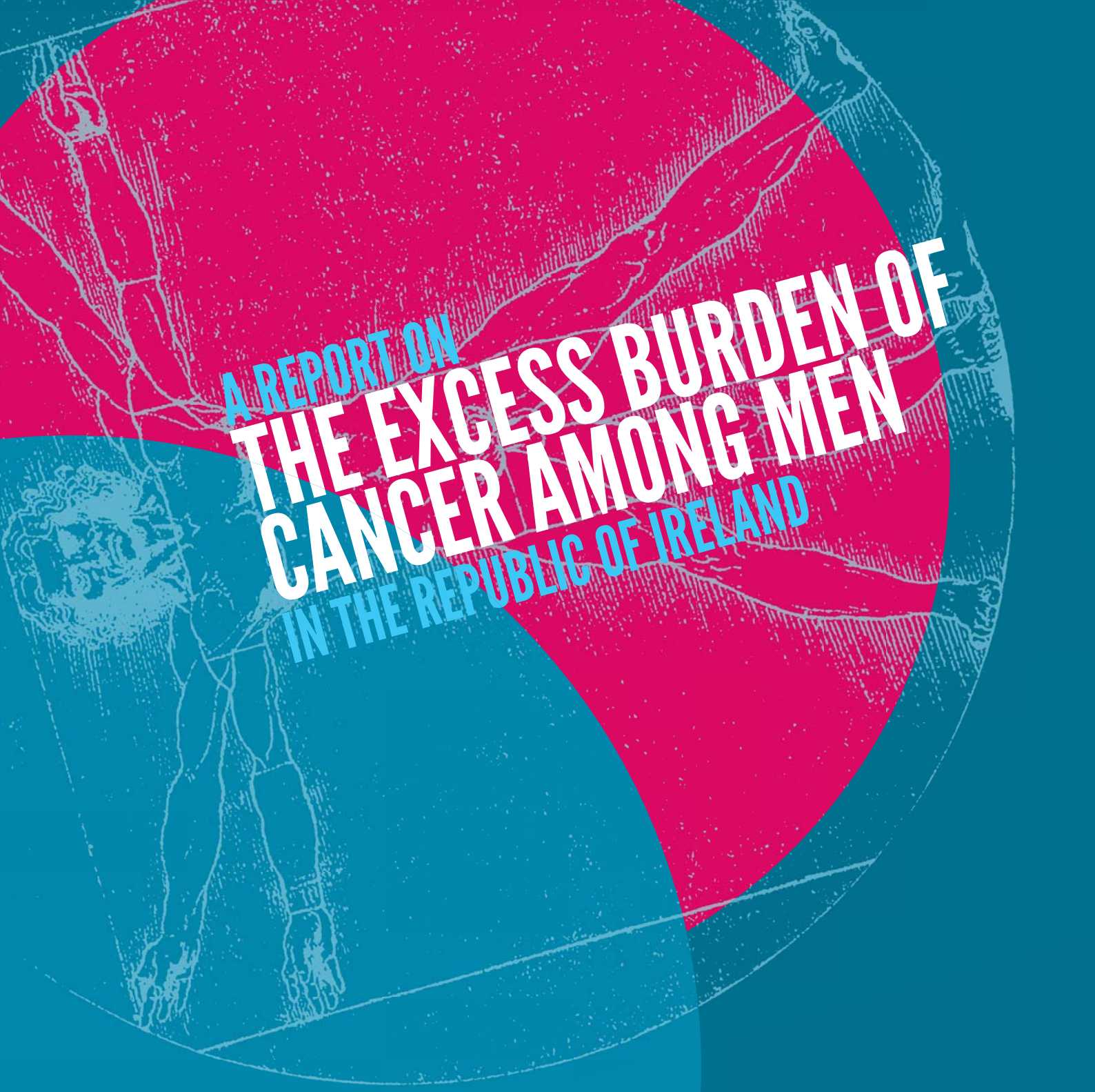

A REPORT ON THE EXCESS BURDEN OF CANCER AMONG MEN IN THE REPUBLIC OF IRELAND

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Irish Cancer Society

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FOREWORD

Male Mortality and Cancer Risk

Cancer represents a significant present and future health challenge. This is particularly true of cancer in men. While many advances have been achieved in treatment modalities and survival outcomes, a gender disparity exists in mortality and survival. It is evident in terms of current trends and future predictions that there is a need for a more gender specific and effective targeting of men in terms of tackling the disproportionate impact of cancer mortality on the male population in the Republic of Ireland.

The vision and ambition of the Irish Cancer Society is nothing less than a future without cancer. Our mission is to eliminate cancer. It may be said that this is an unrealistic and unrealisable ambition but we are sure that it empowers us to provide the leadership which will see huge leaps forward and significant breakthroughs in the battle against cancer. Firstly we must understand the battle we face and this report applies a gender lens to identify the male specific challenges existing and ahead.

The report provides a most valuable overview of the significant issues influencing male mortality and cancer risk. It helps us make sense of the existing incidence, survival and mortality cancer data. Understanding that projections indicate between 2005 and 2035 the overall number of invasive cancers is to increase by 213% or 7% annually for men compared to 165% or 6% annually for women demonstrates the urgency required in addressing this issue.

The recommendations contained within are broadly in line with previous documents such as A Strategy for Cancer Control in Ireland (2006) and the National Men's Health Policy (2008). It identifies that reducing the risk of cancer must be tackled through programmes which influence the uptake of healthy lifestyle options, to include diet and exercise, on a population wide level. Greater awareness of the signs and symptoms of cancer are required to improve mortality rates through earlier intervention. This includes access to and uptake of screening programmes such as BowelScreen. It also recognises the requirement for a male specific research focus on the causative factors associated with cancers in men and an understanding of how and why men do or do not seek help at the most appropriate juncture. Masculine traits of self-reliance, physical toughness and emotional control, are identified as being in conflict with positive health behaviour such as reliance on others and requesting medical aid. Addressing these traits successfully will go some way towards addressing gender gaps in mortality and survival.

In order to effect change we need to understand what works in relation to behaviour change and healthy lifestyle options in men with a particular emphasis on understanding what works for men living in lower socioeconomic groups. Reducing the risk of cancer is one of the primary goals of the Irish Cancer Society's strategy 2013-2017. This report gives us a valuable tool to understand mortality and cancer risk as it applies to the Irish male and allows us to consider our response through this gender lens.

Finally I would like to take this opportunity to acknowledge the contribution of Nick Clarke and Noel Richardson, Centre for Men's Health, Institute of Technology Carlow and Linda Sharp and Eamonn O'Leary of the National Cancer Registry Ireland.

DONAL BUGGY HEAD OF SERVICES, IRISH CANCER SOCIETY

EXECUTIVE SUMMARY

Introduction

The emergence of men's health at a policy level in the Republic of Ireland in recent years is underpinned by a growing awareness and concern about what the policy describes as the 'burden of ill health' experienced by men. Cancer represents a significant proportion of this burden. Age standardised incidence and mortality are higher among men compared to women while survival is lower. With an ageing population, projections indicate that between 2005 and 2035 the overall number of invasive cancers is to increase by 213% or 7% annually for men compared to 165% or 6% annually for women.

The factors underpinning cancer incidence and mortality are multiple and complex. While genetic risk factors for developing cancer can be attributed to a proportion of cancer incidences across a number of cancer sites, lifestyle factors such as smoking, alcohol use, diet and obesity impact significantly upon cancer incidence and are considerably more important. Other key mitigating factors include the relative uptake of available screening and, in the case of men in particular, patterns of help seeking behaviour and awarenes or knowledge of cancer risk factors and symptoms. Cancer incidence is also typically higher in areas where there is greater deprivation and higher population density. It is becoming increasingly evident in terms of current trends and future predictions that there is a need for a more gender specific and effective targeting of men in terms of tackling the apparently disproportionate impact of cancer mortality on the male population in the Republic of Ireland. Furthermore, policymakers and practitioners require a better understanding of the factors underpinning gender based cancer inequalities in order to intervene appropriately to address such inequalities. The purpose of this report is to unravel the statistics in relation to the rates of cancer diagnosis, survival and mortality for men and women in the Republic of Ireland across a number of non-sex specific cancer sites and, in the context of a number of patient characteristics, to offer some key recommendations based on the findings. It is proposed that the findings from this report will inform a gender perspective on policy, service delivery and future research in relation to cancer and men in the Republic of Ireland.

Aims and Objectives

Aim

To investigate key sex and gender differences in relation to incidence, survival and mortality for five non-sex specific cancers (bladder, colorectal, stomach, lung, and melanoma) in the Republic of Ireland from 1994 to 2008 with a view to informing both cancer strategy and men's health policy in the Republic of Ireland.

Objectives

1. To compile detailed incidence, survival and mortality cancer data disaggregated by sex, and to examine these in terms of socioeconomic characteristics (age, marital status, deprivation index) use of tobacco, and clinical characteristics (stage at diagnosis, tumour site location and histological classification).
2. To present cancer rate ratios for males and females for incidence and mortality and to investigate if an association exists with patient characteristics and if such factors impact on survival.
3. To increase our understanding of why males disproportionately die from non-sex specific cancers.
4. For cancer specific deaths, (after adjusting for sociodemographic and clinical factors), males had a significantly increased risk of death from CRC beyond 1 year post diagnosis.
5. To inform and provide an impetus for action towards implementing policy on men's health, cancer diagnosis, prevention and early diagnosisprevention and early diagnosis.

Methodology

In selecting which cancers to include in the study, a decision was made to focus on non-sex specific cancers which were ranked within the top ten most common cancers, namely; (i) colorectal cancer, (ii) lung cancer, (iii) melanoma of the skin, (iv) stomach cancer and (v) bladder cancer. Data was drawn from the National Cancer Registry Ireland (NCRI) for each cancer site for the period 1994-2008. Age standardised mortality rates for each cancer were drawn from the World Health Organisation Cancer Mortality Database. A range of patient characteristics were examined including socio-demographic variables (age, gender, marital status, smoking status and deprivation index) and clinical variables (stage of disease at diagnosis, treatment, histology and subsite). European age standardised incidence and mortality rates were calculated with corresponding rate ratios for incidence and mortality using Poisson approximation. Survival, using deaths from all causes, was investigated using the Hakulinen method to calculate relative survival, with Cox proportional hazards models used to investigate cancer specific survival. To permit survival analysis, information on deaths was obtained from the CSO and linked to cancer registrations by the NCRI.

Results

Colorectal Cancer

- European age standardised colorectal cancer incidence rates were higher for males than for females at all ages and across all age groups. The rate overall in males was 66.53 per 100,000 compared to 41.4 per 100,000 in females.
- There were significantly more males than females diagnosed with colorectal cancer in all age categories.
- Overall age adjusted relative survival from all causes of death was similar for both sexes at 1 year and 5 years post diagnosis over the period 1994-2008. However males under the age of 65 had significantly lower relative survival at 53% compared to 61% for females.
- For cancer specific deaths (after adjusting for sociodemographic and clinical factors), males had a significantly increased risk of death from CRC beyond 1 year post diagnosis.
- Despite yearly decreases from 1994-2008, the male mortality rate remained significantly higher than the female rate, with males being, on average, 1.8 times more at risk of dying from colorectal cancer than females during the period 2006-2008.

Lung Cancer

- European age standardised incidence rates for lung cancer were higher for males (62.18 per 100,000 in males and 31.67 in females) across all age groups and across all time periods. However, while the rate over time has dropped in males, it has increased in females.
- Males of all ages were 1.64 times more at risk of being diagnosed with lung cancer compared to females of all ages, with this excess increasing to 1.8 times in those aged 65 and over.
- Age standardised relative survival from all causes of death for lung cancer was significantly lower in males than in females with this difference being greatest in males and females aged less than 65 (22% v 31% respectively). Male survival at 5 years post diagnosis was 11% compared to 17% for females.
- For cancer specific deaths, (after adjusting for sociodemographic and clinical factors) there remained a significant difference in survival with male risk of death being 16% higher than female risk.
- The European age standardised lung cancer mortality rate for males was higher than that for females across all age groups. Rates have however shown a decrease yearly in males, while increasing yearly in females, reflecting a demographic change in smoking habits in females.
- The mortality rate has decreased in males to 49.91 deaths per 100,000 during the period 2006-2008, while for females the rate has risen somewhat since 1994 and returned to a rate of 27.64 deaths per 100,000 by 2006-2008.
- While more males than females were diagnosed with lung cancer (rate ratio of 1.64 male to female standardised incidence), the risk of males dying from the disease was even higher (rate ratio of 1.81 male to female standardised deaths).

Bladder Cancer

- While rates of bladder cancer have decreased yearly in both sexes, European age standardised incidence rates remained higher in males compared to females (16.68 per 100,000 in males and 5.60 in females) during the period 2006-2008.
- Across all ages, males were 3 times more at risk of being diagnosed with bladder cancer compared to females, while this increased to 3.4 times in males aged over 65.
- Age adjusted relative survival from all causes of death for bladder cancer was significantly higher among males up to two years post diagnosis. Thereafter, while remaining slightly higher, survival in males was similar to that of females.
- Male survival for those aged 75 and over was significantly better than for females of the same age.
- For cancer specific deaths (after adjusting for sociodemographic and clinical factors), males had significantly lower risk of death from bladder cancer than females. However, over time this reverses, particularly at 3-5 years post diagnosis where male risk is 48% higher compared to females.
- The European age standardised mortality rates for bladder cancer were higher among males of all ages and across all periods of diagnosis between 1994 and 2008. Although the rate decreased in males of all ages over this period from 7.33 deaths per 100,000 during 1994-1996 to 6.2 deaths per 100,000 during 2006-2008, the female rate remained relatively static at 2.44 deaths per 100,000 during 1994-1996 and 2.29 deaths per 100,000 during 2006-2008.
- The European age standardised mortality rate ratio was significantly higher in males of all ages. Like that of incidence, males are almost three times more at risk of being diagnosed with bladder cancer and of dying from bladder cancer than females.

Melanoma Skin Cancer

- European age standardised incidence rates in both males and females have increased over the period 1994-2008. In all age categories, the rates were higher in females than in males.
- Male and female melanoma skin cancer rates appear to be converging. Incidence rates in females stood at 13.75 melanoma skin cancers per year during the period 1994-1996 compared to the male rate of 8.41 per 100,000 during the same period. This figure increased to 17.32 and 15.95 melanomas skin cancers per 100,000 in females and males respectively during the period 2006-2008.
- Age adjusted relative survival from all causes of death was significantly lower in males than in females across all age groups examined and across all periods after diagnosis. Male relative survival was 90% at 1 year post diagnosis compared to 96% for females. For those aged 75 and over, relative survival for males was 88% at 1 year post diagnosis compared to 94% for females. This figure dropped to 76% relative survival in males of all ages alive at 5 years post diagnosis in comparison to 89% in females of all ages.
- For cancer specific deaths (after adjusting for sociodemographic and clinical factors), males had a 34% higher risk of death than females. This was evident across all time varying variables except after 5 years.
- Although overall European age standardised mortality rates for melanoma skin cancer were very low, rates were higher in males than in females for the period 1994-2008, with the difference becoming more pronounced from 2003 onwards. While mortality as a result of melanoma skin cancer was relatively low, it has increased in both sexes over time.
- Males of all ages were 1.6 times more at risk of dying from melanoma skin cancer compared to females during the period 2006-2008.
- While females were more at risk of being diagnosed with melanoma skin cancer, males were more at risk of dying from the disease.

Stomach Cancer

- European age standardised incidence rates were higher for males across all age groups and across all time periods from 1994 to 2008. European age standardised incidence rates were highest among those aged over 65, with male rates being significantly higher than female rates across all age groups.
- The age standardised rate ratio of male to female stomach cancer was significantly higher in males, with males in all age categories being twice as likely to be diagnosed with the disease.
- Age adjusted relative survival from all causes of death for stomach cancer did not differ significantly between males and females. However relative survival remained static in females after 3 years at 21%, whereas it decreased slightly

in males after the same period.

- For cancer specific deaths (after adjusting for sociodemographic and clinical factors), female risk of death was similar to male risk at 1 year, 1-3 years and at 3 to 5 years post diagnosis. At 5 years or more, female risk was significantly lower than male risk.
- European age standardised mortality rates were higher for males than for females (12.25 per 100,000 in males compared to 6.14 in females). This was the case both for males in the 0-64 age category and those aged 65 and over.
- Despite decreases in European age standardised mortality rates for both males and females, the rates remained significantly higher in males. Males were twice as likely to die from stomach cancer as females, across all age categories.

Factors underpinning disparities in cancer risk in men

In recent years, there has been an increased focus on factoring gender into studies in order to explain 'inequalities' in incidence and mortality based upon a number of diseases and causes of death, including cancer. Research on causes of cancer worldwide reported that, of the 7 million deaths from cancer in 2001, 35% were attributable to nine potentially modifiable risk factors, namely; overweight and obesity, low fruit and vegetable intake, physical inactivity, smoking, alcohol use, unsafe sex, urban air pollution, indoor smoke from household use of solid fuels, and contaminated injections in health care settings. Notably, these risk factors caused about twice as many deaths in men as in women, with 41% of worldwide cancer deaths in men being attributable to modifiable risk factors compared to 27% in women:

- Research has estimated that 29-38% of all cancers in men in Europe are attributable to smoking, compared to 2-10% of all cancers in women being attributed to smoking. Although rates of smoking in the Republic of Ireland are converging, the most recent SLÁN data indicates that 31% of the male population smokes compared to 27% of the female population.
- A recent study on the burden of alcohol consumption on incidence of cancer in eight European countries reported that up to 10% of cancers in men and 3% of cancers in women may be attributed to alcohol consumption. In the Republic of Ireland, the most recent SLÁN data indicates that men are approximately twice as likely as women to report drinking over the weekly limit and to binge drink.
- Research shows that high levels of body fat are associated with an increased risk of a number of cancers, including colorectal, oesophageal, gastric cardia, thyroid, renal, malignant melanoma, leukaemia, multiple myeloma and non-Hodgkin's lymphoma. The prevalence of overweight (46.3%) and obesity (20.1%) among men in the Republic of Ireland is currently ranked 8th in the EU25 and is rising at a rate of 1% per annum. It is projected that 33% of men on the island of Ireland will be clinically obese by 2015. Men also tend to deposit fat abdominally, thereby increasing their central obesity. This central or visceral fat is associated with an increased risk of fat related cancers.
- There is a long established link between physical inactivity and ill health. Research at a European level investigating the relationship between physical activity and cancer prevention has estimated that approximately 17% of male colon cancer cases, 21% of male lung cancer cases and 14% of prostate cancer cases could be prevented if the male population engaged in sufficient levels of physical activity. Within an Irish context, the most recent SLÁN data indicates that only 48% of men engage in some form of regular physical exercise, with those reporting as sedentary almost doubling between the age categories of 18-29 and 30-39 years (9.9% and 18.3% respectively). The continuing shift towards sedentary occupations and more sedentary lifestyles generally for men has been paralleled by a fivefold increase in obesity between the beginning and end of the last century.
- A recent study on diet and cancer prevention in 10 European countries concluded that cancer risk was increased through high intake of red and processed meat, dairy products, salt and salty foods. Consumption of fruits, non starchy vegetables, allium vegetables, selenium and foods containing selenium reduce one's risk of cancer. The most recent SLÁN data indicates that men's diets are less healthy than women's diets and that, despite two-thirds of Irish males surveyed being overweight/obese, 55% felt that they did not have to make changes to their diet as it was healthy enough.
- The first report on the State of Men's Health in Europe highlighted that infrequent use of health services among men is associated with men experiencing higher levels of potentially preventable health problems and having reduced treatment options when they do become ill. It has been reported that men are more likely to seek help for cancer symptoms if their help- seeking is sanctioned by family or friends or when symptoms interfere with their employment. In addition, men are more likely to undergo screening when it is recommended by a physician to do so.

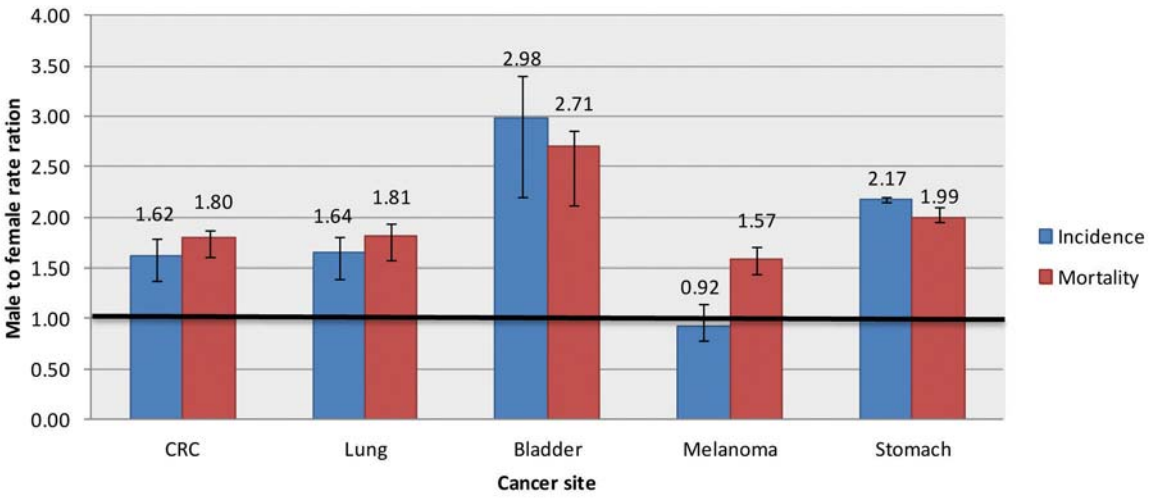
Whilst these risk factors are clearly implicated in the higher incidence of cancers in men, it is more difficult to account for the effect of these factors on the lower survival from cancer that is also seen in men. Survival at one year post diagnosis was very similar in males and females for the majority of cancers in this report; however males were found to be at a significant disadvantage at 5 years post diagnosis. What drives this disparity from 1 year post diagnosis to 5 years post diagnosis is an altogether more difficult question to answer. While sex differences exist in relation to factors such as stage of disease at diagnosis and smoking, survival analysis indicates that even after adjusting for these factors, males are still at greater risk of death from their cancer. Evidence would suggest that women have a biological advantage over men in terms of being more robust in coping with their cancer. Smoking status at diagnosis increases risk of death, however smoking may also be an independent prognostic factor, with evidence suggesting various explanations including higher smoking rates in males and the possibility of poorer responses to treatment, poorer DNA repair capacity and poorer immune competence as a result of smoking. Treatment may also impact on the poorer survival of males. Males may also be at a survival disadvantage as a result of overweight and obesity, lack of physical activity as well as age related co-morbidity.

Risk factors underpinning cancer incidence and survival are also influenced by the broader social determinants of health and, in particular, by the impact of socio-economic status. Why lower socio- economic status seems to infer greater risk of developing and dying from cancer has been attributed, within a US context, to a number of factors, including differences in area based smoking rates, tobacco regulation, advertising, availability of cigarettes, public awareness of the harmful effects of smoking, fatty diets, physical inactivity, reproductive factors, human papillomavirus (HPV) infection, sun exposure and other factors. Conversely, a more rapid adoption of healthier lifestyles and smoking cessation has been reported in populations with higher socioeconomic status. Therefore it appears that the nature of the relationship between a man's socio-economic status (and indeed a woman's) and cancer risk behaviours are complex and are mediated both by the cultural context in which one lives and by the values and attitudes that one develops in relation to health.

Discussion of results and conclusions

It is clear from evidence presented in this report that men in the Republic of Ireland have greater incidence (for all cancers examined except melanoma and ranging from 1.6 to 3 times that of the equivalent female rate for the other four cancers) and mortality (for all cancers examined, ranging from 1.6 to 3 times that of the female mortality rate), with lower survival from colorectal, lung, and melanoma skin cancer (see Figure 1). The excess in these cancers in relation to mortality among males, can, it seems in large part, be explained by [traditionally] higher rates of tobacco use, higher levels of excess alcohol consumption, unhealthy diets, a high prevalence of overweight/ obesity, low levels of physical activity or inactivity and, to some extent, later presentation when chances of survival are lower. Nine of the eleven recommendations from the European Code against Cancer[a] apply to men, and are perhaps more important to men considering the evidence presented in this report.

Figure 1: *Incidence and mortality rate ratios for selected cancers 2006-2008*



[a] European Code Against Cancer http://www.ec.europa.eu/health-eu/doc/cancercode_en.pdf

Changing lifestyle behaviours however remains a very challenging task and, as called for in this report, requires more targeted and gender-specific approaches to achieve better outcomes among those sectors of the population most in need (male, lower socio-economic groups). In addition to this, evidence seems to point to the fact that men's awareness of the signs and symptoms of cancer are lacking. This is compounded by men's reluctance to use health care services and their tendency to present for curative reasons rather than preventative reasons. In the context of screening, evidence from colorectal cancer screening in other jurisdictions points to the fact that males are less likely to take up the opportunity to be screened, even when screening is provided free of charge.

Recommendations

The recommendations contained in this report build upon those contained in A Strategy for Cancer Control in Ireland (2006) and the National Men's Health Policy (2009) and are also in keeping with other reports and legislation, namely, the Report of the Strategic Task Force on Alcohol (2004), the provisions of the Public Health (Tobacco) Acts, 2002 and 2004 and the Report of the National Task Force on Obesity (2005). Ostensibly, the key challenge in tackling the very grave statistics on male cancer incidence, survival and mortality, as outlined in this report, is to apply a gender lens to existing programmes and services based on the National Men's Health Policy's principles of best practice in engaging with men. It is also imperative that men are not seen as a homogenous group and that the recommendations in this report account for the very pronounced differences in cancer incidence, mortality and survival between different subgroups of men, particularly those that are associated with socio-economic status. This enables us to move beyond a 'one size fits all' approach and to consider more innovative and creative ways of engaging with different subpopulations of men (e.g. rural or ethnic minority men), in settings more likely to appeal to men (e.g. workplaces or sports settings), and at critical transition points in men's lives (e.g. fatherhood, the onset of ill-health, retirement/unemployment) when men are more likely to be receptive to health behaviour change. There is also much scope for increased collaboration and partnership between statutory and charitable cancer organisations to work together to share knowledge and to mobilise resources in tackling the excess burden of cancer in men. The following recommendations offer a blueprint for a more targeted and gender-specific approach to addressing the key findings from this report:

Tobacco	
Recommendation	Action
1	Reduce smoking rates among men in the Republic of Ireland through targeted campaigns informing men of the risks and range of cancers attributable to tobacco use and through targeted smoking cessation initiatives[53].
2	Target men of lower socioeconomic status for smoking cessation programmes and initiatives[54].

Alcohol consumption	
Recommendation	Action
3	The recommendations of the Steering Group Report On a National Substance Misuse Strategy[119] should be implemented in full with a particular focus on applying a gender lens across the four key pillars: 'Supply', 'Prevention', Treatment & Rehabilitation' and 'Research'.
4	The recommendations from the Strategic Taskforce on Alcohol[120] should be implemented in full with a particular focus on applying a gender lens across the ten key strategy areas. There should be a specific focus on raising men's awareness of the risks associated with the development of alcohol related cancers.
5	Increase efforts to reduce alcohol consumption in male sub- populations with high prevalence of alcohol consumption, particularly lower socio-economic groups.

Overweight / obesity and diet	
Recommendation	Action
6	In line with A Strategy for Cancer Control[10], the recommendations of the Report of the National Task Force on Obesity[77] should be implemented in full, with a particular focus on measures which raise awareness of the links between obesity and cancer risk in men and which provide tailored dietary information and weight loss/weight management programmes to men[118].
7	Increase the breadth and capacity of primary care teams to deal with obesity and, in particular, to adopt tailored and gender-specific approaches to promote healthy eating in men and to reduce obesity levels in men[118].

Physical activity	
Recommendation	Action
8	In line with the recommendations of the National Men's Health Policy[1], greater emphasis should be placed on the provision of appropriate recreational and leisure facilities for men across the lifespan, particularly for men in their middle and older years, when levels of physical activity tend to decline and cancer risk increases.
9	Adult men should be encouraged to engage in at least 30 minutes a day of moderate activity on 5 days a week in order to reduce their risk of developing cancer in accordance with the National Guidelines on Physical Activity for Ireland[117].

Cancer Awareness – signs and symptoms	
Recommendation	Action
10	Provide more targeted and gender-specific health awareness initiatives and health information to men (i) in settings where men are more likely to access such information (e.g. workplace); (ii) that are focused at key transitional periods in men's lives (e.g. fatherhood); and (iii) that specifically target lower socioeconomic groups of men. The focus of such initiatives should be on increasing men's awareness of signs and symptoms of cancer (particularly the most common cancers) and to encourage earlier help seeking and participation in organised screening where available.
11	Provide an increased focus on safe and reputable on-line cancer information for men. Consideration should also be given to linking existing reputable sites (e.g. Irish Cancer Society; Men's Health Forum in Ireland) to other sites that are commonly used by men.

Early detection and help seeking	
Recommendation	Action
12	In line with A Strategy for Cancer Control in Ireland[10] and the National Men's Health Policy[1] develop specific programmes that promote early detection and prompt help-seeking among men.
13	Provide an increased focus on training for primary care providers that focuses on (i) proactively addressing the barriers men are faced with in relation to early presentation; and (ii) making men feel more comfortable and welcome on initial point of contact with primary care services (where they are most likely to initially seek help if concerned about possible cancer symptoms).

Screening	
Recommendation	Action
14	The uptake of the BowelScreen programme should be monitored in men (particularly lower socio-economic groups of men) and, if necessary, strategies implemented to maximise participation in these groups.
15	BowelScreen campaigns should consider gender-specific approaches that target men specifically, alongside information on the increased probability of reduced incidence and mortality as a result of being screened.

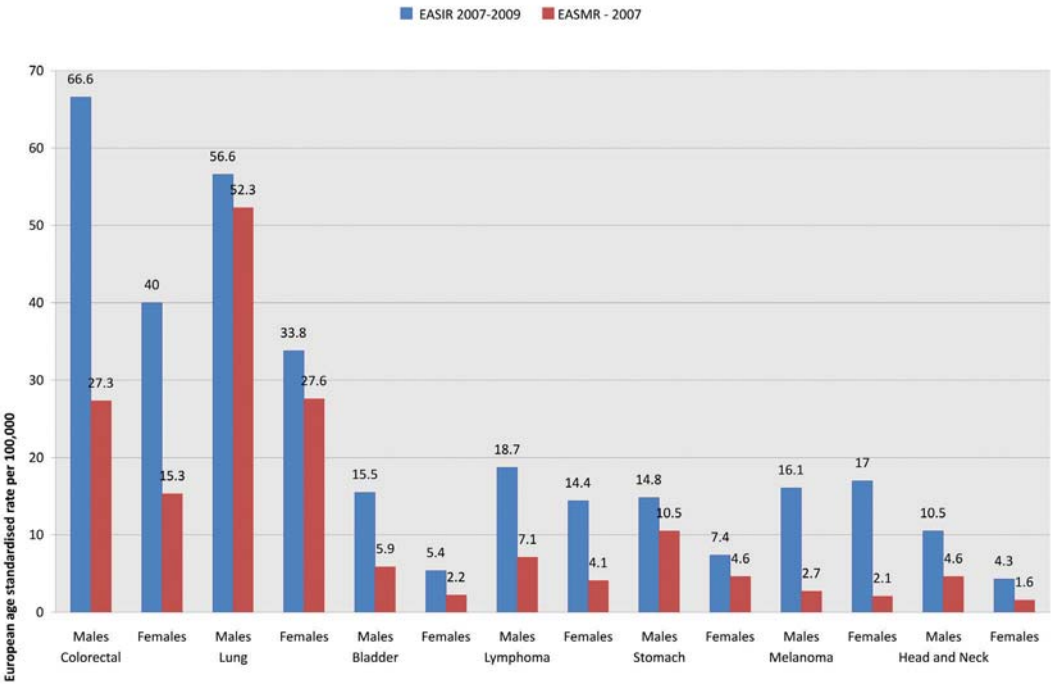
Future Research	
Recommendation	Action
16	Improvements in data collection would enable a greater understanding of the key factors associated with risk of developing cancer. Specifically, improved data collection in areas such as obesity and overweight levels, alcohol consumption patterns, co- morbidities, diet and physical activity levels would provide valuable yearly patterns which could be linked to cancer data currently being collated by the National Cancer Registry. Consider the feasibility of extending the dataset collected by the National Cancer Registry to include data on key lifestyle behaviours which may be available in medical records.
17	As recommended by the European Men's Health Forum in response to the State of Men's Health in Europe Report[27], National Cancer Plans should make specific recommendations to monitor and report male cancer patterns, specifically in relation to male cancer incidence, survival and mortality.
18	Further research is required in relation to how and why men do or do not seek help at the most appropriate juncture. Literature indicates that a focus on how men justify consulting more freely is warranted, rather than a deficit approach which assumes that all men are reluctant to seek help.
19	With the introduction of the BowelScreen programme, it is necessary that research focuses on the uptake of screening among men and women, particularly in light of men's higher incidence and mortality from CRC, and in relation to evidence that men are less likely to engage. Research should focus on men's motivations and attitudes to screening, with a particular emphasis on the influence of masculinity as a motivator or barrier. Such research will help in understanding how compliance with the programme can be improved.
20	Future research should focus on increasing the evidence base on 'what works' in relation to behaviour change and lifestyle improvement in men.

1. INTRODUCTION

1.1 Background & Context

The emergence of men's health at a policy level in the Republic of Ireland in recent years is underpinned by a growing awareness and concern about what the policy describes as the 'burden of ill health' experienced by men[1,p15]. Cancer represents a significant proportion of this burden. While the overall number of cancer cases in males diagnosed during the period 2007-2009 was lower than the number of female cases (males cases = 14324, female cases = 15421)[2], the age standardised incidence rate was higher among males compared to females. Similarly, survival for females (56.5%) was higher compared to males (54.6 %) in the period 2003-2007[2]. This disparity is also observed when mortality is considered, with males having a 14% risk of dying from their cancer compared to an 11.2% risk for females (in 2007)[2]. The age standardised mortality rate was 39% higher in males than females in the Republic of Ireland in 2007 with a male mortality rate of 223.2 per 100,000 compared to a female rate of 160.6 per 100,000[2]. While these rates are difficult to compare when viewed for all cancers (due to the inclusion of sex specific cancers), the rates still show marked sex differences when non-sex specific cancers are considered. Figure 1.1 outlines the age standardised incidence and mortality rates for a range of non-sex specific cancers among males and females in the Republic of Ireland. These cancers are within the top ten most common cancers diagnosed in men in the Republic of Ireland and indicate that men are more likely to develop and to die from each of these cancers.

Figure 1.1: *European age standardised incidence rates (EASIR) and mortality rates (EASMR) for males and females in the Republic of Ireland*



Lung cancer was the largest contributor to cancer mortality during 2007, representing 20% of all cancer deaths. The next largest contributor to cancer mortality in 2007 for males was colorectal cancer followed by prostate cancer. With an ageing population and advances in both the prevention and management of cardiovascular disease, cancer is becoming the most significant cause of premature death in men. The National Cancer Registry Ireland has predicted that the number of cancers is expected to increase more rapidly in the male population in the Republic of Ireland. This is due to the fact that the older male population is expected to age more rapidly than the older female population, with the numbers of those aged 65 and over increasing by 112% in males compared to 90% in females[3]. Projections indicate that between 2005 and 2035, the overall number of invasive cancers is to increase by 213% or 7% annually for men compared to 165% or 6% annually for women[3].

There are a number of complex issues relating to cancer incidence and mortality. While genetic risk factors for developing cancer can be attributed to a proportion of cancer incidences across a number of cancer sites, lifestyle factors such as smoking, alcohol use, diet and obesity impact significantly upon cancer incidence[4] and are considerably more important. Other key mitigating factors include the relative uptake of available screening and, in the case of men in particular, patterns of help seeking behaviour and awareness/knowledge of cancer risk factors and symptoms. In terms of screening, White[5] has pointed out that while men are at greater risk of bowel cancer, they are nevertheless less likely to be screened. Data from the UK[5] indicate that men experience higher mortality rates for colorectal cancer which, the authors claim, may be due to delay in seeking medical help. Late presentation has been linked to poorer health outcomes and unnecessary premature mortality in men[6,7]. This is also evident in data presented in the Republic of Ireland. Whilst over 92% of individuals diagnosed with colorectal cancer at stage I survived 5 years post diagnosis, only 8.6% of those diagnosed at stage IV survived 5 years post diagnosis[8]. Men also seem to have a poorer perception of their cancer mortality risk as well as poorer cancer screening behaviour[9]. The cancer atlas[8] has shown that deprivation and affluence also impact on cancer incidence across a number of cancer sites. Incidence for a number of cancers included in this report is typically higher in areas where there is greater deprivation (areas with high levels of unemployment and lower levels of 3rd level education) and in urban areas (higher population density areas)[8]. Whilst it is difficult to identify anything inherent about socio-economic status that directly confers risk of cancer or impacts on cancer survival, socio- economic status is unequivocally a marker for factors that influence cancer risk or outcome, such as lifestyle and help-seeking behaviours, participation in screening and co-morbidities[8].

It is evident in terms of current trends and future predictions that there is a need for a more gender specific and effective targeting of men in terms of tackling the apparently disproportionate impact of cancer mortality on the male population in the Republic of Ireland. Furthermore, policymakers and practitioners require a better understanding of the factors underpinning gender based cancer inequalities in order to intervene appropriately to address such inequalities. This research is in keeping with that proposed by the Men's Health Forum (England & Wales)[6] and Ireland's National Men's Health Policy[1]. Both sources have outlined the need for a systematic review of existing evidence in relation to men and cancer as well as a need for further research to establish why some patients delay presenting with cancer symptoms, and how and why this varies according to gender. The purpose of this report is to unravel the statistics in relation to the rates of cancer diagnosis, survival and mortality for men and women in the Republic of Ireland across a number of non-sex specific cancer sites and, in the context of a number of patient characteristics, and to offer some key recommendations based on the findings. It is proposed that the findings from this report will inform a gender perspective on policy, service delivery and future research in relation to cancer and men in the Republic of Ireland.

1.2 Aims and Objectives

Aim

To investigate key sex and gender differences in relation to incidence, survival and mortality for five non-sex specific cancers (bladder, colorectal, stomach, lung, and melanoma) in the Republic of Ireland from 1994 to 2008 with a view to informing both cancer strategy[10] and men's health policy[1] in the Republic of Ireland.

In addition to conducting a thorough analysis of existing cancer data, we also reviewed the existing literature on the likely causes, factors and types of interventions required to impact on reducing male cancer mortality.

Objectives

1. To compile detailed incidence, survival and mortality cancer data disaggregated by sex, and to examine these in terms of socioeconomic characteristics (age, marital status, deprivation index) use of tobacco, and clinical characteristics (stage at diagnosis, tumour site location and histological classification).
2. To present cancer rate ratios for males and females for incidence and mortality and to investigate if an association exists with patient characteristics and if such factors impact on survival.
3. To increase our understanding of why males disproportionately die from non-sex specific cancers.
4. To review the likely causes, risk factors and types of interventions required to impact on reducing male cancer mortality.

5. To inform and provide an impetus for action towards implementing policy on men's health, cancer diagnosis, prevention and early diagnosis.

1.3 Report structure

The report is structured in four sections. The first section reports on the methodological approach adopted for the study (chapter 2). The second section presents results on the five cancers under examination, detailing incidence data, patient characteristics, survival analysis and mortality data (chapters 3-7). The third section reports on a review of factors which are currently known to underpin increased cancer risk in males (chapter 8). Finally, the fourth section presents a discussion of the results alongside the conclusions and recommendations resulting from the overall research (chapter 9).

2. METHODOLOGY

2.1 Selection of cancer sites

In selecting which cancers to include in the study, a decision was made to focus on non-sex specific cancers which were ranked within the top ten most common cancers in men. Cancers selected for analysis were; (i) colorectal cancer (IDC10 - C18-C21[b]), ranked as the second most commonly diagnosed cancer in men (and women); (ii) lung cancer (IDC10 – C34 –C80.9), ranked as the third most commonly diagnosed cancer in men (and women); (iii) melanoma of the skin (IDC10 – C44, C76, C80.9), ranked as the fifth most commonly diagnosed cancer in men (fourth in women); (iv) stomach cancer (IDC10 – C16), ranked as the sixth most commonly diagnosed cancer in men (tenth in women); and (v) bladder cancer(IDC10 – C67), ranked as the seventh most commonly diagnosed cancer in men (fourteenth in women).

2.2 The National Cancer Registry Ireland

The National Cancer Registry (NCRI) was founded in 1991 and provides a population-based registry for the Republic of Ireland by collecting most of its information through active case finding. It has collected data for incidence from 1994 onwards, with most notifications coming from pathology departments and a smaller number from other hospital sources, death certificates and general practitioners. The data collected from these sources is gathered by Tumour Registration Officers (TROs) who are trained in cancer registration techniques and are responsible for a particular geographic catchment area. Mortality data for survival analysis (based upon death certificates) is supplied by the Central Statistics Office (CSO), with NCRI having full access to these records. It uses these for case finding and follow-up of patient status. Cancer related death certificates with no supporting information from other sources are followed up with the hospital of death or certifying doctor, with DCO (death certificate only) flags attached to the record if no further information is available.

Data quality and completeness of case ascertainment levels at the Registry are high. The registry complies with international standards and criteria in recording of all major data items, and has been consistent in its application of these since the start of registration in 1994. Overall the completeness of the registries data is estimated to be over 97% (excluding non-melanoma skin cancer)[11,14].

Cancer site in NICR incidence data, based on the electronic data collated from various sources, is coded to the tenth revision of the International Classification of Diseases[12] (ICD10). In addition, cancer morphology is received and coded to the second revision of the International Classification of Diseases for Oncology (ICD-O-2)[13]. Both of these are in wide use throughout the world in cancer registries.

2.3 Electoral Districts (EDs) and Deprivation Index

In the Republic of Ireland the smallest geographic area is the electoral district (ED). These are assigned by NCRI directly from the patient address on cancer incidence records using the GeoDirectory product available from An Post. However, it is not always possible to assign a unique ED, particularly in rural areas, as address information is occasionally incomplete or the address may span two or more small areas.

Using the small geographic areas, a deprivation quintile was assigned to patients using the 2004 SAHRU deprivation index[15] – an index which assigns a deprivation score to each ED based upon the economic characteristics of all persons usually resident in that area. For the purpose of this study, the deprivation quintile was determined by independently ranking EDs according to the appropriate deprivation score and divided into quintiles based upon the population of each small area. Thus quintile 1 contains the fifth of the population resident in the least deprived EDs in the Republic of Ireland, while quintile 5 contains the fifth of the population resident in the most deprived EDs.

[b] For a more detailed description of ICD10 codes used in this report see section on cancer histology and subsite below.

2.4 Incidence, mortality and age standardisation

Data on incidence of the above cancers were extracted from the National Cancer Registry Ireland's database for the years 1994–2008. Data relating to cancer deaths for the above cancers were extracted from the WHO IARC Cancer Mortality Database for the years 1994-2008.

Age standardised rates and ratios for incidence and mortality were calculated using Poisson approximation as outlined in Cancer Registration: Principles and Methods[16]. Patient characteristics were examined to investigate differences in the proportions of males and females within variables such as age, marital status, smoking, level of area based deprivation, stage at diagnosis, tumour site location and histological verification.

Age standardised rates for incidence and mortality were generated using 3 age categories (all ages, <65 and >65). Time periods were also used to examine age standardised incidence and mortality, 1994-1996, 1997-1999, 2000-2002, 2003-2005, 2006-2008 and 1994-2008. Confidence intervals were also generated and male to female differences were tested using standardised rate ratios.

Analysis of data was carried out employing standard statistical methods for registries[16] in line with NCRI's data analysis methods. Analysis was carried out using Stata[11].

2.5 Cancer histology and subsite

Histopathology and cancer subsites were categorised as follows:

Stomach
Histology: Adenocarcinoma, Other Specified Carcinomas, Unspecified Carcinomas, Carcinoids and Other or Unspecified Cancer.
Subsite: Cardia & Fundus (16.0 and C16.1), Other Specified (C16.2 - C16.8), and Not Otherwise Specified (C16.9).

Melanoma
Histology: Superficial Spreading Malignant Melanoma and Other Subsite: Head & Neck (C44.0 - C44), Trunk (C44.5), Upper Limbs & Shoulder (C44.6), Lower Limbs & Hips (C44.7), Overlapping NOS (C44.8 and C44.9) and Other (C76.0 - C80.9).

Lung
Histology: Small Cell Lung Cancer, Non-Small Cell Lung Cancer, Unspecified Cancer Subsite: Main Bronchus (C34.0), Upper Lobe (C34.1), Middle Lobe (C34.2), Lower Lobe (C34.3), Overlapping (C34.8), Not Otherwise Specified (C34.9 & C80.9).

Colorectal
Histology: Adenocarcinoma, NOS, Adenocarcinomas, Specified, Carcinoids and Other Cancers Subsite: Right/Proximal Colon (C18.1 to C18.5), Left/Distal Colon (C18.6 and C18.7), Unknown Colon (C18.8 and C18.9) and Rectum (C19 to C21)

Bladder (C67.0-67.9)
Histopathology: Papillary Transitional Cell Carcinoma, Non-Papillary Transitional Cell Carcinoma, Other Cancer.

2.6 Survival analysis

Registrations were excluded from survival analysis on the following grounds: (i) if the diagnosis was made by death certificate only or at autopsy; (ii) if the registration had been preceded by another primary cancer (other than a non-melanoma skin cancer); (iii) if the individual had been diagnosed with multiple primary tumours; or (iv) if the individual was aged under 15 or 99 or older at diagnosis.

Individuals were followed from the date of diagnosis to death or the end of follow-up (31/12/2009) - whichever occurred first.

2.7 Relative Survival

Relative survival is the ratio of the observed survival in a group of patients to the survival expected in a comparable group from the general population, with the same composition by sex, age and year of death. Deaths from all causes were considered.

Age-adjusted 10-year relative survival for men and women was estimated separately. In addition survival was estimated by age at diagnosis, for which patients were grouped into three age categories: <65, 65 – 74, 75 + years.

Relative survival was calculated for each of the five cancer sites by the Hakulinen method[17,18] and sex, age and calendar year-specific life tables (with 95% confidence intervals) were also calculated to facilitate crude comparisons between relative survival rates at specific time points after diagnosis (i.e. 1 year, 2 years, etc.). As noted by Oberainger & Siebert[128], relative survival is an appropriate means to examine survival differences between males and females because it adjusts for age structure and differences in life expectancy.

2.8 Cox models – cancer-specific

Multivariate Cox proportional hazard models[19,20] were run for cancer-specific mortality. Cancer specific mortality was ascertained by the cause of death recorded on the death certificate and classified deaths due to the specific cancer under investigation according to an algorithm developed by the Scottish Cancer Registry[21]. In these analyses, deaths from other causes were censored.

The primary aim of the analysis was to compare the risk of death in males and females. For four of the five cancer sites, the data conflicted with the basic assumption underlying the Cox model, that the hazards (i.e. risks of death) are proportional. Therefore the analyses were re-run fitting sex as a time- dependent covariate; this allowed the hazard for sex to vary over time (i.e. the relative risk of death in females compared to males varied over time). Four time windows were defined a priori: less than one year from diagnosis; one to three years; three to five years; and five years and over.

These models were adjusted for age and for other covariates significant on likelihood ratio tests ($p < 0.05$). The candidate covariates considered for inclusion in the model were: socio-demographic variables (age, smoking status at diagnosis, marital status, deprivation index) and clinical variables (stage at diagnosis, histology and, for all sites with the exception of bladder, subsite). In these analyses, histology and subsite were grouped into categories as appropriate for the specific cancer site[22].

3. COLORECTAL CANCER

Summary

- European age standardised colorectal cancer incidence rates were higher for males than for females at all ages and across all age groups. The rate overall in males was 66.53 per 100,000 (CI 65.52, 67.54) compared to 41.4 per 100,000 (CI 40.4, 41.87) in females.
- There were significantly more males than females diagnosed with colorectal cancer in all age categories.
- Overall age adjusted relative survival from all causes of death was similar for both sexes at 1 year and 5 years post diagnosis over the period 1994-2008. However males under the age of 65 had significantly lower relative survival at 53% compared to 61% for females.
- For cancer specific deaths (after adjusting for sociodemographic and clinical factors), males had a significantly increased risk of death from CRC beyond 1 year post diagnosis.
- Despite yearly decreases from 1994-2008, the male mortality rate remained significantly higher than the female rate, with males being, on average, 1.8 times more at risk of dying from colorectal cancer than females during the period 2006-2008.

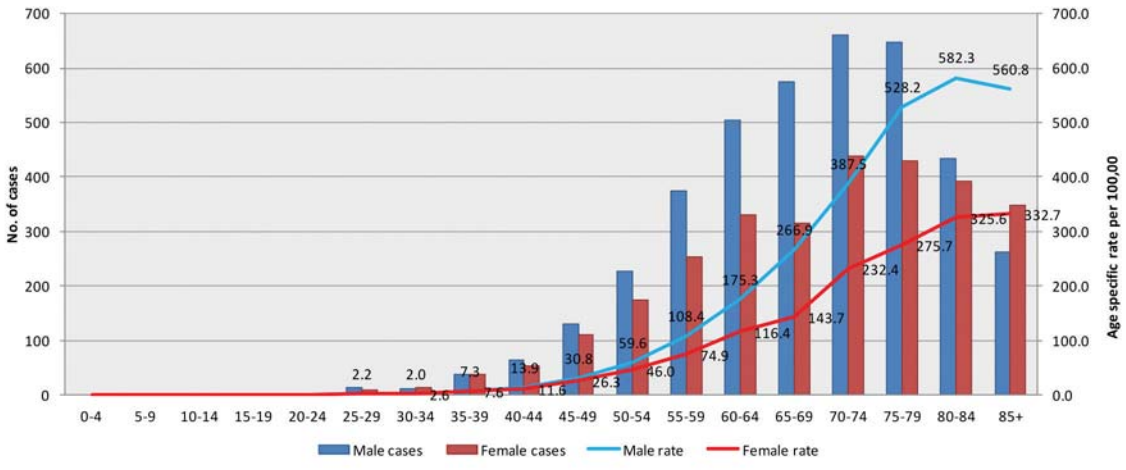
3.1 Incidence

Between 1994 and 2008, a total of 29,972 colorectal (CRC) cases were diagnosed in the Republic of Ireland, 57% of which were in males. Overall, the incidence of CRC was higher in males than in females. An annual average of 2,285 cases of colorectal cancer was diagnosed in the Republic of Ireland between 2006 and 2008.

Age-specific rates

CRC age-specific rates were higher for males than for females. Figure 3.1 illustrates the age-specific rates along with the incidence numbers for males and females diagnosed during the period 2006-2008.

Figure 3.1: *Colorectal cancer incidence and age specific incidence rates per 100,000 population by sex and 5 year age bands, 2006-2008*



European age standardised incidence rates

European age standardised CRC incidence rates were higher for males than for females for all ages and across all age groups (Table 3.1). This pattern was consistent throughout the period 1994 to 2008. Overall, the rate in males of all ages was 66.53 per 100,000 (CI 65.52, 67.54) compared to 41.4 per 100,000 (CI 40.4, 41.87) in females.

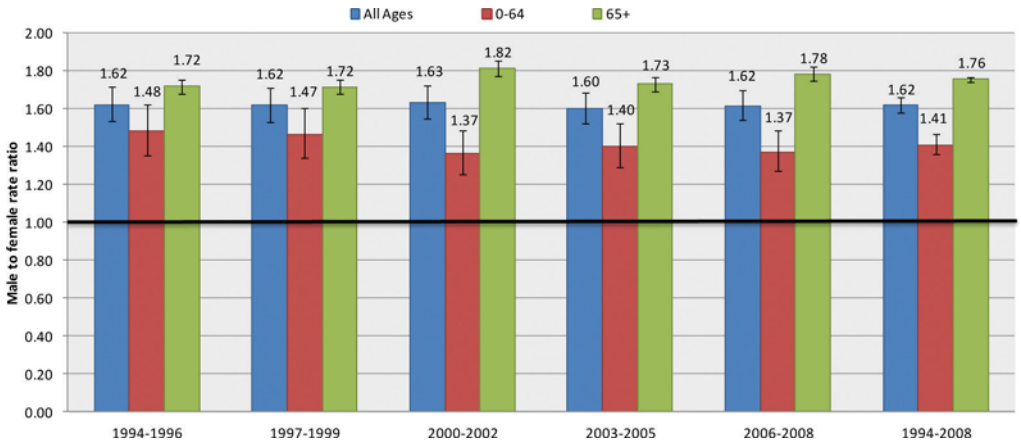
Table 3.1 European age standardised colorectal cancer incidence rates by sex, period of diagnosis and age group, 1994-2008 (Confidence intervals in parenthesis)

	All Ages		<64		65+	
Time period	Males	Females	Males	Females	Males	Females
1994-1996	65.74 (63.34, 68.14)	40.50 (38.78, 42.23)	27.53 (25.92, 29.14)	18.54 (17.22, 19.87)	374.85 (369.25, 380.45)	218.19 (214.58, 221.79)
1997-1999	66.51 (64.17, 68.84)	41.10 (39.40, 42.79)	26.88 (25.35, 28.41)	18.32 (17.05, 19.58)	387.12 (381.58, 392.66)	225.40 (221.77, 229.03)
2000-2002	66.21 (63.94, 68.48)	40.53 (38.89, 42.17)	25.27 (23.85, 26.69)	18.50 (17.28, 19.71)	397.43 (391.91, 402.95)	218.84 (215.30, 222.37)
2003-2005	66.56 (64.37, 68.75)	41.49 (39.88, 43.10)	25.47 (24.11, 26.84)	18.14 (16.99, 19.29)	399.01 (393.66, 404.35)	230.45 (226.87, 234.03)
2006-2008	67.71 (65.59, 69.84)	41.87 (40.29, 43.44)	26.31 (24.99, 27.63)	19.16 (18.02, 20.29)	402.68 (397.48, 407.87)	225.60 (222.13, 229.07)
1994-2008	66.53 (65.52, 67.54)	41.14 (40.40, 41.87)	26.22 (25.58, 26.86)	18.57 (18.03, 19.11)	392.64 (390.21, 395.06)	223.70 (222.11, 225.29)

European Age Standardised incidence Rate Ratios

Males in all age categories were significantly more at risk of being diagnosed with CRC than females. Figure 3.2 illustrates the rate ratio of male to female CRC, with all ratios being statistically significant. CRC incidence in males of all ages was 1.62 (CI 158, 1.66) times higher than in females of all ages. While this was lower in the under 65 age category at 1.41 (CI 1.36, 1.47) times, it was 1.76 (CI 1.74, 1.77) times greater in the 65 and over age category.

Figure 3.2: *European age standardised incidence rate ratios of male to female colorectal cancer by period of diagnosis, 1994-2008*



3.2 Patient characteristics

Age, marital status and smoking at diagnosis

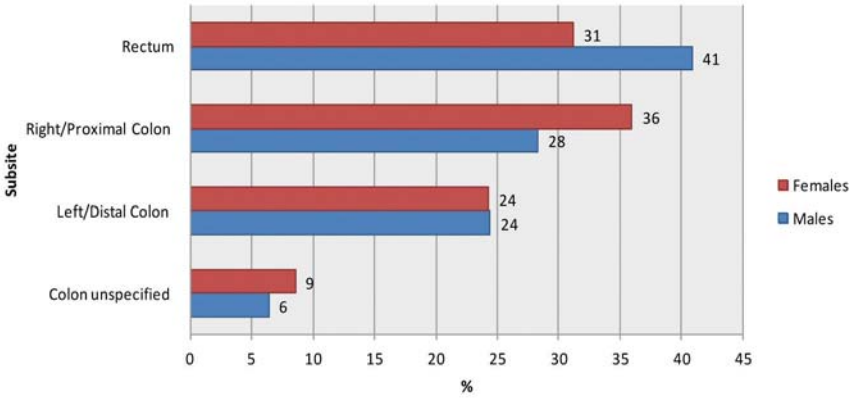
CRC is a disease that predominantly affects older generations with a median age at diagnosis of 70 during the period 2007-20092. There was a small male/female difference in the percentage of cases diagnosed under the age of 65 (34% of males and 31% of females; Table 3.2). There were more males than females diagnosed between the ages of 65-79 with 34% of overall cases among males being diagnosed in this age group compared to 28% of overall cases among females. There was a much higher percentage of females diagnosed in the age category 75 and over (33% of males compared to 41% of females). This is to be expected given females greater longevity, which results in a much higher proportion of the population aged 75 and over being female. This also explains why there were more females widowed when diagnosed than males (33.6% of females compared to 11.2% of males) and more males married when diagnosed than females (63% of males compared to 43% of females). Males were also more likely to be current or ex-smokers when diagnosed with CRC (42% of males compared to 24% of females).

Table 3.2 Colorectal cancer patients' characteristics at diagnosis by sex, 1994-2008							
		Males		Females		All	
		Cases	%	Cases	%	Cases	%
	All	17,052	56.9	12,920	43.1	29,972	100.0
Age	<65	5,723	33.6	4,044	31.3	9,767	32.6
	65-74	5,755	33.8	3,570	27.6	9,325	31.1
	75+	5,574	32.7	5,306	41.1	10,880	36.3
Marital Status	Married	10,741	63.0	5,537	42.9	16,278	54.3
	Single	3,178	18.6	1,988	15.4	5,166	17.2
	Divorced/ Separated/ Widowed	2,358	13.8	4,623	35.8	6,981	23.3
	Unmarried/ unknown	775	4.5	772	6.0	1,547	5.2
Smoking Status	Current	3,416	20.0	1,780	13.8	5,196	17.3
	Non-smoker	6,005	35.2	6,351	49.2	12,356	41.2
	Ex-Smoker	3,792	22.2	1,358	10.5	5,150	17.2
	Unknown	3,839	22.5	3,431	26.6	7,270	24.3

Tumour sub-site

There was a significant difference ($p<0.001$) in the distribution of tumour subsites between males and females (Figure 3.3). Cancer of the proximal colon was the most common sub-site diagnosed in females (36%), whereas cancer of the rectum was the most common subsite in males (41%). There was a similar distribution of cancer of the distal colon among males and females (24%).

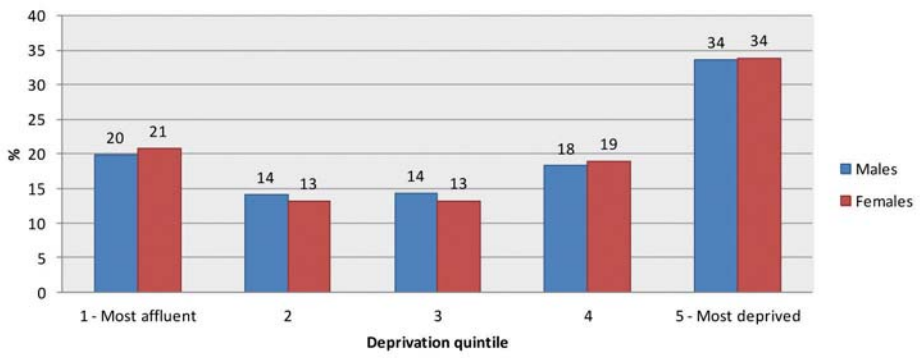
Figure 3.3: *Relative distribution of colorectal cancer sub-site by sex, 1994-2008*



Deprivation

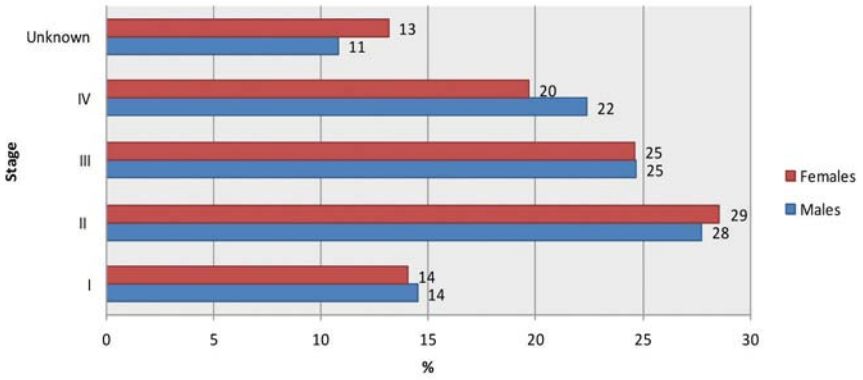
CRC is diagnosed in the most deprived quintile to a much greater extent than other quintiles. Approximately one third (34% of both males and females) of diagnosed cases during the period 1994-2008 occurred in the most deprived quintile (Figure 3.4).

Figure 3.4: *Relative distribution of deprivation index by sex, 1994-2008*



Males and females had a significantly different (p<0.000) distribution of stage at diagnosis (Figure 3.5). During the period 1994-2008, a higher proportion of males were diagnosed at stages three and four (47% compared to 44% of females). However there was a greater proportion of females with an unknown stage at diagnosis (13% compared to 11% in males).

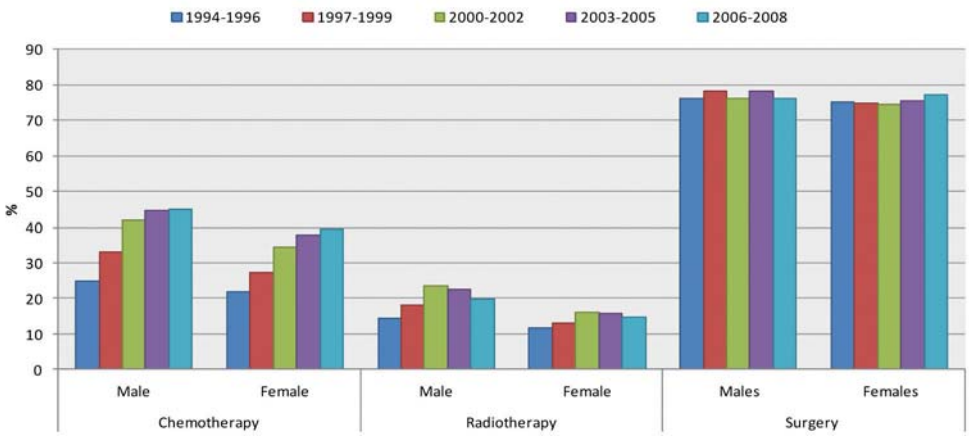
Figure 3.5: *Relative distribution of stage at diagnosis by sex, 1994-2008*



Treatment

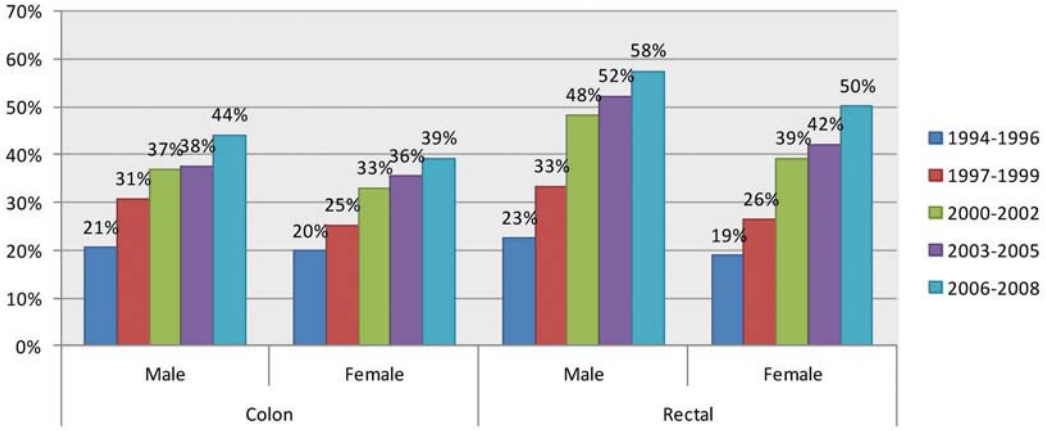
Surgery has been the mainstay of CRC treatment and this has remained relatively static in its frequency of use over the time period of this study (Figure 3.6). The use of chemotherapy has increased for both sexes over time. The percentage of males treated with chemotherapy was higher than the relative percentage of females with 25% of males and 22% of females being treated with chemotherapy in 1994-1996, increasing to 45% of males and 40% of females by 2006-2008.

Figure 3.6: *Relative distribution of treatment by sex and period of diagnosis, 1994-2008*



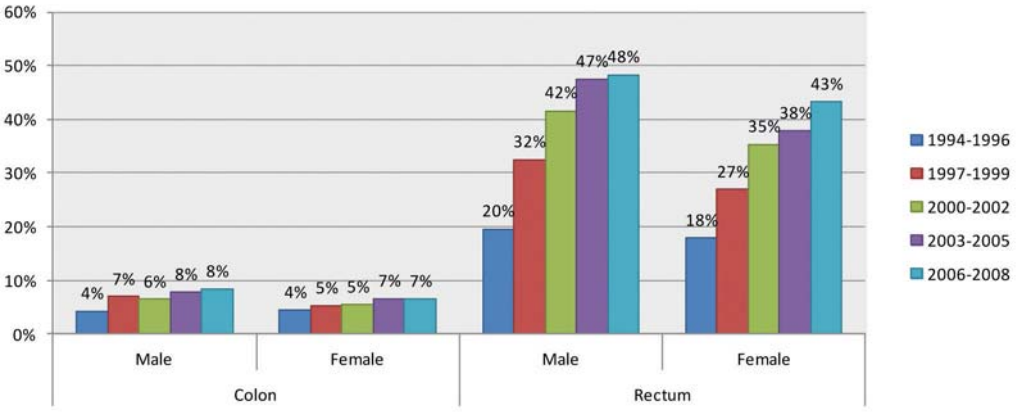
There were some differences in terms of specific treament for colon cancer and rectal cancer. While there was little difference in the proportions of male and female colon cancer patients in receipt of chemotherapy, there were higher proportions of males recieving chemotherapy (as an adjuvant therapy with radiotherapy) for cancer of the rectum over the five time periods. During the period 2006-2008, 58% of males recieved chemotherapy compared to 50% of females (Figure 3.7).

Figure 3.7: *Relative distribution of chemotherapy treatment for colon and rectal (as an adjuvant therapy with radiotherapy) cancer, by sex and period of diagnosis, 1994-2008*



While the use of radiotherapy for colon cancer patients was similar in males and females, there were higher proportions of males recieving radiotherapy for rectal cancer (Figure 3.8). During the period 2006-2008, 48% of males with rectal cancer recieved radiotherapy compared to 43% of females.

Figure 3.8: *Relative distribution of radiotherapy treatment for colon and rectal cancer, by sex and period of diagnosis, 1994-2008*



3.3 Survival

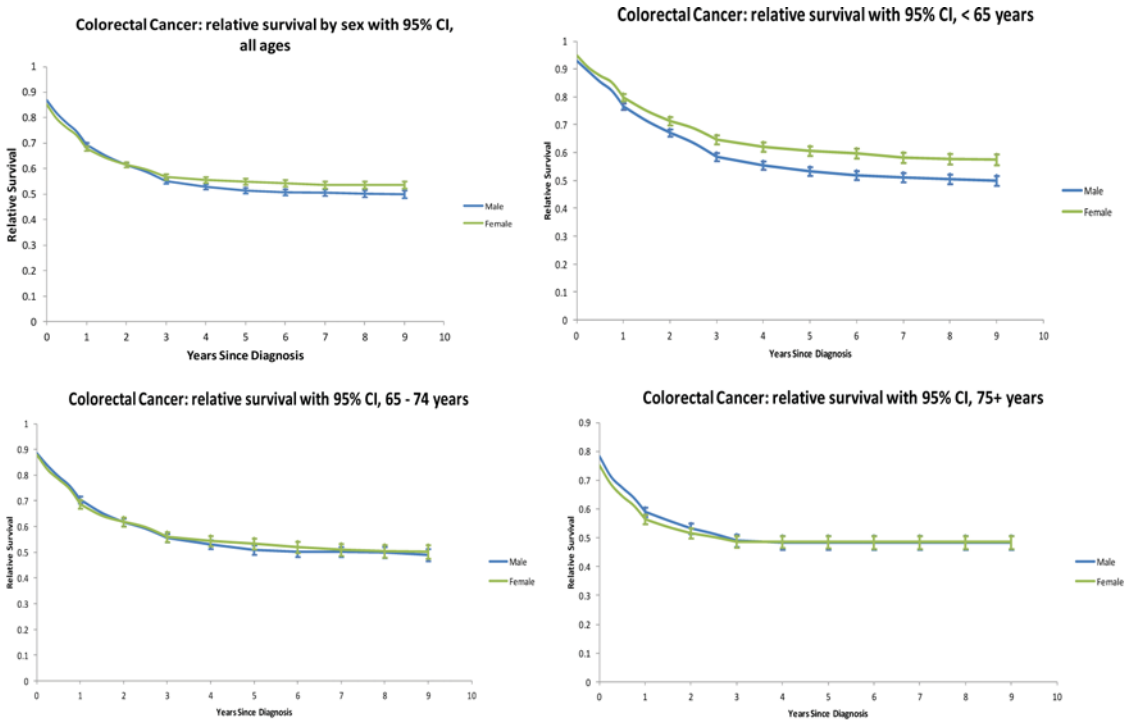
Overall age adjusted relative survival from all causes of death for CRC was similar for both sexes at 1 year post diagnosis (69% for males and 68% for females), and was slightly lower in males than in females at 5 years post diagnosis (52% and 55% respectively; Table 3.3). There was little difference in survival among males and females aged 75 and over. However, in those aged less than 65, males had significantly lower relative survival at 53% compared to females at 61%.

Table 3.3 Age standardised relative survival for colorectal cancer by sex and age, 1994-2008

Survival	Sex	All ages	95% CI	<65	95% CI	65-74	95% CI	75+	95% CI
1 year	Male	69%	(69%, 70%)	77%	(75%, 78%)	71%	(69%, 72%)	59%	(57%, 61%)
	Female	68%	(67%, 69%)	80%	(79%, 81%)	69%	(67%, 70%)	56%	(55%, 58%)
5 year	Male	52%	(50%, 53%)	53%	(52%, 55%)	51%	(49%, 53%)	48%	(46%, 51%)
	Female	55%	(54%, 56%)	61%	(59%, 62%)	53%	(51%, 55%)	49%	(46%, 51%)

As would be expected, there was a steady decrease in survival with increasing age, with males aged less than 65 having 18% higher relative survival than males aged 75 and over at 1 year post diagnosis (Figure 3.9). This difference decreased to 5% between males aged less than 65 and males aged 75 years and over at 5 years post diagnosis. The comparative difference among females aged less than 65 and females aged 75 and over was even greater at 24% 1 year post diagnosis. This difference also decreased to 12% between females aged less than 65 and females aged 75 and over at 5 years post diagnosis.

Figure 3.9: *Colorectal relative survival by age, sex and 10 year time period*



Adjusted hazard ratios for cancer specific deaths, indicating the risk of death at varying time points for males compared to females, are summarised in Table 3.4. Overall, males were found to have a significantly increased risk of death compared to females. While no difference was found in the risk of death at 1 year post diagnosis between males and females, risk of death increased thereafter and became significantly greater than the risk observed for females at 1 to 3 years (16% higher risk of death in males), 3 to 5 years (30% higher risk of death in males) and 5 years or more (27% higher risk of death in males) post diagnosis.

Table 3.4 Colorectal cancer - summary results of associations between sex and risk of death. Cancer specific, with sex fitted as time varying variable

	Sex	Crude HR	95%CI	p-value	Adjusted HR*	95%CI	p-value
	Male Female	1.00 0.96	- 0.92 - 0.99	- 0.015	1.00 0.91	- 0.87 -0.94	- 0.000
Sex fitted as time varying variable							
	Male:	1.00**	-	-	1.00**	-	-
Time: < 1 year	Female:	1.06	1.01 -1.12	0.014	1.02	0.97 -1.07	0.470
Time: 1-2.99 years		0.89	0.83 - 0.95	0.000	0.84	0.79 -0.90	0.000
Time: 3-4.99 years		0.75	0.67 -0.85	0.000	0.70	0.62 -0.78	0.000
Time: ≥5 years		0.81	0.70 -0.95	0.007	0.73	0.63 -0.85	0.000

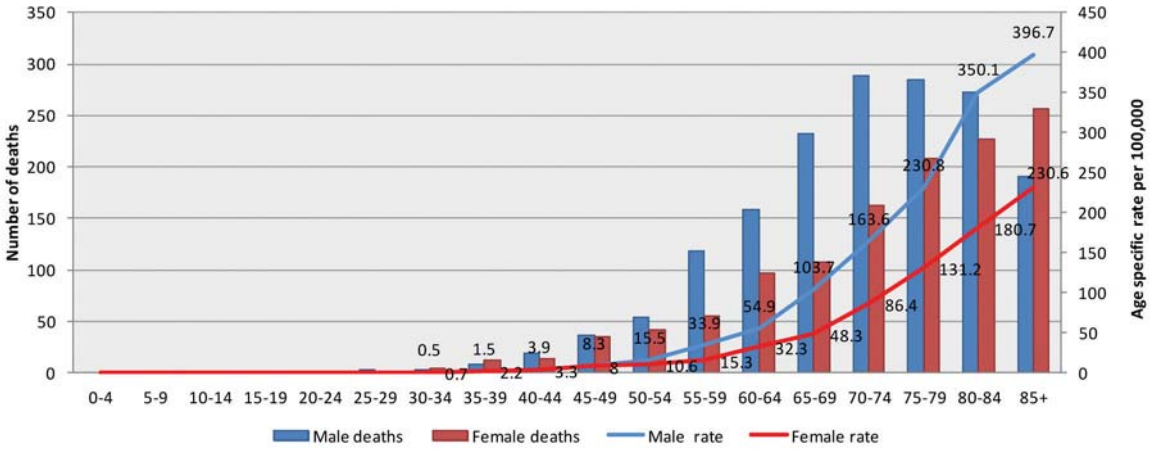
Note: The end of follow-up date is 31/12/2009
** Hazard Ratio adjusted for Age, Smoking Status, Marital Status, Deprivation Index, Stage, Histology and Subsite*
*** Baseline HR for males = 1 in each time window*

Even after adjusting for sociodemographic and clinical factors males still had a significantly increased risk of death from CRC beyond 1 year post diagnosis.

3.4 Mortality

Over the period 1994–2008, there was a total of 14,040 deaths due to CRC, 57% (7971) of which were in males. Figure 3.10 outlines the number of deaths and the age specific death rates among males and females in the Republic of Ireland during the period 2006-2008. Whilst age-specific mortality rates were higher among males in all age categories, the gap was particularly pronounced in the 60-74 year age range where the rate was approximately double in males compared to females.

Figure 3.10: *Colorectal cancer deaths and age specific rates per 100,000 population by sex, 2006-2008*



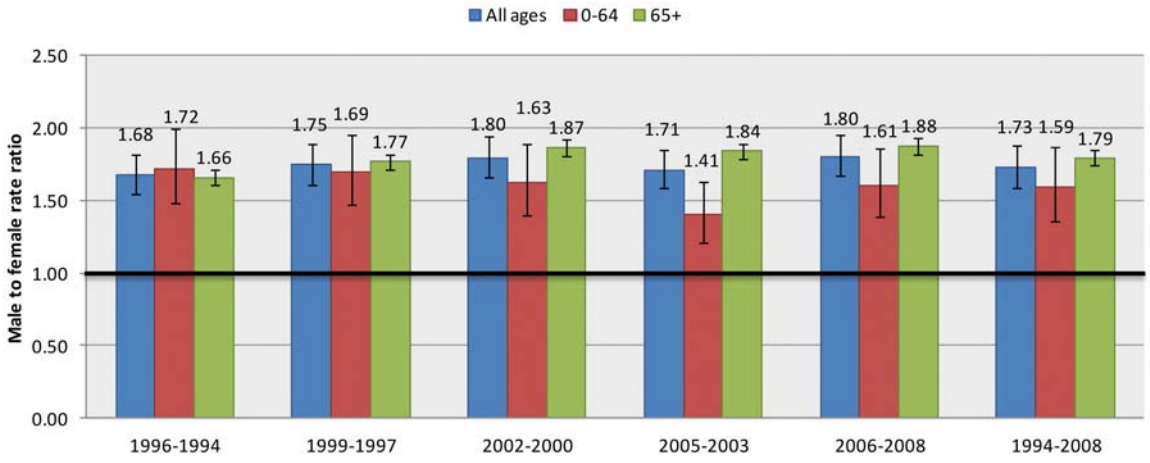
The European age standardised CRC mortality rate for males of all ages was higher than the female rate (Table 3.5). This was the case both for males aged 0-64 and those aged 65 and over. The rate for males aged 65 and over was 209.85 deaths per 100,000 population for the period 1994-1996, decreasing yearly to 192.18 deaths per 100,000 population in the years 2006-2008.

Table 3.5 European age standardised mortality rates per 100,000 population for males and females by age categories and period of death (Confidence intervals in parenthesis)

	All Ages		1-64		65+	
	Males	Females	Males	Females	Males	Females
1994-1996	33.63 (31.92, 35.24)	20.03 (18.86, 21.21)	11.85 (10.79, 12.91)	6.88 (6.07, 7.69)	209.85 (205.66, 214.05)	126.44 (123.75, 129.12)
1997-1999	33.36 (31.70, 35.02)	19.11 (17.99, 20.23)	11.27 (10.28, 12.27)	6.65 (5.89, 7.41)	212.07 (207.93, 216.21)	119.92 (117.32, 122.51)
2000-2002	31.04 (29.48, 32.60)	17.28 (16.24, 18.32)	9.24 (8.83, 10.10)	5.68 (5.00, 6.35)	207.41 (203.39, 211.43)	111.15 (108.68, 113.63)
2003-2005	29.25 (27.79, 30.71)	17.07 (16.07, 18.07)	7.87 (7.11, 8.62)	5.60 (4.96, 6.24)	202.28 (198.44, 206.12)	109.92 (107.52, 112.32)
2006-2008	28.03 (26.66, 29.40)	15.54 (14.62, 16.47)	7.74 (7.02, 8.45)	4.81 (4.25, 5.38)	192.18 (188.59, 195.78)	102.37 (100.11, 104.64)
1994-2008	30.71 (29.07, 32.34)	17.73 (16.63, 18.83)	9.39 (8.45, 10.33)	5.90 (5.15, 6.64)	203.15 (199.02, 207.29)	113.45 (110.89, 116.00)

Despite yearly decreases, the male CRC mortality rate remained significantly higher than the female rate, with males being 1.8 (95% CI 1.67-1.95) times more at risk of dying from CRC than females during 2006-2008. Figure 3.11 illustrates the rate ratio of male to female CRC mortality, with all ratios being statistically significant. Males had significantly higher rates of diagnoses of colorectal cancer (rate ratio of 1.6 male to female standardised incidence), as well as significantly higher mortality from the disease (rate ratio of 1.8 male to female standardised deaths).

Figure 3.11: *European Age Standardised mortality rate ratios of male to female colorectal cancer by period of death, 1994-2008*



4. LUNG CANCER

Summary

- European age standardised incidence rates for lung cancer were higher for males (62.18 per 100,000 in males and 31.67 in females) across all age groups and across all time periods. However, while the rate over time has dropped in males, it has increased in females.
- Males of all ages were 1.64 times more at risk of being diagnosed with lung cancer compared to females of all ages, with this excess increasing to 1.8 times in those aged 65 and over.
- Age standardised relative survival from all causes of death for lung cancer was significantly lower in males than in females with this difference being greatest in males and females aged less than 65 (22% v 31% respectively). Male survival at 5 years post diagnosis was 11% compared to 17% for females.
- For cancer specific deaths (after adjusting for sociodemographic and clinical factors), there remained a significant difference in survival with male risk of death being 16% higher than female risk.
- The European age standardised lung cancer mortality rate for males was higher than that for females across all age groups. Rates have however shown a decrease yearly in males, while increasing yearly in females, reflecting a demographic change in smoking habits in females.
- The mortality rate has decreased in males to 49.91 deaths per 100,000 during the period 2006-2008, while for females the rate has risen somewhat since 1994 and returned to a rate of 27.64 deaths per 100,000 by 2006-2008.
- While more males than females were diagnosed with lung cancer (rate ratio of 1.64 male to female standardised incidence), the risk of males dying from the disease was even higher (rate ratio of 1.81 male to female standardised deaths).

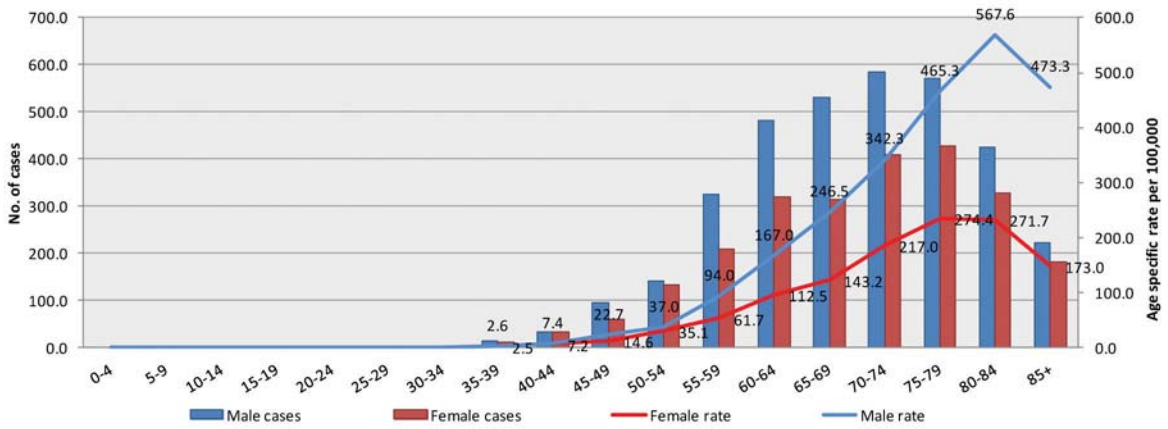
4.1 Incidence

An average of 1,956 cases of lung cancer was diagnosed each year between the years 2006-2008 in the Republic of Ireland. Overall, lung cancer incidence was higher in males than in females. For the period 1994-2008, a total of 25,752 cases of lung cancer were diagnosed, 62% of which were in males and 38% in females.

Age-specific rates

Age-specific rates for lung cancer were higher across all age groups in males compared to females. Figure 4.1 outlines the age specific rates and the incidence numbers for the years 2006 – 2008.

Figure 4.1: *Lung cancer incidence numbers and age specific incidence rates per 100,000 population by sex and 5 year age bands, 2006-2008*



European age standardised incidence rates

European age standardised incidence rates for lung cancer were higher for males across all age groups and across all time periods (Table 4.1). However while the rate has decreased over time in males, it has increased over time in females.

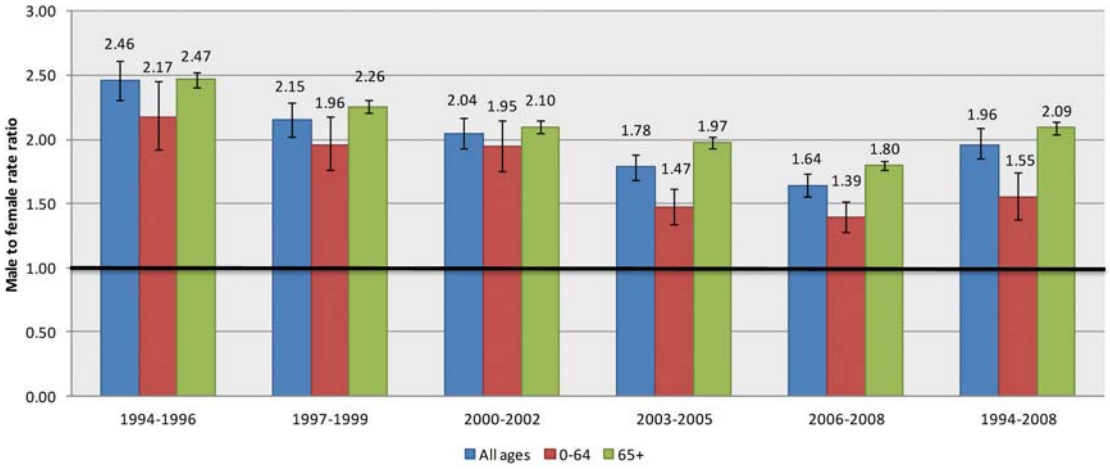
Table 4.1 European age standardised Lung cancer incidence rates by sex, period of diagnosis and age group, 1994-2008 (Confidence intervals in parenthesis)

	All Ages		0-64		65+	
Time period	Males	Females	Males	Females	Males	Females
1994-1996	66.32 (63.93, 68.71)	27.01 (25.61, 28.41)	22.41 (20.77, 24.05)	10.33 (9.34, 11.32)	399.21 (393.51, 404.91)	161.95 (158.80, 165.09)
1997-1999	63.76 (61.47, 66.04)	29.64 (28.19, 31.08)	23.01 (21.59, 24.44)	11.75 (10.73, 12.77)	393.43 (387.85, 399.01)	174.34 (171.10, 177.58)
2000-2002	62.16 (59.96, 64.36)	30.39 (28.97, 31.81)	22.44 (21.09, 23.79)	11.54 (10.57, 12.50)	383.49 (378.08, 388.91)	182.98 (179.69, 186.26)
2003-2005	60.84 (64.37, 68.75)	34.10 (32.63, 35.57)	21.39 (20.13, 22.64)	14.54 (13.50, 15.57)	380.04 (374.81, 385.26)	192.44 (189.13, 195.75)
2006-2008	58.83 (56.85, 60.81)	35.82 (34.36, 37.24)	21.33 (20.14, 22.52)	15.34 (14.32, 16.35)	362.24 (357.32, 367.15)	201.60 (198.27, 204.92)
1994-2008	62.18 (59.87, 64.49)	31.67 (30.15, 33.19)	20.04 (18.48, 21.59)	12.95 (11.84, 14.05)	383.13 (377.54, 388.73)	183.19 (179.87, 186.52)

European age standardised incidence rate ratio

Although lung cancer rates are converging - with increasing rates in females and decreasing rates in males - the male to female standardised incidence rate ratio remains significantly higher in males (Figure 4.2). During the period 1994-1996 males had 2.46 times the incidence rate of lung cancer. By 2006-2008, this had declined to 1.64 times the rate of female lung cancer (95% CI 1.56-1.73) with this excess increasing to 1.8 (95% CI 1.76-1.84) times in those aged 65 and over.

Figure 4.2: *European age standardised incidence rate ratios of male to female lung cancer by period of diagnosis, 1994-2008*



4.2 Patient characteristics

Age, marital status and smoking status at diagnosis

The relative distribution of males and females diagnosed with lung cancer across age groups did not differ greatly (Table 4.2). There was a slightly higher percentage of males (30%) diagnosed among those aged 64 or less compared to females (28%). This was also the case in those aged 65-74, with 36% of males diagnosed in this age group compared to 33% of females. There was a higher proportion of females aged 75 years and over (38%) diagnosed compared to males in this age category (33%). Generally, however, the distribution of age within each sex was similar. According to the National Cancer Registry Ireland[2], lung cancer has a median age of 71 at diagnosis making it a disease which mainly affects people in older age groups.

Males diagnosed with lung cancer were more often married (58%) compared to females (41%). There was a higher percentage of widowed females in comparison to males, which is to be expected given females longer life expectancy. As expected also, there was a higher proportion of males who were current or ex smokers at diagnosis, with males in these categories totalling 78% compared to 69% of females.

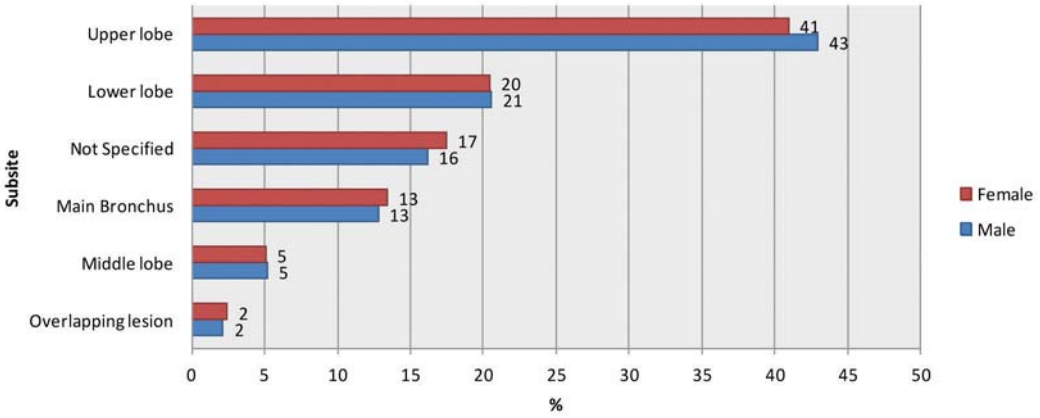
Table 4.2 Lung cancer patients' characteristics by sex, 1994-2008

		Males		Females		All	
		Cases	%	Cases	%	Cases	%
	All	15,935	61.9	9,817	38.1	25,752	100.0
Age	<64	4,855	30.5	2,781	28.3	7,636	29.7
	65-74	5,804	36.4	3,288	33.5	9,092	35.3
	75+	5,276	33.1	3,748	38.2	9,024	35.0
Marital Status	Married	9,256	58.1	3,993	40.7	13,249	51.5
	Single	2,988	18.8	1,169	11.9	4,157	16.1
	Divorced/ Separated/ Widowed	2,674	16.8	3,928	40.0	6,602	25.6
	Unmarried/ unknown	1,017	6.4	727	7.4	1,744	6.8
Smoking Status	Current	8,218	51.6	4,671	47.6	12,889	50.1
	Never smoked	1,081	6.8	1,256	12.8	2,337	9.1
	Ex-Smoker	4,158	26.1	2,103	21.4	6,261	24.3
	Unknown	2,478	15.6	1,787	18.2	4,265	16.6

Tumour location

There was a significant difference (p=0.006) in the distribution of tumour location between males and females (Figure 4.3). The largest difference was in tumours of the upper lobe with 43% of males diagnosed with upper lobe tumours compared to 41% in females.

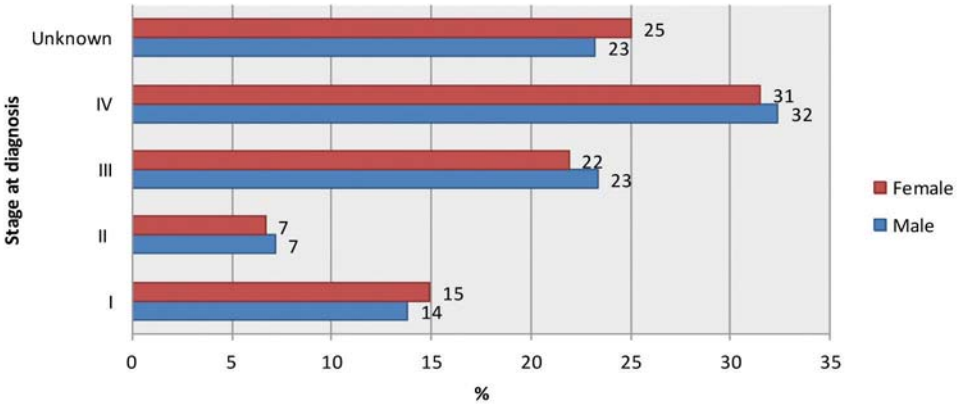
Figure 4.3: *Relative distribution of lung cancer tumour location by sex, 1994-2008*



Staging at diagnosis and deprivation

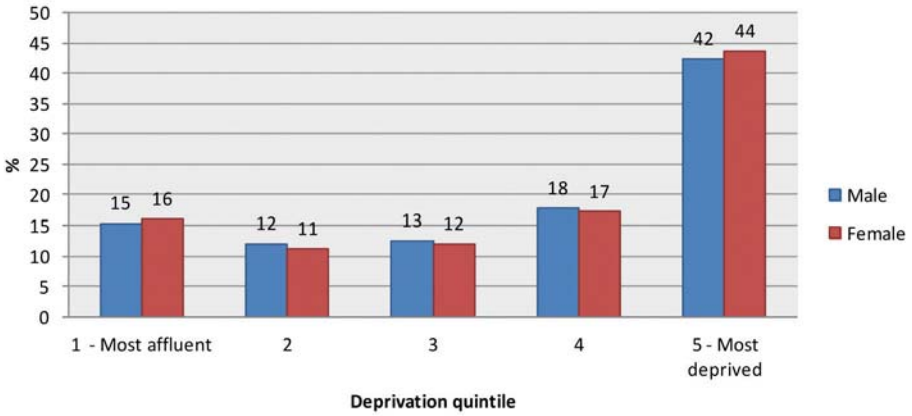
Males and females differed significantly (p<0.000) in the distribution of their stage at diagnosis (Figure 4.4). There was a higher percentage of males compared to females diagnosed at stages III and IV (56% v. 53%).

Figure 4.4: *Relative distribution of lung cancer stage at diagnosis by sex, 1994-2008*



Lung cancer was diagnosed in the most deprived quintiles to a much greater extent than other quintiles, with 60% of males and 61% of females diagnosed coming from quintiles 4 and 5 (Figure 4.5). Male and female diagnoses were relatively equally distributed across deprivation quintiles with no noticeable differences between the sexes.

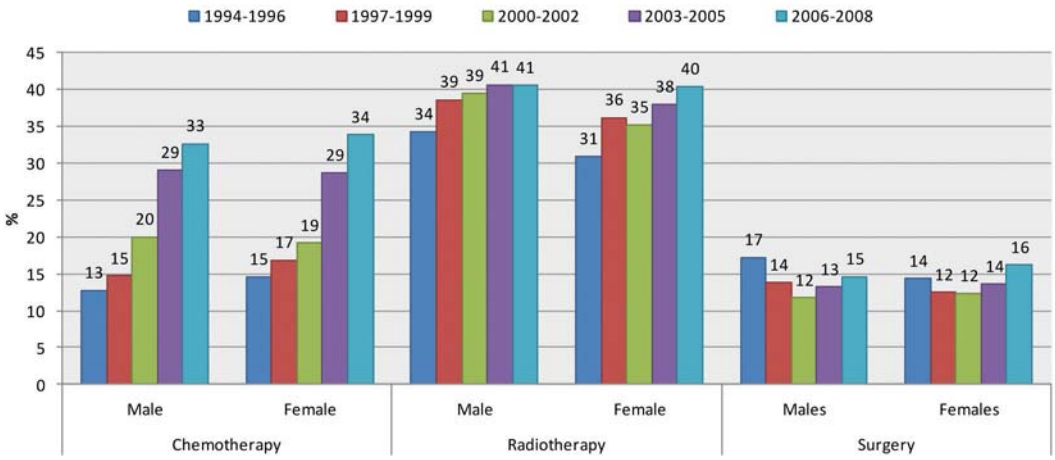
Figure 4.5: *Relative distribution of deprivation quintile by sex, 1994-2008*



Treatment

Receipt of treatment was similar in both sexes with relative distribution of treatments being almost equal particularly in the later periods from 2003-2008 (Figure 4.6). While use of chemotherapy has increased in males and females since 1994, radiotherapy remains the most frequently used therapy in both males and females.

Figure 4.6: *Relative distribution of treatment by sex and period of diagnosis, 1994-2008*



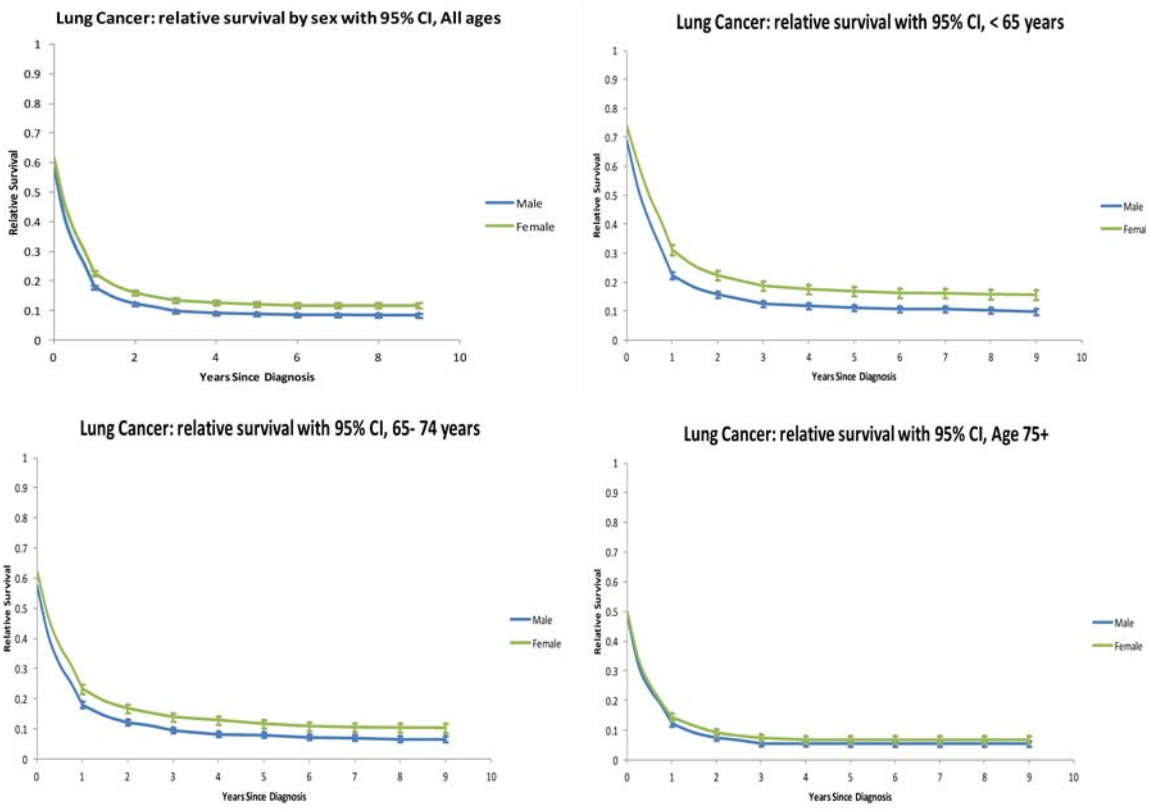
4.3 Survival

Overall age standardised relative survival from all causes of death for males with lung cancer was significantly lower than female survival (Table 4.3). The difference in survival was greatest in males and females aged less than 65, with male survival at 5 years post diagnosis being 11% compared to 17% among females (Figure 4.7). However, survival was similar for males and females aged 75 and over (Figure 4.7).

Table 4.3 Age standardised relative survival for lung cancer by age and sex, 1994-2008

Survival	Sex	All ages	95% CI	<65	95% CI	65-74	95% CI	75+	95% CI
1 year	Male	17%	(17%, 18%)	22%	(21%, 24%)	18%	(17%, 19%)	12%	(11%, 13%)
	Female	23%	(22%, 23%)	31%	(29%, 33%)	23%	(22%, 25%)	14%	(13%, 16%)
5 year	Male	9%	(8%, 9%)	11%	(10%, 12%)	8%	(7%, 9%)	5%	(4%, 6%)
	Female	12%	(11%, 13%)	17%	(15%, 18%)	12%	(10%, 13%)	7%	(6%, 8%)

Figure 4.7: *Lung Cancer relative survival by age, sex and 10 year time period*



The effect of sex did not vary on cancer specific survival over time (Table 4.4).

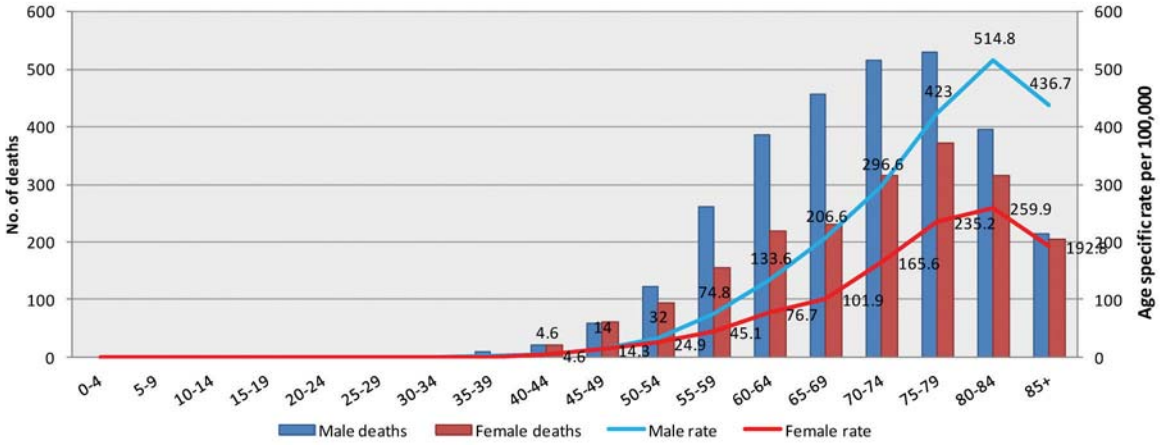
Table 4.4 Lung cancer – summary of results of associations between sex and cancer specific risk of death, with sex fitted for entire period.

Sex	Crude HR	95% CI	p - value	Adjusted HR*	95%CI	p-value
Male	1.00	-	-	1.00	-	-
Female	0.87	0.84 - 0.89	0.000	0.84	0.82 - 0.87	0.000

4.4 Mortality

Over the period 1994 to 2008 there was a total of 23,211 deaths as a result of lung cancer, 63% of which were in males. Figure 4.8 illustrates the number of deaths and the age specific death rates for males and females during the period 2006-2008. As can be seen, the gap in age specific death rates between males and females was particularly pronounced in those aged 65 and over, with rates for males in some age categories (65-69, 80-84 and those age over 85) being double that of females.

Figure 4.8: *Lung cancer deaths and age specific rates per 100,000 population by sex, 2006-2008*



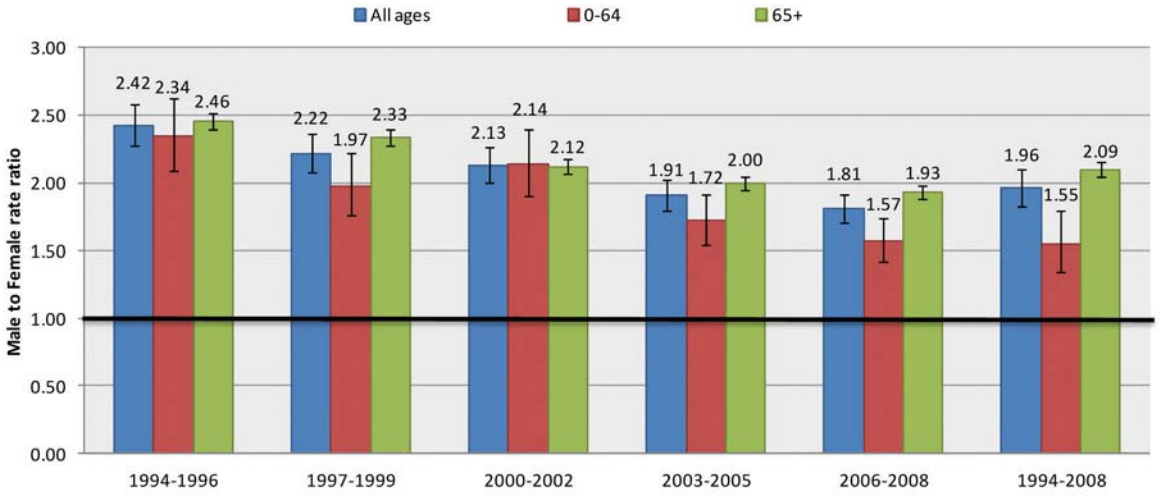
The European age standardised lung cancer mortality rate was higher for males than for females across all age groups (Table 4.5). Rates have decreased yearly in males, while increasing yearly in females, reflecting a demographic change in smoking habits in females. However, despite these changes, rates remain higher in males. European age standardised mortality rates in males aged 65 and over were 403.29 deaths per 100,000 during the period 1994-1996, compared to 164.08 deaths per 100,000 in females. By 2006-2008, this rate had decreased in males to 318.14 deaths per 100,000, while remaining similar for females at 164.79 deaths per 100,000 (having risen somewhat in the intervening years).

Table 4.5 European age standardised lung cancer mortality rates per 100,000 population for males and females by age categories and period of diagnosis (Confidence intervals in parenthesis)

	All Ages		0-64		65+	
Time period	Males	Females	Males	Females	Males	Females
1994-1996	65.15 (62.79, 67.52)	26.92 (25.53, 28.31)	23.36 (21.87, 24.86)	9.97 (8.99, 10.94)	403.29 (397.57, 409.01)	164.08 (160.93, 167.23)
1997-1999	57.78 (55.60, 59.95)	26.05 (24.71, 27.38)	18.58 (17.30, 19.86)	9.42 (8.51, 10.33)	374.92 (369.47, 380.37)	160.57 (157.49, 163.66)
2000-2002	56.19 (54.09, 58.28)	26.43 (25.11, 27.74)	18.76 (17.53, 19.99)	8.78 (7.93, 9.62)	359.01 (353.77, 364.25)	169.21 (166.06, 172.36)
2003-2005	53.50 (51.53, 55.47)	28.02 (26.71, 29.34)	17.35 (16.22, 18.48)	10.09 (9.23, 10.95)	345.93 (340.94, 350.92)	173.12 (170.00, 176.24)
2006-2008	49.91 (48.09, 51.74)	27.64 (26.37, 28.91)	16.76 (15.70, 17.82)	10.69 (9.84, 11.54)	318.14 (313.53,322.74)	164.79 (161.82, 167.76)
1994-2008	55.99 (53.80, 58.18)	27.17 (25.78, 28.56)	18.75 (17.41, 20.09)	9.91 (8.94, 10.88)	357.30 (351.90, 362.70)	166.83 (163.67, 169.98)

Figure 4.9 illustrates the rate ratio of male to female lung cancer deaths, with deaths in all male age categories being significantly higher than those for females. Also noticeable, however, was the decrease in the ratio of male to female deaths from 1994 to 2008. However, even in 2006-2008, despite male decreases in incidence and mortality over time (rate ratio of 1.64 male to female standardised incidence), males had significantly higher mortality from the disease (rate ratio of 1.81 [95% CI 1.70-1.92] male to female standardised deaths).

Figure 4.9: *European Age Standardised mortality rate ratios of male to female lung cancer by period of death, 1994-2008*



4 BLADDER CANCER

Summary

- While rates of bladder cancer have decreased yearly in both sexes, European age standardised incidence rates remained higher in males compared to females (16.68 per 100,000 in males and 5.60 in females) during the period 2006-2008.
- Across all ages, males were 3 times more at risk of being diagnosed with bladder cancer compared to females, while this increased to 3.4 times in males aged over 65.
- Age adjusted relative survival from all causes of death for bladder cancer was significantly higher among males up to two years post diagnosis. Thereafter, while remaining slightly higher, survival in males was similar to that of females.
- Male survival for those aged 75 and over was significantly better than for females of the same age.
- For cancer specific deaths (after adjusting for sociodemographic and clinical factors), males had significantly lower risk of death from bladder cancer than females. However, over time, this reverses, particularly at 3-5 years post diagnosis where male risk is 48% higher compared to females.
- The European age standardised mortality rates for bladder cancer were higher among males of all ages and across all periods of diagnosis between 1994 and 2008. Although the rate decreased in males of all ages over this period from 7.33 deaths per 100,000 during 1994-1996 to 6.2 deaths per 100,000 during 2006-2008, the female rate remained relatively static at 2.44 deaths per 100,000 during 1994-1996 and 2.29 deaths per 100,000 during 2006-2008.
- The European age standardised mortality rate ratio was significantly higher in males of all ages. Like that of incidence, males were almost three times more at risk of being diagnosed with bladder cancer and of dying from bladder cancer than females.

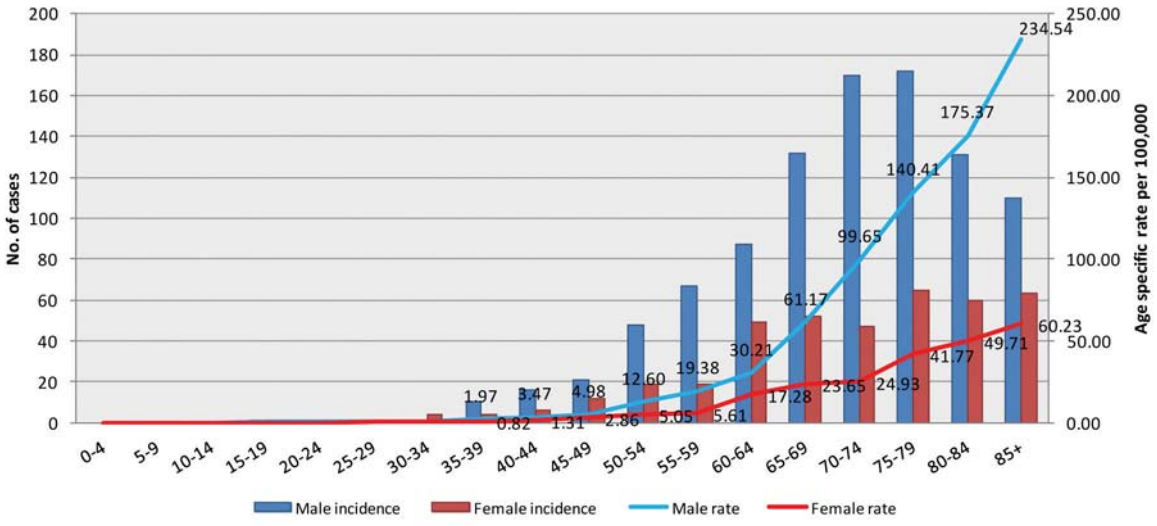
5.1 Incidence

There was an annual average of 456 cases of bladder cancer each year between 2006 and 2008. Overall, the incidence of bladder cancer was much higher in males than in females. Between the years 1994-2008 a total of 6992 bladder cancer cases were diagnosed, 71% of which were in males.

Age specific rate

Between 2006 and 2008, male age-specific bladder cancer rates were double and, in some cases triple that of female age-specific rates, particularly in older age groups (70+ years, Figure 5.1).

Figure 5.1: *Bladder cancer incidence and age specific incidence rates per 100,000 of population by sex and 5 year age bands, 2006-2008*



European age standardised incidence rate

While rates of bladder have decreased yearly in both sexes, European age standardised incidence rates were higher in males compared to females (Table 5.1). During the period 1994-1996 there were 22.87 bladder cancers diagnosed per 100,000 in males and 7.28 in females. This decreased to 16.68 bladder cancers diagnosed per 100,000 in males and 5.60 in females during the period 2006 – 2008.

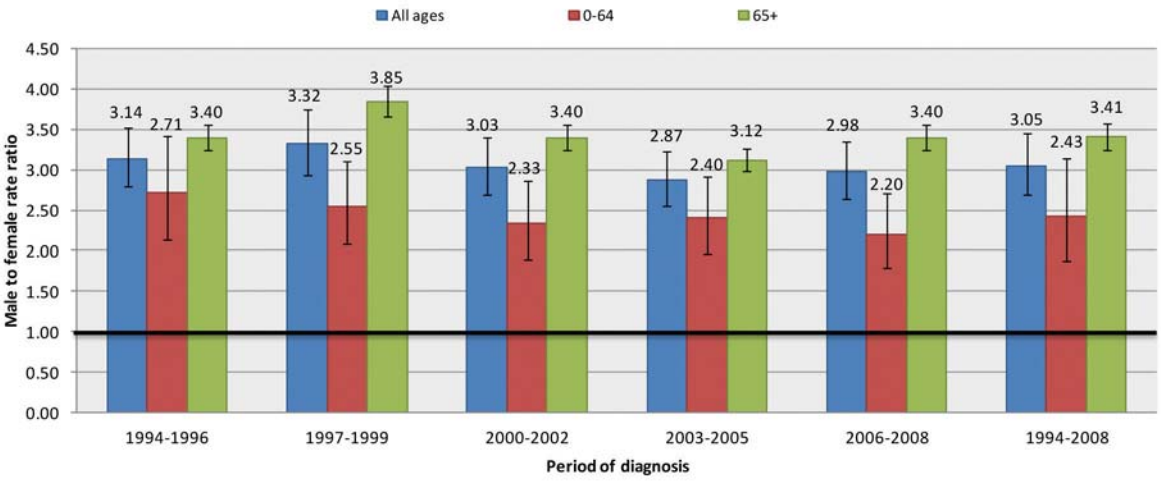
Table 5.1 European age standardised bladder cancer incidence rates by sex, period of diagnosis and age group, 1994-2008 (Confidence intervals in parenthesis)

	All Ages		0-64		65+	
Time period	Males	Females	Males	Females	Males	Females
1994-1996	22.87 (21.46, 24.29)	7.28 (6.56, 8.01)	7.38 (6.44, 8.31)	2.72 (2.15, 3.29)	140.88 (137.43, 144.33)	41.49 (39.91, 43.06)
1997-1999	20.61 (19.30, 21.93)	6.21 (5.54, 6.87)	7.20 (6.41, 7.99)	2.82 (2.33, 3.31)	129.16 (125.92, 132.41)	33.59 (32.18, 35.00)
2000-2002	19.69 (18.45, 20.93)	6.50 (5.85, 7.15)	5.94 (5.25, 6.63)	2.55 (2.09, 3.00)	130.96 (127.77, 134.15)	38.50 (37.01, 39.98)
2003-2005	18.44 (17.28, 19.60)	6.42 (5.79, 7.05)	5.98 (5.32, 6.63)	2.49 (2.06, 2.92)	119.28 (116.32, 122.24)	38.22 (36.76, 39.69)
2006-2008	16.68 (15.62, 17.74)	5.60 (5.03, 6.17)	4.87 (4.31, 5.44)	2.21 (1.83, 2.60)	112.21 (109.46, 114.97)	32.99 (31.67, 34.31)
1994-2008	19.45 (18.15, 20.76)	6.38 (5.70, 7.05)	5.61 (4.80, 6.43)	2.31 (1.79, 2.84)	125.80 (122.53, 129.07)	36.94 (35.45, 38.43)

European age standardised incidence rate ratio

Males in all age categories were significantly more at risk of being diagnosed with bladder cancer than females across all time periods. In 2006-2008, across all ages, males were 3 times (95% CI 2.65 - 3.35) more at risk of being diagnosed with bladder cancer compared to females, while this increased to 3.4 times in males aged 65 and over (Figure 5.2).

Figure 5.2: *European age standardised incidence rate ratios of male to female bladder cancer by period of diagnosis, 1994-2008*



5.2 Patient characteristics

Age, marital status and smoking status at diagnosis

Bladder cancer mainly affects older people with an average age at diagnosis of 72 during the period 2007-2009[2]. Just over a quarter (28%) of total bladder cancer cases in males and females occurred in those aged less than 65 (Table 5.2). There was a higher proportion of males than females diagnosed aged 65-74 (32% and 29% respectively). As with cancers of older generations, there was a higher percentage of females than males aged 75 and over diagnosed (42% and 40% respectively).

More males were married at diagnosis (63% of males compared to 39% of females), while more females were widowed at diagnosis (36% of females compared to 13% of males). The higher percentage of females aged over 80 years, and widowed, was to be expected given females greater longevity. In addition, there were more males who were smokers or ex smokers at diagnosis compared to females (52% and 36% respectively).

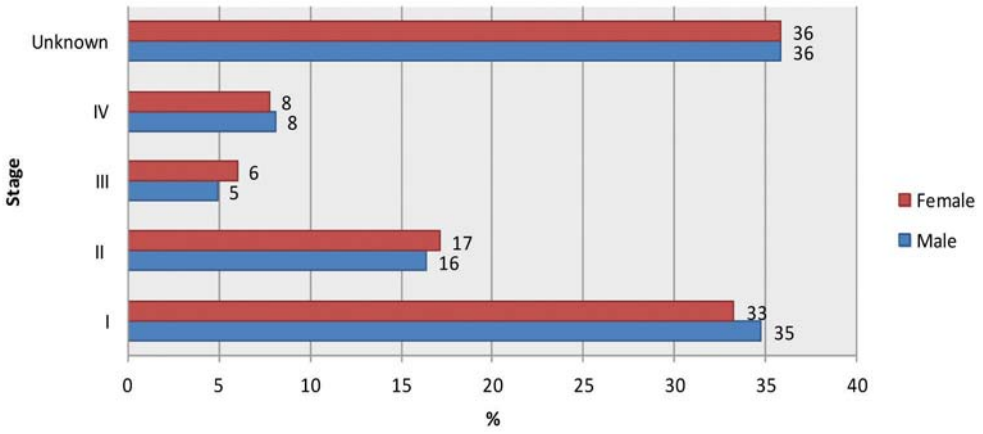
Table 5.2 Bladder cancer patients' characteristics by sex, 1994-2008

		Males		Females		All	
		Cases	%	Cases	%	Cases	%
	All	4,969	71.07	2,023	28.93	6,992	100.0
Age	<64	1,383	27.8	567	28.0	1,950	27.9
	65-74	1,610	32.4	598	29.6	2,208	31.6
	75+	1,976	39.8	858	42.4	2,834	40.5
Marital Status	Married	3,121	62.8	798	39.5	3,919	56.1
	Single	845	17.0	343	17.0	1,188	17.0
	Divorced/ Separated/ Widowed	785	15.8	776	38.4	1,561	22.3
	Unmarried/ unknown	218	4.4	106	5.2	324	4.6
Smoking Status	Current	1,567	31.5	505	25.0	2,072	29.6
	Never smoked	1,259	25.3	761	37.6	2,020	28.9
	Ex-Smoker	1,023	20.6	232	11.5	1,255	18.0
	Unknown	1,120	22.5	525	26.0	1,645	23.5

Stage and tumour location

There were very little differences between males and females with regard to tumour location. There was also very little difference in the stage at which males and females presented with their disease. Thirteen percent of males and 14% of females presented at stages III and IV, while 36% of both males and females were diagnosed with unknown stage (Figure 5.3).

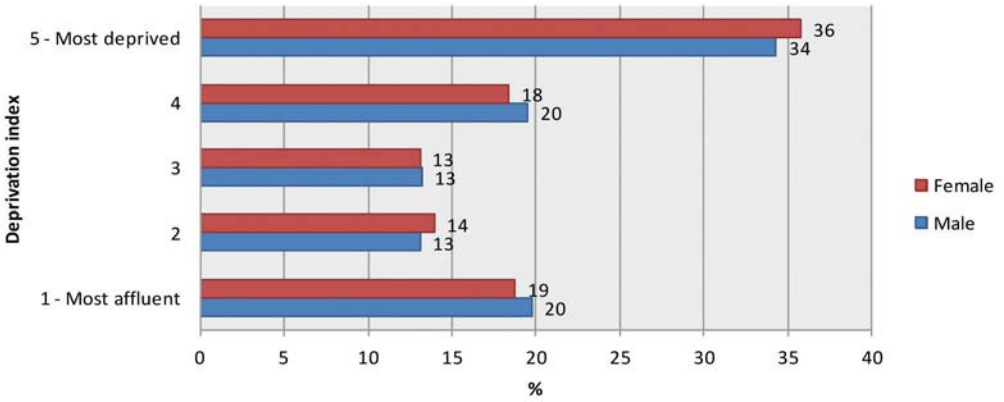
Figure 5.3: *Relative distribution of bladder cancer stage at diagnosis by sex 1994-2008*



Deprivation

The risk of being diagnosed with bladder cancer was much higher for those living in deprived areas. Approximately one third (34% of males and 36% of females) of cases diagnosed during the period 1994-2008 were in the most deprived quintile (Figure 5.4).

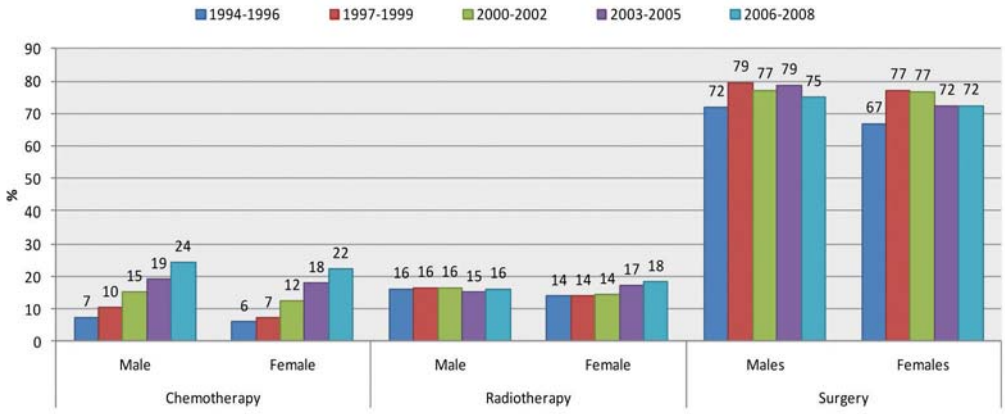
Figure 5.4: *Relative distribution of bladder cancer deprivation quintiles by sex, 1994-2008*



Treatment

Between 1994 and 2008, the most striking change in the treatment for bladder cancer was in the use of chemotherapy. During the period of diagnosis 1994-1996, just 7% of males and 6% of females received chemotherapy, with this increasing to 24% in males and 22% in females by 2006-2008 (Figure 5.5). A small rise in the use of radiotherapy was seen in females during this period, increasing from 14% during 1994-1996 to 18% in 2006-2008. The use of surgery also increased slightly from 72% in males and 67% in females in 1994-1996 to 75% in males and 72% in females in 2006-2008.

Figure 5.5: *Relative distribution of treatment type recieved by sex and period of diagnosis, 1994-2008*



5.3 Survival

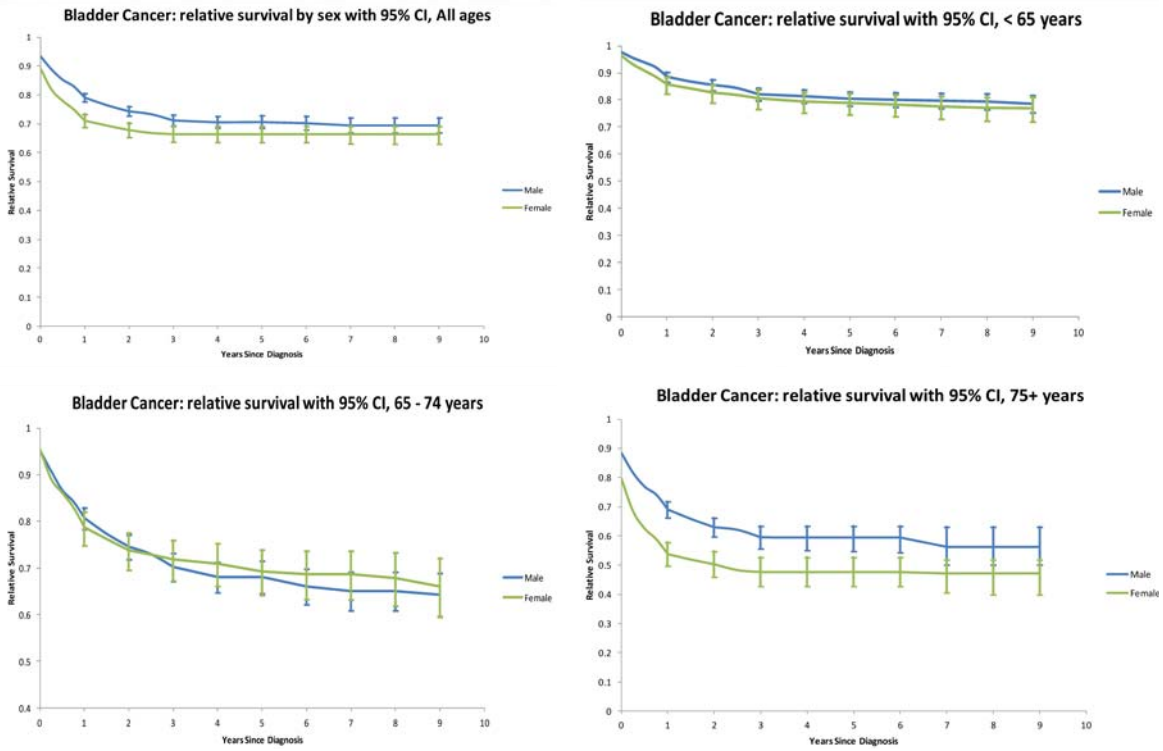
Overall, age standardised relative survival from all causes of death for bladder cancer was significantly higher in males up to two years post diagnosis (Table 5.3). Thereafter, while remaining slightly higher, survival in males was similar to that of females.

The difference in survival between males and females was significant up to 2 years post diagnosis in all ages. However there was little difference in those aged less than 65 years and those aged 65 to 74 years. Male survival however, for those aged 75 and over, was significantly better than for females of the same age (Figure 5.6).

Table 5.3 Age standardised relative survival for colorectal cancer and age, at 1 year and 5 years post diagnosis, 1994-2008

Survival	Sex	All ages	95% CI	<65	95% CI	65-74	95% CI	75+	95% CI
1 year	Male	79%	(78%, 81%)	89%	(87%, 90%)	81%	(81%, 78%)	69%	(66%, 72%)
	Female	71%	(69%, 73%)	86%	(82%, 88%)	79%	(75%, 82%)	54%	(50%, 58%)
5 year	Male	71%	(69%, 73%)	80%	(78%, 83%)	68%	(68%, 65%)	59%	(55%, 63%)
	Female	66%	(64%, 69%)	79%	(75%, 82%)	69%	(64%, 74%)	48%	(43%, 53%)

Figure 5.6: *Bladder cancer relative survival by age, sex and 10 year time period*



Cox proportional hazard ratios were performed in order to examine associations between survival and risk of cancer specific death. Males had significantly lower risk of death than females. However, over time, this reversed, particularly at 3-5 years post diagnosis where male risk was 48% higher than female risk, even after adjusting for factors such as age, smoking status at diagnosis, marital status, deprivation, stage at diagnosis, histology and cancer subsite.

Table 5.4 Bladder cancer – summary of associations between sex and risk of death. Cancer specific, with sex fitted as time varying variable

	Sex	Crude HR	95%CI	p-value	Adjusted HR*	95%CI	p-value
	Male Female	1.00** 1.26	- 1.14 -1.38	- 0.000	1.00 1.14	- 1.03 -1.26	- 0.009
Sex fitted as time varying variable							
	Male:	1.00	-	-	1.00	-	-
Time: < 1 year	Female:	1.62	1.43 -1.83	0.000	1.45	1.28 -1.65	0.000
Time: 1-2.99 years		1.02	0.86 -1.23	0.789	0.95	0.79 -1.14	0.608
Time: 3-4.99 years		0.56	0.38 -0.83	0.004	0.52	0.35 -0.77	0.001
Time: ≥5 years		0.83	0.58 -1.17	0.286	0.77	0.54 -1.10	0.147

Note: The end of follow-up date is 31/12/2009

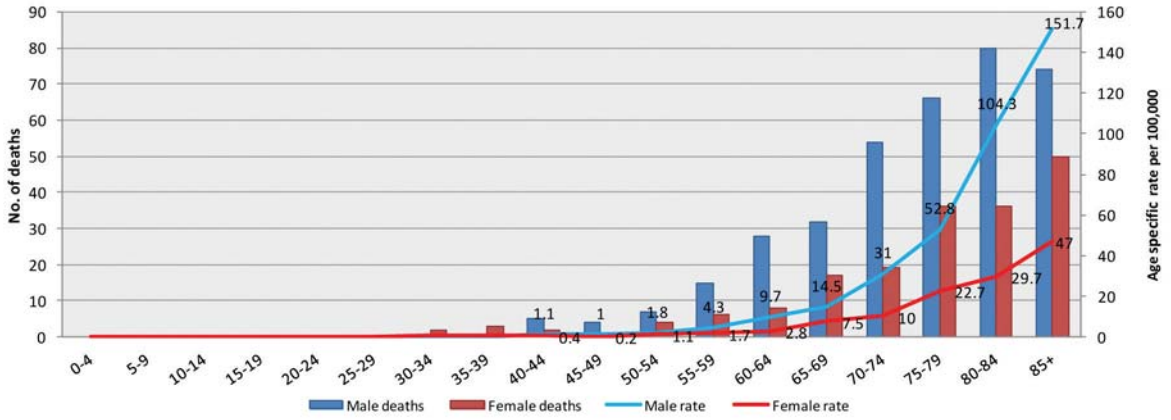
** HR adjusted for Age, Smoking Status, Marital Status, Deprivation Index, Stage, Histology and Subsite*

*** Baseline HR for males = 1 in each time window*

5.4 Mortality

Over the period 1994–2008, there was a total of 2,502 deaths due to bladder cancer, 67% of which were in males. Figure 5.7 outlines the number of deaths and the age specific death rates among males and females in the Republic of Ireland during the period 2006-2008. Whilst age-specific mortality rates were higher among males in all age categories, the gap was particularly pronounced amongst those aged 55 and over. For example, the rate was 2.5 times greater in males aged 55-59, increasing to 3 times in males aged 80 and over.

Figure 5.7: *Bladder cancer deaths and age specific rates per 100,000 population by sex, 2006-2008*



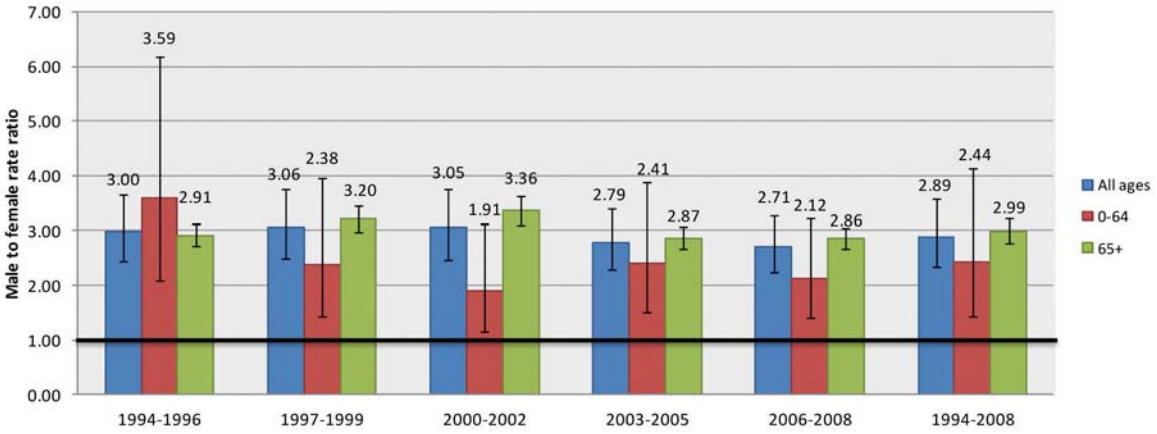
The European age standardised mortality rates for bladder cancer were higher for males of all ages and across all periods of diagnosis (Table 5.5). Although the rate decreased in males of all ages from 7.33 deaths per 100,000 during 1994-1996 to 6.2 deaths per 100,000 during 2006-2008, the female rate remained relatively static at 2.44 deaths per 100,000 during 1994-1996 and 2.29 deaths per 100,000 during 2006-2008. Nevertheless, the rate of standardised male deaths as a result of bladder cancer remained three times higher than the rate of standardised female deaths.

Table 5.5 European age standardised mortality rates per 100,000 population for males and females by age categories and period of death (Confidence intervals in parenthesis)

	All Ages		0-64		65+	
Time period	Males	Females	Males	Females	Males	Females
1994-1996	7.33 (6.53, 8.13)	2.44 (2.06, 2.83)	1.27 (0.92, 1.61)	0.35 (0.17, 0.53)	56.35 (54.15, 58.56)	19.36 (18.32, 20.41)
1997-1999	6.98 (6.21, 7.75)	2.28 (1.91, 2.66)	1.06 (0.75, 1.37)	0.45 (0.25, 0.64)	54.91 (52.76, 57.06)	17.14 (16.15, 18.12)
2000-2002	6.28 (5.57, 6.99)	2.06 (1.71, 2.40)	0.92 (0.65, 1.20)	0.48 (0.29, 0.68)	49.65 (47.65, 51.64)	14.79 (13.91, 15.67)
2003-2005	6.08 (5.40, 6.75)	2.18 (1.83, 2.53)	1.04 (0.76, 1.31)	0.43 (0.25, 0.61)	46.83 (44.95, 48.70)	16.33 (15.41, 17.24)
2006-2008	6.20 (5.55, 6.85)	2.29 (1.94, 2.64)	1.11 (0.84, 1.39)	0.52 (0.34, 0.71)	47.37 (45.57, 49.17)	16.57 (15.68, 17.47)
1994-2008	6.48 (5.72, 7.24)	2.24 (1.86, 2.61)	1.09 (0.77, 1.41)	0.44 (0.24, 0.65)	50.08 (47.98, 52.18)	16.75 (15.77, 17.72)

The European age standardised mortality rate ratio was significantly higher in males of all ages (Figure 5.8). Like that of incidence, males were almost 3 times (95% CI 2.25-3.58) more at risk of dying from bladder cancer than females during the period 2006-2008.

Figure 5.8: *European Age Standardised mortality rate ratios of male to female bladder cancer by period of death, 1994-2008*



6 MELANOMA OF THE SKIN

Summary

- European age standardised incidence rates in both males and females have increased over the period 1994-2008. In all age categories, the rates were higher in females than in males.
- Male and female melanoma skin cancer rates appear to be converging. Incidence rates in females stood at 13.75 melanoma skin cancers per year during the period 1994-1996 compared to the male rate of 8.41 per 100,000 during the same period. This figure increased to 17.32 and 15.95 melanomas skin cancers per 100,000 in females and males respectively during the period 2006-2008.
- Age adjusted relative survival from all causes of death was significantly lower in males than in females across all age groups examined and across all periods after diagnosis. Male relative survival was 90% at 1 year post diagnosis compared to 96% for females. For those aged 75 and over, relative survival for males was 88% at 1 year post diagnosis compared to 94% for females. This figure dropped to 76% relative survival in males of all ages alive at 5 years post diagnosis in comparison to 89% in females of all ages.
- For cancer specific deaths (after adjusting for sociodemographic and clinical factors), males had a 34% higher risk of death than females. This was evident across all time varying variables except after 5 years.
- Although overall European age standardised mortality rates for melanoma skin cancer were very low, rates were higher in males than in females for the period 1994-2008, with the difference becoming more pronounced from 2003 onwards. While mortality as a result of melanoma skin cancer was relatively low, it has increased in both sexes over time.
- Males of all ages were 1.6 times more at risk of dying from melanoma skin cancer compared to females during the period 2006-2008.
- While females were more at risk of being diagnosed with melanoma skin cancer, males were more at risk of dying from the disease.

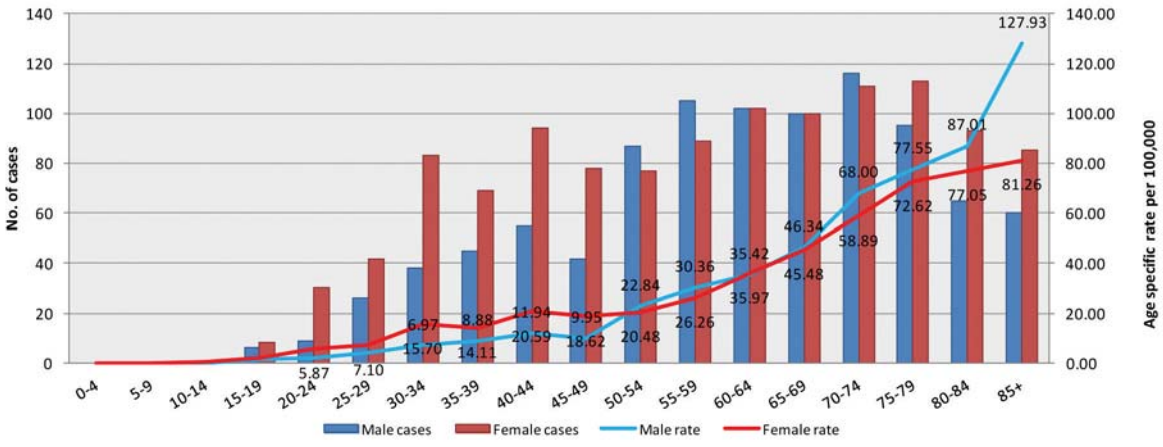
6.1 Incidence

Melanoma skin cancer affected an average of 709 people per year between 2006 and 2008. During the period considered in this report, 1994 to 2008, there were a total of 7,709 cases of melanoma skin cancer, 40% of which were in males.

Age-specific rates

The number of cases of melanoma skin cancer was higher in females than in males up to the age category 45-49 (Figure 6.1). However, the number of cases was similar or higher in males than in females from age 50 to 74. Female cases then exceed male cases from the age of 75 onwards. However, when considering age specific rates per 100,000 of the population, the male rate exceeded the female rate in older age groups from 70 years of age onwards, widening considerably in those aged 85 and over.

Figure 6.1: *Melanoma skin cancer incidence and age specific incidence rates per 100,000 population by sex and 5 year age bands, 2006-2008*



European age standardised incidence rates

European age standardised melanoma skin cancer incidence rates in both males and females have increased over the period 1994-2008 (Table 6.1). In all age categories, the rates were higher in females than in males, with the gap narrowing between males and females in later years. Rates in females stood at 13.75 melanoma skin cancers per 100,000 per year between1994-1996 compared to male melanoma skin cancers of 8.41 per 100,000 per year in the same period. This figure increased to 17.32 and 15.95 melanomas skin cancers per 100,000 in females and males respectively during the period 2006-2008. In this regard it would seem that male and female rates are converging.

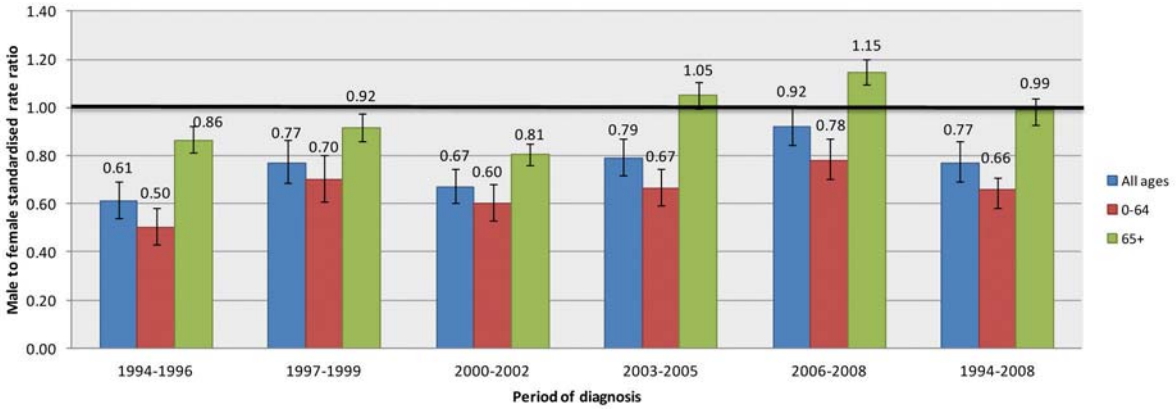
Table 6.1 European age standardised Melanoma skin cancer incidence rates by sex, period of diagnosis and age group, 1994-2008 (Confidence intervals in parenthesis)

	All Ages		0-64		65+	
Time period	Males	Females	Males	Females	Males	Females
1994-1996	8.41 (7.56, 9.25)	13.75 (12.71, 14.79)	5.36 (4.86, 6.05)	10.72 (9.76, 11.69)	33.03 (31.36, 34.69)	38.21 (36.69, 39.73)
1997-1999	10.19 (9.27, 11.10)	13.21 (12.23, 14.20)	6.88 (6.14, 7.63)	9.87 (8.98, 10.75)	36.89 (35.14, 38.64)	40.30 (38.75, 41.85)
2000-2002	10.60 (9.71, 11.49)	15.86 (14.81, 16.91)	7.21 (6.48, 7.94)	11.98 (11.04, 12.92)	38.06 (36.36, 39.76)	47.26 (45.59, 48.92)
2003-2005	13.09 (12.13, 14.06)	16.57 (15.54, 17.60)	8.40 (7.64, 9.16)	12.61 (11.69, 13.54)	51.07 (49.12, 53.02)	48.59 (46.93, 50.26)
2006-2008	15.95 (14.92, 16.97)	17.32 (16.31, 18.33)	9.39 (8.62, 10.16)	12.02 (11.16, 12.88)	69.04 (66.87, 71.20)	60.19 (58.38, 62.00)
1994-2008	11.89 (10.88, 12.91)	15.45 (14.36, 16.54)	7.61 (6.79, 8.42)	11.53 (10.53, 12.52)	46. 58 (44.58, 48.57)	47.17 (45.49, 48.86)

European age standardised incidence rate ratios

While female melanoma skin cancer incidence rates were higher for all ages and those aged less than 65, there was a change in rates in those aged over 65 during the period 1994 to 2008. During the periods of diagnosis 2003-2005 and 2006-2008, the rates in males exceeded those of females. The standardised rate ratio of male to female melanoma skin cancer incidence was significantly higher in females during 1994-2008 (0.77 [95% CI 0.69-0.86]). However increasing rates in males, particularly in males over 65 (1.15 [95% CI 1.10-1.20]), indicate a trend towards convergence or excess male incidence (Figure 6.2).

Figure 6.2: *European age standardised incidence rate ratios of male to female melanoma skin cancer by period of diagnosis, 1994-2008*



6.2 Patient characteristics

Age, marital status and smoking status at diagnosis

In contrast to the other cancers discussed in this report, there was a higher percentage of females diagnosed compared to males, as well as a lower median age at diagnosis for females of 60[2]. While a higher percentage of females were diagnosed with melanoma skin cancer under the age of 65 (60% in females compared to 58% in males), there was a greater proportion of males diagnosed in the 65-74 age category compared to females (21% v 17.5%; Table 6.2). Figures for those

aged over 75 were similar with 21% of males and 22% of females being diagnosed with melanoma skin cancer. Males were more often married (58%) when diagnosed with melanoma skin cancer than were females (46%). There were higher proportions of females who were widowed (17% v 7%) when diagnosed. There were also more male than female smokers or ex smokers (23% v. 15%).

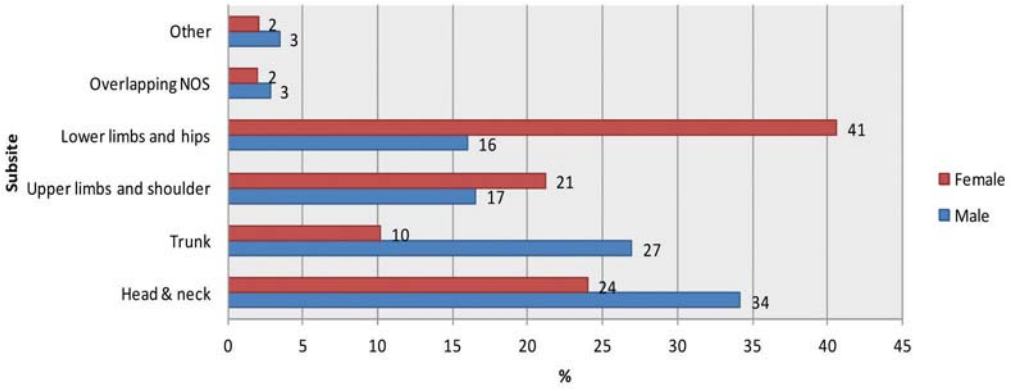
Table 6.2 Melanoma skin cancer patients' characteristics by sex, 1994-2008

		Males		Females		All	
		Cases	%	Cases	%	Cases	%
	All	3,118	40.5	4,591	59.6	7,709	100.0
Age	<64	1,799	57.7	2,760	60.1	4,559	59.1
	65-74	653	20.9	805	17.5	1,458	18.9
	75+	666	21.4	1,026	22.4	1,692	22.0
Marital Status	Married	1,802	57.8	2,126	46.3	3,928	51.0
	Single	573	18.4	819	17.8	1,392	18.1
	Divorced/ Separated/ Widowed	266	8.5	864	18.8	1,130	14.7
	Unmarried/ unknown	477	15.3	782	17.0	1,259	16.3
Smoking Status	Current	398	12.8	435	9.5	833	10.8
	Never smoked	821	26.3	1,399	30.5	2,220	28.8
	Ex-Smoker	332	10.7	234	5.1	566	7.3
	Unknown	1,567	50.3	2,523	55.0	4,090	53.1

Tumour location

There were significant differences ($p<0.000$) in the relative distribution of melanoma skin cancer tumour location among males and females (Figure 6.3). While tumours of the lower limb and hip were more common in females (41% compared to 16% in males), tumours on the head and neck were more common in males (34% compared to 24% in females). Therefore, the majority of male melanoma skin cancers were diagnosed on the upper body, primarily on the head and neck, and on the trunk, whereas in females the majority of melanomas were diagnosed on the limbs and shoulders.

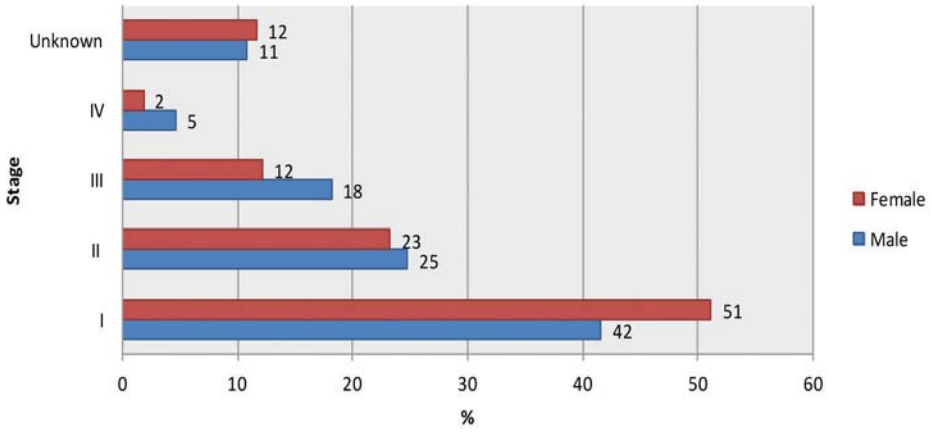
Figure 6.3: *Relative distribution of melanoma skin cancer tumour locations by sex, 1994-2008*



Stage and deprivation quintile

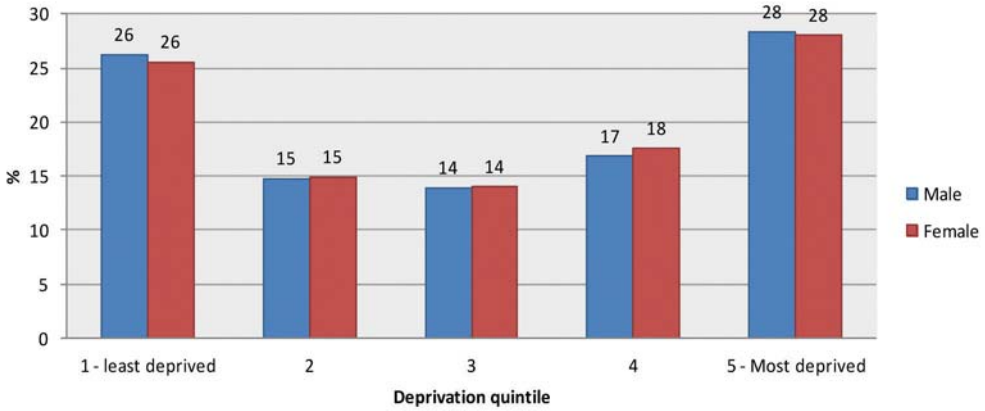
There was a significant difference ($p<0.000$) in the distribution of stage of diagnosis for melanoma skin cancer among males and females. Both males and females were diagnosed most frequently in earlier stages I and II, however there was a higher proportion of males compared to females (23% v 14%) diagnosed at stages III and IV (Figure 6.4).

Figure 6.4: *Relative distribution of stage at diagnosis by sex, 1994-2008*



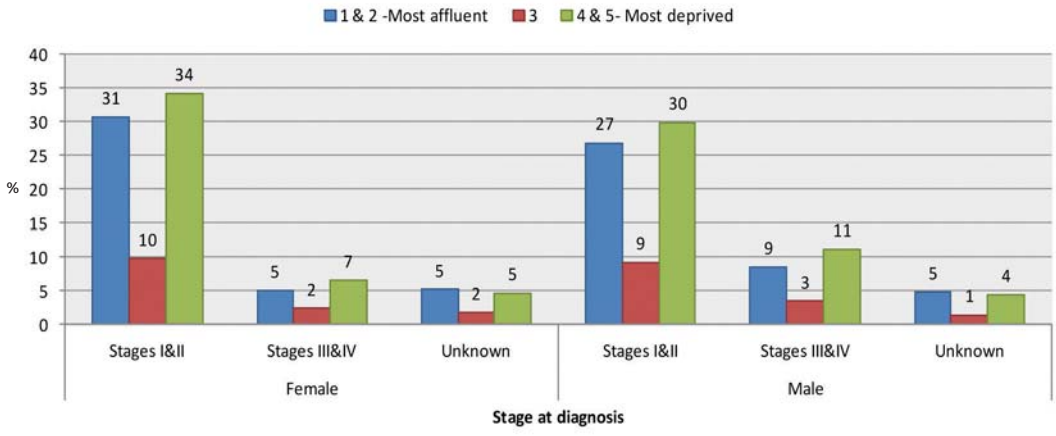
There was no difference in the relative distribution of deprivation among males and females diagnosed with melanoma skin cancer (Figure 6.5). Approximately 45% of cases (both male and female) were diagnosed in the most deprived quintiles 4 and 5, while approximately 40% of male and female cases were diagnosed in the most affluent quintiles 1 and 2.

Figure 6.5: *Relative distribution of melanoma skin cancer by deprivation index and sex, 1994-2008*



A higher proportion of males from the most deprived quintiles were diagnosed at later stages of their disease compared to females in the same categories (Figure 6.6).

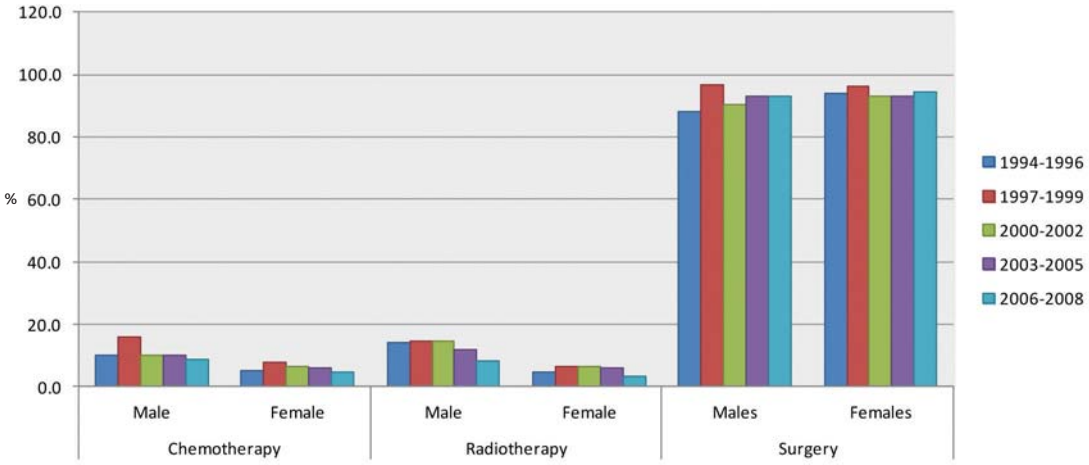
Figure 6.6: *Relative distribution of stage and deprivation by sex for melanoma skin cancer, 1994-2008*



Treatment

Surgery was the main treatment for melanoma of the skin and males and females had similar distributions of treatment over the time period 1994-2008.

Figure 6.7: *Relative distribution of treatment by sex and period of diagnosis, 1994-2008*



6.3 Survival

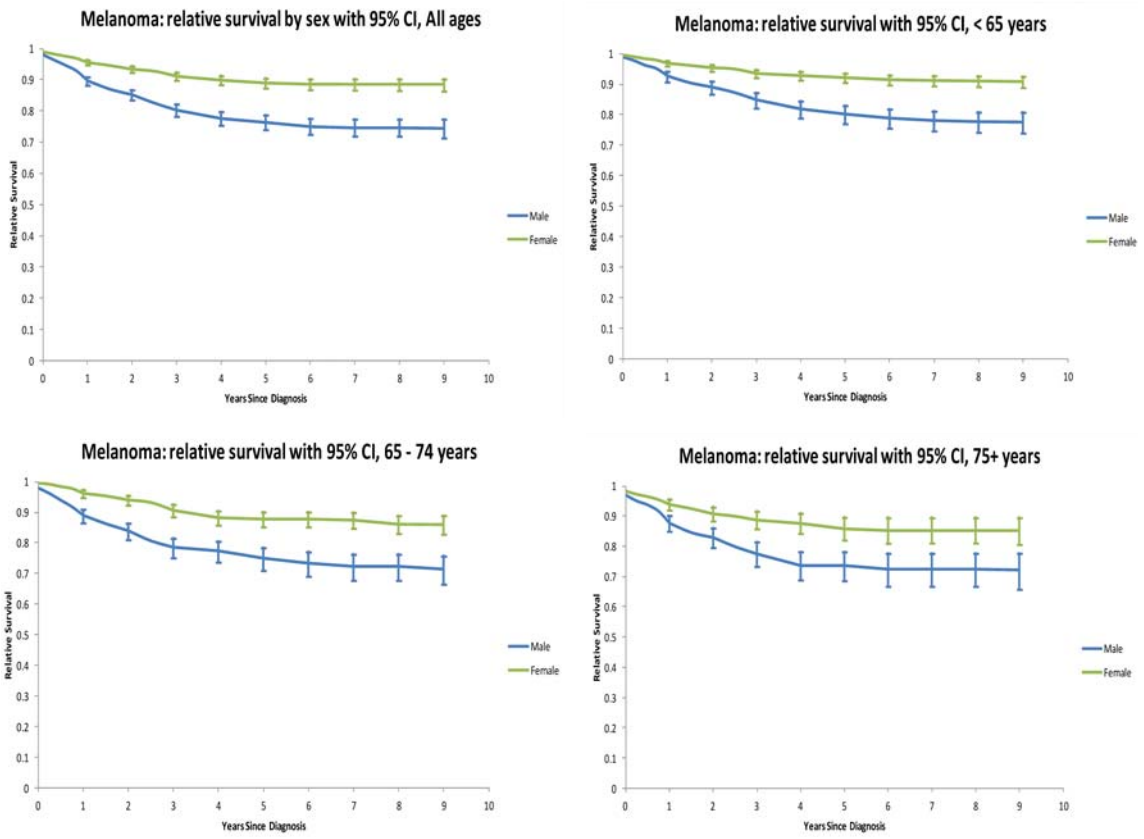
Overall age adjusted relative survival from all causes of death was significantly lower in males than in females (Table 6.3). This contrasts to the higher age standardised incidence of melanoma skin cancer in females, but reflects the higher age standardised mortality in males as a result of melanoma skin cancer diagnosis.

Table 6.3 Standardised relative survival for melanoma of the skin by sex and age, 1994-2008

Survival	Sex	All ages	95% CI	<65	95% CI	65-74	95% CI	75+	95% CI
1 year	Male	90%	(88%, 91%)	93%	(91%, 94%)	89%	(87%, 91%)	88%	(85%, 90%)
	Female	96%	(95%, 96%)	97%	(96%, 98%)	96%	(95%, 97%)	94%	(92%, 96%)
5 year	Male	76%	(74%, 79%)	80%	(77%, 83%)	75%	(71%, 78%)	74%	(69%, 78%)
	Female	89%	(87%, 90%)	92%	(91%, 94%)	88%	(85%, 90%)	86%	(82%, 90%)

Lower survival was observed in males across all age groups examined and across all periods since diagnosis (Figure 6.8). Overall survival in males at 1 year post diagnosis was 90% compared to 96% in females. For those aged 75 and over, survival was 88% in males at 1 year post diagnosis compared to 94% in females. This figure dropped to 76% in males of all ages at 5 years post diagnosis in comparison to 89% of females of all ages. Across all age groups, male survival at both 1 year post diagnosis and 5 years post diagnosis remained significantly lower than female survival.

Figure 6.8: *Melanoma of the skin relative survival by age, sex and 10 year time period*



Cox proportional hazard ratios were performed in order to examine associations between melanoma of the skin and cancer specific risk of death and are outlined in Table 6.4. Male risk of death was 50% higher than female risk. After adjusting for sociodemographic and clinical factors, males still had a 34% higher risk of death compared to females. This was evident across all time varying variables except after 5 years post diagnosis.

Table 6.4 Melanoma of the skin - summary results of associations between sex and risk of death. Cancer specific, with sex fitted as time varying variable

	Sex	Crude HR	95%CI	p-value	Adjusted HR*	95%CI	p-value
	Male Female	1.00** 0.50	- 0.45 - 0.56	- 0.000	1.00 0.66	- 0.58 - 0.75	- 0.000
Sex fitted as time varying variable							
	Male:	1.00	-	-	1.00	-	-
Time: < 1 year	Female:	0.45	0.36 - 0.56	0.000	0.62	0.49 - 0.77	0.000
Time: 1-2.99 years		0.46	0.38 - 0.56	0.000	0.59	0.48 - 0.72	0.000
Time: 3-4.99 years		0.56	0.43 - 0.73	0.000	0.72	0.55 - 0.95	0.019
Time: ≥5 years		0.66	0.47 - 0.91	0.011	0.92	0.66 - 1.29	0.636

Note: The end of follow-up date is 31/12/2009

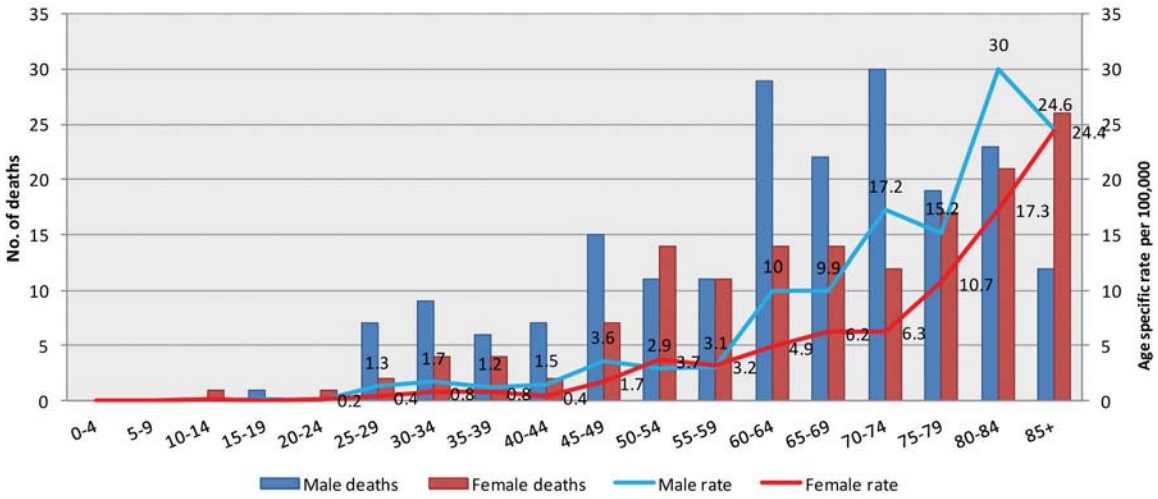
** HR adjusted for Age, Smoking Status, Marital Status, Deprivation Index, Stage, Histology and Subsite*

*** Baseline HR for males = 1 in each time window*

6.4 Mortality

During the period 1994-2008, there were a total of 1,255 deaths due to melanoma skin cancer, 51% of which were in males. The number of deaths and the age-specific death rate were both higher in males in the 25-49 age category and in the 60-84 age category, with this excess male incidence being particularly pronounced in the 70-74 age group where both the rate and the number of deaths were almost three times higher in males (Figure 6.9).

Figure 6.9: *Melanoma skin cancer deaths and age specific death rates per 100,000 population by sex, 2006-2008*



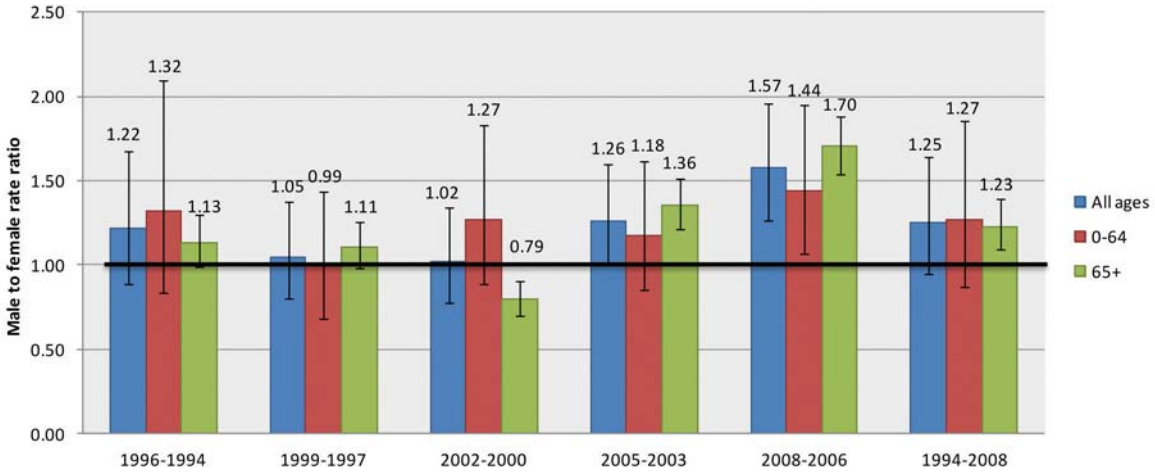
Although overall European age standardised mortality rates for melanoma skin cancer were very low, rates were higher in males than in females for the period 1994-2008, with the difference becoming more pronounced from 2003 onwards (Table 6.5). A trend towards increasing mortality rates in both sexes over time was also observed.

Table 6.5 European age standardised mortality rates per 100,000 population for males and females by age categories and period of death (Confidence intervals in parenthesis)

	All Ages		0-64		65+	
Time period	Males	Females	Males	Females	Males	Females
1994-1996	1.79 (1.39, 2.18)	1.47 (1.14, 1.79)	0.97 (0.68, 1.27)	0.74 (0.48, 0.99)	8.35 (7.50, 9.19)	7.36 (6.70, 8.02)
1997-1999	2.15 (1.73, 2.57)	2.05 (1.67, 2.44)	1.19 (0.88, 1.51)	1.20 (0.89, 1.52)	9.88 (8.99, 10.78)	8.91 (8.19, 9.63)
2000-2002	1.90 (1.52, 2.27)	1.86 (1.51, 2.21)	1.26 (0.96, 1.56)	0.99 (0.72, 1.26)	7.05 (6.30, 7.79)	8.87 (8.16, 9.58)
2003-2005	2.73 (2.29, 3.18)	2.17 (1.80, 2.53)	1.52 (1.19, 1.85)	1.29 (1.00, 1.59)	12.54 (11.57, 13.50)	9.24 (8.54, 9.93)
2006-2008	3.32 (2.86, 3.79)	2.11 (1.76, 2.46)	1.71 (1.38, 2.03)	1.18 (0.90, 1.46)	16.42 (15.37, 17.47)	9.65 (8.95, 10.34)
1994-2008	2.42 (1.96, 2.88)	1.94 (1.56, 2.32)	1.37 (1.02, 1.72)	1.08 (0.77, 1.39)	10.93 (9.97, 11.89)	8.89 (8.17, 9.61)

In contrast to European age standardised incidence rates, the mortality rate ratio of male to female deaths was somewhat higher in males across most time periods and across most age groups. However the rate was at its highest during the period 2006-2008 with males having significantly higher mortality rates. Males of all ages had 1.6 times (95% CI 1.27-1.96) the rate of mortality from melanoma skin cancer compared to females (Figure 6.10) during the period 2006-2008. Overall, the data indicates that while there were more females diagnosed with melanoma skin cancer, more males died from the disease.

Figure 6.10: *European Age Standardised mortality rate ratios of male to female melanoma skin cancer by period of death, 1994-2008*



7 STOMACH CANCER

Summary

- European age standardised incidence rates were higher for males across all age groups and across all time periods from 1994 to 2008. European age standardised incidence rates were highest among those aged over 65, with male rates being significantly higher than female rates across all age groups.
- The age standardised rate ratio of male to female stomach cancer was significantly higher in males, with males in all age categories being twice as likely to be diagnosed with the disease.
- Age adjusted relative survival from all causes of death for stomach cancer did not differ significantly between males and females. However relative survival remained static in females after 3 years at 21%, whereas it decreased slightly in males after the same period.
- For cancer specific deaths (after adjusting for sociodemographic and clinical factors), female risk of death was similar to male risk at 1 year, 1-3 years and at 3 to 5 years post diagnosis. At 5 years or more, female risk was significantly lower than male risk.
- European age standardised mortality rates were higher for males than for females (12.25 per 100,000 in males compared to 6.14 in females). This was the case both for males in the 0-64 age category and those aged 65 and over.
- Despite decreases in European age standardised mortality rates for both males and females, the rates remain significantly higher in males. Males were twice as likely to die from stomach cancer as females, across all age categories.

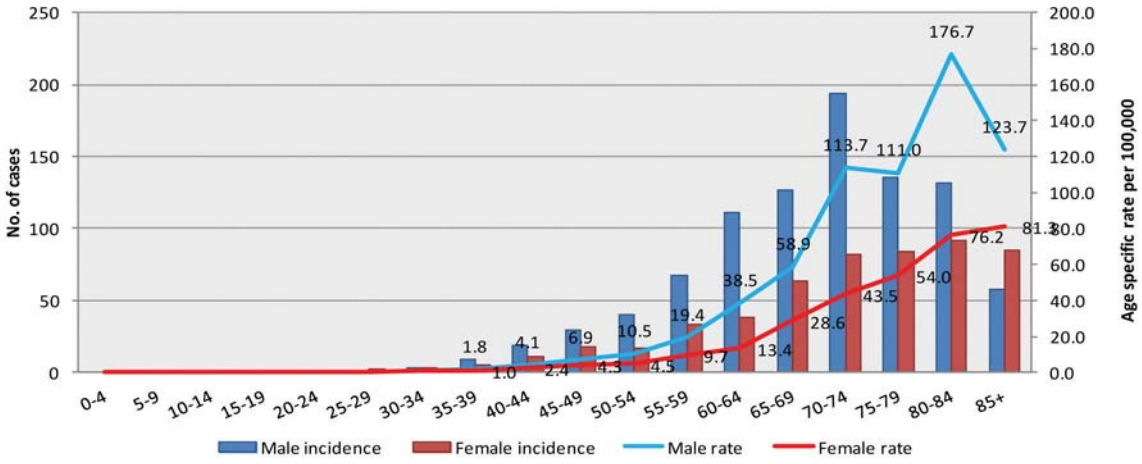
7.1 Incidence

An average of 487 cases of stomach cancer was diagnosed each year between the years 2006-2008. Overall, stomach cancer incidence was higher in males than in females. Over the period under study in this report, a total of 7,154 cases of stomach cancer were diagnosed, 62% of which were in males.

Age-specific rates

Stomach cancer age-specific rates were higher for males than for females during the period 1994-2008. Figure 7.1 illustrates the age-specific rates alongside the incidence numbers for the period 2006-2008.

Figure 7.1: *Stomach cancer incidence and age-specific incidence rates per 100,000 population by sex and 5 year age bands, 2006-2008*



European age standardised incidence rates

European age standardised incidence rates for stomach cancer were higher for males across all age groups and across all time periods from 1994 to 2008 (Table 7.1). European age standardised incidence rates were highest among those aged over 65, with male rates being significantly higher than female rates across all age groups. Males of all ages were twice as likely to be diagnosed with stomach cancer compared to females of all ages. There was a similar trend across the 0-64 age group and for those aged 65 and over. Across all ages, the male rate was double that of the corresponding female rate.

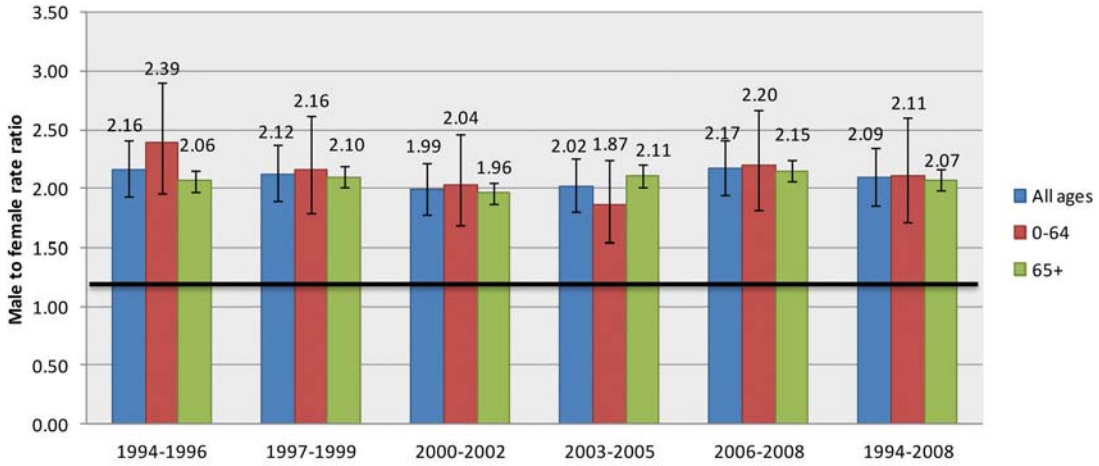
Table 7.1 European age standardised incidence rates for stomach cancer by sex, period of diagnosis and age group, 1994-2008 (Confidence intervals in parenthesis)

	All Ages		0-64		65+	
Time period	Males	Females	Males	Females	Males	Females
1994-1996	19.95 (18.64, 21.27)	9.22 (8.42, 10.02)	7.72 (6.87, 8.57)	3.24 (2.69, 3.78)	118.91 (115.75, 122.06)	57.64 (55.80, 59.48)
1997-1999	18.83 (17.58, 20.07)	8.87 (8.10, 9.64)	7.26 (6.46, 8.05)	3.35 (2.82, 3.89)	112.47 (109.47, 115.46)	53.53 (51.77, 55.28)
2000-2002	16.69 (15.55, 17.83)	8.40 (7.67, 9.14)	6.53 (5.81, 7.25)	3.21 (2.70, 3.71)	98.90 (96.14, 101.66)	50.46 (48.77, 52.15)
2003-2005	15.87 (14.80, 16.94)	7.85 (7.16, 8.54)	5.80 (5.15, 6.44)	3.11 (2.63, 3.58)	97.37 (94.70, 100.03)	46.23 (44.64, 47.81)
2006-2008	15.77 (14.75, 16.79)	7.28 (6.64, 7.92)	5.37 (4.78, 5.97)	2.44 (2.04, 2.85)	99.91 (97.33, 102.48)	46.41 (44.86, 47.97)
1994-2008	17.26 (16.04, 18.48)	8.28 (7.52, 9.04)	6.42 (5.65, 7.20)	3.04 (2.51, 3.57)	104.92 (101.97, 107.87)	50.63 (48.91, 52.36)

European age standardised rate ratios

The European age standardised rate ratio of male to female stomach cancer was significantly higher in males, with males in all age categories being twice (2.17 [95% CI 1.94-2.42) as likely to be diagnosed with the disease during the period 2006-2008 (Figure 7.2).

Figure 7.2: *European age standardised incidence rate ratios of male to female stomach cancer by period of diagnosis, 1994-2008*



7.2 Patient characteristics

Age, marital status and smoking status at diagnosis

Stomach cancer is a disease that affects mainly older populations with a median age of 72 at diagnosis[2]. There was a greater distribution of males than females diagnosed with stomach cancer in those aged less than 65 (32% v 25%), and among those aged 65-74 (33% v 28%; Table 7.2). Conversely, more females aged 75 and over were diagnosed with the disease (47% of females compared to 35% of males).

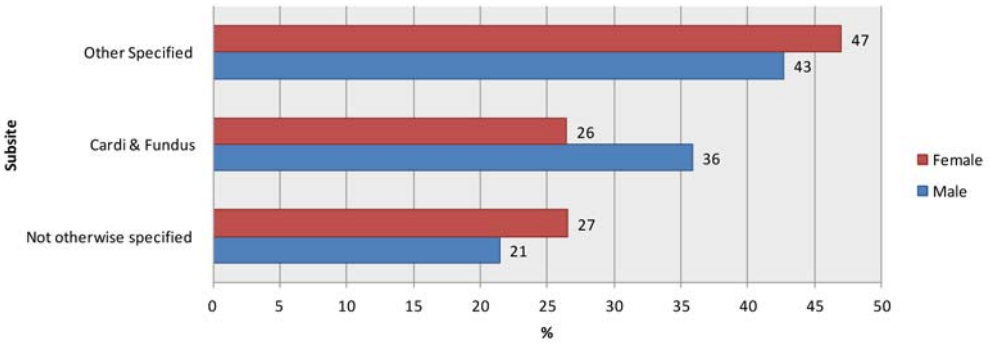
Compared to females, males diagnosed with stomach cancer were more likely to be married (62% v 40%) and to be current or ex smokers (49% v. 28%). As highlighted in Chapter 9, smoking is a known factor in increasing a person's risk of developing stomach cancer.

Table 7.2 Stomach cancer patients' characteristics at diagnosis by sex, 1994-2008							
		Males		Females		All	
		Cases	%	Cases	%	Cases	%
	All	4,437	62.0	2,717	38.0	7,154	100.0
Age	<64	1,413	31.9	671	24.7	2,084	29.1
	65-74	1,481	33.4	768	28.3	2,249	31.4
	75+	1,543	34.8	1,278	47.0	2,821	39.4
Marital Status	Married	2,733	61.6	1,076	39.6	3,809	53.2
	Single	863	19.5	407	15.0	1,270	17.8
	Divorced/ Separated/ Widowed	598	13.5	1,016	37.4	1,614	22.6
	Unmarried/ unknown	243	5.5	218	8.0	461	6.4
Smoking Status	Current	1,175	26.5	507	18.7	1,682	23.5
	Never smoked	1,005	22.7	300	11.0	1,305	18.2
	Ex-Smoker	1,252	28.2	1,138	41.9	2,390	33.4
	Unknown	1,005	22.7	772	28.4	1,777	24.8

Tumour location

There was a significant difference ($p<0.001$) between males and females in the distribution of tumour locations. The most common tumour sub-site recorded in males and females was in the category 'other specified tumours', with females having higher levels of this sub-site at 47% compared to 43% in males (Figure 7.3). Males had higher levels of tumours of the cardia and fundus compared to females (36% v 26%).

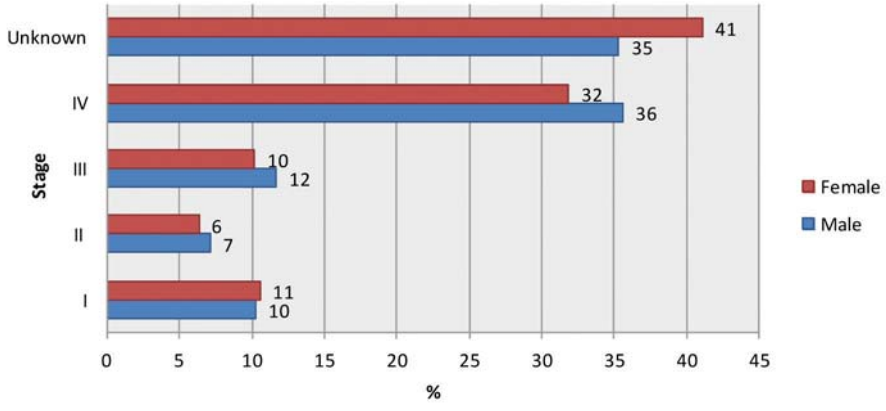
Figure 7.3: *Relative distribution of stomach cancer tumour location by sex, 1994-2008*



Staging and deprivation

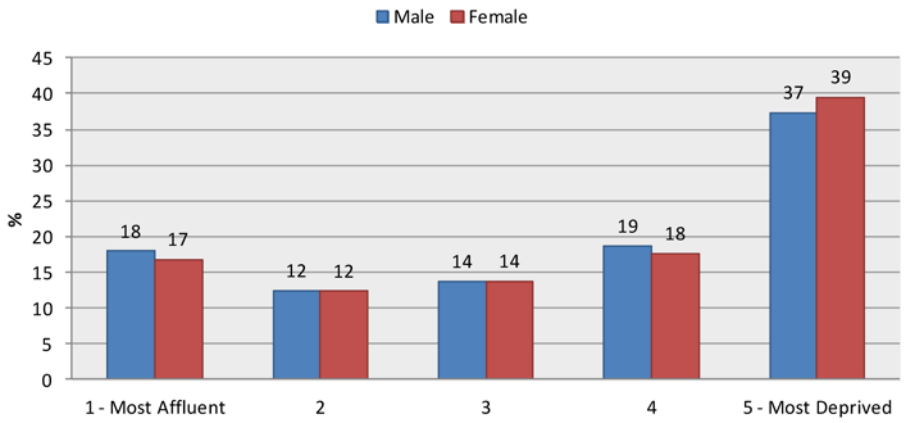
There was a significant difference ($p<0.001$) between males and females with regards to stage of disease at diagnosis for stomach cancer. More males than females (47% v 42%) were diagnosed at later stages III and IV of their cancer (Figure 7.4). However there were 6% more females with unknown stage at diagnosis.

Figure 7.4: *Relative distribution of stage at diagnosis by sex, 1994-2008*



There was very little difference in the distribution of males and females across deprivation categories (Figure 7.5) with both males and females being more likely to be diagnosed in the most deprived quintiles 4 and 5.

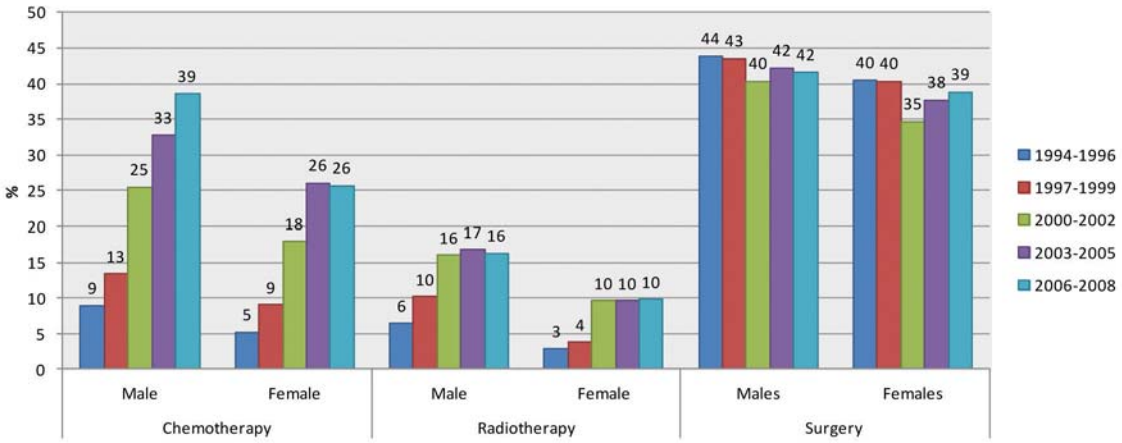
Figure 7.5: *Relative distribution of deprivation quintile by sex, 1994-2008*



Treatment

The most striking change in treatment for stomach cancer among males and females over the timeframe of this study was in the increased use of chemotherapy. During the period 1994-1996, just 9% of males and 5% of females received chemotherapy, with this increasing to 39% of males and 26% of females by 2006-2008 (Figure 7.6). The use of radiotherapy also increased yearly, again with a higher relative proportion of males in receipt of radiotherapy compared to females. Surgery however decreased in use among both males and females over the period 1994-2008, with a slightly higher proportion of males in receipt of surgical treatment in 2006-2008.

Figure 7.6: *Relative distribution of treatment by sex and period of diagnosis, 1994-2008*

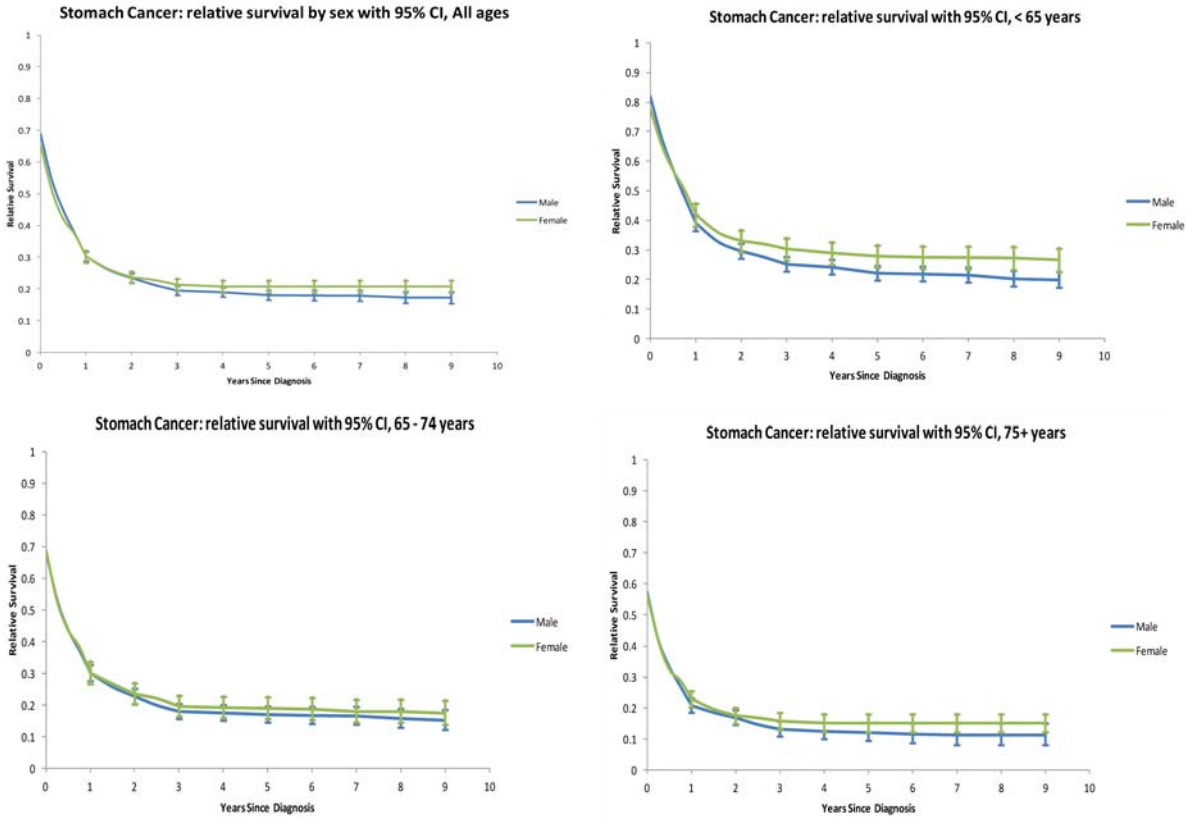


7.3 Survival

Overall, age standardised relative survival from all causes of death for stomach cancer did not differ significantly between males and females. However relative survival remained static in females after 3 years at 21%, whereas it decreased slightly in males after the same period (Table 7.3).

Table 7.3 Age standardised relative survival for stomach cancer by sex and age, 1994-2008									
Survival	Sex	All ages	95% CI	<65	95% CI	65-74	95% CI	75+	95% CI
1 year	Male	30%	(29%, 32%)	39%	(36%, 42%)	30%	(28%, 33%)	21%	(19%, 23%)
	Female	30%	(28%, 32%)	42%	(38%, 46%)	30%	(27%, 34%)	23%	(20%, 26%)
5 year	Male	18%	(17%, 20%)	22%	(20%, 25%)	17%	(15%, 20%)	12%	(9%, 15%)
	Female	21%	(19%, 23%)	28%	(24%, 32%)	19%	(16%, 23%)	15%	(12%, 18%)

Figure 7.7: *Stomach cancer relative survival by age, sex and 10 year time period*



Cox proportional hazard ratios were performed in order to examine associations between survival and cancer specific risk of death. Table 7.4 describes the differences between male and female survival over given time periods and is adjusted for sociodemographic and clinical factors. Female survival was similar to male survival at one year post diagnosis, 1-3 years and at 3 to 5 years post diagnosis. However, at 5 years or more, male survival was significantly lower than female survival.

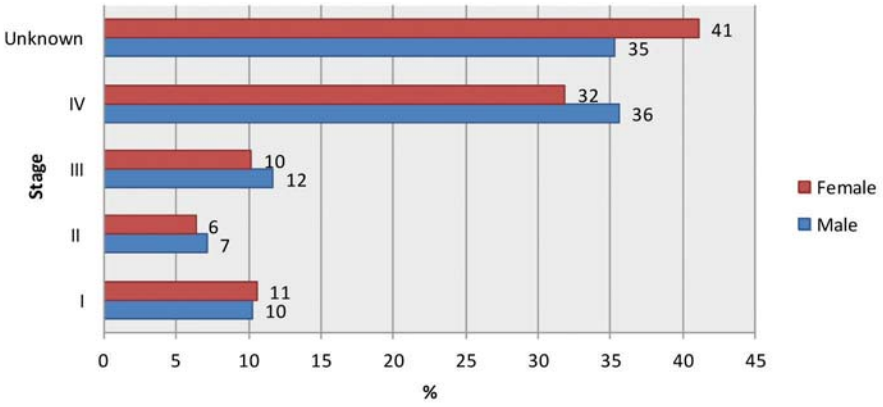
Table 7.4 Stomach cancer - summary results of associations between sex and risk of death. Cancer specific, with sex fitted as time varying variable							
	Sex	Crude HR	95%CI	p-value	Adjusted HR*	95%CI	p-value
	Male	1.00**	-	-	1.00	-	-
	Female	0.99	0.45 - 0.56	0.000	0.66	0.58 - 0.75	0.000
Sex fitted as time varying variable							
	Male:	1.00	-	-	1.00	-	-
Time: < 1 year	Female:	1.04	0.97 - 1.11	0.299	0.99	0.92 - 1.06	0.745
Time: 1-2.99 years		0.92	0.80 - 1.05	0.211	0.89	0.77 - 1.02	0.097
Time: 3-4.99 years		0.81	0.56 -1.18	0.275	0.78	0.54 - 1.13	0.194
Time: ≥5 years		0.44	0.26 - 0.75	0.002	0.41	0.24 -0.69	0.001

Note: The end of follow-up date is 31/12/2009
** HR adjusted for Age, Smoking Status, Marital Status, Deprivation Index, Stage, Histology and Subsite*
*** Baseline HR for males = 1 in each time window*

7.4 Mortality

Death rates and number of deaths were higher for males than for females across all age groups (Figure 7.8). Between the ages of 70 to 84, male age specific death rates were double that of female rates with the gap narrowing thereafter.

Figure 7.8: *Stomach cancer deaths and age specific rates per 100,000 population by sex, 2006-2008*



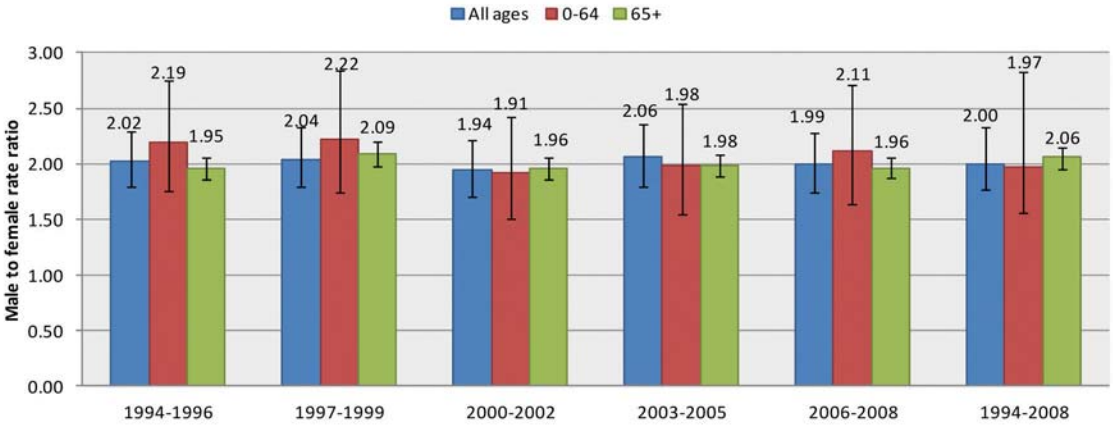
European age standardised mortality rates were higher for males than for females (Table 7.5). This was the case both for males in the 0-64 age category and for those aged 65 or over. The rate for males aged 65 or over was 99.52 deaths per 100,000 population for the period of diagnosis 1994 to 1996, decreasing yearly to 66.15 deaths per 100,000 population during the period 2006 to 2008.

Table 7.5 European age standardised stomach cancer mortality rates per 100,000 population for males and females by age categories and period of diagnosis (Confidence intervals in parenthesis)

	All Ages		0-64		65+	
Time period	Males	Females	Males	Females	Males	Females
1994-1996	15.93 (14.75, 17.11)	7.87 (7.14, 8.60)	5.60 (4.88, 6.33)	2.56 (2.07, 3.04)	99.52 (96.62, 102.42)	50.89 (49.18, 52.6)
1997-1999	13.60 (12.54, 14.67)	6.66 (6.00, 7.31)	4.48 (3.85, 5.11)	2.02 (1.60, 2.44)	87.39 (84.72, 90.06)	44.17 (42.61, 45.74)
2000-2002	12.05 (11.08, 13.02)	6.20 (5.58, 6.82)	3.95 (3.39, 4.51)	2.06 (1.66, 2.46)	77.58 (75.12, 80.14)	39.65 (38.16, 41.13)
2003-2005	10.89 (10.00, 11.79)	5.29 (4.74, 5.85)	3.30 (2.81, 3.79)	1.67 (1.32, 2.01)	72.31 (70.00, 74.62)	34.65 (33.29, 36.0)
2006-2008	10.01 (9.19, 10.82)	5.02 (4.50, 5.54)	3.07 (2.62, 3.52)	1.46 (1.15, 1.76)	66.15 (64.05, 68.26)	33.85 (32.54, 35.16)
1994-2008	12.25 (11.22, 13.28)	6.14 (5.49, 6.78)	3.97 (3.36, 4.58)	1.93 (1.51, 2.35)	79.24 (76.65, 81.82)	40.17 (38.65, 41.69)

Despite decreases in European age standardised mortality rates for both males and females, the rates remained significantly higher in males (Figure 7.9). Males were twice as likely (1.99 [95% CI 1.74-2.28]) as females to die from stomach cancer, across all age categories, with the rate ratios of male to female mortality being significantly higher in males.

Figure 7.9: *European Age Standardised mortality rate ratios of male to female stomach cancer by period of diagnosis, 1994-2008*



8. FACTORS UNDERPINNING CANCER RISK AND SURVIVAL IN MEN

8.1 Introduction

It is now over a decade since a report from the Institute of Public Health in Ireland generated considerable debate by describing the excess mortality among males (at that time) on the island of Ireland "as a fundamental inequality in health"[144;p11]. The question of inequalities in health between the sexes has been the subject of much debate[49]. There has, in recent years, however, been an increased focus on looking beyond sex differences in incidence and mortality from different diseases (including cancer) and factoring gender into studies in order to explain not just differences between men and women but between different populations of men (and women)[4,23,24,25,26,27]. Factors which drive inequalities in health among men and women are still not understood in detail. In terms of cancer, a number of factors come into play in the disparities observed in the incidence of cancer. These include lifestyle factors, genetics, family history of cancer, environmental factors - including occupation and exposure to toxicities, socio-economic conditions, health service utilisation and health behaviours.

Research on causes of cancer worldwide reported that, of the 7 million deaths from cancer in 2001, 35% were attributable to nine potentially modifiable risk factors, namely; overweight and obesity, low fruit and vegetable intake, physical inactivity, smoking, alcohol use, unsafe sex, urban air pollution, indoor smoke from household use of solid fuels, and contaminated injections in health care settings[28]. These risk factors caused about twice as many deaths in men as in women, with 41% of worldwide cancer deaths in men being attributable to known modifiable risk factors compared to 27% in women[28]. It is more difficult to account for the effect of these risk factors on the lower survival in men. While we can justifiably point to men's increased risk of developing cancer as a result of engaging in particular 'risky' behaviours, it is far more difficult to point to these risk factors in terms of decreased survival in men. Survival at one year post diagnosis was found to be very similar in males and females for the majority of cancers in this report; however males were at a significant disadvantage at 5 years post diagnosis. What drives this disparity from 1 year post diagnosis to 5 years post diagnosis? This is an altogether more difficult question to answer.

Risk factors are also influenced by the broader social determinants of health and, in particular, by the impact of socio-economic status. Low socio-economic status would seem to be a marker for factors that influence cancer risk or outcome, such as lifestyle behaviours, help seeking attitudes and participation in screening activities, among other factors. Low socio-economic status is associated with a higher risk of developing a number of cancers [29,30,31]. For the cancers discussed in this report, low socioeconomic status has been associated with higher risk in both men and women[29], except in the case of melanoma of the skin where the relationship is inversely associated with socio-economic status[2,29], with more affluent females being at greater risk. There is a consistent relationship with lung cancer and lower socioeconomic status reflecting higher levels of tobacco use in lower social classes[29,30]. Men and women living in areas with high unemployment and lower levels of educational attainment have a higher risk of developing lung, stomach and bladder cancer[29]. In relation to colorectal cancer, men living in areas of high unemployment have a higher risk of developing the disease; however this is not the case for women. Research has pointed to the fact that those living in lower socioeconomic groups smoke more, have greater alcohol intake, have unhealthier diets and take less exercise, and that all of these factors lead to increased risk for a number of cancers. In a review of the associations between risk, treatment, mortality and survival in relation to colorectal cancer, the authors report less favourable outcomes among patients with lower socioeconomic status[32]. This can partly be explained by lower participation rates among lower socio-economic groups in screening programmes. It is recommended that for mass screening programmes to be effective, it is imperative that high participation rates are achieved from lower socioeconomic groups in society[33].

It is important to acknowledge that low socio-economic status is more than simply a marker for increased cancer risk behaviours. For example, research on men's health in the Republic of Ireland revealed that men with the lowest socio-economic status were twice as likely as men with the highest socio-economic status to report having neglected or paid

little attention to their health over the course of their lives[7]. Furthermore, men from the lowest socio-economic groups were significantly less likely to report overall satisfaction with their GP, more likely to report going to their GP as a "last resort", less likely to engage in the recommended amount of weekly physical activity, and more likely to report weekly binge drinking[7]. The author states that neglecting health and engaging in negative health behaviours are significantly associated with men from lower socio-economic groups. However other research has indicated that, across Europe, doctor consultation rates were higher among men who were unemployed compared to men who were employed[27].

Research shows those living in lower socio-economic groups have higher mortality rates than those in higher socio-economic groups. A Combat Poverty report showed a clear link between lower social class, lower educational qualifications, lower incomes and poorer health[34]. The authors report that while 23% of the general population reported a chronic illness, 47% of those in consistent poverty and 38% of the income poor (poverty defined as being under a specific income amount, often 60% of median income) reported a chronic illness. In relation to men, the same report highlighted that 11% in the most affluent group reported a chronic illness compared to 42% in the most deprived group. Men were also found to be less likely than women to have visited their GP in the last 12 months (67% compared 81% in women)[34]. More generally, it has been reported that, in Ireland, females visit their GP more frequently even when recent childbirth is taken into account[143].At the extreme end of this inequality in health is the Traveller community - one of the most deprived and disadvantaged communities in the Republic of Ireland. For example, a Traveller man's life expectancy is 15.1 years less than his settled counterpart[35]. Traveller men have higher mortality rates from all the leading causes of death, including cancer. The expected deaths from cancer among male Travellers were 9 per 100,000 while the observed deaths from cancer mortality were 21.9, making the excess mortality in male Travellers 12.9 per 100,000[35]. Across Europe it has also been reported that men's health is greatly influenced by their socio-economic status[27] and that much of men's risk of premature mortality is caused by socio-cultural factors and therefore potentially avoidable[36]. Why lower socio-economic status seems to infer greater risk of developing and dying from cancer has been attributed, within a US context, to a number of factors, including differences in area based smoking rates, tobacco regulation, advertising, availability of cigarettes, public awareness of the harmful effects of smoking, fatty diets, physical inactivity, reproductive factors, human papillomavirus (HPV) infection, sun exposure and other factors[30]. Area level data indicates a more rapid adoption of healthier lifestyles and smoking cessation in populations with higher socioeconomic status[30]. Clearly therefore, the nature of the relationship between a man's socio-economic status (and indeed a woman's) and cancer risk behaviours is complex. Whilst socio-economic status is unequivocally a marker for lifestyle and health behaviours that influence cancer risk or outcome, this relationship is mediated both by the cultural context in which one lives and by the values and attitudes that one develops in relation to health.

This chapter will briefly describe the known and hypothesised factors underpinning men's higher incidence and mortality as a result of a cancer diagnosis. It seems clear that the excess cancer incidence in men is, in large part, attributable to excesses in the factors named above, particularly, smoking, alcohol consumption, unhealthy diets and physical inactivity – all of which have a strong gender dimension. In light of some of the evidence, we will also present a discussion of men's utilisation of health services, although results in our research have pointed to only minimal differences in presentation and treatment among men and women in relation to the stage of disease at which they present. As stated above, the factors associated with the lower survival observed in men at 5 years post diagnosis in this report is a more difficult question to answer and requires further attention and research.

8.2 Tobacco smoking

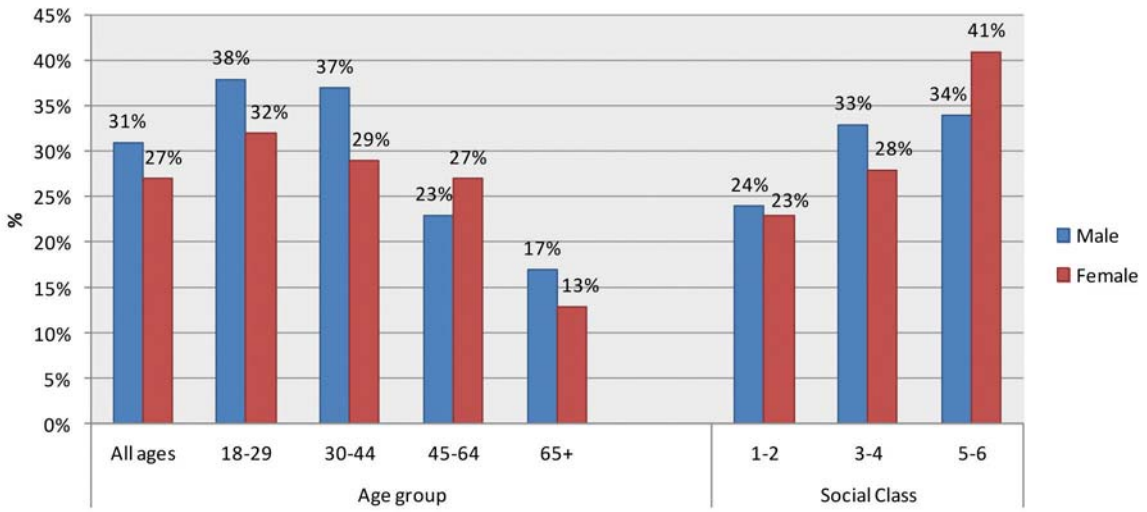
Tobacco smoke is a known cause of many different types of cancer, including cancers of the lung, oral cavity, nasal cavity and paranasal sinuses, nasopharynx, oropharynx, hypopharynx, larynx, oesophagus (adenocarcinoma and squamous cell carcinoma), upper aerodigestive tract combined, stomach, pancreas, liver, kidney (body and pelvis), ureter, urinary bladder, cervix and myeloid leukaemia.[37, 38, 39]. Research has estimated that 29-38% of all cancers in men in Europe are attributable to smoking, compared to 2-10% of all cancer in women being attributed to smoking[40]. The European Commission report on the effects of tobacco on health in the European Union outlines some of the known factors in the effects of tobacco on cancer incidence and mortality[37].

- Tobacco smoke is a known cause of 16 different cancers
- Smoking increases risk for the above cancers from 2 for stomach cancer to 20 for lung cancer
- Smokers are at double the risk of dying from all cancers combined compared to those who have never smoked, with heavy smokers tripling their risk
- Risk of developing lung cancer increases with the number of cigarettes smoked so that heavy smokers are at 25 times the risk of dying from lung cancer compared to those who have never smoked
- Smoking has also been linked with other forms of cancer such as colorectal cancer

Smoking increases risk of lung cancer more than any other cancer. While rates of smoking have decreased in both males and females, the rate of lung cancer incidence is converging between the sexes, with decreasing male age standardised incidence rates and increasing female rates[41]. More recent research has suggested that female smokers are at greater risk of developing lung cancer. Factors which increase risk in female smokers include the interaction of endocrine factors, namely the secretion of oestrogen in the lung, and the genotoxic effect of carcinogens from tobacco smoke[42,43,44,45,46]. Whilst smoking rates are decreasing in the Republic of Ireland in males and females (down from 33% in 1998 to 29% in 2007), evidence shows a similar picture to that in Europe, with more males smoking compared to females (31% compared to 27% respectively)[47]. However it should also be noted that more men have been successful at quitting smoking in this time[47].

A Eurobarometer report[48] showed that, across Europe, smokers were more likely to be male, under the age of 54, from lower socio-economic groups, unemployed and engaged in manual work or self- employed. Lung cancer has also been shown to have higher prevalence in less well educated groups in the EU[50]. Similarly, within an Irish context, smokers are more likely to be younger, male and from lower socioeconomic groups; with 38% of males aged 18-29 reporting being current smokers compared to 32% of females (Figure 8.1)[47]. Other vulnerable populations include those on low income or those with lower levels of education[50]. Incidence rates of head and neck cancer and lung cancer also show correlations with smoking and alcohol use in males from socio-economically deprived areas[2].

Figure 8.1: *Percentage of respondents smoking by gender, age and social class in 2007 (SLÁN47)*



There is ample evidence available to show that second-hand smoke, or passive smoking, increases risk of lung cancer in people who have never smoked. In spouses of smokers, this risk is higher in men than in women (RR 1.24 in women and 1.37 in men)[51]. It is reported that the proportion of non-smoking adults exposed regularly to second-hand tobacco smoke in Europe, including Ireland, is 34% in males and 32% in females[39]. The three main sources of passive smoking are; spouses, workplaces and social settings[51]. Whilst the link between passive smoking and lung cancer has been established, causal associations between other cancers and passive smoking are still under investigation, and as posited by the International Agency for Research on Cancer (IARC) report; *"History may repeat itself in terms of causal associations between passive smoking and cancer sites other than lung"* (IARC,2008, 119,[51]).

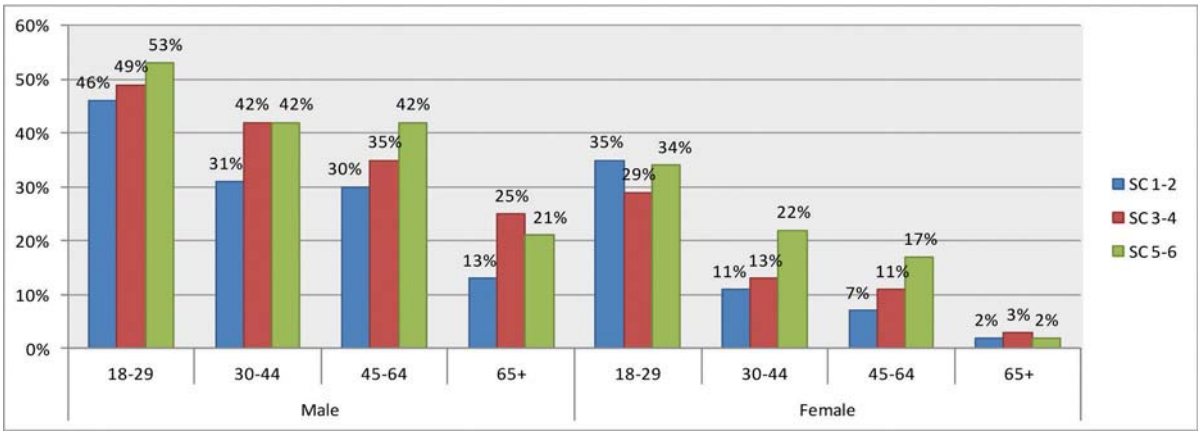
A review of the relationship between gender, sex and lung cancer points towards the interplay of a range of factors such as sex, ethnicity, class, smoking, economic development, ways of smoking among men and women, biology and gender differences and biological vulnerability[52]. Payne suggests that while knowledge of women's lung cancer mortality risk fuels health promotion intervention, it is important to understand the nature and complexity of these risks by focusing on both sex and gender influences[52]. It has also been suggested that, in the Republic of Ireland, the nature of support needed by individuals who wish to give up smoking may be different for males and females with evidence suggesting that men are more successful at giving up[47].

In summary, it can be said that males smoke more, have higher incidence of many of the cancers caused by smoking, and die in greater numbers from those cancers. Regardless of the fact that rates among males and females may be converging, there is still an urgent requirement to help both men and women who smoke to quit. Targeted campaigns designed with a gender focus are required if incidence and mortality from smoking related cancers are to be reduced[53,54]. As recommended by Payne[52], this means integrating approaches to advance a model which reflects the complexity of biology and gender as influences on risk of lung cancer. The University of British Columbia's 'iTAG'[55] programme of research provides an excellent model to advance such an approach. As has been reported in other literature, "the benefit of smoking cessation is clear within five years and is progressively more noticeable with the passage of time" (Martin-Moreno et al., 2008, 139[40]). Indeed, quitting smoking reduces one's risk of lung cancer and other cancer immediately, even when smoking for many years. It has been reported that people who stop smoking; even those who have smoked well into middle age; avoid most of their subsequent risk of lung cancer, while stopping before middle age avoids more than 90% of the risk attributable to tobacco[56]. This may not be well understood by those who smoke within the population and should form a basis on which to develop smoking cessation campaigns.

8.3 Alcohol

In the Republic of Ireland, the most recent SLÁN data indicates that the prevalence of binge drinking is much higher among males – particularly younger males from lower socio-economic groups[57] (Figure 8.2). Even though reported levels of drinking have decreased compared to 2002 levels[57], men are still more likely to report drinking over the recommended weekly limit compared to women (11% compared to 5% respectively).

Figure 8.2: *Percentage of drinkers who report binge drinking on one or more occasions per week, by gender, age and social class (SLÁN, 2009)*



In addition, 7 out of 10 men who drink (compared to 4 out of 10 women) had positive AUDIT-C scores, indicating that their drinking patterns were harmful[57]. While these figures have decreased on patterns of drinking in previous surveys in the Republic of Ireland, they are still a cause for concern, particularly among men. It has also been highlighted that 30% of drinkers in the SLÁN survey were also smokers and that drinkers were twice as likely to be smokers as non-drinkers. Those who drank more than the average were also twice as likely to be smokers compared to those who drank less than the average number of standard drinks per typical drinking session[57].

Causal associations have been established between use of alcohol and a number of cancers, including liver, colon, rectum, oesophagus, oral cavity, pharynx, larynx and breast cancer in women[38,39]. A recent study on the burden of alcohol consumption on incidence of cancer in eight European countries reported that up to 10% of cancer in men and 3% of cancer in women may be attributed to alcohol consumption[58]. In the case of each cancer, men were noticeably more at risk of each non-sex specific cancer, except in the case of colorectal cancer where it was found that the extent to which alcohol could be attributed to increased incidence was similar. Alcohol is a known cause of upper aero digestive tract cancers and liver cancer, and has been shown to moderately increase risk in males and females for colorectal cancer, pancreatic cancer and breast cancer in women[59]. Other studies have shown increased risk with alcohol consumption and tobacco smoking for pancreatic cancer[60], liver cancer[61], upper areodigestive tract cancers (especially in men)[62,63] and earlier development of colorectal cancer - with later presentation associated with alcohol and tobacco consumption (a predominantly male study)[64]. While moderate alcohol consumption has been linked to a decrease in risk for cardiovascular disease, the overall net effect of drinking in relation to cancer risk, even of moderate drinking, has been shown to be harmful[58].

The projected number of new cases of alcohol related cancers in the Republic of Ireland is expected to double by the year 2020 for women and by 81% for men[65]. Because alcohol consumption is higher among people of lower socioeconomic status, risk for alcohol related cancer is also higher within this group[51]. The National Cancer Registry has noted the correlation between higher incidence of head and neck cancers and lung cancer among males in the Republic of Ireland living in socio- economically deprived areas and the corresponding higher rates of alcohol consumption and tobacco use in these areas[2].

In conclusion, alcohol related cancers represent a substantial proportion of cancers in men. Moreno and colleagues have stated that:

"Despite the attempts to combat excess alcohol intake through policy… it is clear that the general population underestimates, ignores or is unaware of the risks"
(Martin-Moreno et al, 2008[40; p1392]).

In light of the high proportion of Irish men who drink above the recommended limit and who engage in binge drinking, there is an urgent need for a more targeted and gender-specific approach to reducing alcohol consumption among men, particularly lower socio-economic groups of men, and to addressing the issue of binge drinking. For example, it has been posited that alcohol consumption is a common male rite of passage for many men and may in fact be symbolic of being male[7]. Strategies designed to reduce alcohol consumption in men need to factor these gendered aspects of alcohol consumption into the overall approach that is taken.

8.4 Overweight and obesity

Being overweight/obese is associated with an increased risk of several cancers including cancers of the oesophagus, pancreas, colorectal (particularly abdominal fatness), breast and kidney[66]. The International Association on Cancer Research reports that high levels of body fat are associated with increased risk of colon cancer and that this association is higher among men[67]. It has been reported that obesity, measured using BMI, is a much stronger predictor of colon cancer in men compared to women[68,69]. While BMI increases risk of colon cancer in both sexes, the risk seems to be modified in females by menopause status, with risk increasing after menopause[70]. Oestrogen levels therefore seem to impart a benefit to women in reducing risk of colon cancer[70]. Increased BMI has also been reported to increase risk in males for oesophageal and gastric cardia cancer[71]. Excess body weight, overweight and obesity have also been associated with increased risk of developing primary liver cancer, with the association being stronger in men[72]. A systematic review of the association between BMI and incidence of cancer found that an increase of 5kg/m2 in BMI was strongly associated with oesophageal adenocarcinoma, thyroid, colon and renal cancer in men[73]. Weaker positive associations were found between increased BMI in men and rectal cancer, malignant melanoma, leukaemia, multiple myeloma and non-Hodgkin's lymphoma[73]. Several studies have indicated that metabolic syndrome - a group of risk factors that occur together, primarily central obesity and insulin resistance - while increasing risk for coronary heart disease, stroke and type II diabetes, also increases mortality risk in men for all cancers, particularly lung and colorectal cancer[69,74].

As highlighted in the National Men's Health Policy[1], the prevalence of overweight (46.3%) and obesity (20.1%) among men in the Republic of Ireland[75] is currently ranked 8th in the EU25[76,77] and is rising at a rate of 1% per annum[78]. It is projected that 33% of men on the island of Ireland will be clinically obese by 2015[79]. The proportion of obese men increases almost 5-fold between the age categories of 25-44 years[78]. Men with third-level education and with professional occupations are least likely to be obese[78], indicating that those with lower levels of education and lower income are at greater risk. It has been reported that the prevalence of obesity in 18-64 year olds in Ireland has increased significantly during the period 1990 to 2011, from 8% to 26% in males and 13% to 21% in females[80]. The greatest increase however was among males aged 51-64. With obesity being one of the main drivers of direct health care costs, it has been projected that, relative to normal weight individuals, health care costs may be increased by up to 30% in obese individuals[80]. It is estimated that the economic cost of overweight and obesity (including healthcare, drugs, absenteeism, and premature mortality), in Ireland in 2009 was €1.13 billion[80]. Included in the main drivers of these costs are the direct costs attributable to treatment of colon cancer, as well as other chronic diseases. The authors recommend specific targeting of the overweight and obese in the national colorectal cancer screening programme (BowelScreenc)[80].

It is also well established that men tend to deposit fat abdominally, thereby increasing their central obesity. This central or visceral fat is associated with an increased risk of fat related cancers. By comparison, women tend to deposit fat around the hips or thighs although some evidence indicates that this is changing with more women increasing central obesity[81]. The EU report on Men's Health[27] states that the growing number of overweight and obese men across Europe can be attributed to several factors, including; increasing sedentary lifestyles; declining manual labour; reduction in walking; reduced opportunity for exercise; changes in eating patterns; increased alcohol consumption; and long working hours.

While evidence relating to diet and associations with cancer are generally weak, research shows that there are direct correlations between diet, physical activity and overweight and obesity and a number of cancers including kidney cancer, colorectal cancer, breast cancer and gallbladder cancer[51,66,82]. In the case of men in the Republic of Ireland, for whom both incidence and mortality rates of colorectal cancer are higher than for women, the evidence points towards the need for more targeted health promotion in relation to overweight and obesity, physical activity and healthy diets. Men should also be encouraged to engage in screening rather than presenting with symptoms when the disease is possibly at a later stage. In summary ,the adoption of healthier diets and a reduction in the levels of overweight/obesity has the potential to substantially reduce the risk of cancers[72,83] in men in the Republic of Ireland.

8.5 Physical inactivity

There is a long established link between physical inactivity and ill health[84,85]. Evidence shows that engaging in physical activity reduces risk for a number of diseases such as diabetes, cardiovascular disease and some cancers. There is convincing evidence that physical activity reduces one's risk of developing colon cancer in addition to some limited evidence that physical activity reduces risk of lung and pancreatic cancer[66]. It has been suggested that the role of physical activity on the health of men may change over particular periods in life, at times playing a more crucial role in influencing biological mechanisms[86]. While the biological mechanisms of physical activity on cancer risk are unknown, it has been suggested that physical activity may reduce risk by improving circulation, ventilation and bowel transit time, improving energy balance and immune function, possibly improving capacity to perform DNA repair, reducing central obesity and modulating hormone levels and growth factors[86,87].

Research investigating the relationship between physical activity and cancer prevention has estimated that approximately 17% of male colon cancer cases, 21% of male lung cancer cases and 14% of prostate cancer cases could be prevented if sufficient levels of physical activity were achieved by all European men[88]. Within an Irish context, an earlier study estimated that the population attributable risk of colon cancer among men could be reduced by 17% among those who are insufficiently active and by 8% among those who are sedentary[89]. For lung cancer, the estimate is 21% of cases for men who are insufficiently active and 11% for men who are sedentary, while for prostate cancer it is 14% for those who are insufficiently active and 7% for those who are sedentary[88]. While the authors state that the estimates may be optimistic due to a presumption of increased physical activity at the upper end of the physical activity range, nevertheless, they estimate that up to 1,421 cases of prostate, lung and colon cancer combined, could be prevented if such increases in physical activity were achieved among males in Ireland[88].

The first EU report on the state of men's health[27] reported that over half of all men in the EU do not reach the recommended levels of physical activity, that approximately 1 in 3 are sedentary and that this has occurred alongside a fivefold increase in obesity in the last century. The same report highlighted that the likelihood of being sufficiently active to derive health benefits decreased and the likelihood of being sedentary increased with increasing age. Within an Irish context, only 48% of men engage in some form of regular physical exercise[78], with those reporting as sedentary almost doubling between the age categories of 18-29 and 30-39 years (9.9% to 18.3% respectively)[79]. The continuing shift towards sedentary occupations and more sedentary lifestyles generally for men has been paralleled by a fivefold increase in obesity between the beginning and end of the last century[90].

In the context of influencing factors to engage in sport or to be physically active, data from a Eurobarometer[91] report demonstrates that women, more than men, were motivated by health reasons (63% v 58%), to improve physical appearance (25% v 22%) and weight control (26% v 23%); men more by having fun (35% v 27%), to improve physical performance (25% v 22%) and to be with friends (25% v 19%). From the point of view of weight management, men tend to see physical activity and sport as more relevant than nutrition[92] and are therefore more likely to seek to manage their weight by means of exercise than by dieting[93]. This is also borne out by the statistics on dieting, with women (26%) being much more likely than men (15%) to have been on a diet over the past 12 months[94]. Physical activity initiatives targeting men should therefore emphasise the health, performance, social and fun aspects of physical activity and sport. Ireland's National Men's Health Policy stresses that the intrinsic value of staying active to maintain strength, power, virility and good health should be highlighted, and calls on national governing sporting bodies to provide a range of activities for men to stave off their retirement from competitive sport[1]. For example, the promotion of veterans' football has been associated with significant health and fitness benefits among older men[95].

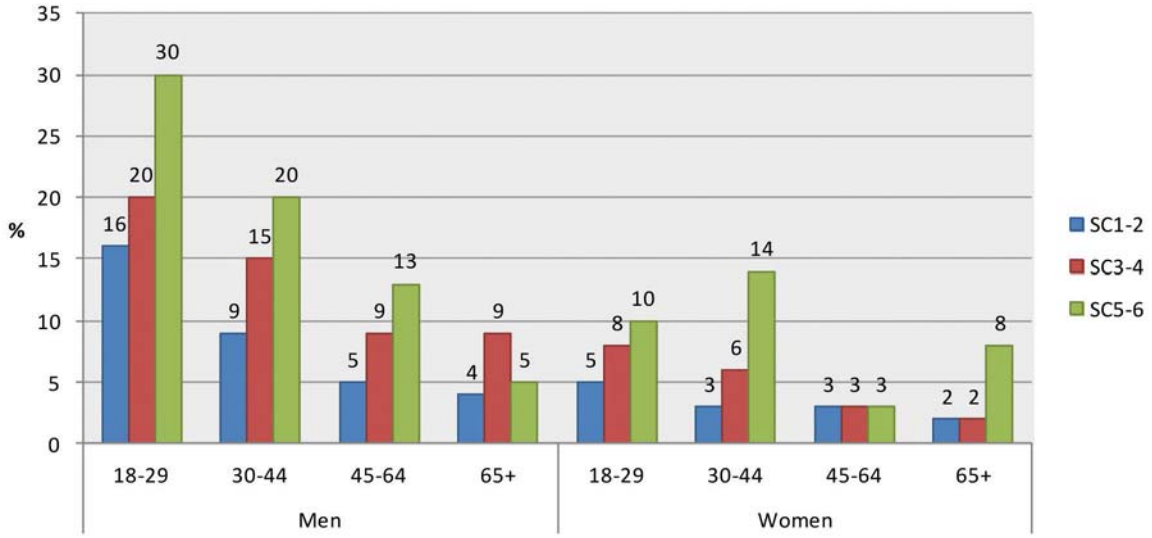
8.6 Diet

Unhealthy diets are among the leading causes of the major non-communicable diseases, including certain types of cancer, and contribute substantially to the burden of disease, death and disability within the EU[96]. Diet and consumption of particular foodstuffs are believed to either reduce or increase risk of cancer, although much research is still inconclusive about specific dietary items[40,66]. A recent study on diet and cancer prevention in 10 European countries concluded that cancer risk was increased through high intake of red and processed meat for colorectal cancer and gastric cancer; with further evidence that high intake of dairy protein and calcium from dairy products increased risk of prostate cancer[82], although calcium and milk are considered to reduce one's risk of colorectal cancer[66]. Consumption of fruits, non-starchy vegetables, allium vegetables, selenium and foods containing selenium reduce one's risk of cancer. Foods considered to increase one's risk of cancer include red meat, processed meat, salt and salty foods, and smoked, barbequed and grilled meats[66]. Studies have shown that high intake of red meats and processed meats, highly refined grains and starches, and sugars are associated with increased risk of colorectal cancer[83]. Those living in lower socio-economic groups are also at increased risk of colorectal cancer, particularly within a European context, due to a higher prevalence of unhealthy diets among these population groups[32,97,98]. Stomach cancer risk is increased through consumption of salt, salted or salty foods or salt preserved foods[99,100]. Table 8.1 outlines a summary of the evidence in terms of risk in relation to the five cancers discussed in this report.

Table 8.1 Evidence relating to dietary risk of cancer[66]				
	Reducess risk		Increases srisk	
Cancer site	Convincing/ probable evidence	Limited evidence	Convincing/ probable evidence	Limited evidence
Lung	Fruits Foods containing carotenoids	Non-starchy vegtables Foods containing selenium Foods containing quercetin	Arsenic in drinking water Beta carotene supplements	Red meat Processed meat Total fat Butter Retinol supplements
Stomach	Non-starchy vegtables Fruits Allium vegatables	Pulses Foods containing selenium	Salt salted and salty foods	Chilli Processed meat Smoked foods Grilled, barbequed animal foods
Colorectal	Foods containing dietary fibre Garlic Milk Calcium	Non-starchy vegtables Selenium Foods containing selenium Fruits Foods containing folate Fish Foods containing Vitamin D	Red meat Processed meat Alcohol	Foods containing iron Cheese Foods containing animal fat Foods containing sugars
Skin		Retinol	Arsenic in drinking water	Selenium supplements
Bladder		Milk		Arsenic in drinking water

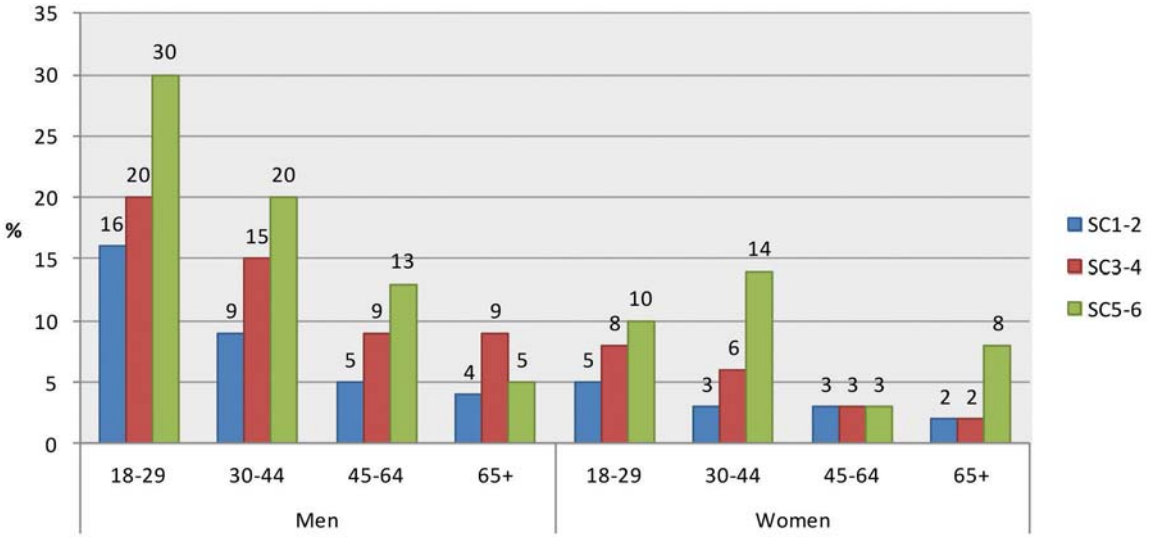
Across the EU, men's diets have been reported to be less healthy than women's diets and men's nutritional knowledge more limited[27]. Within an Irish context, the most recent SLÁN[101] data reported a number of findings which indicate that men have a less healthy diet compared to women. High percentages of men reported consuming fried food 4 or more times per week (14% compared to 6% of females), with 30% of men from the lowest social class groups reporting as such. There was a clear gradient with increased consumption of fried foods in lower social classes, particularly among males (Figure 8.3).

Figure 8.3: *Percentage of SLÁN respondents consuming fried foods 4 or more times per week, by age, gender and social class (2007)*



The SLÁN data also showed that men were more likely to consume more than the recommended 2 servings of meat, poultry or fish per day. Some 46% of men (compared to 35% of women) in the lowest social class groups reported consuming over the daily recommended limit of meat, poultry or fish. This figure increased to 63% for males aged 18-29 and 57% for males aged 30-44. Men were more likely to 'always'/'usually' add salt to food compared to women (35% vs. 30%). Men were more likely to consume more than the recommended daily servings of milk, cheese and yogurt. Men were also less likely to consume the recommended 5 daily servings of fruit and vegetables per day (59% men and 71% women), this being evident across all age groups and social classes (Figure 8.4).

Figure 8.4: *Percentage of SLÁN respondents consuming 5 or more daily servings of fruit and vegetables per day, by gender, age and social class*



It has also been reported that men are less likely to read food labels compared to women[102]. Other Irish research on men's health revealed that men listed smoking, dietary issues and excess alcohol consumption as the most prevalent issues of 'neglect' that they felt had led to subsequent health problems[7]. It has been suggested that men lack control over their diets as food preparation has traditionally been seen as women's responsibility, and that men's dietary habits are influenced by working hours and commuting long distances with a corresponding increased reliance on unhealthy convenience and snack foods[27].

A Eurobarometer[94] report on the meaning that EU citizens ascribed to 'eating a healthy diet' found that men were less likely than women to associate a healthy diet with eating more fruit and vegetables (54% v 61%) or with not eating too much fatty foods (42% v 47%). The same report also highlighted that, with the notable exception of having attempted to reduce alcohol consumption, men were less likely than women to have attempted to make changes to their diet over the past 12 months. For those that did report changes to their diet, the motivation for making such changes was prompted more by the desire to lose weight for women (39% v 26% for men) compared to staying healthy for men (34% v 27% for women). Irish data shows that, despite two-thirds (66.4%) of Irish males surveyed being overweight/obese, 55% felt that they did not have to make changes to their diet as it was healthy enough, while only 37% reported having modified their eating habits in the year prior to the study[89]. In a qualitative study that examined barriers to healthy eating among men, Gough et al[103] reported a perception among the men that healthy food tasted bland, and that the very notion of healthy eating was associated with 'hassle', 'self-denial' and being 'boring'. There was also a scepticism and cynicism among the men toward health promotion messages filtered through the media, with many viewing such information as misleading or contradictory and as an affront to their freedom of individual choice in terms of what they ate. In reacting against such messages and choosing to forge their own paths with regard to their dietary habits, the authors concluded that endeavours to promote healthy eating among men could, paradoxically, lead to a rejection of healthy food choices. More dominant constructions of masculinity tend to be associated with autonomous decision-making over obedience to authority, and plenitude and fulfilment over scarcity and self-denial[115]. Gough et al's study[103] also reported that resistance to altering diets, for men, may be reduced when there are medical grounds to do so, which highlights the potency of appropriate medical advice in altering the dietary behaviours of men.

The application of a gender lens to nutrition policy and to dietary health promotion measures directed at men in particular, should (i) emphasise personal choice and responsibility, (ii) encourage men to reflect on their dietary habits, (iii) provide links to further health promotion information and (iv) create an association between health foods and substance/satiation to counter perceptions of healthy food as bland or unappetising[103]. It is well established that eating habits adopted early in life can have a marked influence on those carried into adult life – indeed, childhood obesity is an important predictor of adult obesity[105]. Therefore, nutrition and dietary policy measures should have a more explicit and gender focus on boys and young men. For example, reducing access to vending machines and fast food outlets during school breaks and lunchtime, and the promotion of healthy lunch policies have been identified as important mechanisms in this regard[77]. The European Code against Cancer (ECAC)[106] recommends increasing daily intake and variety of vegetables and fruits, eating at least five servings daily, in addition to limiting intake of foods containing fats from animal sources.

8.7 Ultraviolet radiation exposure

In terms of melanoma skin cancer, the main risk factor for developing the disease is exposure to ultraviolet (UV) rays. While males have similar incidence rates to females, trends would indicate rising rates in males, converging with the rates observed in females. More importantly however, males have an increased risk of dying from melanoma of the skin, particularly in the first year, indicating that late presentation may be a factor in their higher rates of mortality. Increasing incidence of melanoma in males has also been noted in the UK[105]. It is suggested that the increase is consistent with greater sun exposure and poorer compliance with sun protection measures[105]. Other research recommends the need to improve occupational sun exposure protection using comprehensive workplace sun safety interventions[106].

8.8 Health service utilisation

The first report on the state of men's health in Europe[27] highlighted that infrequent use of health services among men was associated with men experiencing higher levels of potentially preventable health problems and having reduced treatment options when they become ill. Men in Europe had higher rates of hospital admissions compared to women for all leading causes of disease and health problems, indicating that men may present at more advanced stages of disease when treatment options and survival may be reduced. In addition, it was found that men were less likely than women to engage in routine or preventative health checks, as well as having poorer knowledge and awareness of health and health issues. It has been suggested that women are habituated into regular contact with health services due to antenatal provision in the early years. Men, on the other hand, are more likely to use accident and emergency services and less likely to use primary health care services, indicating that men present in crisis and for curative reasons rather than for preventative care[27].

It has been reported that men's help seeking behaviour for health related problems is poorer than women's[27]. Research reports that men are less inclined to acknowledge ill health or to seek help when ill compared to women[107]. A qualitative synthesis of studies carried out on patients' help seeking experiences and delay in cancer presentation reported that some of the reasons for delay included[108];

- Lack of recognition and interpretation of symptoms such as vague or mild symptoms, which may mistakenly be attributed to a common ailment not in need of urgent attention
- Absence of pain or a lump resulting in a belief that the symptoms would go away
- Intermittent symptoms
- No awareness of cancer symptoms or awareness of risk
- Previous benign diagnosis of symptoms by a doctor
- Embarrassment about sexual areas of the body
- Fear of loss of sexuality after treatment
- Seeing help-seeking as un-masculine
- Not wanting to appear neurotic
- A belief among men that women find help seeking easier because of their greater contact with health services for themselves and their families

In a sex and gender based review of colorectal cancer in men and women, Payne[109] reported that men were more likely to seek help for cancer symptoms if their help-seeking was sanctioned by family or friends or when symptoms interfered with their employment. It has also been reported that men are more likely to undergo screening when it is recommended by a physician, however when screening tests are sent to a man's home, they are less likely than women to take up the opportunity to be tested[109]. In a study on how men differ in their attitudes to bowel cancer screening, it was found that men's intention to be screened for the disease was lower than women's[110]. Men perceived bowel cancer as a less serious disease as well as, conversely, having higher fatalistic beliefs about the disease (belief that cancer is out of their control), both of which reduced their intention to be screened. Men also believed that carrying out the test (a home-based faecal occult blood test) was more awkward, again reducing intent to take the test[110].

Research conducted on men's and women's beliefs about cancer screening found that far fewer men had experience of cancer screening compared to women[112]. Given that there is a wider availability of cancer screening for women, due to more evidence-based and technological advances in female only cancers, men's attitudes to screening and cancer differed. Men were more likely to underestimate cancer incidence and more likely to underestimate risk factors such as family history and sexually transmitted infections - although these risk factors are more likely to infer greater risk to females. Findings suggest that knowledge of cancer correlates with women's closer involvement in cancer screening activities; however men did report a stronger interest in bowel cancer screening. The tendency to overlook gender as irrelevant to the way in which people comprehend health and health screening continues to be a significant obstacle to developing effective health promotion policies[112].

In a review of evidence on gender differences in early detection of cancer, the authors report that men were less convinced of the value of preventative health behaviours, had lower rates of health protective behaviours and visited the doctor less frequently than women, particularly for preventative rather than curative care (except where some evidence pointed to men being more responsive to physician recommendation for screening)[111]. Evidence relating to men's perceived risk of cancer varied with some studies indicating that men have higher perceived risk, others showing lower perceived risk and others showing no difference. The review also found that women's greater contact with health services facilitated greater health knowledge, while lower levels of awareness of male cancers among men may be reflective of lower levels of publicity of these cancers. The authors suggest that male health concerns may have a lower profile across society as a whole. The authors also point to evidence within the literature that particular aspects of the male role, such as masculine traits of self reliance, physical toughness and emotional control, are in conflict with positive health behaviour such as reliance on others and requesting medical aid[111]. The authors conclude that men have lower levels of awareness of cancer, poorer knowledge of cancer warning signs, engage in self-examination less frequently and are more likely to delay reporting cancer symptoms to a doctor. Others suggest that while evidence in relation to help seeking for cancer symptoms does not differ between men and women, there is a need for research on why male consultations do not exceed female consultations, given that males are at greater risk[113]. Findings of studies aimed at understanding cancer knowledge in the UK have indicated that family history and female sex were associated with greater cancer knowledge and hence knowledge of cancer was lower among men[114,115].

With best prognosis for lung cancer related to early presentation with symptoms, it is essential that men be aware of the symptoms of lung cancer, even though studies have revealed that this is often lacking. A review on barriers and facilitators to male engagement in symptom reporting and screening for lung cancer reported a number of key factors associated with men's presentation for the disease[116]. Patients may experience symptoms associated with lung cancer in a vague manner, such as cough, chest or shoulder pain, dyspnoea, weight loss, hoarseness, finger clubbing, cervical/ supraclavicular lymphadenopathy. Evidence suggests that men are less likely to be aware of such symptoms being associated with lung cancer risk[116]. In addition, studies have shown that symptoms such as changes in breathing patterns, chest pains, extreme fatigue or irritating cough were not associated with lung cancer[116]. Experiencing these symptoms as vague and not associating them with lung cancer can lead to late presentation, particularly in men[116]. The authors report that men have also been shown to have less knowledge about cancer warning signs compared to women and to be more likely to attribute extreme fatigue or coughs to ageing or changes in one's environment[116]. Beliefs held by men which were found to inhibit presentation included:

- Having vague symptoms
- Symptoms not warranting an appointment with a doctor
- Men seek help less than women
- Men worry less about symptoms
- A tendency among men to ignore symptoms
- Having 'minor' symptoms
- A reticence or unwillingness to report minor symptoms
- Not wanting to waste doctor's time
- Being seen as weak and un-masculine
- A willingness to suffer on until one can present with something concrete
- Stigma associated with lung cancer and blaming oneself and thus;
- Feeling unworthy of treatment

The authors suggest that family members are vital in facilitating earlier presentation and help seeking especially among men due to their ability to sanction and legitimise such behaviour[116]. They also suggested that health promotion campaigns have tended to stigmatise those with lung cancer. This can have the effect of placing blame on the individual and creating a defeatist attitude (smoking is the predominant cause) among those who may have the disease, with the consequence that help seeking may be delayed[116].

8.9 Survival – The impact of smoking, overweight & obesity, treatment and other factors

The results from this report indicate that survival, for those cancers considered, is poorer among men in the Republic of Ireland. While sex differences exist in relation to factors such as stage of disease at diagnosis and smoking, survival analysis indicates that, even after adjusting for these factors, males are still at greater risk of death from their cancer. This report has also gone a step further by adjusting for anatomical site and histology, as these have been shown to influence survival[22]. Nevertheless, the results remain that male survival is still poorer than female survival. Evidence across Europe would indicate that females have a significant survival advantage over males, but that the magnitude of this advantage is smaller in older age groups[121]. Micheli et al[121] have suggested that women may be intrinsically more robust than men in coping with their cancer due to differences in sex hormones, although, as reported earlier, this also increases the risk of developing lung cancer in females[122].

Some tentative research has indicated that smoking impacts on survival. Research from the National Cancer Registry Ireland[123] concluded that smoking (at diagnosis) increased the risk of dying from several types of cancer, with the magnitude of this risk being greatest for colorectal cancer, prostate cancer and breast cancer. The research findings also highlighted that smokers diagnosed with lung cancer and melanoma also died sooner than those who were non-smokers or ex-smokers. This, however, was not found to be the case among patients with stomach or bladder cancer. In particular, smoking at diagnosis significantly increased the risk of death at 1 year post diagnosis for colorectal and lung cancer. These results persisted even after adjusting for socioeconomic status[123].

It has been proposed that smoking might be an independent prognostic factor for a number of cancers. How exactly smoking impacts on survival is unclear, but one hypothesis relates to the effects of smoking on immune competence[124], particularly in western lifestyles in terms of increased levels of hygiene, lack of exposure to infective agents in early life, increased exposure to carcinogens, higher levels of obesity and lower levels of physical activity. Further hypotheses on how smoking impacts on survival include: the inflammatory response[125]; metabolism of chemotherapy drugs and the potential failure of treatment due to smoking both before and after treatment[126]; and genetic damage and repair capacity in that smokers, non-smokers (passive smokers) and ex-smokers have significantly increased DNA damage associated with a decrease in DNA repair capacity[127].

Oberainger & Seiber[128] suggest a need for research which considers the impact of smoking on survival. Our research considered the effects of smoking on survival in males and females. Despite the fact that data used in the survival

analysis in this report may be a crude measure of smoking status - in that (i) it only considers smoking at diagnosis and not thereafter; (ii) it does not account for the level of tobacco consumption; and (iii) levels of missing data are quite high - it nevertheless begins to inform us of the deleterious effects of smoking on cancer survival in men and women. A major strength of this report is the ability of the National Cancer Registry to include smoking in the analysis on survival, indicating that while smoking does impact on survival; nevertheless, male survival is still poorer even after adjustment for smoking. Possible explanations for this, as outlined earlier, may include higher smoking rates in males, the possibility of poorer responses to treatment, poorer DNA repair capacity and poorer immune competence as a result of smoking.

A number of additional explanations for sex differences in survival have been proposed. Chatkin et al[122] reported that women live longer than men after surgery for stage 1 non-small-cell lung carcinoma (NSCLC) even after adjusting for a number of clinical factors. A systematic review of sex disparities in cancer mortality and survival pointed to a modest but appreciably worse survival in men for a number of cancers and that possible explanations for this could be increased co-morbidity in males and more aggressive tumour types in males[129]. In Ireland, the use of chemotherapy and radiation for Non-Hodgkins Lymphoma has been found to be lower in older patients and associated with lower survival[130,131]. Factors that were associated with the type of treatment received, and which significantly increased risk of death, included being male, older, not married or being a smoker[132]. Sharp et al[133] reported that there may be potential to improve survival at the population level through the extended dissemination of chemotherapy, along with greater utilisation of curative resection for pancreatic cancer.

A study by Sinicrope et al[134] has shown sex differences in survival related to obesity. Men with class 2/3 obesity had a 19% increased risk of death compared to normal weight men, with the risk of death increasing to 35% in very obese men. Among females however, there was no statistical difference observed. In addition, it has been reported that increased central adiposity and a lack of regular physical activity prior to a diagnosis of colorectal cancer was associated with poorer overall survival and poorer cancer specific survival[135]. However other studies have reported that neither BMI nor weight change (during or 6 months after completion of therapy) were associated with risk of death in patients with colon cancer[136,137]. A review of the role of diet and physical activity on cancer survival[138] suggested that excess weight is an important risk factor for cancer prognosis. The authors suggest that while weight gain and sedentary lifestyles are common after cancer diagnosis, there is a need to target the achievement of healthy weight in cancer survivors.

Dehmark-Wahnfield et al's[139] review of associations between energy balance (body weight, energy restriction and increased physical activity) and cancer recurrence and survival, pointed to age related co-morbidity as a potential factor impacting on survival The authors pointed to diabetes, in particular, as having the potential to increase the risk of death from breast, colon and prostate cancer, by 2 to 3 times that of patients without co-occurring disease. The authors suggested that this increase in risk may be a result of less aggressive treatment among diabetics, or less aggressive glucose control among those diagnosed with cancer. Incidence of diagnosed diabetes in Ireland is similar among males and females aged over 45 years, however there is a higher level of undiagnosed diabetes among men in the population (4% in men compared to 1.5% in women)[140].

Evidence also shows that physical activity is associated with reduced all-cause and colon cancer- specific mortality[141]. Exercise may result in beneficial changes in circulating levels of insulin, insulin-related pathways, inflammation and, possibly, immunity. Other research has pointed to the protective effect of marriage in terms of better outcomes from colon cancer[142], a possible result of better social and psychological support among married couples in addition to potentially healthier diets.

8.10 Conclusion

Tobacco smoke is a known cause of 16 different cancers and is one of the main modifiable risk factors in terms of reducing the incidence of cancer. In the context of this report, further reductions in tobacco use have the greatest potential in terms of decreasing incidence of cancer among men in the Republic of Ireland. Smoking rates are highest among younger men and it is therefore imperative to focus cessation programmes at younger people. Second hand smoke also increases risk in those who do not smoke and campaigns should aim to establish this in the mindset of smokers, particularly in relation to family members of smokers.

Excessive alcohol consumption is also firmly established as a key risk factor in the development of a number of different cancers. As highlighted in this chapter, high proportions of men in the Republic of Ireland binge drink and drink beyond recommended limits. The projected number of new cases of alcohol related cancers in Ireland is expected to double by the year 2020 for women and by 81% for men. Alcohol consumption and tobacco use are also linked in terms of increasing cancer risk further. Drinkers are more likely to be smokers than non-drinkers. Many studies have noted higher rates of alcohol and tobacco use in lower socio-economic groups, with cancer rates also being disproportionately higher in these groups. It would therefore be useful to develop gender-specific health promotion programmes which target alcohol and tobacco use in combination and that are directed specifically at lower socio-economic groups of men.

While evidence relating to diet and associations with cancer are generally weak, research shows that there are direct correlations between diet, physical activity and overweight and obesity and a number of cancers including kidney cancer, colorectal cancer, breast cancer and gallbladder cancer. In the case of men in the Republic of Ireland, for whom both incidence and mortality rates of colorectal cancer are higher than for women, the evidence points towards a need for more targeted health promotion in relation to overweight and obesity, physical activity and healthy diets. Men should also be encouraged to engage in the BowelScreen programme rather than presenting with symptoms when the disease is possibly at a later stage. Changes in diet and lifestyle therefore have the potential to substantially reduce the risk of cancers in men in the Republic of Ireland.

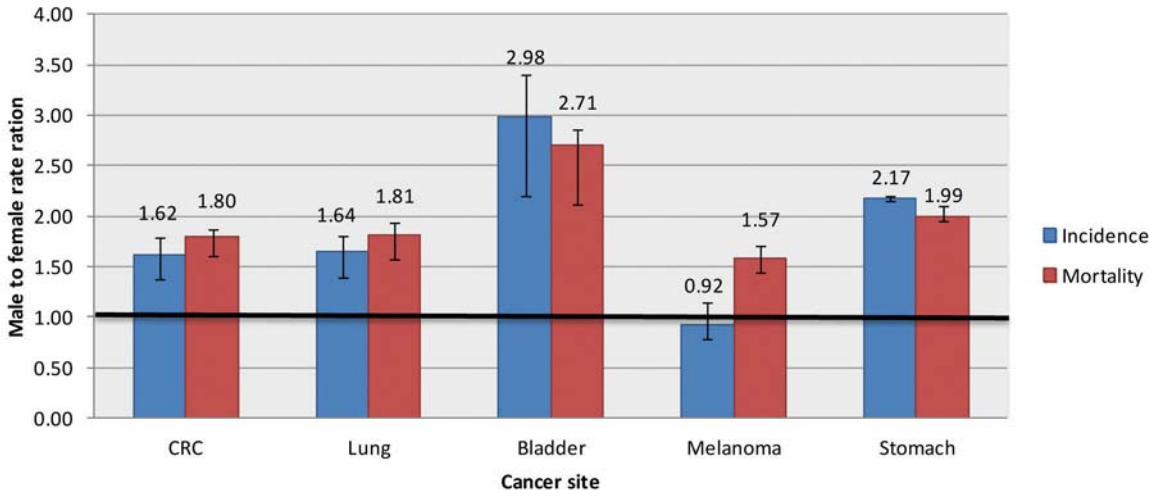
The evidence also points towards men having poorer awareness of cancer signs and symptoms and tending to underutilise screening opportunities when offered. Men also tend to have lower rates of health protective behaviours and tend to present to their doctor for curative rather than preventative reasons. Other evidence would point to particular masculine traits such as physical toughness, emotional control and self reliance as being in conflict with positive health behaviours.

Finally, survival, for those cancers considered, is poorer among men in the Republic of Ireland. While sex differences exist in relation to factors such as stage of disease at diagnosis and smoking, survival analysis indicates that, even after adjusting for these factors, males are still at greater risk of death from their cancer. Evidence would suggest that women have a biological advantage over men in terms of being more robust in coping with their cancer. Smoking status at diagnosis increases risk of death, however smoking may also be an independent prognostic factor, with evidence suggesting various explanations including higher smoking rates in males and the possibility of poorer responses to treatment, poorer DNA repair capacity and poorer immune competence as a result of smoking. Treatment may also impact on the poorer survival of males. Males may also be at a survival disadvantage as a result of overweight and obesity, lack of physical activity as well as age related co- morbidity.

9. DISCUSSION OF RESULTS AND CONCLUSIONS

Overall, the five cancers under examination in this report were similar in terms of incidence and mortality in that males have higher age standardised incidence, ranging from 1.6 to 3 times that of the equivalent female rate, except in the case of melanoma of the skin, where male rates are converging with female rates. Similarly age standardised mortality among males was higher, with rates ranging from 1.6 to 3 times that of the female mortality rate (Figure 9.1).

Figure 9.1: *Incidence and mortality rate ratios for selected cancers 2006-2008*



Risk of death for males was significantly higher for colorectal, lung, melanoma, and stomach cancer (at 5 years post diagnosis). This was the case even after adjusting for risk factors such as age, smoking status, marital status, deprivation index, histology and subsite.

The recent National Cancer Equality Initiative (NCEI) reportd in the UK has asked the question "what accounts for the differences in incidence and mortality between males and females and to what extent can these be accounted for by known risk factors, such as smoking, alcohol consumption and obesity? In addition a further question asks; what are the most effective ways to communicate cancer risk, prevention and screening messages to men and women across the equalities spectrum? The report outlines the similarities in the underlying causes of cancer inequality including:

- Greater risk factors, either because of lifestyle or genetic predisposition
- Later diagnosis, because of lower levels of awareness and therefore presentation, problems within primary care in identifying potential signs and symptoms, or lower uptake of screening opportunities
- Lower levels of active treatment, either because of patient preference or the assumptions made by clinicians about patient preferences
- Poor experience of treatment and care either because of different needs and preferences not being recognised/ met, or patients not feeling they have been treated with dignity and respect.

Actions in relation to these points would make significant contributions towards securing greater equality in terms of outcomes from cancer.

It is clear from evidence presented in this report that men in the Republic of Ireland have greater incidence (for all cancers examined except melanoma) and mortality (for all cancers examined), with lower survival from colorectal, lung, and melanoma skin cancer. The excess in these cancers in relation to mortality among males, can, it seems in large part, be explained by [traditionally] higher rates of tobacco use, higher levels of excess alcohol consumption, unhealthy diets, a high prevalence of overweight/ obesity, low levels of physical activity or inactivity and, to some extent, later presentation when chances of survival are lower.

[d] http://www.cancerinfo.nhs.uk/healthcare-professional/ncei

Nine of the eleven recommendations from the European Code against Cancer[106] apply to men, and are perhaps more important to men considering evidence presented in this report:

- Do not smoke if you smoke, stop doing so. If you fail to stop, do not smoke in the presence of non-smokers.
- Avoid obesity.
- Undertake some brisk, physical activity every day.
- Increase your daily intake and variety of vegetables and fruits: eat at least five servings daily.
- Limit your intake of foods containing fats from animal sources.
- If you drink alcohol, whether beer, wine or spirits, moderate your consumption to two drinks per day if you are a man or one drink per day if you are a woman.
- Care must be taken to avoid excessive sun exposure. It is specifically important to protect children and adolescents. For individuals who have a tendency to burn in the sun, active protective measures must be taken throughout life.
- Apply strictly regulations aimed at preventing any exposure to known cancer-causing substances. Follow all health and safety instructions on substances which may cause cancer. Follow advice of national radiation protection offices.
- Men and women from 50 years of age should participate in colorectal cancer screening. This should be within programmes with built-in quality assurance procedures.
- Participate in vaccination programmes against hepatitis B virus infection.

Changing lifestyle behaviours however remains a very challenging task and, as called for in this report, requires more targeted and gender-specific approaches to achieve better outcomes among those sectors of the population most in need (male, lower socio-economic groups). In addition to this, evidence seems to point to the fact that men's awareness of the signs and symptoms of cancer is lacking. This is compounded by men's reluctance to use health care services and their tendency to present for curative reasons rather than preventative reasons. While women's contact with health care services has, historically, been greater due to their needs in relation to gynecological services, men's lower utilisation of such services should be seen as a factor in their higher mortality and lower survival from cancer and other chronic diseases. Lower health service utilisation by men is also a result of traditional masculine norms whereby some men believe that seeking help for illness may be a sign of weakness, or that it may impact upon their work or career, or their ability to work and thus to support themselves and their families. Such associations and beliefs must be challenged in terms of encouraging men to seek help. Support in terms of care, treatment and financial stability needs to be extended to those who receive a cancer diagnosis[24].

Screening has traditionally been an option open to women for various forms of female specific cancers. Whilst prostate-specific antigen (PSA) testing is used for the detection of prostate cancer, specific issues exist such as over diagnosis and negative outcomes as a result of subsequent treatment. The only other screening available to men is for colorectal cancer. However, evidence points to the fact that males are less likely to take up the opportunity to be screened, even when screening is provided free of charge. With the recent introduction of the BowelScreen programme, there is a need to place specific emphasis on effective targeting of males in relation to uptake of screening.

10. RECOMMENDATIONS

The recommendations contained in this report build upon those contained in A Strategy for Cancer Control in Ireland (2006)[10] and the National Men's Health Policy (2008)[1] and are also in keeping with other reports and legislation, namely, the Report of the Strategic Task Force on Alcohol (2004)[119], the provisions of the Public Health (Tobacco) Acts, 2002 and 2004 and the Report of the National Task Force on Obesity (2005)[77]. Ostensibly, the key challenge in tackling the very grave statistics on male cancer incidence, survival and mortality, as outlined in this report is to apply a gender lens to existing programmes and services based on the National Men's Health Policy's principles of best practice in engaging with men. It is also imperative that men are not seen as a homogenous group and that the recommendations in this report account for the very pronounced differences in cancer incidence, mortality and survival between different subgroups of men, particularly those that are associated with socio-economic status. This enables us to move beyond a 'one size fits all' approach and to consider more innovative and creative ways of engaging with different subpopulations of men (e.g. rural or ethnic minority men), in settings more likely to appeal to men (e.g. workplaces or sports settings), and at critical transition points in men's lives (e.g. fatherhood, the onset of ill-health, retirement/unemployment) when men are more likely to be receptive to health behaviour change. There is also much scope for increased collaboration and partnership between statutory and charitable cancer organisations to work together to share knowledge and to mobilise resources in tackling the excess burden of cancer in men. The following recommendations offer a blueprint for a more targeted and gender-specific approach to addressing the key findings from this report:

10.1 Lifestyle behaviours

The following set of recommendations focus on bringing about positive changes to men's lifestyles, namely; improving diet, increasing consumption of fruit and vegetables, increasing physical activity, reducing levels of overweight and obesity, reducing tobacco use and reducing alcohol consumption. While these recommendations are consistent with existing preventative measures and health promotion approaches, the evidence from this report points to the need for a specific policy spotlight on men – gender-proofing existing and new approaches to ensure that men are not being over-looked in terms of health awareness, health promotion and other preventative measures designed to promote positive health behaviour change.

10.1.1 Tobacco use

The need to reduce use of tobacco is well established and smoking prevention efforts have yielded reductions in smoking among the male population. However it is clear that there is still a long way to go. Despite increases in female rates of smoking, males are still more likely to smoke, with evidence from the five cancers examined in this report revealing a higher proportion of male smokers than female smokers among those diagnosed with cancer. There is a consistent relationship with lung cancer and lower socioeconomic status reflecting high levels of tobacco use in lower social classes. Further reducing smoking rates among males will lead to reductions in incidence and mortality.

Recommendation	Action
1	Reduce smoking rates among men in the Republic of Ireland through targeted campaigns informing men of the risks and range of cancers attributable to tobacco use and through targeted smoking cessation initiatives[53].
2	Target men of lower socioeconomic status for smoking cessation programmes and initiatives[54].

10.1.2 Alcohol consumption

This report has highlighted that alcohol is associated with the development of several forms of cancer and that the rates of alcohol attributable cancers are higher in males than in females (10% v. 3% respectively). While alcohol consumption has decreased in the Republic of Ireland from a historic high level in 2001, overall rates of alcohol consumption and binge drinking in particular remain worryingly high in men, and there is an urgent need to focus campaigns on reducing alcohol use in the male population. Evidence also suggests that use of alcohol and tobacco act synergistically to increase risk for a number of cancers.

Recommendation	Action
3	The recommendations of the Steering Group Report On a National Substance Misuse Strategy[119] should be implemented in full with a particular focus on applying a gender lens across the four key pillars: 'Supply', 'Prevention', Treatment & Rehabilitation' and 'Research'.
4	The recommendations from the Strategic Taskforce on Alcohol[120] should be implemented in full with a particular focus on applying a gender lens across the ten key strategy areas. There should be a specific focus on raising men's awareness of the risks associated with the development of alcohol related cancers.
5	Increase efforts to reduce alcohol consumption in male sub- populations with high prevalence of alcohol consumption, particularly lower socio-economic groups.

10.1.3 Overweight / obesity and diet

There is a long-established association between overweight/obesity and increased risk of several types of cancer. It is also well documented that there is now a higher prevalence of overweight/obesity in males than in females in Ireland. Because males are more likely to deposit fat abdominally they are at an increased risk of developing cancers such as colorectal, liver, kidney, and oesophagus. This risk is again increased among males in their middle or older adult years. Avoiding or reducing overweight and obesity are important factors in greatly reducing men's risk of developing these cancers.

Recommendation	Action
6	In line with A Strategy for Cancer Control[10], the recommendations of the Report of the National Task Force on Obesity[77] should be implemented in full, with a particular focus on measures which raise awareness of the links between obesity and cancer risk in men and which provide tailored dietary information and weight loss/weight management programmes to men[118].
7	Increase the breadth and capacity of primary care teams to deal with obesity and, in particular, to adopt tailored and gender-specific approaches to promote healthy eating in men and to reduce obesity levels in men[118].

10.1.4 Physical activity

Physical activity is known to offer a protective effect against the development of a wide range of cancers, particularly prostate and colon cancer, as well as providing other health benefits. Strategies should consider how men's physical activity can be increased on an overall lifestyle basis through recreation, but should also consider occupational settings for further opportunities to increase levels of physical activity among men. It has been recommended that 30-60 minutes of moderate or vigorous physical activity be done at least 5 days per week.

Recommendation	Action
8	In line with the recommendations of the National Men's Health Policy[1], greater emphasis should be placed on the provision of appropriate recreational and leisure facilities for men across the lifespan, particularly for men in their middle and older years, when levels of physical activity tend to decline and cancer risk increases.
9	Adult men should be encouraged to engage in at least 30 minutes a day of moderate activity on 5 days a week in order to reduce their risk of developing cancer in accordance with the National Guidelines on Physical Activity for Ireland[117].

10.2 Cancer Awareness – signs and symptoms

Although evidence is limited in the Republic of Ireland, international evidence points to a lack of awareness among men of the signs and symptoms of many cancers, including lung cancer, colorectal cancer and melanoma. Lack of recognition of the signs and symptoms of cancer can lead to late presentation, reduced chances of survival and ultimately death. The presence of a lump can often be a warning sign, particularly in breast cancer; however a lump is not the most common symptom, especially for the more common cancers such as lung cancer and colorectal cancer. For example, it has been suggested that improving knowledge about CRC may encourage less negative attitudes about the disease with the possible outcome of increasing participation in screening. Informing those at risk, particularly males in the 55-75 age group that CRC is a very curable disease if caught early, should increase willingness to take up the opportunity to be screened.

While lung cancer screening programmes do not exist in the Republic of Ireland, there is a need to increase men's awareness of the signs and symptoms of lung cancer in order to facilitate earlier presentation with the disease. Braybrook et al[116] have advocated 'push' and 'pull' strategies which involve elements of social marketing and coproduction 'pushing' people towards services by using social marketing, campaigns, community events and co-production, and then 'pulling' them through the system as quickly as possible, using awareness raising and training for those working in primary care, and reviews of the sufficiency and efficiency of X-ray services in secondary care. This method concentrates on individuals who have had a cough for 3 weeks or more and encouraging them to go for an x-ray.

There is therefore a need to target education and awareness initiatives to improve men's awareness of signs and symptoms of these and other cancers, including melanoma of the skin, where evidence suggests that males present at later stages of the disease. As highlighted by Smith et al[108], confusion related to cancer symptoms has implications for health educators and indeed health promotion activities in making patients and their partners more aware and more vigilant of changes in the functioning of their bodies.

Recommendation	Action
10	Provide more targeted and gender-specific health awareness initiatives and health information to men (i) in settings where men are more likely to access such information (e.g. workplace); (ii) that are focused at key transitional periods in men's lives (e.g. fatherhood); and (iii) that specifically target lower socioeconomic groups of men. The focus of such initiatives should be on increasing men's awareness of signs and symptoms of cancer (particularly the most common cancers) and to encourage earlier help seeking and participation in organised screening where available.
11	Provide an increased focus on safe and reputable on-line cancer information for men. Consideration should also be given to linking existing reputable sites (e.g. Irish Cancer Society; Men's Health Forum in Ireland) to other sites that are commonly used by men.

10.3 Early detection and help seeking

As recommended in A Strategy for Cancer Control in Ireland (2006)[10], the HSE should develop specific programmes that promote early detection of cancer. However this is particularly important for men because of the lack of evidence based screening programmes that target men and because men's risk is increased due to poorer lifestyle behaviours such as higher rates of tobacco use, higher rates of alcohol use, poorer diets and higher levels of overweight and obesity. In addition, men have poorer knowledge and awareness of the risk factors associated with cancer compared to women. Thus there needs to be more targeted initiatives that focus on early detection and prompt help- seeking among men. Particular attention should be paid to the barriers to early help seeking for men which include fear, embarrassment, sexuality, financial implications of a diagnosis, masculinity, lack of recognition of symptoms, time wasting and not wanting to appear neurotic.

Recommendation	Action
12	In line with A Strategy for Cancer Control in Ireland[10] and the National Men's Health Policy[1] develop specific programmes that promote early detection and prompt help-seeking among men.
13	Provide an increased focus on training for primary care providers that focuses on (i) proactively addressing the barriers men are faced with in relation to early presentation; and (ii) making men feel more comfortable and welcome on initial point of contact with primary care services (where they are most likely to initially seek help if concerned about possible cancer symptoms).

10.4 Screening

Although screening has been developed for female specific cancers, there are, as yet, no evidence-based screening programmes for male-specific cancers. The National Cancer Screening Service recently introduced a national colorectal cancer screening programme (BowelScreen) which offers a valuable opportunity to impact on the incidence, survival and mortality rates among males and females from colorectal cancer. Evidence from other jurisdictions suggests that fewer men engage in CRC screening using the initial screening modality employed by NCSS (stool based sampling using Faecal Immunochemical Testing [FIT]). It has also been reported that those in low socioeconomic groups have lower uptake of screening. In our research, those from the most deprived quintiles had lower survival compared to those from the least deprived quintiles. Evidence also suggests that males are more likely to develop colorectal cancer at earlier ages. This would point to the need to introduce screening at an earlier age in men, although whether this would be (i) effective or (ii) cost effective has yet to be established.

Recommendation	Action
14	The uptake of the BowelScreen programme should be monitored in men (particularly lower socio-economic groups of men) and, if necessary, strategies implemented to maximise participation in these groups.

It has been suggested in other jurisdictions that information regarding CRC and CRC screening which is male specific should be developed alongside the general information. Marketing campaigns should target men specifically in order to increase their participation in screening, in light of the higher incidence and mortality rates from CRC among men.

Recommendation	Action
15	BowelScreen campaigns should consider gender-specific approaches that target men specifically, alongside information on the increased probability of reduced incidence and mortality as a result of being screened.

10.5 Future research

The following areas should be addressed for future research:

Recommendation	Action
16	Improvements in data collection would enable a greater understanding of the key factors associated with risk of developing cancer. Specifically, improved data collection in areas such as obesity and overweight levels, alcohol consumption patterns, co- morbidities, diet and physical activity levels would provide valuable yearly patterns which could be linked to cancer data currently being collated by the National Cancer Registry. Consider the feasibility of extending the dataset collected by the National Cancer Registry to include data on key lifestyle behaviours which may be available in medical records.
17	As recommended by the European Men's Health Forum in response to the State of Men's Health in Europe Report[27], National Cancer Plans should make specific recommendations to monitor and report male cancer patterns, specifically in relation to male cancer incidence, survival and mortality.
18	Further research is required in relation to how and why men do or do not seek help at the most appropriate juncture. Literature indicates that a focus on how men justify consulting more freely is warranted, rather than a deficit approach which assumes that all men are reluctant to seek help.
19	With the introduction of the BowelScreen programme, it is necessary that research focuses on the uptake of screening among men and women, particularly in light of men's higher incidence and mortality from CRC, and in relation to evidence that men are less likely to engage. Research should focus on men's motivations and attitudes to screening, with a particular emphasis on the influence of masculinity as a motivator or barrier. Such research will help in understanding how compliance with the programme can be improved.
20	Future research should focus on increasing the evidence base on 'what works' in relation to behaviour change and lifestyle improvement in men.

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