



Cancer Atlas of the United Kingdom and Ireland 1991–2000

Studies on Medical and Population Subjects No. 68

Editors:

Mike Quinn

Helen Wood

Nicola Cooper

Steve Rowan

palgrave
macmillan

© Crown copyright 2005

Published with the permission of the Controller of Her Majesty's Stationery Office (HMSO).

This publication, excluding logos, may be reproduced free of charge, in any format or medium for research or private study subject to it being reproduced accurately and not used in a misleading context. The material must be acknowledged as crown copyright and the title of the publication specified. This publication can also be accessed at the National Statistics website: www.statistics.gov.uk

For any other use of this material please apply for a free Click-Use Licence on the HMSO website:

www.hmso.gov.uk/click-use-home.htm

or write to HMSO at The Licensing Division, St Clements House, 2-16 Colegate, Norwich, NR3 1BQ

Fax: 01603 723000 or e-mail: hmsolicensing@cabinetoffice.x.gsi.gov.uk

First published 2005 by
PALGRAVE MACMILLAN

Houndmills, Basingstoke, Hampshire RG21 6XS and
175 Fifth Avenue, New York, NY 10010

Companies and representatives throughout the world.

PALGRAVE MACMILLAN is the global academic imprint of the Palgrave Macmillan division of St. Martin's Press, LLC and of Palgrave Macmillan Ltd. Macmillan® is a registered trademark in the United States, United Kingdom and other countries. Palgrave is a registered trademark in the European Union and other countries.

ISBN 1-4039-9645-8

This book is printed on paper suitable for recycling and made from fully managed and sustained forest sources.

A catalogue record for this book is available from the British Library.

10 9 8 7 6 5 4 3 2 1
14 13 12 11 10 09 08 07 06 05

Printed and bound in Great Britain by
Ashford Colour Press Ltd, Gosport.

A National Statistics publication

National Statistics are produced to high professional standards as set out in the National Statistics Code of Practice. They are produced free from political influence.

About the Office for National Statistics

The Office for National Statistics (ONS) is the government agency responsible for compiling, analysing and disseminating economic, social and demographic statistics about the United Kingdom. It also administers the statutory registration of births, marriages and deaths in England and Wales.

The Director of ONS is also the National Statistician and the Registrar General for England and Wales.

For enquiries about this publication, contact:

National Cancer Intelligence Centre

Tel: 01329 813759

E-mail: cancer@ons.gov.uk

For general enquiries, contact the National Statistics Customer Contact Centre.

Tel: **0845 601 3034** (minicom: 01633 812399)

E-mail: info@statistics.gsi.gov.uk

Fax: 01633 652747

Post: Room 1015, Government Buildings,
Cardiff Road, Newport NP10 8XG

You can also find National Statistics on the internet at

www.statistics.gov.uk

Contents

	Page
List of tables	iv
List of figures	v
List of maps	vi
Foreword	viii
Acknowledgements	x
Abbreviations	xii
1 Introduction – Mike Quinn	1
2 Geographical patterns in cancer in the UK and Ireland – Mike Quinn, Helen Wood, Steve Rowan, Nicola Cooper	7
3 Bladder – Nicola Cooper, Ray Cartwright	39
4 Brain – Paul Silcocks, John Steward, Helen Wood	51
5 Breast – Mike Quinn	63
6 Cervix – Mike Quinn	71
7 Colorectal – Steve Rowan, David Brewster	79
8 Hodgkin’s disease – Peter Adamson, Richard McNally	91
9 Kidney – Steve Rowan, Robert Haward, David Forman, Caroline Brook	101
10 Larynx – David Brewster, Henrik Møller	111
11 Leukaemia – Peter Adamson	119
12 Lip, mouth and pharynx – Henrik Møller, David Brewster	129
13 Lung – Helen Wood, Nicola Cooper, Steve Rowan, Mike Quinn	139
14 Melanoma of skin – Anna Gavin, Paul Walsh	151
15 Multiple myeloma – Peter Adamson	163
16 Non-Hodgkin’s lymphoma – Ray Cartwright, Helen Wood, Mike Quinn	173
17 Oesophagus – Helen Wood, David Brewster, Henrik Møller	183
18 Ovary – Paul Walsh, Nicola Cooper	193
19 Pancreas – Paul Walsh, Helen Wood	201
20 Prostate – Henrik Møller, Mike Quinn	211
21 Stomach – John Steward, Helen Wood	219
22 Testis – Henrik Møller	231
23 Uterus – Nicola Cooper	239
Appendices	
A Key maps	249
B Data tables	253
C Population estimates	343
D Figures and maps for all cancers combined	347
E Cancer maps – ‘absolute’ scale	357
F Socio-economic deprivation – Steve Rowan	377
G Data – background information – Steve Rowan, Helen Wood, Mike Quinn	379
H Methods – Steve Rowan, Mike Quinn	385
I Country profiles – Helen Wood (editor)	389
J United Kingdom Association of Cancer Registries – Mike Quinn	397
K Methodological issues considered – Mike Quinn	401
L Glossary	411

List of tables

	Page	
Chapter 2		
2.1	Incidence of the 21 cancers covered in Chapters 3-23, UK and Ireland, 1991-99	12
2.2	Mortality from the 21 cancers covered in Chapters 3-23, UK and Ireland, 1991-2000	12
2.3	Incidence of, and mortality from, all cancers combined: difference (%) from UK and Ireland average by country and region of England	15
2.4	Incidence of, and mortality from, all cancers combined: difference (%) between highest and lowest health authority rates by country and region of England	15
2.5	Characteristics of the 21 cancers covered in Chapters 3 to 23	18
2.6	Potential for prevention of cancer cases and deaths each year, UK and Ireland	33
Chapter 9		
9.1	Cases of and deaths from kidney cancer by sub-site, 1999	101
Appendix B		
B2.1 – B23.1	Annual average age-standardised incidence and mortality by health authority within country and region of England, UK and Ireland, 1991-2000: by sex	254–338
B2.2 – B23.2	Annual average numbers of registrations and deaths by health authority within country and region of England, UK and Ireland, 1991-2000: by sex	256–340
Appendix C		
C1 – C7	Population estimates by sex and five-year age group, UK and Ireland by country, 1996	344–345
C8	European standard population by five-year age group	345
C9	Population estimates: UK and Ireland, by country, region of England, and health authority, 1996	346
Appendix G		
G1	Time periods covered by incidence and mortality data	379
G2	Cancer site codes in ICD9 and ICD10	379
G3	Mortality-to-incidence ratios for Ireland: effect of DCO registrations	381
G4	Summary of advantages and disadvantages of incidence and mortality data	383
G5	Health authorities in the UK and Ireland	383
Appendix H		
H1	Colouring and ranges of values used for the 'relative scale' maps in Chapters 3-23	387
H2	Colouring and ranges of values used for the 'absolute scale' maps in Appendix E	387
H3	'Low' cancer incidence and mortality rates at the health authority level (used in calculating estimates of preventable cases and deaths)	387
Appendix K		
K1	Health authority areas and their equivalents by country, UK and Ireland	405

List of figures

		Page
Chapter 2		
2.1	Selected major causes of death: age-standardised mortality trends, England and Wales 1950-2003: by sex	8
2.2a	All cancers: age-standardised incidence and mortality, by sex, England and Wales 1950-2003	9
2.2b	All cancers: age-standardised incidence and mortality, by sex, Scotland 1950-2003	9
2.3	Selected major cancers: age-standardised incidence trends, England and Wales 1971-2002: by sex	10
2.4	Selected major cancers: age-standardised mortality trends, England and Wales 1971-2003: by sex	10
2.5	All cancers: age-specific incidence by sex and age group, UK and Ireland 1991-99	11
2.6	All cancers: frequency distribution of cases by sex and age group, UK and Ireland 1991-99	11
2.7	Major cancers: age-standardised incidence, UK and Ireland 1991-99: by sex	13
2.8	Major cancers: age-standardised mortality, UK and Ireland 1991-2000: by sex	13
2.9	Percentage of the population by socio-economic deprivation category, Great Britain 1991	14
Chapters 3-23		
3.1 - 23.1	Incidence by sex, country, and region of England, UK and Ireland 1991-99	41-240
3.2 - 23.2	Mortality by sex, country, and region of England, UK and Ireland 1991-2000	41-240
3.3 - 23.3	Incidence by health authority within country, and region of England, UK and Ireland 1991-99: by sex	42-241
3.4 - 23.4	Mortality by health authority within country, and region of England, UK and Ireland 1991-2000: by sex	43-241
Appendix C		
C1 - C7	Population estimates by sex and five-year age group, UK and Ireland by country 1996	344-345
C8	European standard population by five-year age group	345
Appendix D		
D2.1	All cancers: incidence by sex, country, and region of England, UK and Ireland 1991-99	349
D2.2	All cancers: mortality by sex, country, and region of England, UK and Ireland 1991-2000	349
D2.3	All cancers: incidence by health authority within country, and region of England, UK and Ireland 1991-99: by sex	350
D2.4	All cancers: mortality by health authority within country, and region of England, UK and Ireland 1991-2000: by sex	351

List of maps

Maps in Chapters 3-23 and Appendix D illustrate the *ratio* of the directly age-standardised rate in each health authority to the relevant average rate for the UK and Ireland. Maps in Appendix E illustrate the *actual* rates. See Appendix H for further details.

	Page
Chapter 2	
2.1	Lung: incidence by health authority, males, UK and Ireland 1991-99 (from Chapter 13) 17
2.2	Larynx: incidence by health authority, males, UK and Ireland 1991-99 (from Chapter 10) 17
2.3	Lip, mouth and pharynx: incidence by health authority, males, UK and Ireland 1991-99 (from Chapter 12) 17
2.4	Lip, mouth and pharynx: incidence by health authority, females, UK and Ireland 1991-99 (from Chapter 12) 17
2.5	Colorectal: incidence by health authority, males, UK and Ireland 1991-99 (from Chapter 7) 21
2.6	Pancreas: incidence by health authority, males, UK and Ireland 1991-99 (from Chapter 19) 21
2.7	Oesophagus: incidence by health authority, males, UK and Ireland 1991-99 (from Chapter 17) 21
2.8	Stomach: incidence by health authority, males, UK and Ireland 1991-99 (from Chapter 21) 21
2.9	Breast: incidence by health authority, females, UK and Ireland 1991-99 (from Chapter 5) 24
2.10	Breast: mortality by health authority, females, UK and Ireland 1991-99 (from Chapter 5) 24
2.11	Ovary: incidence by health authority, UK and Ireland 1991-99 (from Chapter 18) 24
2.12	Uterus: incidence by health authority, UK and Ireland 1991-99 (from Chapter 23) 24
2.13	Prostate: incidence by health authority, UK and Ireland 1991-99 (from Chapter 20) 25
2.14	Prostate: mortality by health authority, UK and Ireland 1991-99 (from Chapter 20) 25
2.15	Cervix: incidence by health authority, UK and Ireland 1991-99 (from Chapter 6) 25
2.16	Testis: incidence by health authority, UK and Ireland 1991-99 (from Chapter 22) 25
2.17	Bladder: mortality by health authority, males, UK and Ireland 1991-99 (from Chapter 3) 27
2.18	Kidney: mortality by health authority, males, UK and Ireland 1991-99 (from Chapter 9) 27
2.19	Brain: incidence by health authority, males, UK and Ireland 1991-99 (from Chapter 4) 27
2.20	Melanoma of skin: incidence by health authority, females, UK and Ireland 1991-99 (from Chapter 14) 27
2.21	Hodgkin's disease: incidence by health authority, females, UK and Ireland 1991-99 (from Chapter 8) 29
2.22	Non-Hodgkin's lymphoma: incidence by health authority, females, UK and Ireland 1991-99 (from Chapter 16) 29
2.23	Multiple myeloma: incidence by health authority, females, UK and Ireland 1991-99 (from Chapter 15) 29
2.24	Leukaemia: incidence by health authority, females, UK and Ireland 1991-99 (from Chapter 11) 29
2.25	Lung: incidence by health authority, females, UK and Ireland 1991-99 (from Appendix E) 30
2.26	Colorectal: incidence by health authority, females, UK and Ireland 1991-99 (from Appendix E) 30
2.27	Stomach: incidence by health authority, females, UK and Ireland 1991-99 (from Appendix E) 30
2.28	Ovary: incidence by health authority, UK and Ireland 1991-99 (from Appendix E) 30
2.29	Cervix: incidence by health authority, UK and Ireland 1991-99 (from Appendix E) 31
2.30	Bladder: mortality by health authority, females, UK and Ireland 1991-99 (from Appendix E) 31
2.31	Melanoma of skin: incidence by health authority, females, UK and Ireland 1991-99 (from Appendix E) 31
2.32	Leukaemia: incidence by health authority, males, UK and Ireland 1991-99 (from Appendix E) 31
Chapters 3-23	
3.1 – 23.1	Incidence by health authority, UK and Ireland 1991-99: by sex 44–242
3.2 – 23.2	Mortality by health authority, UK and Ireland 1991-2000: by sex 46–243

	Page
Appendix A	
A1	United Kingdom and Ireland: Health geography, 2001 (key map of health authorities) 250
A2	Cancer registries in the UK and Ireland and health regional offices within England 252
Appendix D	
D2.1	All cancers: incidence by health authority, UK and Ireland 1991-99: by sex 352
D2.2	All cancers: mortality by health authority, UK and Ireland 1991-2000: by sex 354
Appendix E	
	Incidence by health authority, UK and Ireland 1991-99: by cancer type and sex 358
	Mortality by health authority, UK and Ireland 1991-2000: by cancer type and sex 359
Appendix F	
F1	Deprivation by local authority (England and Wales) and health board (Scotland) in 1991 showing health authorities in 2001 378

Foreword

Maps – of all types – are fascinating, and are an extremely useful way of enabling the assimilation and understanding of large amounts of often complex geographical information. Many atlases of cancer incidence or mortality have been published around the world, and have led to the identification of areas with previously unsuspected high rates or to advances in knowledge about the causes of cancer.

Two cancer atlases for England and Wales (one of incidence and one of mortality) and one for Scotland (of incidence) have previously been published, and the UK was included in a cancer mortality atlas of the European Economic Community; these atlases, all published in the past 20 years, used data for different periods during the late 1960s to the mid-1980s. This atlas brings the information on geographical patterns of cancer up to date; it includes both incidence and mortality; and it covers not only all the four countries of the UK, but also Ireland.

It is well known that there are wide inequalities within the UK and Ireland in terms of who gets cancer, and what happens to them when they do. People in deprived areas are more likely to get some types of cancer and their survival from most types of cancer is lower. This atlas complements our current knowledge, and will prove invaluable in several ways. It enables rapid visual assessment of the range of variability in cancer incidence and mortality at the health authority level; it shows the locations of groups of areas adjacent to each other that have higher rates within larger areas for which the overall rate is not raised; and it identifies geographical patterns that cross administrative boundaries. The charts and maps also facilitate the assessment of the similarity – or otherwise – of the geographical patterns for diseases with related aetiology, such as those for which smoking tobacco is a major risk factor. The vast majority of cases of lung cancer are avoidable. But the wide differences around the world in the incidence of most of the other major cancers suggest that they too are largely avoidable. The results and analyses in this atlas show that despite all previous efforts to reduce the cancer burden, wide geographical differences in incidence still exist for many cancers in the UK and Ireland. This atlas highlights those cancers and areas where further education, provision of services, or attention to the environment – in the broadest sense, including diet – could markedly reduce the numbers of cancer cases and deaths.

Better recognition and understanding of the geographical patterns in cancer incidence and mortality will assist in ensuring that resources can be appropriately targeted, and that suitable baselines can be set against which the impact of policies and initiatives to tackle the problems can be measured.

This atlas was edited, collated, and in part written by staff at the National Cancer Intelligence Centre at the Office for National Statistics (ONS) with the collaboration of many experts, mostly from the cancer registries of the UK and Ireland. The authors of the 21 chapters on each of the specific types of cancer have taken particular care to discuss those aspects of data collection and data quality that may influence the interpretation of the results. They have also discussed the probable impact of the distribution of known risk factors and of socio-economic deprivation on the observed geographical patterns of cancer incidence and mortality. All of these chapters were peer reviewed by experts in the field of cancer epidemiology.

ONS and its predecessors have for many years published annual statistics on both cancer incidence and mortality (for England and Wales), and a compendium of trends in cancer incidence, mortality and survival was published in 2001. In collaboration with the London School of Hygiene and Tropical Medicine, extensive analyses of cancer survival trends over time by region and socio-economic deprivation have been published. Annual data on incidence and mortality and analyses of survival trends have also long been published for Scotland, and by the

cancer registries in Northern Ireland and Ireland that began operation in the early 1990s. In addition, they and the regional cancer registries in England publish a vast amount of detailed information relating to their geographical areas, as well as conducting research which is published in peer reviewed scientific and medical journals.

So much more is known about cancer than for many other diseases because for many years population based – and hence unbiased – data have been collected and collated through the cancer registration system. The cancer registries are essential for monitoring incidence, the effectiveness of screening programmes, and outcomes – particularly survival rates in relation to treatment. The NHS Cancer Plan for England, and similar plans in the other countries of the UK, recognise that these public health benefits depend on the completeness of cancer registration, and on its quality and timeliness. The Government strengthened the cancer registries in England following the review undertaken by Professor Charles Gillis in 2000. And with the current development of large and complex IT systems in the NHS, and the general concerns about the confidentiality of patients' information, the Government is determined to secure the future of the registries. The comprehensive information on cancer mortality presented in this atlas was based on the data collected by the four General Register Offices in the UK and Ireland. The high quality of those data and the validity of the results described in this atlas are due to the expertise and vigilance of all their staff.

I warmly welcome the publication of this atlas, which expertly illustrates the detailed picture of the cancer burden in the UK and Ireland and relates the geographical patterns in all of the major cancers to known risk factors and to levels of socio-economic deprivation.

A handwritten signature in black ink, appearing to read 'Mike Richards', written in a cursive style.

Professor M A Richards, National Cancer Director (England)

Acknowledgements

The editors in the London team of the National Cancer Intelligence Centre (NCIC) at the Office for National Statistics acknowledge with gratitude the following contributors to this atlas:

The directors and all the staff of the regional cancer registries in England and of the Welsh Cancer Intelligence and Surveillance Unit for their continued co-operation with the NCIC at ONS in the processing of the extremely large numbers of cancer registrations and death records.

All the staff of the NCIC teams in Titchfield and in Southport. The high quality of the national cancer database and the validity of the outputs based on it depend critically on their commitment and attention to detail.

The ONS staff in the General Register Office and in the Social and Vital Statistics Division for their work in collecting and processing the mortality data for England and Wales.

The directors and all the staff of the cancer registries and general register offices in Scotland, Northern Ireland and Ireland who collected the original cancer registration and mortality data for those countries; and those staff who liaised with ONS and supplied the aggregated information for inclusion in this atlas.

The authors of chapters 3-23 – their full details and affiliations are:

Peter J Adamson BSc MSc
Research Fellow, Epidemiology and Genetics Unit, University of York

David H Brewster MD MSc FFPH MRCP DCH DRCOG
Director, Scottish Cancer Registry, Edinburgh
Honorary Clinical Senior Lecturer, Division of Community Health Sciences, University of Edinburgh

Caroline Brook BA(Hons) MSc
Information Services Manager, Northern and Yorkshire Cancer Registry and Information Service, Leeds

Ray A Cartwright MA PhD FFPH FFOM FRC(Edin)
Emeritus Professor of Cancer Epidemiology, University of Leeds

David Forman BA PhD FFPH
Director of Information and Research, Northern and Yorkshire Cancer Registry and Information Service, Leeds
Professor of Cancer Epidemiology, Centre for Epidemiology and Biostatistics, University of Leeds

Anna T Gavin MB BCH BAO MSc FFPHM
Director, Northern Ireland Cancer Registry, Belfast
Senior Lecturer, Queen's University Belfast

Robert A Haward FFPHM DPH MBChB QHP
Medical Director, Northern and Yorkshire Cancer Registry and Information Service, Leeds
Professor of Cancer Studies, University of Leeds

Richard McNally BSc MSc DIC PhD
Reader in Epidemiology, University of Newcastle upon Tyne

Henrik Møller BA BSc MSc DM FFPH
Director, Thames Cancer Registry
Professor of Cancer Epidemiology, Guy's, King's and St Thomas' School of Medicine, London; and the London School of Hygiene and Tropical Medicine

Paul Silcocks BSc BM BCH MSc FRCPath FFPH CStat
Medical Advisor, Trent Cancer Registry, Sheffield
Clinical Senior Lecturer Trent RDSU (University of Nottingham), Queen's Medical Centre, Nottingham

John Steward MBBCh BA MSc PhD FFPH
Director, Welsh Cancer Intelligence and Surveillance Unit, Velindre NHS Trust, Cardiff
Honorary Senior Lecturer, Epidemiology, Statistics, Public Health, University of Cardiff

Paul M Walsh BSc MSc PhD
Epidemiologist, National Cancer Registry (Ireland), Cork

The experts in the field of cancer epidemiology who reviewed Chapters 3-23.

Colleagues at ONS involved in the publication process:

James Twist, Andy Leach, Tony Castro – Design

Paul Hyatt – Publications

Ali Dent, Pam Blunt, Jeremy Brocklehurst, Deborah Rhodes – ONS Geography

Phil Hodgson – Editorial

Diane Bennett, Kim Slatter, Sue Wilde, Dave Pike, Angela Cannell – Desk Top Publishing

Marged Lloyd and Claudine Munro-Lafon – Web Team

Cindy Robinson and Maya Malagoda – former members of the NCIC team in London who worked on this atlas in its early stages.

Editors:

Mike Quinn BSc MSc PhD CStat, Director, NCIC

Helen E Wood BA MA DPhil, Research Officer, NCIC

Nicola Cooper BSc, Senior Epidemiologist, NCIC

Stephen D Rowan, Research Officer, NCIC

Cover picture: Getty Images

Abbreviations

ALL	acute lymphoblastic leukaemia
AML	acute myeloid leukaemia
CIN	cervical intraepithelial neoplasia
CLL	chronic lymphocytic leukaemia
CML	chronic myeloid leukaemia
CT	computed tomography
DCO	death certificate only
DH	Department of Health
EBV	Epstein-Barr virus
EEC	European Economic Community
FOBt	faecal occult blood test
GOR	government office region
GRO	General Register Office (England and Wales)
GRONI	General Register Office for Northern Ireland
GROS	General Register Office for Scotland
H pylori	helicobacter pylori
HD	Hodgkin's disease
HHV-6	human herpes virus type 6
HIV	human immunodeficiency virus
HPV	human papillomavirus
HRT	hormone replacement therapy
ICD	International Classification of Diseases (ICD9, ninth revision; ICD10, tenth revision)
ICDO	International Classification of Diseases for Oncology (ICDO2, second edition)
LA	local authority
MGUS	monoclonal gammopathy of unknown significance
M:I	mortality-to-incidence ratio
MRI	magnetic resonance imaging
NAW	National Assembly of Wales
NCIC	National Cancer Intelligence Centre (at the Office for National Statistics)
NCRI	National Cancer Registry of Ireland
NHL	non-Hodgkin's lymphoma
NHS	National Health Service
NHSCR	National Health Service Central Register
NICR	Northern Ireland Cancer Registry
NMSC	non-melanoma skin cancer
NSAID	non-steroidal anti-inflammatory drug
ONS	Office for National Statistics
OPCS	Office of Population Censuses and Surveys
PAS	patient administration system
PCT	primary care trust
PSA	prostate-specific antigen (test)
SCC	squamous cell carcinoma
SHA	strategic health authority
SIR	standardised incidence ratio
SMR	standardised mortality ratio
UK	United Kingdom
UKACR	United Kingdom Association of Cancer Registries
USA	United States of America
WAG	Welsh Assembly Government
WCISU	Welsh Cancer Intelligence and Surveillance Unit
WHO	World Health Organisation