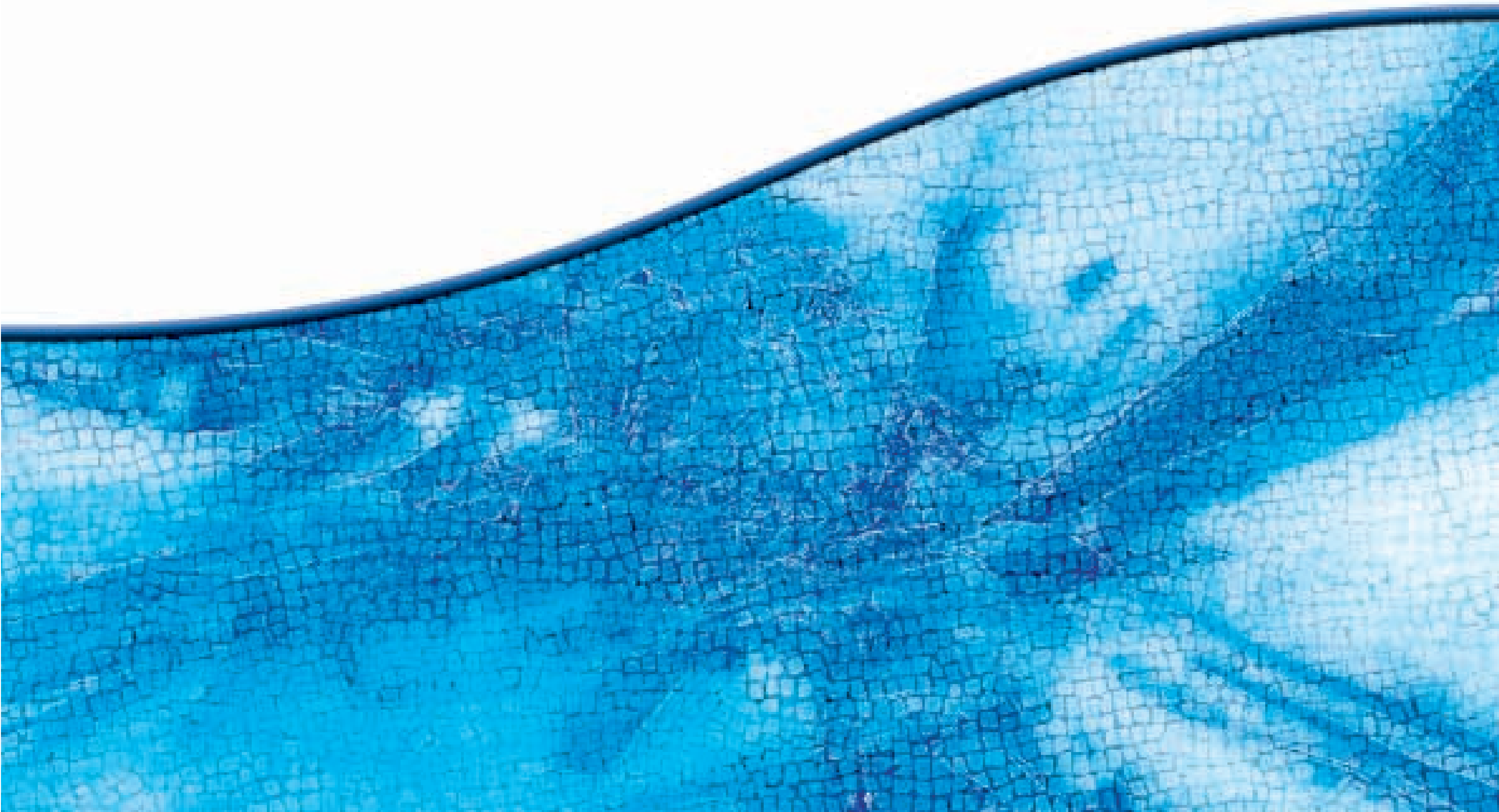
NHS
Health Development Agency

# The smoking epidemic in England



Health Development Agency

# The smoking epidemic in England

*Liz Twigg, Graham Moon and Sarah Walker*

*Institute for the Geography of Health, University of Portsmouth*

This document is also published on the Health Development Agency website at www.hda.nhs.uk

## Acknowledgements

We would like to thank all staff from the National Centre for Social Research, the Office for National Statistics (ONS), the Northern Irish Statistics and Research Agency (NISRA), Information and Statistics Division, Scotland, and Manchester Information and Associated Services (MIMAS), who helped with the supply of data for this project.

In addition, we are also very grateful to Nick Adkin, Patsy Bailey, Lorna Booth, Simon Capewell, Eileen Goddard and Lesley Owen for their hard work and contribution in peer reviewing a succession of drafts.

Finally, thanks are also due to Angela Collard, Jane Wright, Brenda Fullard, Paul Hooper and Becky Pollard for their helpful comments and support.

Copies of this publication are available to download from the HDA website (www.hda.nhs.uk).

Health Development Agency
Holborn Gate
330 High Holborn
London
WC1V 7BA

Email: communications@hda-online.org.uk

ISBN 1-84279-318-7



## About the Health Development Agency

The Health Development Agency (www.hda.nhs.uk) is the national authority and information resource on what works to improve people's health and reduce health inequalities in England. It gathers evidence and produces advice for policy makers, professionals and practitioners, working alongside them to get evidence into practice.

# Contents

# Foreword

We are in the grip of a smoking epidemic: an estimated 106,000 people in the UK are dying needlessly each year because of smoking. This smoking epidemic is also a root cause of health inequality – numbers of deaths are higher in disadvantaged areas.

I welcome the publication of *The smoking epidemic in England* which starkly sets out the scale of the problem we face. The report presents the latest estimates of deaths caused by cigarette smoking in England and the UK. For the first time, it presents the estimated figures of smoking–attributable deaths in each primary care trust (PCT) across England. Significant health inequalities are revealed with the percentage of deaths caused by smoking varying by around 20% across primary care trusts.

Although the number of deaths caused by smoking reflects past smoking behaviour, the findings from this report suggest that these alarming variations will continue for some time. As the researchers note, these figures will almost certainly underestimate the impact of smoking, as they do not take account of the number of deaths caused by second-hand smoke.

Smoking isn't just a national problem; these figures show clearly how our local communities are affected. We're making progress with smoking cessation programmes, but we still have a long way to go. I believe that this report will be a valuable tool to help primary care trusts make the case for smoking cessation resources in their area, and a useful document for everyone working to tackle the prevalence of smoking in this country.

**Sir Liam Donaldson**
*Chief Medical Officer*
*Department of Health*

# Summary

This report summarises research commissioned by the Health Development Agency and undertaken by the Institute for the Geography of Health, University of Portsmouth. The main objective of the study was to estimate levels of smoking-attributable mortality across two target geographies: primary care trusts (PCTs) and strategic health authorities (SHAs) in England.

Estimates of smoking-attributable deaths are based on data from three sources: published relative risk factors for mortality of current and ex-smokers from various diseases; small-area counts of death by cause in England for the period 1998–2002; and small-area estimates of current and ex-smoking behaviours. Smoking information is unavailable for small areas across England, so the data were generated using multi-level synthetic estimation techniques applied to four runs of the Health Survey for England (HSfE) (1998–2001). The report also briefly discusses the general methodology and substantive results relating to the synthetic estimation of smoking behaviour.

A second objective was to produce an overall UK estimate of smoking-attributable mortality with separate figures for England, Wales, Scotland and Northern Ireland. To produce this estimate, the English smoking-attributable mortality figures were derived from the first stage of the research outlined above. Figures for Scotland were available from a similar, parallel project undertaken by the researchers. The equivalent figures for Wales and Northern Ireland were derived by applying the published relative risk factors to national estimates of age- and sex-specific rates of current and ex-smoking. The derived attributable proportions were then applied to national counts of cause-, sex- and age-specific mortality.

It should be emphasised that throughout this report the focus is on estimation. Reported figures are estimates, and should be treated as such. They reflect expected values for the topics under investigation, controlling for relevant individual and geographical characteristics, and should not be regarded as absolute or exact. In the absence of direct, routine measures they are, however, an acceptable and available substitution.

## Key findings

- Adult smoking prevalence in England (1998–2001) was estimated at 27%. Rates estimated for men were slightly higher (28%) than for women (26%).
- Over a third of men aged under 54 and a third of women under 44 in England were estimated to be current smokers. Highest rates were found among men aged 25–34, where prevalence was estimated to be as high as 40%.
- Large spatial variations were estimated across the English PCTs, with rates ranging from 20 to 40%.
- Less variation was estimated at the English SHA level, where lowest rates are around 25% and highest rates were given as 30%.
- Just over one third of adults in England were estimated to be ex-smokers, with higher rates estimated for men compared with women (35 versus 28%).
- A strong age gradient exists in the estimated proportion of ex-smokers across England, with highest rates reported for the elderly.
- Geographical variation in ex-smokers is estimated to range between 15 and 38% for English PCTs and between 24 and 34% for English SHAs.
- In terms of smoking-attributable mortality, it was estimated that between 1998 and 2002 an annual average of 86,500 deaths were caused by smoking in England.
- Of these deaths, 62% were among men and 38% among women.
- The greatest impact is on the number of lung cancer deaths, where just over nine in ten male lung cancer

deaths and eight in ten female lung cancer deaths in England were smoking-attributable.

- A particularly high death toll is found for chronic obstructive lung disease, where it is estimated that 17,400 deaths each year in England were caused by smoking.
- 11,500 deaths from ischaemic heart disease among those over 65 in England were estimated to be smoking-attributable.
- Across the UK it is estimated that one quarter of female deaths and just over one third of male deaths from diseases associated with smoking were attributable to smoking. In terms of total deaths (all causes), approximately 23% (men) and 12% (women) are attributable to smoking.
- The number of deaths from smoking-attributable disease has decreased. Across the UK there were approximately 120,000 deaths attributable to smoking in 1995, and just over 106,000 per annum between 1998 and 2002. This represents an estimated fall from just over one in five deaths in 1995 to just under one in six deaths for the later period.

Looking to the future, it can be anticipated that smoking-attributable deaths will continue to decline. The rate of this decline may decrease as prevalence rates level out. This report highlights the varying levels of estimated prevalence across gender and age. If sustained reductions in smoking-attributable deaths are to be maintained, particular attention will need to be paid to groups where current smoking is not reducing – this suggests that initiatives focusing on younger adults will be particularly important.

# Aims and objectives

The primary aim of this project was to investigate the impact of smoking behaviour on mortality by providing an estimate of the proportion of deaths in England that are directly attributable to smoking. This work updates previous investigations (Health Education Authority, 1991; Callum, 1998) and uses published risk factors that link smoking behaviour with smoking-attributable mortality.

Previous work has focused on the production of a single national or UK figure for smoking-attributable mortality, due to the unavailability of estimates of smoking behaviour across small areas. In the work presented here, synthetic estimation is used to derive small-area profiles of current smoking prevalence and the proportion who are ex-smokers. This allows for the description of smoking-attributable mortality to be undertaken across ‘bespoke’ but policy-relevant areas such as PCTs and SHAs.

A secondary aim was to produce an updated UK estimate of smoking-attributable mortality to compare with the figure provided by Callum (1998). A consequence of this objective was that the present study does not consider the impact of passive smoking on mortality. In producing an estimate of smoking-attributable mortality, the figures for England are derived from the first stage of the project. Similar estimates are also available for Scotland (Moon *et al*., 2003). For Wales and Northern Ireland, direct survey estimates of national age- and sex-specific rates of smoking and ex-smoking behaviour are used with the published risk factors that link such behaviours with smoking-attributable mortality.

The specific objectives are to:

- Provide profiles of smoking behaviour for the 303 PCTs and 28 SHAs across England
- Estimate the smoking-attributable proportion of deaths occurring across SHAs and PCTs by applying a standard equation that links disease-specific risk with smoking behaviour
- Provide estimates of gender-specific and, for certain diseases, age-specific counts of the number of smoking-attributable deaths across disease groups for England
- Generate estimates of the smoking-attributable proportion across the bespoke geographies
- Provide a UK estimate of smoking-attributable mortality with summary figures for England, Wales, Scotland and Northern Ireland.

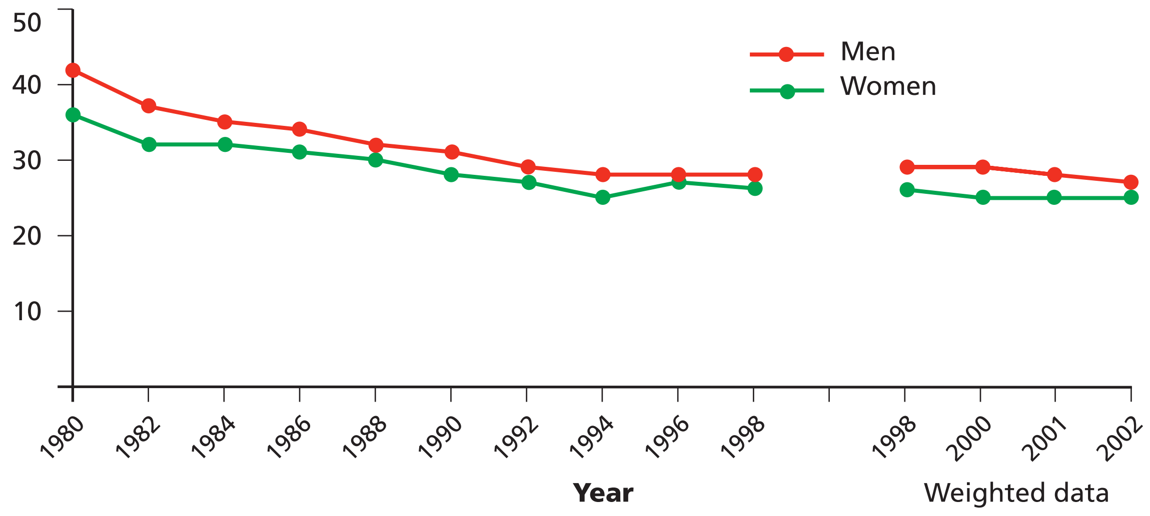
# Background

Results from the General Household Survey indicate that 26% of adults (aged 16 or over) smoked cigarettes in 2002 (ONS, 2004). This percentage was made up of 27% men and 25% women. Although rates have fallen since the early 1980s, the decline levelled in the mid-1990s. This trend is shown in Figure 1. Data for the past three years up to 2001 are separated from the main graph, as these are based on a weighted sample of General Household Survey respondents designed to make up for under-representation of certain subgroups of the population. Prevalence rates varied by age. For both sexes, the highest rates were found among the 20–24 year olds, with reported rates for 2001 at 39 and 35% for men and women, respectively.

The proportion of ex-smokers in the population remained relatively stable over the same period, with more men (27%) than women (21%) stating that they were ex-regular smokers (Department of Health, 2003).

Smoking prevalence and mortality data for 1995 were used to produce the last estimate of smoking-attributable mortality (Callum, 1998). It was estimated that across the UK 120,000 deaths among people aged over 35 were due to smoking. This represented one in five of all deaths, 84% of all deaths from lung cancer, and 15% of all circulatory diseases. In England the estimated number of deaths due to smoking in 1995 was 98,800, with the percentage of all deaths, at all ages, caused by smoking given as 26% for men and 12% for women. English studies since Callum's report include those produced by the Royal College of Physicians (2000) and Peto *et al.* (2004). Other analyses are restricted to a regional (eg SWPHO, 2003) or subregional focus (eg Bedfordshire and Hertfordshire SHA, 2004).

**Figure 1 Prevalence of smoking cigarettes among adults aged 16+ in England 1980–2002, by gender (*Source*: ONS, 2004)**



# Method

Focusing on smoking-attributable mortality at PCT and SHA levels requires information on smoking and past smoking prevalence at these levels, as well as information on deaths from smoking-related disease. While relevant data on mortality are available, information on smoking prevalence has only recently become available at the SHA level, and is estimated by merging data from several runs of the HSfE. (These data became available after the start date of this project, and can now be downloaded in electronic format from the Department of Health website: www.dh.gov.uk/PublicationsAndStatistics/PublishedSurvey/HealthSurveyForEngland/HealthSurveyResults/fs/en). National surveys such as the General Household Survey and the HSfE are only reliably representative at the regional level for any one year.

To bridge this information gap in identifying the prevalence of current smoking and the proportion of ex-smokers in SHAs and PCTs requires synthetic statistical estimation. Synthetic estimation allows identification of the numbers of people in each SHA or PCT who, given certain assumptions, might be expected to be current or ex-smokers. Robust procedures are available to generate high quality synthetic estimates (Box 1). Once data on smoking prevalence are available, they can be used in conjunction with published formulae to identify smoking-attributable mortality. A technical account of the synthetic estimation process is given in Appendix 1.

### *Box 1 Synthetic estimation: quality assurance*

We use the procedure of Twigg *et al*. (2000). This has been:

- Subject to peer-reviewed evaluation in a leading journal (Twigg *et al*., 2002)
- Assessed and reviewed favourably by the National Centre for Social Research (NatCen) (Bajekal *et al*., 2004)
- Applied and reviewed favourably in investigating the links between social capital and health (Mohan *et al*., 2004a,b).

The application of this procedure in the present research has been subject to extensive quality checking (Appendix 3).

# Results: current and past smoking behaviour

## Current smoking prevalence

Although this report is not concerned with ward-level estimates of smoking and ex-smoking prevalence, it is useful to look at the overall averages across the 7,932 wards of England, noting gender differences and the overall spread of the results. The estimated overall average smoking prevalence (for those aged 16+) is given as 27%, with a slightly higher average for males (28%) compared with females (26%). Table 1 indicates how the sex-specific rates vary with age. Highest rates are found among 25–34 year olds for men and 16–24 year olds for women. These estimates suggest that over a third of men are smoking until the age of 54, and around a third of women do so until the age of 44. Rates decline to around 23 or 24% for those aged 55–64, and just under one fifth smoke between the ages of 65 and 74. Lowest prevalences (around 10%) are reported for both men and women in the over-75 age group. Prevalences are lowest in the elder age groups partly because of quitting, but also partly because of the increased risk of smokers dying.

**Table 1 Estimated smoking prevalence by sex and age using Health Survey for England data, 1998–2001**

| Age group | Estimated current smoking prevalence (%) | | |
|---|---|---|---|
| | Males | Females | All Persons |
| 16–24 | 36 | 36 | 36 |
| 25–34 | 38 | 35 | 36 |
| 35–44 | 34 | 30 | 32 |
| 45–54 | 30 | 28 | 29 |
| 55–64 | 24 | 23 | 23 |
| 65–74 | 18 | 18 | 18 |
| 75+ | 10 | 10 | 10 |

## Geographical differences

The distribution of prevalences across the 303 PCTs for England is shown in Figure 2. The lowest prevalences are just under 20% and the highest is just over 40%. The average prevalence across PCTs is around 28%, with a standard deviation of 4.2%. The estimates for all PCTs are given in Appendix 6.

Figure 3 maps the spatial distribution of estimates of current smoking prevalence across the 303 PCTs for England. Highest rates are clustered around the urban areas of inner London, parts of the North East, the North West, the West Midlands and East Midlands. Lowest rates are found in some of the more rural areas such as Devon, Cornwall, East Anglia, the southern English Midlands, North Yorkshire, North Lancashire and the southern Home Counties.

In terms of SHAs, the estimated prevalences are shown in ascending order in Table 2 (page 9). Lowest rates (around 25%) are estimated for Surrey, Sussex, Dorset, Somerset, Coventry, Warwickshire, Herefordshire, Worcestershire and Thames Valley. Highest prevalences are found in parts of London, the North East, Greater Manchester and South Yorkshire, where prevalence rates are predicted to be above 30%. The prevalences are mapped in Figure 4.

**Figure 2 Estimated smoking prevalence across PCTs**

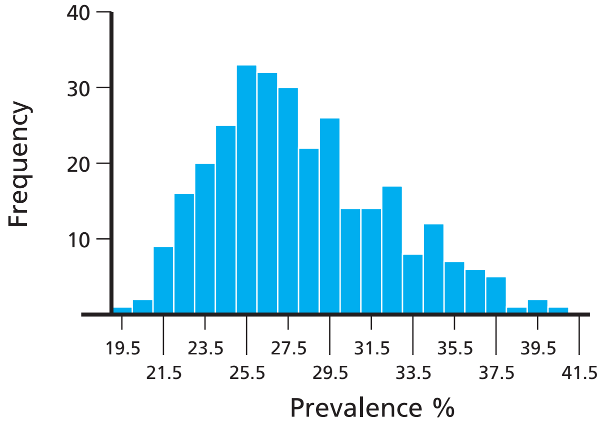


**Figure 3  Estimated current smoking: PCTs**

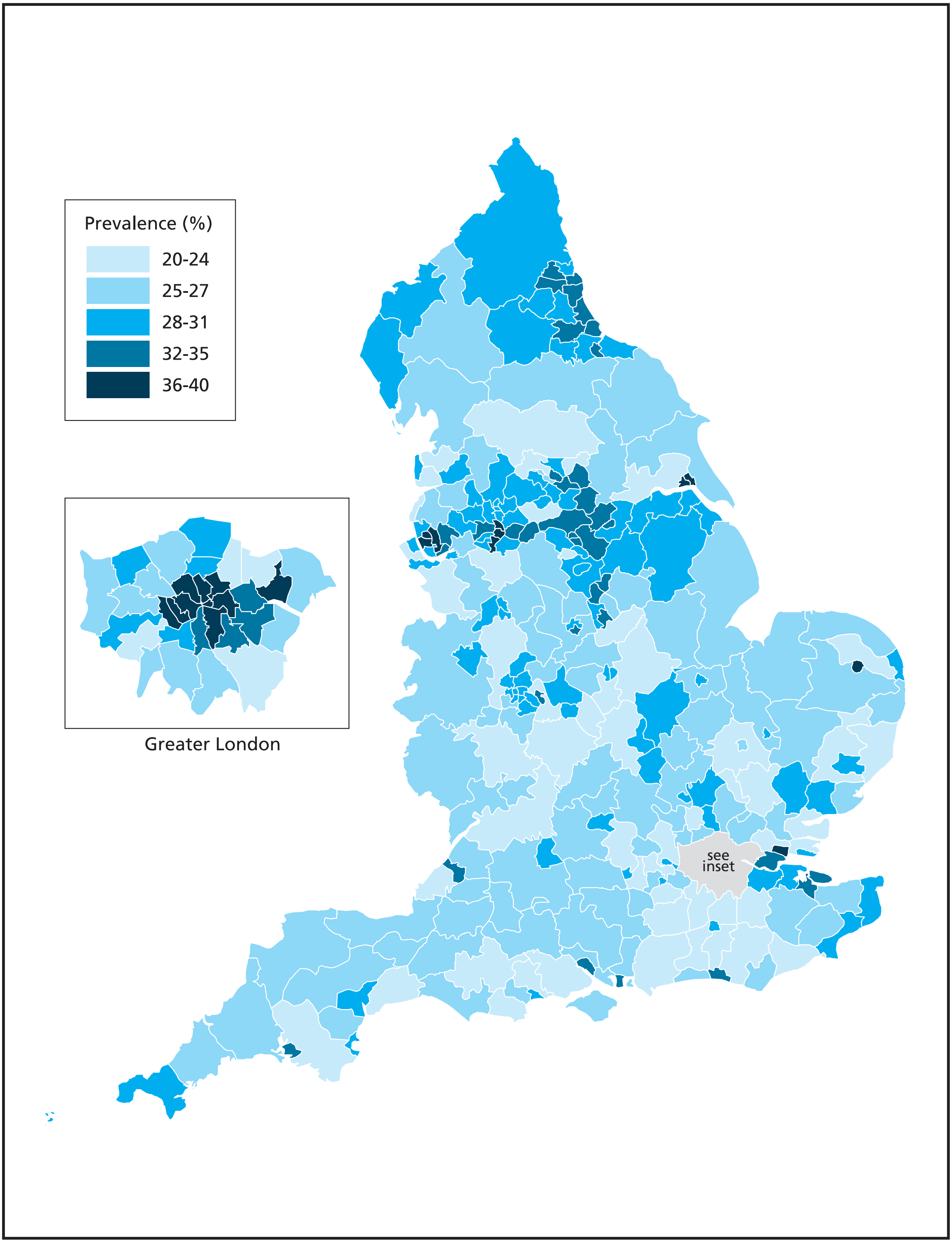
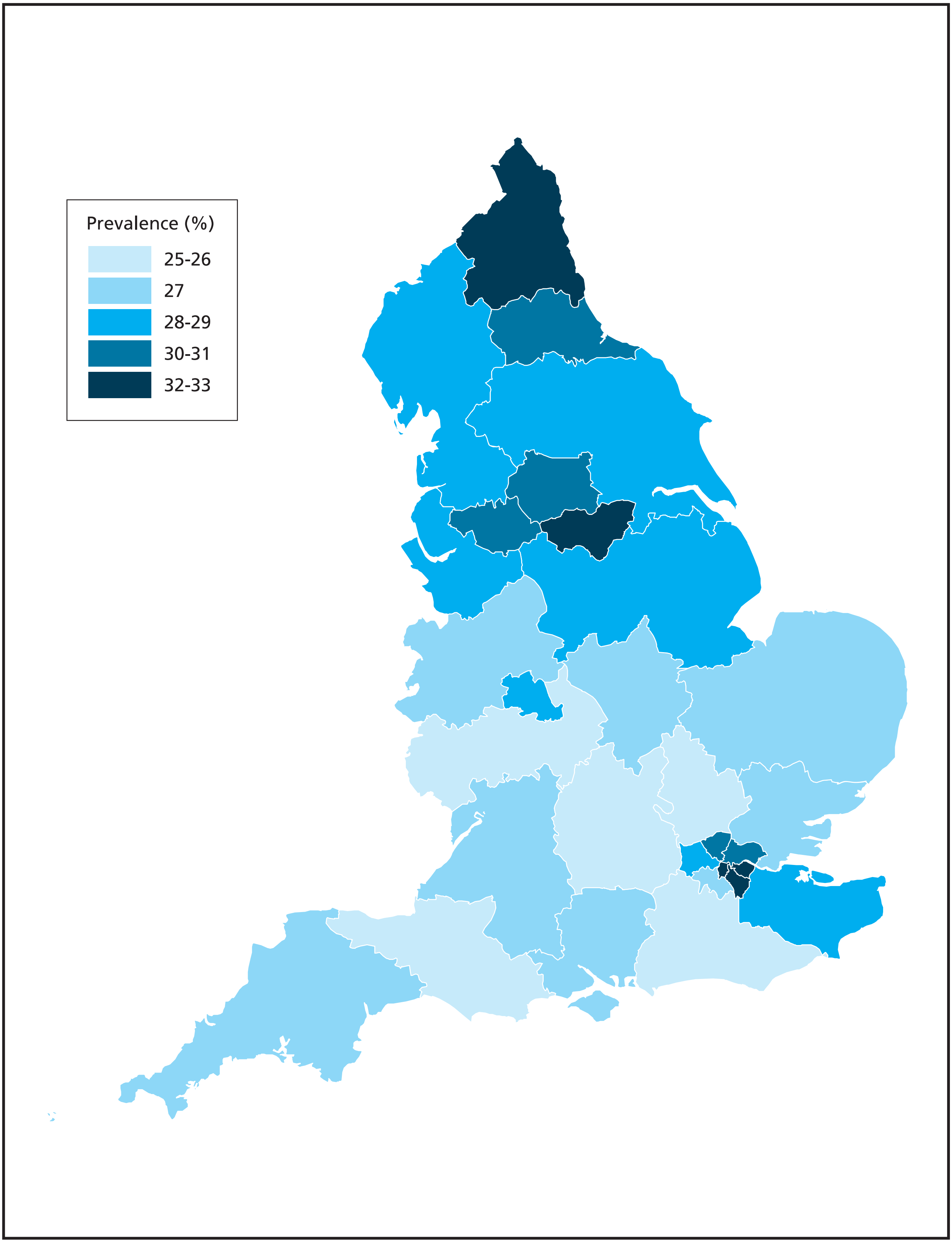


**Figure 4 Estimated current smoking: SHAs**



| SHA code | SHA | Current smoking prevalence (%) |
|---|---|---|
| Q19 | Surrey and Sussex | 25 |
| Q22 | Dorset and Somerset | 25 |
| Q28 | Coventry, Warwickshire, Herefordshire and Worcestershire | 26 |
| Q16 | Thames Valley | 26 |
| Q02 | Bedfordshire and Hertfordshire | 26 |
| Q20 | Avon, Gloucestershire and Wiltshire | 27 |
| Q08 | South West London | 27 |
| Q25 | Leicestershire, Northamptonshire and Rutland | 27 |
| Q01 | Norfolk, Suffolk and Cambridgeshire | 27 |
| Q03 | Essex | 27 |
| Q26 | Shropshire and Staffordshire | 27 |
| Q21 | South West Peninsula | 27 |
| Q17 | Hampshire and Isle of Wight | 27 |
| Q13 | Cumbria and Lancashire | 28 |
| Q11 | North and East Yorkshire and Northern Lincolnshire | 28 |
| Q18 | Kent and Medway | 28 |
| Q04 | North West London | 28 |
| Q24 | Trent | 28 |
| Q27 | Birmingham and the Black Country | 29 |
| Q15 | Cheshire and Merseyside | 29 |
| Q12 | West Yorkshire | 30 |
| Q05 | North Central London | 31 |
| Q10 | County Durham and Tees Valley | 31 |
| Q14 | Greater Manchester | 31 |
| Q06 | North East London | 31 |
| Q23 | South Yorkshire | 32 |
| Q07 | South East London | 32 |
| Q09 | Northumberland, Tyne & Wear | 33 |

**Table 2 Estimates of current smoking prevalence: SHAs**

## Ex-smoking behaviour

The overall average percentage of ex-smokers across the 7,932 wards of England is estimated at 31%. There are slightly higher rates for males (35%) compared with females (28%). The age- and sex-specific estimated percentages are shown in Table 3.

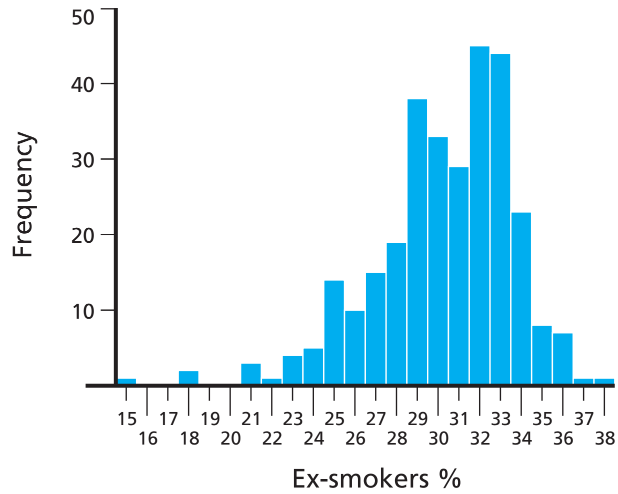
There is a strong age gradient in the estimated proportion of ex-smokers across both sexes, with higher proportions reported in the higher age groups. Gender differences are negligible below age 44; above this age higher proportions are estimated for males compared with females. For those aged over 75, over two thirds of men are estimated to be ex-smokers compared with just over 40% of women. These age and gender differences reflect historical age–sex variation in smoking prevalence.

The overall distribution of estimated ex-smoking across the 303 PCTs is shown in Figure 5. The lowest estimated rate is just under 15% and the highest is around 38%. The average percentage is around 30%, with a standard deviation of 3.4%. Again the full data set is given in Appendix 6.

Figure 6 maps the spatial distribution of estimates of ex-smoking percentages across the 303 PCTs for England. High

| Table 3 Estimated proportions of ex-smokers by age group and sex | | | |
|---|---|---|---|
| | Estimated proportion of ex-smokers (%) | | |
| Age group | Males | Females | All Persons |
| 16–24 | 11 | 12 | 12 |
| 25–34 | 19 | 20 | 20 |
| 35–44 | 23 | 23 | 23 |
| 45–54 | 36 | 28 | 32 |
| 55–64 | 49 | 33 | 41 |
| 65–74 | 59 | 38 | 48 |
| 75+ | 68 | 42 | 52 |

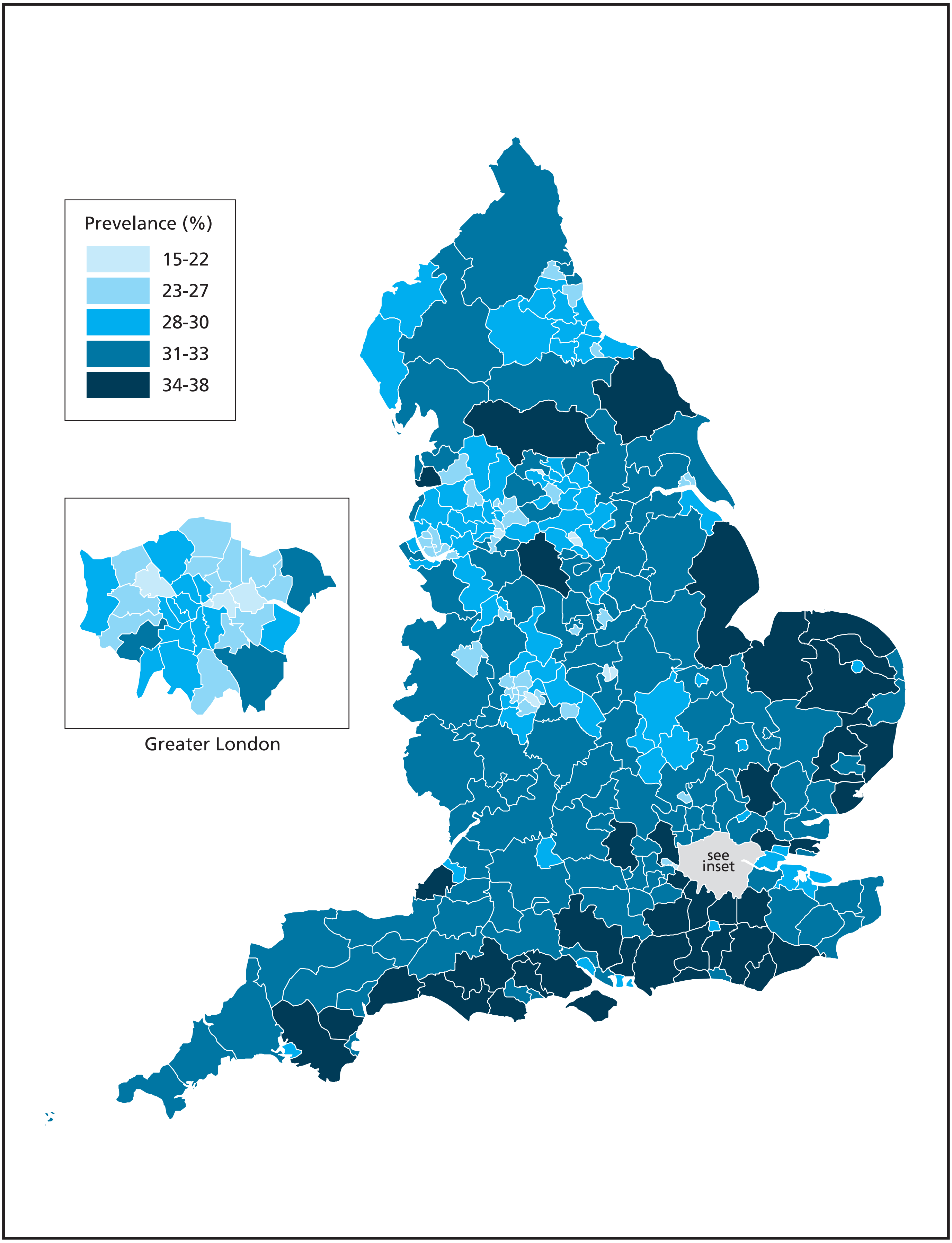
**Figure 5 Estimated ex-smoking across PCTs, England**




rates are found along the coastal areas of England and in the southern Home Counties, reflecting the concentrations of elderly people. Lowest rates are found in the urban areas in and around London, the North West, North East and West Midlands. When the estimated proportion of ex-smokers is correlated with current smoking prevalence, a coefficient of $r = -0.650$ is derived ($P < 0.00$), suggesting that higher proportions of ex-smokers are found in areas where current smoking prevalence is low. The pattern is also consistent with the suggestion that higher rates of smoking cessation are found in more affluent areas.

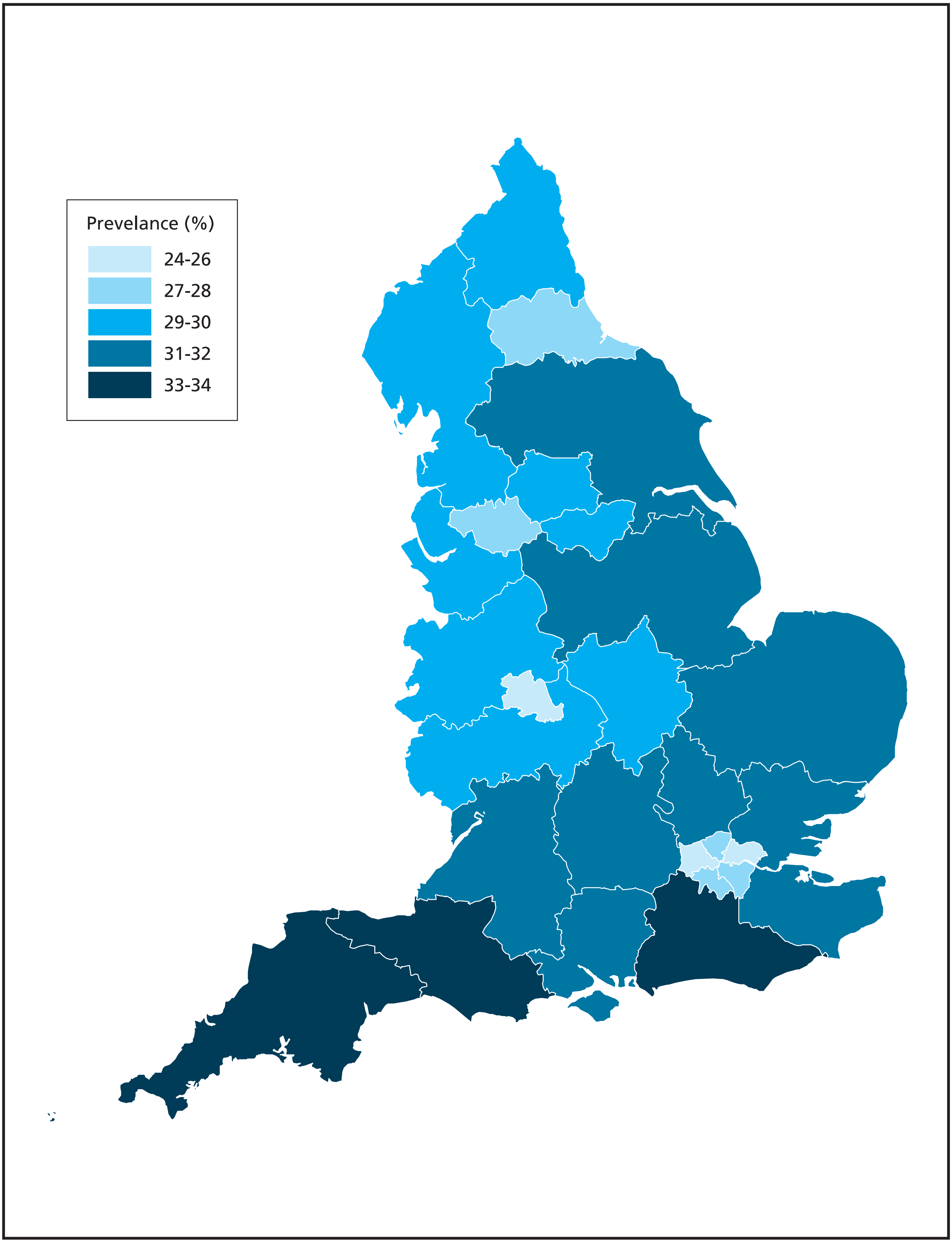
The estimated proportions of ex-smoking across the SHAs are shown in ascending order in Table 4. It is notable that some of the SHAs with the highest ex-smoking rates are also estimated to have the lowest current smoking prevalence (eg Surrey and Sussex; Dorset and Somerset), again reflecting population age structure. The ex-smoking percentages for SHAs are also mapped in Figure 7.

**Figure 6 Ex-smoking estimates: PCTs**



| Table 4 Estimated proportion of ex-smokers: SHAs | | |
|---|---|---|
| **SHA code** | **SHA** | **Ex-smoking prevalence (%)** |
| Q06 | North East London | 24 |
| Q27 | Birmingham and the Black Country | 26 |
| Q04 | North West London | 26 |
| Q07 | South East London | 27 |
| Q05 | North Central London | 27 |
| Q14 | Greater Manchester | 28 |
| Q10 | County Durham and Tees Valley | 28 |
| Q08 | South West London | 29 |
| Q09 | Northumberland, Tyne & Wear | 29 |
| Q12 | West Yorkshire | 29 |
| Q15 | Cheshire and Merseyside | 29 |
| Q25 | Leicestershire, Northamptonshire and Rutland | 30 |
| Q23 | South Yorkshire | 30 |
| Q26 | Shropshire and Staffordshire | 30 |
| Q13 | Cumbria and Lancashire | 30 |
| Q28 | Coventry, Warwickshire, Herefordshire and Worcestershire | 30 |
| Q02 | Bedfordshire and Hertfordshire | 31 |
| Q24 | Trent | 31 |
| Q16 | Thames Valley | 31 |
| Q20 | Avon, Gloucestershire and Wiltshire | 31 |
| Q11 | North and East Yorkshire and Northern Lincolnshire | 32 |
| Q18 | Kent and Medway | 32 |
| Q03 | Essex | 32 |
| Q01 | Norfolk, Suffolk and Cambridgeshire | 32 |
| Q17 | Hampshire and Isle of Wight | 32 |
| Q21 | South West Peninsula | 33 |
| Q22 | Dorset and Somerset | 34 |
| Q19 | Surrey and Sussex | 34 |

**Figure 7  Ex-smoking estimates: SHAs**



# Results: smoking-attributable mortality

Using the methodology outlined in Appendix 1, smoking-attributable mortality was calculated for each PCT. The PCT data were then aggregated to provide disease- and sex-specific counts and proportions for England. Table 5 shows, for England, the observed number of deaths by cause; the number estimated to be smoking-attributable (negative in the case of Parkinson's disease and endometrial cancer); and the percentage of those deaths attributable to smoking. In the case of Parkinson's disease and endometrial cancer, this percentage represents the proportion inhibited by smoking. The percentages are rounded to the nearest whole number, and the number of smoking-attributable deaths are rounded to the nearest 100.

For England as a whole it is estimated that, on average, each year 86,500 deaths were caused by smoking over the period 1998–2002. This represents an average of over 1,663 deaths per week, 237 deaths every day, and nearly 10 deaths an hour. Of the total number of smoking-attributable deaths, just over 62% (53,800) are among males and 38% are among women (32,700). In contrast, 900 male deaths and 500 female deaths caused by Parkinson's disease are estimated to have been prevented through smoking. Furthermore, 200 deaths from endometrial cancer are estimated to have been prevented among women. The net overall figure for smoking-attributable mortality is therefore given as 84,900.

In terms of cause of death, the greatest attributable proportion is given for lung cancer. Just over nine in ten male lung cancer deaths, and eight in ten female lung cancer deaths, are estimated to be smoking-attributable. Over 70% of mortality due to cancer of the oesophagus is estimated to be smoking-attributable, and over three quarters of male upper respiratory cancer deaths are due to smoking. High attributable proportions are also present in the case of chronic obstructive lung disease, where more than eight in ten deaths are smoking-attributable. In terms of the circulatory diseases, the majority of deaths due to ischaemic heart disease between ages 35 and 54 are smoking-attributable, with the proportion slightly higher for women (63%) than men (57%). Similarly over half the deaths from cerebrovascular disease in the 35–54 age groups are also smoking-attributable, and over 60% of all deaths from aortic aneurysm are estimated to be smoking-attributable. While relative proportions may be lower for some disease and age categories, the absolute number affected is much larger. For example, just over a quarter of male deaths and over one fifth of female deaths from ischaemic heart disease in the 65–74 group are smoking-attributable – this is estimated at 4,100 male deaths and 7,400 female deaths.

The geography of female and male smoking-attributable mortality across the PCTs is shown in Figures 8–10, respectively. In these maps the causes are grouped together; disaggregating the causes across the 303 PCTs would lead to relatively small numbers and unreliable results. The percentages are based on the net figure (subtracting the 'prevented' Parkinson's disease and endometrial cancer deaths from the total number of attributable deaths). The percentages are based on the five years of available mortality data, and represent the attributable proportion among those over 35 years using a base derived from the total number of deaths for the diseases listed in Table 5. The geographical pattern for males, females and all persons is fairly similar. Higher proportions of smoking-attributable mortality are found in the North East, North West, parts of the Midlands, East Midlands, parts of London and northern Kent. The geographical pattern in both maps picks up the underlying pattern of smoking prevalence shown in Figure 3.

**Table 5  Deaths attributable to smoking as percentage of all deaths from that disease: England (1998–2002)**

| Disease | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | Observed | Attributable number | Attributable percentage | Observed | Attributable number | Attributable percentage |
| Cancer | | | | | | |
| Lung | 16,957 | 15,400 | 91 | 10,466 | 8,300 | 80 |
| Upper respiratory | 653 | 500 | 77 | 188 | 100 | 58 |
| Oesophagus | 3,575 | 2,500 | 70 | 2,110 | 1,500 | 72 |
| Bladder | 2,755 | 1,300 | 49 | 1,404 | 300 | 23 |
| Kidney | 1,509 | 600 | 42 | 942 | 100 | 7 |
| Stomach | 3,387 | 1,200 | 35 | 2,066 | 300 | 12 |
| Pancreas | 2,710 | 700 | 26 | 2,904 | 900 | 31 |
| Unspecified site | 4,536 | 1,500 | 33 | 4,738 | 300 | 7 |
| Myeloid leukaemia | 1,034 | 200 | 19 | 927 | 100 | 12 |
| Respiratory | | | | | | |
| Chronic obstructive lung disease | 11,219 | 9,700 | 87 | 9,036 | 7,600 | 84 |
| Pneumonia 35–64 | 542 | 200 | 34 | 324 | 200 | 51 |
| Pneumonia 65+ | 6,377 | 1,600 | 24 | 9,752 | 1,500 | 15 |
| Circulatory | | | | | | |
| Ischaemic heart disease 35–54 | 3,676 | 2,100 | 57 | 767 | 500 | 63 |
| Ischaemic heart disease 55–64 | 7,084 | 2,900 | 41 | 2,084 | 700 | 34 |
| Ischaemic heart disease 65–74 | 15,337 | 4,100 | 27 | 7,454 | 1,600 | 22 |
| Ischaemic heart disease 75+ | 30,470 | 2,900 | 10 | 35,977 | 2,700 | 8 |
| Cerebrovascular disease 35–54 | 773 | 400 | 58 | 680 | 400 | 52 |
| Cerebrovascular disease 55–64 | 1,298 | 400 | 33 | 967 | 300 | 35 |
| Cerebrovascular disease 65–74 | 3,896 | 700 | 17 | 3,380 | 1,300 | 38 |
| Cerebrovascular disease 75+ | 13,841 | 500 | 4 | 28,025 | 500 | 2 |
| Aortic aneurysm | 5,311 | 3,400 | 64 | 3,354 | 2,200 | 65 |
| Myocardial degeneration | 278 | 100 | 26 | 960 | 200 | 18 |
| Atherosclerosis | 416 | 100 | 22 | 754 | 100 | 17 |
| Digestive | | | | | | |
| Stomach/duodenal ulcer | 1,482 | 800 | 54 | 1,649 | 1,000 | 58 |
| Diseases prevented by smoking | | | | | | |
| Parkinson's disease | 1,677 | –900 | –51 | 1,345 | –500 | –38 |
| Endometrial cancer | na | na | na | 810 | –200 | –20 |

*Continued from page 15*

**Table 5 Deaths attributable to smoking as percentage of all deaths from that disease: England (1998–2001)**

| | All Persons | | |
|---|---|---|---|
| **Disease** | **Observed** | **Attributable number** | **Attributable percentage** |
| Cancer | | | |
| Lung | 27423 | 23700 | 87 |
| Upper respiratory | 841 | 600 | 73 |
| Oesophagus | 5685 | 4000 | 71 |
| Bladder | 4159 | 1700 | 40 |
| Kidney | 2451 | 700 | 28 |
| Stomach | 5453 | 1400 | 27 |
| Pancreas | 5614 | 1600 | 29 |
| Unspecified site | 9274 | 1800 | 20 |
| Myeloid leukaemia | 1961 | 300 | 16 |
| Respiratory | | | |
| Chronic obstructive lung disease | 20255 | 17400 | 86 |
| Pneumonia 35–64 | 866 | 300 | 40 |
| Pneumonia 65+ | 16129 | 3000 | 19 |
| Circulatory | | | |
| Ischaemic heart disease 35–54 | 4443 | 2600 | 58 |
| Ischaemic heart disease 55–64 | 9168 | 3600 | 39 |
| Ischaemic heart disease 65–74 | 22791 | 5800 | 25 |
| Ischaemic heart disease 75+ | 66447 | 5700 | 9 |
| Cerebrovascular disease 35–54 | 1453 | 800 | 55 |
| Cerebrovascular disease 55–64 | 2265 | 800 | 34 |
| Cerebrovascular disease 65–74 | 7276 | 1900 | 27 |
| Cerebrovascular disease 75+ | 41866 | 1000 | 2 |
| Aortic aneurysm | 8665 | 5600 | 64 |
| Myocardial degeneration | 1238 | 200 | 20 |
| Atherosclerosis | 1170 | 200 | 19 |
| Digestive | | | |
| Stomach/duodenal ulcer | 3131 | 1800 | 56 |
| Diseases prevented by smoking | | | |
| Parkinson's disease | 3022 | -1400 | -45 |
| Endometrial cancer | na | | |

Note: the 'All person attributable number' may not equate with the men and women total due to rounding and percentages have been calculated before rounding of the attributable number.

**Figure 8 Female smoking-attributable mortality: PCTs (percentage represents percentage of all deaths of those aged 35+ from causes associated with smoking; average figure for 1998–2002)**

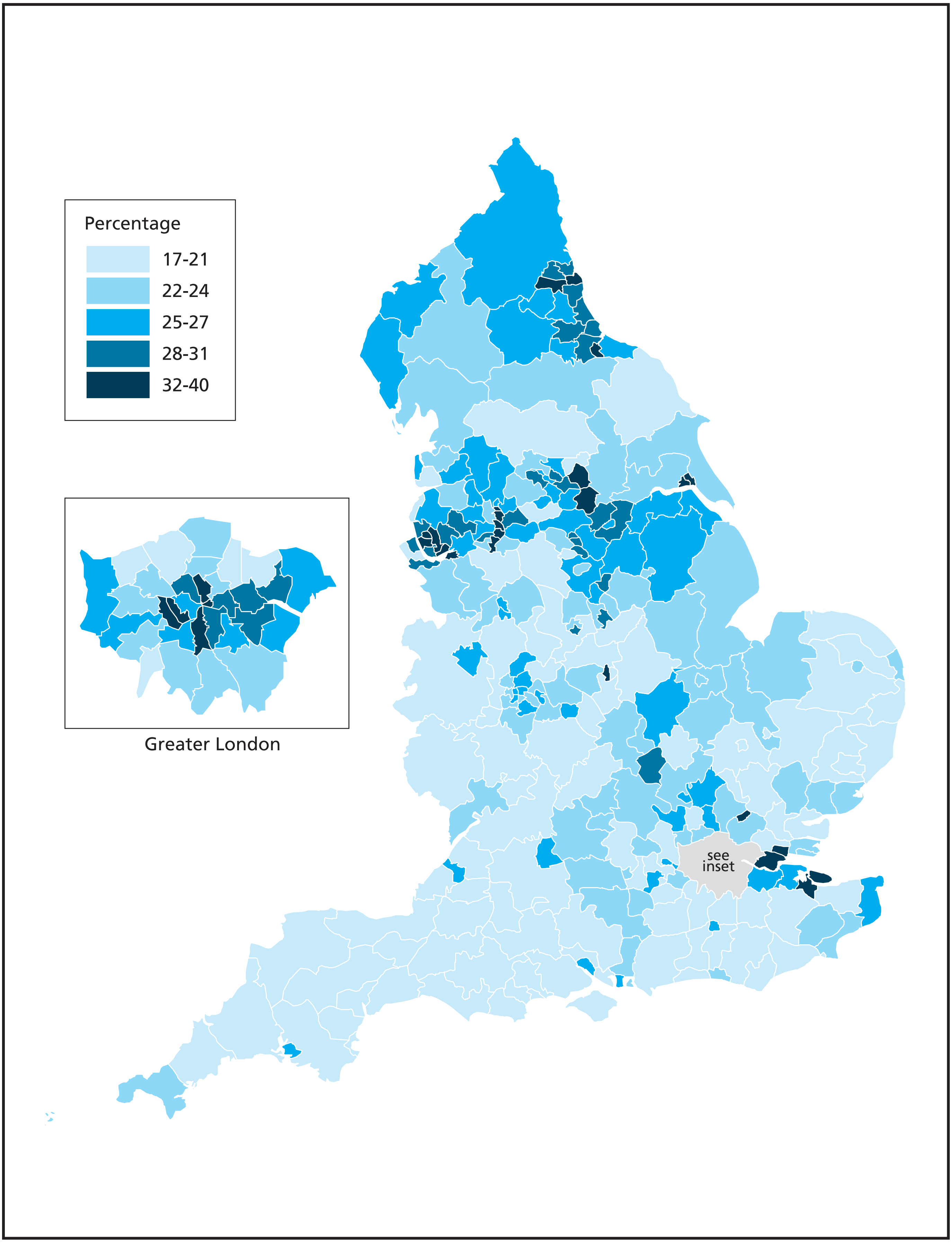


**Figure 9 Male smoking-attributable mortality: PCTs (percentage represents percentage of all deaths of those aged 35+ from causes associated with smoking; average figure for 1998–2002))**

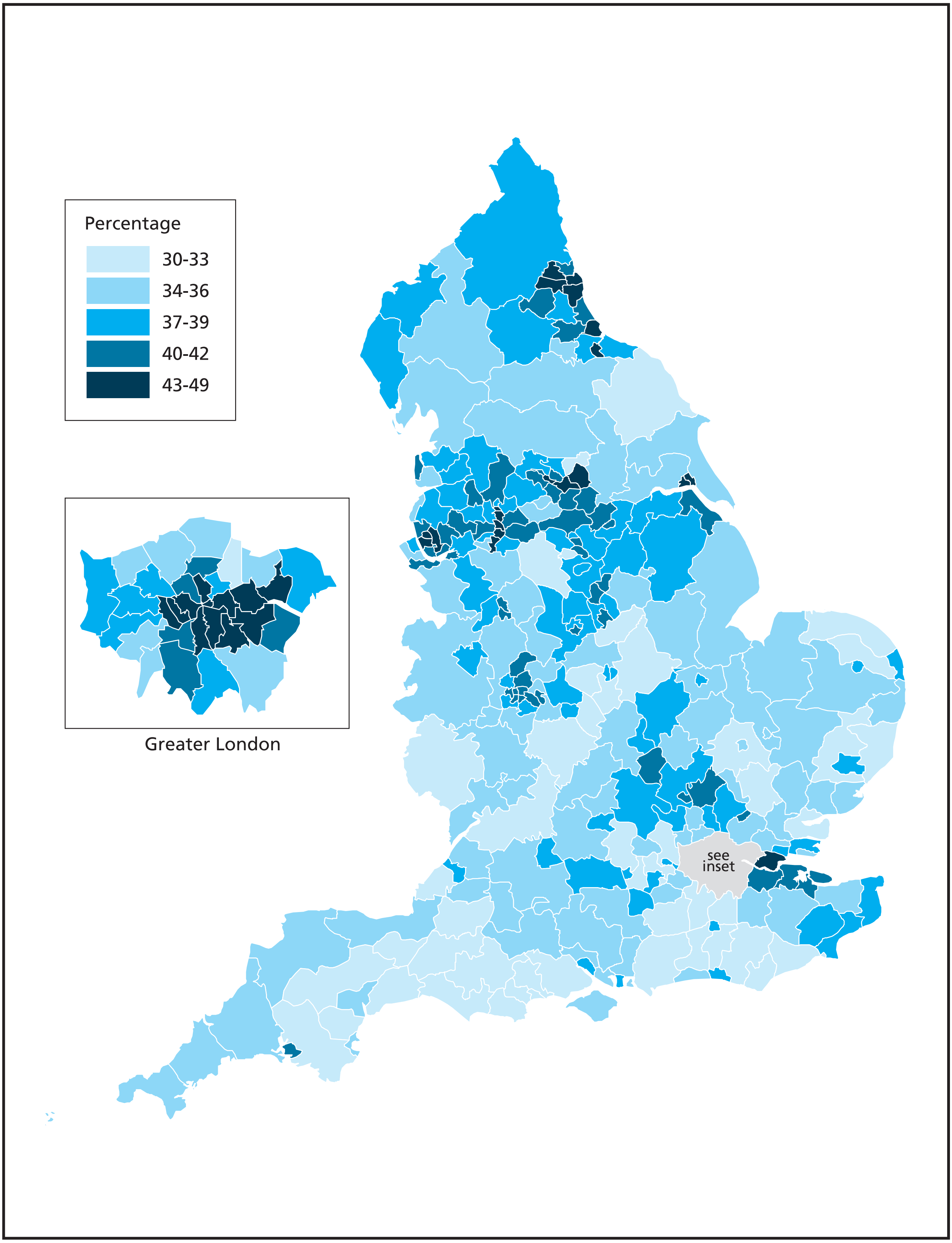
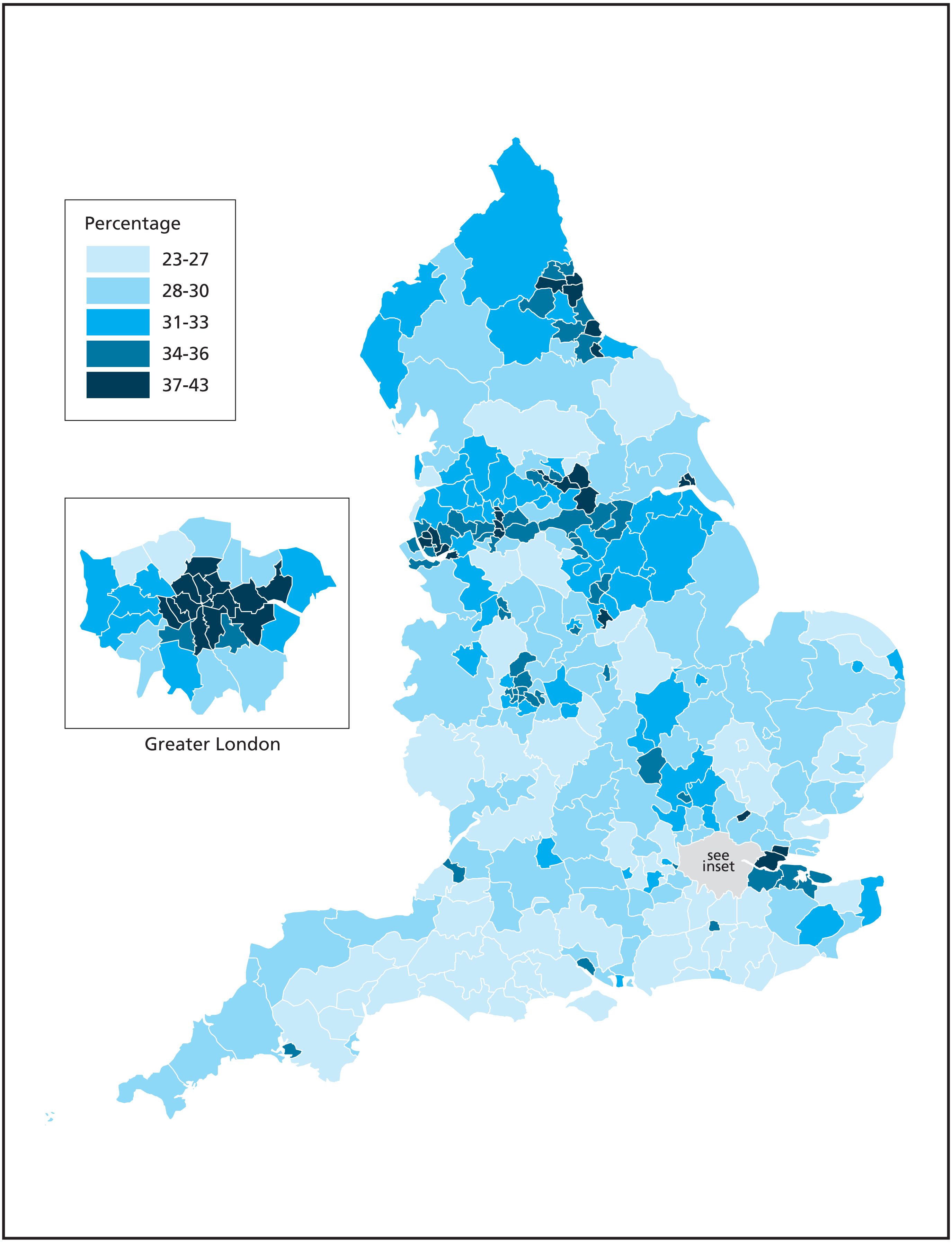


**Figure 10 Smoking-attributable mortality (persons): PCTs (percentage represents percentage of all deaths of those aged 35+ from causes associated with smoking; average figure for 1998–2002)**



| Table 6 Smoking-attributable mortality – percentages and counts across SHAs | | | | | | | |
|---|---|---|---|---|---|---|---|
| SHA code | Name | Smoking-attributable mortality (%) | | | Average annual smoking-attributable mortality counts 1998–2002 | | |
| | | Males | Females | All Persons | Males | Females | All Persons |
| Q01 | Norfolk, Suffolk and Cambridgeshire | 35 | 21 | 28 | 2,200 | 1,200 | 3400 |
| Q02 | Bedfordshire and Hertfordshire | 38 | 23 | 31 | 1,500 | 800 | 2300 |
| Q03 | Essex | 36 | 23 | 30 | 1,600 | 1,000 | 2600 |
| Q04 | North West London | 39 | 25 | 32 | 1,400 | 800 | 2200 |
| Q05 | North Central London | 39 | 24 | 32 | 1,000 | 600 | 1600 |
| Q06 | North East London | 42 | 25 | 36 | 1,500 | 800 | 2300 |
| Q07 | South East London | 39 | 24 | 35 | 1,500 | 900 | 2400 |
| Q08 | South West London | 38 | 24 | 31 | 1,100 | 700 | 1700 |
| Q09 | Northumberland, Tyne & Wear | 42 | 30 | 36 | 2,000 | 1,300 | 3300 |
| Q10 | County Durham and Tees Valley | 40 | 29 | 34 | 1,500 | 1,000 | 2500 |
| Q11 | North and East Yorkshire and Northern Lincolnshire | 37 | 24 | 31 | 1,900 | 1,200 | 3100 |
| Q12 | West Yorkshire | 40 | 27 | 33 | 2,400 | 1,600 | 3900 |
| Q13 | Cumbria and Lancashire | 38 | 25 | 31 | 2,400 | 1,500 | 3900 |
| Q14 | Greater Manchester | 41 | 27 | 34 | 3,300 | 2,100 | 5400 |
| Q15 | Cheshire and Merseyside | 41 | 28 | 34 | 3,000 | 2,000 | 5000 |
| Q16 | Thames Valley | 36 | 22 | 29 | 1,700 | 1,000 | 2700 |
| Q17 | Hampshire and Isle of Wight | 36 | 22 | 29 | 1,700 | 1,000 | 2800 |
| Q18 | Kent and Medway | 38 | 24 | 31 | 1,700 | 1,000 | 2800 |
| Q19 | Surrey and Sussex | 34 | 21 | 27 | 2,600 | 1,600 | 4200 |
| Q20 | Avon, Gloucestershire and Wiltshire | 35 | 21 | 28 | 2,100 | 1,200 | 3300 |
| Q21 | South West Peninsula | 35 | 21 | 28 | 1,800 | 1,000 | 2900 |
| Q22 | Dorset and Somerset | 33 | 20 | 27 | 1,300 | 800 | 2100 |
| Q23 | South Yorkshire | 39 | 27 | 33 | 1,600 | 1,000 | 2700 |
| Q24 | Trent | 38 | 24 | 31 | 3,000 | 1,800 | 4800 |
| Q25 | Leicestershire, Northamptonshire and Rutland | 36 | 23 | 30 | 1,500 | 800 | 2300 |
| Q26 | Shropshire and Staffordshire | 37 | 23 | 30 | 1,600 | 900 | 2600 |
| Q27 | Birmingham and the Black Country | 39 | 25 | 32 | 2,700 | 1,500 | 4200 |
| Q28 | Coventry, Warwickshire, Herefordshire and Worcestershire | 35 | 22 | 29 | 1,500 | 900 | 2400 |

Note that the overall England total may not be the same as that in Tables 7 and A1 due to rounding to the nearest 100. The 'All person attributable number' may not equate with the men and women total due to rounding and percentages have been calculated before rounding of the attributable number.

Table 6 provides the net proportion of deaths attributable to smoking for the SHAs. The protective effect of smoking in terms of preventing endometrial cancer and Parkinson's disease deaths is not discernible after rounding. Again, the base used to calculate these percentages is the total number of deaths from the causes listed in Table 5, and they have been calculated using five years of mortality information. The average annual count across these five years is also provided as an insight into the annual deaths attributable to smoking across the SHAs.

# Producing a UK estimate of smoking-attributable mortality

In compiling a UK estimate of smoking-attributable mortality, the England component was derived from the work summarised previously. The Scottish figure was derived from similar work undertaken by Moon *et al.* (2003). The equivalent figures for Wales and Northern Ireland were derived by applying the attributable risk formula used in the above reports to national estimates of age- and sex-specific rates of current and ex-smoking. These were derived from the 1998 Welsh Health Survey (National Assembly for Wales, 2000) and the 2000–01 Continuous Household Survey (NISRA, 2002), respectively. The derived attributable proportions were then applied to national counts of cause-, sex- and age-specific mortality for Wales (supplied by National Statistics) and Northern Ireland (supplied by the Northern Ireland Statistics and Research Agency). All mortality sources used five years of data (1998–2002), and the results shown in Table 7 represent the **annual average** smoking-attributable mortality across these years. Again, estimates have been rounded to the nearest 100.

It is estimated that, in total, 106,100 persons die each year from smoking-attributable causes across the UK. It is estimated that 23% of male deaths from all causes are attributable to smoking. For women the equivalent figure is lower, at 12%. In terms of constituent countries, the highest proportion is given for Scotland, where almost one in five deaths are smoking-attributable (19%). For males in Scotland over a quarter of deaths are smoking-attributable, and for women the estimated percentage is 14%. Northern Ireland is estimated to have the lowest attributable proportions, with 21% of male deaths and 10% of female deaths being attributable to smoking.

The equivalent total for 1995 was 120,000 (Callum, 1998). Although we cannot be certain there has been a real reduction in the number of deaths due to smoking, the reduced figure presented here is in line with trends. An update produced by the Royal College of Physicians (2000), using 1997 mortality data, 1996 smoking information and the Callum methodology, resulted in an estimate of 117,400 attributable deaths. A further reduction was evident in the work of Peto *et al*. (2004). Using a different methodology, they suggested that 114,000 deaths were due to smoking in 2000. The results in the present report appear to be in line with this reducing trend in smoking-attributable mortality. They are the first estimates to take account of subnational variations in smoking behaviour and geographical differences in mortality. This, together with other methodological differences and the reducing trend, accounts for the difference between the estimate in the present report and those produced previously.

**Table 7 Smoking-attributable mortality across the UK, annual averages 1998–2002**

| Nation | Total number of deaths[1] | | | Smoking-attributable mortality[2] | | | Smoking-attributable proportion | | |
|---|---|---|---|---|---|---|---|---|---|
| | Males | Females | Persons | Males | Females | Persons | Males | Females | Persons |
| England | 241,222 | 265,847 | 507,069 | 53,800 | 32,700 | 86,500 | 0.22 | 0.12 | 0.17 |
| Scotland | 27,463 | 30,683 | 58,146 | 7,100 | 4,200 | 11,300 | 0.26 | 0.14 | 0.19 |
| Wales | 15,962 | 17,738 | 33,700 | 3,800 | 2,200 | 6,000 | 0.24 | 0.12 | 0.18 |
| Northern Ireland | 7,174 | 7,758 | 14,932 | 1,500 | 800 | 2,300 | 0.21 | 0.10 | 0.15 |
| Total UK | 293,061 | 322,556 | 615,617 | 66,200 | 39,900 | 106,100 | 0.23 | 0.12 | 0.17 |

[1]From all causes of death.
[2]These figures do not include an adjustment for deaths that may have been prevented by smoking (ie endometrial cancer and Parkinson's disease).

# Conclusion: limitations and implementation

A single important summary point needs to be made about the data presented in this report. These data represent a reasoned, robust 'best guess' as to smoking prevalence and smoking-attributable mortality. The estimates of smoking prevalence at local level almost certainly will not mirror precisely any available measures from local studies or surveys, but past work and current investigation have shown that they are likely to be similar. The estimates of smoking-attributable mortality are, nonetheless, in line with those produced for 1995 (Callum, 1998). Some underestimation of mortality has undoubtedly occurred, both in the work reported here and in that reported by Callum, because passive smoking has not been taken into account. With this in mind, however, the estimated reduction in the overall figure for smoking-attributable deaths in England and the UK is an expected consequence of the overall reduction in deaths from diseases such as lung cancer, ischaemic heart disease and cerebrovascular disease.

It follows from these limitations that the results from this research (presented in the accompanying electronic files on the HDA website (www.hda.nhs.uk)) must be used with caution. The data indicate expected levels of smoking, ex-smoking and smoking-attributable mortality, given the local expression of national associations between key indicators and these target variables. Point prevalences should always be clearly presented as estimates, and direct comparisons between PCTs or SHAs should be avoided. For preference, it is recommended that users adopt statements such as those listed in Box 2. Users should also round raw figures to the nearest 100 for smoking-attributable mortality and focus only on all-cause mortality across both genders when considering PCT data. Similarly, percentages should be rounded to the nearest whole number when discussing prevalence percentages.

It is anticipated that, using this approach, SHAs and PCTs will wish to use the information as a basis for assessing

## *Box 2 Reporting the findings*

### *Smoking and ex-smoking prevalence*

- Given the characteristics of the local population and the regional setting, we would expect a smoking (or ex-smoking) prevalence of approximately *x*% within *X* SHA (or PCT).
- Given the characteristics of the local population and regional setting, *X* SHA (or PCT) is estimated to be within the highest (or lowest) 10% (or 5%, 15%, 20% etc) of PCTs/SHAs in terms of smoking prevalence (or ex-smoking prevalence).

### *Smoking-attributable mortality*

- Given the characteristics of the local population and the regional setting, we would expect around *x* deaths per year to be caused by smoking.
- Given the characteristics of the local population, the regional setting and local information on cause of death, *X* SHA (or PCT) is estimated to be within the highest (or lowest) 10% (or 5%, 15%, 20% etc) of PCTs/SHAs in terms of smoking-attributable mortality.

the need for health promotion initiatives and public health campaigns.

Looking to the future, it can be anticipated that smoking-attributable deaths will continue to decline. The rate of this decline may decrease as prevalence rates level out. This report highlights the varying levels of estimated prevalence across gender and age. If sustained reductions in smoking-attributable deaths are to be maintained, particular attention will need to be paid to groups where current smoking is not reducing – this suggests that initiatives focusing on younger adults will be particularly important.

# References


Bajekal, M., Scholes, S. and Pickering, K. (2004) *Synthetic estimation of healthy lifestyles indicators*. Report to the National Center for Social Research, forthcoming.

Bedfordshire and Hertfordshire SHA (2004) *Smoking cessation uptake and smoking attributable mortality across Bedfordshire & Hertfordshire – preliminary health equity audit.* St Albans: Bedforshire and Hertfordshire Strategic Health Authority. www.bhha.nhs.uk/phi/#presentation

Browne, W. (2003) *MCMC estimation in MLwiN*. London: Centre for Multilevel Modelling, Institute of Education, University of London.

Callum, C. (1998) *The UK smoking epidemic: deaths in 1995*. London: Health Education Authority.

Department of Health (2003) *Statistics on smoking: England. Statistical Bulletin 2003/21*. London: Department of Health.

Field, A. (2000) *Discovering statistics using SPSS for Windows: advanced techniques for beginners*. London: Sage.

Goldstein, H. (1995) *Multilevel statistical models.* London: Edward Arnold.

Heady, P., Clarke, P., Brown, G. *et al*. (2003) *Small area estimation project report*. Model-based small area estimation Series No. 2. London: Office for National Statistics.

Health Education Authority (1991) *The smoking epidemic: counting the cost in England*. London: Health Education Authority.

IARC (2002) *Tobacco smoking and tobacco smoke*. Summary of data reported and evaluation. Lyon, France: International Agency for Research on Cancer.

Kreft, I. and de Leeuw, J. (1998) *Introducing multilevel modelling.* London: Sage.

Leyland, A. and Goldstein, H. (2001) *Multilevel modelling of health statistics*. London: Wiley.

Mohan, J., Barnard, S., Jones, K. and Twigg, L. (2004a) Social capital, geography and health: a small-area analysis for England. *Social Science and Medicine*, forthcoming.

Mohan, J., Barnard, S., Jones, K. and Twigg, L. (2004b) Social capital, geography and health: developing and applying small-area indicators of social capital in the explanation of health inequalities. In: Morgan, A. and Swann, C. (eds) *Social capital for health: issues of definition, measurement and links to health*, pp. 83-110. London: Health Development Agency.

Moon, G., Barnard, S. and Twigg, L. (2003) *The smoking epidemic in Scotland: technical report.* Portsmouth: Institute for the Geography of Health, University of Portsmouth.

National Assembly for Wales (2000) *Welsh Health Survey, 1998* [computer file]. Colchester, Essex: UK Data Archive.

NCRS/UCL (2004) *Health Survey for England, 2002* [computer file]. National Centre for Social Research/University College London, Department of Epidemiology and Public Health. Colchester, Essex: UK Data Archive.

NISRA (2002) *Continuous Household Survey, 2000–2001* [computer file]. Northern Ireland Statistics and Research Agency, Central Survey Unit. Colchester, Essex: UK Data Archive.

ONS (2004) *General Household Survey, 2002–2003, 2nd edn* [computer file]. Office for National Statistics, Social Survey Division. Colchester, Essex: UK Data Archive.

Peto, R., Lopez, A., Boreham, J., Thun, M. and Heath, C.J. (1994) *Mortality from smoking in developed countries 1950–2000: indirect estimates from national vital statistics.* Oxford: Oxford University Press.

Peto, R., Lopez, A., Boreham, J., Thun, M. and Heath, C.J. (2004) *Mortality from smoking in developed countries:* 2004 update at www.ctsu.ox.ac.uk.

Rasbash, J. *et al.* (2000) *A user's guide to MLwiN*. London: Institute of Education, University of London.

Royal College of Physicians (2000) *Nicotine addiction in Britain: a report of the Tobacco Advisory Group*. London: Royal College of Physicians.

Snijders, T.A.B. and Bosker, R.J. (1999) *Multilevel analysis.* London: Sage.

SWPHO (2003) Estimates of smoking attributable premature mortality from lung cancer and vascular disease. *SWPHO Bulletin*, September. Bristol: South West Public Health Observatory.

Twigg, L. and Moon, G. (2002) Predicting small-area health-related behaviour: a comparison of multilevel synthetic estimation and local survey data. *Social Science and Medicine* 54(6): 931-7.

Twigg, L., Moon, G. and Jones, K. (2000) Predicting small-area health-related behaviour: a comparison of smoking and drinking indicators. *Social Science and Medicine* 50(7-8): 1109-20.

US DHHS (1989) *Reducing the health consequences of smoking: 25 years of progress*. A report of the Surgeon-General. Publication No. (CDC) 89-8411 Maryland: US Department of Health and Human Services, Public Health Service, Centers for Disease Control, Office on Smoking and Health.

# Appendix 1 Technical background

Synthetic estimation has to work with the sampling structure of data sets containing information on current and ex-smoking. Typically this design samples individuals in postcode sectors in regions. It does not involve SHAs or PCTs; regions are larger than either. Hence it is necessary to build estimates of PCT and SHA smoking behaviour from a lower level. Following Twigg *et al.* (2000) and Heady *et al*. (2003), electoral wards were used as the building blocks in this research; wards are generally similar in size to postcode sectors.

## Estimating smoking behaviour for wards

Estimation used the technically robust and innovative framework for generating small-area data on smoking behaviour documented by Twigg *et al*. (2000). This approach has recently been used in a similar, parallel exercise for Scotland (Moon *et al*., 2003). The approach employs multi-level modelling, an extension of the more familiar generalised linear regression model. Regression builds an equation that estimates a target response variable in terms of a number of candidate predictor variables. In this case the response might be whether or not a person smokes, and the predictors would be variables that are thought to relate closely to smoking, eg age, sex or social status. Multi-level modelling takes this a stage further, recognising that the chance of an individual smoking reflects not only that individual's personal characteristics, but also the characteristics of the environment in which the person lives. In short, the approach acknowledges that people's behaviour may be influenced by their environment. The characteristics of multi-level analysis and the associated statistical theory are well documented (Goldstein, 1995; Kreft and de Leeuw, 1998; Snijders and Bosker, 1999). Health applications are discussed by Leyland and Goldstein (2001).

**Table A1 The multi-level structure**

| Level | Unit | *N* |
|---|---|---|
| 1 | Individuals | 47,341 |
| 2 | Postcode sectors units | 2,053 |
| 3 | Government office regions | 9 |

### *Data sources*

Multi-level models of past and current smoking behaviour were developed using individual data from the Health Survey for England (HSfE). This is an annual survey commissioned by the Department of Health to provide regular information on various aspects of the nation's health that cannot be obtained from other sources. It is designed to monitor certain health conditions and also to investigate risk factors associated with certain diseases. A full description of the survey content and sampling framework is provided by the National Centre for Social Research and University College London, Department of Epidemiology and Public Health (NCRS/UCL, 2004).

To improve the reliability of results, information from four runs of HSfE data was merged. These related to the individual responses provided for 1998–2001. The multi-stage, clustered design of this survey results in a sample of individuals being selected from a sample of postcode sectors. Normally the public data set provides information on the clustering of individuals within postcode sectors without disclosing the identification (and hence location) of the sectors. For this study the research team were allowed access to the identification details of these sectors so that additional data from the 2001 Census could be merged with HSfE information. A working contract was agreed with the National Centre for Social Research that did not threaten the anonymity of any HSfE survey respondents. The required runs of the HSfE were sourced from the UK Data Archive.

The multi-level structure of the working data set comprised individuals (level 1) nested within postcode sectors (level 2). In turn, these level 2 units nested within standard government office regions. The multi-level structure is defined in Table A1.

## Response variables

Estimates of two aspects of smoking behaviour were needed to calculate smoking-attributable mortality: current and past smoking prevalence. Respondents in the HSfE are asked about their current and past cigarette-smoking behaviour, and two binary outcome variables can be derived from the survey responses. One variable indicates whether or not an individual is a current smoker ($Y_1$) and the other indicates whether or not the individual used to smoke cigarettes ($Y_2$). Across the four years (1998–2001) of HSfE survey information, the percentage of adult respondents who are current smokers is given as 26.5%, and 31.5% of respondents report that they have given up.

## Predictor or explanatory variables

Within a multi-level modelling framework it is permissible to have predictor variables that relate either to individual-level influences on the response, or to higher-level (ecological or area) influences.

### Individual level

While there are numerous individual level predictors that might be identified from the HSfE, the actual selection is crucially constrained by the subsequent use of the models within a predictive framework. Individual level predictor variables must therefore be present in both the HSfE and the 2001 Census, and must be defined in similar ways. It is possible to use complex cross-tabulations of routine local base statistics from the UK Census to provide counts of the numbers of individuals in each ward who fall into particular sociodemographic categories. The most detailed cross-tabulation available at census ward level and relevant to health-related behaviour is age (grouped into bands), marital status and gender. The individual-level explanatory variables used in the models are therefore age, gender and marital status. Ideally it would be useful to include other individual-level variables, such as social class and/or ethnicity. Due to the constraints listed above concerning availability of small-area cross-tabulation, count data from the 2001 Census and definitional consistency across the data sources, these variables could not be included.

Marital status is defined as a dichotomous variable, those stating they are single, divorced, widowed or a cohabitee being contrasted with those who are married, married and now separated, or who have remarried. Different arrangements of this classification were tested, and this dichotomy was chosen on the grounds of model parsimony and the need to work with an identical classification from the population census. Age is split into the following age bands: 16–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75+.

### Ecological or area data

Access to the postcode sector identification details of the HSfE survey respondents allowed linkage of the postcode sector to 2001 Census output area. Postcode sector characteristics were aggregated from constituent Census output areas. A range of such ecological variables were attached to the respondents in the HSfE and tested for significance in both the current and past smoking models.

## Models of smoking behaviour

Each model of smoking behaviour included the individual age, gender and marital status terms, and interactions between any combinations of these (where they were found to be statistically significant). Similarly, a slightly different array of ecological variables and cross-level interactions (between individual and area characteristics) was generated for each model.

The resulting models and their parameter estimates are provided in Appendix 2. In summary, the results indicate that the chance of being a current smoker is approximately 23% if you are categorised as the stereotypical individual (female, in the ‘married’ group, aged 35–44, living in a typical or average area in terms of social grade make-up, ethnicity, large housing, rented tenure, level of dependent children and economically inactive males – and equate to all of the listed interactions). This percentage is obtained by taking the antilogit of –1.186 (the intercept term). If, however, you happen to be single, but otherwise the stereotypical individual, this percentage increases to around 39%. An increase is also reported for being male (28%), and also for those in the youngest age group (33%), but otherwise stereotypical individuals. Smoking prevalence decreases for those aged 55 and above, with the lowest rates reported for those aged 75 and over (7%). Interestingly, while the main effects of being single or being male increase the chance of smoking, the interaction of these (being single and male) slightly reduces the impact of these individual terms. A similar effect is seen for the interaction of marital status and age as well as gender and those aged over 45. As expected, the chances are reduced for individuals living in areas where there is a high percentage of social grade A and B, and also where there is a high percentage of households with more than six rooms. The effect of living in a community that has a high percentage of non-whites also reduces the likelihood of being a current smoker, whereas high percentages of rented tenure increase the likelihood.

The results of the ex-smoking model indicate that the chances of being an ex-smoker are approximately 24% (for the stereotypical individual, who has a slightly different definition in terms of area characteristics and interactions for this model; see Appendix 1 for details). Being 'single' reduces the chance of being an ex-smoker slightly to around 22%, whereas being male increases the chance slightly, to 26%. The logit values illustrate the strong age gradient and show that the chance of being an ex-smoker is approximately 42% if aged over 75 (and otherwise the stereotypical individual). Significant positive interactions are given for the gender and age interaction (for those over 45) and also for marital status and those over 65. In contrast, the chance of being an ex-smoker is reduced for the interaction of marital status and gender, and marital status and the youngest age group. In terms of area effects, the chance of being an ex-smoker is reduced with an increase in the percentage of people in low social grade; the percentage of households with dependent children; the percentage of female unemployment; and the percentage of non-whites. In contrast, the chances are increased with an increase in the percentage of households with more than one car; and in levels of overcrowding.

### *Generating predictions of current and past smoking behaviour*

Multi-level models take into account individual and local influences on the likelihood that an individual will be a current smoker, or the likelihood that someone has given up. Predictions were generated forwards using the model equations, then aggregated to the larger geographies of PCTs and SHAs. Lookup tables exist that link this ward geography with other higher-level administrative geographies such as PCTs and SHAs, ensuring that such procedures can be largely automated. Appendix 3 provides a discussion of the quality of the estimates.

There are a total of 7,987 census wards across England. Due to confidentiality restrictions regarding small populations, demographic and/or other area characteristics were unavailable for a total of 55 wards (16 of these were in London). The Office for National Statistics (ONS) amalgamates the data for these wards within a neighbouring ward to form a 'standard table ward' for census reporting purposes. The details of the wards involved in this latter amalgamation are given in Appendix 4. Predictions of smoking behaviour were therefore calculated for 7,932 wards in England.

The ward-level predictions were aggregated to form estimates of smoking prevalence and past smoking behaviour for the 303 PCTs and 28 SHAs across England. ONS provided details on definitions of PCTs based on census wards as of November 2003. Details were also provided on the link between PCTs and SHAs as of 1 April 2003. Unfortunately wards do not always nest within PCTs, and there are 110 wards whose area straddles two PCTs. ONS provided details of these split wards and, based on the nature of the split, the ward was allocated to the PCT in which the largest part of the ward was found.

## Estimating smoking-attributable mortality

Estimates of smoking-attributable deaths are based on data from three sources: published factors for mortality of current and ex-smokers from various diseases known to be associated with smoking; estimates of age- and sex-specific current and ex-smoking behaviour for the target geographies; and counts of death by cause for those geographies disaggregated by age and sex.

### *Risk of death from smoking*

Callum (1998) investigated smoking-attributable mortality within England for smoking and mortality data collected in 1995. In essence, the Callum methodology followed that used to estimate deaths in the USA caused by smoking (US DHHS, 1989). The excess risk of death for current and ex-smokers compared with those who have never smoked was derived from a prospective study of 1 million adults in the USA undertaken by the American Cancer Society in the 1980s (see Callum, 1998). The published relative risks are considered to be transferable to the UK situation. Table A2 lists the causes of death known to be associated with smoking and the sex-specific relative risks for current and ex-smokers. These published relative risks continue to be used by other investigators (eg Royal College of Physicians, 2000) and, while there have been suggestions that other diseases should be added, there is as yet no information available on the relative risks involved. The International Agency for Research on Cancer, for example, suggests that cancer of the nasal cavities, nasal sinuses and liver are smoking-attributable (IARC, 2002). After due consideration of the absence of alternative data and the relatively stable differential risk of mortality accruing to smokers, it was decided to use again the relative risks employed in the Callum (1998) study. This had the additional analytical gain of enabling comparability with Callum's study. Using the same relative risks as previous studies allows for a more robust comparison of research results.

**Table A2 Relative mortality risks by disease for current and ex-smokers, male and female**

| Disease | Male smokers | | Female smokers | |
|---|---|---|---|---|
| | Current ($r_c$) | Ex ($r_f$) | Current ($r_c$) | Ex ($r_f$) |
| Cancer | | | | |
| Lung | 26.6 | 8.2 | 13.6 | 4.1 |
| Upper respiratory sites | 10.6 | 3.0 | 6.1 | 1.5 |
| Oesophagus | 5.3 | 4.0 | 9.3 | 3.1 |
| Bladder | 2.9 | 2.1 | 1.6 | 1.5 |
| Kidney | 2.8 | 1.6 | 1.3 | 1.0 |
| Stomach | 2.1 | 1.6 | 1.2 | 1.3 |
| Pancreas | 2.2 | 1.1 | 2.3 | 1.5 |
| Unspecified site | 4.4 | 2.3 | 2.1 | 1.2 |
| Myeloid leukaemia | 1.4 | 1.3 | 1.2 | 1.3 |
| Respiratory | | | | |
| Chronic obstructive lung disease | 14.1 | 8.4 | 14.0 | 8.6 |
| Pneumonia 35–64 | 2.3 | 1.3 | 4.6 | 1.1 |
| Pneumonia 65+ | 1.9 | 1.3 | 2.0 | 1.1 |
| Circulatory | | | | |
| Ischaemic heart disease 35–54 | 4.2 | 1.9 | 5.2 | 2.9 |
| Ischaemic heart disease 55–64 | 2.6 | 1.6 | 3.0 | 1.1 |
| Ischaemic heart disease 65–74 | 1.7 | 1.4 | 2.1 | 1.2 |
| Ischaemic heart disease 75+ | 1.4 | 1.1 | 1.4 | 1.1 |
| Cerebrovascular disease 35–54 | 5.1 | 1.1 | 4.5 | 1.1 |
| Cerebrovascular disease 55–64 | 2.8 | 1.1 | 3.2 | 1.1 |
| Cerebrovascular disease 65–74 | 2.1 | 1.0 | 3.0 | 1.6 |
| Cerebrovascular disease 75+ | 1.4 | 1.0 | 1.2 | 1.0 |
| Aortic aneurysm | 5.3 | 2.6 | 8.2 | 1.6 |
| Myocardial degeneration | 2.1 | 1.2 | 1.7 | 1.2 |
| Atherosclerosis | 1.9 | 1.1 | 2.2 | 0.8 |
| Digestive | | | | |
| Stomach/duodenal ulcer | 4.5 | 1.6 | 6.4 | 1.4 |

Each value represents the risk of a person in the relevant smoking and gender category dying of that disease, compared with the risk for someone who has never smoked. Factors greater than unity represent an increased risk of death. For the majority of diseases the factors, as published, apply to persons aged over 35. Age-specific risks are given for pneumonia, ischaemic heart disease and cerebrovascular disease, and differences in relative risks exist between men and women. There are many reasons for this, linked to current and historical smoking prevalences as well as to differential environmental exposures.

Relative risk factors less than unity are also published for two diseases that may be inhibited by smoking: Parkinson's disease and endometrial cancer. These estimates are subject to a rather higher level of uncertainty than those published in Table A2. The relative risks for these two diseases are given in Table A3.

| Table A3 Relative mortality risks for diseases inhibited by smoking | | | | |
|---|---|---|---|---|
| | **Male smokers** | | **Female smokers** | |
| **Disease** | **Current ($r_c$)** | **Ex ($r_f$)** | **Current ($r_c$)** | **Ex ($r_f$)** |
| Parkinson's disease | 0.5 | 0.5 | 0.5 | 0.5 |
| Endometrial cancer | na | na | 0.7 | 0.7 |

## *Calculating the smoking-attributable proportion*

For each disease, each gender and, where applicable, each age band, an expression was evaluated that linked estimates of PCT-based smoking behaviour with the published relative risks. The formula is given as:

$$AP = \{[P_c(R_c - 1) + P_f(R_f - 1)]\}/\{[1 + P_c(R_c - 1) + P_f(R_f - 1)]\}$$

where

$AP$ is the attributable proportion for each disease

$P_c$ is the proportion of the population who are current smokers

$P_f$ is the proportion of the population who are ex-smokers

$R_c$ is the relative risk factor for current smokers

$R_f$ is the relative risk factor for ex-smokers.

Calculation of gender- and (where applicable) age-specific attributable proportions for each of the diseases listed in Tables A2 and A3 required the substitution of the appropriate relative risk factors into the expression and its application to the relevant estimated proportions of smokers and ex-smokers. This generated an attributable proportion for each disease, each gender and, where applicable, for each age group in each ward. Although the relative risk values do not vary with geography, the prevalence estimates of smoking behaviour do, and the attributable proportions are location-specific.

## *Death information*

To estimate the number of deaths that occur due to smoking, the two dimensions of smoking behaviour (current and ex-smoking) and the estimates of attributable risk have to be combined with observed counts of mortality to derive the smoking-attributable proportion. Counts of death in England, covering five years from 1998 to 2002 inclusive, were made available at ward level. The data covered all deaths from the diseases listed in Tables A2 and A3. Each death was recorded by cause, by the year death occurred, and by the age, gender and ward of the deceased. The relative risks shown in Tables A2 and A3 apply only to persons aged over 35 and cannot refer to deaths occurring at earlier ages. Therefore counts of death were for those occurring at age 35 or over. This constraint means it is likely that we are underestimating both the number and proportion of total smoking-attributable mortality.

The death data were supplied by ONS with diseases coded according to the ICD-9 or ICD-10 international standards, depending on the year of the deaths concerned. Years 1998–2000 applied the ICD-9 codes, while the ICD-10 codes were applied from 2001 onwards. No problems were notified regarding bridging between ICD-9 and ICD-10. These codes are shown in Appendix 5. Counts at ward level ensured these data could then be aggregated to the level of the working target geography (PCT).

## *A note on timespans*

Mortality information has been collected for a five-year period (1998–2002). In the results sections the smoking-attributable mortality counts have been divided by 5 to provide an annual average count for comparative purposes.

# Appendix 2 Models of current and ex-smoking behaviour

Both models (Tables A4 and A5) had a binomial response variable and used a logit link function and second-order penalised quasi-likelihood for the estimation of the logit values. The model's coefficients were checked for stability using Monte Carlo Markov Chain (MCMC) simulation (Rasbash *et al*., 2000; Browne, 2003). The resulting estimates from the MCMC current and past smoking models are presented below. The ecological variables for this model are defined as follows:

| | |
|---|---|
| Percentage of people in social grade A or B | (SgAB) |
| Percentage of people in social grade C2, D or E | (SgC2DE) |
| Percentage of people non-white | (Ethnic) |
| Percentage of households with more than six rooms | (Rooms) |
| Percentage of households in rented tenure | (Rent) |
| Percentage of household with dependent children | (DepenCh) |
| Percentage households with more than one car | (Car1+) |
| Percentage of males economically inactive | (Minactive) |
| Percentage of females unemployed | (Funemp) |
| Percentage of households overcrowded | (Overcrowding) |

As part of the modelling process, residuals can be identified at each level in the modelled hierarchy. As all regions are modelled, the region-level residual can be used to improve the estimations. These adjustments are shown in Table A6 (the residuals are given as logits).

**Table A6 Adjustments**

| Government regional office | Current smoking model | Ex-smoking model |
|---|---|---|
| East Midlands | 0.0081 | 0.0329 |
| East of England | 0.0104 | 0.0309 |
| London | –0.0169 | 0.0184 |
| North East | –0.0172 | –0.0574 |
| North West | 0.0083 | –0.0406 |
| South East | 0.0453 | 0.0378 |
| South West | 0.0014 | –0.0127 |
| West Midlands | –0.0387 | –0.0389 |
| Yorkshire and the Humber | –0.0016 | 0.0302 |

**Table A4 Current smoking model – mean estimates, standard deviation (SD) and credible interval[1] results from final MCMC model**

| Levels and variable type | Variable | Coefficient (SD) | 95% credible interval |
|---|---|---|---|
| | Intercept | –1.186 (0.038) | –1.259 to –1.109 |
| Individual terms: main effects | Single | 0.748 (0.046) | 0.658 to 0.842 |
| | Male | 0.244 (0.044) | 0.156 to 0.333 |
| | Age 16–24 | 0.470 (0.151) | 0.177 to 0.750 |
| | Age 25–34 | 0.058 (0.038) | –0.015 to 0.136 |
| | Age 45–54 | 0.018 (0.053) | –0.086 to 0.116 |
| | Age 55–64 | –0.231 (0.055) | –0.337 to –0.122 |
| | Age 65–74 | –0.579 (0.063) | –0.701 to –0.458 |
| | Age 75+ | –1.427 (0.077) | –1.581 to –1.280 |
| Individual terms: two-way interactions | Single.Male | –0.276 (0.060) | –0.395 to –0.162 |
| | Single.16–24 | –0.612 (0.153) | –0.894 to –0.314 |
| | Single.45–54 | –0.145 (0.083) | –0.306 to 0.020 |
| | Single.55–75+ | –0.359 (0.075) | –0.501 to –0.206 |
| | Male.45–75+ | –0.211 (0.062) | –0.333 to –0.090 |
| Individual term: three-way interaction | Single.Male.45–75+ | 0.378 (0.098) | 0.187 to 0.574 |
| Ecological effects: level 2 | SgAB[2] | –0.017 (0.003) | –0.023 to –0.010 |
| | Ethnic | –0.012 (0.002) | –0.015 to –0.009 |
| | Rooms | –0.009 (0.002) | –0.014 to –0.005 |
| | Rent | 0.014 (0.002) | 0.011 to 0.018 |
| | DepenCh | 0.005 (0.003) | –0.002 to 0.005 |
| | Minactive | –0.001 (0.003) | –0.007 to 0.005 |
| Cross-level interactions | 16–34.SgAB | 0.009 (0.003) | 0.004 to 0.015 |
| | Male.Ethnic | 0.011 (0.002) | 0.007 to 0.014 |
| | 16–24.Ethnic | –0.012 (0.003) | –0.017 to –0.007 |
| | Single.Rent | –0.005 (0.002) | –0.008 to –0.001 |
| | 55–75+.DepenCh | 0.014 (0.006) | 0.003 to 0.024 |
| | 16–24.Minactive | –0.012 (0.005) | –0.023 to –0.002 |

[1]Credible intervals are derived via MCMC methods and can be interpreted in much the same way as traditional confidence intervals.
[2]These are the two highest social grades in the current UK classification.

| **Table A5 Ex-smoking model – mean estimates, standard deviation (SD) and credible interval[1] results from final MCMC model** | | | |
|---|---|---|---|
| **Levels and variable type** | **Variable** | **Coefficient (SD)** | **95% credible interval** |
| | Intercept | –1.134 (0.037) | –1.207 to –1.058 |
| Individual terms: main effects | Single | –0.133 (0.037) | –0.207 to –0.050 |
| | Male | 0.094 (0.042) | 0.012 to 0.175 |
| | Age 16–24 | –0.211 (0.167) | –0.543 to 0.092 |
| | Age 25–34 | –0.155 (0.039) | –0.230 to –0.081 |
| | Age 45–54 | 0.260 (0.048) | 0.168 to 0.356 |
| | Age 55–64 | 0.461 (0.048) | 0.364 to 0.555 |
| | Age 65–74 | 0.641 (0.053) | 0.537 to 0.748 |
| | Age 75+ | 0.815 (0.061) | 0.694 to 0.934 |
| Individual terms: two-way interactions | Single.Male | –0.215 (0.049) | –0.312 to –0.122 |
| | Single.16–24 | –0.513 (0.173) | –0.83 to –0.540 |
| | Single.65–75+ | 0.144 (0.057) | 0.027 to 0.255 |
| | Male.45–54 | 0.336 (0.067) | 0.203 to 0.461 |
| | Male.55–64 | 0.635 (0.067) | 0.505 to 0.764 |
| | Male.65–74 | 0.818 (0.068) | 0.688 to 0.955 |
| | Male.75+ | 1.076 (0.081) | 0.920 to 1.239 |
| Ecological effects: level 2 | SgC2DE | –0.006 (0.002) | –0.010 to –0.001 |
| | DepenCh | –0.013 (0.004) | –0.020 to –0.006 |
| | Car1+ | 0.004 (0.002) | 0.000 to 0.008 |
| | Overcrowding | 0.016 (0.006) | 0.005 to 0.028 |
| | Funemp | –0.050 (0.023) | –0.096 to –0.005 |
| | Ethnic | –0.016 (0.002) | –0.021 to –0.012 |
| Cross-level interactions | Single.SgC2DE | –0.005 (0.002) | –0.009 to –0.001 |
| | 45–75+.SgC2DE | 0.005 (0.002) | 0.000 to 0.009 |
| | 55–75+.DepenCh | 0.019 (0.005) | 0.010 to 0.029 |
| | 55–75+.Cars1+ | –0.007 (0.002) | –0.011 to –0.003 |
| | Male.Overcrowded | –0.015 (0.006) | –0.027 to –0.002 |
| | 16–34.Funemp | 0.076 (0.030) | 0.017 to 0.134 |
| | Single.Ethnic | 0.006 (0.002) | 0.002 to 0.010 |
| | Male.Ethnic | 0.007 (0.003) | 0.002 to 0.013 |

[1]Credible intervals are derived via MCMC methods and can be interpreted in much the same way as traditional confidence intervals.

# Appendix 3 Assessing the estimates

How 'good' are the estimates? This is an important question, but in many ways it is not the right question. The real issue is the knowledge gain provided by the estimates: they provide a reasoned, localised insight into smoking and smoking-attributable mortality. That insight has not previously been possible on the same basis across the whole of England.

Any evaluation of the estimates must recognise that they depend on two data sources: the HSfE and the 2001 Census. They also depend on the robustness of the two models and the reliability of the smoking-attributable risks. This multiple dependency means it is problematic to think in terms of traditional notions such as confidence intervals around the estimates of smoking-attributable mortality. It is better to note that the data sources are the best available, while acknowledging that there is differential completion of HSfE questions and a level of non-response in the 2001 Census.

We can explore the quality question in two ways.

### *1. How good are the models used to estimate current smoking prevalence and the proportion of ex-smokers?*

- We can see how good the model is at predicting the original survey responses using the 'Percentage Correct Prediction' (Field, 2000). In the null current smoking model this is given as 50% and in the full model it rises to 60.1%. For the ex-smoking models the values are 53.4% and 63.7%, respectively.
- We can look at the deviance drop between the null and full models. The deviance statistic, given as –2* (loglikelihood), can be considered as a measure of poorness of fit. By measuring the reduction in deviance in a full model from that in an initial (null) model, an assessment of model performance can be made. Table A7 reports the deviance statistic for the initial null models and full models described in Appendix 2. The reduction in the value is given as a percentage of the null deviance.
- The method described by Snijders and Bosker (1999) can be used to approximate the variance explained by the two models. In the model of current smoking behaviour this is estimated at 11.8%; for the ex-smoking model the corresponding value is 14%.
- While we have noted above that it is problematic to generate confidence intervals around our estimates of smoking-attributable mortality, we can use the approach described by Heady *et al.* (2003) to generate confidence intervals around our estimates of smoking behaviour (Figures A1 and A2).
- Goldstein (1995) outlines a method for apportioning the overall variance across the different levels of a multi-level model. The percentage of the level 2 area variance in the current smoking null model that is explained in the final model is 68.2%. For current smoking approximately 5.4% of the overall variation in a null model is occurring at the level of postcode sector. Once the predictor variables are included, this is reduced to 0.5%. Overall this suggests that the model is relatively successful at controlling for variation at the postcode sector level – the level viewed as equivalent to wards for which current smoking is predicted. The percentage of level 2 area variance in the

**Table A7**

| | | Null model | Full model | Percentage reduction |
|---|---|---|---|---|
| Deviance statistic | Current smoking | 51340.30 | 44166.54 | 14.0 |
| | Ex-smoking | 56300.23 | 46951.68 | 16.6 |

**Figure A1 Model estimates and 95% confidence intervals for current smoking**

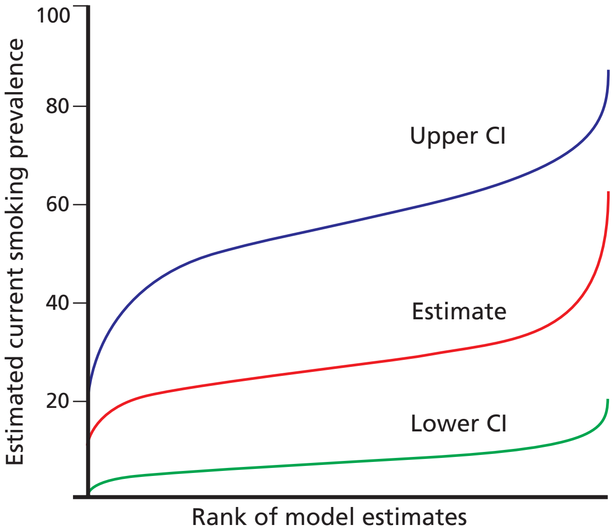
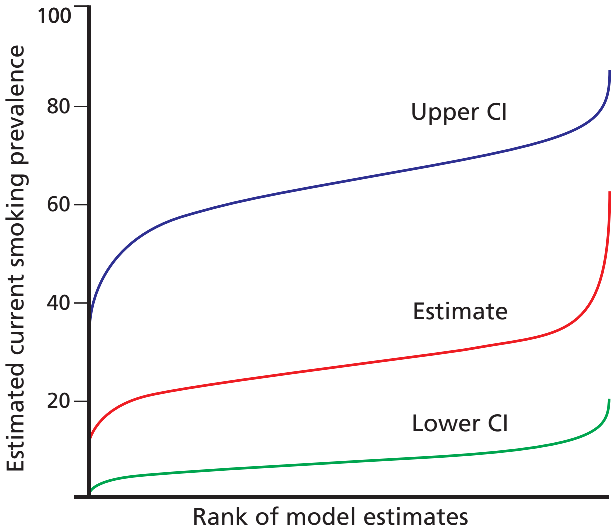


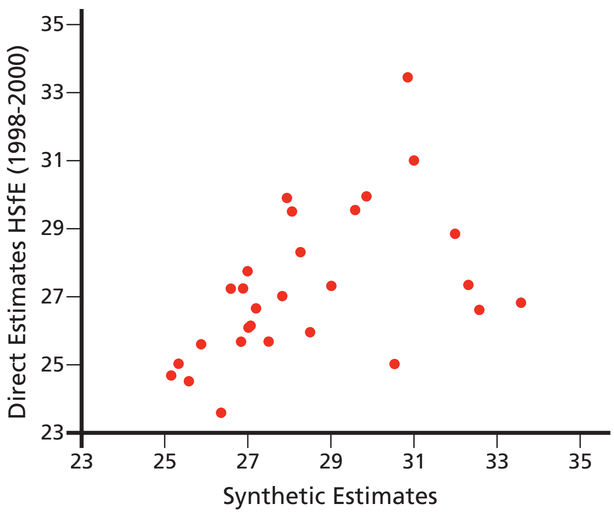

**Figure A2 Model estimates and 95% confidence intervals for ex-smoking**




ex-smoking model that is explained in the final model is 40.6%. Approximately 2.0% of the overall variation in a null model is occurring at the level of postcode sector. Once the predictor variables are included, this is reduced to 1.2%.

- Direct survey estimates can be compared with the synthetic modelled estimates using simple scatter plots and correlations (Twigg and Moon, 2002). Estimates of current smoking behaviour for SHAs have recently been generated from the HSfE by merging several years of survey results. Figure A3 shows the relationship between the synthetic estimates used in this report and estimated prevalences produced directly from the HSfE for all persons. The synthetic estimates are based on four runs of HSfE information (1998–2001) and the direct estimates relate to the average for 1998–2000. The plot shows a positive association between the two sources with a correlation coefficient of 0.485 ($P = 0.009$). The difference between the synthetic and direct estimates is above 5% in only three of the SHAs; in half, the difference is less than 1%.
- In comparing the synthetic estimates with those derived directly from the HSfE we are not necessarily assuming that one set is any more reliable than the other, but it must be noted that the HSfE was not originally designed to represent the SHA for the years reported in this comparative analysis.

**Figure A3 Direct versus synthetic estimates: smoking prevalences (persons)**




## *2. How good are the relative risks for smoking-attributable mortality?*

We use the published relative risks employed by Callum (1998). These are taken from the US DHHS (1989) and are widely used in other studies. They continue to represent the best available information on attributable risk, but it must be noted that there are confidence intervals associated with these measures (Table A8).

| **Table A8** | | | | |
|---|---|---|---|---|
| **Disease** | **Male smokers** | | **Female smokers** | |
| | **Current ($r_c$)** | **Ex ($r_f$)** | **Current ($r_c$)** | **Ex ($r_f$)** |
| Cancers | | | | |
| Lung | 26.6 (21.0–33.6) | 8.2 (6.5–10.4) | 13.6 (11.6–16.0) | 4.1 (3.4–4.9) |
| Upper respiratory sites | 10.6 (6.0–18.7) | 3.0 (1.6 –5.5) | 6.1 (3.8–10.0) | 1.5 (0.8–2.9) |
| Oesophagus | 5.3 (3.1–9.2) | 4.0 (2.3–6.9) | 9.3 (4.7–18.3) | 3.1 (1.4–6.7) |
| Bladder | 2.9 (1.9–4.4) | 2.1 (1.4–3.0) | 1.6 (0.8–3.0) | 1.5 (0.8–2.7) |
| Kidney | 2.8 (1.9–4.2) | 1.6 (1.1–2.4) | 1.3 (0.9–2.0) | 1.0 (0.6–1.6) |
| Stomach | 2.1 (1.4–3.2) | 1.6 (1.1–2.3) | 1.2 (0.8–1.8) | 1.3 (0.9–2.0) |
| Pancreas | 2.2 (1.7–2.8) | 1.1 (0.8–1.4) | 2.3 (1.8–2.9) | 1.5 (1.2–1.9) |
| Unspecified site | 4.4 (3.3–5.9) | 2.3 (1.8–3.1) | 2.1 (1.7–2.6) | 1.2 (0.9–1.6) |
| Myeloid leukaemia | 1.4 (0.8–2.3) | 1.3 (0.8–2.0) | 1.2 (0.7–2.0) | 1.3 (0.8–2.0) |
| Respiratory | | | | |
| Chronic obstructive lung disease | 14.1 (10.3–19.3) | 8.4 (6.4–11.2) | 14.0 (10.9–18.1) | 8.6 (6.7–11.0) |
| Pneumonia 35–64 | 2.3 (1.2–4.4) | 1.3 (1.1–1.6) | 4.6 (2.4–8.6) | 1.1 (0.8–1.5) |
| Pneumonia 65+ | 1.9 (1.4–2.6) | 1.3 (1.1–1.6) | 2.0 (1.4–2.7) | 1.1 (0.8–1.5) |
| Circulatory | | | | |
| Ischaemic heart disease 35–54 | 4.2 (3.1–5.7) | 1.9 (1.3–2.6) | 5.2 (3.3–8.3) | 2.9 (1.7–5.0) |
| Ischaemic heart disease 55–64 | 2.6 (2.2–3.0) | 1.6 (1.4–1.9) | 3.0 (2.5–3.7) | 1.1 (0.9–1.5) |
| Ischaemic heart disease 65–74 | 1.7 (1.6–1.9) | 1.4 (1.2–1.5) | 2.1 (1.8–2.4) | 1.2 (1.0–1.4) |
| Ischaemic heart disease 75+ | 1.4 (1.2–1.6) | 1.1 (1.0–1.2) | 1.4 (1.3–1.7) | 1.1 (1.0–1.2) |
| Cerebrovascular disease 35–54 | 5.1 (2.1–12.2) | 1.1 (0.7–1.7) | 4.5 (2.4–8.5) | 1.1 (0.7–1.7) |
| Cerebrovascular disease 55–64 | 2.8 (1.9–4.3) | 1.1 (0.7–1.7) | 3.2 (2.2–4.7) | 1.1 (0.7–1.7) |
| Cerebrovascular disease 65–74 | 2.1 (1.6–2.7) | 1.0 (0.9–1.2) | 3.0 (2.4–3.9) | 1.6 (1.2–2.1) |
| Cerebrovascular disease 75+ | 1.4 (1.1–1.8) | 1.0 (0.9–1.2) | 1.2 (1.0–1.6) | 1.0 (0.8–1.3) |
| Aortic aneurysm | 5.3 (3.8–7.5) | 2.6 (1.9–3.7) | 8.2 (5.4–12.5) | 1.6 (0.9–2.9) |
| Myocardial degeneration | 2.1 (1.8–2.4) | 1.2 (1.1–1.4) | 1.7 (1.5–2.0) | 1.2 (1.0–1.4) |
| Atherosclerosis | 1.9 (1.0–3.4) | 1.1 (0.7–1.9) | 2.2 (1.2–4.0) | 0.8 (0.4–1.7) |
| Digestive | | | | |
| Stomach/duodenal ulcer | 4.5 (1.9–10.3) | 1.6 (0.7–3.2) | 6.4 (3.3–12.4) | 1.4 (0.6–3.5) |

# Appendix 4 Census ward to census standard table ward lookup

**Table A9**

| CAS ward | Ward name | Standard table ward | CAS ward | Ward name | Standard table ward |
|---|---|---|---|---|---|
| 00AAFE | Bishopsgate | 00AAFT | 35UBGF | Longhoughton with Craster | 35UBGF |
| 00AAFS | Farringdon Within | 00AAFT | 35UBGK | Whittingham | 35UBGK |
| 00AAFT | Farringdon Without | 00AAFT | 35UCFS | Bamburgh | 35UCFU |
| 00AAFY | Queenhithe | 00AAFT | 35UCFT | Beadnell | 35UCGE |
| 00AAFZ | Tower | 00AAFT | 35UCFU | Belford | 35UCFU |
| 00AAGB | Walbrook | 00AAFT | 35UCFW | Cheviot | 35UCFW |
| 15UHFB | St Agnes | 15UHFD | 35UCFZ | Flodden | 35UCFW |
| 15UHFC | St Martin's | 15UHFD | 35UCGA | Ford | 35UCGC |
| 15UHFD | St Mary's | 15UHFD | 35UCGC | Lowick | 35UCGC |
| 15UHFE | Tresco | 15UHFD | 35UCGE | North Sunderland | 35UCGE |
| 16UFGK | Brough | 16UFGK | 35UCGF | Prior | 35UCGF |
| 16UFHH | Ravenstonedale | 16UFGK | 35UCGH | Shielfield | 35UCGF |
| 20UHFY | Barnard Castle West | 20UHFY | 35UFGK | Acomb | 35UFGK |
| 20UHFZ | Barningham and Ovington | 20UHGG | 35UFGM | Bellingham | 35UFGM |
| 20UHGB | Cotherstone with Lartington | 20UHGC | 35UFGN | Broomhaugh and Riding | 35UFHH |
| 20UHGC | Eggleston | 20UHGC | 35UFGW | Hexham Gilesgate | 35UFGK |
| 20UHGF | Gainford and Winston | 20UHGF | 35UFHG | Redesdale | 35UFHG |
| 20UHGG | Greta | 20UHGG | 35UFHH | Sandhoe with Dilston | 35UFHH |
| 20UHGH | Hamsterley and South Bedbu | 20UHGK | 35UFHM | Upper North Tyne | 35UFHG |
| 20UHGJ | Ingleton | 20UHGF | 35UFHN | Wanney | 35UFGM |
| 20UHGK | Lynesack | 20UHGK | 38UCFW | Carfax | 38UCFW |
| 20UHGL | Middleton-in-Teesdale | 20UHGL | 38UCGD | Holywell | 38UCFW |
| 20UHGM | Romaldkirk | 20UHGL | 39UFGM | Chirbury | 39UFHE |
| 20UHGN | Staindrop | 20UHGN | 39UFGS | Clun | 39UFGS |
| 20UHGP | Startforth | 20UHFY | 39UFGT | Clun Forest | 39UFGS |
| 20UHGQ | Streatlam and Whorlton | 20UHGN | 39UFHE | Worthen | 39UFHE |
| 22UQGL | Birchanger | 22UQHB | 40UFFY | Aville Vale | 40UFFY |
| 22UQHB | Stansted South | 22UQHB | 40UFFZ | Brompton Ralph and Haddon | 40UFGB |
| 29UBHS | Park Farm North | 29UBHS | 40UFGB | Crowcombe and Stogumber | 40UFGB |
| 29UBHT | Park Farm South | 29UBHS | 40UFGD | Dunster | 40UFFY |
| 35UBGB | Embleton | 35UBGF | 40UFGE | Exmoor | 40UFGL |
| 35UBGC | Harbottle and Elsdon | 35UBGK | 40UFGL | Quarme | 40UFGL |
| 35UBGD | Hedgeley | 35UBGE | 41UEGJ | Keele | 41UEGN |
| 35UBGE | Longframlington | 35UBGE | 41UEGN | Madeley | 41UEGN |

# Appendix 5 Smoking-attributable diseases and their ICD-9 and ICD-10 codes

**Table A10**

| **Disease** | **ICD-9 code** | **ICD-10 code** |
|---|---|---|
| Cancer | | |
| Lung | 162 | C33 and C34 |
| Upper respiratory sites | 161 and 1490 | C32 and C140 |
| Oesophagus | 150 | C15 |
| Bladder | 188 | C67 |
| Kidney | 1890 | C64 |
| Stomach | 151 | C16 |
| Pancreas | 157 | C25 |
| Unspecified site | 1991 | C80 |
| Myeloid leukaemia | 205 | C92 |
| Endometrial (uterus) | 182 | C54 |
| Respiratory | | |
| Chronic obstructive lung disease | 496 | J44 |
| Pneumonia | 486 | J18 |
| Circulatory | | |
| Ischaemic heart disease | 410–414 | I20–I25 |
| Cerebrovascular disease | 430–438 | I60–I69 |
| Aortic aneurysm | 441 | I71 |
| Myocardial degeneration | 4291 | I515 |
| Atherosclerosis | 440 | I70 |
| Digestive | | |
| Stomach/duodenal ulcer | 531 and 532 | K25 and K26 |
| Parkinson's disease | 332 | G20 |

# Appendix 6 Estimates of current smoking prevalence and proportion of ex-smokers: PCTs

**Table A11**

| PCT code | Name | Current smoking prevalence (%) | Ex-smokers (%) |
|---|---|---|---|
| 5L8 | Adur, Arun and Worthing | 26 | 36 |
| 5AW | Airedale | 24 | 32 |
| 5ED | Amber Valley | 27 | 32 |
| 5FA | Ashfield | 32 | 30 |
| 5LL | Ashford | 27 | 33 |
| 5HG | Ashton, Leigh and Wigan | 31 | 29 |
| 5C2 | Barking and Dagenham | 37 | 27 |
| 5A9 | Barnet | 25 | 28 |
| 5JE | Barnsley | 34 | 30 |
| 5GR | Basildon | 36 | 29 |
| 5ET | Bassetlaw | 29 | 31 |
| 5FL | Bath and North East Somerset | 25 | 32 |
| 5F8 | Bebington and West Wirral | 21 | 33 |
| 5GD | Bedford | 26 | 30 |
| 5GE | Bedfordshire Heartlands | 26 | 32 |
| 5FH | Bexhill and Rother | 22 | 38 |
| TAK | Bexley | 27 | 30 |
| 5GP | Billericay, Brentwood and Wickford | 22 | 34 |
| 5H2 | Birkenhead and Wallasey | 31 | 28 |
| 5CC | Blackburn with Darwen | 29 | 25 |
| 5HP | Blackpool | 31 | 31 |
| 5G6 | Blackwater Valley and Hart | 26 | 32 |
| 5HQ | Bolton | 30 | 28 |
| 5CE | Bournemouth Teaching | 29 | 32 |
| 5G2 | Bracknell Forest | 27 | 31 |
| 5CF | Bradford City | 27 | 18 |
| 5CG | Bradford South and West | 31 | 28 |
| 5K5 | Brent Teaching | 27 | 22 |
| 5LQ | Brighton and Hove City | 33 | 32 |
| 5JF | Bristol North | 30 | 29 |
| 5JG | Bristol South and West | 33 | 29 |
| 5JL | Broadland | 23 | 34 |
| 5A7 | Bromley | 24 | 32 |
| 5EV | Broxtowe & Hucknall | 28 | 31 |
| 5G8 | Burnley, Pendle and Rossendale | 29 | 28 |
| 5DQ | Burntwood, Lichfield and Tamworth | 27 | 30 |
| 5JX | Bury | 28 | 29 |

| PCT code | Name | Current smoking prevalence (%) | Ex-smokers (%) |
|---|---|---|---|
| 5J6 | Calderdale | 29 | 31 |
| 5JH | Cambridge City | 29 | 29 |
| 5K7 | Camden | 35 | 28 |
| 5MM | Cannock Chase | 29 | 29 |
| 5LM | Canterbury and Coastal | 27 | 33 |
| 5D4 | Carlisle and District | 29 | 30 |
| 5JP | Castle Point and Rochford | 24 | 34 |
| 5H4 | Central Cheshire | 26 | 30 |
| 5KT | Central Cornwall | 27 | 33 |
| 5AL | Central Derby | 32 | 23 |
| 5HA | Central Liverpool | 37 | 25 |
| 5CL | Central Manchester | 35 | 21 |
| 5JT | Central Suffolk | 23 | 34 |
| 5JC | Charnwood and North West Leicestershire | 26 | 31 |
| 5JN | Chelmsford | 25 | 33 |
| 5KW | Cheltenham and Tewkesbury | 26 | 32 |
| 5DV | Cherwell Vale | 26 | 33 |
| 5H3 | Cheshire West | 24 | 32 |
| 5EA | Chesterfield | 32 | 31 |
| 5G4 | Chiltern and South Bucks | 20 | 35 |
| 5F2 | Chorley and South Ribble | 26 | 30 |
| 5C3 | City and Hackney Teaching | 37 | 23 |
| 5GM | Colchester | 28 | 31 |
| 5KY | Cotswold and Vale | 24 | 33 |
| 5MD | Coventry | 29 | 26 |
| 5KJ | Craven, Harrogate and Rural District | 24 | 34 |
| 5MA | Crawley | 31 | 29 |
| 5K9 | Croydon | 26 | 26 |
| 5GW | Dacorum | 27 | 32 |
| 5J9 | Darlington | 29 | 29 |
| 5CM | Dartford, Gravesham and Swanley | 29 | 31 |
| 5AC | Daventry and South Northamptonshire | 23 | 33 |
| 5H7 | Derbyshire Dales and South Derbyshire | 25 | 32 |
| 5KA | Derwentside | 31 | 29 |
| 5CK | Doncaster Central | 32 | 29 |
| 5EK | Doncaster East | 28 | 31 |
| 5EL | Doncaster West | 34 | 29 |
| 5HV | Dudley Beacon and Castle | 31 | 27 |
| 5HT | Dudley South | 27 | 30 |
| 5KC | Durham and Chester-le-Street | 28 | 29 |
| 5J8 | Durham Dales | 30 | 30 |
| 5HX | Ealing | 27 | 25 |
| 5KD | Easington | 34 | 28 |
| 5JK | East Cambridgeshire and Fenland | 27 | 33 |

| PCT code | Name | Current smoking prevalence (%) | Ex-smokers (%) |
|---|---|---|---|
| 5FT | East Devon | 22 | 36 |
| 5KP | East Elmbridge and Mid Surrey | 21 | 35 |
| 5FD | East Hampshire | 26 | 34 |
| 5LN | East Kent Coastal | 29 | 33 |
| 5HK | East Leeds | 34 | 29 |
| 5H9 | East Lincolnshire | 26 | 34 |
| 5ML | East Staffordshire | 25 | 30 |
| 5KQ | East Surrey | 24 | 34 |
| 5E3 | East Yorkshire | 23 | 33 |
| 5LR | Eastbourne Downs | 26 | 36 |
| 5MY | Eastern Birmingham | 32 | 25 |
| 5H5 | Eastern Cheshire | 22 | 33 |
| 5E5 | Eastern Hull | 40 | 27 |
| 5EY | Eastern Leicester | 28 | 21 |
| 5E7 | Eastern Wakefield | 35 | 30 |
| 5LY | Eastleigh and Test Valley South | 25 | 33 |
| 5D5 | Eden Valley | 25 | 33 |
| 5H6 | Ellesmere Port and Neston | 29 | 30 |
| 5C1 | Enfield | 28 | 27 |
| 5AJ | Epping Forest | 26 | 33 |
| 5ER | Erewash | 29 | 31 |
| 5FR | Exeter | 29 | 31 |
| 5LX | Fareham and Gosport | 26 | 33 |
| 5HE | Fylde | 22 | 34 |
| 5KF | Gateshead | 35 | 29 |
| 5EC | Gedling | 26 | 32 |
| 5GT | Great Yarmouth | 30 | 32 |
| 5EX | Greater Derby | 28 | 31 |
| 5A8 | Greenwich | 34 | 26 |
| 5L5 | Guildford and Waverley | 23 | 34 |
| 5J1 | Halton | 34 | 27 |
| 5KH | Hambleton and Richmondshire | 26 | 33 |
| 5H1 | Hammersmith and Fulham | 34 | 29 |
| 5C9 | Haringey Teaching | 32 | 24 |
| 5DC | Harlow | 36 | 30 |
| 5K6 | Harrow | 21 | 25 |
| 5D9 | Hartlepool | 33 | 28 |
| 5FJ | Hastings and St Leonards | 33 | 32 |
| 5A4 | Havering | 27 | 32 |
| 5MX | Heart of Birmingham Teaching | 28 | 15 |
| 5CN | Herefordshire | 25 | 32 |
| 5CP | Hertsmere | 26 | 32 |
| 5F4 | Heywood and Middleton | 35 | 28 |
| 5HN | High Peak and Dales | 25 | 34 |
| 5AT | Hillingdon | 27 | 28 |

| PCT code | Name | Current smoking prevalence (%) | Ex-smokers (%) |
|---|---|---|---|
| 5JA | Hinckley and Bosworth | 25 | 32 |
| 5MC | Horsham and Chanctonbury | 23 | 35 |
| 5HY | Hounslow | 29 | 25 |
| 5LJ | Huddersfield Central | 28 | 28 |
| 5GF | Huntingdonshire | 25 | 32 |
| 5G7 | Hyndburn and Ribble Valley | 27 | 30 |
| 5JQ | Ipswich | 30 | 31 |
| 5DG | Isle of Wight | 27 | 34 |
| 5K8 | Islington | 38 | 26 |
| 5K4 | Kennet and North Wiltshire | 26 | 32 |
| 5LA | Kensington and Chelsea | 30 | 32 |
| 5A5 | Kingston | 25 | 30 |
| 5J4 | Knowsley | 36 | 26 |
| 5LD | Lambeth | 35 | 23 |
| 5KN | Langbaurgh | 29 | 29 |
| 5HJ | Leeds North East | 22 | 32 |
| 5HM | Leeds North West | 29 | 29 |
| 5HH | Leeds West | 33 | 29 |
| 5EJ | Leicester City West | 37 | 25 |
| 5LF | Lewisham | 33 | 24 |
| 5D3 | Lincolnshire South West Teaching | 26 | 32 |
| 5GC | Luton | 29 | 25 |
| 5L2 | Maidstone Weald | 26 | 33 |
| 5GL | Maldon and South Chelmsford | 23 | 33 |
| 5AM | Mansfield District | 32 | 30 |
| 5L3 | Medway | 30 | 29 |
| 5EH | Melton, Rutland and Harborough | 23 | 33 |
| 5FX | Mendip | 26 | 32 |
| 5E9 | Mid-Hampshire | 25 | 34 |
| 5FK | Mid-Sussex | 23 | 35 |
| 5FV | Mid-Devon | 26 | 33 |
| 5KM | Middlesbrough | 34 | 26 |
| 5CQ | Milton Keynes | 29 | 29 |
| 5DD | Morecambe Bay | 27 | 31 |
| 5A1 | New Forest | 23 | 36 |
| 5AP | Newark and Sherwood | 27 | 32 |
| 5DK | Newbury and Community | 26 | 33 |
| 5HW | Newcastle-under-Lyme | 28 | 30 |
| 5D7 | Newcastle | 33 | 27 |
| 5C5 | Newham | 33 | 18 |
| 5KR | North and East Cornwall | 26 | 33 |
| 5MW | North Birmingham | 24 | 30 |
| 5CH | North Bradford | 27 | 30 |
| 5FQ | North Devon | 26 | 33 |
| 5CD | North Dorset | 24 | 34 |

| PCT code | Name | Current smoking prevalence (%) | Ex-smokers (%) |
|---|---|---|---|
| 5AN | North East Lincolnshire | 31 | 29 |
| 5DT | North East Oxfordshire | 26 | 32 |
| 5EG | North Eastern Derbyshire | 30 | 32 |
| 5DF | North Hampshire | 26 | 32 |
| 5GH | North Hertfordshire and Stevenage | 29 | 31 |
| 5J7 | North Kirklees | 29 | 27 |
| 5EF | North Lincolnshire | 29 | 31 |
| 5G9 | North Liverpool | 40 | 25 |
| 5CR | North Manchester | 40 | 25 |
| 5JM | North Norfolk | 25 | 36 |
| 5AF | North Peterborough | 31 | 28 |
| 5EE | North Sheffield | 38 | 27 |
| 5M8 | North Somerset | 23 | 34 |
| 5ME | North Stoke | 34 | 28 |
| 5L6 | North Surrey | 25 | 34 |
| 5E1 | North Tees | 29 | 28 |
| 5D8 | North Tyneside | 30 | 30 |
| 5MP | North Warwickshire | 28 | 29 |
| 5LW | Northampton | 28 | 29 |
| 5LV | Northamptonshire Heartlands | 29 | 30 |
| TAC | Northumberland Care Trust | 28 | 31 |
| 5A2 | Norwich | 37 | 29 |
| 5EM | Nottingham City | 35 | 25 |
| 5MG | Oldbury and Smethwick | 29 | 23 |
| 5J5 | Oldham | 31 | 27 |
| 5DW | Oxford City | 29 | 29 |
| 5F1 | Plymouth Teaching | 32 | 30 |
| 5KV | Poole | 25 | 33 |
| 5FE | Portsmouth City Teaching | 33 | 29 |
| 5HD | Preston | 28 | 27 |
| 5DL | Reading | 28 | 30 |
| 5NA | Redbridge | 23 | 25 |
| 5MR | Redditch and Bromsgrove | 25 | 30 |
| 5M6 | Richmond and Twickenham | 24 | 32 |
| 5JY | Rochdale | 30 | 26 |
| 5H8 | Rotherham | 32 | 30 |
| 5MH | Rowley Regis and Tipton | 35 | 26 |
| 5GK | Royston, Buntingford and Bishop’s Stortford | 23 | 33 |
| 5M9 | Rugby | 24 | 30 |
| 5FC | Rushcliffe | 22 | 33 |
| 5F5 | Salford | 35 | 28 |
| 5KK | Scarborough, Whitby and Ryedale | 27 | 34 |
| 5KE | Sedgefield | 33 | 29 |
| 5E2 | Selby and York | 26 | 32 |
| 5EP | Sheffield South West | 24 | 31 |

| PCT code | Name | Current smoking prevalence (%) | Ex-smokers (%) |
|---|---|---|---|
| 5EN | Sheffield West | 29 | 29 |
| 5LP | Shepway | 28 | 33 |
| 5M2 | Shropshire County | 25 | 32 |
| 5DM | Slough | 30 | 24 |
| 5D1 | Solihull | 23 | 31 |
| 5FW | Somerset Coast | 25 | 33 |
| 5FN | South and East Dorset | 22 | 37 |
| 5M1 | South Birmingham | 30 | 26 |
| 5JJ | South Cambridgeshire | 22 | 33 |
| 5GJ | South East Hertfordshire | 26 | 32 |
| 5DX | South East Oxfordshire | 22 | 35 |
| 5EQ | South East Sheffield | 35 | 29 |
| 5A3 | South Gloucestershire | 25 | 31 |
| 5CV | South Hams and West Devon | 23 | 34 |
| 5LK | South Huddersfield | 24 | 33 |
| 5HL | South Leeds | 34 | 29 |
| 5JD | South Leicestershire | 23 | 31 |
| 5HC | South Liverpool | 31 | 29 |
| 5AA | South Manchester | 37 | 26 |
| 5AG | South Peterborough | 27 | 31 |
| 5M5 | South Sefton | 31 | 29 |
| 5K1 | South Somerset | 25 | 33 |
| 5MF | South Stoke | 31 | 27 |
| 5KG | South Tyneside | 35 | 28 |
| 5MQ | South Warwickshire | 23 | 32 |
| 5FP | South West Dorset | 26 | 34 |
| 5FF | South West Kent | 24 | 35 |
| 5DY | South West Oxfordshire | 26 | 33 |
| 5MN | South Western Staffordshire | 23 | 32 |
| 5DJ | South Wiltshire | 27 | 33 |
| 5MT | South Worcestershire | 24 | 32 |
| 5L1 | Southampton City | 35 | 29 |
| 5AK | Southend on Sea | 28 | 33 |
| 5G1 | Southern Norfolk | 25 | 34 |
| 5F9 | Southport and Formby | 22 | 33 |
| 5LE | Southwark | 37 | 24 |
| 5J3 | St Helens | 32 | 29 |
| 5GX | St Albans and Harpenden | 22 | 33 |
| 5HR | Staffordshire Moorlands | 25 | 31 |
| 5F7 | Stockport | 26 | 31 |
| 5JR | Suffolk Coastal | 24 | 35 |
| 5JW | Suffolk West | 27 | 32 |
| 5KL | Sunderland Teaching | 35 | 27 |
| 5LT | Sussex Downs and Weald | 23 | 35 |
| 5M7 | Sutton and Merton | 27 | 29 |

| PCT code | Name | Current smoking prevalence (%) | Ex-smokers (%) |
|---|---|---|---|
| 5L4 | Swale | 32 | 30 |
| 5K3 | Swindon | 29 | 30 |
| 5LH | Tameside and Glossop | 32 | 28 |
| 5K2 | Taunton Deane | 26 | 33 |
| 5FY | Teignbridge | 25 | 34 |
| 5MK | Telford and Wrekin | 29 | 27 |
| 5AH | Tendring | 25 | 36 |
| 5GQ | Thurrock | 33 | 29 |
| 5CW | Torbay | 28 | 33 |
| 5C4 | Tower Hamlets | 37 | 21 |
| 5F6 | Trafford North | 30 | 28 |
| 5CX | Trafford South | 23 | 32 |
| 5GN | Uttlesford | 22 | 34 |
| 5DP | Vale of Aylesbury | 25 | 32 |
| 5E8 | Wakefield West | 30 | 30 |
| 5M3 | Walsall Teaching | 30 | 27 |
| 5NC | Waltham Forest | 30 | 24 |
| 5LG | Wandsworth | 31 | 28 |
| 5J2 | Warrington | 27 | 30 |
| 5GV | Watford and Three Rivers | 26 | 31 |
| 5JV | Waveney | 27 | 33 |
| 5MJ | Wednesbury and West Bromwich | 31 | 25 |
| 5GG | Welwyn Hatfield | 28 | 32 |
| 5D6 | West Cumbria | 31 | 29 |
| 5KX | West Gloucestershire | 27 | 31 |
| 5E6 | West Hull | 38 | 27 |
| 5F3 | West Lancashire | 27 | 30 |
| 5D2 | West Lincolnshire | 28 | 32 |
| 5CY | West Norfolk | 26 | 34 |
| 5FM | West of Cornwall | 28 | 32 |
| 5DH | West Wiltshire | 25 | 32 |
| 5L9 | Western Sussex | 24 | 36 |
| 5LC | Westminster | 33 | 30 |
| 5G3 | Windsor, Ascot and Maidenhead | 23 | 33 |
| TAG | Witham, Braintree and Halstead | 28 | 32 |
| 5L7 | Woking Area | 23 | 33 |
| 5DN | Wokingham | 20 | 32 |
| 5MV | Wolverhampton City | 30 | 25 |
| 5G5 | Wycombe | 25 | 31 |
| 5HF | Wyre | 24 | 33 |
| 5DR | Wyre Forest | 26 | 31 |
| 5E4 | Yorkshire Wolds and Coast | 25 | 33 |

Health Development Agency
Holborn Gate
330 High Holborn
London WC1V 7BA

Tel: +44 (0)20 7430 0850
Fax: +44 (0)20 7061 3390

URL: www.hda.nhs.uk
email: communications@hda-online.org.uk

ISBN: 1-84279-318-7


**The smoking epidemic in England**

This report presents estimates for the number of deaths caused by smoking in England. For the first time separate figures are available for primary care trusts (PCTs) and strategic health authorities (SHAs). An update of the overall estimate for UK smoking-attributable mortality is also provided.

The number of deaths caused by smoking reflect past smoking trends. The inclusion in the report of estimates of smoking prevalence for PCTs and SHAs provides an indication of the likely future loss of life.

This document can be found on the HDA website:
www.hda.nhs.uk