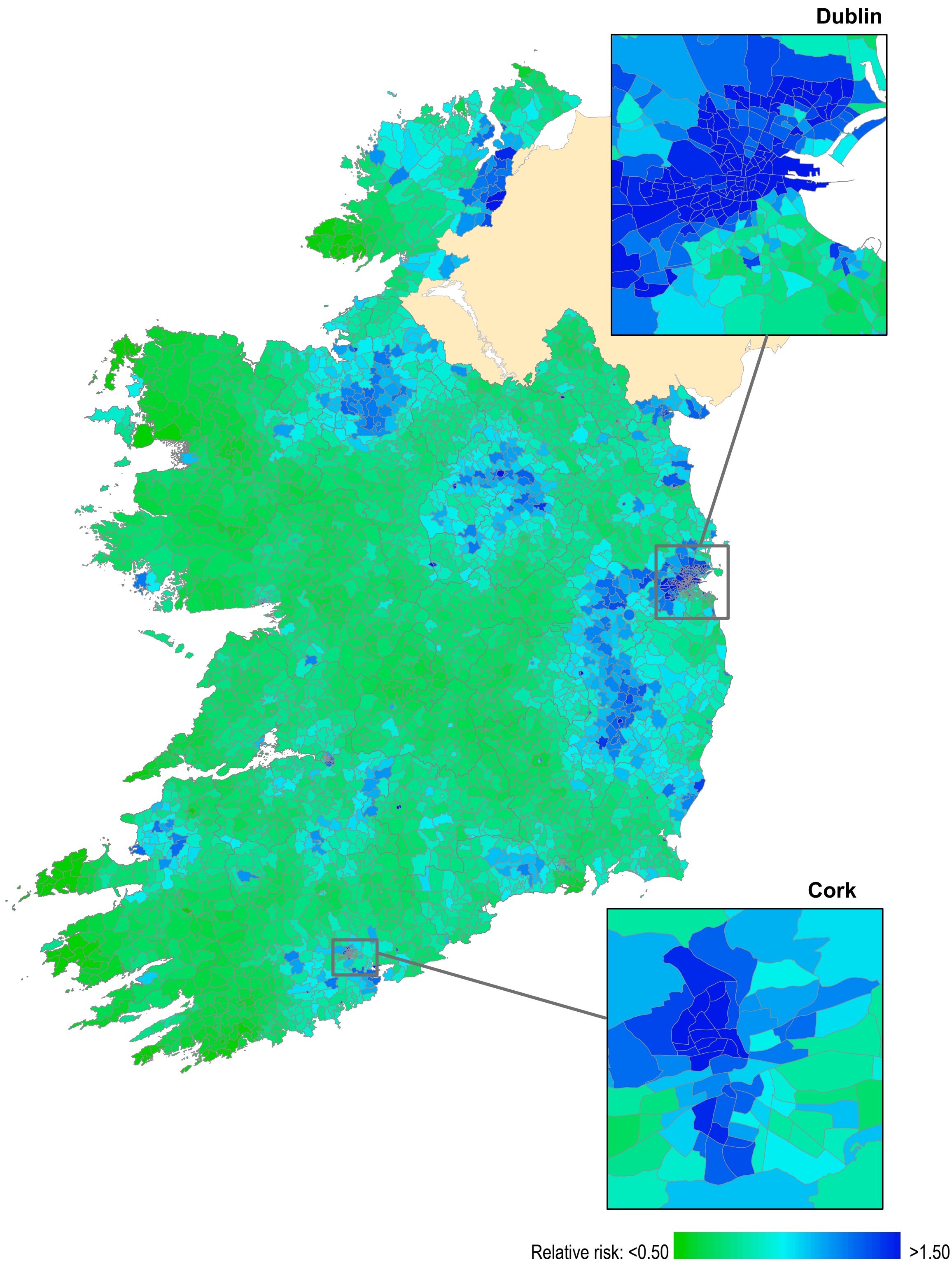
The geographical distribution of lung cancer was similar for men and women; the male pattern predominated when both sexes were combined, due to the higher incidence in men (maps 7.1-7.3). For women, the area of highest incidence was in Leinster, centred on Dublin, with the highest rates in Dublin, Kildare and Wicklow. A much smaller area of high incidence was centred on Cork city. Within Dublin and Cork cities, the areas of highest incidence were in the north and northwest respectively, which contain a larger proportion of areas of higher deprivation. For men, there was a more widespread pattern of high incidence. In addition to high rates in Leinster, there were pockets of high incidence in the northwest - Sligo, Leitrim and Donegal. Within the cities of Cork and Dublin, the pattern was similar to that seen for women.

There was, as would be expected, a correlation with the geographical distribution of levels of current smoking reported in the SLÁN survey (Appendix 1). However, there was little apparent relationship to measures of household income or social class. Although not striking, there were some similarities between the distribution of lung cancer (outwith the main cities) and that of radon levels, at least in the southeast of the country. However, lung cancer incidence was not especially high in the western parts of the country, which had higher predicted percentages of houses with radon levels exceeding 200 Bq/m^3 (Appendix 1).

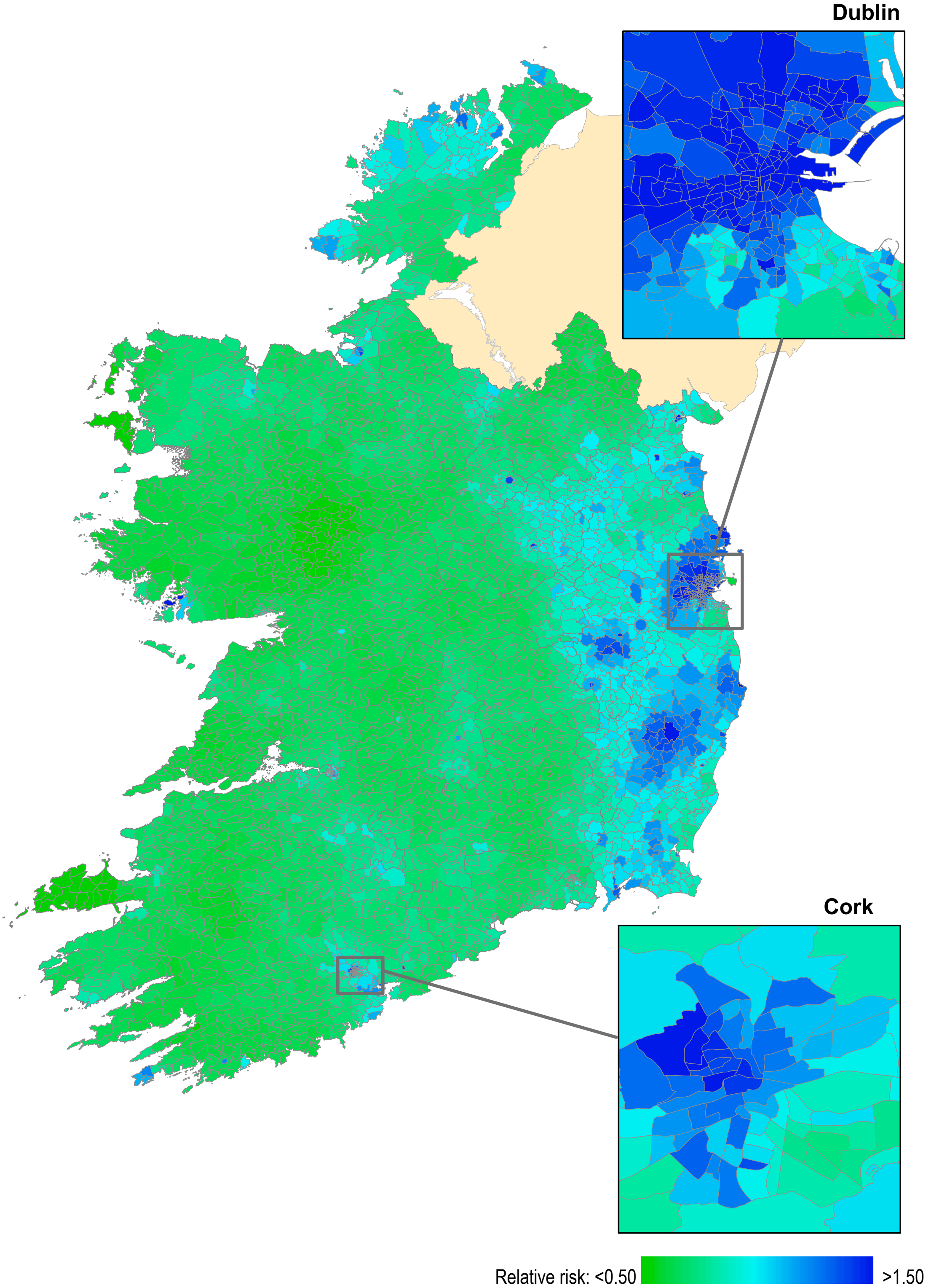
Map 7.1 Lung cancer, smoothed relative risks: both sexes



Map 7.2 Lung cancer, smoothed relative risks: males



Map 7.3 Lung cancer, smoothed relative risks: females



8 Prostate cancer

8.1 Summary

Prostate cancer is the most commonly diagnosed cancer in men in Ireland. When non-melanoma skin cancer is excluded, prostate cancer accounts for 23% of all new cancers in men. Each year, approximately 1,525 men are diagnosed with a prostate tumour. During 1994 and 2003, the incidence of prostate cancer rose faster than that of any other cancer; rates increased by an average of 7.1% annually. This has been driven, in large part, by large increases in the frequency of prostate specific antigen (PSA) testing in Ireland over this period (Drummond et al, 2009a).

Table 8.1 Summary information for prostate cancer in Ireland, 1994-2003

% of all new cancer cases	16%
% of all new cancer cases excluding non-melanoma skin cancer	23%
Average number of new cases per year	1,525
Average number of deaths per year	517
Age standardised incidence rate per 100,000 (European standard population)	94.5
Estimated annual percentage change in rate 1994-2003	7.1%

Prostate cancer is predominantly a disease of older age. Less than 1% of cases present in those aged under 50, while 90% occur in those 70 and older (figure 8.1). Just over one-fifth of cases are diagnosed in men aged 80 years and older.

Figure 8.1 Age distribution of prostate cancer cases, 1994-2003