Key Health Data for the West Midlands – 2008/09

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NOTES

PREFACE

This is the Eleventh edition in the Key Health Data for the West Midlands series. The report is compiled by the Public Health, Epidemiology and Biostatistics Unit at the University of Birmingham. This year the report is a collaborative project between Health Protection Agency (West Midlands), NHS West Midlands, Sandwell Primary Care Trust, West Midlands Cancer Intelligence Unit, West Midlands Perinatal Institute and the West Midlands Public Health Observatory.

Contemporary Public Health employs a wide definition of health. Key Health Data reflects this spectrum, we try not only to report measurable mortality and morbidity but also the social and economic impacts that affect a person’s well being.

Our philosophy remains to signpost reliable health, health care, environmental and social information and highlight the variation across the West Midlands. Its purpose is not to determine the cause or to provide ‘league tables’ of ill health but rather to promote the widest possible debate and to encourage active collaboration.

The content this year builds on previous Key Health Data reports.
The CD-ROM enclosed includes past Key Health Data reports, associated data as well as extra material we were not able to include in the reports.

The report along with signposted additional data and chapters can also be downloaded from the Key Health Data website:

http://www.bham.ac.uk/keyhealthdata

We thank those who have contributed and helped with its production, and trust that is provides valuable information for those concerned with health and health care in the West Midlands. We welcome any comments you may have.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASR	Age Standardised Rate
CDS	Commissioning Data Set
CEMACH	Confidential Enquiry into Maternal and Child Health
CIS	Cancer Information Service
CMO	Chief medical Officer
CO_2	Carbon Dioxide
COPD	Chronic Obstructive Pulmonary Disease
COMEAP	Committee on the Medical Effects of Air Pollution
CNET	Cancer Network
CRC	Commission for Rural Communities
CWI	Child Well-being Index
DCLG	Department of Communities and Local Government
DEFRA	Department of Food and Rural Affairs
DMA	Digital Mapping Agreement
DMIT	Disease Management Information Toolkit
ED	Emergency Department
ERIC	Estates Returns Information Collection
FEV_1	Forced Expiratory Volume in 1 second
FVC	Forced Vital Capacity
GIS	Geographical Information System
GUM	Genitourinary Medicine
HES	Hospital Episodes Statistics
HPA	Health Protection Agency
ICD	International Classification of Diseases
ID	Indices of Deprivation
IMD	Index of Multiple Deprivation
ITN	Integrated Transport Network
JSA	Jobseekers Allowance
LA	Local Authority
LOS	Length of Stay
LSOA	Lower Super Output Area
MenC	Meningococcal C
MRP	Microdata Release Panel
MSOA	Middle Super Output Area
NHS	National Health Service
NOIDS	Notification of Infectious Diseases
NOx	Nitrogen Oxides
NSF	National Service Framework
ONS	Office for National Statistics
PCT	Primary Care Trust
PGA	Pan Government Agreement
PM_{10}	Particulate matter less than 10µg in diameter
QOF	Quality Outcomes Framework
ReCoDe	Relevant Condition at Death
SDU	Sustainable Development Unit
SHA	Strategic Health Authority
SMR	Standardised Mortality Ratio
SOA	Super Output Area
TB	Tuberculosis
tPCT	Teaching PCT
UK	United Kingdom
UKACR	United Kingdom Association of Cancer Registries
VOC	Volatile Organic Compounds
WHO	World Health Organisation
WMCAR	West Midlands Congenital Anomaly Register
WMCIU	West Midlands Cancer Intelligence Unit
WMPHO	West Midlands Public Health Observatory

CHAPTER ONE: HEALTH GEOGRAPHY

1.1 Introduction

This chapter will outline work underway to prepare for reporting cancer statistics for ONS Statistical geographies and will provide an update on minor geographical changes to national Cancer Networks and the rollout of the new Digital Mapping Agreement for the NHS.

1.2 Using Middle Super Output Areas to Report Cancer Statistics

West Midlands Cancer Intelligence Unit (WMCIU) has traditionally reported statistics for small areas at ward level. Ward boundaries are administrative areas defined for the purposes of local government, primarily to elect councillors. The advantage of presenting cancer data at this geography is that their boundaries are generally understood at local level but there are significant disadvantages in using wards to present health statistics:

- Ward boundaries undergo a regular cycle of review by the Boundary Committee for England to ensure the electoral arrangements of all local authorities in England are fair but this means that in any year there could be a new set of ward boundaries in one or more of the 30 local authorities in the region.

- Whilst all the wards in one local authority are of a similar size they may be very different in size to wards in an adjacent local authority e.g. some wards in West Midlands represent less than 800 people, others more than 30,000 people.

- It is impossible to present reliable data on cancer for very small populations because the number of events occurring in such areas will be small and small changes in number from year to year make it very difficult to determine whether a time trend is genuine or merely a chance occurrence. Data for the wards with smaller populations is less robust than the same data for wards with larger populations.

1.3 Super Output Area Statistical Geographies

Following the 2001 census ONS adopted new methods for developing census output area geography by assigning like postcodes and property types to areas of consistent population sizes. The resulting census output areas are then used as building blocks to develop a hierarchy of statistical geographic areas for England and Wales collectively referred to as Super Output Areas (SOAs).

ONS proposed a 3-tier hierarchy of SOAs:

Lower Super Output Areas (LSOAs)

- Groups of 3-5 census output areas.
- An average population size 1,500, minimum 1,000.
- Constrained to fit wholly within the ward boundaries as defined at 31st December 2003.
- 3,482 in the West Midlands, 32,482 in England; each identified by 9 character alphanumeric code.

Middle Super Output Areas (MSOAs)

- Built from groups of 3-5 LSOAs
- Average population size 7,200, minimum 5,000.
- Constrained to local authority boundaries as defined at 31st December 2003.
- 735 in West Midlands; identified by 9 character alphanumeric code and name based on local authority name and 3 digit reference number.

Upper Super Output Areas

- Average population size approx 25,000.
- Expected to number approximately 200 in West Midlands,
- NOT currently defined as no need has been identified.

LSOAs and MSOAs have been adopted by ONS and should remain fixed at least until 2011 Census. ONS will only redefine them at 2011 Census if there has been particular growth or contraction in population since 2001. Any changes will be designed to cause minimum fragmentation of 2001 areas.

1.4 Providing Time Series Population Denominators for MSOAs

To supply cancer statistics the WMCIU needs to have access to detailed time series population denominators for all reporting geographies. Time series population denominator datasets are not routinely produced by ONS or from any other national source. Instead ONS concentrate their efforts on producing annual population estimates for current geographies.

Since 2001 Census ONS have produced mid-year estimates of population for electoral ward geographies as defined at 31st December each year and for the new LSOA and MSOA statistical geographies.

The UK Association for Cancer Registries (UKACR) has undertaken an extensive process of re-attributing historic ward population denominators to current LSOA geographies and now has one consistent time-series population denominator database from 1981–2007 for LSOAs and MSOAs in England and Wales.

1.5 Providing Deprivation Indices for MSOAs

The Indices of Deprivation 2007 (ID2007) published by the Department for Communities and Local Government are based on LSOA geographies. The WMCIU has used the LSOA scores and ranks to develop an average MSOA score in each domain of the ID2007. Each of the 735 MSOAs in the region are then ranked by both average score and rank to determine the population weighted deprivation quintile within the region.

***This data is provided on the accompanying CD-ROM and is also downloadable from the Key Health Data website* www.bham.ac.uk/keyhealthdata**

1.6 Local Names for MSOAs

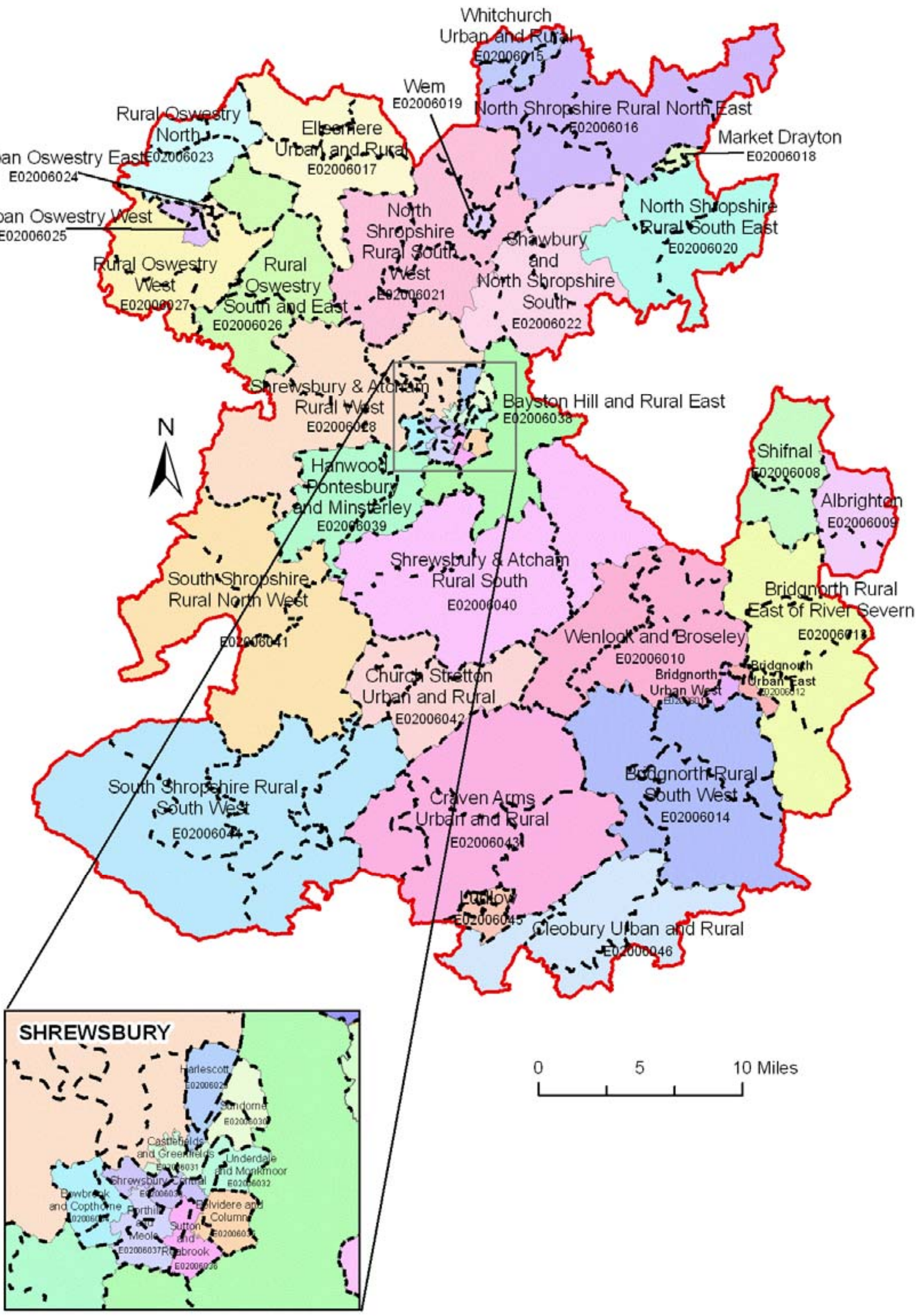
One disadvantage of using MSOAs to provide cancer statistics was seen as the lack of local names for the areas. ONS recognised this in 2005 and invited local authorities to provide names for them. As local authorities do not produce much statistical information many did not respond to the consultation and as a result ONS was only able to provide local names for MSOAs in Sandwell, Shropshire and Walsall. Consultation with the remaining local authorities in the West Midlands during the course of Spring 2009 has provided names for Coventry, Herefordshire, Solihull, Staffordshire, Stoke on Trent and Warwickshire. The Health GIS team at WMCIU have therefore devised local names for the remaining 10 local authorities. We undertook wherever possible NOT to reuse a ward name unless the boundaries were coterminous with a ward that existed in the 2001 census and to choose geographical names/strings of names from the Ordnance Survey 1:50,000 maps rather than create new ones. Although we have shared our lists with the local authorities concerned and West Midlands Regional Observatory these names should not be regarded as official.

***This data is provided on the accompanying CD-ROM and is also downloadable from the Key Health Data website* www.bham.ac.uk/keyhealthdata**

Map 1.1: Sandwell PCT

Source: 2001 Census, Output Area Boundaries. Crown Copyright 2003. Crown copyright material is reproduced with the permission of the Controller of HMSO. O.S. Licence No: 100020290.
Prepared by West Midlands Cancer Intelligence Unit on behalf of Department of Health (2009).

Map 1.2: Shropshire County PCT



Prepared by West Midlands Cancer Intelligence Unit on behalf of Department of Health (2009).

Map 1.3: Walsall PCT

A series of 15 maps showing these local names; MSOA codes and census ward boundaries for every PCT in the region are provided on the accompanying CD-ROM and are downloadable from **www.bham.ac.uk/keyhealthdata**

1.7 Using MSOAs to report Cancer Statistics

The benefits of using SOA geographies for cancer statistics are that they:

- Are specifically designed for statistical purposes.
- Represent both a stable and coterminous hierarchy of geographies.
- Are supported by annual mid-year estimates of population.

Their main drawbacks are that:

- They do not relate directly to local democratic areas.
- They do not have easily identifiable names.

As LSOA geographies account for an average population of 1500 people (typically less than 50 per five-year age-sex group), it is impossible for WMCIU to publish cancer statistics at this level without compromising UKACR confidentiality guidelines. In an effort to acknowledge the need for small area data (sub-local authority level) and at the same time ensure that the data, and any conclusions drawn from it are robust the WMCIU will adopt the MSOA as the geography of choice for the provision of small area cancer statistics.

The presentation of data at MSOA level will affect different Primary Care Trusts (PCTs) in different ways. In rural areas, MSOAs will sometimes span up to five geographically large but sparsely populated wards and therefore provide less detail in the outputs made available for them. In urban areas there will be more MSOAs than wards and so greater detail will be available in the cancer statistics than was previously possible.

1.8 Cancer Statistics for MSOAs in 2000-2006

A summary table showing cancer incidence for key cancer sites by MSOA in the region is provided on the accompanying CD-ROM and can be downloaded from **www.bham.ac.uk/keyhealthdata**

1.9 Cancer Network Geography

Cancer Network geography has remained static in 2008 except for the merger of Mid-Trent, Derby-Burton and Leicestershire, Northampton and Rutland cancer networks into one East Midlands Cancer Network from 1st October 2008. This reduces the number of cancer networks in England from 30 to 28 and sees the cancer care of residents of East Staffordshire managed under a wider East Midlands Cancer Network.

A new national boundary set is provided from aggregations of LSOAs.

Map 1.4 Cancer Networks in England and Wales

Cancer Networks as at 1st October 2008

Since August 2008 a Cancer Network and a Cancer Registry field have been added to the NHS Postcode Directory.

1.10 Access to Digital Map Data by NHS Organisations

A new framework agreement for the procurement of geographical data by NHS organisations was awarded to Dotted Eyes, Bromsgrove 1st May 2008. All NHS organisations may now purchase licenses through the NHS Digital Mapping Agreement (DMA).

Cancer Registries and Public Health Observatories continue to access geographical data through the Department of Health license to the Pan Government Agreement (PGA) renegotiated from 1st April 2009.

Not all datasets delivered under the PGA are compatible with those in the DMA which might have implications for joint working.

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CHAPTER TWO: LOCAL CHILD WELL-BEING INDEX 2009 IN THE WEST MIDLANDS

2.1 Introduction

The Child Well-Being Index (CWI) is based upon a similar approach and methodology to the Indices of Deprivation and was introduced by Department of Communities and Local Government (DCLG) in order to reflect a set of Indices for different groups in the population; in this case children and young people.

The age range used is generally 0 to 16 or 18 if in full time education (although this was not always possible in some cases). The indicators relate to data from 2005 with the exception of the housing domain which is solely based on 2001 Census data.

Similar to the Indices of Deprivation the CWI consists of several domains. These are:

- Material well-being
- Health
- Education
- Crime
- Housing
- Environment
- Children in Need

Each Lower Super Output Area (LSOA) in England is assigned a score and rank for each domain, and an overall Child Well-Being Index is produced using weighted scores.

The Index was published in early-2009 and this chapter provides a brief analysis of the Index for the West Midlands region.

Nationally, the West Midlands region has 17% of its LSOAs within the top 20% of LSOAs in England – those with the highest child well-being. The region with the greatest proportion of its LSOAs in this top quintile is the South West (34%).

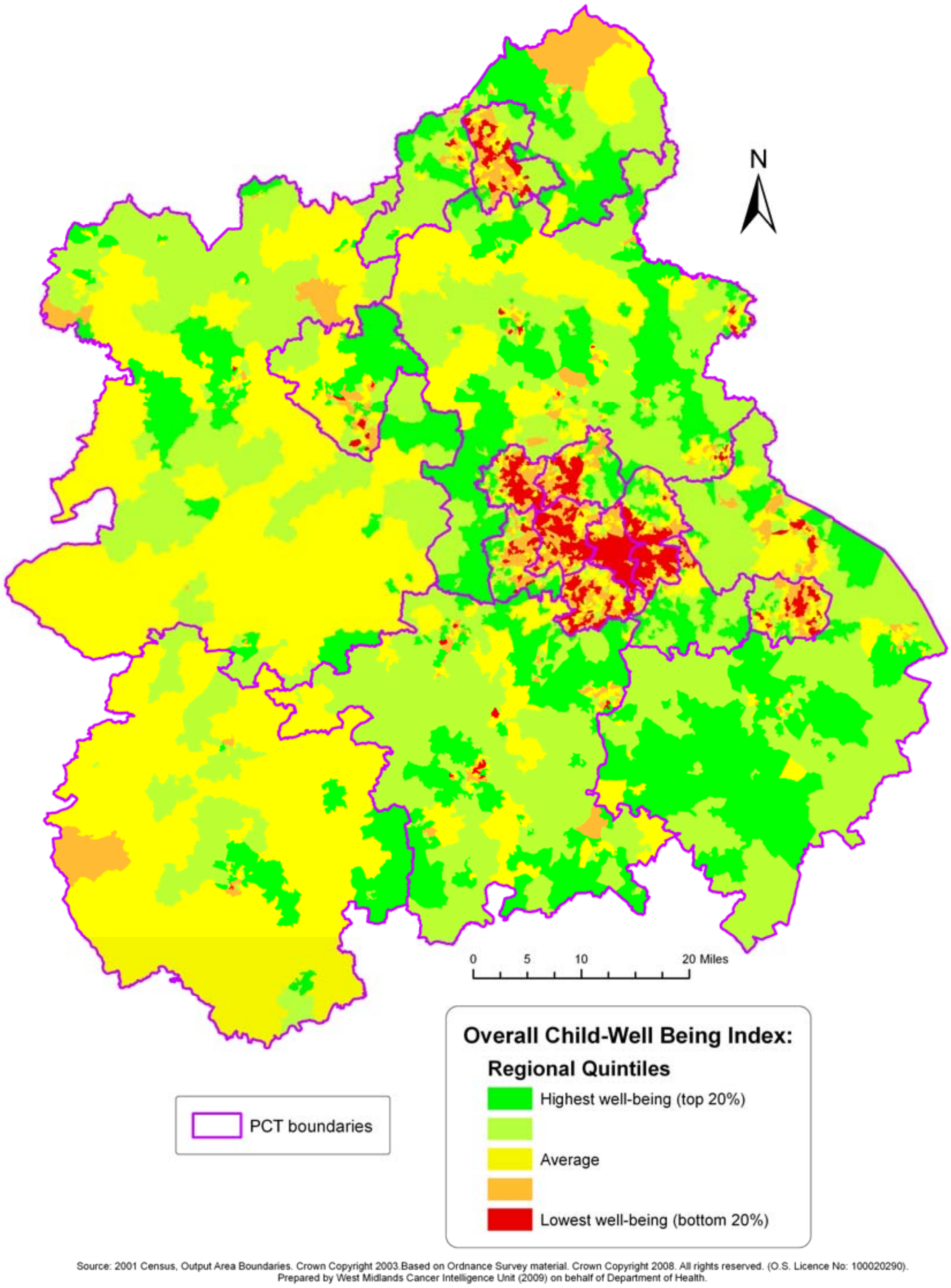
The West Midlands has a quarter of its LSOAs in the bottom national quintile - those LSOAs in England with the lowest child well-being. The London region has the greatest proportion of its LSOAs in this bottom quintile (34%).

For this chapter, a specific ranking of each LSOA for the West Midlands has been used, based on overall Index score. This has then been used to create quintiles, to identify the number of LSOAs in the best and worst 20% of LSOAs within the region, in terms of child well-being. Analysis of results has been broken down for each primary care trust within the region.

2.2 Child Well-Being in the West Midlands

The regional pattern of the Local Child Well-Being Index, by LSOA, is illustrated in figure Map 2.1, below:

Map 2.1: Regional quintiles for the Overall Child-Well Being Index in the West Midlands



The general pattern is similar to that of deprivation measures, such as the Indices of Deprivation; those LSOAs within the bottom quintiles are more prominent in the urban areas of the region. This is particularly noticeable within Birmingham and the Black Country, and other urban centres such as Coventry and Stoke-on-Trent.

2.3. Local Child Well-Being Index by Primary Care Trust

Solihull Care Trust and NHS Warwickshire both have the highest proportions of LSOAs in the top quintile; that is those with the highest child well-being in the region

Table 2.1, below, shows the proportion of LSOAs in the top quintile for all the PCTs. It is noticeable that Heart of Birmingham Teaching, Sandwell and NHS South Birmingham do not contain a single LSOA in this top quintile.

Table 2.1: PCTs containing the most LSOAs in the top 20% of LSOAs in the Region

Primary Care Trust	**Proportion of LSOAs in top 20% of LSOAs in West Midlands**
Solihull Care Trust	39.1
NHS Warwickshire	39.0
NHS North Staffordshire	36.3
Worcestershire	34.9
Shropshire County	29.2
South Staffordshire	28.6
Telford and Wrekin	24.1
Dudley	23.8
Herefordshire	23.3
NHS Walsall	11.8
Birmingham East and North	7.9
Wolverhampton City	7.6
NHS Coventry	7.1
NHS Stoke-on-Trent	3.6
Heart of Birmingham Teaching	0.0
Sandwell	0.0
NHS South Birmingham	0.0

Heart of Birmingham Teaching contains by far the greatest majority of its LSOAs within the bottom quintile in the region for child well being. Birmingham East & North is the other PCT to see a majority of its LSOAs being in the bottom quintile, with Sandwell having just under a half of its LSOAs in this bottom quintile.

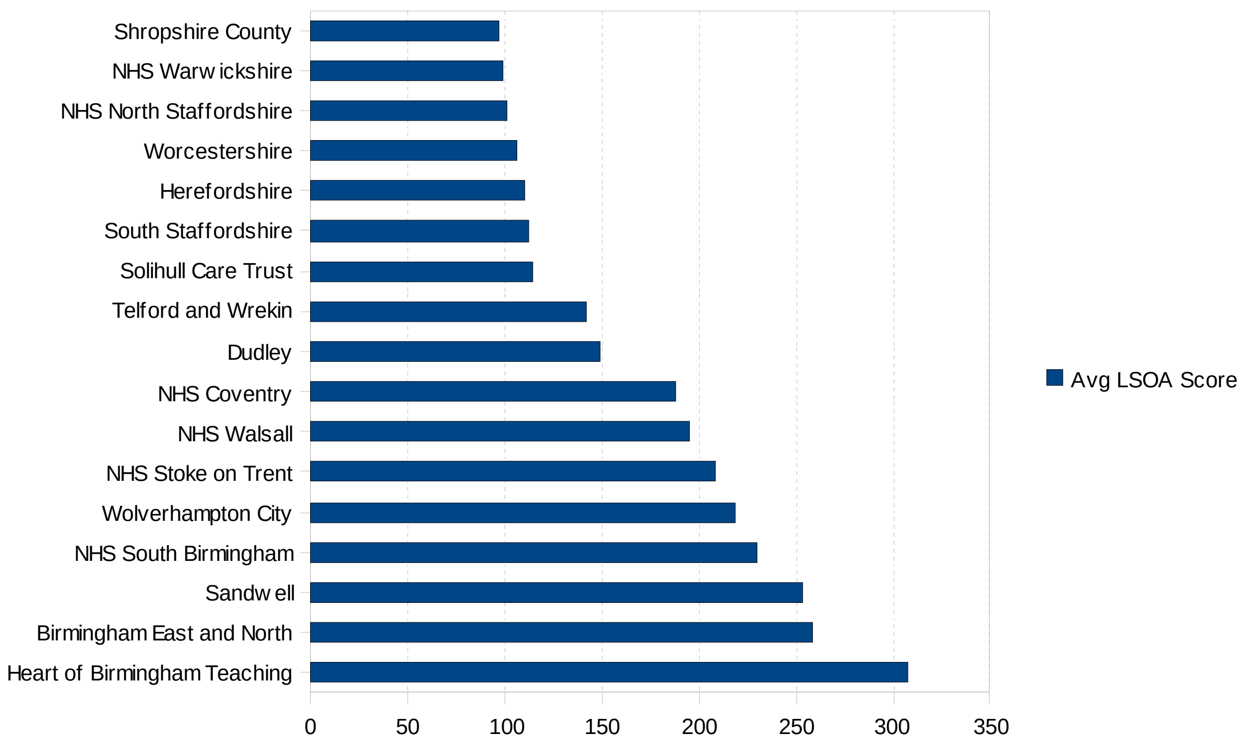
Unlike the top quintile, each PCT has at least one LSOA in the bottom quintile:

Table 2.2: PCTs containing the most LSOAs in the bottom 20% of LSOAs in the Region

Primary Care Trust	**Proportion of LSOA in bottom 20% of LSOAs in West Midlands**
Heart of Birmingham Teaching	72.3
Birmingham East and North	54.0
Sandwell	46.5
NHS South Birmingham	37.2
Wolverhampton City	32.9
NHS Stoke-on-Trent	28.5
NHS Walsall	26.6
NHS Coventry	21.3
Telford and Wrekin	11.1
Solihull Care Trust	9.0
Dudley	8.4
South Staffordshire	4.4
Worcestershire	4.2
NHS Warwickshire	2.4
NHS North Staffordshire	1.5
Herefordshire	0.9
Shropshire County	0.5

In addition to regional quintiles, further analysis has been conducted by calculating the average score of each LSOA within each PCT in the West Midlands:

Figure 2.1: Child well-being index average LSOA score for each PCT



Solihull Care Trust, which contains the most LSOAs in the top quintile, performs less well in this ranking based on average score. There is a more evident urban-rural divide when based on average LSOA score, with the rural PCTs (Shropshire, Warwickshire, North and South Staffordshire, Herefordshire, and Worcestershire) now showing to have the best child well-being.

The Birmingham PCTs, most notably Heart of Birmingham, along with Sandwell have again performed poorly and are those PCTs with the lowest child well-being in the West Midlands.

2.4 Summary

The Child-Well Being Local Index is the first attempt, at such a small geographical level, to create a national Index score specifically measuring the well-being of children.

Whilst it is important to remember that the Index measures well-being and not deprivation of children, it does bare many similarities with the Indices of Multiple Deprivation.

The indicator could be used, in addition to, or as an alternative to, deprivation measures (such as the Indices of Multiple Deprivation or Townsend Index) especially when specifically assessing the needs of children and young people.

References and Further Reading

1. Local Index of Child Well-Being 2009, Department of Communities and Local Government
http://www.communities.gov.uk/publications/communities/childwellbeing2009

2. Indices of Deprivation 2007, Department of Communities and Local Government
http://www.communities.gov.uk/communities/neighbourhoodrenewal/deprivation/deprivation07/

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CHAPTER THREE: MEASURING ACCESS TO BREAST SCREENING SERVICES, COLPOSCOPY AND GUM CLINICS

3.1 Introduction

This chapter looks at access to a range of health services, extending work previously reported in Key Health Data[1], as well as other data sources on accessibility (such as the Core National Accessibility Indicators[2], CRC's Access to Services[3] and the Indices of Deprivation[4]) which tend to focus on local health services such as GP practices, dental practices, pharmacies and opticians.

The types of service chosen for analysis are: breast screening units (all static and mobile sites), colposcopy clinics, and genitourinary medicine (GUM) clinics.

These services are more widely dispersed throughout the region and it is therefore less likely that people would choose to walk to these services. The measure of access in this analysis is: 'how long it takes to drive to the closest breast screening unit, colposcopy clinic and GUM clinic'.

A road network within the West Midlands, based on Ordnance Survey Integrated Transport Network (ITN) Layer, has been configured with average speeds reflecting increased congestion in more dense urban areas[5]. Isochrone polygons (areas of equal time from a location) are produced for each type of health services. These are then used to calculate how many people live within a 5, 10, 15 or 20 minute drive of each type of service and those living more than a 20 minute drive away Counts of population are based on 2006 LSOA mid-year population estimates. Where applicable the population counts will only count those in the target population, i.e. females aged 25-64 in the cervical screening programme and females aged 50-70 in the breast screening programme.

The drive times produced by the analysis assume a starting vehicle speed as that of the speed allocated to the road and does not include time taken to get in/out of a vehicle, nor does it factor for the acceleration or deceleration of a vehicle. In practice several minutes would need to be added to gain a realistic 'door-to-door' journey time.

Some services which are close to but beyond the region boundary are included, although this has been less successful for services in Wales, where the road network is not currently licensed by Department of Health.

The analysis has been performed on the following three primary care trusts in the region:

Sandwell, part of the West Midlands conurbation, is a densely populated and highly urbanised area. It is one of the most deprived PCTs in the West Midlands.

Warwickshire covers a large area and is recognised as consisting of a mixed proportion of urban and rural areas[6]. It is the least deprived PCT in the West Midlands.

Herefordshire is one of the most rural and least populated counties in England covering a vast land area with a relatively small population. In terms of deprivation, whilst it performs relatively well in some domains, it performs far less well in other domains; most notably the Barriers to Housing & Services domain.

These PCTs have been selected to compare access across varyingly urban and rural areas, and with contrasting socio-economic conditions:

Table 3.1: Summary of selected Primary Care Trusts

PCT	No. of LSOAs	Area (sq. km)	Population Density (persons per sq. km)	Total Population	Females aged 25 - 64 (colp.)	Females aged 50 - 69* (breast)	Proportion of population amongst most deprived in West Midlands[7]
Herefordshire	116	2179.73	81.58	177,816	46,921	24,394	1.73%
Warwickshire	333	1977.59	264.07	522,232	140,593	64,507	2.47%
Sandwell	187	85.56	3360.79	287,561	74,328	29,763	40.94%

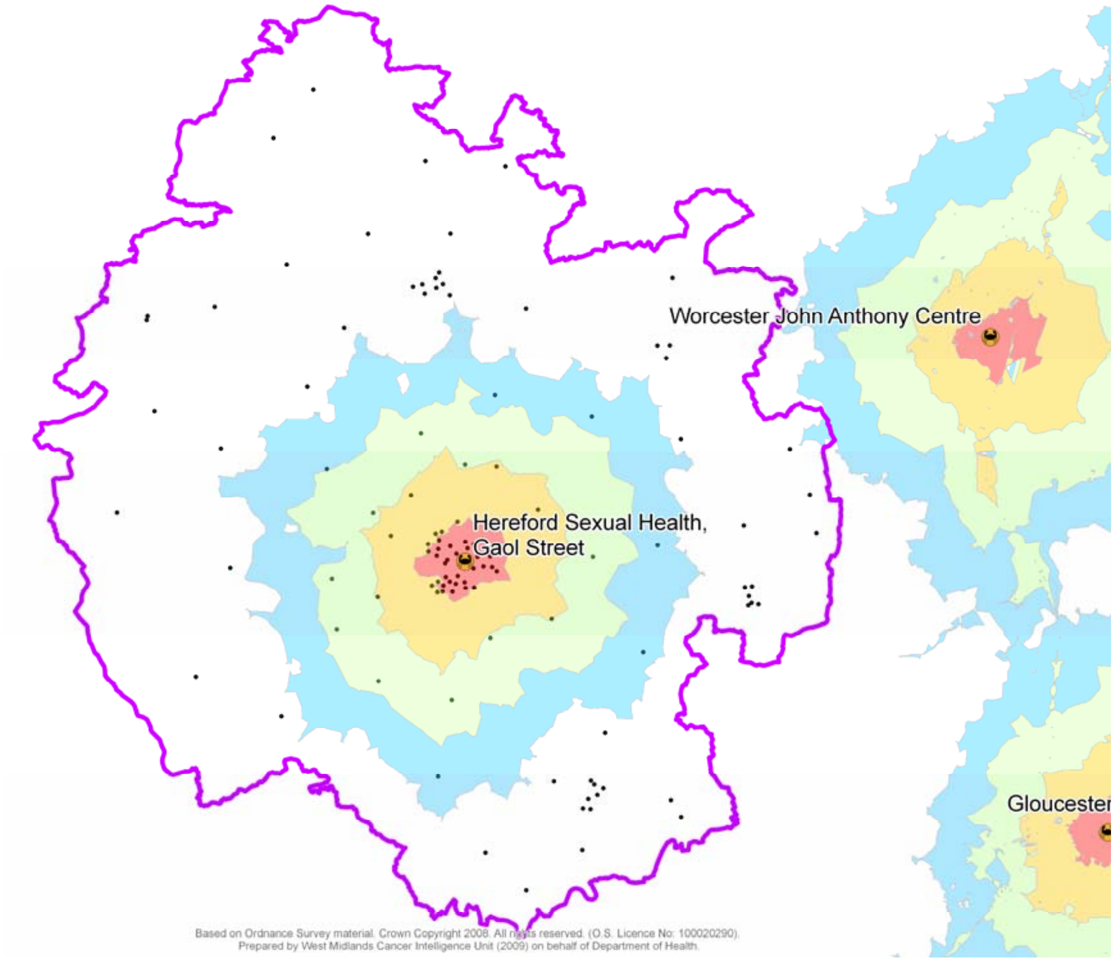
*(*Note: The exact age range in the breast screening programme is those aged 50 - 70. However, population statistics are only available at LSOA level for 5-year age groups. Populations are based on LSOA annual estimates, 2006.)*

The findings of the drive-time analysis are presented below and summarised accordingly for each health service and PCT.

3.2. GUM Clinics

3.2.1 Herefordshire PCT

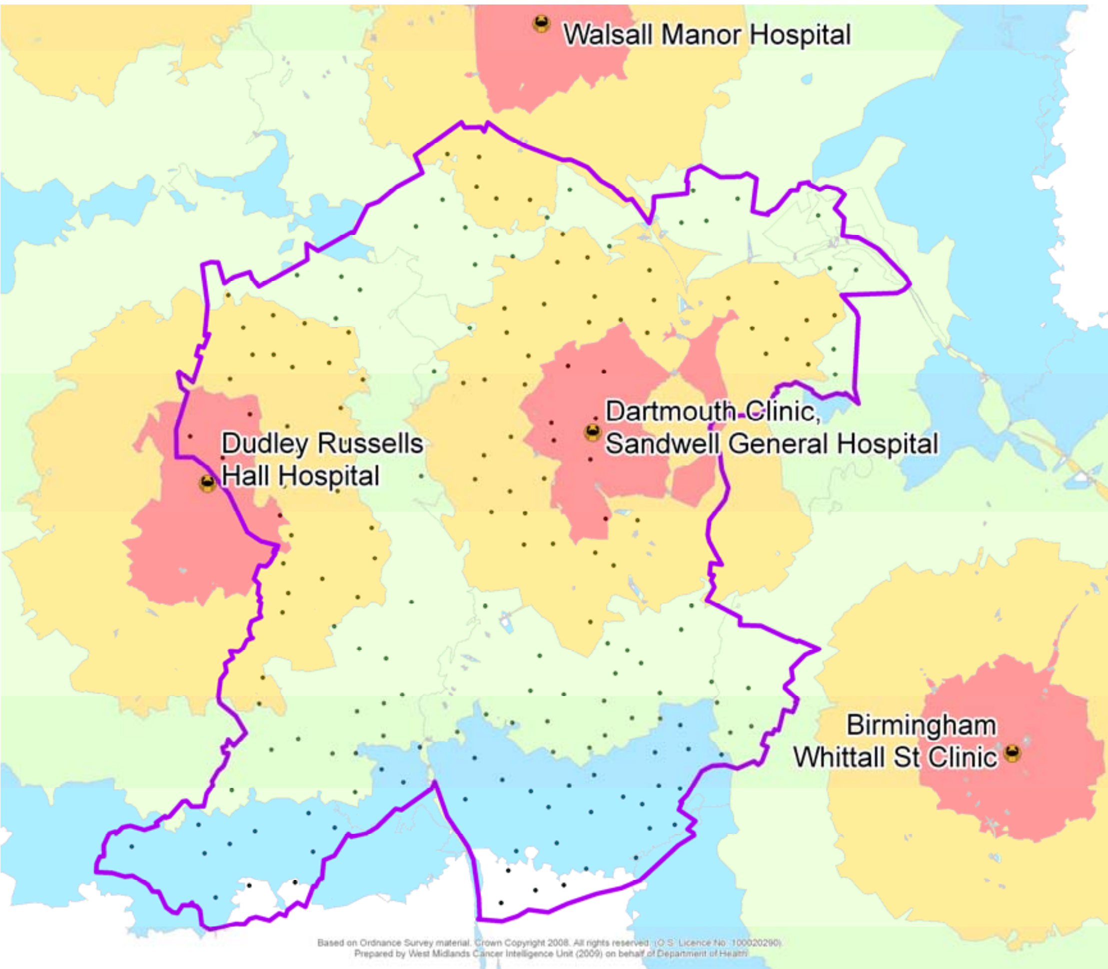
Map 3.1: GUM Clinics drive time analysis for Herefordshire PCT



- Hereford Sexual Health is the only clinic in the PCT and is the nearest for 97% of the population; with the remaining 3% have their nearest clinic located in neighbouring Worcester.
- A quarter of its population are within a 5 minute drive of their nearest clinic.
- This increases to 37% within a 10-minute drive and 47% within a 15 minute drive.
- A significant proportion (48%) of the population is more than a 20 minute drive from their nearest GUM clinic.
- Approximately half of the most deprived population (those in the bottom quintile for the West Midlands) are within a five-minute drive, whilst the remaining half reside more than 20 minutes away. However it should be taken into account that Herefordshire has only two LSOAs in this quintile.

3.2.2 Sandwell PCT

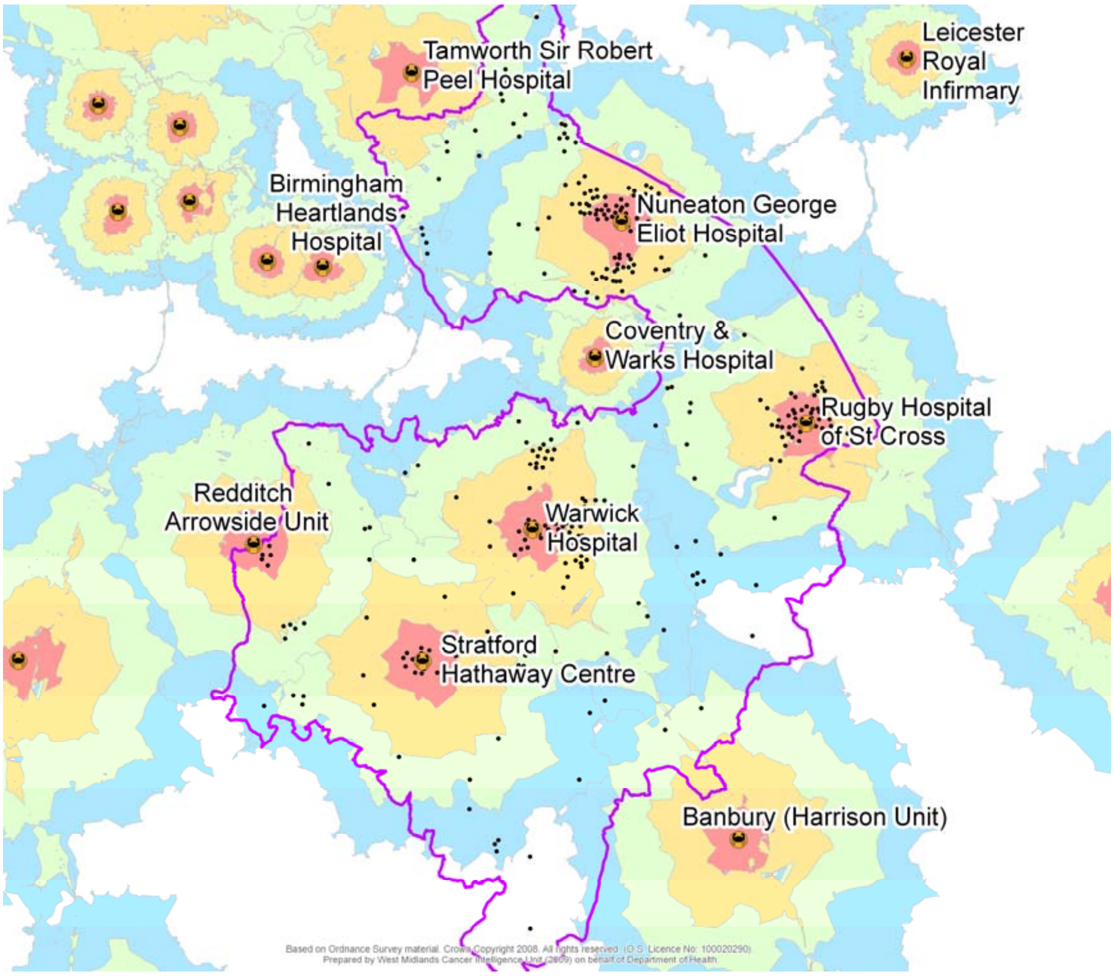
Map 3.2: GUM Clinics drive time analysis for Sandwell PCT



- The nearest clinic for just over half (51%) of the population is the Dartmouth clinic located within Sandwell, whilst the next nearest for 35% of the population is located within Dudley, whilst smaller proportions have their nearest clinic located within Walsall (8%) and Birmingham (6%).
- Only 6.5% of the total population are within a five-minute drive of a GUM clinic, although this rises sharply to 43% for those within a 10 minute drive.
- 97% of the population are within a 20 minute drive, leaving just 3% more than a 20 minute drive away. These are located in the southern areas of the PCT.
- The majority of the most deprived population (57%) live more than a 10 minute drive, but all of this group are within a 20 minute drive.

3.2.3 Warwickshire PCT

Map 3.3: GUM Clinics drive time analysis for Warwickshire PCT



- For the large majority of the resident population, their nearest clinics are located within the PCT at Nuneaton George Eliot (29%) Warwick Hospital (29%), Rugby Hospital St Cross (19%) and Stratford Hathaway Clinic (13%).
- Smaller proportions of the population have their nearest clinics located outside the PCT in Redditch (4%), Tamworth (7%), and a very small proportion (1%) outside of the West Midlands region in Banbury.
- 29% of the population are within a 5 minute drive of their nearest GUM clinic with this increasing to 67% within a 10 minute drive.
- 90% of the population are within a 15 minute drive and just 1% of its total population live more than a 20 minute drive.
- All of the most deprived population are within 15 minute drive.

3.2.4 GUM Clinic Summary

The main findings for the GUM clinic analysis are identified in the table below:

Table 3.2: Summary of GUM clinic drive times analysis by population (%)

PCT	5 minutes	10 minutes	15 minutes	20 minutes	Over 20 minutes
Herefordshire	24.76	37.27	46.51	51.47	48.53
Warwickshire	28.77	67.18	90.59	99.00	1.00
Sandwell	6.54	42.77	77.97	97.37	2.63

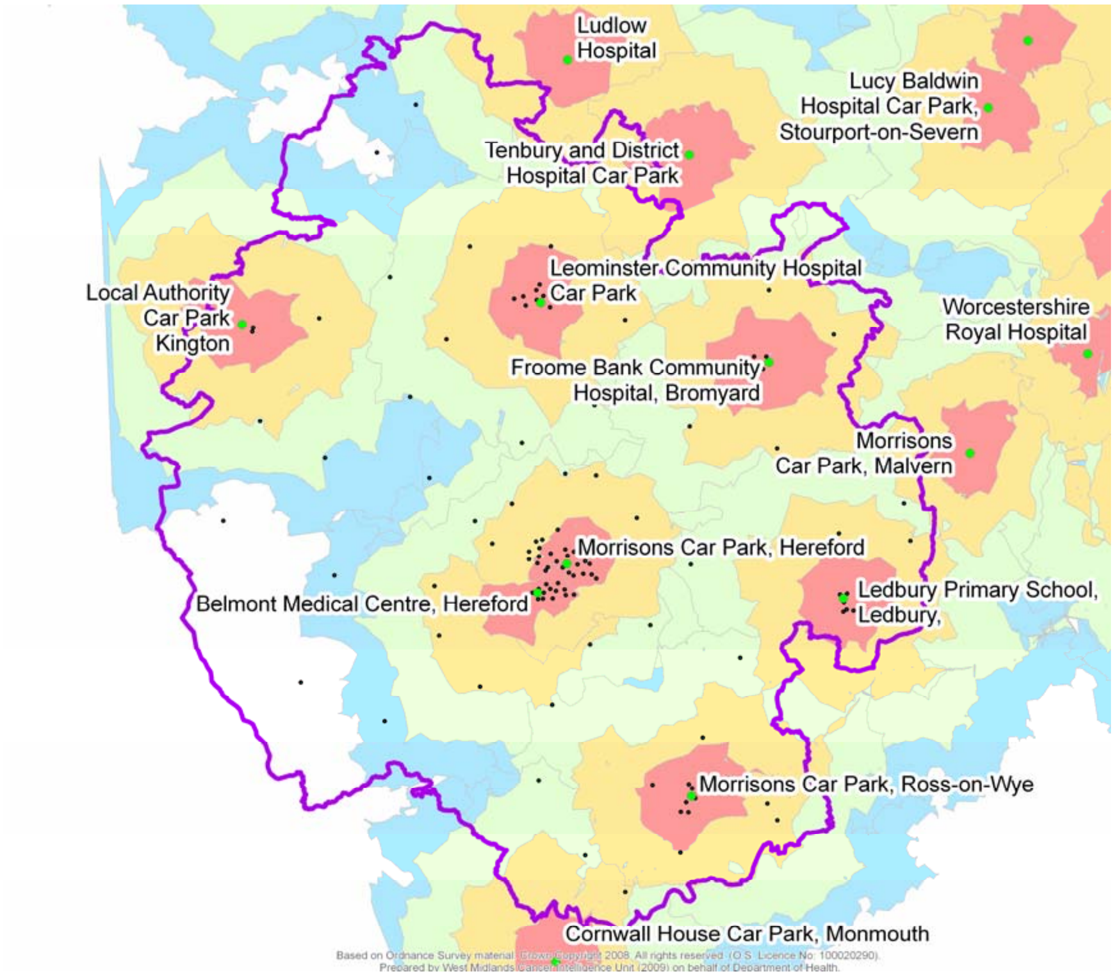
Whilst the more rural PCTs of Herefordshire and Warwickshire have noticeably greater catchments within a five-minute drive, the incremental increase in proportion of populations reduces thereafter, especially for Herefordshire.

Contrastingly, Sandwell sees its catchment population increase rapidly. Both Sandwell and Warwickshire have near complete coverage within 20 minutes, whilst Herefordshire barely sees half of its population covered.

3.3 Breast Screening Units

3.3.1 Herefordshire PCT

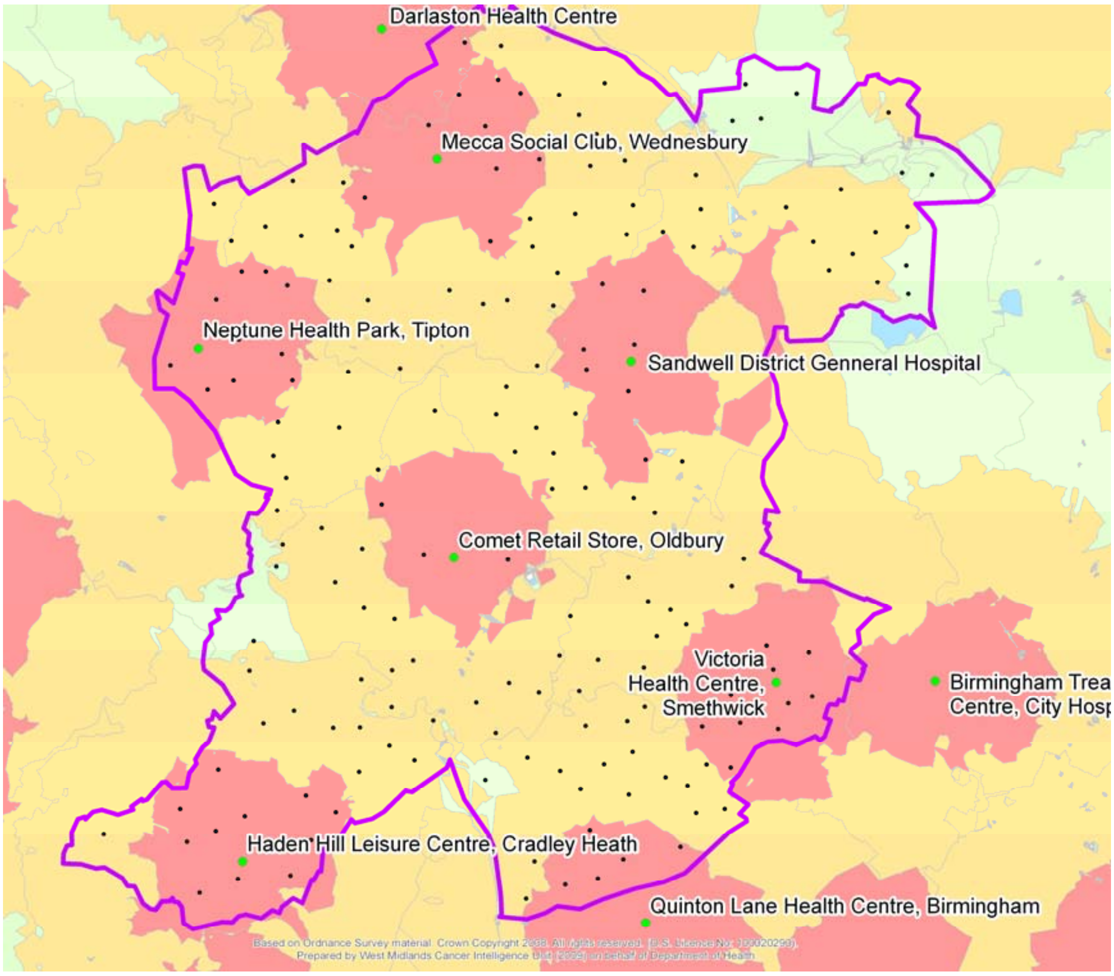
Map 3.4: Breast Screening Units drive time analysis for Herefordshire PCT



- There are 7 breast screening units located within Herefordshire PCT (this equates to an average of 3 units per 100,00 of the target age group).
- 43% of females aged 50-69 are within a five minute drive of their nearest breast screening service location.
- This proportion increases to 76% within 10 minutes, and 91% within 15 minutes.
- 3% of the target population reside more than a 20 minute drive from their nearest unit, with many of these located near the Welsh borders.
- In terms of deprivation all of those females in Herefordshire, who are in the most deprived regional quintile, are within a five-minute drive.

3.3.2 Sandwell PCT

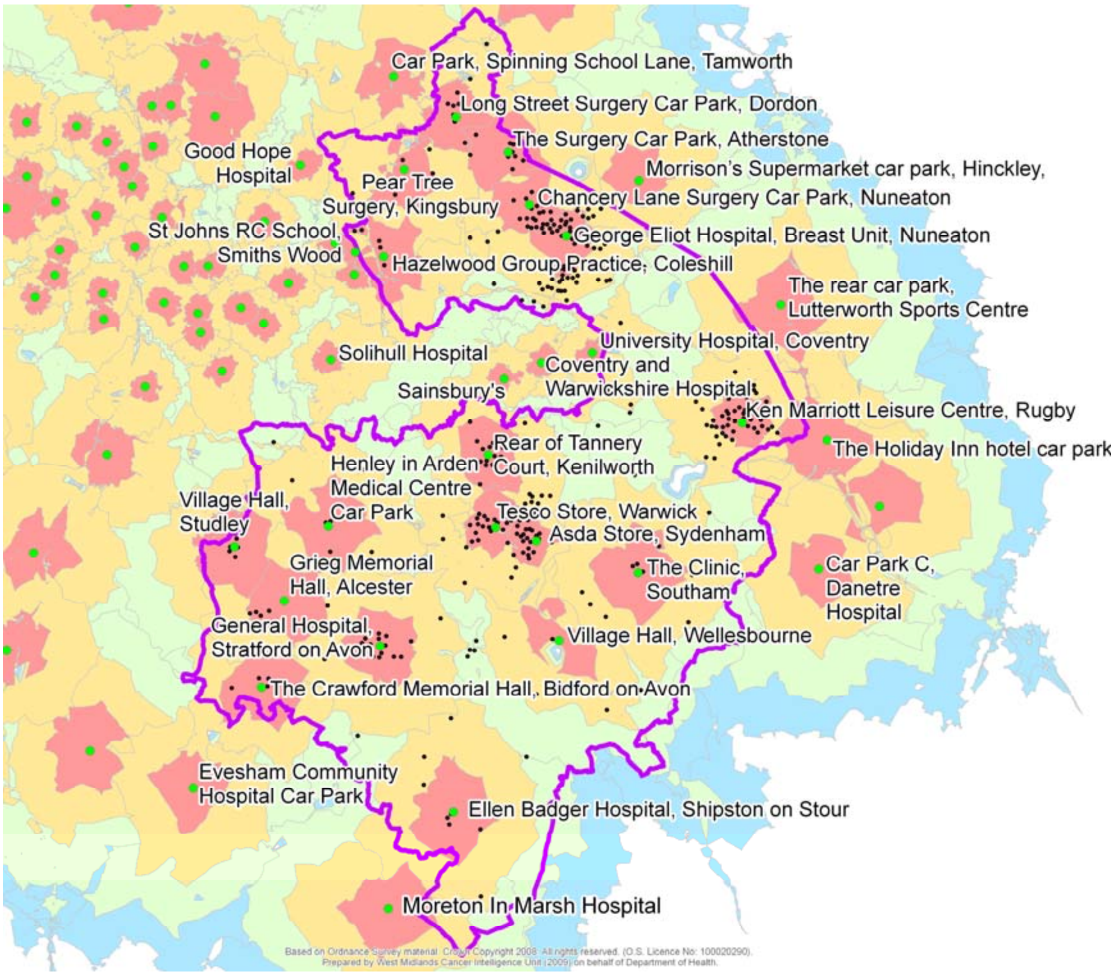
Map 3.5: Breast Screening Units drive time analysis for Sandwell PCT



- There are six breast screening units located within Sandwell PCT (an average of 2 units per 10,000 of the target age group).
- Only 31% of Sandwell females aged 50-69 are within a five minute drive to their nearest unit, although this increases rapidly to cover most of the population (93%) within a 10 minute drive.
- There is a complete coverage of the target population within 15 minutes.
- Of those Sandwell females aged 50-69 who are in the most deprived quintile, a similar pattern is observed – albeit with a slightly improved coverage – 34% are within 5 minutes, and 99% are within 10 minutes drive.

3.3.3 Warwickshire PCT

Map 3.6: Breast Screening Units drive time analysis for Warwickshire PCT



- There are 18 breast screening units located within the PCT, meaning it has by far the greatest number of any PCT within the region (an average of 2.8 per 10,000 of the target age group).
- Over half of females aged 50-69 (56%) are within a five minute drive to their nearest unit, and this increases to 92% within 10 minutes.
- At 15 minute drive time there is complete coverage for all the target population.
- Of those females in the most deprived quintile, 88% are within 5 minutes and there is complete coverage by 10 minutes drive time.

3.3.4 Breast Screening Units Summary

The main findings for the breast screening units analysis are identified in the table below:

Table 3.3: Summary of breast screening units drive times analysis by population (%)

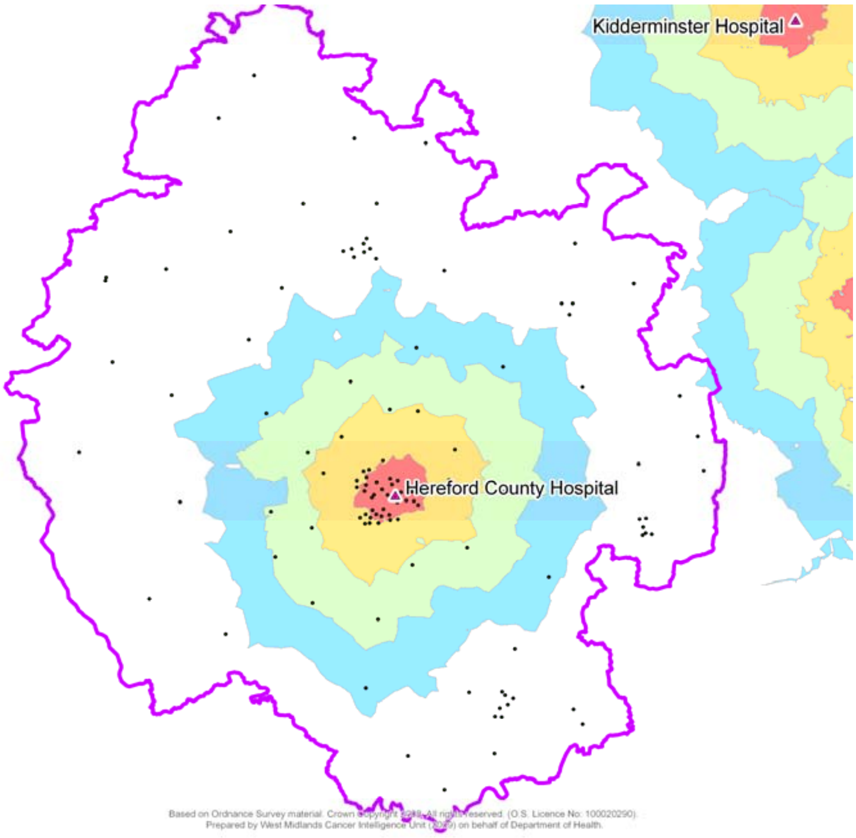
PCT	5 minutes	10 minutes	15 minutes	20 minutes	Over 20 minutes
Herefordshire	43.14	76.30	91.33	96.88	3.12
Warwickshire	56.06	92.36	100	100	0
Sandwell	31.06	93.61	100	100	0

Whilst Sandwell and Warwickshire see total coverage at 15 minutes drive time (and indeed near total coverage within 10 minutes), Herefordshire is unable to gain complete coverage within 20 minutes, with a small proportion of women residing more than 20 minutes from their nearest breast screening unit.

3.4 Colposcopy Clinics

3.4.1 Herefordshire PCT

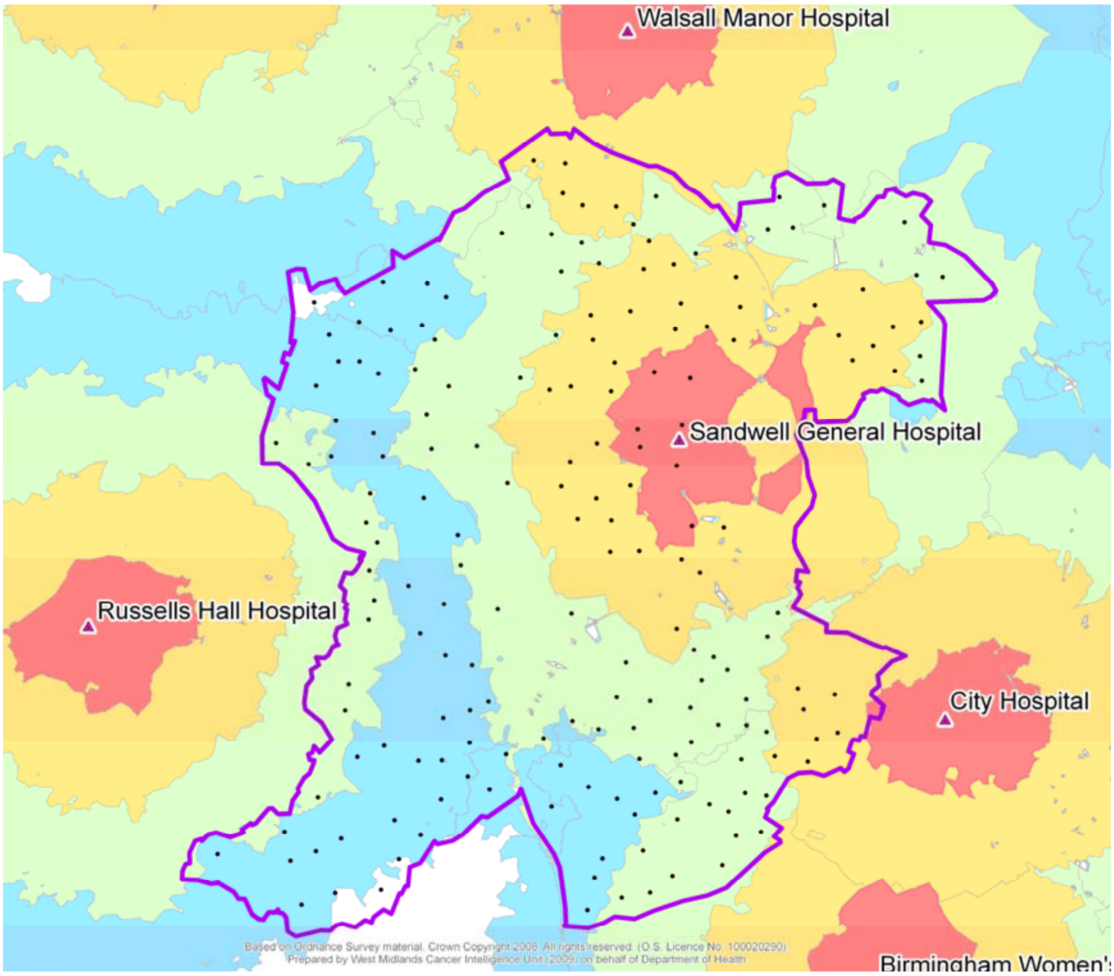
Map 3.7: Colposcopy clinics drive time analysis for Herefordshire PCT



- Herefordshire County Hospital is the only colposcopy clinic located within the PCT, and for 97% of females aged 25-64 it is their nearest clinic (the nearest for the remaining 3% is located in Worcestershire).
- A fifth of the female target population are within a 5 minute drive of their nearest clinic, with this rising to 37% within 10 minutes.
- Just over half (52%) of the population are within a 20 minute drive, and just under half (48%) are more than 20 minutes.
- Half (51%) of those females aged 25-64 in the most deprived quintile are within 10 minute drive to their nearest clinic, with the remaining half residing more than 20 minutes.

3.4.2 Sandwell PCT

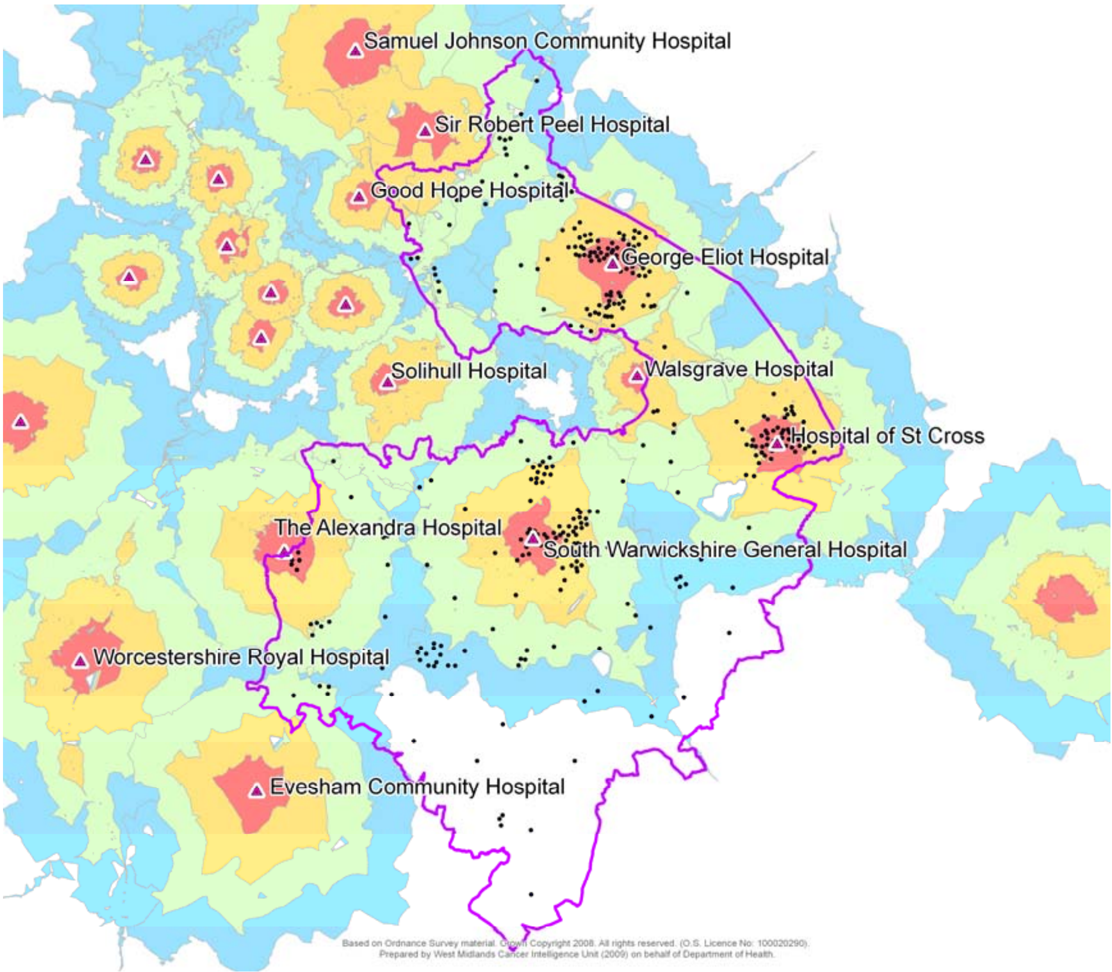
Map 3.8: Colposcopy clinics drive time analysis for Sandwell PCT



- There is only one clinic located within Sandwell, at Sandwell General Hospital, which is the nearest for 58% of the target population.
- Other clinics in neighbouring PCTs provide the nearest clinic for significant proportions of the remaining target population: Dudley (15%), Birmingham (11%), and Walsall (9%).
- Only 4% of women are located within five minute drive to their nearest clinic although this increases to 30% within 10 minutes and 70% within 15 minutes.
- All but 2% of the target population are within a 20 minute drive.
- For those in the most deprived quintile, an almost identical pattern to the whole population is observed.

3.4.3 Warwickshire PCT

Map 3.9: Colposcopy clinics drive time analysis for Warwickshire PCT



- There are three clinics located within the PCT, and these are the nearest for 62% of the target population.
- Small proportions have their nearest clinic located outside the PCT in Coventry, Solihull, South Staffordshire, Worcestershire, and Birmingham East & North.
- Almost a quarter of women (24%) are within a 5 minute drive of their nearest clinic, with this increasing significantly to 61% within 10 minutes.
- There is near complete coverage (96%) attained within 20 minutes.

3.4.4 Colposcopy Summary

The main findings for the colposcopy clinics analysis are identified in the table below:

Table 3.4: Summary of breast screening units drive times analysis

PCT	5 minutes	10 minutes	15 minutes	20 minutes	Over 20 minutes
Herefordshire	19.99	36.61	46.61	51.83	48.17
Warwickshire	23.93	61.39	83.55	95.56	4.44
Sandwell	3.97	28.76	70.32	98.39	1.61

Sandwell and Warwickshire again are shown to have the greatest coverage, with near total coverage of the target population within 20 minutes.

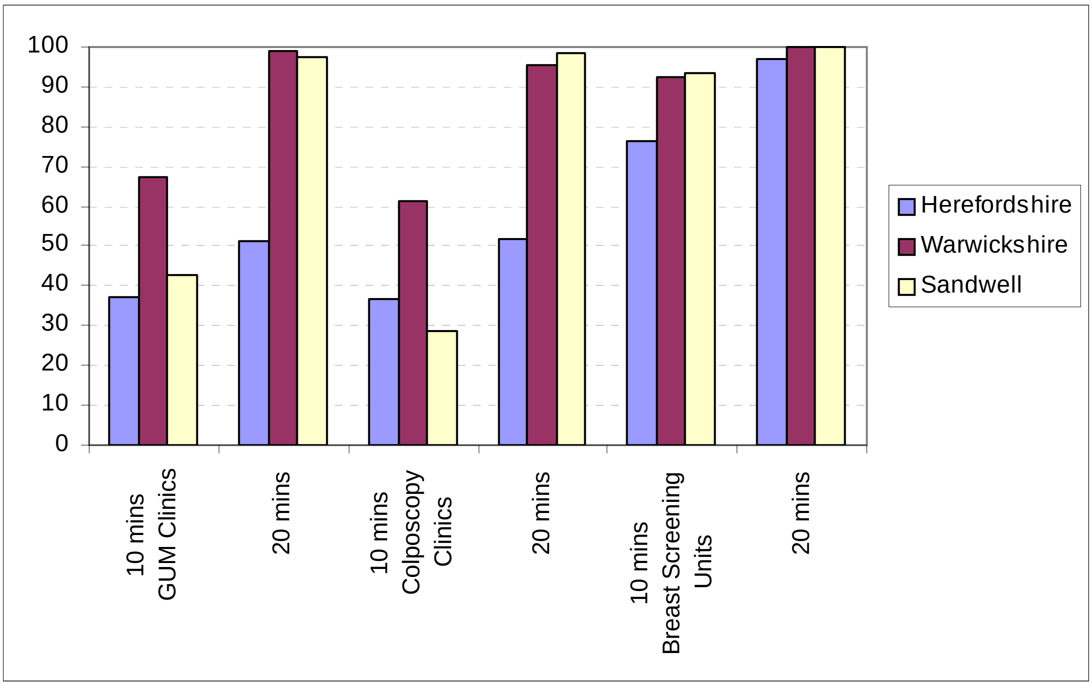
Although Herefordshire sees a fifth of its target population being within five minutes, it only sees approx. half of the population covered within 20 minutes.

3.5 Summary and Conclusions

The analysis has shown that there are variations in drive times to health services according to type of health service and the PCTs in this analysis.

Figure 3.1, below, summarises the proportions of populations of the three PCTs within a 10 and 20 minute of each of the services:

Figure 3.1: Summary of PCTs to all services: populations (%) within 10 and 20 minute drive times



In terms of health services, the breast screening units have complete coverage within a 20-minute drive, with the exception of Herefordshire, which is just short of this. All PCTs have relatively high proportions within 10 minutes.

The pattern for GUM and colposcopy clinics is almost identical where there is almost complete coverage within 20 minutes for both Sandwell and Warwickshire, but Herefordshire has only half of its population covered within 20 minutes. Sandwell and Herefordshire both experience similar proportions, under half their populations, within a 10-minute drive.

Herefordshire, the most rural of PCTs in the analysis, is the only PCT not to have full coverage of its population for any service within 20 minutes. The rural nature of the PCT combined with its dispersed population and fewer services perhaps makes this inevitable.

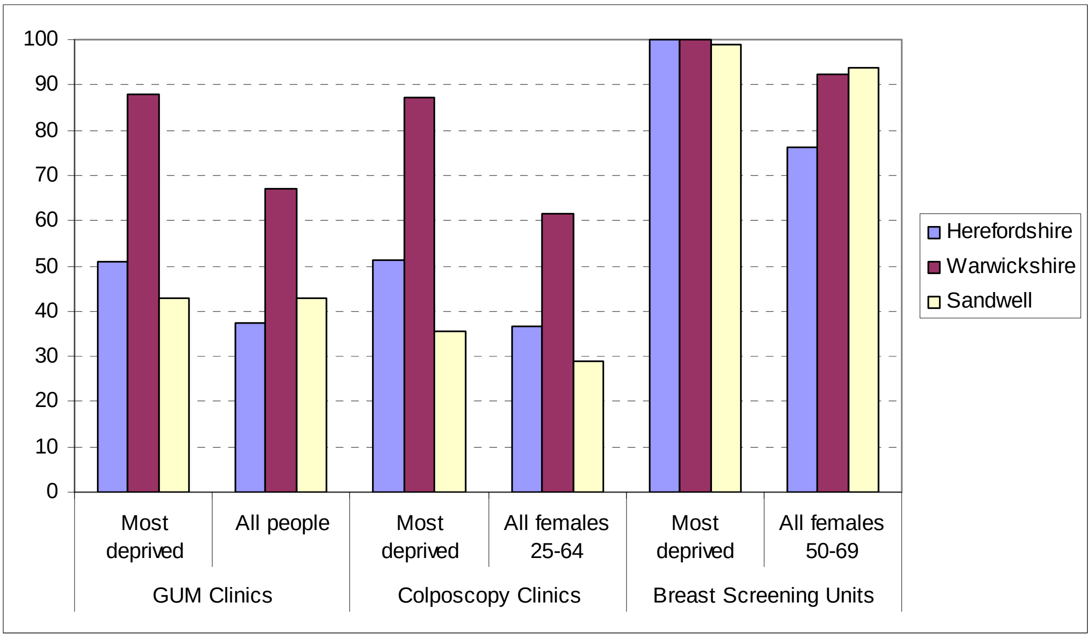
It is interesting, however, to see that in Herefordshire the catchment for those within 5 minutes is often considerably more than that of Sandwell and comparable when within 10 minutes. This suggests that those living within the main towns are covered well, but there remain isolated communities.

The isochrone polygons generated in Sandwell are much smaller in area, and this can be seen as a direct effect of urban traffic congestion affecting travel times. Despite this, Sandwell still sees the majority of its population are within 15 minutes drive of the services investigated.

Warwickshire has overall seen a very good coverage of its population for all the services analysed, with over half of its population covered within 10 minutes for all the services. This is perhaps due to the presence of a high number of services across a large area combined with the large towns (such as Nuneaton, Warwick, Bedworth, Leamington Spa) and also its proximity to Coventry.

In terms of deprivation some of the results found in this analysis may not be too robust due to the relative low levels of deprivation in Herefordshire and Warwickshire, however the analysis does suggest that there is a greater proportion of the most deprived group within shorter drive times to health services:

Figure 3.2: Summary of PCTs to all services by deprivation: populations (%) within 10minute drive times



This is most likely due to the fact that, generally speaking, there are higher levels of deprivation found in urban areas and more services are located in urban centres. Further analysis in Birmingham has also shown that the most deprived group are within shorter journey times compared to the least deprived group.

Such analysis can not only help identify gaps in services provision but help assist in scenario planning and in helping health services better target their intended population groups. Reduced journey times for patients to health services may not just help increase attendance but may also help contribute toward a reduced carbon footprint.

References and Further Reading

1. Key Health Data 2004/05 Chapter 6: Access to Services, Dr Richard Wilson
2. Core National Accessibility Indicators 2007 produced by Department for Transport
3. Rural Services Data Series produced by Commission for Rural Communities
4. Indices of Deprivation 2007: Barriers to Housing and Services Domain and Geographical Barriers Sub Domain, produced by Department for Communities and Local Government
5. Methodology for allocating average road speeds is based upon the Competition Commission's report on the mergers of supermarket chains, *Appendix 5.2: Road speed assumptions* (2003)
6. Classification of PCTs (post October 2006 boundaries) based on the Rural and Urban Area Classification system for LSOAs, produced by Association of Public Health Observatories
7. Indices of Deprivation 2007. Produced by Department of Communities and Local Government. Regional quintiles have been calculated by WMCIU using the Income Domain

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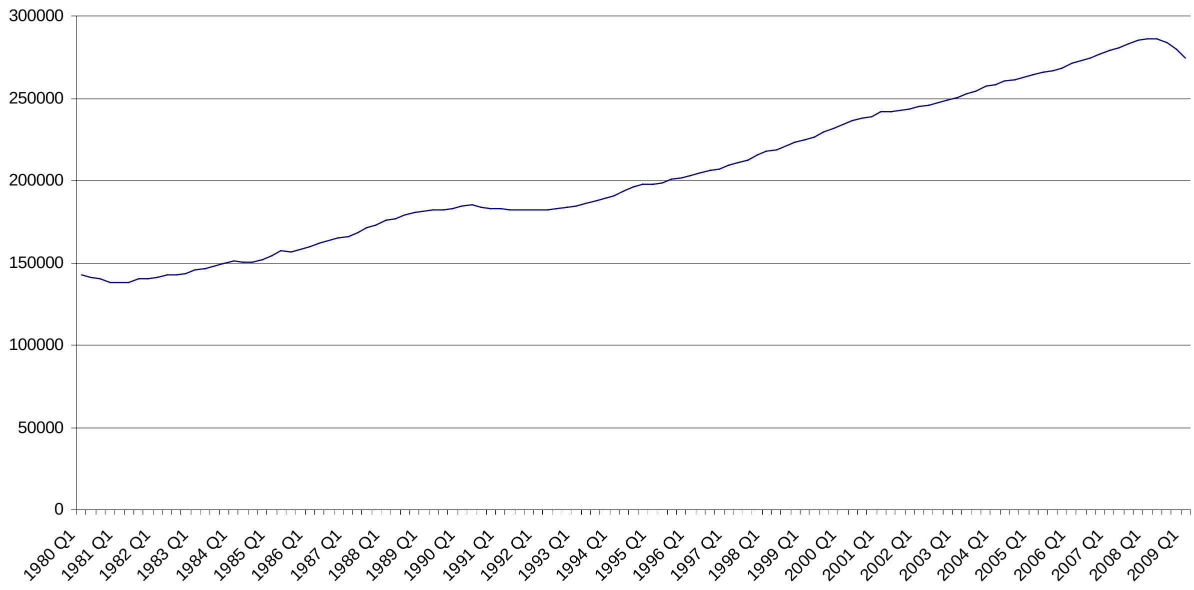
CHAPTER FOUR: RECESSION AND HEALTH

4.1 The Recession

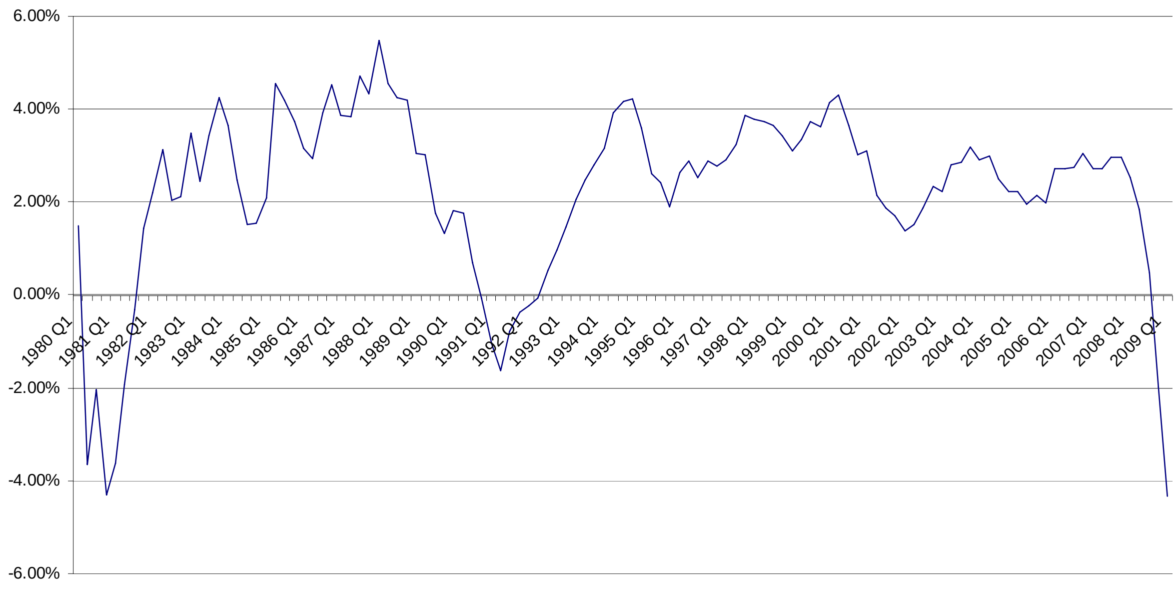
Since the second financial quarter of 2008 the Gross Domestic Product of the United Kingdom economy has been decreasing after a period of sustained growth from the early 1990s (Figure 4.1). The depth of the recession is deeper than the early 1990s and is deeper than that of the early 1980s, it has dropped 4.33% in the period quarter 1 2008 to quarter 1 2009, compared to 1980 low of 4.31% in (Figure 4.2).

Figure 4.1: Gross Value Added at basic prices: chained volume measures: Seasonally adjusted, 1980 to 2009 by quarters



Source: ONS

Figure 4.2: Gross Value Added at basic prices: chained volume measures: Seasonally adjusted, year on year change.



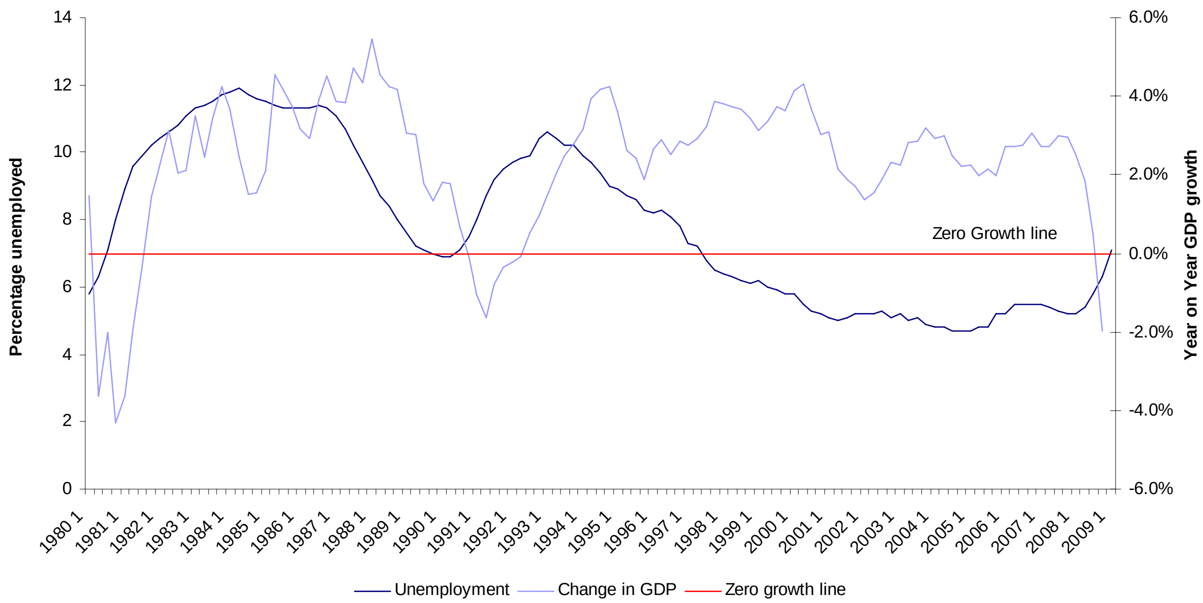
Source: ONS

One of the best guides we have to the possible future effects of economic downturns are studies of previous recessions. The best evidence comes from a study of the 1980s where it was found that in men who had been continuously employed for at least 5 years their mortality doubled in the five years after redundancy in those aged 40-59 in 1980 [1.]

Research into mass unemployment during the early 1990s in the United Kingdom found that people in secure employment recovered more quickly from illness. In contrast, unemployment increased the chance of being ill, especially for those who had never worked or had had poorly paid jobs [2]. Unemployment increases rates of depression, particularly in the young—who form most of the group who have never worked and who are usually most badly hit when jobs are few. Parasuicide rates in young men who are unemployed are 9.5-25 times higher than in employed young men[3] .

History tells us that breaking the downward trend in growth does not lead directly to improved employment. Figure 4.3 shows the cycle of growth and unemployment. In 1980 despite an upturn in growth in quarter 1 of 1981, unemployment did not substantially start to drop until quarter 4 of 1986, almost 7 years after the recession started. The relationship was less stark in the 1990s but again unemployment lagged along behind growth. It will be important to monitor unemployment, to see how quickly we can get people back in work to protect their health.

Figure 4.3: The temporal relationship between Gross Value Added and Unemployment, 1980 to 2000



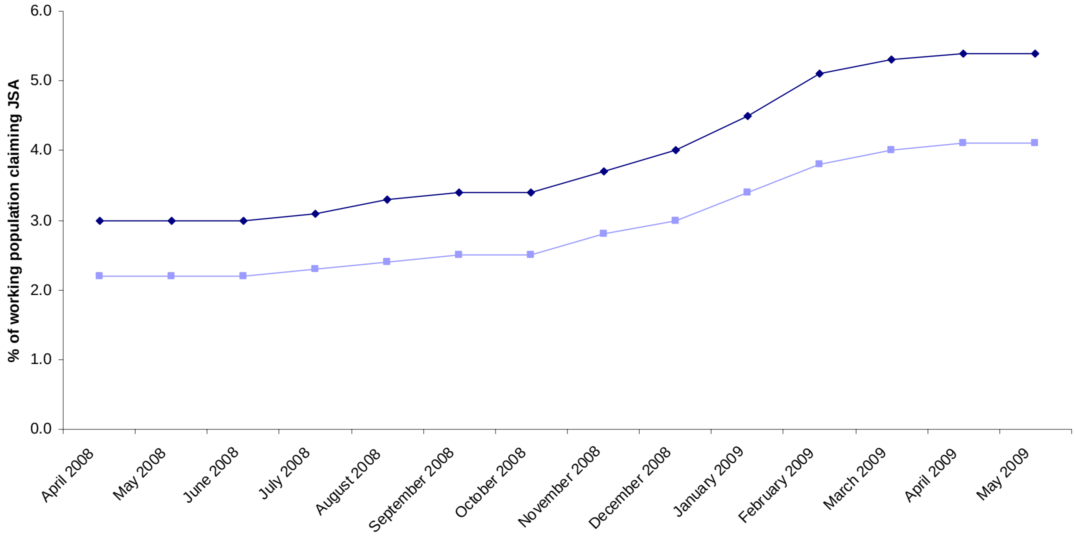
Source: ONS

4.2 Unemployment in the West Midlands

The best measure we have of unemployment is Job Seeker Allowance (JSA) claimants, however changes to the benefit entitlements mean that some of the increase in the numbers of JSA claimants could be due to changes to the benefit system which were introduced in October 2008 (for Incapacity benefit claimants) and November 2008 (for lone parents claiming Income Support).

Since July the numbers claiming income support has gone up 80.7%, from 98,232 (3% of working age population) to 177,467 (5.4%) by May 2009 (Figure 4.4). Men have been affected harder than women with claimants rising by 65% compared to 44.5% for woman.

Figure 4.4: JSA claimants, West Midlands, April 2008 to May 2009



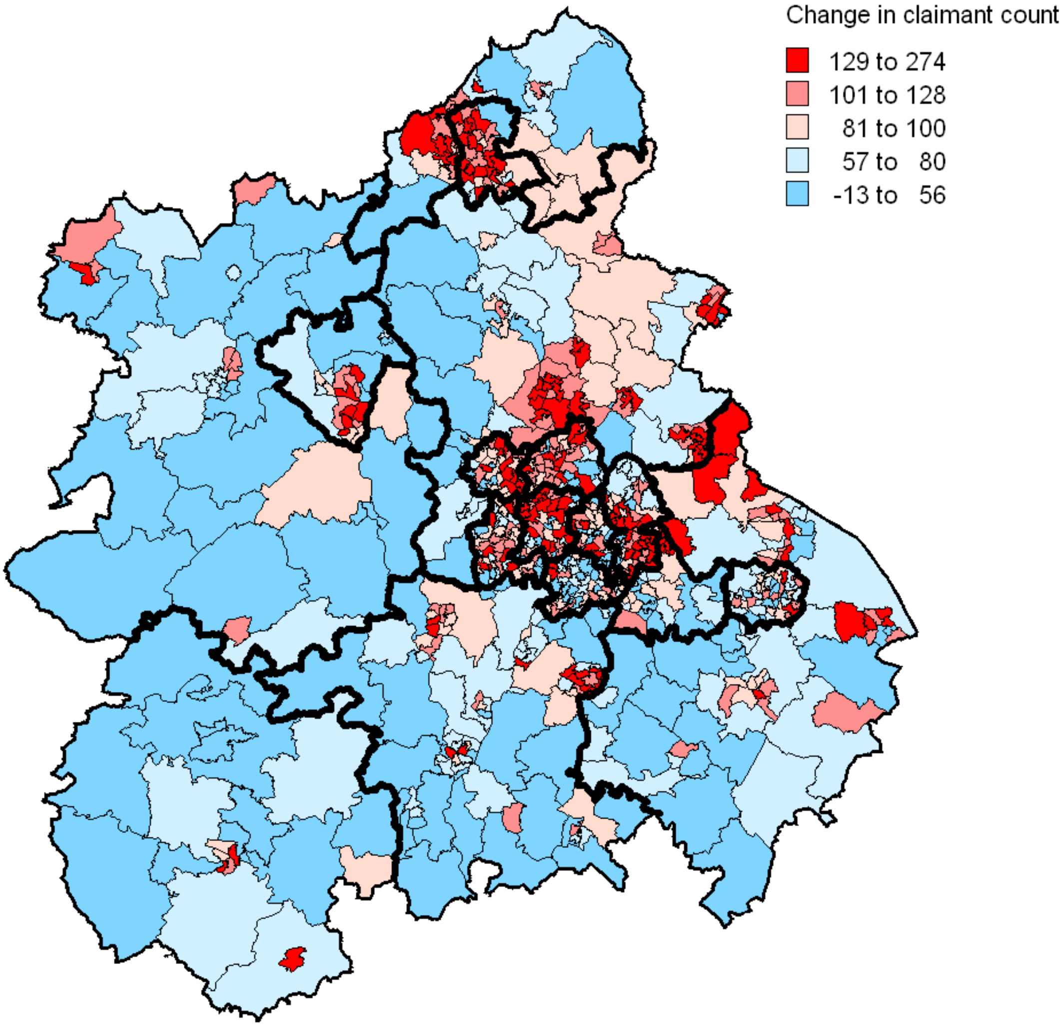
Source: NOMIS

4.3 Geographical impact

The increase in the number of claimants has been greatest in the urban centre of the West Midlands (Map 4.1). However, the relative percentage change has been greatest in the rural areas, where there has been a more substantial increase in what had been historically low number of claimants (Map 4.2).

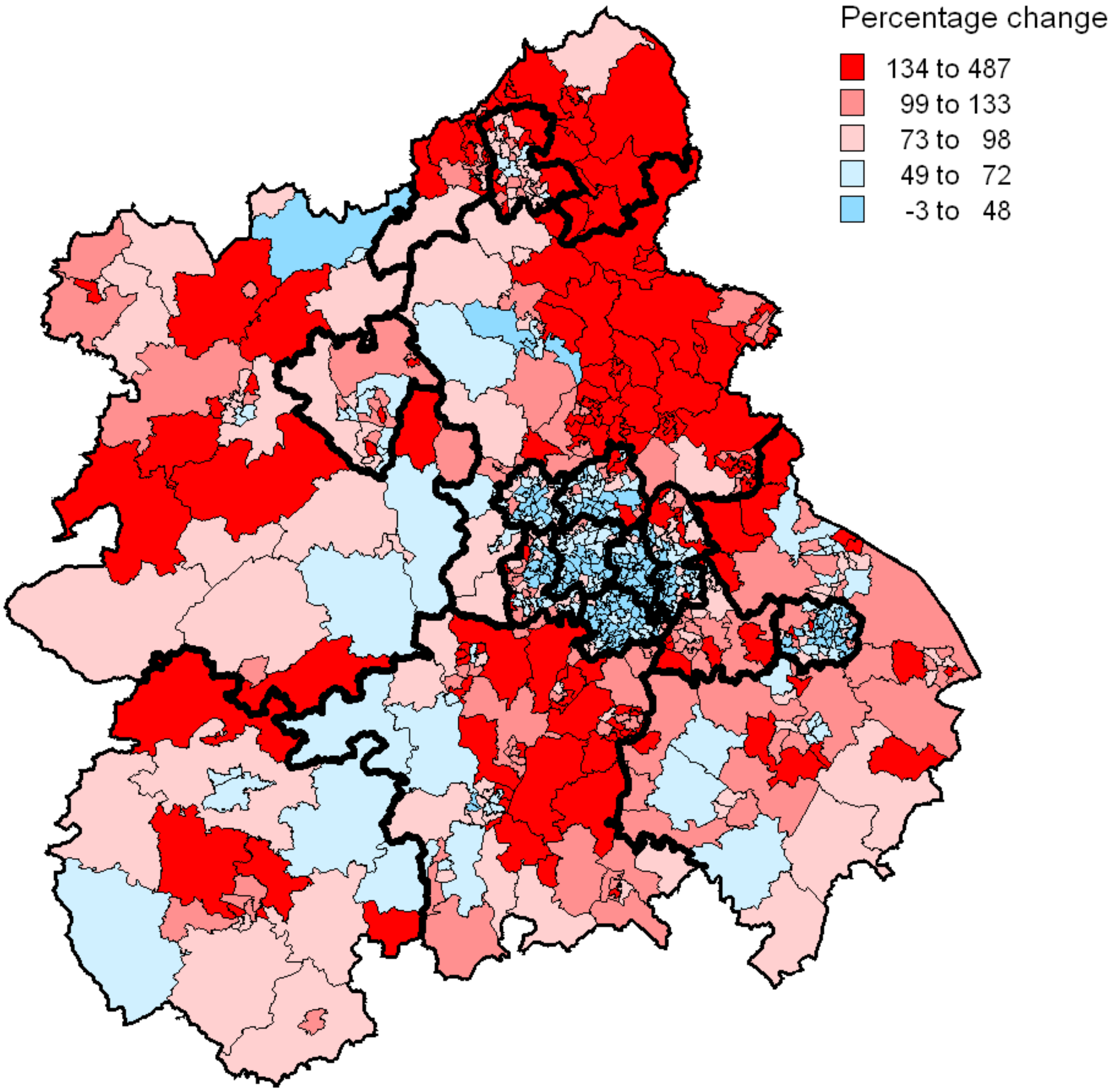
Data by Local Authorities is provided on the accompanying CD-ROM and is also downloadable from the Key Health Data website www.bham.ac.uk/keyhealthdata

Map 4.1: Increase in claimant counts April 2008 to April 2009, by Middle Super Output Area



Source: NOMIS and WMCIU

Map 4.2: Percentage increase in claimant counts April 2008 to April 2009, by Middle Super Output Area

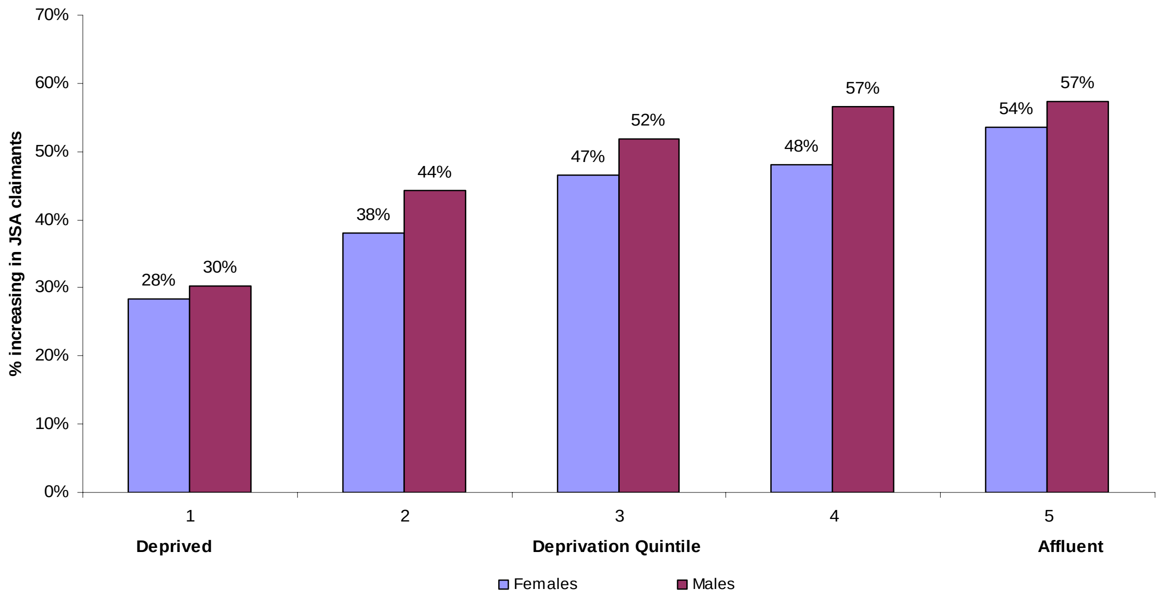


Source: NOMIS and WMCIU

4.4 Impact by Existing Deprivation

The greatest number of claimants are still from the most deprived areas, however reflecting the impact in rural areas, there have been substantial increases in unemployment in the most affluent areas, where previously these levels were low, (Figure 4.5).

Figure 4.5: Percentage change in unemployment by deprivation quintile, April 2007 to April 2009



Source: NOMIS and WMCIU

4.5 Demography

As stated above, the recession has hit males more than females, and those aged 25-49 (Table 4.1). It may be that older people are more likely to claim JSA if they become unemployed than young people. This certainly applies to the 16-19 age group, the majority of who would not be eligible to claim JSA as normally it is only available to people aged over 18, hence JSA is not the best measure of youth unemployment.

Table 4.1: JSA claimants by age and sex

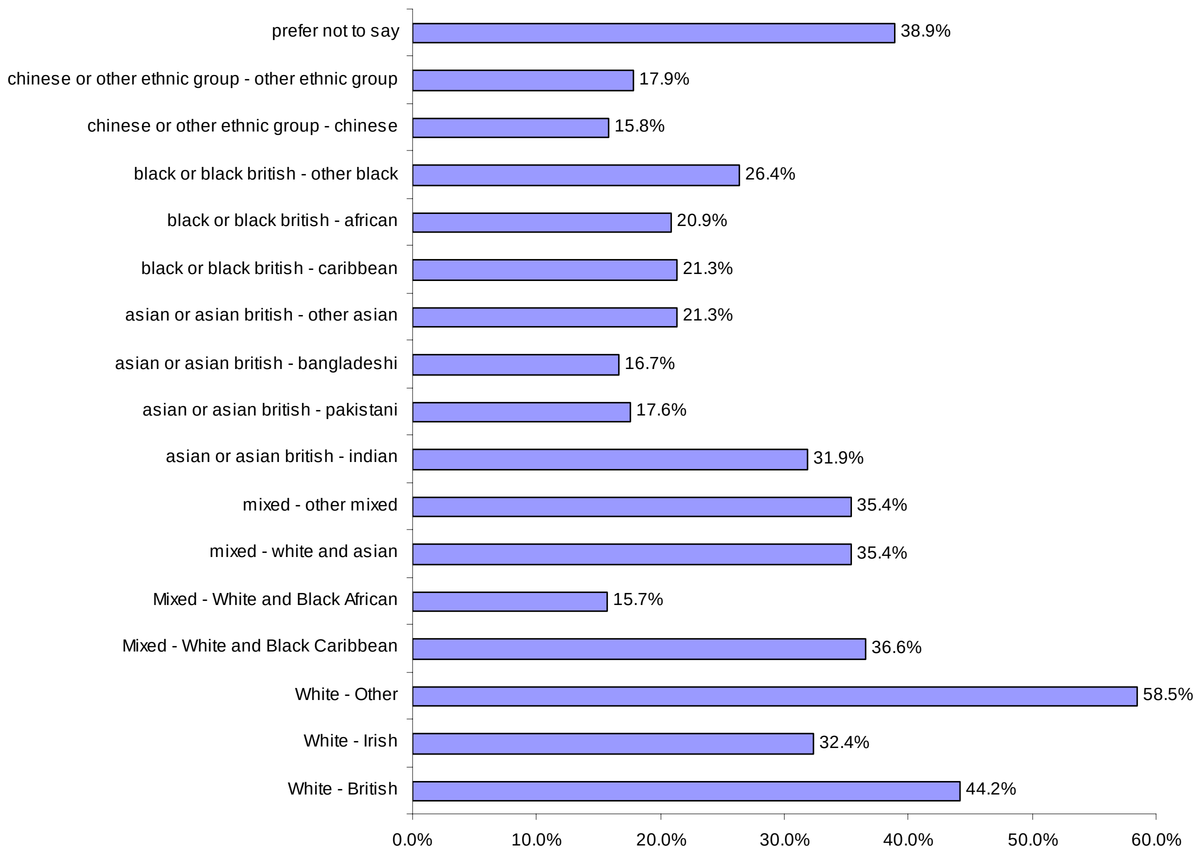
		Aged 18-24	Aged 25-49	Aged 50+
Males	JSA Counts	36,625	75,195	21,225
	Increase	14,800	30,775	8,730
	% Increase	45.9%	46.7%	42.3%
Females	JSA Counts	15,125	20,965	7,605
	Increase	4,900	8,660	2,945
	% Increase	37.0%	44.5%	39.0%
Totals	JSA Counts	51,750	96,155	28,835
	Increase	19,700	39,430	11,680
	% Increase	43.5%	46.2%	41.4%

Source: NOMIS

4.6 Ethnicity

The recession has impacted most on the white population, with JSA claimants increasing most rapidly in the white populations. The large percentage increase in white – other is interesting and is perhaps indicative of the growth in the Ascension Country workers from Eastern Europe (Figure 4.6).

Figure 4.6: JSA Claimants by ethnic growth.



Source: NOMIS

4.7 Impact by Occupation

The industries which have been hardest hit, as measured by unemployment, are Customer Service with a 330% increase in claimants seeking jobs in that area (Table 4.2).

Table 4.2: Occupations sought by claimant count, Feb 2009

				% Change		
	Men	Women	Overall	Men	Women	Overall
Corporate Managers	39,320	10,805	50,125	208.6	230.5	213.0
Managers and Proprietors in Agriculture and Services	8,155	2,955	11,110	177.5	191.3	180.9
Science and Technology Professionals	20,945	1,355	22,300	161.5	126.3	159.1
Health Professionals	405	370	775	88.2	118.8	103.0
Teaching and Research Professionals	6,385	5,305	11,690	105.3	124.8	113.7
Business and Public Service Professionals	6,330	3,205	9,535	210.7	242.3	220.6
Science and Technology Associate Professionals	19,130	1,575	20,705	219.6	208.2	218.7
Health and Social Welfare Associate Professionals	6,295	5,080	11,375	157.4	206.5	177.3
Protective Service Occupations	1,540	280	1,820	227.3	177.8	218.9
Culture, Media and Sports Occupations	22,495	5,765	28,260	126.3	152.2	131.3
Business and Public Service Associate Professionals	18,620	6,385	25,005	214.0	243.1	221.3
Administrative Occupations	70,160	71,325	141,485	172.6	195.9	184.3
Secretarial and Related Occupations	1,135	15,025	16,160	253.3	215.0	217.3
Skilled Agricultural Trades	26,760	1,190	27,950	170.1	165.7	169.9
Skilled Metal and Electronic Trades	71,710	1,050	72,760	189.5	206.3	189.7
Skilled Construction and Building Trades	81,520	730	82,250	243.9	195.8	243.4
Textiles, Printing and Other Skilled Trades	23,265	3,725	26990	144.5	180.3	149.0
Caring Personal Service Occupations	12,120	46,295	58,415	176.6	168.6	170.3
Leisure and Other Personal Service Occupations	8,780	10,550	19,330	172.4	164.7	168.1
Sales Occupations	108,735	110,475	219,210	222.6	207.2	214.5
Customer Service Occupations	15,240	10,750	25,990	354.4	299.6	330.4
Process, Plant and Machine Operatives	88,505	16,700	105,205	203.6	150.9	194.0
Transport and Mobile Machine Drivers and Operatives	123,295	3,425	126,720	237.6	209.9	236.8
Elementary Trades, Plant and Storage Related Occupations	410,525	41,690	452,215	158.6	98.0	151.8
Elementary Administration and Service Occupations	90,730	50,570	141,300	199.2	231.1	209.9

Source: NOMIS

4.8 What is the Health Impact?

If the trends seen in the 1980s are repeated, we can expect the risk of dying within 5 years for men who lose their job to double (relative risk 2.13 (95% confidence interval 1.71 to 2.65)), compared to those who remain in employment. Adjustment for socioeconomic variables (town and social class), health related behaviour (smoking, alcohol consumption, and body weight), and health indicators only slightly reduces the risk to 1.95 (1.57 to 2.43) indicating that it is the act of being unemployed which impacts on men. The increased risk of mortality after redundancy tends to be greater in men than in women[4]. What this means is that for every 1,000 men made unemployed we could expect an additional 3 to die within the next 5 years. That means across the West Midlands with 11,675 people aged over 50 being made unemployed by April 2008 that an additional 28 men will die prematurely due to the recession alone. The reason why men suffer more during economic downturns is because they are generally affected more from a prevailing belief that when things go wrong no one will be there to help [5].

References and Further Reading

Data taken from:

- NOMIS**:** **www.nomisweb.org.uk**
- ONS: **www.statistics.gov.uk**

1. Morris JK, Cook DG, Shaper AG. Loss of employment and mortality. BMJ 1994; 308:1135-9
2. Bartley M, Sacker A, Clarke P. Employment status, employment conditions, and limiting illness: prospective evidence from the British household panel survey 1991-2001. J Epidemiol Community Health 2004; 58:501-6. (The major source for review of employment and health issues)
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5. Kraemer S. Review: Textbook of men's mental health. Br J Psychiatry 2007; 161:573-

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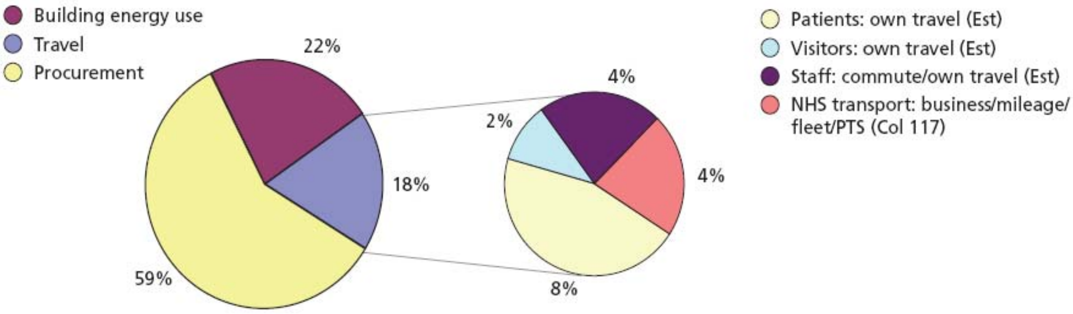
CHAPTER FIVE: THE CARBON FOOTPRINT OF RADIOTHERAPY TREATMENT FOR BREAST CANCER IN THE WEST MIDLANDS 1990 AND 2004

5.1 Introduction

In the Climate Change Bill the UK government is committed to 'cut carbon dioxide emissions by at least 60% by 2050, based on 1990 levels'. To ensure the NHS helps government achieve these targets the NHS' Sustainable Development Unit (SDU) has produced the NHS Carbon Reduction Strategy which aims to reduce carbon emissions in 3 key areas of NHS activity; energy consumption, transport and procurement. The NHS has no national data on which to base its 1990 carbon footprint and approached the Stockholm Environment Institute to calculate its carbon footprint in 2004.

NHS expenditure on energy, transport and consumption in 2004 forms the basis for calculating CO_2 emissions. It is estimated that the NHS produced the equivalent of 18 million tonnes CO_2 in 2004, of which 3.41 million tonnes is attributed to travel, equivalent to 10.5 billion kilometres.

Figure 5.1: Stockholm Institute estimates of NHS CO_2 emissions in 2004



Source: NHS Carbon Reduction Strategy (Draft 2008)

Transport related CO_2 emissions for the NHS were calculated on the basis of the NHS Estates Returns Information Collection (ERIC) system which records expenditure on transport services provided by NHS organisations and their staff business travel claims. Additionally the Stockholm Environment Institute predicted that patient and visitor travel would contribute a further 10% of all travel CO_2 emissions but had no means to measure this element.

Cancer Registries have excellent records for patients diagnosed with cancer since 1981, which include patient addresses and hospitals of treatment. The work reported here develops a method for assessing the carbon footprint of patient travel for one small area of NHS activity, radiotherapy treatment for breast cancer, in the West Midlands region in both the government's baseline year 1990 and in 2004. The work described will use GIS and patient registers to address two key information gaps:

- Patient travel to NHS services.
- Comparable data for patient travel in 1990 and 2004.

5.2 Data Sources

An extract for all breast cancers recorded as treated with radiotherapy or having a 'planned radiotherapy' treatment in each of our target years, 1990 & 2004 was extracted from the cancer registry database. In instances where the radiotherapy centre was not recorded in the database, if the hospital of diagnosis was a radiotherapy centre at time of treatment the hospital of diagnosis is used as a proxy for radiotherapy treatment centre. There were, more cases in 1990 with no radiotherapy treatment centre recorded than in 2004 but by adopting hospital of diagnosis for these cases we were able to include over 97% of all cases identified. The number of patients receiving radiotherapy for breast cancer in 2004 almost doubled from 1990 levels.

Table 5.1: Breast cancer cases identified for inclusion in study

Year	No. Cases recorded	No. Cases with hospital of treatment	No. Cases with no treatment recorded	% Cases included in carbon footprint study
1990	1716	1677	39	97.7%
2004	3350	3341	9	99.5%

The West Midlands Cancer Registration database does not currently record evidence of the radiotherapy regime delivered to each patient so we have relied on the results of two Royal College of Radiologists audits[1, 2] of patient treatment regimen in 1993 and in 2003 and applied the relevant percentages to our patient cohorts. Table 5.2 summarises the percentage allocation of cases to each regime in the two years. The number of fractions is taken to be equivalent to the number of days attendance at radiotherapy centre for each patient.

Table 5.2: Allocation of treatment regime to patients based on published research

Year	Radiotherapy regimen			
	15 fractions	20 fractions	25 fractions	Other
1990	27%	19%	30%	24%
2004	45%	16%	21%	18%

Source: Royal College of Radiologists 1995[1] and 2006[2]

The diagnosis postcode of each patient is allocated to its Lower Super Output Area and provides a start location for each journey and the radiotherapy centre of treatment ultimately determines how far they travel. One return journey to treatment is recorded for every fraction of radiotherapy administered regardless of whether this is given as an inpatient or day patient, which allows for some account of visitor travel. No account is made of consultations and other appointments attended prior to, nor following a course of radiotherapy. No account is made of additional 'booster' radiotherapy treatments added to a standard regime for some patients. The percentage of patients allocated to each regime assumes a standard distribution of disease stage geographically across the region.

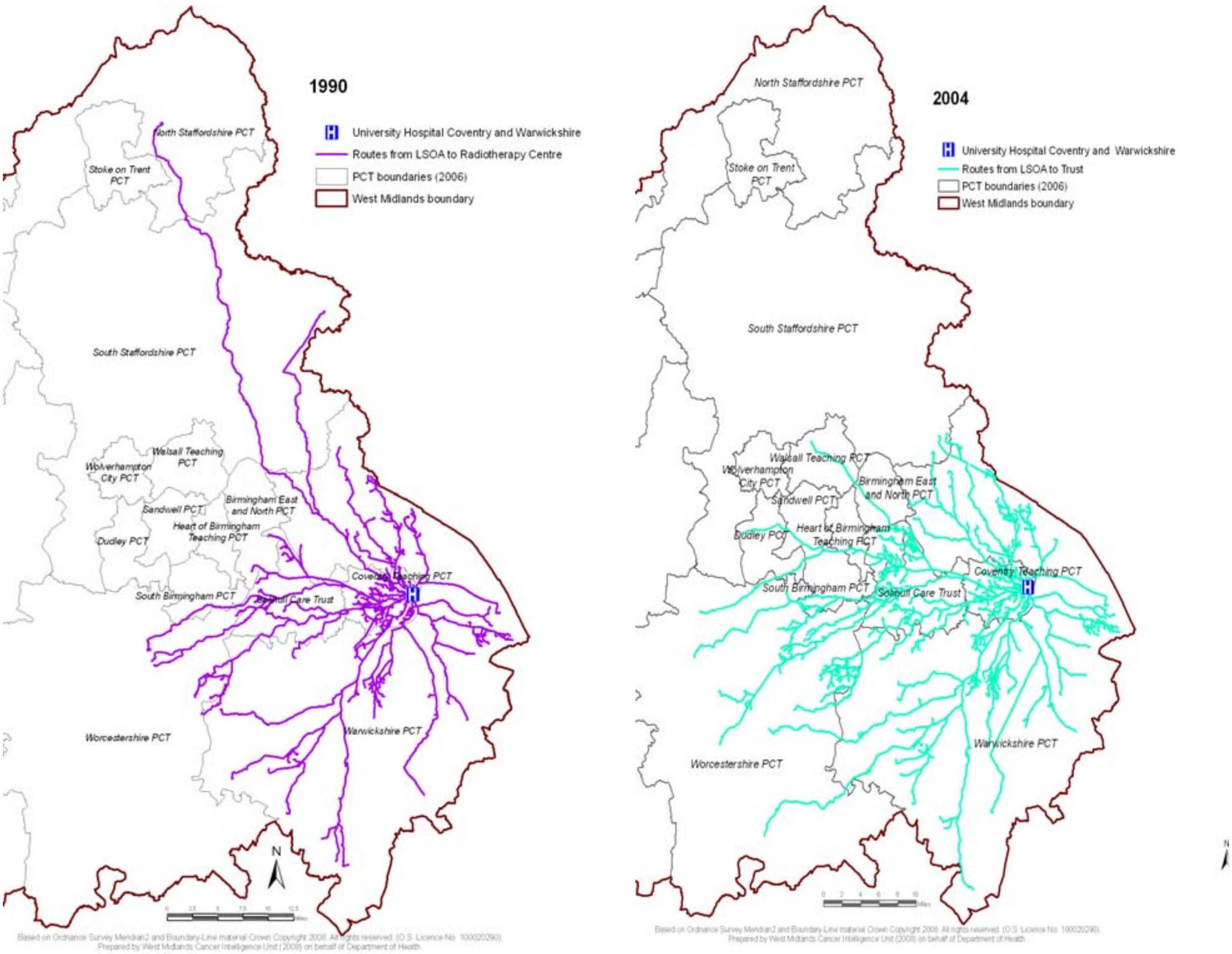
The Ordnance Survey flagship road product, the Integrated Transport Network (ITN) is used with the ArcGIS Network Analyst extension to determine the routes to radiotherapy centres based on road hierarchy. An origin-destination matrix from the population weighted centroid of every LSOA in the region to every NHS Acute Trust (n=20) is produced which can be reused in future analyses with minimum effort. Travel routes from each LSOA to radiotherapy centre are identified with priority given to main road routes over minor roads. The distance along these routes is calculated for every patient to give a total annual single return distance travelled. Total distance is allocated in proportion to each radiotherapy regime and factored up to provide total distance travelled by all patients following all regimes.

Total distances travelled are converted to CO_2 emissions based on DEFRA's greenhouse gas conversion tables (2008). The conversion factor takes account of a mixed age range and fuel type of cars typical in 2008 (0.2042 kg/km was used). Similar conversion factors for cars licensed in 1990 and 2004 do not appear to be available. No account of travel by public transport is included in the model as we felt that although the region has some good train and bus routes most women would aim to travel by private vehicle or taxi for at least one leg of their daily journey. Even if they did not drive themselves their driver would generate a minimum of one return car journey. Some double counting may have been made for those patients that used NHS patient transport services.

5.3 Results

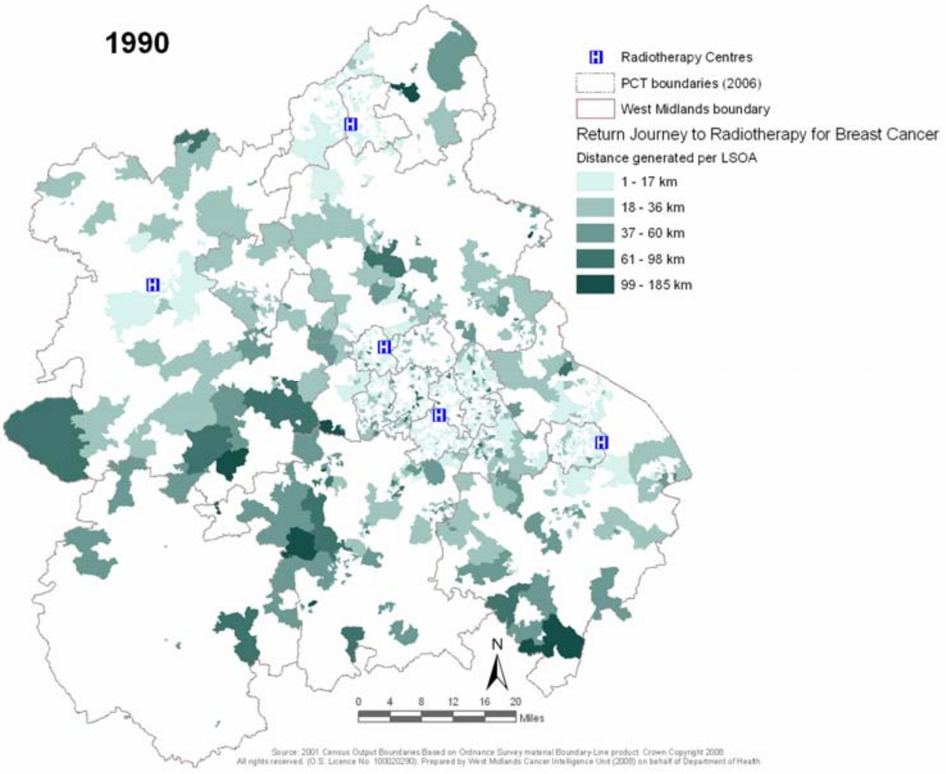
Routes are assigned from the source LSOA to each radiotherapy centre. Map 5.1 provides an illustration of these routes for patients treated at University Hospital Coventry and Warwickshire. The longest distances travelled in 1990 were from North Staffordshire and whilst these are not repeated in 2004 more patients now travel from Mid Worcestershire and from Walsall and Dudley reflecting cancer network commissioning patterns.

Map 5.1: Routes to University Hospital Coventry and Warwickshire in 1990

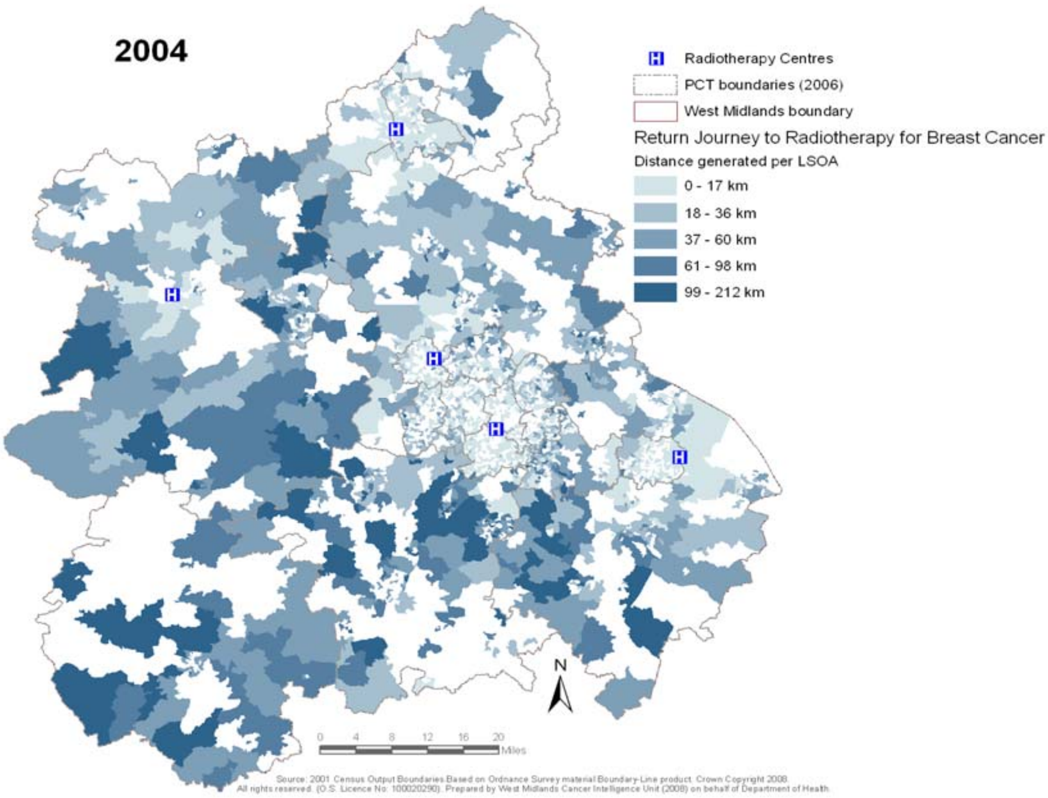


From these origin destination matrices the cumulative distances travelled by all patients to access one dose of radiotherapy treatment were calculated in each year. Although patient numbers had doubled and some referral patterns changed during the period total return journeys still doubled from 1990 to 2004.

Map 5.2 Single Return Journey Distance generated per LSOA by all patients receiving radiotherapy for breast cancer in 1990



Map 5.3: Single Return Journey Distance generated per LSOA by all patients receiving radiotherapy for breast cancer in 2004



In 1990 a patient would travel an average of 34.5km (21.4 miles) to access each fraction of radiotherapy treatment for breast cancer but by 2004 this had risen to 38.5km (23.9 miles) a 12% increase in distance.

Table 5.3: Cumulative Distances travelled by patients once treatment regime taken into account

Year	No. Fractions	% Patients	No. Patients allocated	Total Distance Travelled		CO2 emissions generated		Target CO2 emissions for 2050(tonnes)	
				Km	Miles	Kg	Tonnes	60% reduction	26% reduction
1990	15	24	403	208,275	130,172	42,530	42.53		
	20	17	285	196,388	122,743	40,102	40.10		
	25	35	587	505,614	316,008	103,246	103.25		
	Other	24	402	13,851	8,657	2,828	2.83		
	TOTAL		**1677**	**924,127**	**577,579**	**188,707**	**188.71**	**75.49**	**139.64**
2004	15	45	1503	867,232	542,020	177,089	177.09		
	20	16	535	411,594	257,246	84,047	84.05		
	25	21	702	675,091	421,932	137,854	137.85		
	Other	18	601	23,119	14,449	4,721	4.72		
	TOTAL		**3341**	**1,977,036**	**1,235,647**	**403,711**	**403.71**	**161.48**	**298.75**

In 1990 1,677 patients received radiotherapy for breast cancer and generated over half million miles of road travel and almost 190 tonnes of CO_2 emissions. By 2004 there had been a doubling in the number of patients treated with radiotherapy which contributed over 1.2 million miles travel and over 400 tonnes of CO_2 emissions.

5.4 Conclusions

The numbers of patients treated with radiotherapy for breast cancer almost doubled from 1990 to 2004 and despite a reduction in the number of radiotherapy fractions administered and the introduction of new Cancer Network commissioning patterns there was no curtailment in the volume of travel generated by treatment for breast cancer. If we consider our findings in terms of the measures produced by the Stockholm Environment Institute for the NHS, patient travel to radiotherapy for breast cancer in West Midlands would account for 0.012% CO_2 emissions currently identified in NHS estimates. The West Midlands population has a fairly typical age structure and accounts for just short of one tenth of the English population so assuming it to be of typical geography one might expect radiotherapy for breast cancer in England to account for 0.12% of all NHS CO_2 emissions for travel.

We know that radiotherapy treatment is only one aspect of treatment for breast cancer if we add the carbon footprint of diagnostic tests and other patient consultations it seems likely that the whole carbon footprint of breast cancer may be nearer 1% of the SDU allocation for the carbon footprint of travel in the NHS. Add to these figures consultations and treatment for all other cancers, visitor journeys to inpatients and the SDU estimates for all NHS travel and transport activity may well become an under-estimate of patient and visitor travel associated with the NHS.

The linkage of standard geographical data to Cancer Registry data provides a sustainable method for assessing the burden NHS cancer services place on the NHS Carbon Footprint. By producing an origin-destination matrix at LSOA level new patient postcodes can easily be included in the analyses and the method applied to any NHS hospital led activity. It is sustainable because the road network data and hospital locations are unlikely to change in the short term.

Despite the assumptions implicit in our model it does provide a novel yet efficient way for the NHS to gain a real understanding of the carbon footprint of patient and visitor travel. It is easily reproducible across England as it uses standard geographical datasets. Cancer registry databases provide good historic records of patient treatment patterns, records for other diseases may not be so readily available.

5.5 Implications of NHS Carbon Reduction Strategy on the Delivery of Cancer Services

In order to contribute at a 'pro rata' rate to government targets radiotherapy for breast cancer would need to reduce its carbon footprint to 161 tonnes p.a. If based on 2004 data and to 76.5 tonnes p.a. when based on the Government's 1990 baseline (equivalent to an 81% reduction in CO_2 emissions). When Department of Transport anticipates a 35% increase in transport CO_2 emissions for UK by 2035 one has to ask whether the NHS can contribute to reaching these targets without radically rethinking its service configuration.

If radiotherapy treatment for breast cancer is in anyway representative of the delivery of health services in the region it would appear a radical change in either clinical practice or the pricing policy of health services will be required in order to achieve a 60% reduction in CO_2 emissions. If a 'carbon footprint cost for travel and procurement' is not included in commissioning toolkits we may be forced to make patients use public transport when attending health service appointments and out patient treatment. Alternatively current high cost drugs may suddenly become more affordable or will centralised services become a thing of the past to ensure we make our contribution to the NHS carbon reduction strategy? The Government has to be clear strategies currently seen as cost savings may be in conflict with its environmental strategies and manage the service planning for long-term future as well as short term cost savings.

We cannot deny patients treatment for cancer but can we really support the government's targets to reduce CO_2 emissions by 60% when so little is known of our true carbon footprint. Attaining a carbon reduction target must depend on conceptualising the scale of the task. By calculating 1990 and 2004 CO_2 emissions based on patient activity records and carbon conversion factors typical of car ownership patterns in both 1990 and 2004 we may be able to better understand the travel element of the NHS carbon footprint.

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Acknowledgements

- Catherine Lagord and Christopher Lawrence for their assistance in extracting and interpreting data from West Midlands Cancer Registration Database.

- Samuel Jones for his perseverance in setting up the ITN road network files and running the origin destination matrix.

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CHAPTER SIX: COLON CANCER IN THE WEST MIDLANDS

6.1.1 Colon Cancer – Introduction

In 2006 colon cancer was the fourth most common cancer in England and responsible for 9% of all new cases of cancer (excluding non melanoma skin cancer)[1]. Colon cancer is more common in men than in women; in 2006 in England, the number of men diagnosed with colon cancer was 9,770 (age standardised rate: 32 per 100,000) compared to 9,313 women (age standardised rate: 23 per 100,000)[1]. The majority of those diagnosed are over 65 with risk increasing with age. Although colon cancer is primarily a disease of the elderly, 24% of colon cancer patients diagnosed in England are under 65[1].

Colon cancer was responsible for over 6% of cancer deaths in England in 2005[1]. More than 80% of colon cancer deaths in England occur in people aged 65 and over, and more than 40% in those aged 80 and over[1]. In 2005 there were 8,360 deaths from colon cancer in England; 4,207 men and 4,153 women. The Age Standardised Rate (ASR) for men was 13 deaths per 100,000 population compared with 9 deaths per 100,000 women[1]. Whilst incidence rates have changed little over the past ten years, colon cancer mortality has been falling since the early 1990s. Between 1990 and 2005, the colon cancer age-standardised mortality rates in England fell by 33%[1].

Since the early 1970s there has been a considerable improvement in one and five-year survival rates for individuals diagnosed with colon cancer. One-year relative survival rates rose from around 40% in the early 1970s to 67% for both sexes in the late 1990s. The 5-year relative survival rate for colon cancer rose from 22 and 23% for males and females respectively diagnosed in the early 1970s to 47 and 48% in the late 1990s. Ten-year survival rates are only a little lower than those at five-years indicating that most patients who survive for five years are generally cured from this disease. Nationally, 5-year survival is at least 5% higher for the most affluent patients diagnosed with colon cancer compared with those from the most deprived groups[2].

6.1.2 Risk Factors

A number of risk factors can influence the likelihood of an individual developing colon cancer. These include:

Diet - Red meat and processed meat have been linked by several studies to an increased risk of colon cancer. Less than 10g of fibre daily also increases the risk. Eating fish on a regular basis has been shown to reduce risk. A low fat diet offers no significant protection against colon cancer, although it is believed that reducing total calorie intake may lower the risk[2,3].
Alcohol consumption – Excess alcohol intake (45g/day or more) increases the risk of developing colon cancer; quantity rather than type (for instance beer or wine) is a more significant risk factor[2].
Obesity - Being overweight results in a higher risk of colon cancer, although the risk is greater in men than in women. Obese men are approximately 50% more likely to develop colon cancer. This risk is reduced with increased levels of physical exercise over time.[2,3]
Genetics - Fewer than 5% of colon cancers are linked to a genetic inheritance; although individuals with an immediate family member with colon cancer are approximately twice as likely to develop the cancer. The risk is increased further if the relative is young at diagnosis or there is more than one first-degree relative diagnosed with colon cancer[3]

6.2 Epidemiology

6.2.1 Incidence and Mortality

The data presented here are taken from the West Midlands Cancer Registry database, 2006 data. Mortality data are from the ONS, with the most recent data available from 2005 at the time of production.

In the West Midlands in 2006, 2,026 cases of colon cancer were diagnosed; 1,029 in males and 997 in females (Table 6.1). The crude incidence rates (number of cases per 100,000 population) in males and females were similar (40.0 per 100,000 and 36.6 per 100,000 respectively) but the age standardised incidence rate in males (30.9 per 100,000) was 1.3 times higher than that in females (23.4 per 100,000).

In 2005, there were 937 deaths from colon cancer in the West Midlands: 495 in males and 442 in females. The crude mortality rate in males was higher than that in females (18.8 per 100,000 in males compared with 16.2 per 100,000 in females) and the age standardised incidence rate in males (14.8 per 100,000) was 1.6 times higher than that in females (9.3 per 100,000).

The differences between crude and age adjusted incidence and mortality rates arise because colon cancer is primarily a disease of the elderly and, as women generally have a longer life expectancy than men, there are more elderly women than elderly men in the West Midlands population. Age adjusted rates correct for these differences in age distribution, allowing comparisons of incidence and mortality rates in populations with the same age structure.

Table 6.1: Colon cancer incidence and mortality in the West Midlands and England[4]

		Incidence		Mortality	
		West Midlands 2006	England 2006	West Midlands 2005	England 2005
Number of cases	Males	1,029	9,770	495	4,207
	Females	997	9,313	442	4,153
	Persons	2,026	19,083	937	8,360
Crude rate per 100,000 population	Males	40.0	39.2	18.8	17.0
	Females	36.6	36.1	16.2	16.2
	Persons	37.8	37.6	17.5	16.6
Age standardised rate per 100,000 population	Males	30.9 (28.9 - 32.8)	31.5 (30.9 - 32.1)	14.8 (13.4 - 16.1)	13.4 (13.0 - 13.8)
	Females	23.4 (21.8 - 24.9)	23.1 (22.6 - 23.6)	9.3 (8.4 - 10.3)	9.5 (9.1 - 9.8)
	Persons	26.7 (25.5 - 27.9)	27.3 (26.9 - 27.7)	11.7 (10.9 - 12.5)	11.4 (11.2 - 11.7)

West Midlands Incidence Source: Cancer Registration database, CNET Reports_2008 extract. West Midlands Mortality Source: Office of National Statistics Crown copyright 2008 supplied under MRP Data access agreement 1052/2007. Data for England taken from the National Cancer Information Service: CIS 4.2d.003: July 2008 refresh (1985-2006 data).

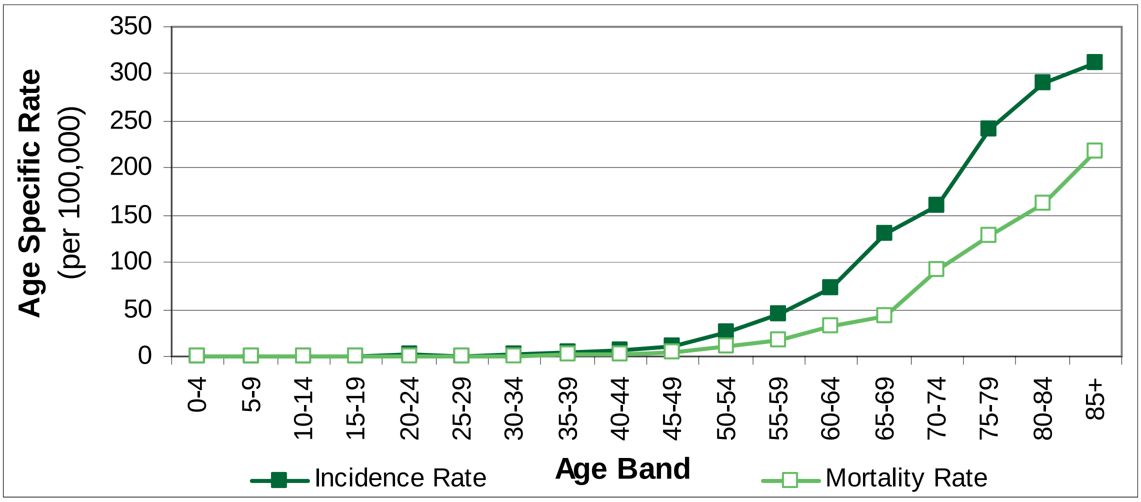
In 2006, the overall age standardised colon cancer incidence rate in the West Midlands was very similar at 26.7 per 100,000 than that for England (27.3 per 100,000). Age standardised colon cancer incidence rates in the male and female population in the West Midlands were also similar to those in England (30.9 per 100,000 compared with 31.5 per 100,000 for males and 23.4 per 100,000 compared with 23.1 per 100,000 for females).

In 2005, the overall age standardised mortality rate for colon cancer in the West Midlands was very similar at 11.7 per 100,000 compared to that for England (11.4 per 100,000). Age standardised colon cancer mortality rates in the male and female population in the West Midlands were also similar to those in England (14.8 per 100,000 compared with 13.4 per 100,000 for males and 9.3 per 100,000 compared to 9.5 per 100,000 for females).

6.2.2 Incidence and Mortality Age Profiles in the West Midlands

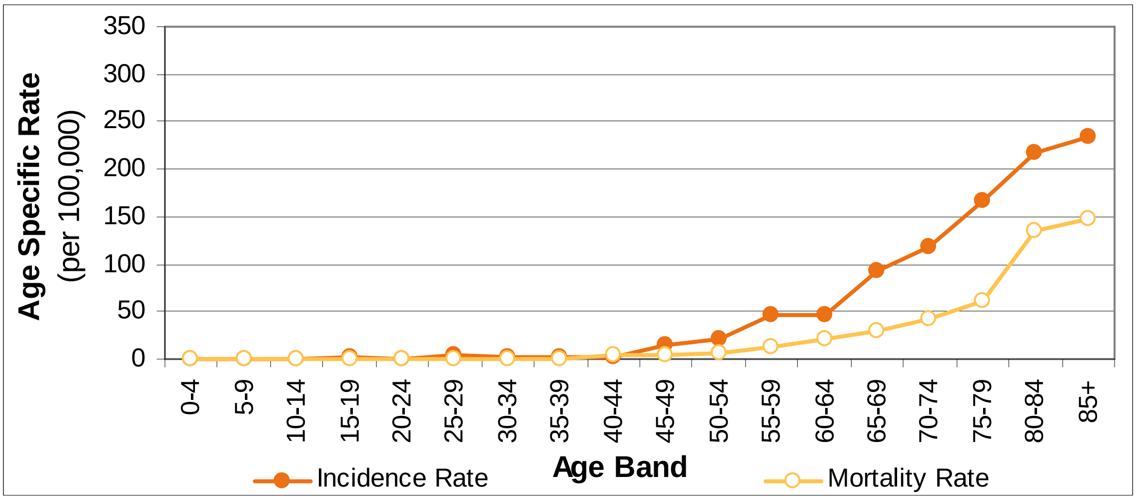
Figures 6.1a and 6.1b show how colon cancer incidence rates in 2006 and colon cancer mortality rates in 2005 varied with age group and gender in the West Midlands. Colon cancer incidence rates increased rapidly in men and women aged 60 and above; with 83% of colon cancers being diagnosed in men over 60 and 84% diagnosed in women over 60. Colon cancer mortality rates also increased rapidly in older men and women; with 78% of colon cancer deaths in men and 82% of colon cancer deaths women occurring in those aged 65 or over. The median age of diagnosis was 73 for males and 76 for females, and the median age of death was 75 for males and 80 for females.

Figure 6.1a: Age specific incidence rates for colon cancer in 2006 and mortality rates in 2005 in the West Midlands, males



Incidence Source: Cancer Registration database, CNET Reports_2008 extract. Mortality Source: Office of National Statistics Crown copyright 2008 supplied under MRP Data access agreement 1052/2007

Figure 6.1b: Age specific incidence rates for colon cancer in 2006 and mortality rates in 2005 in the West Midlands, females



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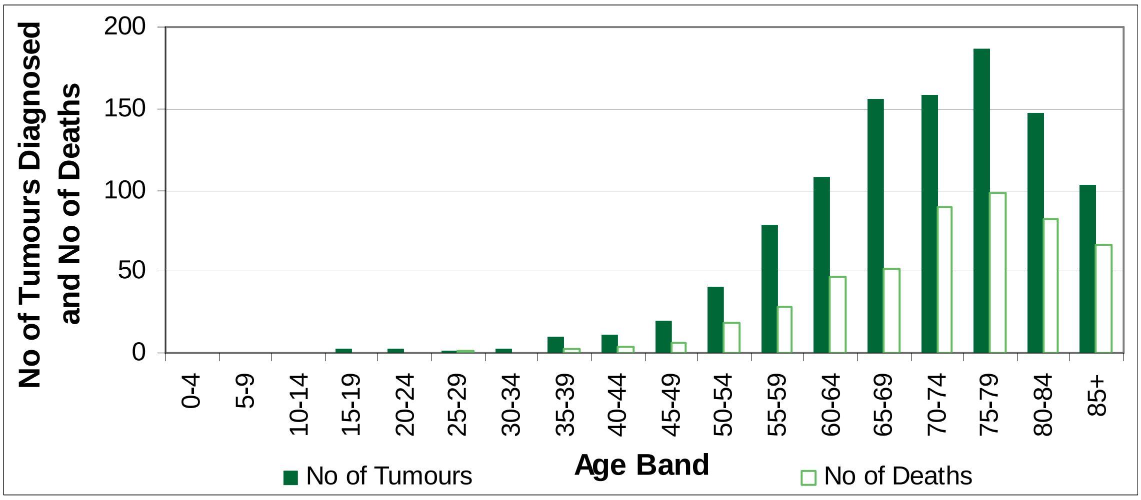
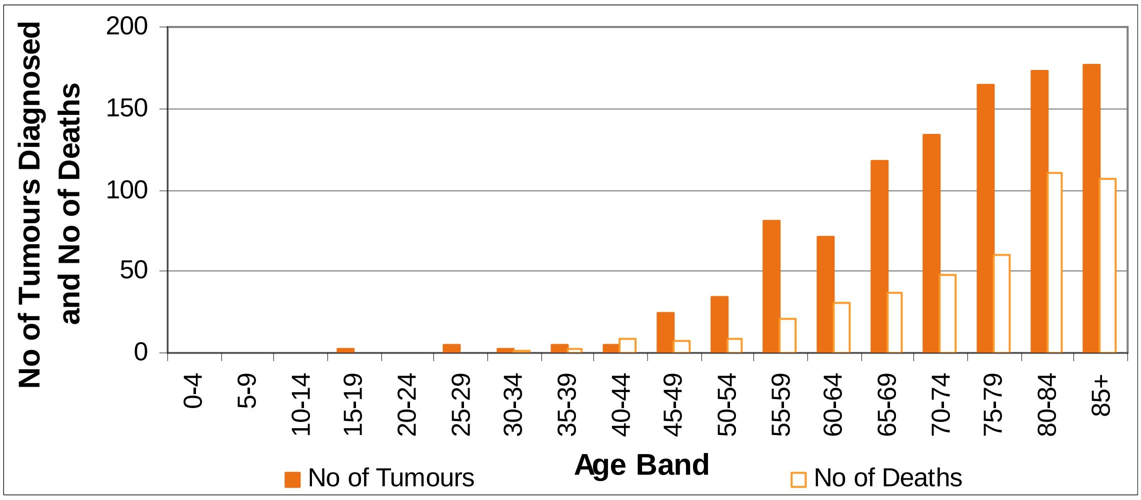
Figures 6.2a and 6.2b show how the numbers of colon cancers diagnosed in 2006 and the number of deaths from colon cancer in 2005 varied with age group and gender in the West Midlands.

Figure 6.2a: Age profile for number of cases of colon cancer in 2006 and the number of deaths from colon cancer in 2005 in the West Midlands, males



Incidence Source: Cancer Registration database, CNET Reports_2008 extract. Mortality Source: Office of National Statistics Crown copyright 2008 supplied under MRP Data access agreement 1052/2007

Figure 6.2b: Age profile for number of cases of colon cancer in 2006 and the number of deaths from colon cancer in 2005 in the West Midlands, females



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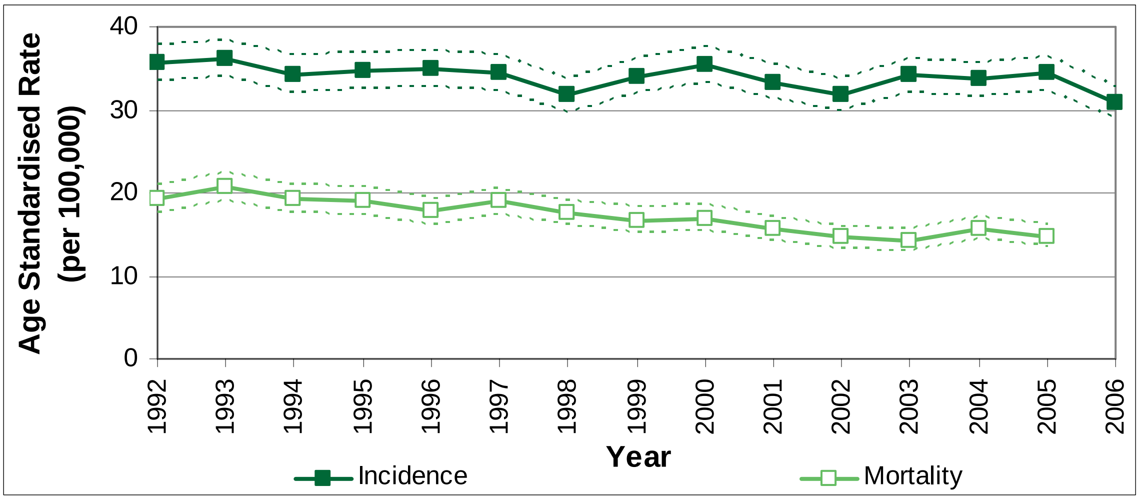
6.2.3 Incidence and Mortality Trends in the West Midlands

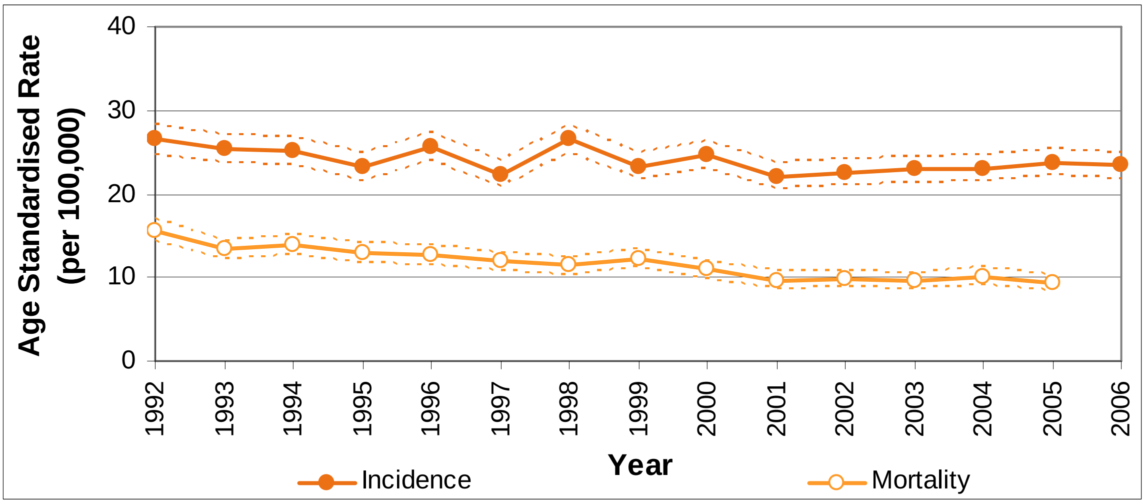
Figures 6.3a and 6.3b show changes in age standardised incidence rates between 1992 and 2006 and mortality rates between 1992 and 2005 in the West Midlands for males and females respectively. Age standardised incidence rates in males and females have decreased by 13% and 11% respectively since 1992 (from 35.7 per 100,000 to 30.9 per 100,000 in males and from 26.5 per 100,000 to 23.4 per 100,000 in females). Age standardised mortality rates in males and females have decreased by 23% and 40% respectively since 1992 (from 19.2 per 100,000 to 14.8 per 100,000 in males and from 15.6 per 100,000 to 9.3 per 100,000 in females). There was a statistically significant negative correlation with time for incidence and mortality in males and females.

Figure 6.3a: Incidence and mortality trends in the West Midlands, males
Dotted lines represent 95% confidence intervals



Incidence Source: Cancer Registration database, CNET Reports_2008 extract. Mortality Source: Office of National Statistics Crown copyright 2008 supplied under MRP Data access agreement 1052/2007

Figure 6.3b: Incidence and mortality trends in the West Midlands, females
Dotted lines represent 95% confidence intervals



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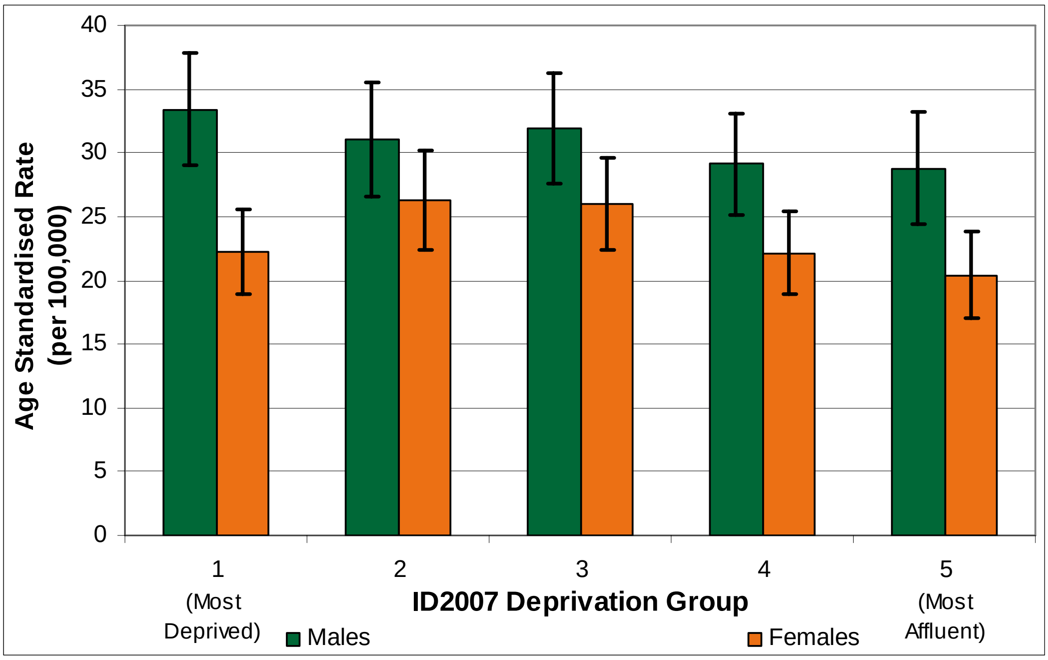
6.2.4 Variation in Incidence with Deprivation in the West Midlands

Figure 6.4 shows how age standardised colon cancer incidence rates in males and females varied with deprivation group in 2006. Colon cancer patients were allocated to five deprivation groups on the basis of deprivation scores calculated from the income domain of the Index of Deprivation for 2007 (ID2007). Although the age standardised incidence rates for colon cancer were higher (33.4 per 100,000) in males in the most deprived group compared with those in the most affluent group (28.8 per 100,000), there is no statistically significant relationship between colon cancer incidence and deprivation. There is also no distinctive or statistically significant relationship between colon cancer incidence and deprivation in females.

Figure 6.4: Variation with deprivation group in incidence rates for colon cancer diagnosed in 2006, males and females



Source: Cancer Registration database, CNET Reports_2008 extract

6.2.5 Incidence Rates in PCTs

Figures 6.5a and 6.5b show funnel plots of the age standardised colon cancer incidence rates in West Midlands PCTs for males and females in 2006. None of the PCTs had a colon cancer incidence rate in males which was significantly higher or lower than the West Midlands average of 30.9 per 100,000. However, at 14.9 per 100,000, the incidence rate for females in Solihull Care Trust was significantly lower than the West Midlands average of 23.4 per 100,000, and at 32.4 per 100,000, the incidence rate for females in South Birmingham PCT was significantly higher than the West Midlands average.

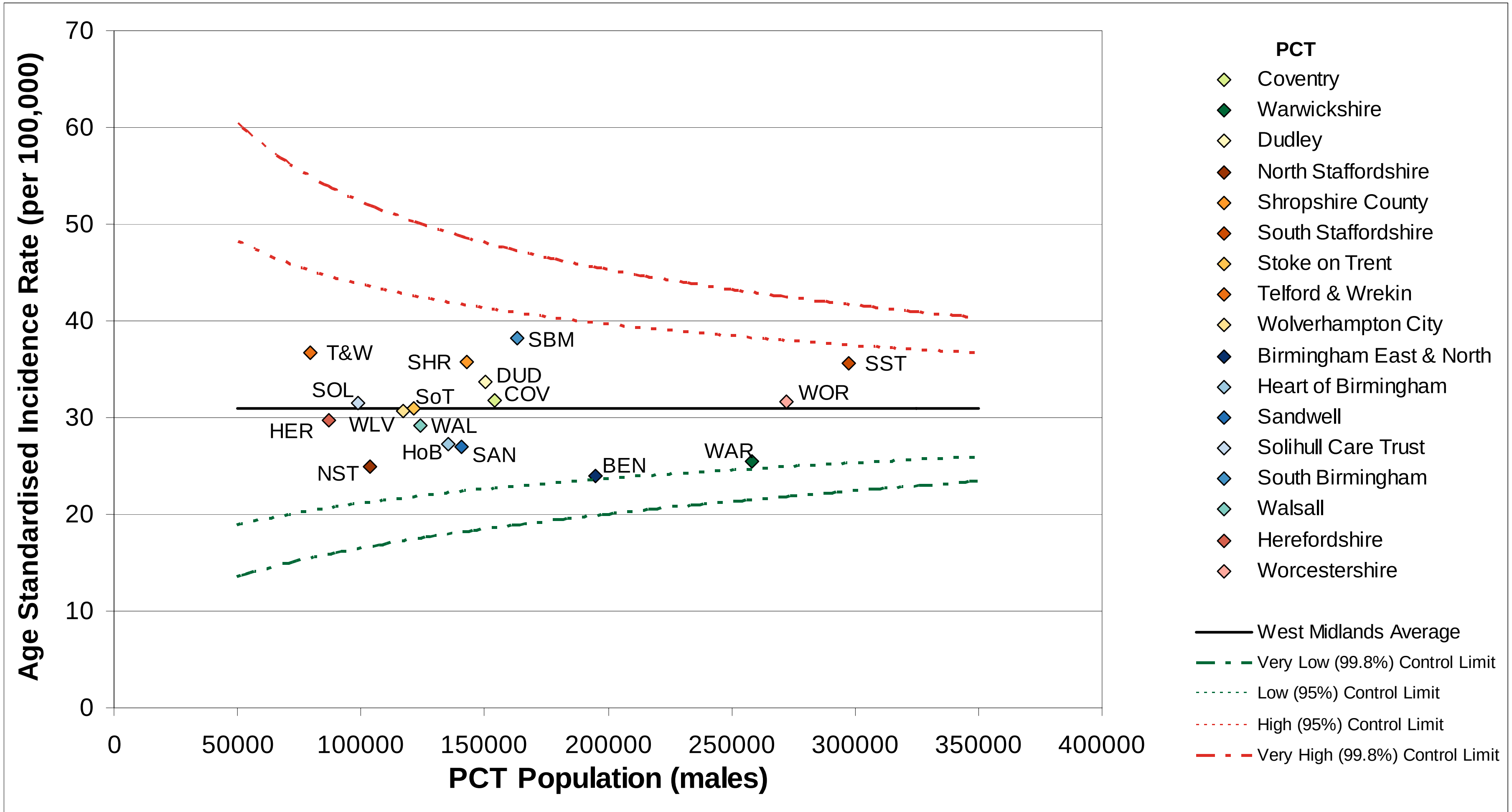
6.2.6 Mortality Rates in PCTs

Figures 6.6a and 6.6b show funnel plots of the age standardised colon cancer mortality rates in West Midlands PCTs for males and females in 2005. There were no PCTs with a colon cancer mortality rate in males which was significantly higher or lower than the West Midlands average of 14.8 per 100,000. For females, the mortality rate in Heart of Birmingham tPCT (3.7 per 100,000) was significantly lower than the West Midlands (9.3 per 100,000). None of the PCTs had a colon cancer mortality rate in females which was significantly higher than the West Midlands average.

6.2.7 Mortality/Incidence Rate Ratios in PCTs

Figures 6.7a and 6.7b show funnel plots of age standardised colon cancer mortality/incidence rate ratios in West Midlands PCTs for males and females. In order to maintain comparability, incidence and mortality data are for 2005. The mortality/incidence rate ratios for colon cancers diagnosed in 2005 in males and females in the West Midlands region were 0.44 and 0.45 respectively. Wolverhampton City PCT had the highest mortality/incidence rate ratios in males (0.60) and North Staffordshire had the highest mortality/incidence rate ratio in females (0.59). The lowest mortality/incidence rate ratio in males (0.25) occurred in Telford & Wrekin PCT and Solihull Care Trust. None of the PCTs had a significantly higher or lower mortality/incidence rate ratio in males compared to the West Midlands average. Heart of Birmingham tPCT had the lowest mortality/incidence rate ratio in females (0.26) and this was significantly lower than the West Midlands average. None of the PCTs had a significantly higher mortality/incidence rate ratio in females compared to the West Midlands average.

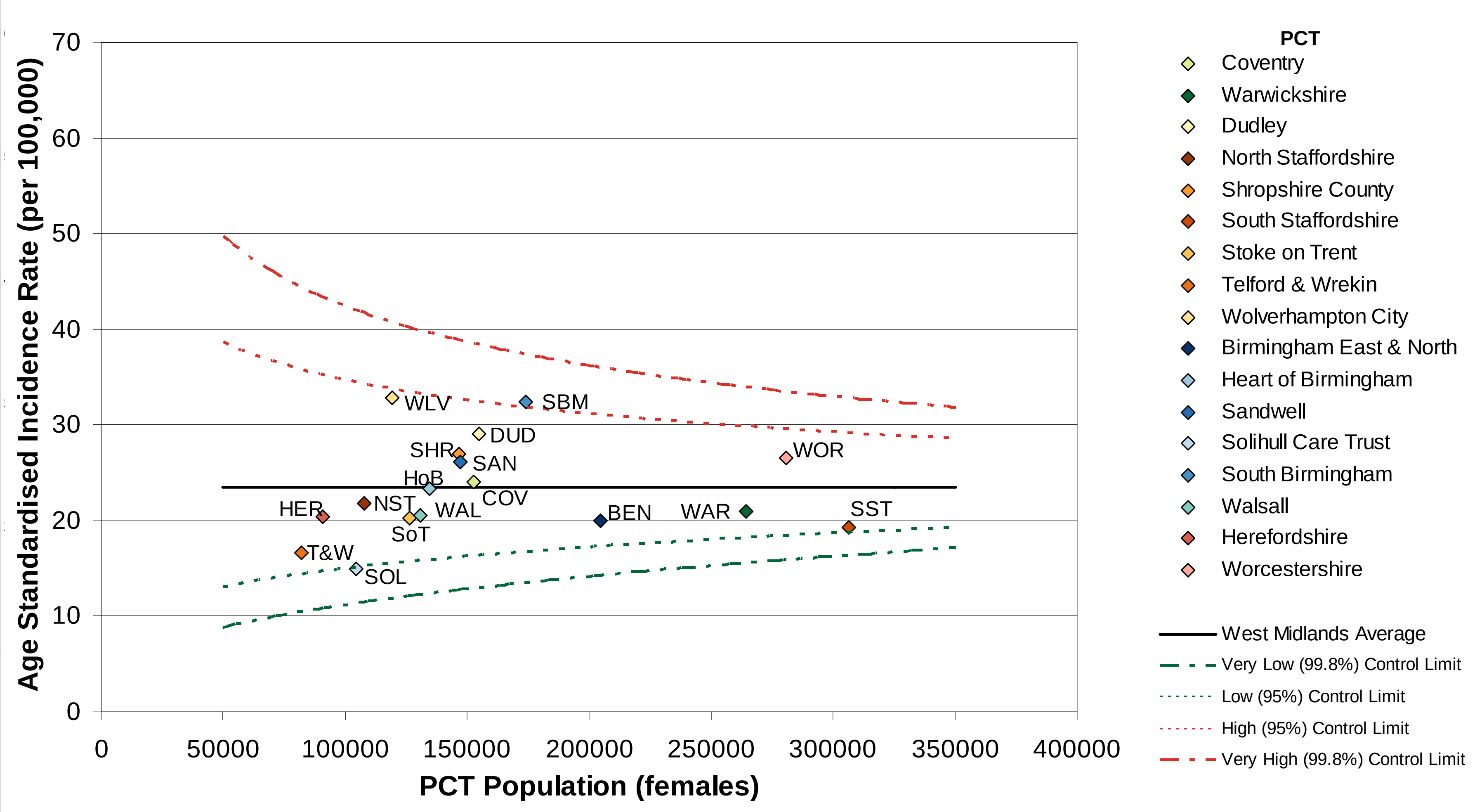
Figure 6.5a: Variation in colon cancer incidence rates in West Midlands PCTs, males
Colon cancers diagnosed in 2006 in males in each PCT



Incidence Source: Cancer Registration database, CNET Reports_2008 extract

Population Source: Office for National Statistics Experimental Statistics Crown Copyright 2007 supplied under MRP Data Access Agreement 0826/2007

Figure 6.5b: Variation in colon cancer incidence rates in West Midlands PCTs, females
Colon cancers diagnosed in 2006 in females in each PCT



Incidence Source: Cancer Registration database, CNET Reports_2008 extract

Population Source: Office for National Statistics Experimental Statistics Crown Copyright 2007 supplied under MRP Data Access Agreement 0826/2007

6.6a: Variation in colon cancer mortality rates in West Midlands PCTs, males

Colon cancer deaths in 2005 in males in each PCT

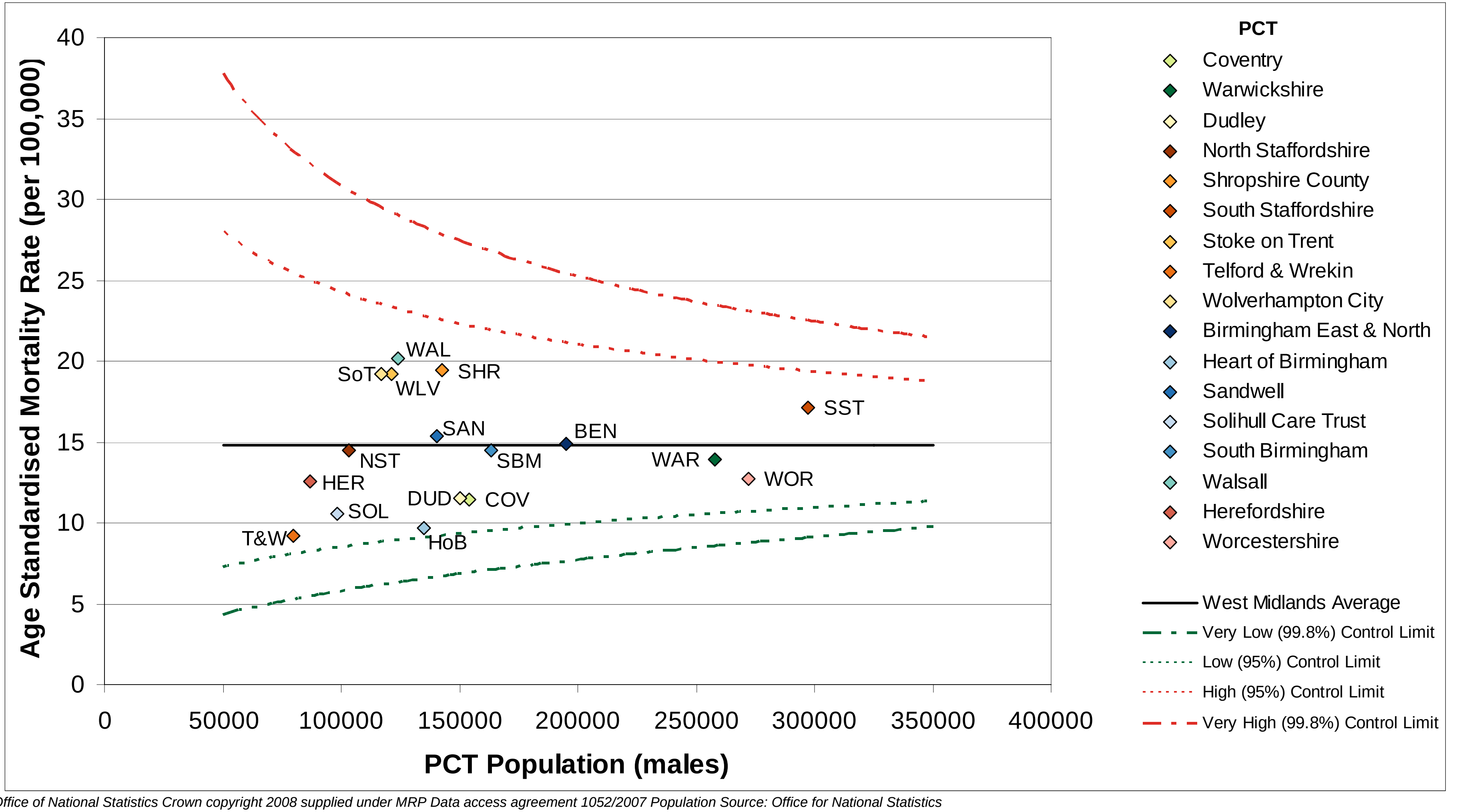


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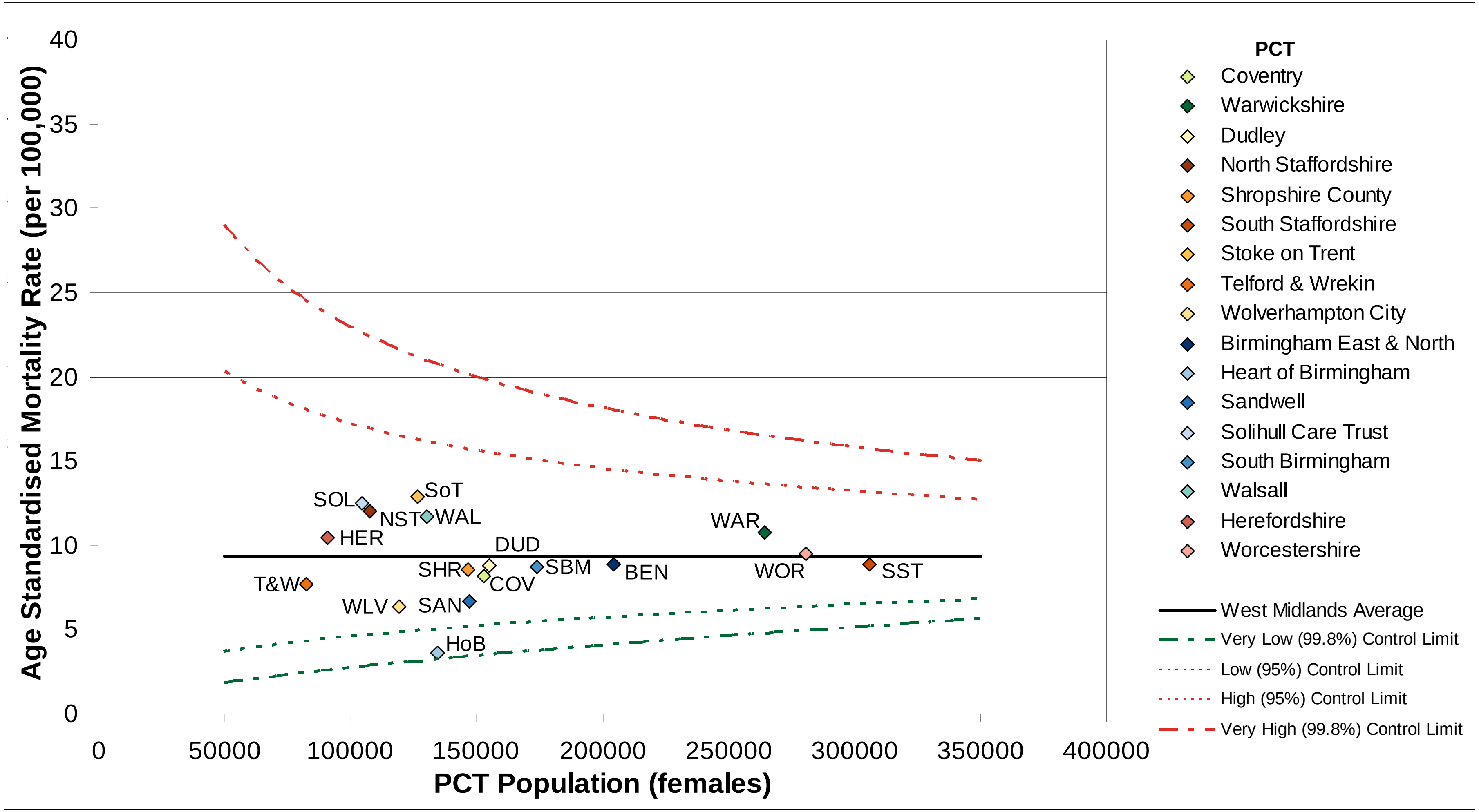
Figure 6.6b: Variation in colon cancer mortality rates in West Midlands PCTs, females
Colon cancer deaths in 2005 in females in each PCT



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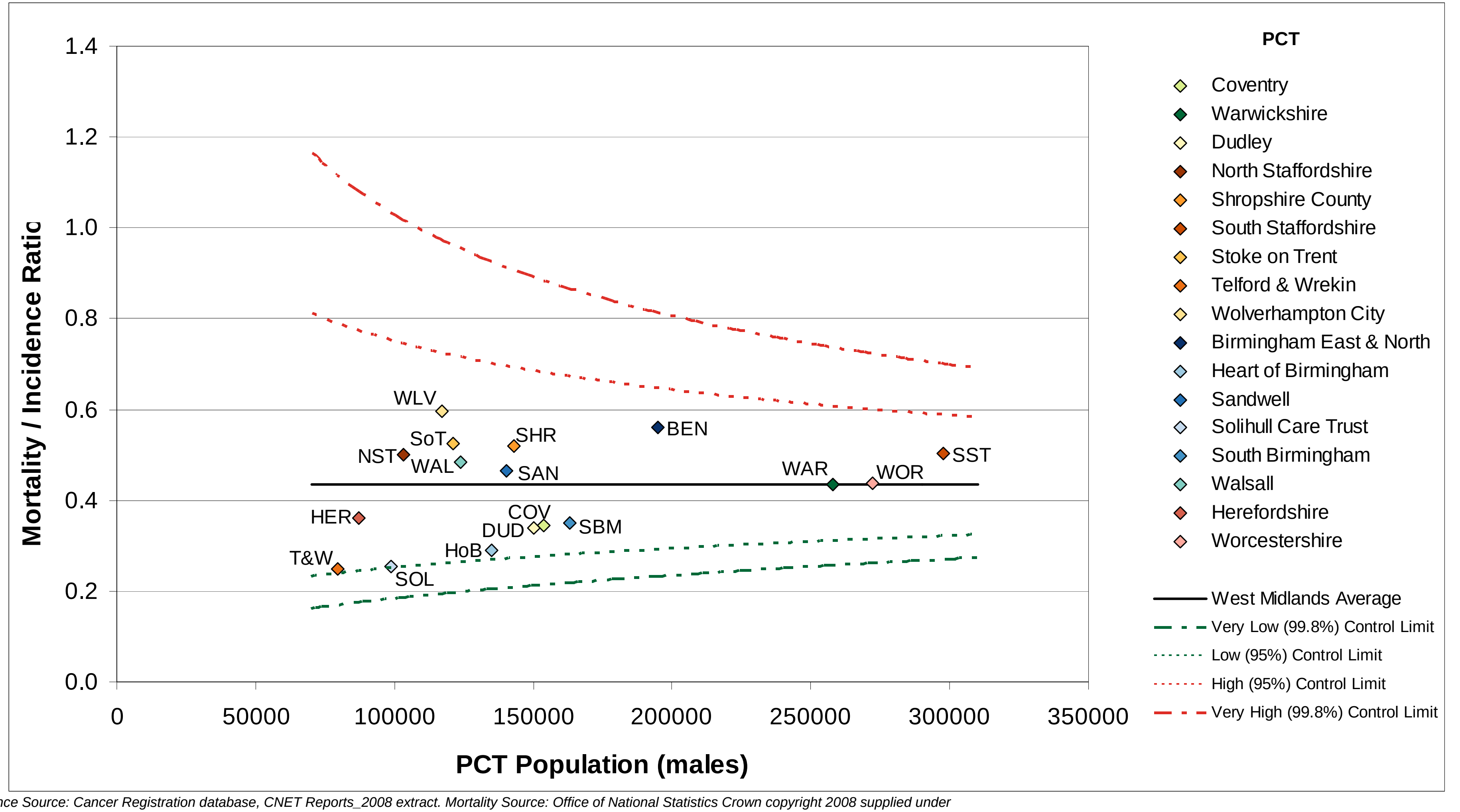
Population Source: Office for National Statistics Experimental Statistics Crown Copyright 2007 supplied under MRP Data Access Agreement 0826/2007

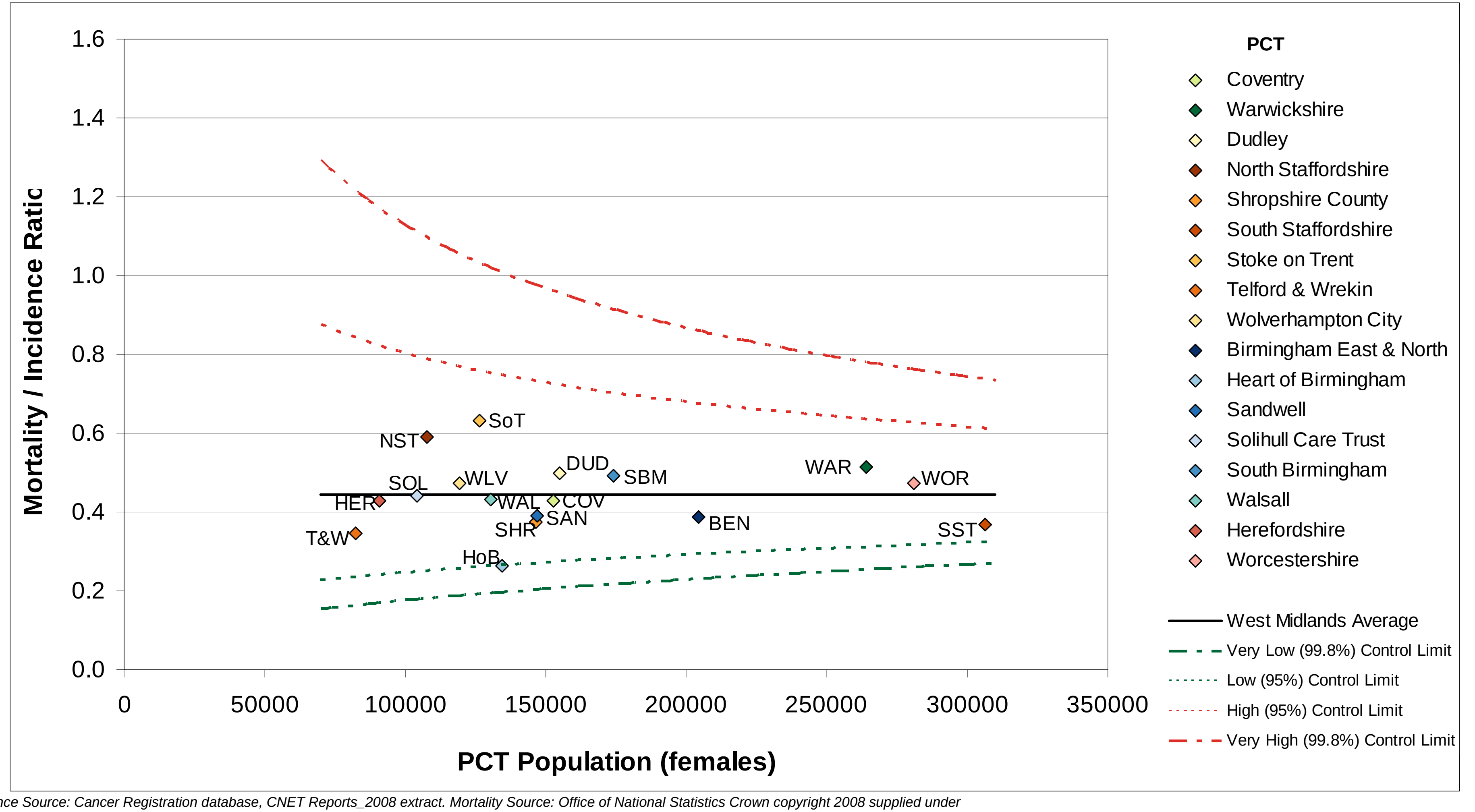
Figure 6.7a: Variation in colon cancer mortality/incidence rate ratios in West Midlands PCTs, males
Colon cancer cases diagnosed in 2005 and deaths in 2005 in males in each PCT



Incidence Source: Cancer Registration database, CNET Reports_2008 extract. Mortality Source: Office of National Statistics Crown copyright 2008 supplied under MRP Data access agreement 1052/2007

Population Source: Office for National Statistics Experimental Statistics Crown Copyright 2007 supplied under MRP Data Access Agreement 0826/2007

Figure 6.7b: Variation in colon cancer mortality/ incidence rate ratios in West Midlands PCTs, females
Colon cancer cases diagnosed in 2005 and deaths in 2005 in females in each PCT



Incidence Source: Cancer Registration database, CNET Reports_2008 extract. Mortality Source: Office of National Statistics Crown copyright 2008 supplied under MRP Data access agreement 1052/2007

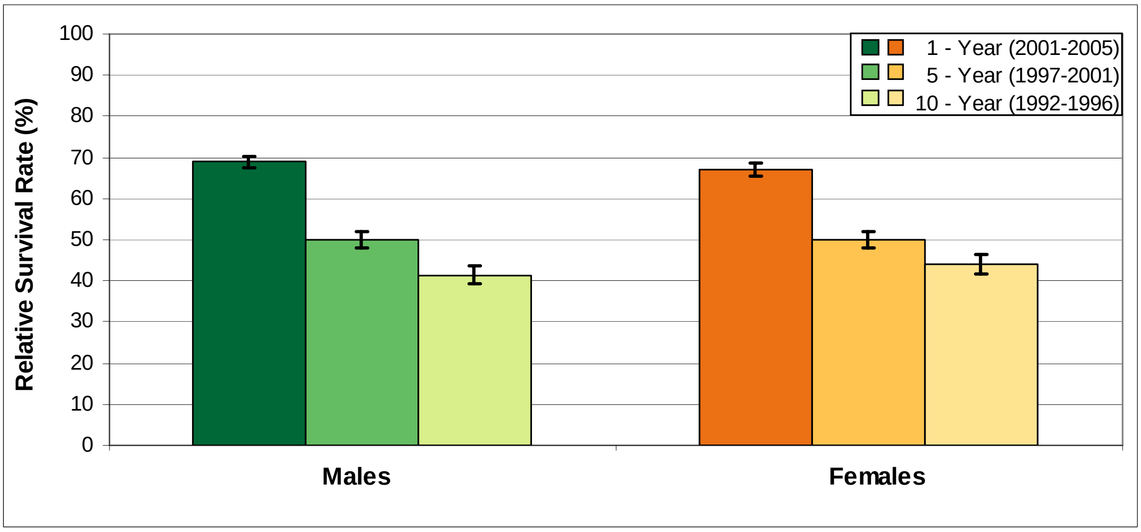
Population Source: Office for National Statistics Experimental Statistics Crown Copyright 2007 supplied under MRP Data Access Agreement 0826/2007

6.3.1 Survival

Figure 6.8 shows that males and females diagnosed with colon cancer have very similar 1-year, 5-year and 10-year relative survival rates. One-year relative survival rates for males and females diagnosed with colon cancer in 2001-2005 in the West Midlands were 69% and 67% respectively. Five-year relative survival rates for males and females diagnosed with colon cancer in 1997-2001 were both 50%. Ten-year relative survival rates for colon cancers diagnosed in males and females in 1992-1996 were 41% and 44% respectively.

The differences in yearly survival between males and females are not significant, but the differences between survival years for each sex are. The difference between 1-year and 5-year survival rates are greater for both sexes than between 5-year and 10-year survival. While higher numbers of people are likely to survive 1 year, this method of analysis is not effective at depicting true survival. Since 5 and 10-year survival are similar it could be concluded that 5 year survival is a good measure of cure rates.

Figure 6.8: 1-year, 5-year and 10-year relative survival rates in the West Midlands, males and females *(Error bars indicate 95% confidence intervals)*

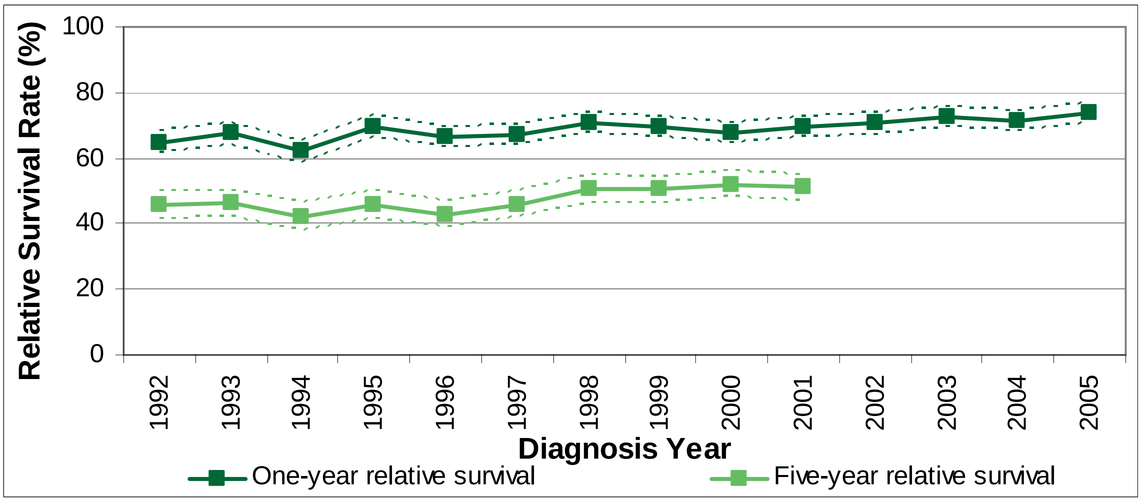


Source: Cancer Registration database, CNET Reports_2008 extract

Figures 6.9a and 6.9b show 1-year and 5-year relative survival trends for males and females in the West Midlands. Since the early 1990s, 1-year and 5-year relative survival rates have improved for both males and females. One-year relative survival for males has increased from 65% for cases diagnosed in 1992 to 74% for cases diagnosed in 2005, and for females has increased from 62% for cases diagnosed in 1992 to 71% for cases diagnosed in 2005.

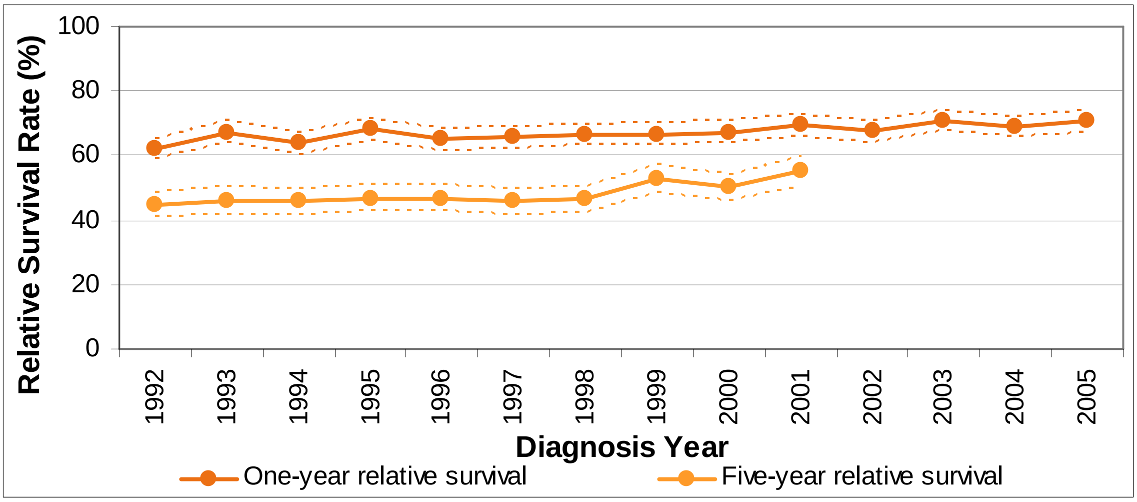
Five-year relative survival for males has increased from 46% for cases diagnosed in 1992 to 51% for cases diagnosed in 2001 and for females has increased from 45% for cases diagnosed in 1992 to 55% for cases diagnosed in 2001. The greatest increases in 5-year relative survival have occurred since 1998; prior to this, the rates in males and females were relatively stable. The increase from 1992 to the end of the time period is statistically significant for 1-year survival in both sexes and for 5-year survival in females. Earlier diagnosis will artificially improve 1-year survival.

Figure 6.9a: Trends in 1-year and 5-year colon cancer relative survival rates in the West Midlands, males



Source: Cancer Registration database, CNET Reports_2008 extract

Figure 6.9b: Trends in 1-year and 5-year colon cancer relative survival rates in the West Midlands, females



Source: Cancer Registration database, CNET Reports_2008 extract

6.3.2 Survival and Deprivation in the West Midlands

Figures 6.10a and 6.10b show how relative survival rates for males and females diagnosed with colon cancer in the West Midlands in 1997-2001 varied with ID2007 deprivation group over the five-year period following their diagnosis. Males in the most deprived group (ID2007 group 1) had the lowest relative survival rates at five years (43%) and females in the most affluent group (ID2007 group 5) the highest relative survival at five years (59%).

Figure 6.10a: West Midlands relative survival by ID2007 deprivation group, males (diagnosed 1997-2001, followed up to 2006)

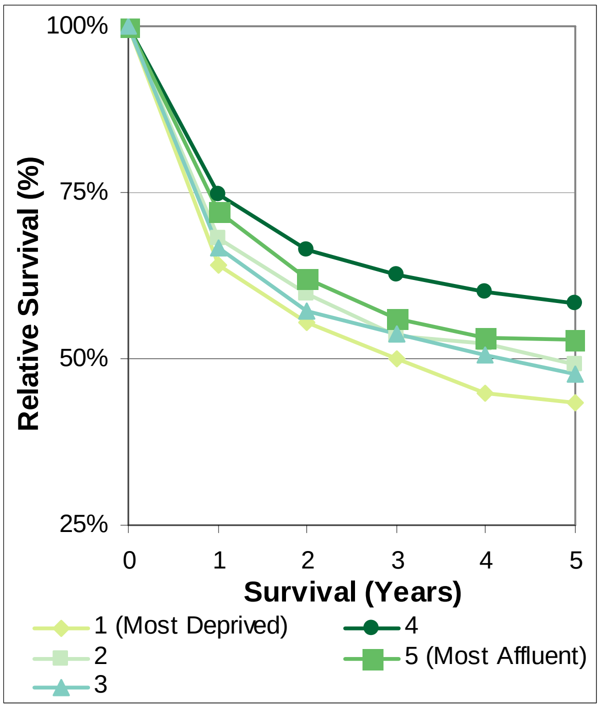
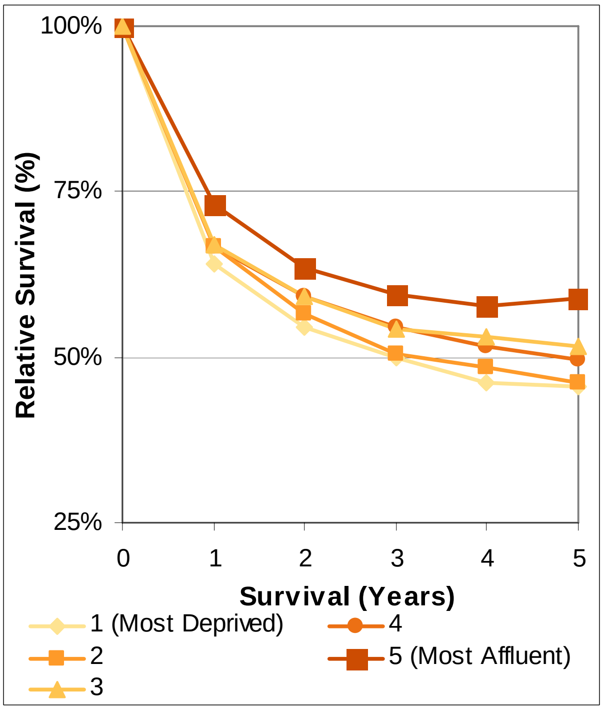


Figure 6.10b: West Midlands relative survival by ID2007 deprivation group, females (diagnosed 1997-2001, followed up to 2006)



Source: Cancer Registration database, CNET Reports_2008 extract

Figure 6.10c shows that for males diagnosed with colon cancer in 1997-2001 there was a statistically significant difference between 1-year and 5-year relative survival rates in males in the most deprived groups (ID2007 group 1) and those in the most affluent groups (ID2007 group 5); 1-year and 5-year relative survival being 69% and 43% respectively in the most deprived groups compared with 74% and 53% respectively in the most affluent groups.

Figure 6.10d shows that for females diagnosed with colon cancer in 1997-2001 there was a statistically significant difference between 1-year and 5-year relative survival rates in females in the most deprived group (ID2007 group 1) and those in the most affluent group (ID2007 group 5); 1-year and 5-year relative survival being 66% and 46% respectively in the most deprived group compared with 76% and 59% respectively in the most affluent group.

Figure 6.10c: West Midlands 1-year and 5-year relative survival by ID2007 group, (diagnosed 2001-2005 and 1997-2001 respectively) followed up to end of 2006, males

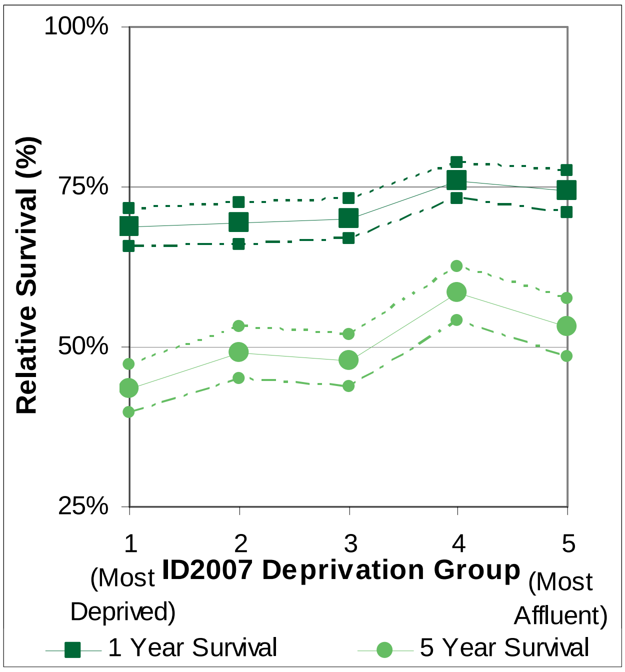
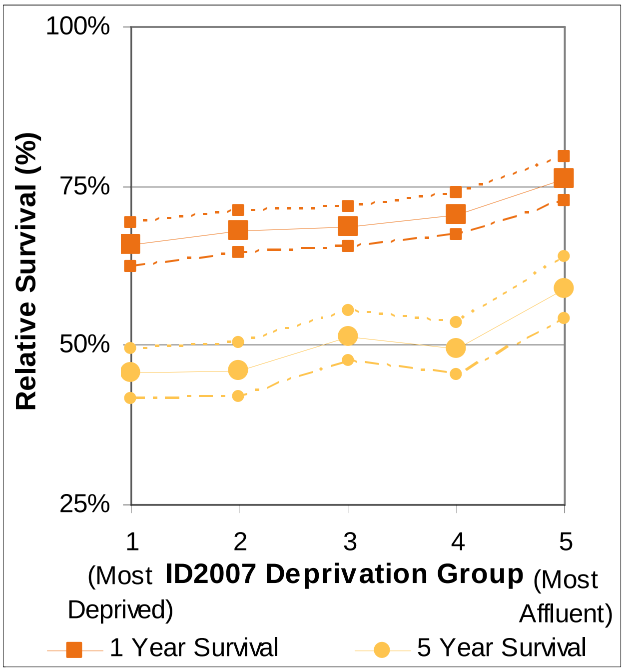


Figure 6.10d: West Midlands 1-year and 5-year relative survival by ID2007 group, (diagnosed 2001-2005 and 1997-2001 respectively) followed up to end 2006, females



(The dotted lines represent the 95% confidence intervals)

Source: Cancer Registration database, CNET Reports_2008 extract

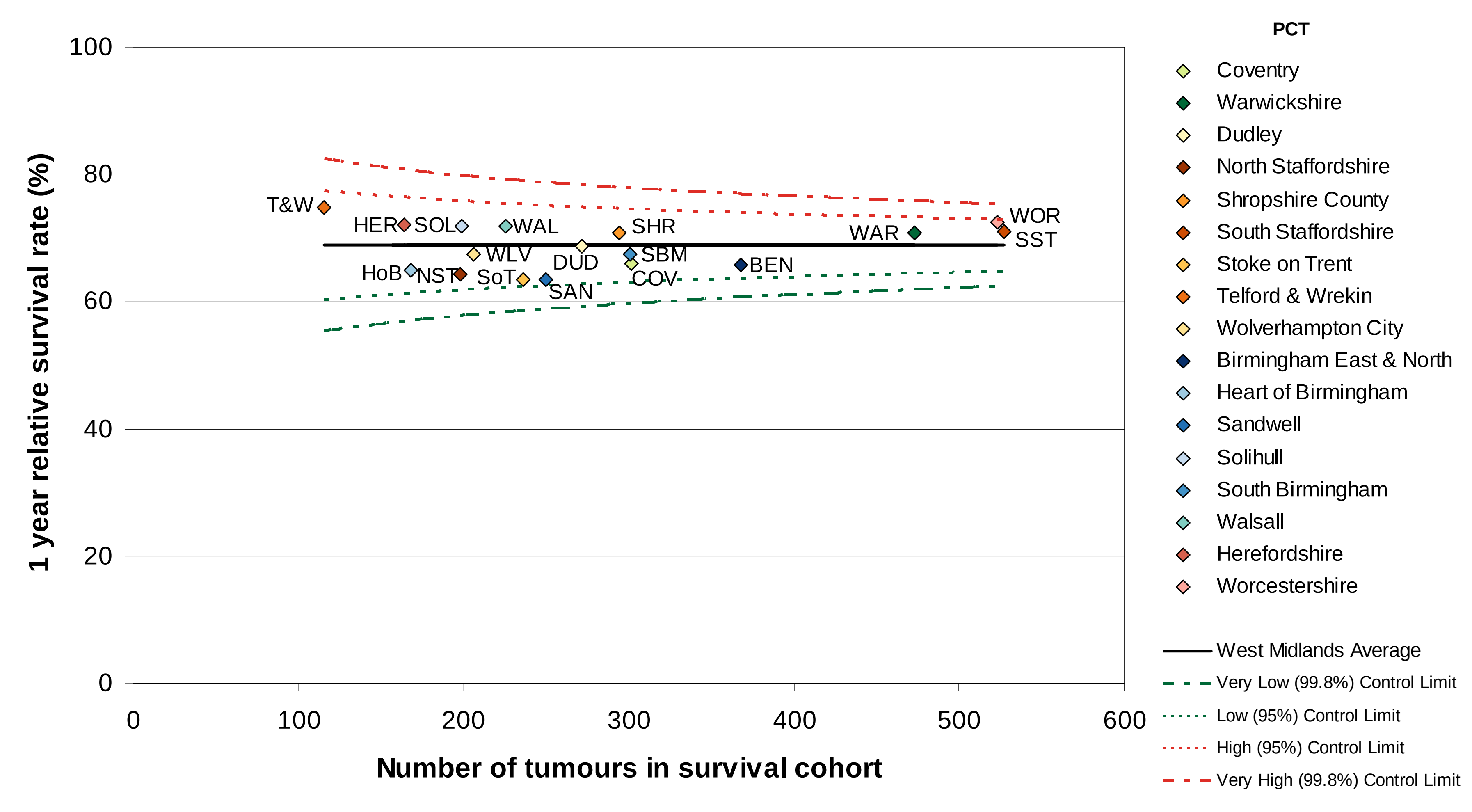
6.3.3 1-Year Relative Survival in PCTs

Figures 6.11a and 6.11b show funnel plots of 1-year relative survival rates for males and females in West Midlands PCTs who were diagnosed with colon cancer in 2001-2005. For the West Midlands as a whole the 1-year relative survival rate for males was 69% and the 1-year relative survival rate for females was 67%. The PCT with the highest 1-year relative survival rate for males was Telford & Wrekin PCT at 75%, while the lowest 1-year relative survival rates were in Sandwell PCT and Stoke-on-Trent PCT at 63%. The PCT with the highest 1-year relative survival rate for females was Herefordshire PCT at 71%, while the lowest 1-year relative survival rate was in North Staffordshire PCT at 61%. None of the PCTs had a 1-year relative survival rate in males or females that was significantly higher or lower than the West Midlands average.

6.3.4 5-Year Relative Survival in PCTs

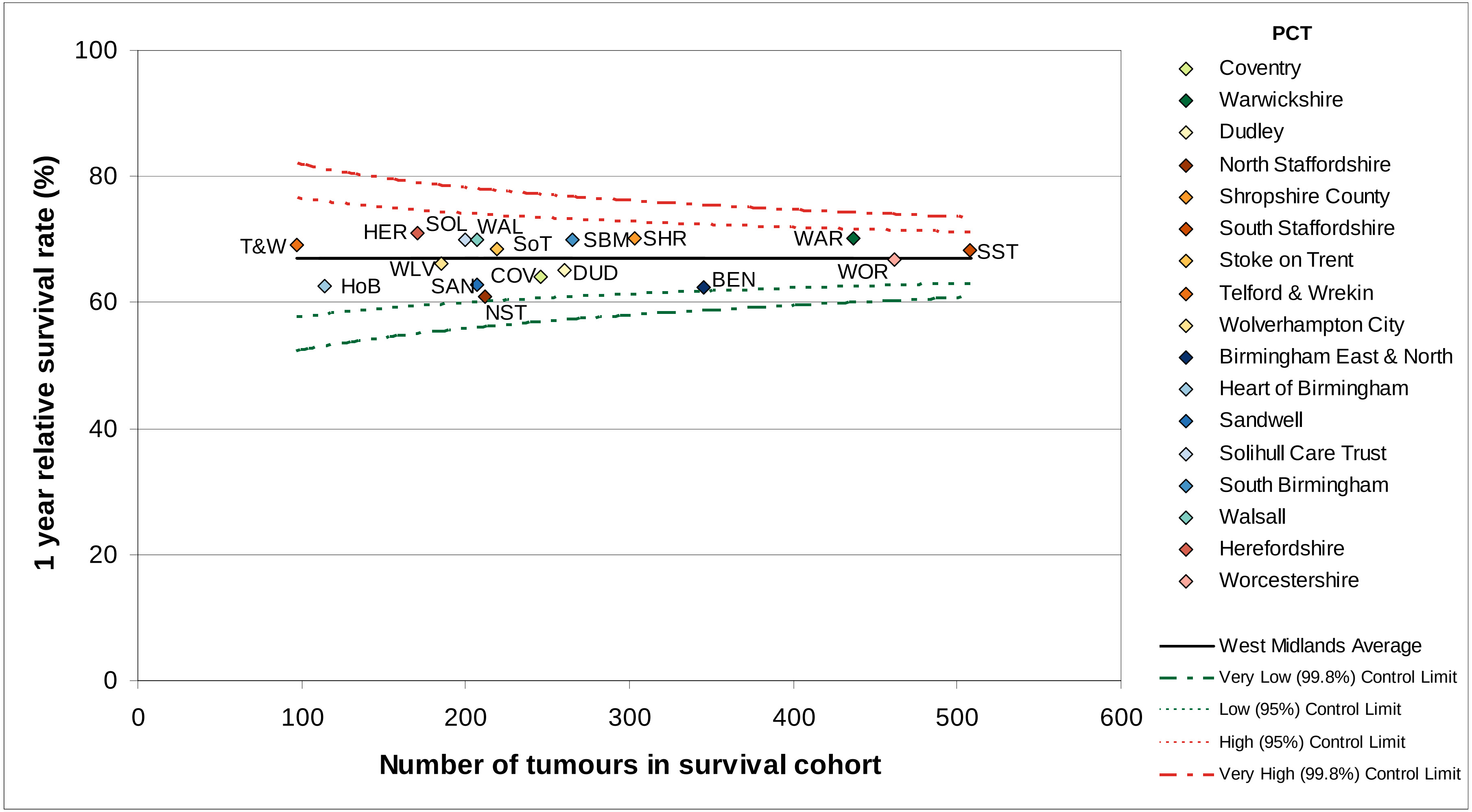
Figures 6.12a and 6.12b show funnel plots of 5-year relative survival rates for males and females in West Midlands PCTs who were diagnosed with colon cancer in 1997-2001. For the West Midlands as a whole the 5-year relative survival rates for males and females were 50%. Herefordshire PCT and Worcestershire PCT had the highest male 5-year relative survival rates at 62% and 57% respectively. At 40%, Sandwell PCT had the lowest 5-year relative survival rate for males and this is significantly lower than the West Midlands average. South Birmingham PCT had the highest 5-year relative survival rate for females at 59% and this is significantly higher than the West Midlands average. Sandwell PCT (38%), Dudley PCT (41%) and Birmingham East & North PCT (42%) all had significantly lower 5-year relative survival rates for females than the West Midlands average.

Figure 6.11a: 1-year relative survival in West Midlands PCTs, males
Colon cancers diagnosed in 2001-2005 in males in each PCT



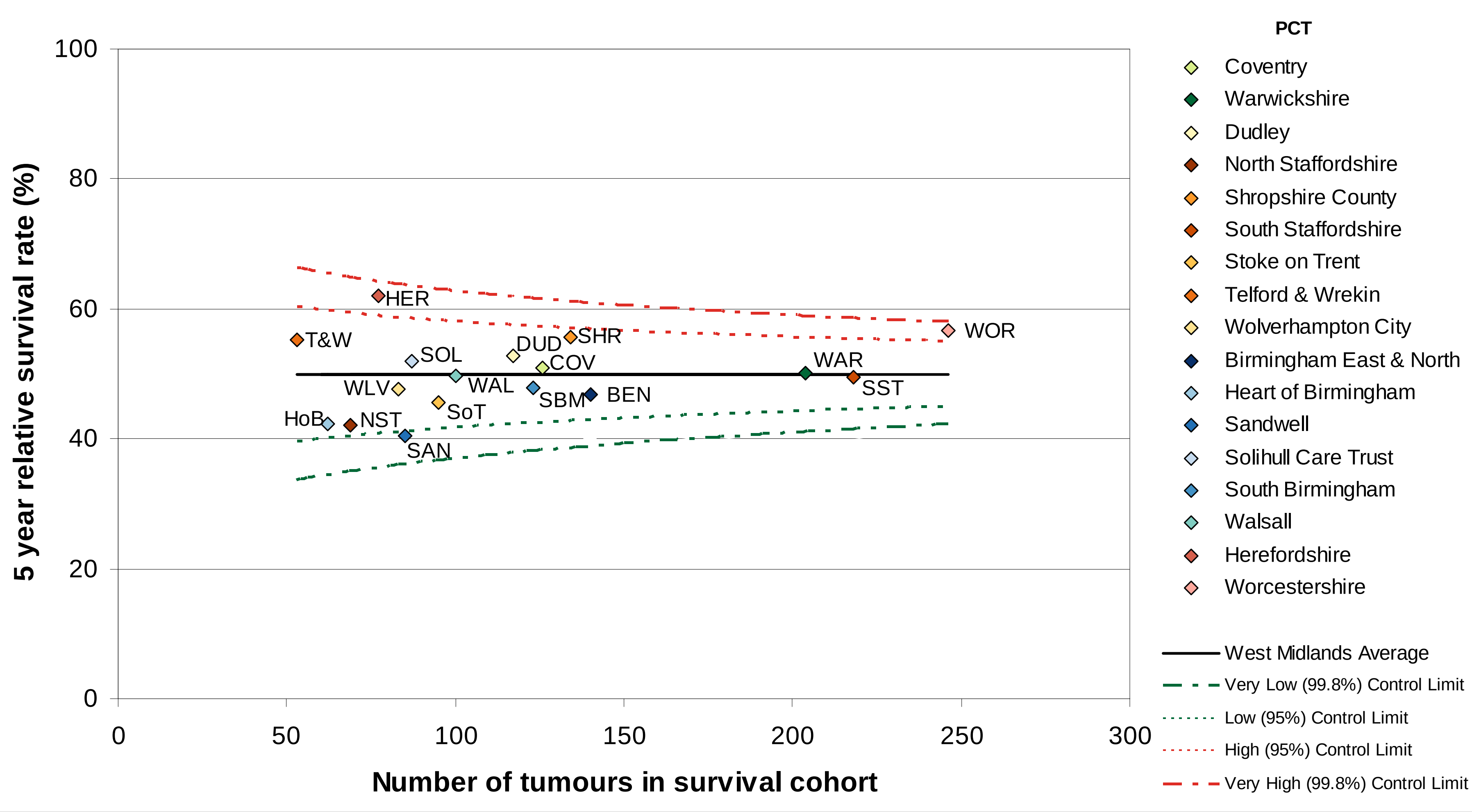
Source: Cancer Registration database, CNET Reports_2008 extract

Figure 6.11b: 1-year relative survival in West Midlands PCTs, males
Colon cancers diagnosed in 2001-2005 in males in each PCT



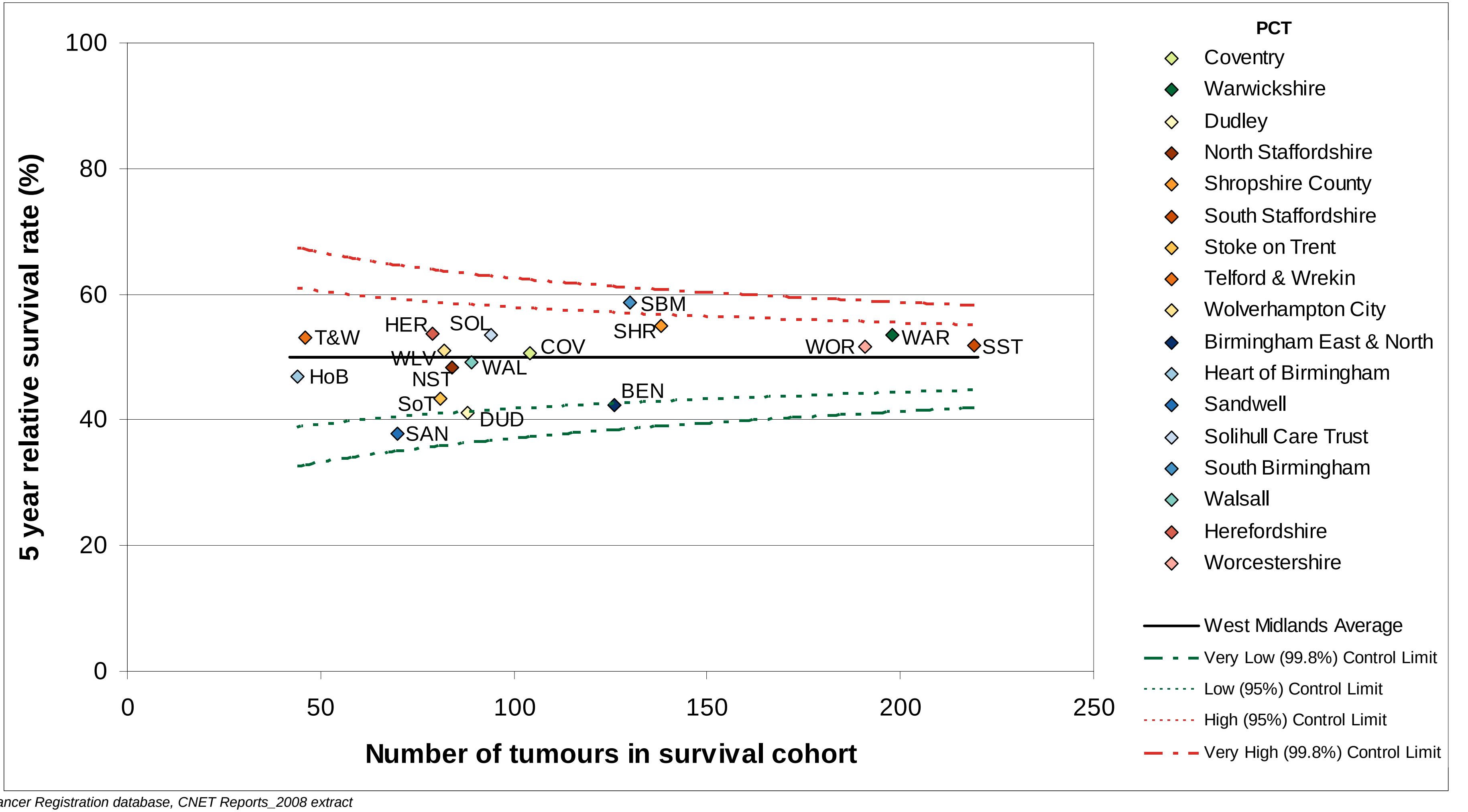
Source: Cancer Registration database, CNET Reports_2008 extract

Figure 6.12a: 5-year relative survival in West Midlands PCTs, males
Colon cancers diagnosed in 1997-2001 in males in each PCT



Source: Cancer Registration database, CNET Reports_2008 extract

Figure 6.12b: 5-year relative survival in West Midlands PCTs, females
Colon cancers diagnosed in 1997-2001 in females in each PCT



Source: Cancer Registration database, CNET Reports_2008 extract

6.4.1 Key Facts of Colon Cancer incidence in the West Midlands

- In 2006, 2,026 cases of colon cancer were diagnosed in West Midlands residents, and in 2005 there were 957 colon cancer deaths.

- Over 80% of colon cancers in males and females are diagnosed in those aged 60 and over. Age standardised colon cancer incidence and mortality rates in males are 1.3 and 1.6 times higher respectively than those in females.

- Since 1992, incidence rates in males and females have decreased by 13% and 11% respectively and mortality rates have decreased by 23% and 40% respectively.

- In 2006, colon cancer incidence in females was significantly lower in Solihull Care Trust and significantly higher in South Birmingham PCT than the West Midlands average. In 2005, colon cancer mortality in Heart of Birmingham tPCT was significantly lower than the West Midlands average.

- In 2005, mortality/incidence rate ratios in males in Telford & Wrekin PCT and females in Heart of Birmingham tPCT were significantly lower than the West Midlands average. Solihull Care Trust and Stoke on Trent PCT both had significantly higher mortality/incidence rate ratios compared to the West Midlands average.

- 1-year relative survival rates for males and females diagnosed with colon cancer in 2001-2005 were 69% and 67% respectively; 5-year relative survival rates were both 50% and 10-year relative survival rates were 41% and 44% respectively. 1-year and 5-year relative survival rates for males and females have been increased by 45-55% since 1992.

- Although there is no statistically significant relationship between colon cancer incidence and deprivation in the West Midlands, survival is linked to deprivation with males and females in the most deprived groups having worse 1-year and 5-year survival rates.

References

1. National Cancer Information Service, 01/03/2009
2. Cancer Research UK; website, Cancer Stats Key Facts *01/03/2009*
3. National Institute for Clinical Excellence. Improving Outcomes in Colon Cancer: Update Manual
4. Data for England taken from the National Cancer Information Service, *01/03/2009*

CHAPTER SEVEN: ENVIRONMENT AND HEALTH – OUTDOOR AIR POLLUTION

7.1 Introduction

"Pollution - the addition of any substance or form of energy (e.g., heat, sound, radioactivity) to the environment at a rate faster than the environment can accommodate it by dispersion, breakdown, recycling, or storage in some harmless form" [1]

The World Health Organization (WHO) estimates that roughly 2 million deaths a year are from causes directly attributable to indoor or outdoor air pollution[2]. The WHO recognises that individuals have little control of the air pollutants to which they may be subject[2] and therefore measures must be put in place at a global and local level in which to protect individuals.

The 'Clean Air Act' of 1956 arose from concerns over smog in London in the 1950s, when in one episode more than 3 times as many people died than would have been expected[3]. The UK Government has continued to make commitments to improve the countries air quality.

The Department for Environment Food and Rural Affairs (DEFRA) report that daily peak ozone levels and the long-term exposure to particulate matter have the greatest impacts on health[4]. The adverse health effects of poor air quality can contribute to difficulties in breathing, wheezing, coughing and aggravation of existing respiratory and cardiac conditions. WHO estimate that air quality related deaths could be reduced by 15% if levels of particulate matter (PM_{10}) were reduced from 70 to 20 micrograms per cubic meter. Though outdoor air pollution is thought to have an effect on health, the population spend most of their time indoors.

This chapter will explore some of the potential adverse health effects of outdoor air pollutants and where possible data will be presented for the West Midlands Region.
Since 1993 when DEFRA began making estimates, levels of both PM_{10} and ozone in the UK have been steadily decreasing[4].

7.2 Particulate Matter

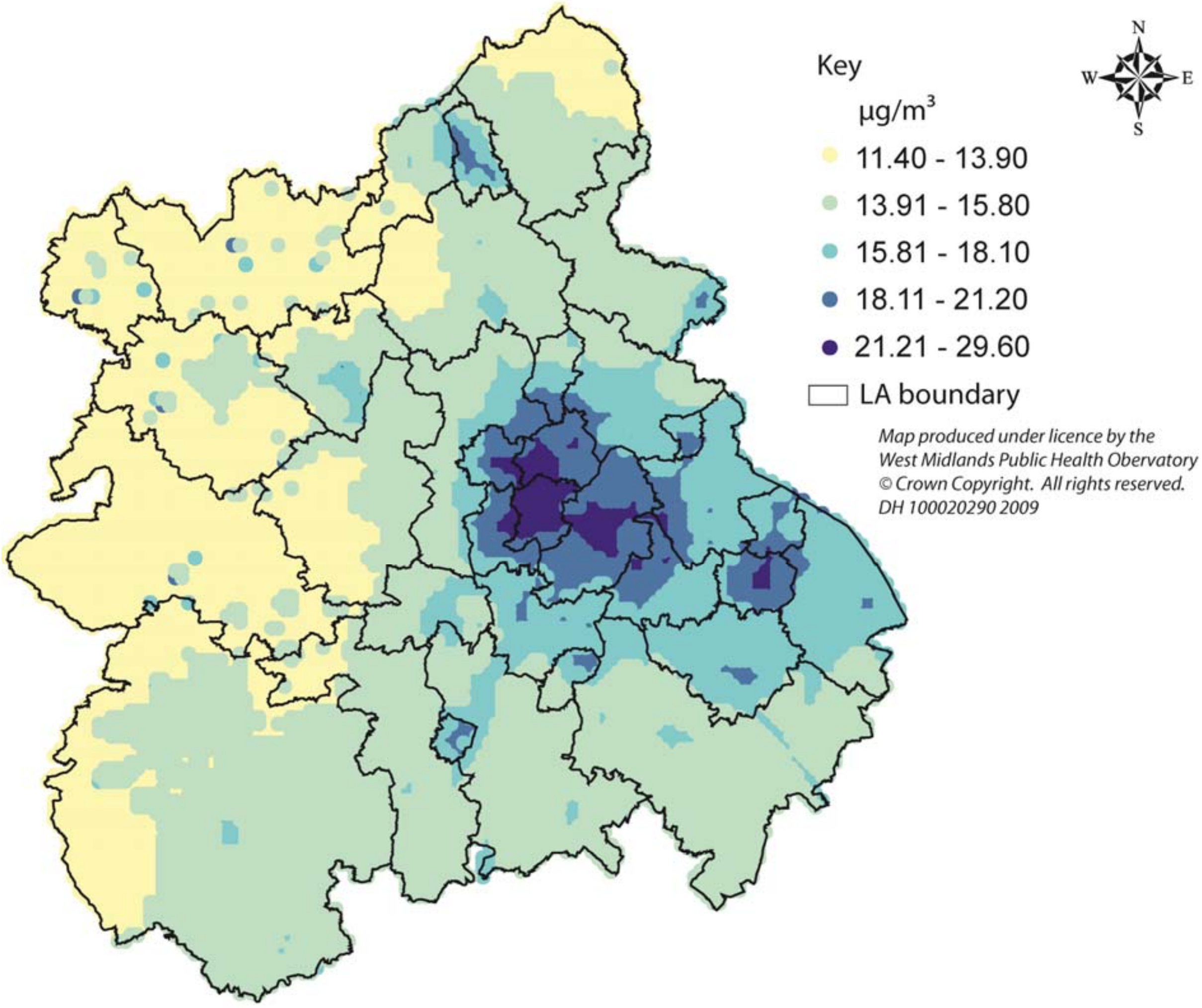
Airborne liquid or solid particles from a variety of sources are termed particulate matter. The size of these particulates are important in health terms as it determines which parts of the body they can reach if inhaled. Particulate matter less than 10µg in diameter is referred to as PM_{10}. Levels of PM_{10} are commonly monitored, as at this size and smaller, the particles have the ability to reach the lower regions of the respiratory tract and can potentially be absorbed into the blood.

In the UK particulate matter pollutants mainly come from car emissions, combustion processes and dust particles thrown up into the air. Coarse particles can cause irritation to the eyes nose and throat[5]. Smaller particles may get deeper into the lungs and be absorbed into the blood causing lung and other problems.
Particles less than 2.5µg in diameter ($PM_{2.5}$) come mainly from vehicle exhausts. These smaller particles can penetrate deeper into the lungs and into air spaces involved with gas exchange[6].

Both PM_{10} and $PM_{2.5}$ are thought to contribute to increases in mortality from respiratory and cardiovascular disease. Increases in SO_2 and particulates have been thought to contribute to bronchitis and emphysema incidence[5].

To date studies of the association of air pollution and health (mortality and morbidity) have largely focused on areas other that the West Midlands. This chapter explored the distribution of some aspects of air pollution and some respiratory illnesses which might be related to air pollution in the West Midlands.

Map 7.1: Map of annual mean PM_{10} concentrations in 2008 within LA areas of the West Midlands



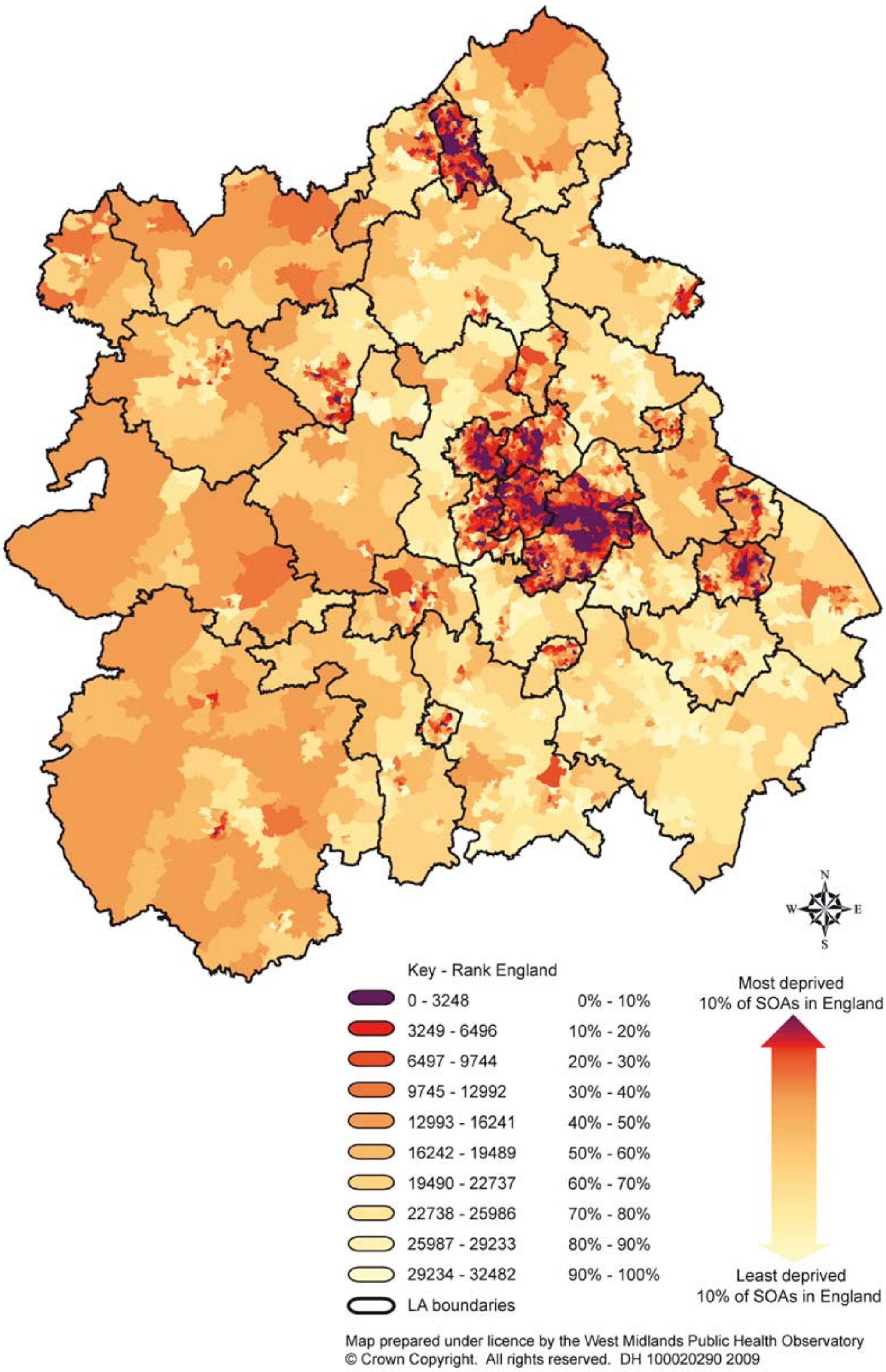
Data Source: UK Air Quality Archive

Map 7.1 shows that the areas with the highest PM_{10} concentration (mean average level) appear to be in the urban areas particularly around the more industrialised areas of Birmingham and the Black Country and Coventry.

The dark blue areas represent the mean average levels of PM_{10} above 20 micrograms per cubic meter. The areas of Wolverhampton, Dudley, Sandwell, Birmingham and Coventry LA have some small pockets within them that exceed 20µg/m3. Reducing these levels could help reduce mortality[2].

Map 7.2 shows the levels of deprivation across the region based on the index of multiple deprivation rankings. Comparing figures 7.1 and 7.2 we can see that areas with higher PM_{10} concentrations also experience the most deprivation and research by the Environment Agency has produced similar findings[7].

Map 7.2: Overall deprivation in the West Midlands (Indices of Deprivation 2007)

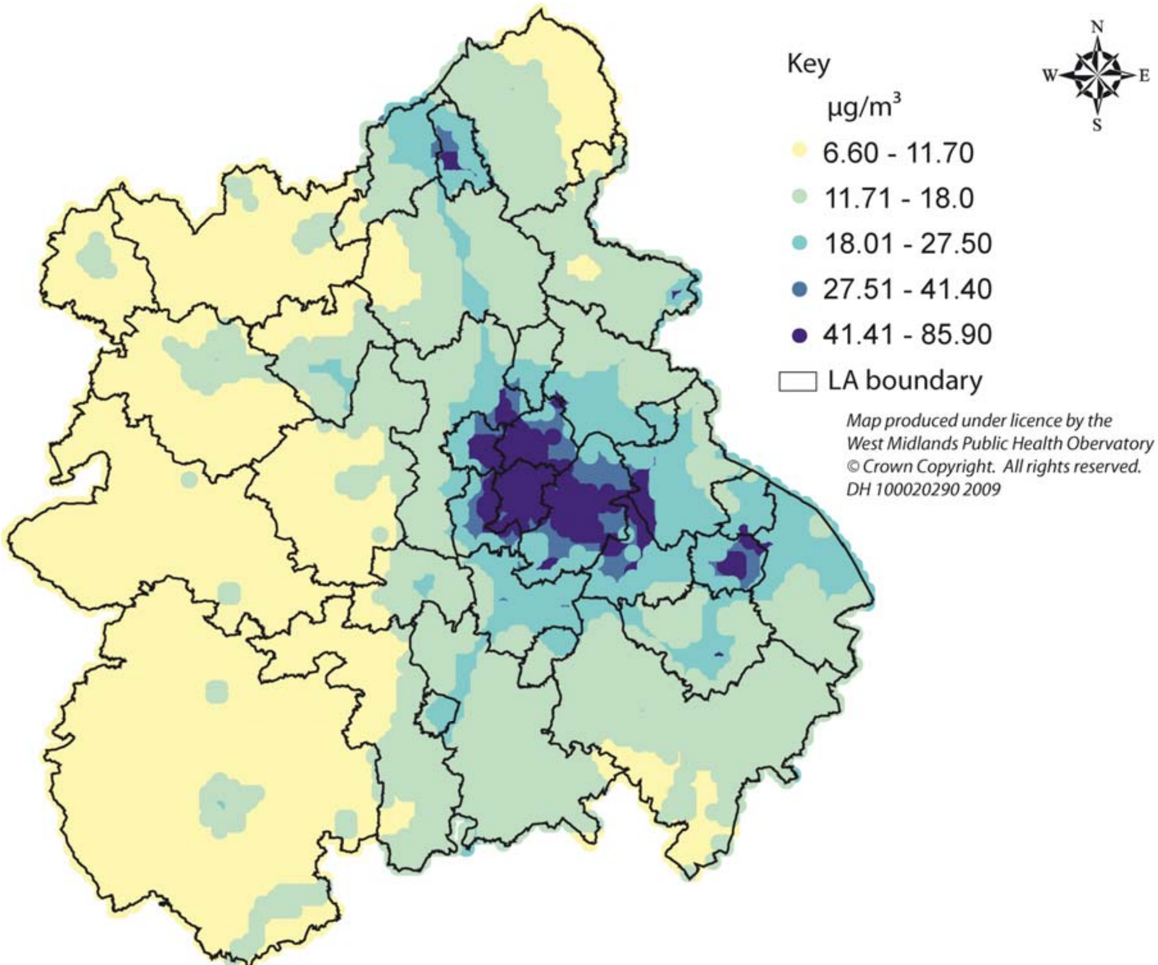


Data Source: Department for Communities and Local Government

7.3 Nitrogen Oxides

Nitrogen dioxide and nitrous oxides collectively are referred to as nitrogen oxides (NOx).
Other pollutants and nitrogen oxides react with other substances found in the air and rapidly breaks down. Its reaction with sunlight can lead to formation of ozone and smog.
Concentrations of nitrogen oxides are thought to be higher in areas where there are combustion sources such as coal power plants or heavy traffic.
Exposure to nitrogen oxides even at a low level can cause irritation to the eyes, nose and throat.

Map 7.3: Map of annual mean NOx concentrations in 2008 within LA areas of the West Midlands



Data Source: UK Air Quality Archive

Map 7.3 shows the annual mean concentrations of NOx. The map highlights the major road networks of the region as having higher levels of pollutants than elsewhere in the region. Again the areas of highest concentrations are the more built up urban areas.

7.4 Ozone

Ozone is a gas that is created in the atmosphere[8] by the action of sunlight and the chemical reaction between different primary pollutants. Increases in global emissions have led to a rising trend an in the annual average of background hemispheric ozone concentrations[8].
As ozone is very reactive it can cause health problems such as irritations of the eyes, nose and throat. It is thought that at high concentrations ozone can cause cardiovascular respiratory diseases as well as congestion, chest pain and throat inflammation.
The WHO estimates that 21,000 premature deaths are caused each year in Europe from causes attributable to ozone pollution[9].

Ozone concentration is linked with levels of Nitrogen Oxides (NOx). However the relationship is complex as higher levels on NOx in urban areas are linked to lower levels of ozone. Several studies however show that over a larger geographical area increases in NOx are related to an increase in ozone. Controls in the UK and Europe of both NOx and Volatile organic compounds (VOC) has helped to lower the intensity of summer ozone episodes[8]

7.5 Sulphur Dioxide

Sulphur dioxide is a gas released into the atmosphere from the combustion of fossil fuels. It can cause irritation to the airway as it is absorbed in the upper airways. Restriction to the bronchus is common especially in asthmatics[6]. The health effects in humans of sulphur dioxide pollution presents quickly with symptoms occurring within about 30 minutes of exposure. Due to the difficulty of obtaining data around Sulphur Dioxide for the region no data has been presented.

7.6 Carbon Dioxide Emissions

Carbon dioxide is directly linked to Global Warming. Increases in carbon dioxide lead to increases in air temperature. It is estimated that as little as a one degrees Celsius rise in temperature could lead to 20,000 excess deaths globally[10]. To tackle excess deaths from rises in temperature we therefore need to reduce carbon dioxide emissions.

Table 7.1: Per capita emissions by Local Authority, 2006

Local Authority	Per capita emissions (t) kt CO_2
North Warwickshire	11.1
Bridgnorth	10.0
East Staffordshire	9.6
Herefordshire, County of	9.5
South Shropshire	9.4
Wychavon	9.3
Rugby	9.2
North Shropshire	9.1
Stratford-upon-Avon	8.5
Staffordshire Moorlands	8.4
Lichfield	8.4
Shrewsbury and Atcham	8.3
Telford and Wrekin	7.9
Oswestry	7.9
Redditch	7.8
Stafford	7.8
Warwick	7.6
Malvern Hills	7.3
South Staffordshire	7.1
Sandwell	7.1
WM total	**7.1**
Stoke-on-Trent	7.0
Solihull	7.0
Walsall	6.6
Newcastle-under-Lyme	6.4
Worcester	6.3
Coventry	6.3
Bromsgrove	6.3
Wyre Forest	6.2
Wolverhampton	6.2
Birmingham	6.0
Cannock Chase	5.9
Dudley	5.8
Tamworth	5.7
Nuneaton and Bedworth	5.4

Source: LA CO_2 estimates produced by AEA technology on behalf of DEFRA (NI 186)

The estimated emission from CO_2 within the West Midlands shows that North Warwickshire and Bridgnorth produce 10 or more kt CO_2 per capita per person per year emissions which are the highest levels within the region and higher than the national average at 7.4 kt CO_2 per capita.

7.7 Mortality and Admissions Data

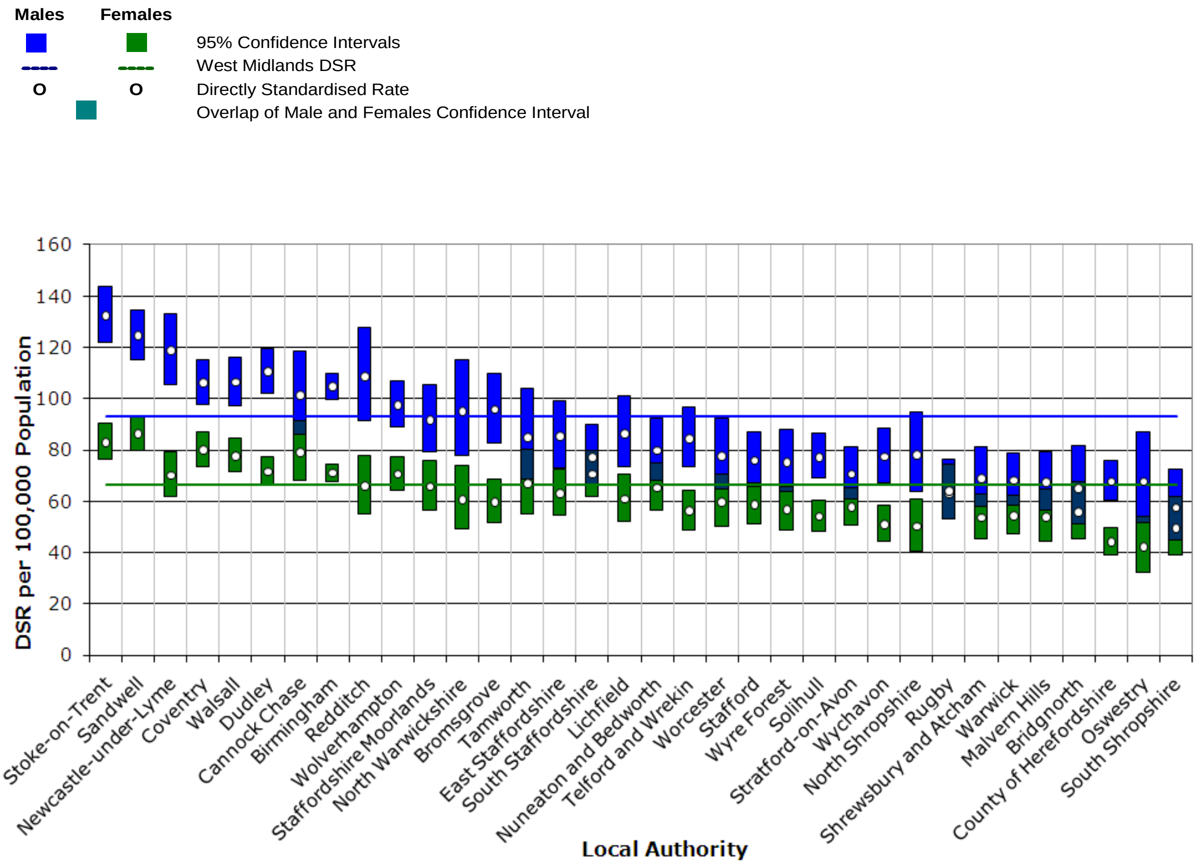
The Committee on the Medical Effects of Air Pollution (COMEAP) research has suggested that there are 8,100 excess deaths per year in Great Britain that may be attributed to PM_{10} air pollution largely in the elderly or already sick. Some of the excess deaths associated with PM_{10} may be due to bringing forward of deaths that would have occurred a few days later rather than deaths of healthy individuals[11]. In this respect, deaths associated with PM_{10} may be similar to excess winter deaths and deaths ascribed to influenza.

A report by the Department of Health COMEAP suggests that a 10 µg m^3 increase in fine particles is associated with a 6% increase in risk of death from all-causes[12]. This effect is larger than previously thought. The evidence for the effects of long-term exposure to sulphur dioxide, nitrogen dioxide, carbon monoxide and ozone on mortality is also discussed but is felt to be weaker than that regarding particles.

Mortality and hospital admissions data for the West Midlands has been presented for various respiratory diseases. It is not known exactly how many deaths or admissions can be directly attributable to air pollution. Most of the deaths associated with air pollution are due to cardiovascular causes.

Figure 7.1: Directly Age Standardised Mortality rates for Diseases of the Respiratory System (ICD10 J00-J99), by Local Authority, All Ages, 2005-2007 pooled.

Legend

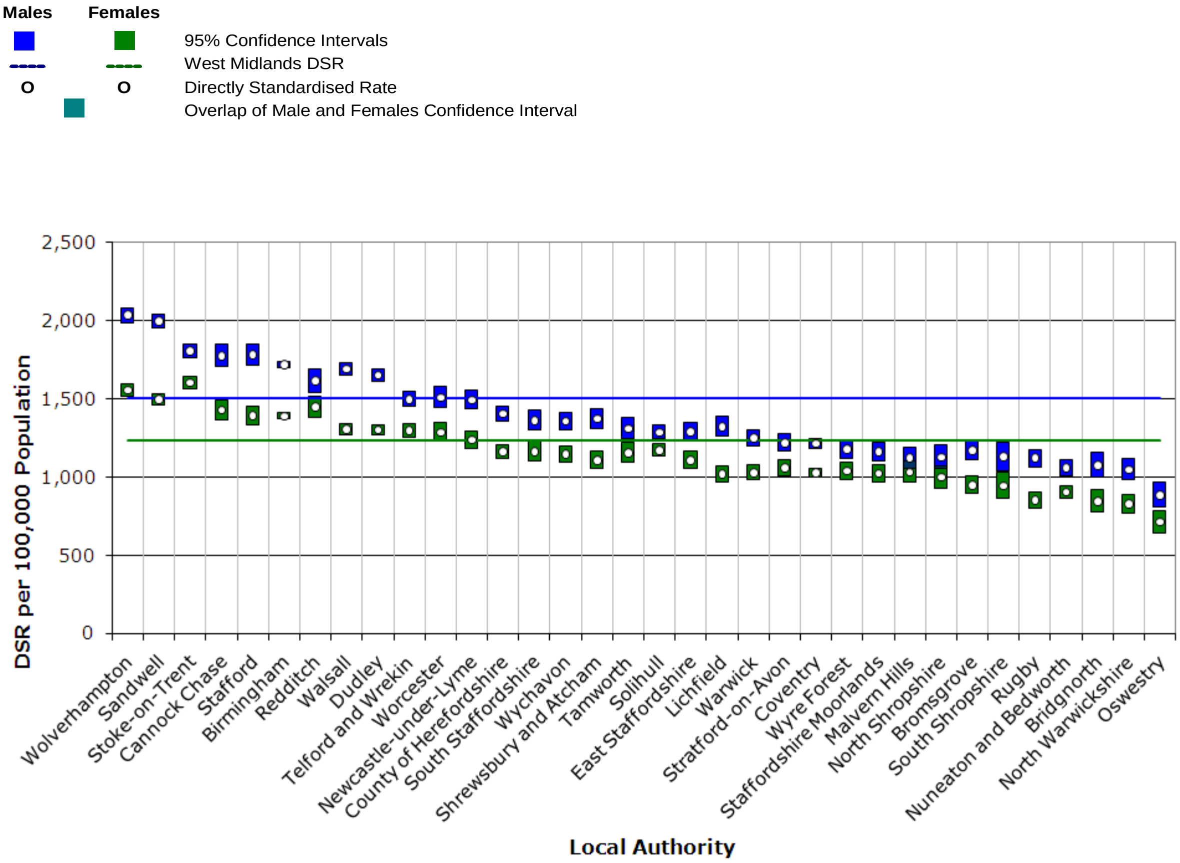


Source: National Statistics Mortality Files, National Statistics -Mid year population estimates, 2005, 2006, 2007, Analysis: WMPHO

Figure 7.1 shows that the mortality rates from diseases of the respiratory system are highest in Stoke-on-Trent, Sandwell, and Newcastle-under-Lyme. The rural areas of Herefordshire Oswestry, and South Shropshire experience the lowest mortality rates within the region from respiratory diseases.

Figure 7.2: Directly Age Standardised Admission rates for Diseases of the Respiratory System (ICD10 J00-J99), by Local Authority, All Ages, 2005-2007 pooled.

Legend



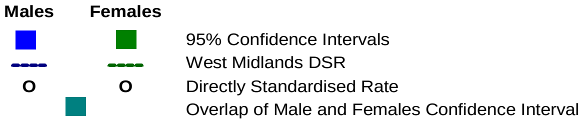
Source: HES, National Statistics -Mid year population estimates, 2005, 2006, 2007

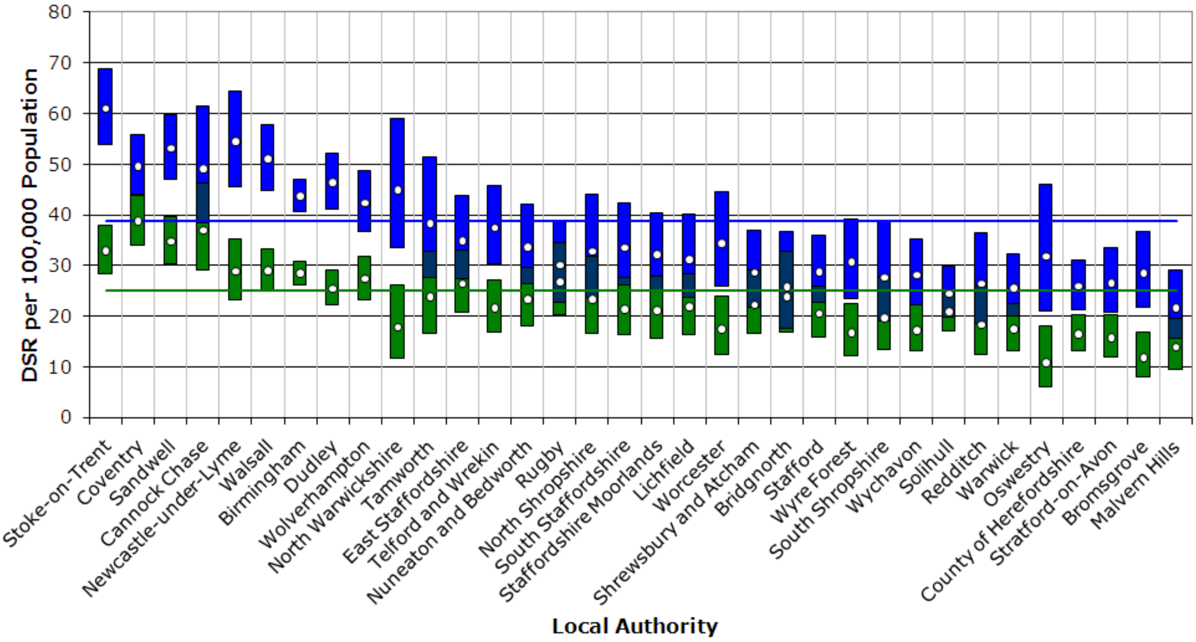
Analysis: WMPHO

The admission rate for diseases of the respiratory system was on average 1,500 per 100,000 for males and 1,200 per 100,000 for females. There were roughly 77,000 admissions a year in the region from diseases of the respiratory system.

Figure 7.3: Directly Age Standardised Mortality rates for Chronic Lower Respiratory Disease (ICD10 J40-J47), by Local Authority, All Ages, 2005-2007 pooled.

Legend





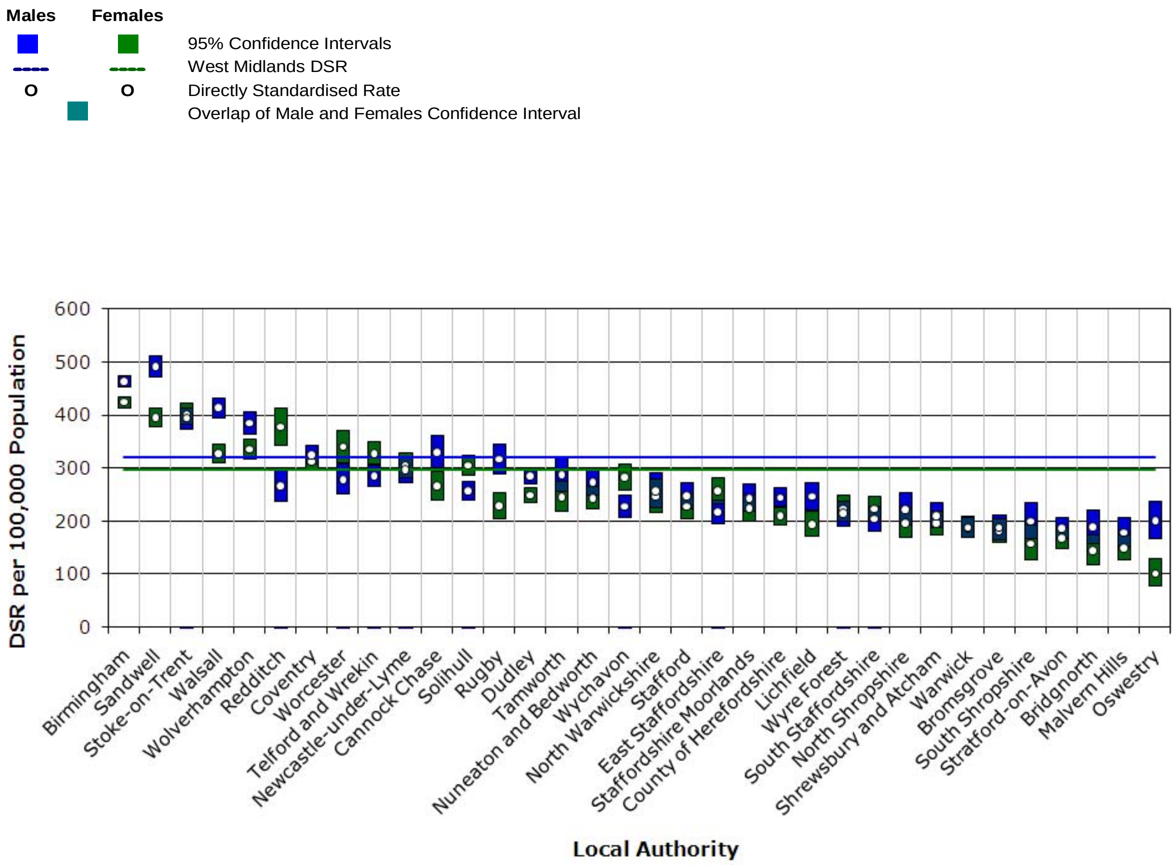
Source: National Statistics Mortality Files, National Statistics -Mid year population estimates, 2005, 2006, 2007, Analysis: WMPHO

Long lasting diseases of the airways and lung structures are referred to as chronic respiratory diseases. These include chronic obstructive pulmonary disease (COPD) and asthma which have also been presented individually in figures 7.5-7.7 to give a more informative picture.

The average mortality rate for the region from Chronic Lower Respiratory Disease is 38.8 per 100,000 for males and 25 per 100,000 for females. Stoke-on-Trent LA has the highest rates of mortality, probably an historic artefact of the industrial revolution.

Figure 7.4: Directly Age Standardised Admission rates for Chronic Lower Respiratory Disease (ICD10 J40-J47), by Local Authority, All Ages, 2005-2007 pooled.

Legend



Source: HES, National Statistics -Mid year population estimates, 2005, 2006, 2007

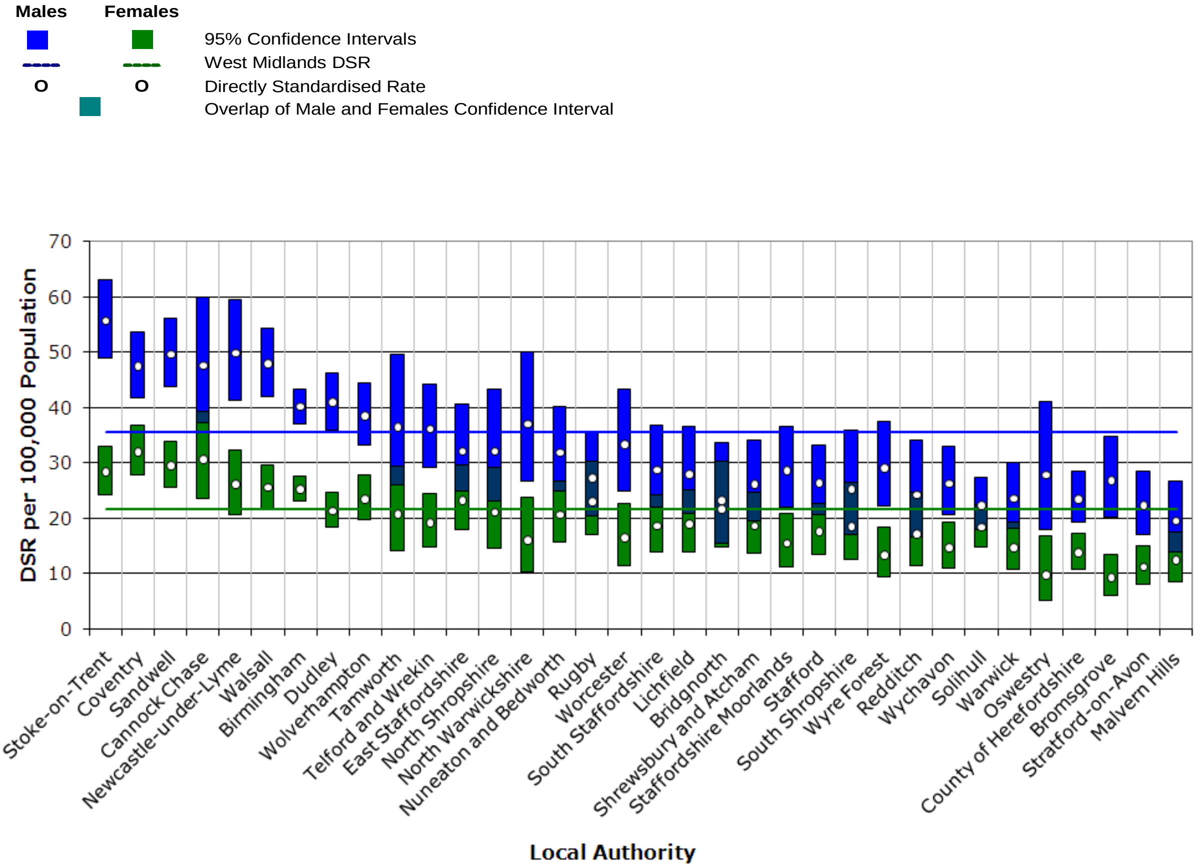
Analysis: WMPHO

There are over 19,000 admissions from Chronic Lower Respiratory Disease each year. The rates are highest in males for Sandwell LA (491 per 100,000) and for Females in Birmingham LA (425 per 100,000). These rates are 3 to 4 times that of the lowest rates within the region.

Other pollutants which may be carcinogenic are emitted by individual processes though these are strictly controlled by licensing operations. In the 1950s studies were carried out that proved a link between smoking and lung cancers. Several other studies have since been carried out trying to establish a link between air quality and lung cancer. A review of the evidence done in 2000[13] concluded it was difficult to quantify the exact causal effect due to so many other factors that could not be easily controlled for.

Figure 7.5: Directly Age Standardised Mortality rates for Chronic Obstructive Pulmonary Disease (ICD10 J40, J41, J42, J43, J44), by Local Authority, All Ages, 2005-2007 pooled.

Legend

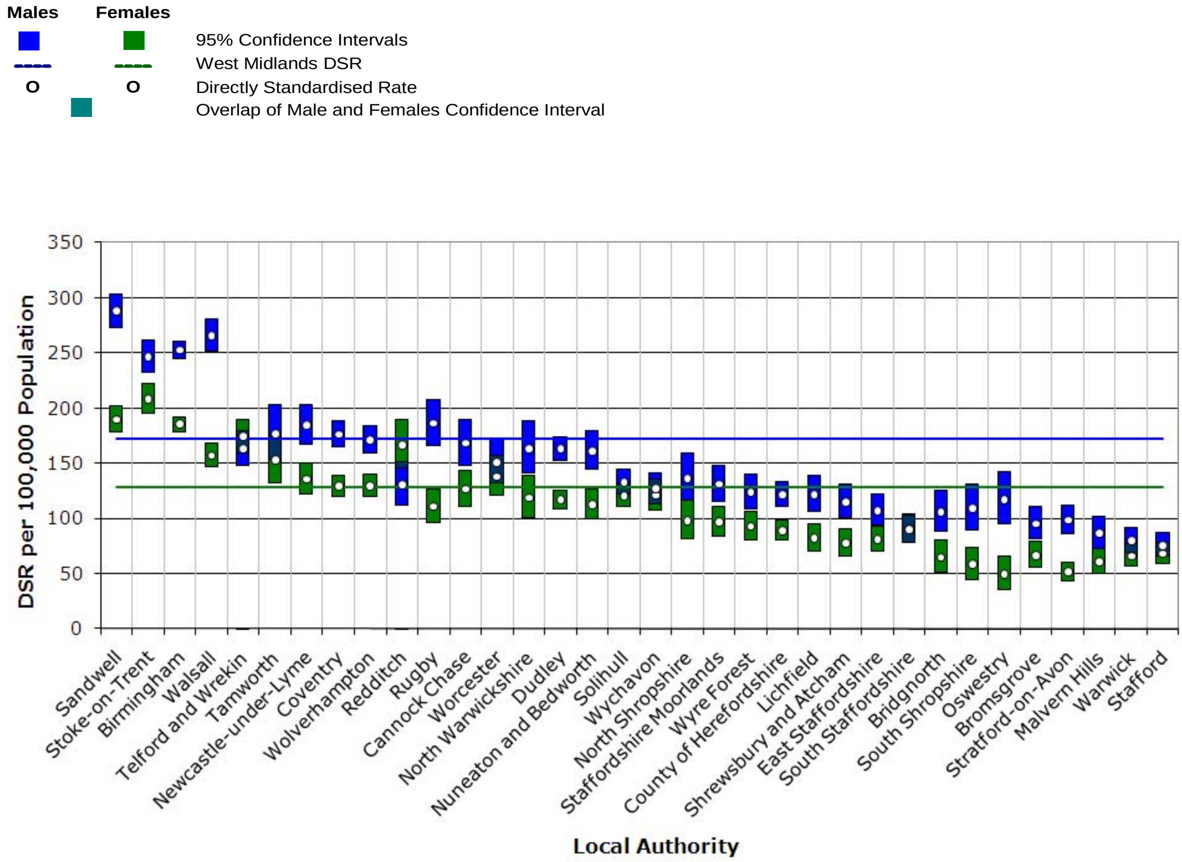


Source: National Statistics Mortality Files, National Statistics -Mid year population estimates, 2005, 2006, 2007, Analysis: WMPHO

In the West Midlands there are over 2000 deaths each year from COPD. Figure 7.3 shows the death rate from COPD varies across the West Midlands region. Stoke-on-Trent LA has the highest death rate for males within the region of 55.8 per 100,000. The highest death rate amongst females was in Coventry with 32.1 per 100,000.

Figure 7.6: Directly Age Standardised Admission rates for Chronic Obstructive Pulmonary Disease (ICD10 J40, J41, J42, J43, J44), by Local Authority, All Ages, 2005-2007 pooled.

Legend



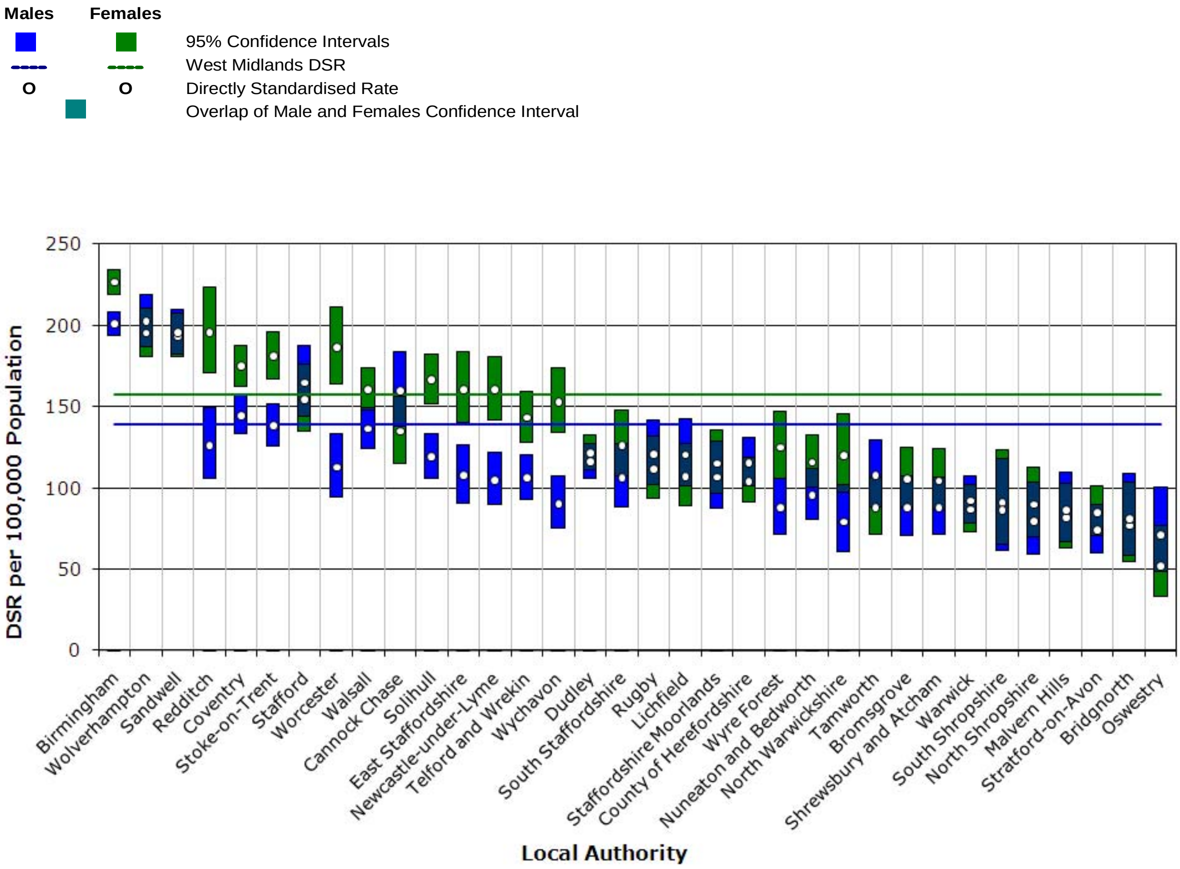
Source: HES, National Statistics -Mid year population estimates, 2005, 2006, 2007

Analysis: WMPHO

There are over 11,000 admissions to hospital a year from COPD in the West Midlands. Sandwell has the highest rate, other urban areas such as Stoke-on-Trent, Birmingham and Walsall also have high rates for both males and females.

Figure 7.7: Directly Age Standardised Admission rates for Asthma (ICD10 J45 - J46), by Local Authority, All Ages, 2005-2007 pooled.

Legend



Source: HES, National Statistics -Mid year population estimates, 2005, 2006, 2007

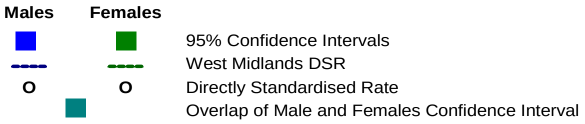
Analysis: WMPHO

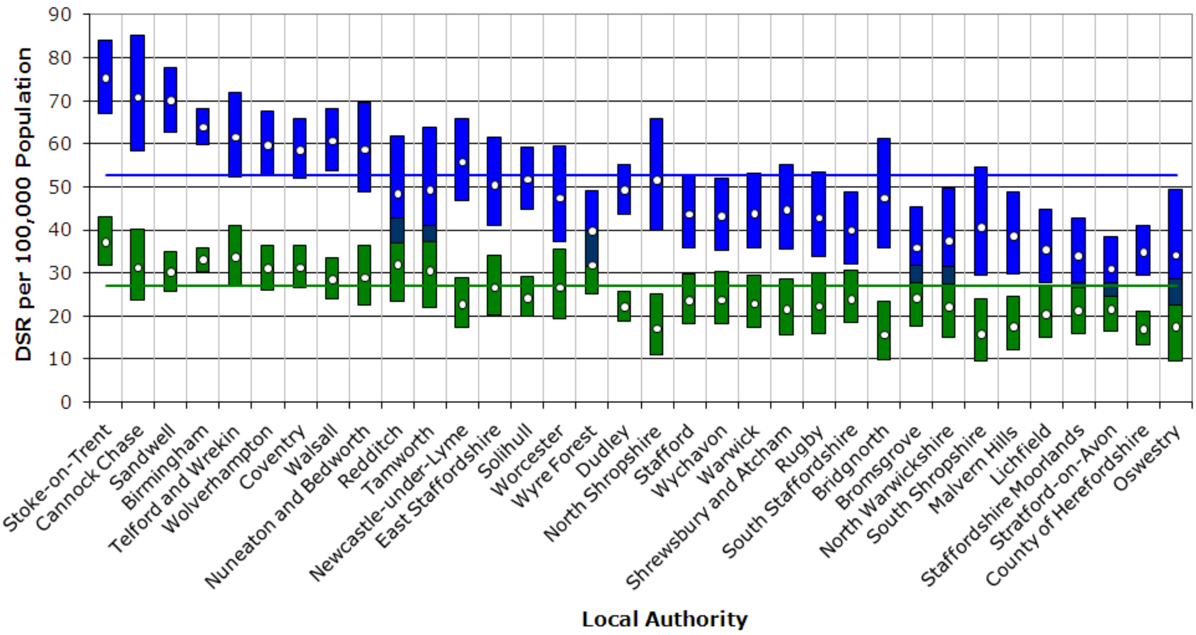
Death rates from Asthma remain low, however there are over 7,500 admissions to hospital from Asthma each year in the West Midlands. It is important to remember however that most episodes of asthma do not lead to a hospital admission.

Rates again appear highest in the more urban industrial areas of the region with the more rural areas having a lower than average admission rate for the region. The admission rates range from 52-226.7 per 100,000 population.

Figure 7.8: Directly Age Standardised Mortality rates for Lung Cancer (ICD10 C33-C34), by Local Authority, All Ages, 2005-2007 pooled.

Legend



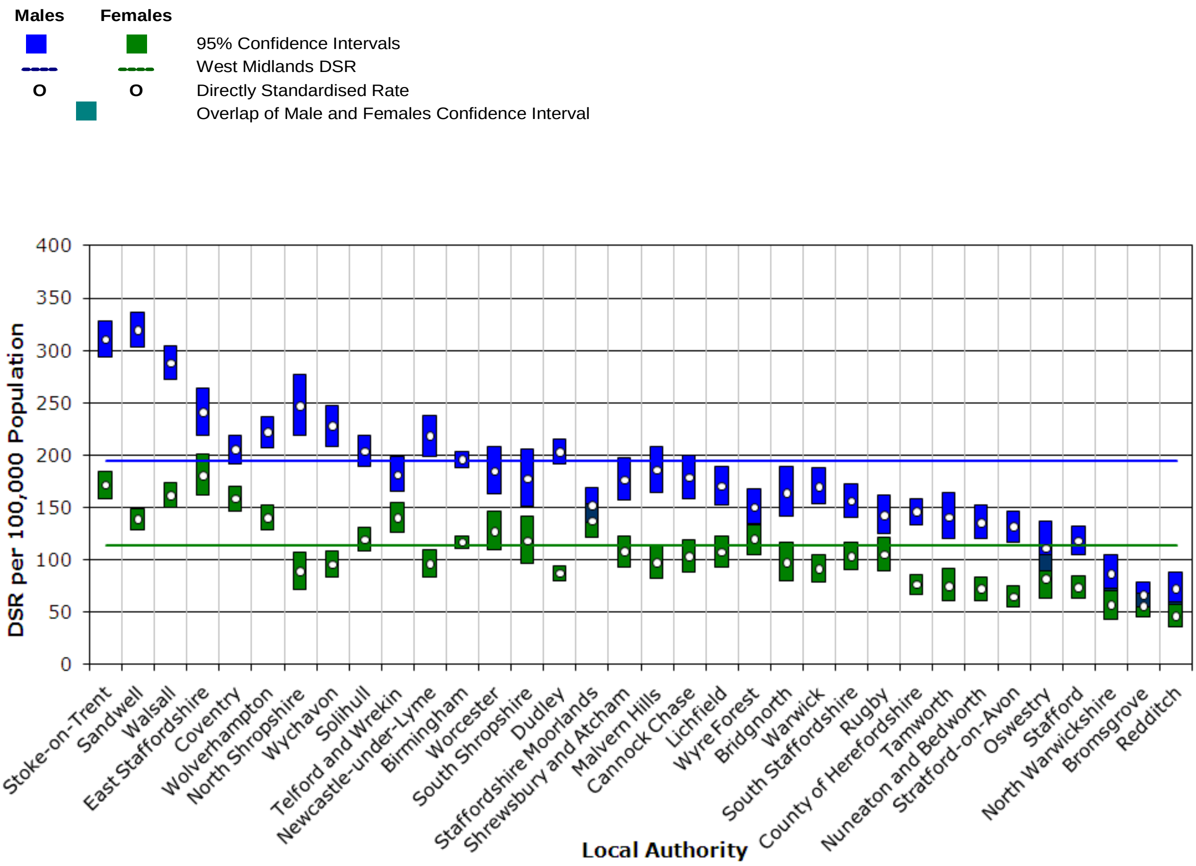


Source: National Statistics Mortality Files, National Statistics -Mid year population estimates, 2005, 2006, 2007, Analysis: WMPHO

Death rates from Lung Cancer are again highest in Stoke-on-Trent LA followed by Cannock Chase and Sandwell LAs. Rates are lowest in the more rural areas of Oswestry, Herefordshire and Stratford-upon-Avon.

Figure 7.9: Directly Age Standardised Admission rates for Lung Cancer (ICD10 C33-C34), by Local Authority, All Ages, 2005-2007 pooled.

Legend



Source: HES, National Statistics -Mid year population estimates, 2005, 2006, 2007

Analysis: WMPHO

Lung Cancer admission rates for the West Midlands are on average for males 108 per 100,000 and for females 64 per 100,000. Stoke-on-Trent, Sandwell and Walsall experience the highest admissions rates within the region and Redditch, Bromsgrove and North Warwickshire the lowest.

7.8 Conclusion

Studies in the UK, Europe and elsewhere clearly show an association of air pollution and health. In the West Midlands air pollution and poor respiratory health tend to be found in similar places. However these places also have other characteristics in common such as high deprivation scores and perhaps smoking so it does not necessarily follow that air pollution causes the ill health. None the less there is a strong health argument for reducing air pollution.

Appendix 1 – Data definitions used to pull off Mortality and HES data

Indicator	ICD 10
Diseases of the Respiratory System	J00 – J99
Chronic Obstructive Pulmonary Disease	J40, J41, J42, J43, J44
Asthma	J45 – J46
Chronic Lower Respiratory Disease	J40 – J47
Lung Cancer	C33 – C34

Hospital Episode Statistics
Hospital admissions data was filtered on finished in year admissions, ungrossed, total episodes.

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Acknowledgments: George Fowajuh and Dr John Kemm

CHAPTER EIGHT: CHRONIC OBSTRUCTIVE PULMONARY DISEASES: THE EPIDEMIOLOGY, ECONOMICS AND QUALITY OF CARE IN THE WEST MIDLANDS

8.1 Introduction

Chronic Obstructive Pulmonary Disease (COPD) is an umbrella term covering a range of conditions that include chronic bronchitis and emphysema. It is a condition characterized by airflow obstruction, which is usually progressive, not fully reversible and does not change markedly over several months[1]. Although asthma is associated with airflow obstruction, it is usually considered a separate clinical entity. Because of the high prevalence of asthma and COPD, these conditions coexist in many patients, creating diagnostic uncertainty[2].

The national commitment to tackle the burden of COPD is evidenced by the Chief Medical Officer's (CMO) Report for 2004, where he called for the development of National Service Frameworks (NSF) for COPD[3]. He also re-enforced on immediate action against smoking in support for the 1998 government white paper Smoking Kills. The white paper Choosing Health: Making Healthier Choices Easier[10] that was published in 2004. Further developments include the publication of NICE guidelines[1] in 2004 and the new General Medical Services contract with the Quality and Outcomes Frameworks with COPD included. The British Thoracic Society report (2006)[4] and recommendations from the Health Care Commission report (2006)[5] were major influences to the government's call for the development of a national service framework (NSF) for COPD.

8.1.2 Diagnosis

When the lung tissues are damaged as in the case of COPD, the elasticity of the airways is destroyed, terminal bronchioles collapse and alveoli are damaged obstructing the airflow in the lungs. The diagnosis is suspected on the basis of symptoms that include breathlessness and cough and supported by spirometry[2].

8.2 Major Risk Factors

8.2.1 Smoking: Tobacco smoking is the major risk factor for COPD. About half of smokers develop some airflow obstruction and 10 to 20 percent develop clinically significant COPD. About 20% of COPD cases are not attributed to smoking. The risk of COPD also increases with passive smoking and maternal smoking is associated with reduced infant, childhood and adult ventilatory function[2].

8.2.2 Air Pollution: Urban air pollution may affect lung function development hence a risk factor for COPD. Exposure to particulate and nitrogen dioxide air pollution has been associated with increased cough, sputum production, breathlessness, impaired ventilator function in adults and reduced lung growth in children[2].

8.2.3 Occupation: Numerous litigations have been experienced in the UK between British Coal and coal miners. The final judgement recognised the similarities of effects between coal dust and smoking. Intense prolonged exposure to dust and chemicals can cause COPD independently of cigarette smoking, though smoking seems to enhance the effects of occupational exposure. Exposure to coal and other mineral dust have been implicated in the development of chronic airways obstruction[2]. This has implications on COPD in the West Midlands with regards to previous coal mining in the region.

8.2.4 Alpha Antitrypsin Deficiency: Alpha antitrypsin deficiency occurs in over 50% of patients with COPD who are below the age of 40 years. It is a rare genetic condition and the best documented genetic risk factor for COPD[2].

8.3 The Epidemiology of COPD

8.3.1 ICD10 Codes

Chronic respiratory conditions ICD codes J40 to J44 (Table 8.1) were selected for this analysis to satisfy the definition for COPD.

Table 8.1: ICD codes for COPD

ICD codes for COPD	
J40	Bronchitis not specified as acute or chronic
J41	Simple and mucopurulent chronic bronchitis
J42	Unspecified bronchitis
J43	Emphysema
J44	Other COPD

8.3.2 Incidence of COPD

The incidence rates for COPD are estimated as the ratio of the number of new cases of COPD and the number of person years at risk (per 1000). Person years at risk are equal to the length of follow up for each member of the cohort. One large international European Cohort has estimated the incidence of COPD to be 2.8 cases/1000/year (CI 2.3 – 3.3)[9].

8.3.3 Admissions

COPD contributed one percent of all admissions in the West Midlands during 2007/8. Stroke contributed the same percentage and Ischaemic heart diseases (IHD) contributed 2% of all admissions[10]. This observation supports the need to give special attention to COPD as a major cause morbidity and disability.

Among all respiratory diseases, COPD is the most common cause of emergency admissions to hospital[4]. Emergency hospital admissions are higher in more deprived communities than affluent communities. About 30% of patients admitted with COPD for the first time will be readmitted within 3 months and 15% of patients admitted will die within 3 months of discharge. The latter figure varies between hospital according to the number of respiratory consultants and community deprivation status[5].

Figure 8.1: Age and sex specific admission rates for COPD in the West Midlands Region 2007-08

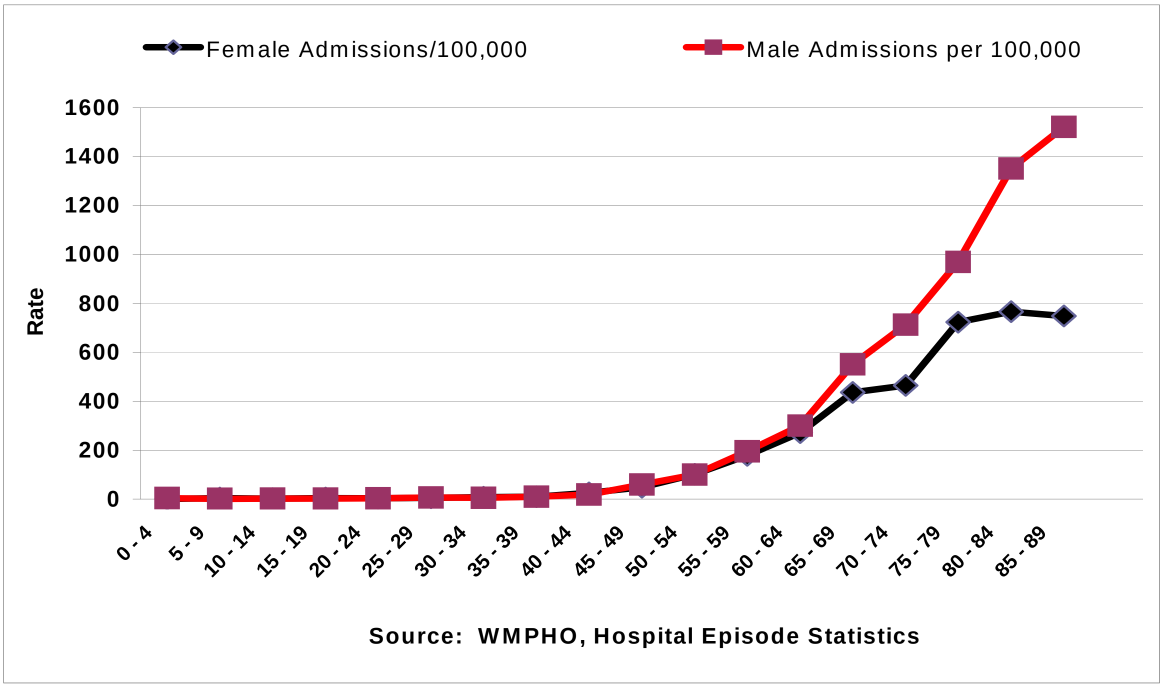
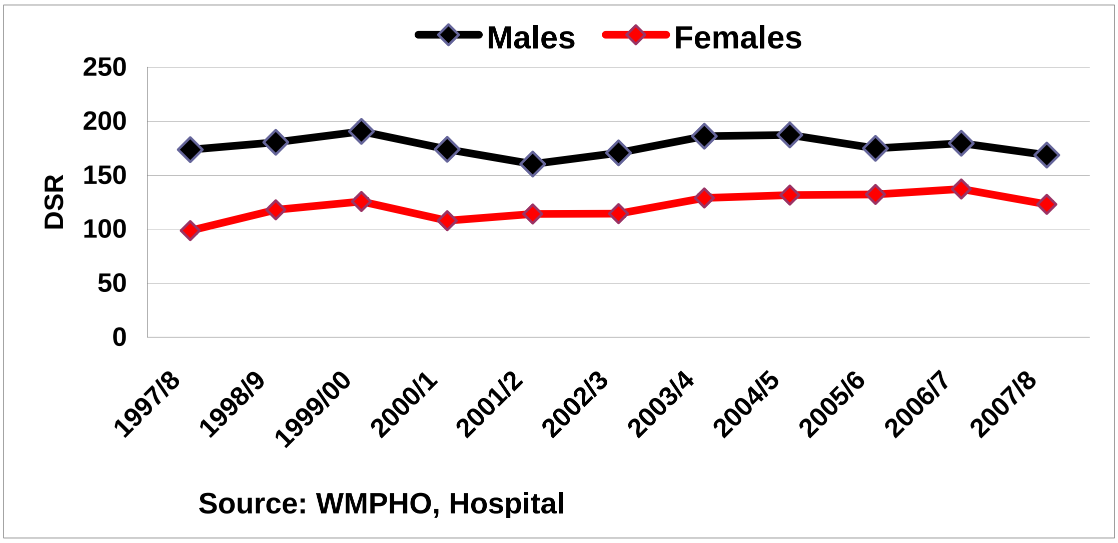


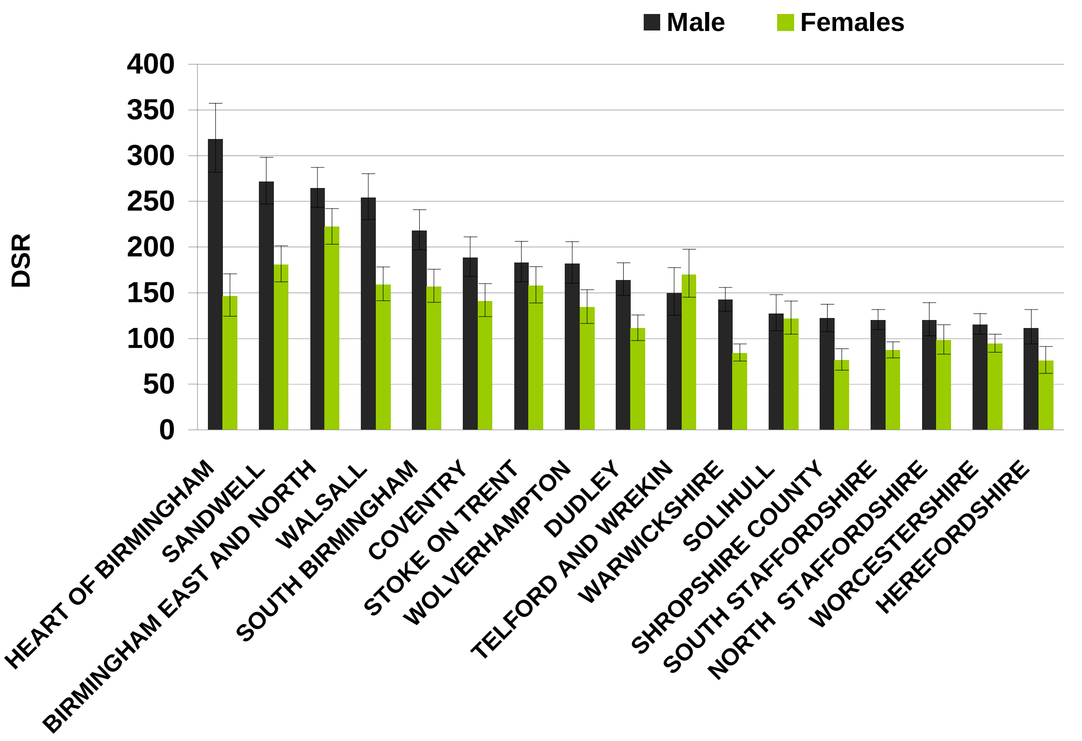
Figure 8.1 shows age specific admission rates for 2007/8 in the West Midlands. In both sexes COPD is less common below the age of 40 years. Just like the rest of the country COPD is common above the age of 40 years and it is more common among men.

Figure 8.2: Age and Sex Directly Standardised Admission rates for COPD per 100 000 in the West Midlands 1997-2008



Admission rates for males are significantly higher than for females during the whole period from 1997 to 2008 (Figure 8.2). The trends are fairly constant for males and are rising for the females. There is a significantly wide gap between admission rates for males and females with the female trends in admissions rising and narrowing the gap since 2003. Admission rates for females are on the increase which could be a result of the increase in smoking among females during the smoking epidemic.

Figure 8.3: Age and Sex Directly Standardised Admission Rates for COPD per 100,000 for PCTs in the West Midlands 2007-08



Source: WMPHO, Hospital Episode Statistics

Heart of Birmingham PCT has the highest admission rates followed by Sandwell and Birmingham East and North PCTs (Figure 8.3). Herefordshire has the lowest admission rate, followed by Worcestershire PCT and North Staffordshire PCT. There are significantly wide gaps between male and female admission rates in the majority of the PCTs. Much wider gaps are evident in Heart of Birmingham and Sandwell PCTs.

8.3.4 Prevalence

In England and Wales, some 900 000 people have COPD diagnosed. After allowing for under diagnosis, the true number with COPD is likely to be about 1.5 million. COPD primarily affects people above the age of 45 years and the mean age at diagnosis is 67 years and the prevalence increase with age. It is more common in men than women and is associated with socioeconomic deprivation[2].

There is evidence that the prevalence of diagnosed COPD is increasing among women in the United Kingdom. In 1990 it was 0.8% and by 1997 it was 1.4%, whereas in men it seems to have reached a plateau since the middle 1990s. These trends in prevalence probably reflect sex differences in cigarette smoking since the 1970s[2].

Some authors believe that COPD is probably the number one chronic disease showing the differential effect between higher and lower social groups[8].

Figure 8.4: Trends in Annual Prevalence 2001 - 2007: Age Standardised person prevalence rates per 10,000 for COPD

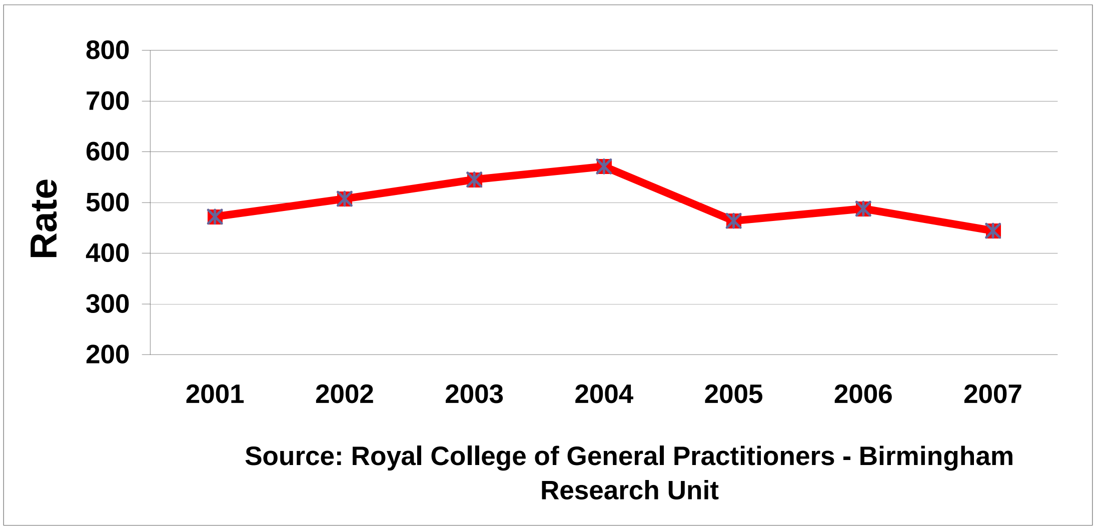
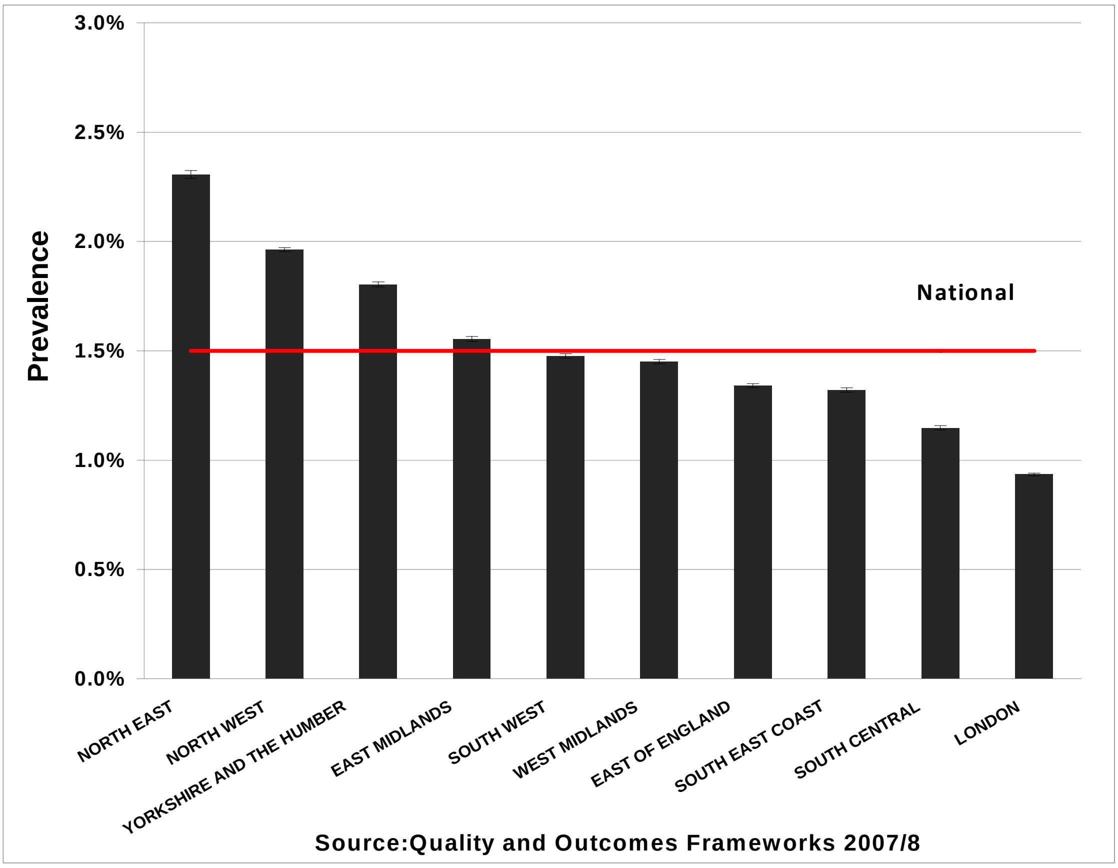


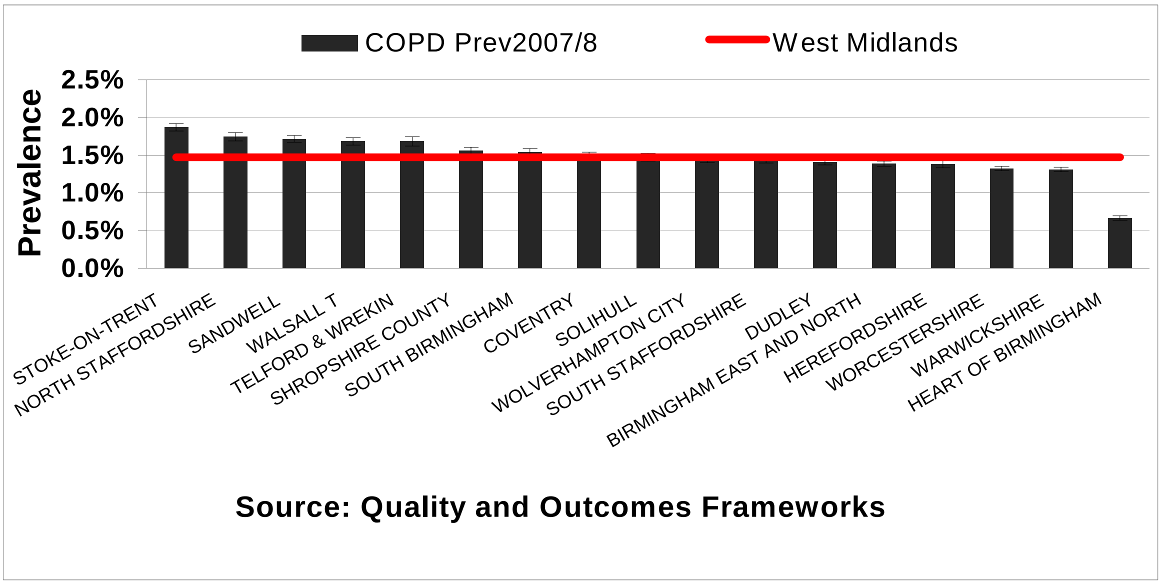
Figure 8.4 shows trends in the prevalence of COPD in England as reported by practices in their weekly reporting service for the period between 2001 and 2007. There prevalence has been raising and rose steadily from 2001 to 2004. Since 2004 it has been declining. The prevalence rates are almost double what we expect from the QOF data. This data is dependent on timeliness, accuracy and completeness of reports and has been analysed according to ICD 9 (revised).

Figure 8.5: Unadjusted Prevalence of COPD by Strategic Health Authority 2007 – 2008



The North and South divide is clearly demonstrated by the regional prevalence for COPD in England (Figure 8.5) with the North East having the highest, followed by the North West and London the lowest. London is characterized by large numbers of immigrants who tend to be younger and hence the lowest prevalence of COPD. The West Midlands is the fourth lowest and is significantly lower than the national average.

Figure 8.6: Unadjusted prevalence of COPD by PCT in West Midlands, 2007 - 2008.



Heart of Birmingham PCT had the lowest prevalence of COPD (Figure 8.6). Although this is an unadjusted prevalence, there are other explanatory factors that include the level of case ascertainment for COPD that may be low and the age and sex structure for the PCT. Warwickshire and Worcestershire are the second and third lowest. The highest is Stoke-on-Trent followed by North Staffordshire PCT and Sandwell PCT.

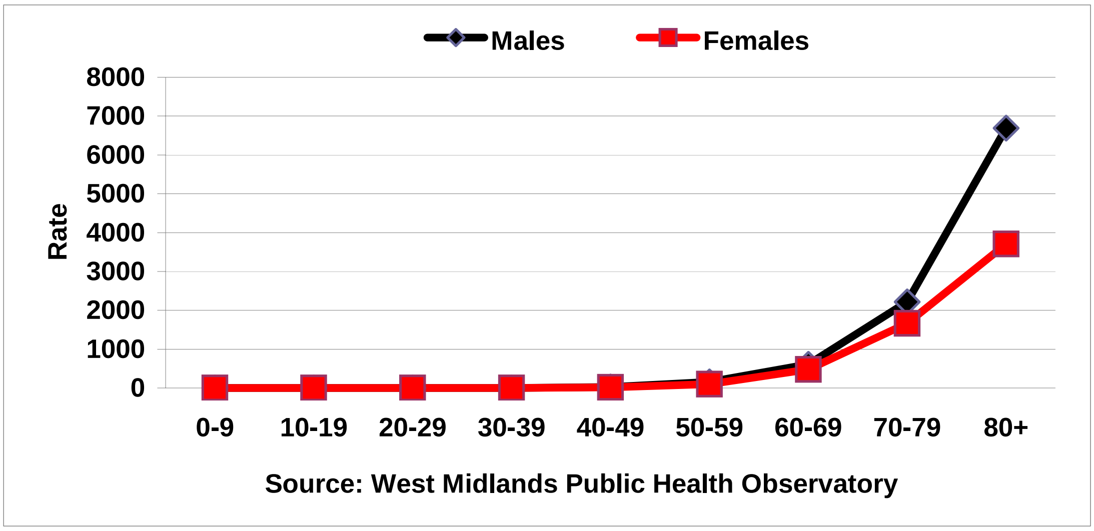
8.3.5 Mortality

COPD causes about 30,000 deaths each year and it is the third cause of respiratory death in the UK, accounting for more than one fifth (23%) of all respiratory deaths[5]. Excluding cancers of the respiratory system as major causes of respiratory deaths makes COPD a major cause of death second to pneumonias[4]. More than 90% of COPD deaths occur in those aged over 65 years. Mortality in the UK shows a strong rural urban gradient with high mortality rates in large conurbations in the North of England. There are also social inequalities with men aged 20–64 employed in unskilled manual occupations being 14 times more likely to die from COPD than those in professional occupations[5].

COPD is estimated to be the fourth leading cause of death worldwide and the World Health Organisation predictions suggest that it will set to become the third leading cause by 2020 primarily related to changes in smoking behaviours in the developing world and changes in population age structure[3].

Between 2005 and 2007, there were 157,030 registered deaths for both males and females in the West Midlands. Of these deaths 7,154 were COPD deaths and this translates to COPD mortality contributing up to 5% of all cause mortality in West Midlands between 2005 and 2007[10].

Figure 8.7: Age and Sex Specific Death rates for COPD per 100,000 population in the West Midlands 2007-08.



Mortality for COPD increases with age in both sexes in the West Midlands (Figure 8.7). Mortality from COPD is rare below the age of 40 years and there are no observable sex differences in mortality at that age. There is a gradual rise up to the age of 50 years and then a sharp rise in mortality is evident thereafter showing higher mortality rates in males than in females and almost twice as much in males after the age of 80 years.

Figure 8.8: Trends in mortality (SMR) from COPD 1993 to 2007, based on England age specific rates 2006.

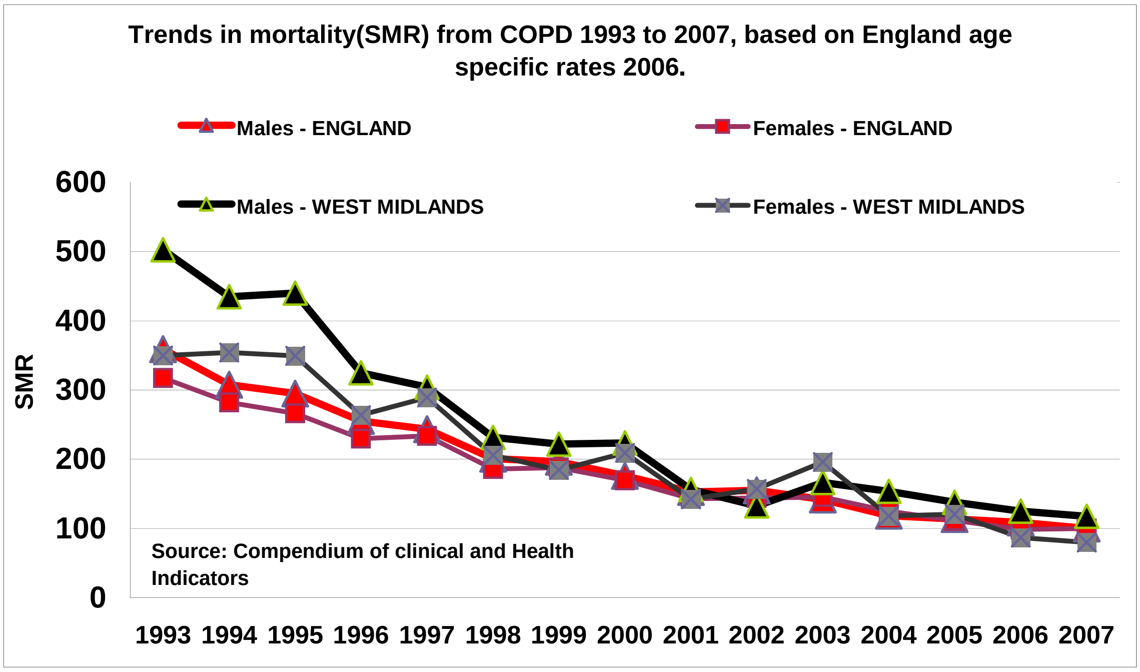


Figure 8.8 shows trends in mortality from COPD. The standard rates used are England age specific rates for 2006. Data is based on underlying cause of death. Mortality from COPD has been decreasing over the years nationally and regionally. Mortality has been about 5 times higher in 1993 in the West Midlands males than 2007. Mortality for males in England and females in the West Midlands were both 3 and half times higher than mortality in 2007. By 2007, the Standardised Mortality Ratio (SMR) for the West Midlands males was 117 (17% higher than England SMR) and 80 (20% below the England SMR) for West Midlands females.

Figure 8.9: Mortality from COPD, DSR/100 000 for all persons, 2005-07 pooled, all regions

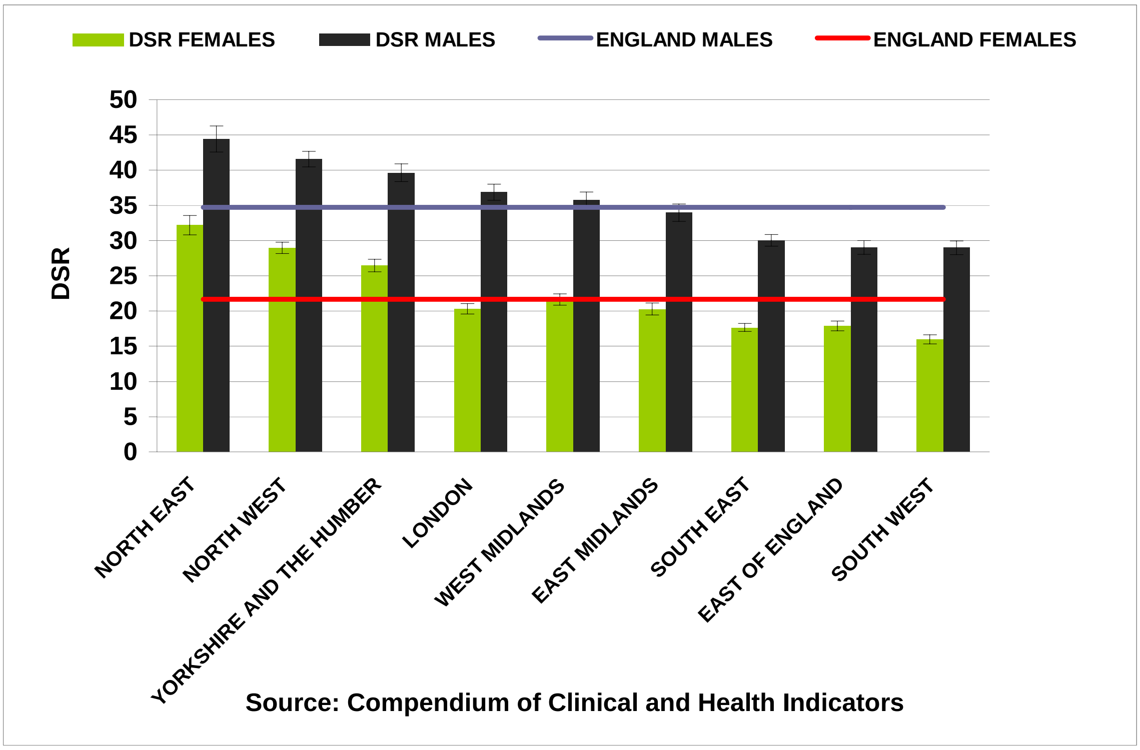
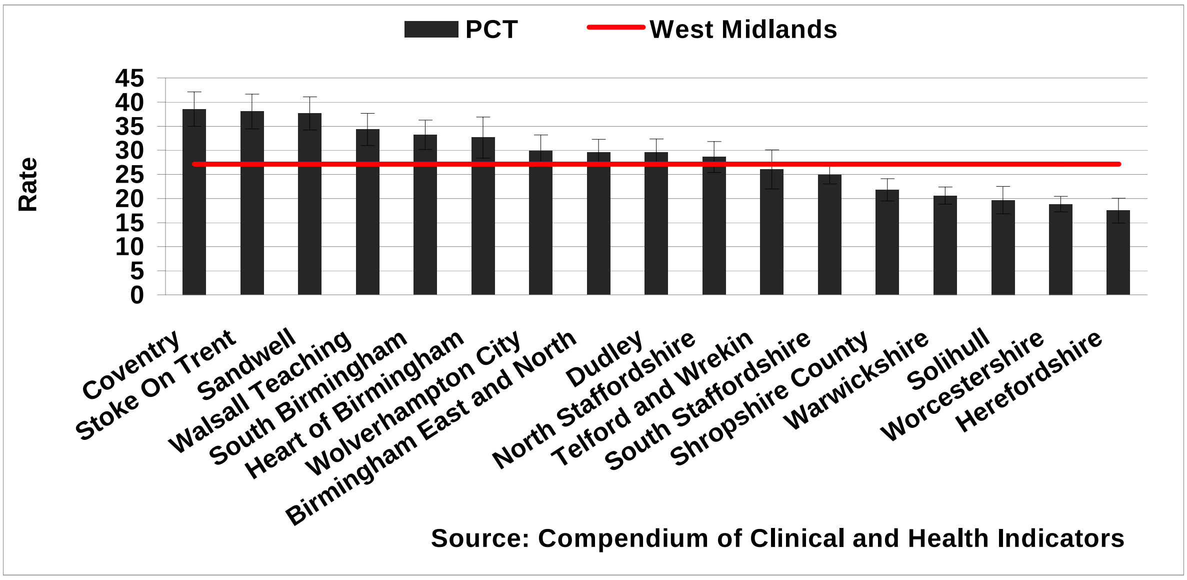


Figure 8.9 shows directly standardised mortality rates by region. The North East has the highest mortality from COPD followed by North West and Yorkshire and Humber. This is significantly higher than the national average for both sexes. The East of England has the lowest mortality followed by the South West and the South East. This is significantly lower than the national average for both sexes.

Figure 8.10: Directly Standardised COPD Mortality rates per 100,000 for all ages, pooled 2005-2007 by PCT



Coventry has the highest directly standardised mortality rate for COPD in the West Midlands (Figure 8.10). Although it is not significantly higher than the next seven PCT below it, it is significantly higher than the rest of the PCTs with Herefordshire having the lowest Mortality Rate.

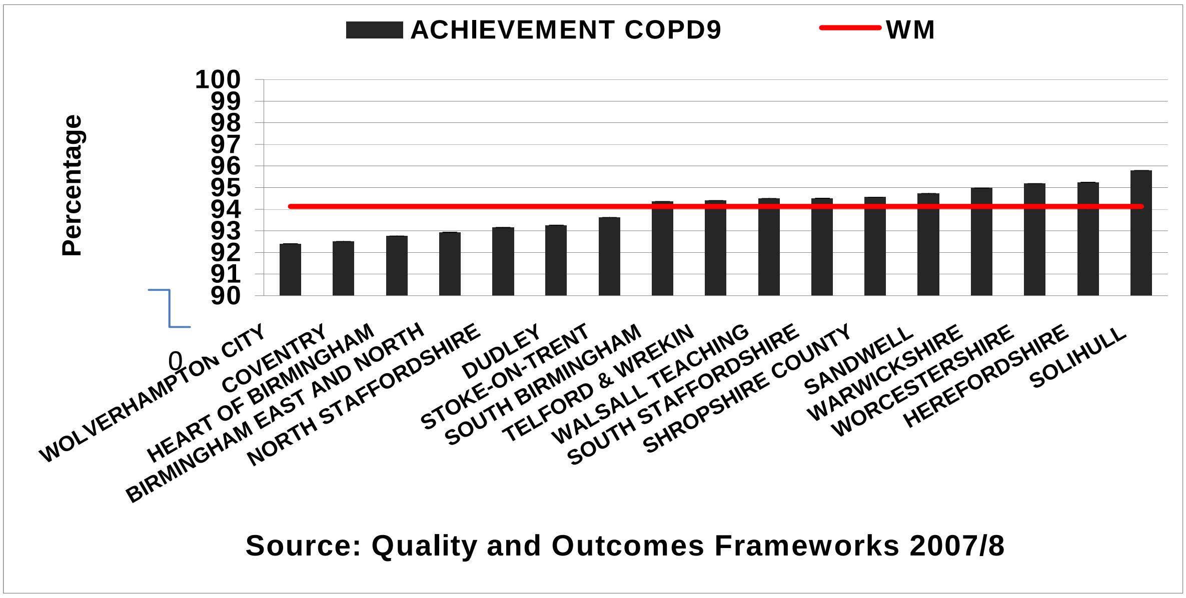
8.3.6 Quality of Care

The indicators that have been used are only proxies to true quality and only limited to the clinical domain of the quality outcomes framework (QOF). Measuring quality is a complex process which would need much more detailed information that meets all the dimensions of quality.

8.3.6.1 COPD Confirmed by Spirometry

NICE guidelines recommend the use of spirometry in the confirmation of COPD diagnosis in all patients. Air flow obstruction is defined as a reduced Forced Expiratory Volume in 1 second (FEV_1). A reduced ratio of FEV_1 and Forced Vital Capacity (FVC) such that FEV_1 is less than 80% predicted and FEV_1/FVC is less than 70%. The percentage of patients who have had a measure of FEV_1 test can be used as a proxy measure for the quality of care given to COPD patient.

Figure 8.11: Percentage of all patients with COPD in whom diagnosis has been confirmed by spirometry including reversibility testing 2007-08



Wolverhampton PCT has the lowest percentage followed by Coventry and Heart of Birmingham PCT. Solihull PCT has the highest achievement followed by Herefordshire and Worcestershire. There is no PCT below 92% achievement (Figure 8.11).

8.3.6.2 Influenza Vaccination

The Chief Medical Officer and similarly the NICE guidance for COPD recommend that the pneumococcal vaccine and an annual influenza vaccination should be offered to all patients with COPD. This is another proxy measure for the quality of care given to COPD patients.

Figure 8.12: The Percentage of all patients with COPD who have had influenza immunisation in the preceding 1st September to 31st March by PCT 2007-08

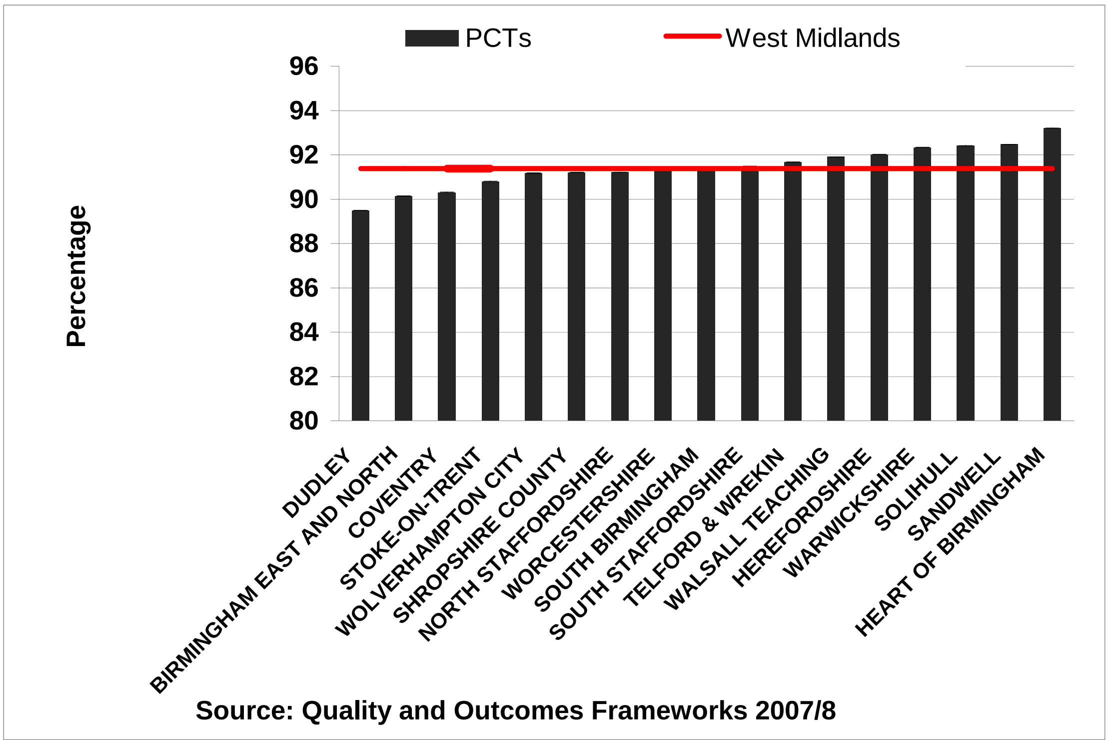
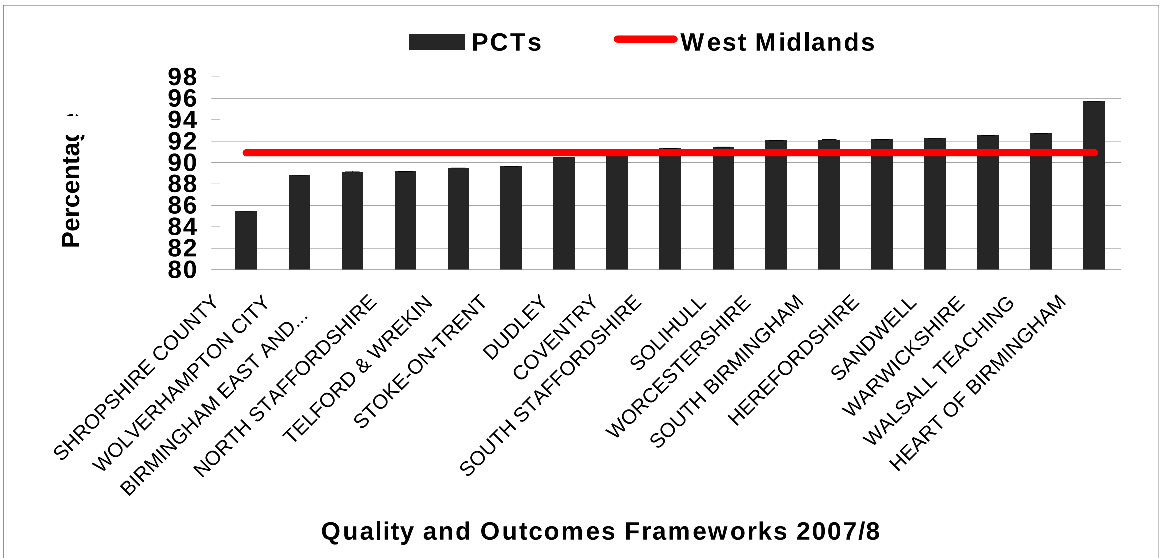


Figure 8.12 shows that Heart of Birmingham PCT had the highest percentage of COPD patients who had influenza vaccine immunization in the preceding 1 September to 31 March for 2006/7. The lowest was Dudley PCT.

8.3.6.3 Inhaler Technique

Figure 8.13: Percentage of COPD patients receiving inhaled treatment where there is a record that the inhaler technique has been checked in the previous 15 months, 2007-08



Shropshire County PCT has the lowest percentage followed by Wolverhampton and Birmingham East and North. The highest is Heart of Birmingham PCT followed by Walsall PCT (Figure 8.13).

8.3.6.4 Discharge Destinations

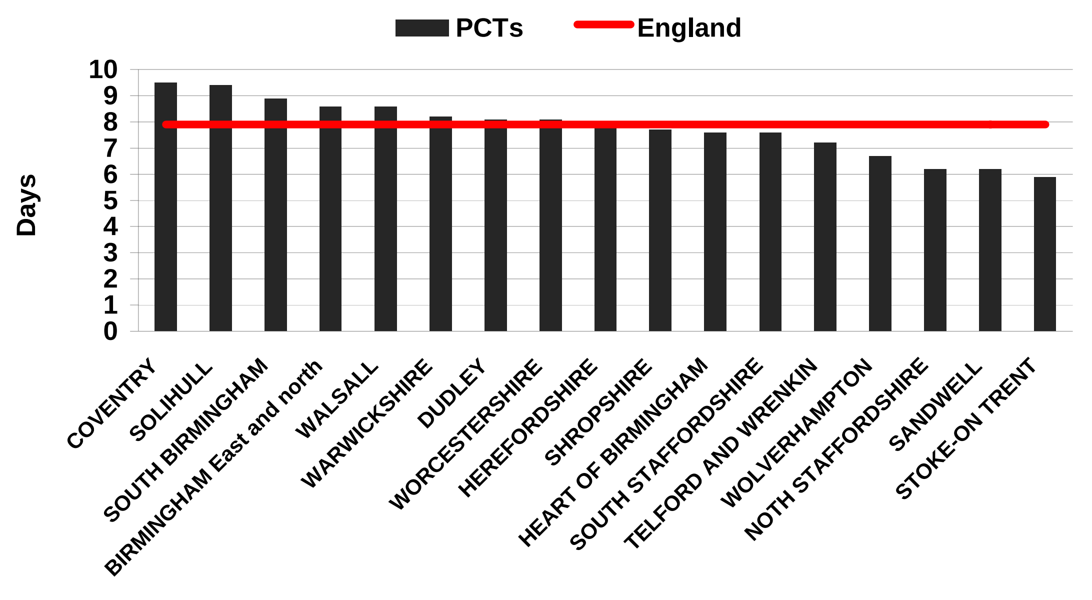
Analysis of 2007 Hospital Episode Statistics for the West Midlands showed that the majority of COPD patients discharged from hospital during 2007 go back to their usual place of residence. A few are sent to private care homes or NHS funded care. Strengthening community care is a priority for COPD care and is one of the Health care Commission recommendations to reduce admissions to secondary care.

8.4 Economics

The impact of COPD on the heath care system cannot be underestimated; it accounts for £800 million in direct health care costs each year[3]. This equates to £1.3 million per 100,000 populations per year. More than half the costs are related to hospital care and costs are as expected, greater for those with more severe disease. COPD is associated with 24 million lost working days per annum, with the cost of lost productivity estimated at around £2.7 billion[3]. The current Disease Management Information Toolkit (DMIT) (18th July 2008) was used to analyse the economic effects of reducing admission rates and length of stay for COPD.

8.4.1 Average Length of Stay (LOS)

Figure 8.14: Average length of stay for COPD patients by PCTs in West Midlands, 2006/07



Source: Department of Health, Disease Management Information Toolkit, 2008.

Coventry PCT, Solihull, South Birmingham, Birmingham North and East, Walsall, Warwickshire, Dudley and Worcestershire PCT have an average length of stay above the England average (Figure 8.14). The cost per bed day is £167. There are potential savings from reducing the average LOS in these PCTs to the England average (Table 8.1)

Table 8.2: Potential Savings from reducing average LOS to the England average (2006 – 2007)

PCT	COST/BED DAY	POTENTIAL SAVINGS
Coventry	£167	£159, 175
Solihull	£167	£ 97, 759
South Birmingham	£167	£130, 125
Birmingham (E and N)	£167	£123, 880
Walsall	£167	£76, 627
Warwickshire	£167	£32, 429
Dudley	£167	£16, 194
Worcestershire	£167	£27, 656

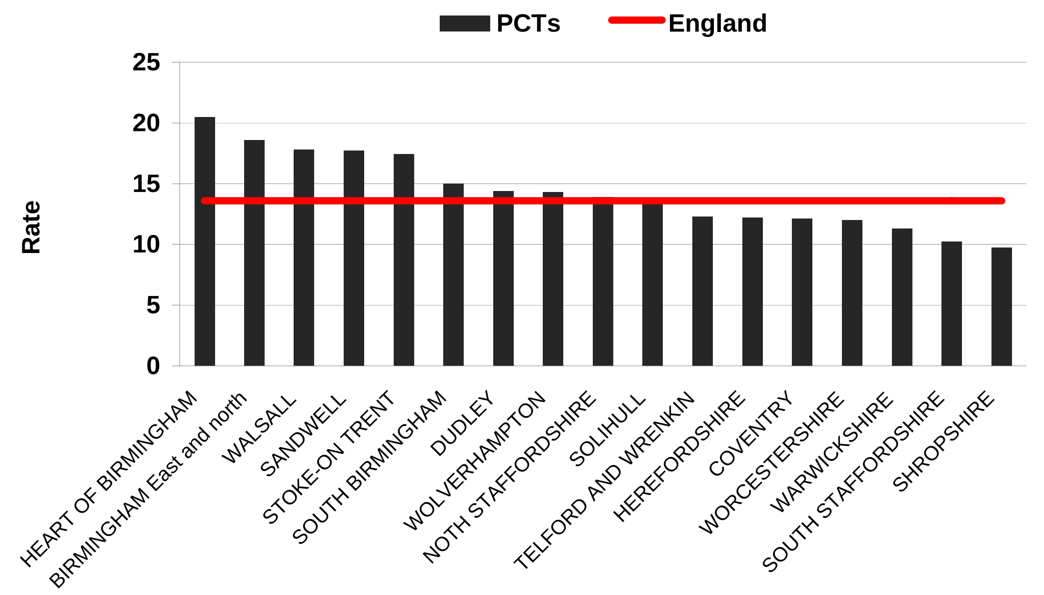
Source DMIT

Table 8.2 shows the potential savings that could have been benefited by the PCTs with average LOS above the England average from reducing average LOS to the England average during the year 2006 - 2007.

The effect of reducing the length of stay is a boost in potential financial gains. Such gains can be injected to strengthen community care.

8.4.2 Admission Rates

Figure 8.15: Admission rate per 100 people in the COPD register by PCT in the West Midlands, 2006/7



Source: Department of Health, Disease Management Information Toolkit, 2008.

Admission rates in Heart of Birmingham PCT, Birmingham East and North, Walsall, Sandwell, Stoke-On-Trent, South Birmingham, Dudley, Wolverhampton and North Staffordshire are above the England average (Figure 8.15). Reducing admission rates to the England average (Table 8.2) will result in the following potential savings, taking the cost per COPD admission to be £1,707.

Table 8.3: Potential savings from reducing admission rates to the England average 06-07.

PCT	COST/ADMISSION	POTENTIAL SAVINGS
Heart of Birmingham	£ 1, 707	£247, 707
Birmingham (E and N)	£ 1, 707	£505, 032
Walsall	£ 1, 707	£292, 178
Sandwell	£ 1, 707	£375, 289
Stoke-on-Trent	£ 1, 707	£323, 875
South Birmingham	£ 1, 707	£138, 494
Dudley	£ 1, 707	£55, 338
Wolverhampton	£ 1, 707	£40, 935
North Staffordshire	£ 1, 707	£14, 744

Source DMIT

Table 8.3 shows the potential savings that could have been benefited if the above PCTs average LOS were to be reduced to the England average during the year 2006- 2007.
Reduction in admission rate can be achieved through patient empowerment to self manage; home based treatment for acute exacerbations, pulmonary rehabilitation, triage for admission and early supported discharge schemes which also reduce the length of stay. Resources saved by reducing the rate of admissions and the length of stay in hospital could be directed towards increasing human and material resources for care closer home for COPD.

8.5 Summary

- COPD is an umbrella term for a group of lung diseases which are characterized by airflow obstruction and these include chronic bronchitis, emphysema. Lung damage over a long period of time impairs air flow and caused breathlessness and cough.
- The major risk factor for COPD is smoking. Other risk factors include air pollution, and alpha antitrypsin deficiency in those with COPD below the age of 40 years.
- An estimated 900,000 people have COPD diagnosed in England and Wales. After allowing for under diagnosis the figure is likely to be 1.5 million. In the West Midlands, unadjusted prevalence was highest in Stoke-on-Trent and lowest in the Heart of Birmingham PCT in 2007/08.
- COPD is the commonest cause of emergency admissions among respiratory diseases. In 2007-08, COPD contributed 1% of all admissions in the West Midlands, just like stroke admissions in the same year.
- COPD kills about 30 000 people in the UK each year. More than 90% of these deaths occur in those aged over 65 years. The trends in mortality are however decreasing. In the West Midlands, mortality from COPD is highest in Coventry and lowest in Herefordshire PCT.
- Proxy measures for quality in 2007/08 show that the West Midlands' performance was significantly below the national average for Spirometry and influenza vaccination. Within the West Midlands, the Heart of Birmingham PCT was the best performer for Influenza vaccination and inhaler technique.
- Reducing the rate of admission and the length of stay in those PCTs who are above the England average can lead to massive potential savings which can be channelled to improving home based care for COPD.

8.6 Recommendations

- COPD is mostly preventable. Targeted smoking cessation services by socioeconomic deprivation are essential as well as the whole population approach in terms of health promotion.
- It is essential to encourage and support all COPD patients who smoke, to stop smoking. All levels of care should audit their smoking cessation services for effectiveness as a quality improvement program.
- COPD patients must be offered effective management as recommended by NICE to reduce morbidity and mortality from COPD. Explicit care pathways, staff training and Spirometry for screening and diagnosis in primary care are an essential quality improvement package.
- Patient empowerment to self manage, home based treatment for acute exacerbations, pulmonary rehabilitation, triage for admission are linked to improved quality of care and reduced admissions. Early discharge schemes are linked to reduced length of stay due to acute exacerbations as long as there is a treatment package and visits by a nurse. Resources saved by reducing the rate of admissions and the length of stay in hospital could be directed towards increasing human and material resources for home based care.

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CHAPTER NINE: PREDICTORS OF EMERGENCY DEPARTMENT USE AT NEIGHBOURHOOD LEVEL IN THE WEST MIDLANDS

9.1 Introduction

Patterns of Emergency Department (ED) attendance in the Region are highly geographically variable. This study had two aims. Firstly to describe this variation in detail and secondly to explore two commonly cited correlates of attendance, those of deprivation and proximity to hospital. As can be seen from the maps shown in Maps 9.1 – 9.3, hospitals are often located near areas of deprivation. Deprived populations are known to use EDs more. Also it seems reasonable to expect that people are more likely to access a service if they live close to it. However it is not certain how these variables work together in their effect on how a population uses EDs.

9.2 Method

We took the accident and emergency commissioning data set (CDS) and used it to calculate the directly age sex standardised attendance rates for the registered population of the lower level super output areas (LSOAs) in the West Midlands Region. We then mapped the LSOAs by Primary Care Trust (PCT) areas to show those neighbourhoods that had high and low rates of use. These were mapped using standard deviations from the PCT mean attendance rate to show the extent of variation within each area.

We then looked at the income deprivation score for each of the LSOAs (using the income domain of the Index of Multiple Deprivation 2007 and also the Euclidian (straight-line) distance from the geographical centre of the LSOAs to the nearest ED site. These were then entered into a simple linear regression model with the attendance rate as the dependent variable and the strength of association with distance and deprivation was then examined further.

9.3 Results

The urban populations of the region have generally good access to EDs. Approximately 75% of the registered population live in an LSOA whose centre is 5 miles (8.05 km) from an ED. Approximately 10% live in an LSOA whose centre is less than a mile (1.61 km) from an ED. No LSOA centre is more than 22 miles from an emergency department, although road distances may be somewhat further, especially in rural areas.

As can be seen in Maps 9.1– 9.3, in many cases EDs are located close to or even in the midst of some of the more deprived areas of the region.

Also Maps 9.4 – 9.20 show that the distribution of attendance rates by LSOAs within the PCTs of the region. As can be seen, these are very variable and clusters of LSOAs of higher use occur in all of them. Again many of these are very close to the site of an ED. Having described the geographical variation in attendance around the region, we looked in greater detail at the relative importance of distance and deprivation. Intuitively both of these variables seem very important and other studies have shown that ED use increases as distance is lower and deprivation is greater[1,2].

Simple linear regression shows strong relationships with both of our variables of interest and attendance rate (Figures 9.1 and 9.2). When we adjusted for linearity and the interaction between the two factors using a simple model, we found that both distance and deprivation remained important factors independent of each other. The deprivation co-efficients was not very intuitive to interpret, as a 1-point difference in income deprivation score is wider than the entire West Midlands range, the mean score being 0.18 and standard deviation being 0.14. For this reason we chose to include the standardised regression co-efficients (Table 9.1).

As can be seen, one standard deviation increase in distance from hospital is associated with just under half a standard deviation decrease in attendance rate. One standard deviation

increase in income deprivation is associated with just over half a standard deviation increase in attendance rate. The relationship between deprivation and distance from hospital was weaker than the maps appear to show, however there is a modest effect and the two variables do interact in a non-constant way (not described here). The overall model fit was good, with an adjusted R^2 of 0.64. Note that a square root transformation of the standardised attendance rate was used to derive the model statistics.

9.4 Discussion

This is the first time that we have been able to explore this relationship. It appears that deprivation is the strongest predictive variable, but both deprivation and distance are strong predictors of how much populations use EDs and importantly they appear highly independently predictive. There is further work to be done on how deprivation and distance interact with each other, but this is outside the scope of this brief chapter.

The strength of the model fit was surprising as some other possibly quite important variables were not included such as primary care characteristics and proximity of minor injury units and walk-in centres.

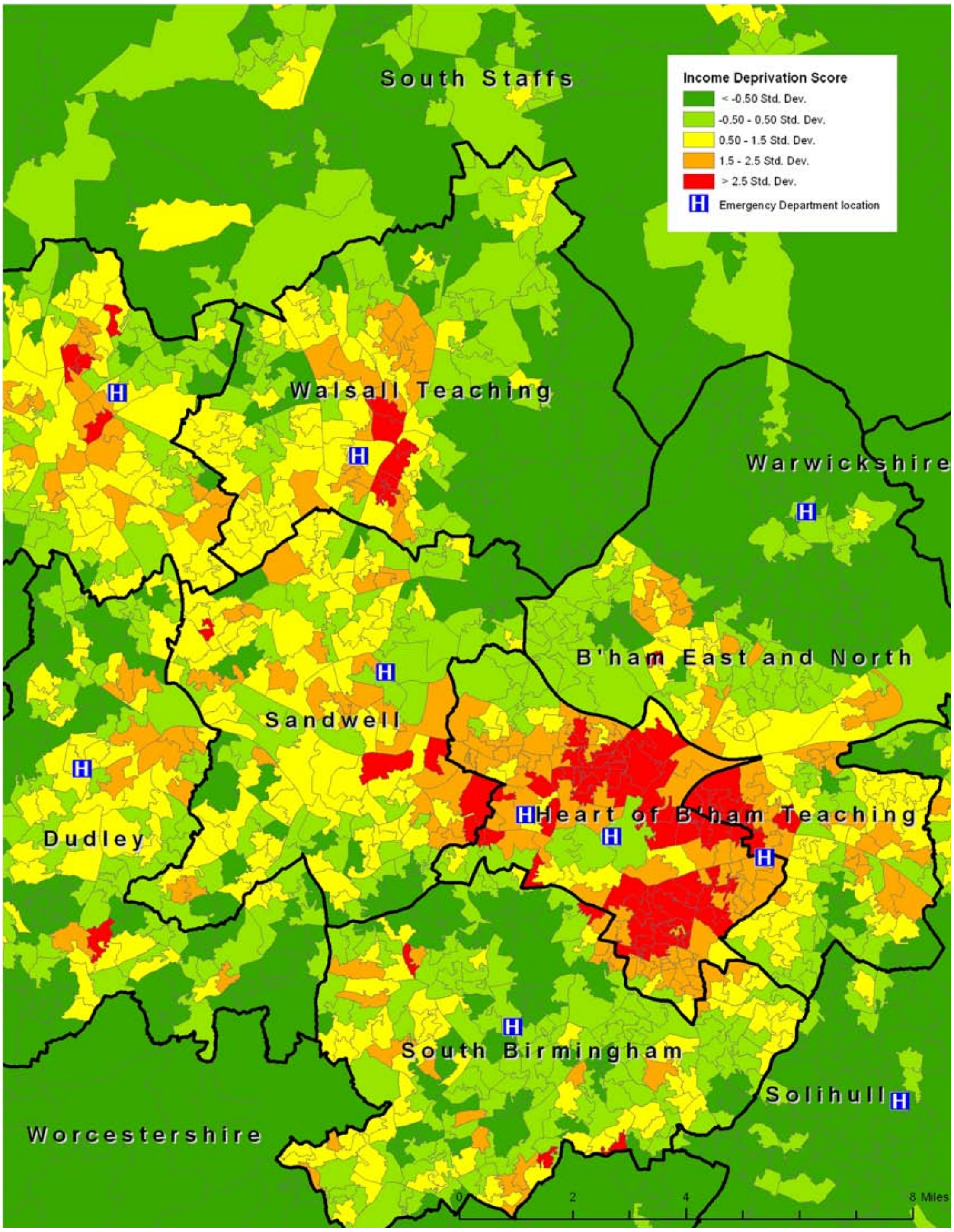
We did identify some further possible problems with the approach that we used. Using road distances rather than euclidian distances may have altered the behaviour of the distance variable, although another study of hospital accessibility found little difference between these two measures as model terms [3]. Also there were some possible confounders. Our results related to all attendances although one of our EDs was a children's ED. We chose to leave this in the model for simplicity. Also many of the LSOAs which were very close to this ED were almost equally close to another major provider that of City Hospital.

Another problem was a lack of homogeneity in our EDs. Some will have separate pathways for minor injuries and primary care problems. One of our EDs was in fact a minor injuries unit (Kidderminster). We included this as we happened to have separately identifiable data for this unit available for analysis. However we do not have data in this model for minor injury units or walk-in centres for the rest of the region. It is also known that the CDS itself has problems. The Department of Health estimated that around 8% of attendances could be missing from CDS returns in the region [4], although this is somewhat smaller than the estimate for missing data nationally. If these data are missing at random, then given the total number of observations, this need not be a serious issue, however if there was systematic undercounting in specific hospitals, this could undermine the analysis.

We also had possible denominator problems with some LSOAs at the edges of the region. Our denominators were registered West Midland's patients by LSOA. We used these as it is believed that for some important groups of attenders (especially younger adults in deprived areas), that this is a more accurate estimate than others that are available. However there were a few isolated LSOAs where most of the residents were registered just outside the region and yet the preferred ED of attendance was inside it. In theses cases and artificially large ED usage rate was produced. As this happened very infrequently, we left these values in the analysis rather than trying to model in a more accurate population for these areas.

There was not a strong relationship between proximity to hospital and deprivation. The fact that both are important factors but the fact that they are strongly independently predictive is important. This means that in PCTs where there are deprived communities living near EDs will see exceptionally high demand in these areas.

Map 9.1: Income deprivation by LSOA and location of Emergency Departments in Birmingham and the Black Country



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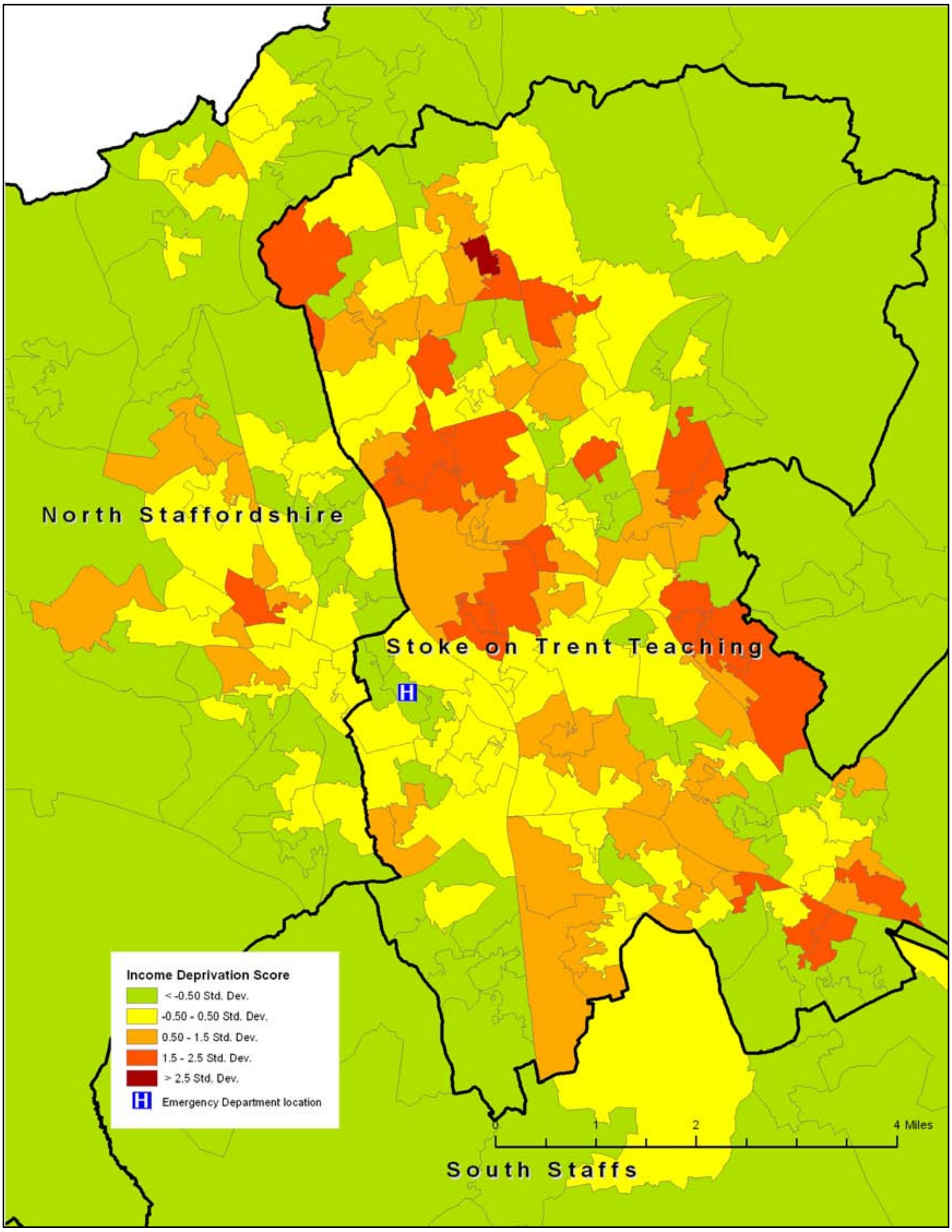
Map 9.2: Income deprivation by LSOA and location of Emergency Departments in the Stoke- on-Trent area



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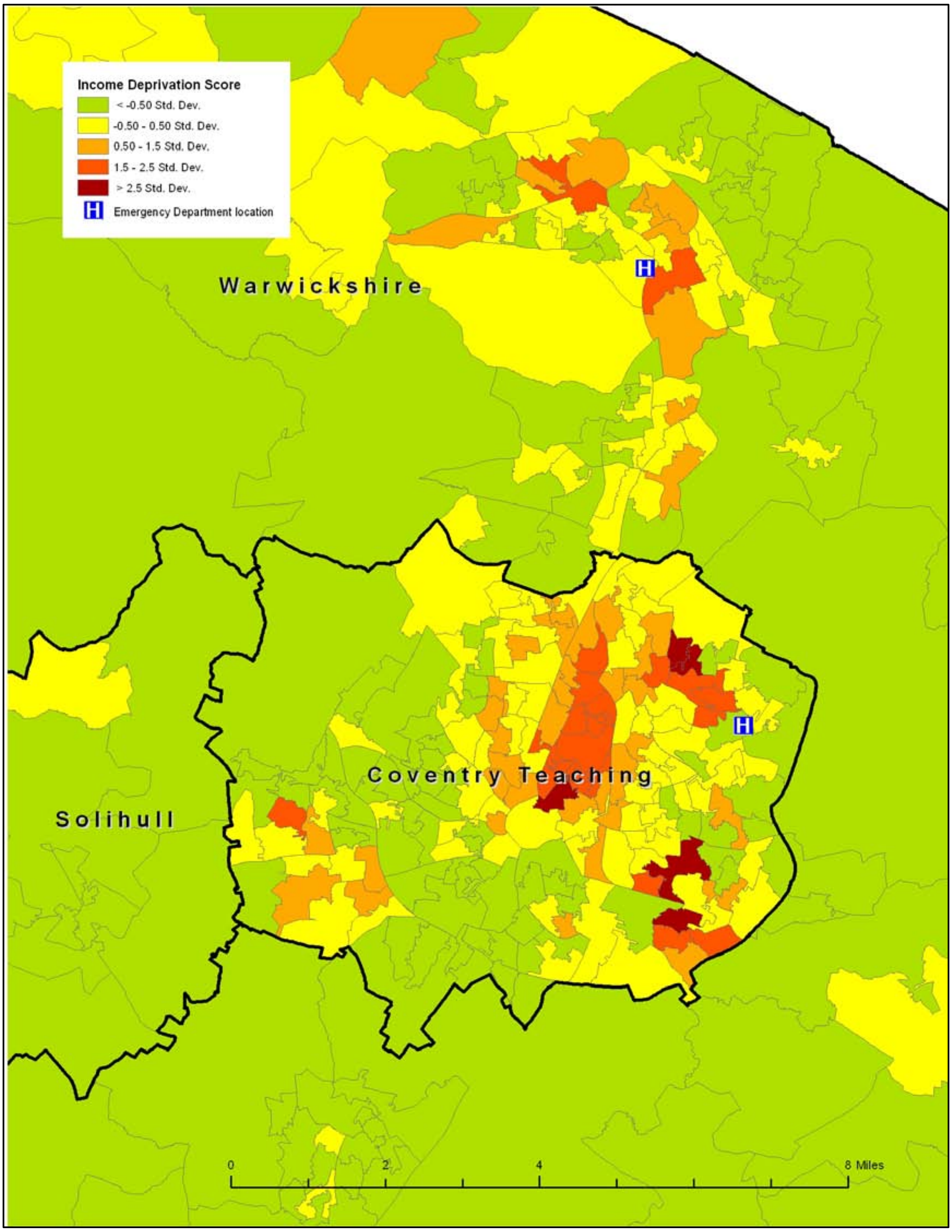
Map 9.3: Income deprivation by LSOA and location of Emergency Departments in the Coventry area



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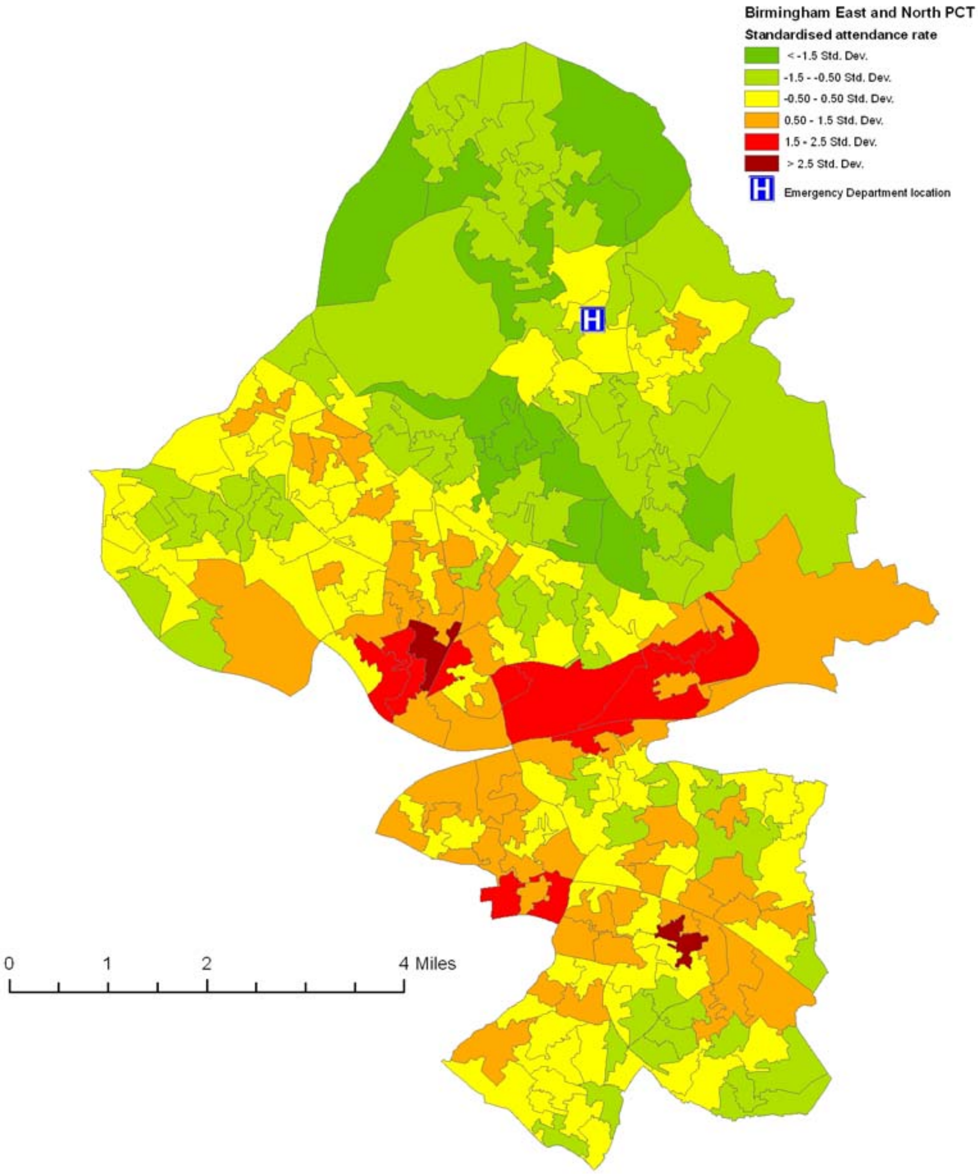
Map 9.4: Emergency Department attendance rate variation in Birmingham East and North PCT, 2007/2008



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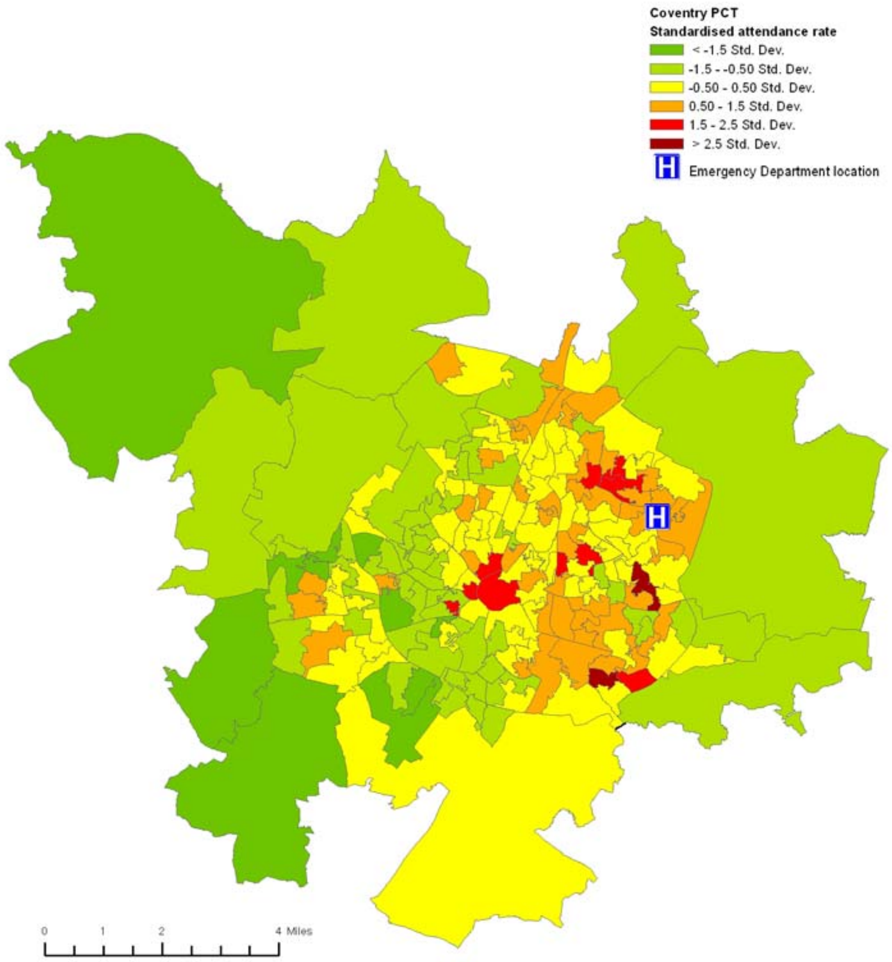
Map 9.5: Emergency Department attendance rate variation in Coventry PCT, 2007/2008



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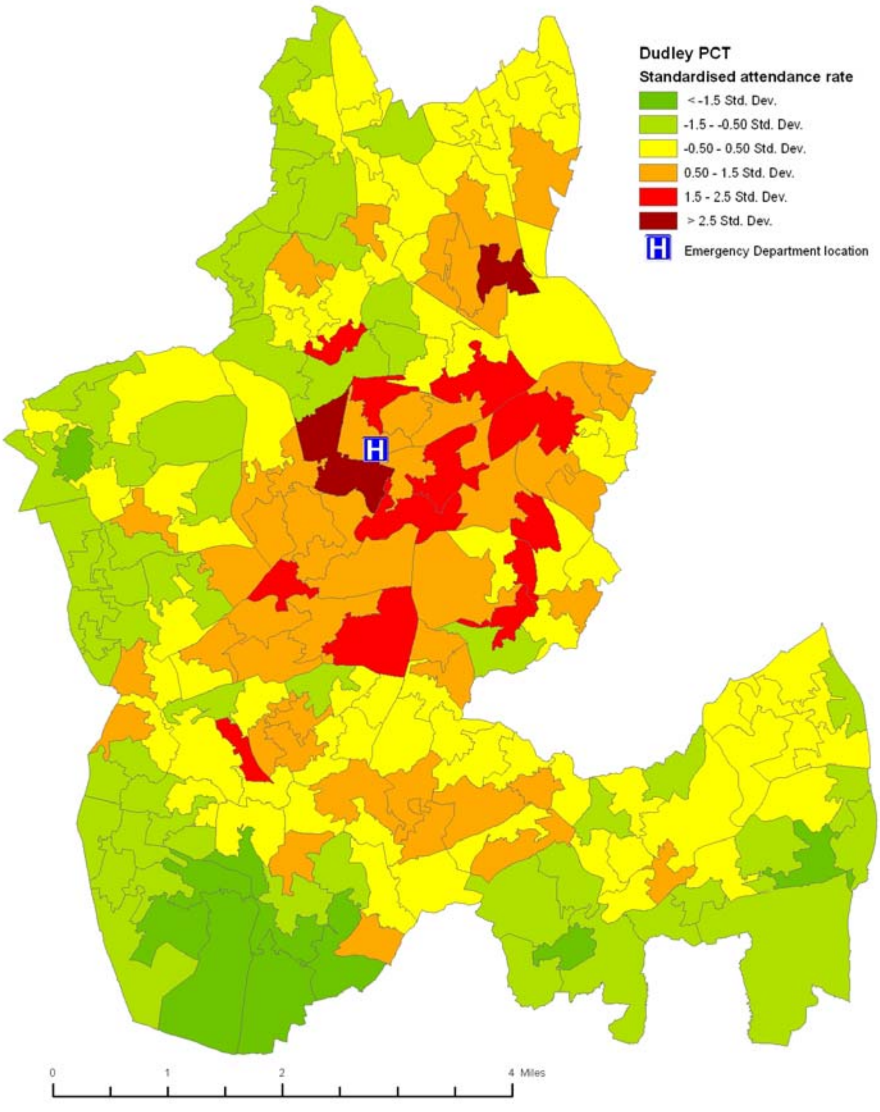
Map 9.6: Emergency Department attendance rate variation in Dudley PCT, 2007/2008



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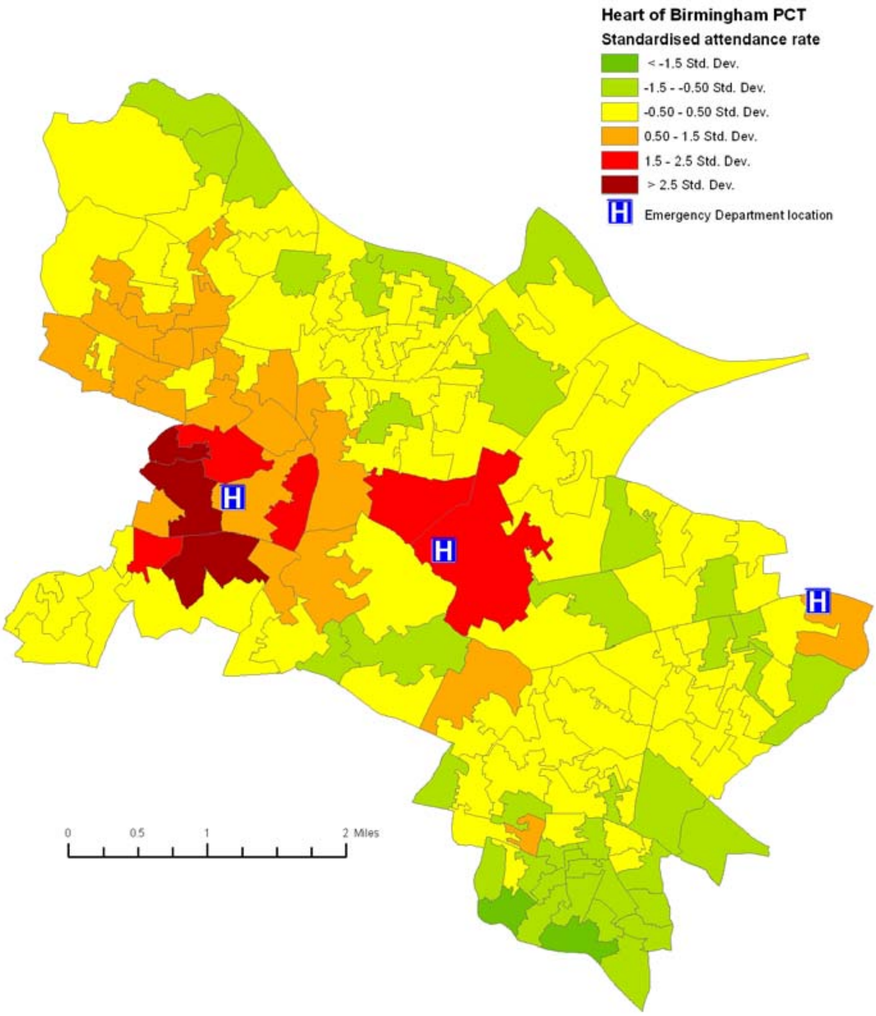
Map 9.7: Emergency Department attendance rate variation in Heart of Birmingham PCT, 2007/2008



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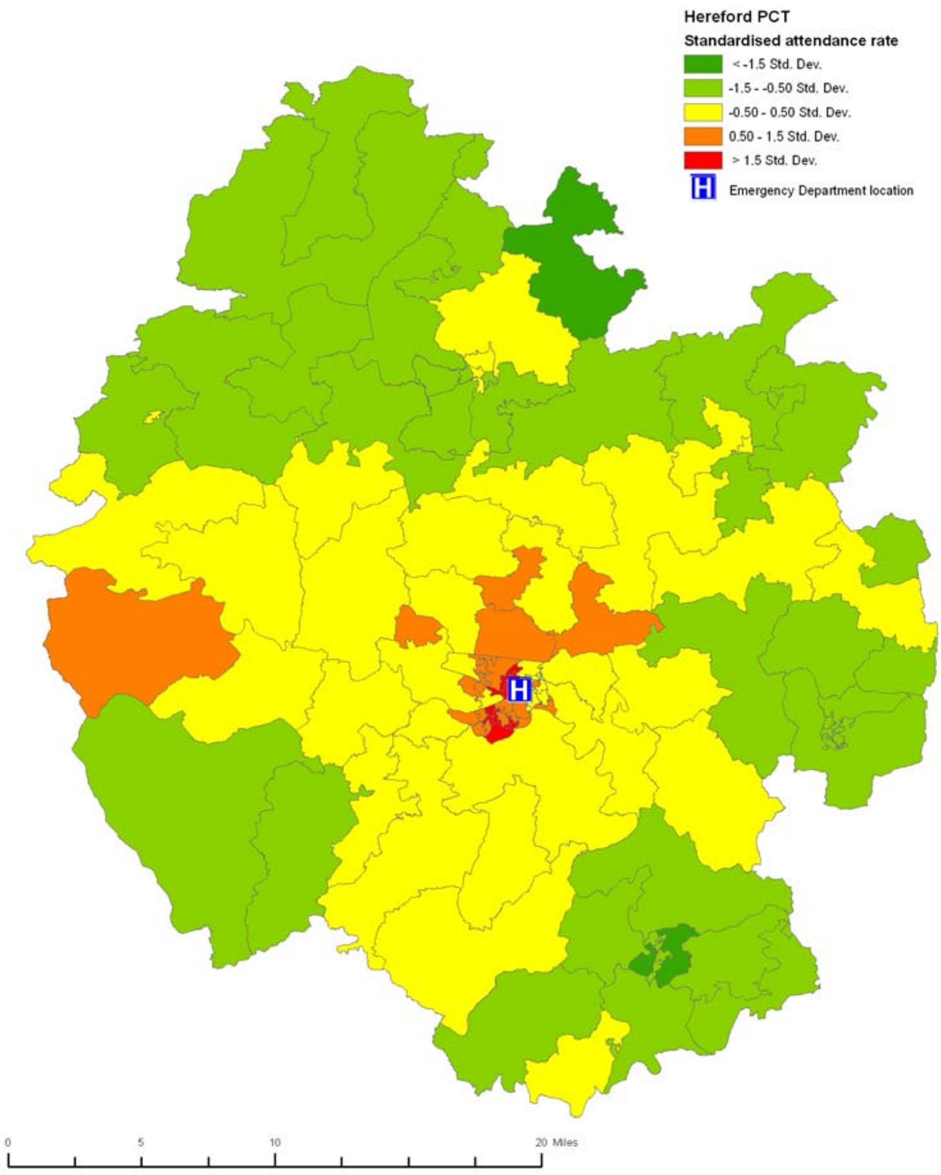
Map 9.8: Emergency Department attendance rate variation in Hereford PCT, 2007/20



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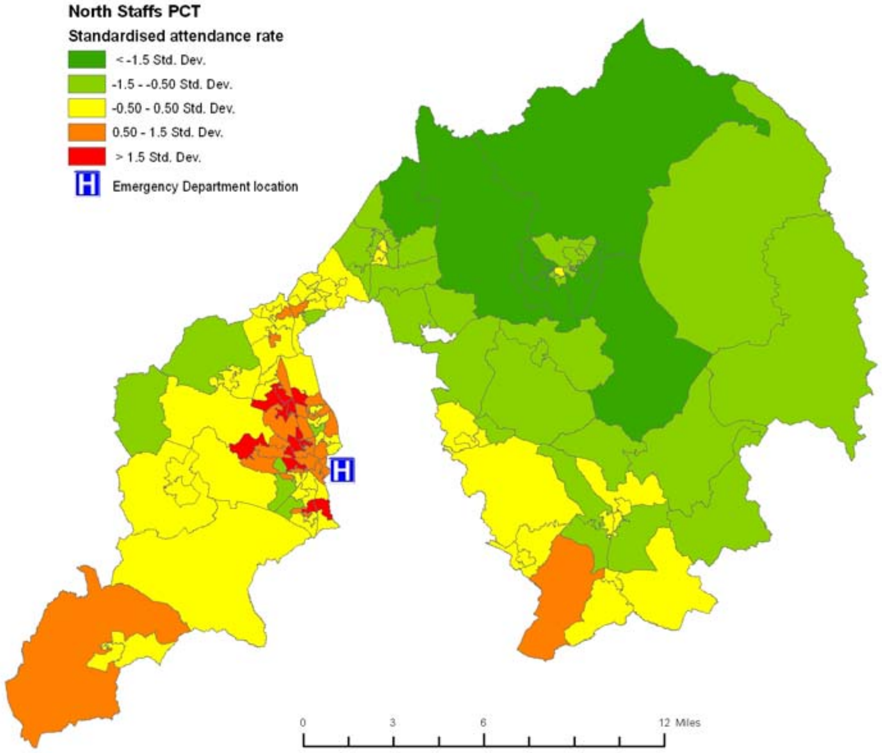
Map 9.9: Emergency Department attendance rate variation in North Staffordshire PCT, 2007/2008



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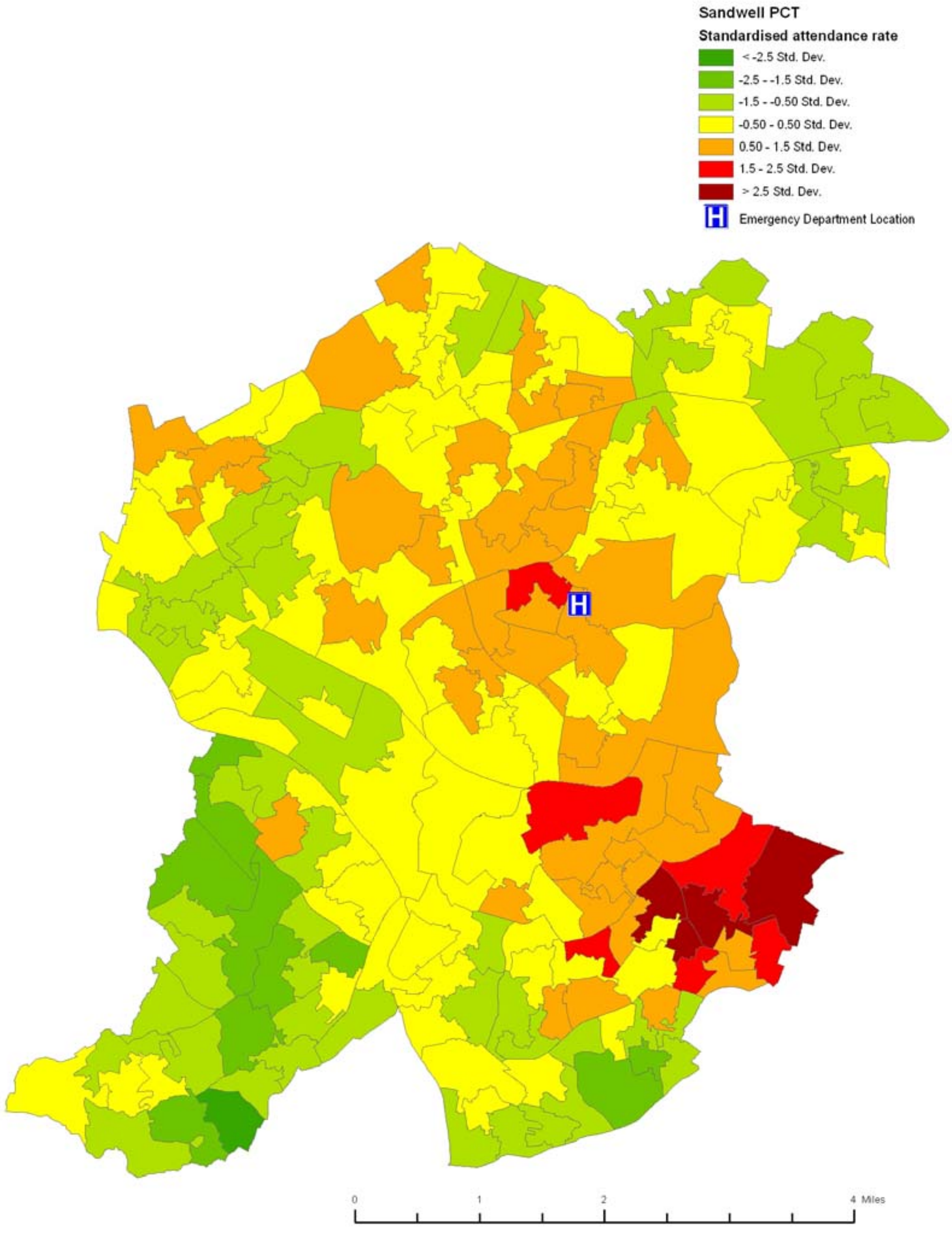
Map 9.10: Emergency Department attendance rate variation in Sandwell PCT, 2007/2008



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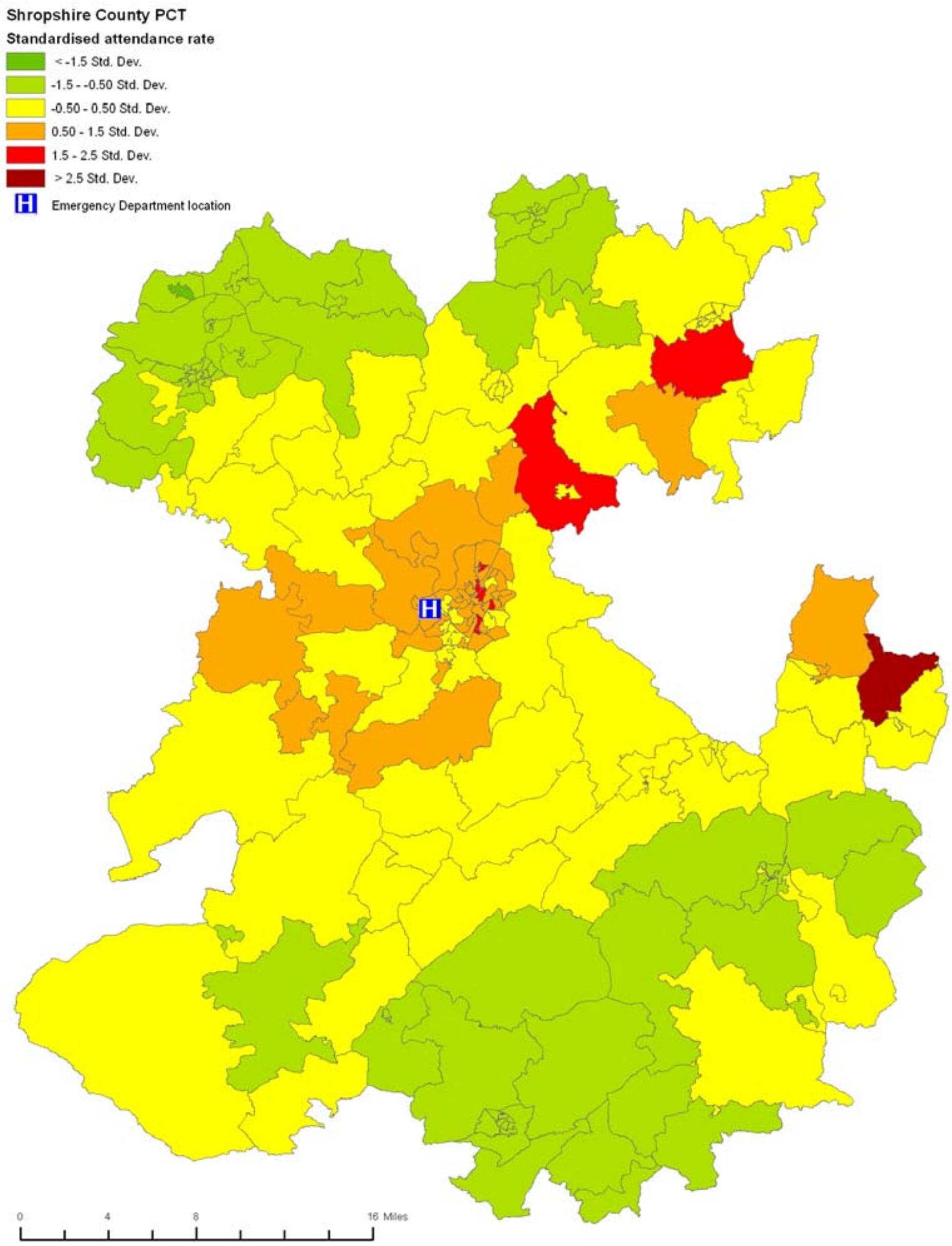
Map 9.11: Emergency Department attendance rate variation in Shropshire County PCT, 2007/2008



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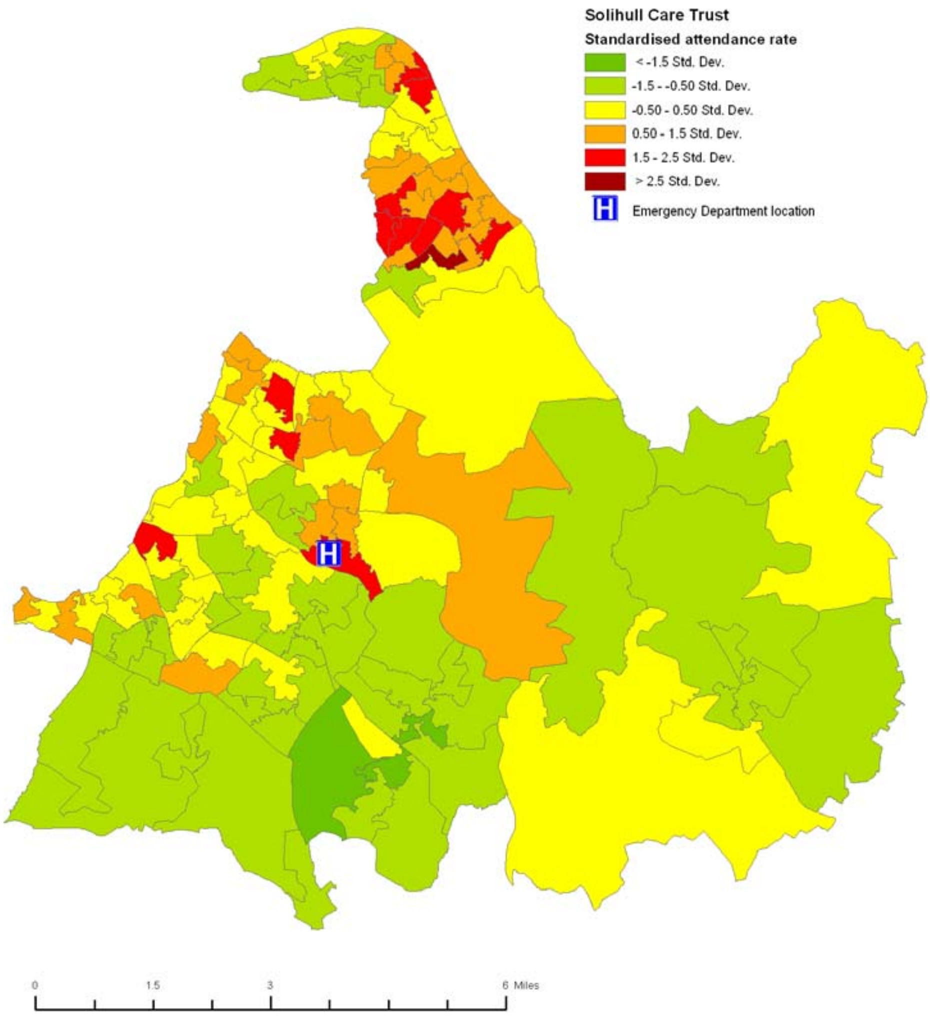
Map 9.12: Emergency Department attendance rate variation in Solihull PCT, 2007/2008



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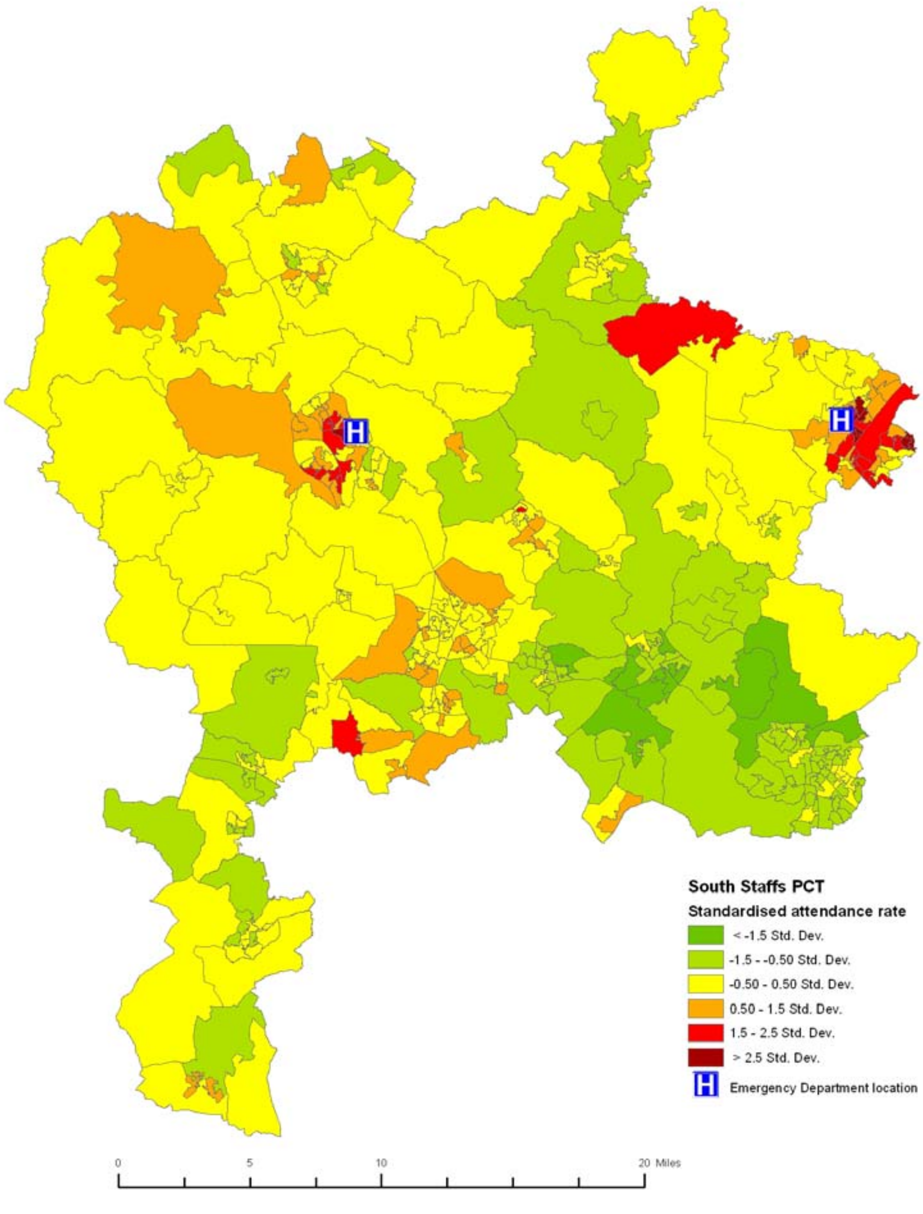
Map 9.13: Emergency Department attendance rate variation in South Staffordshire PCT, 2007/2008



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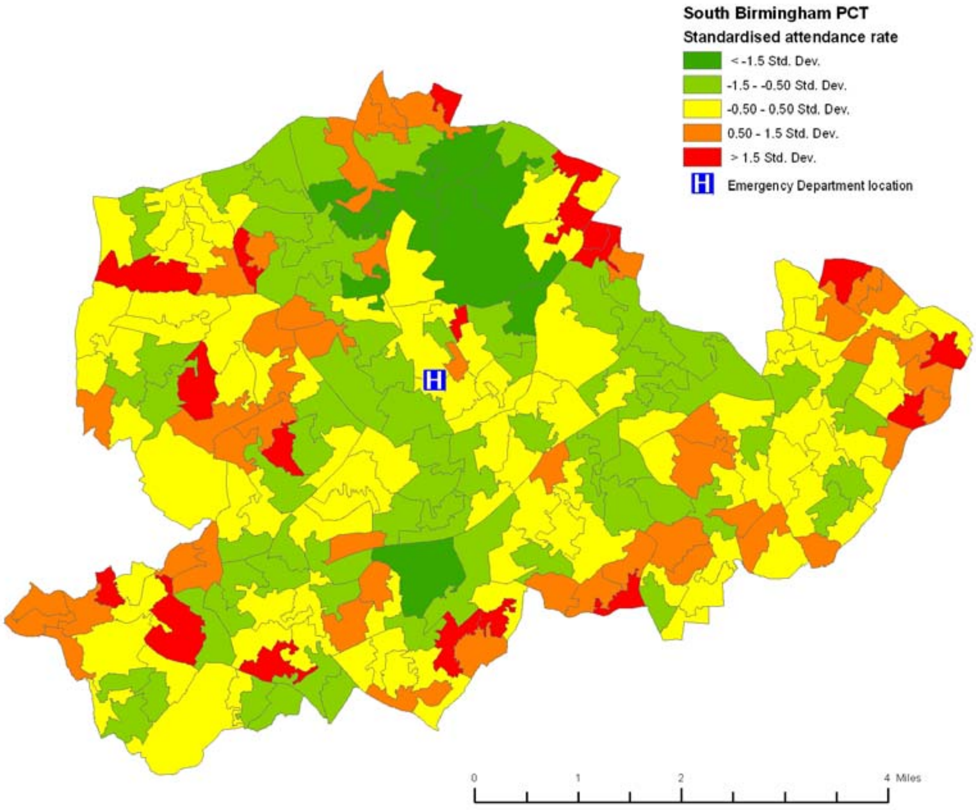
Map 9.14: Emergency Department attendance rate variation in South Birmingham PCT, 2007/2008



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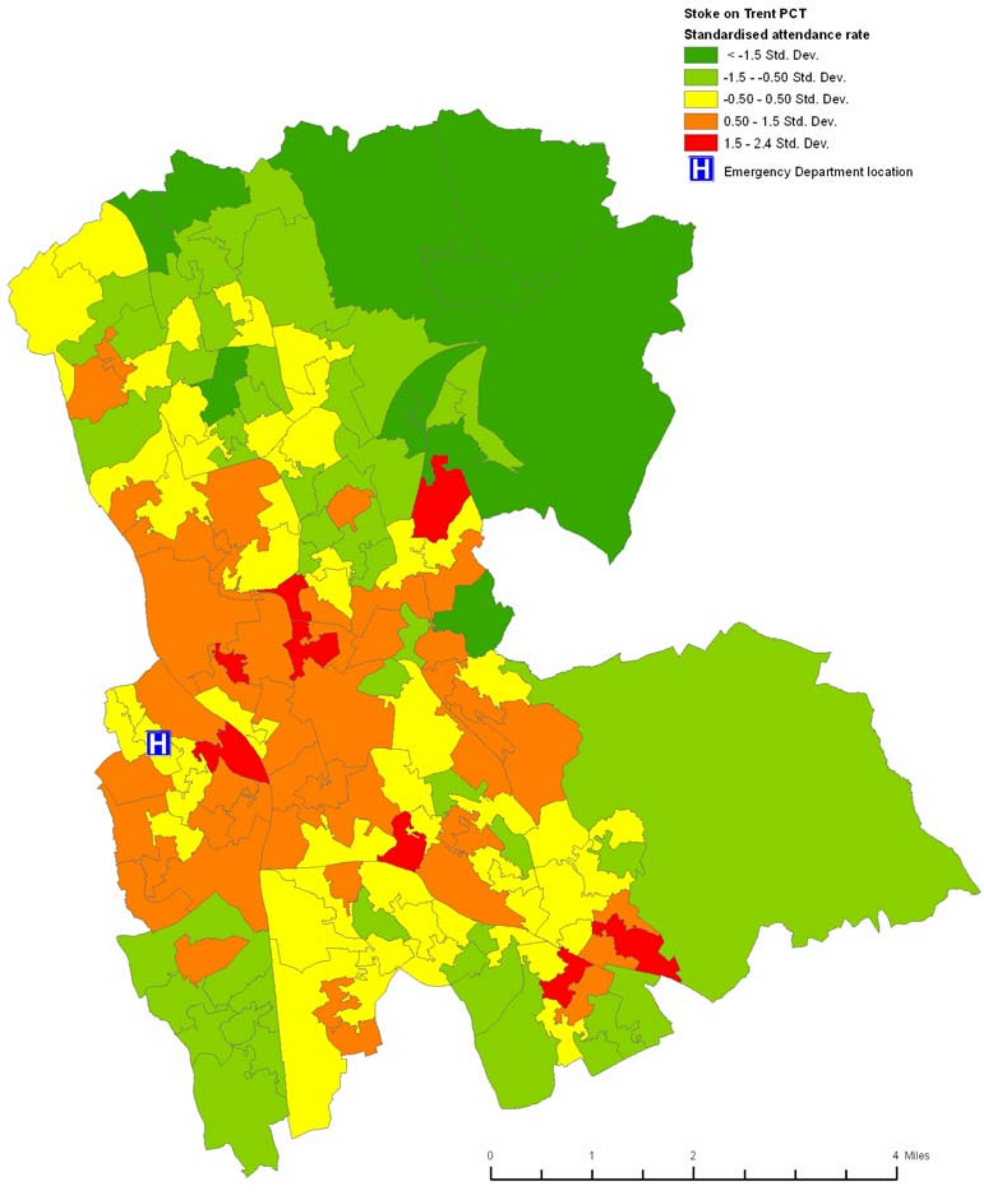
Map 9.15: Emergency Department attendance rate variation in Stoke-on-Trent PCT, 2007/2008



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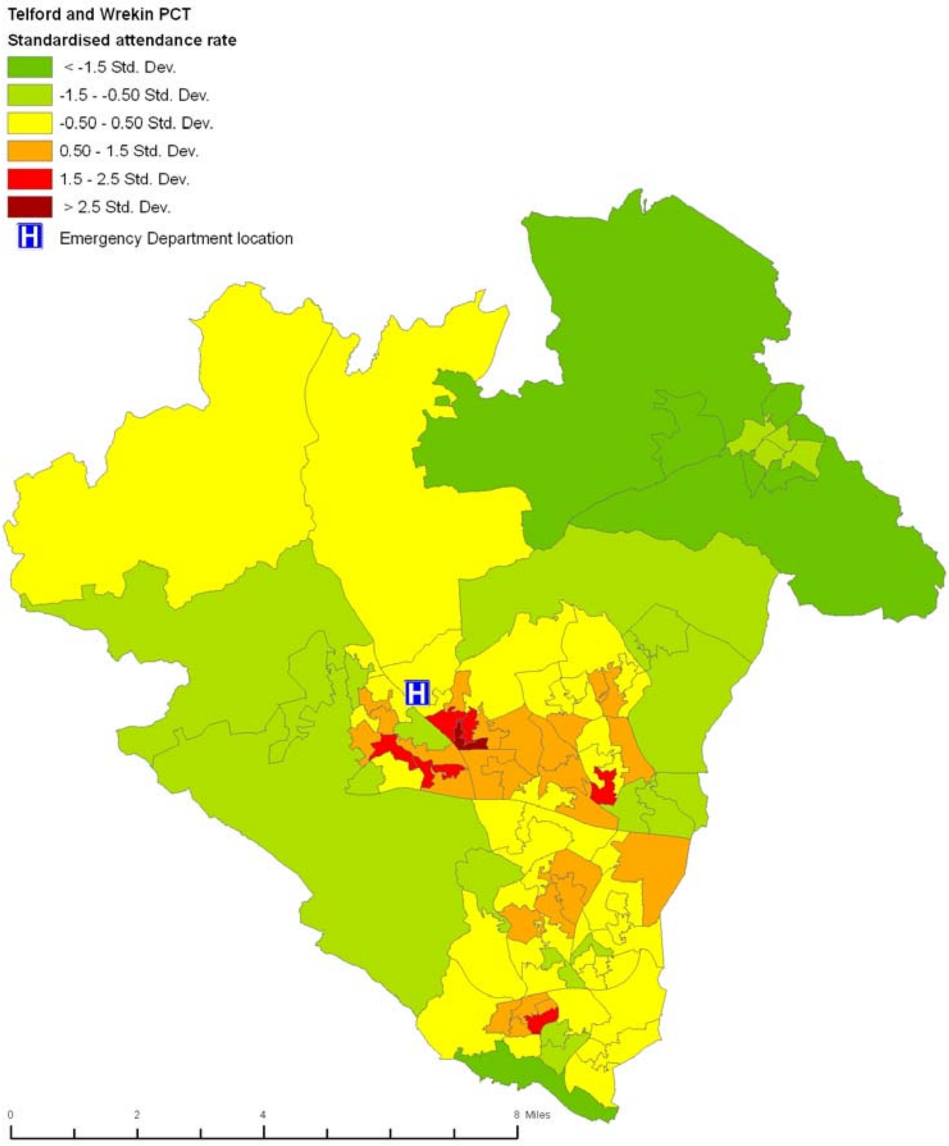
Map 9.16: Emergency Department attendance rate variation in Telford and Wrekin PCT, 2007/2008



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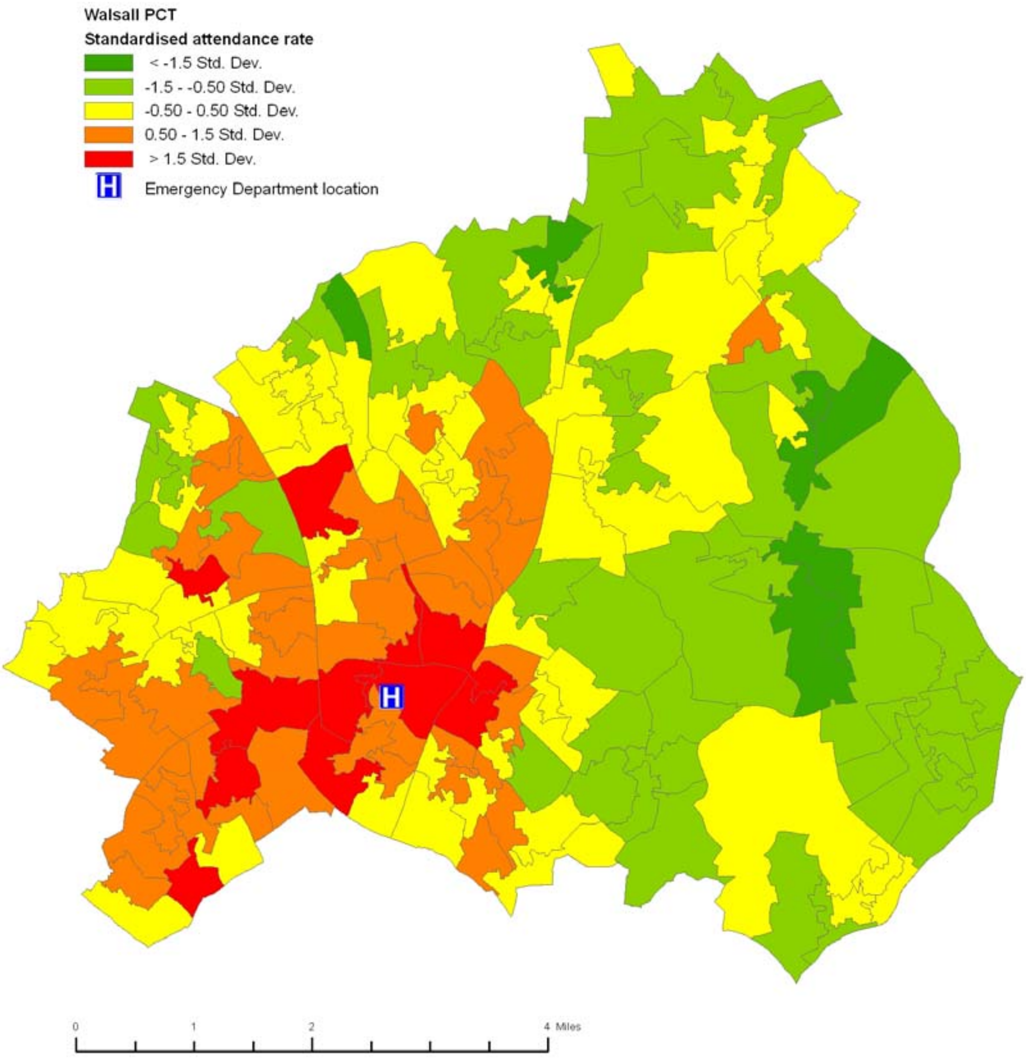
Map 9.17: Emergency Department attendance rate variation in Walsall PCT, 2007/2008



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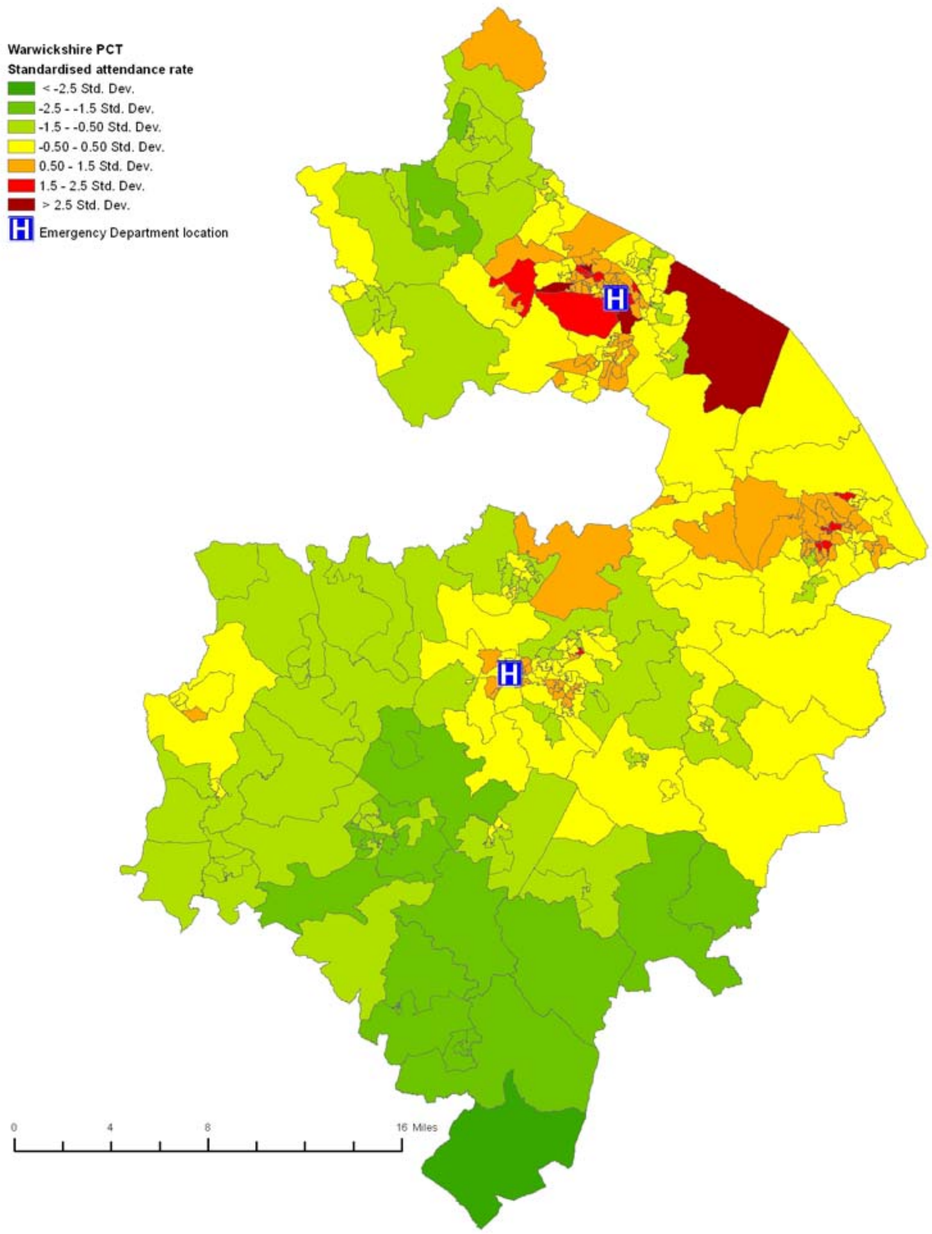
Map 9.18: Emergency Department attendance rate variation in Warwickshire PCT, 2007/2008



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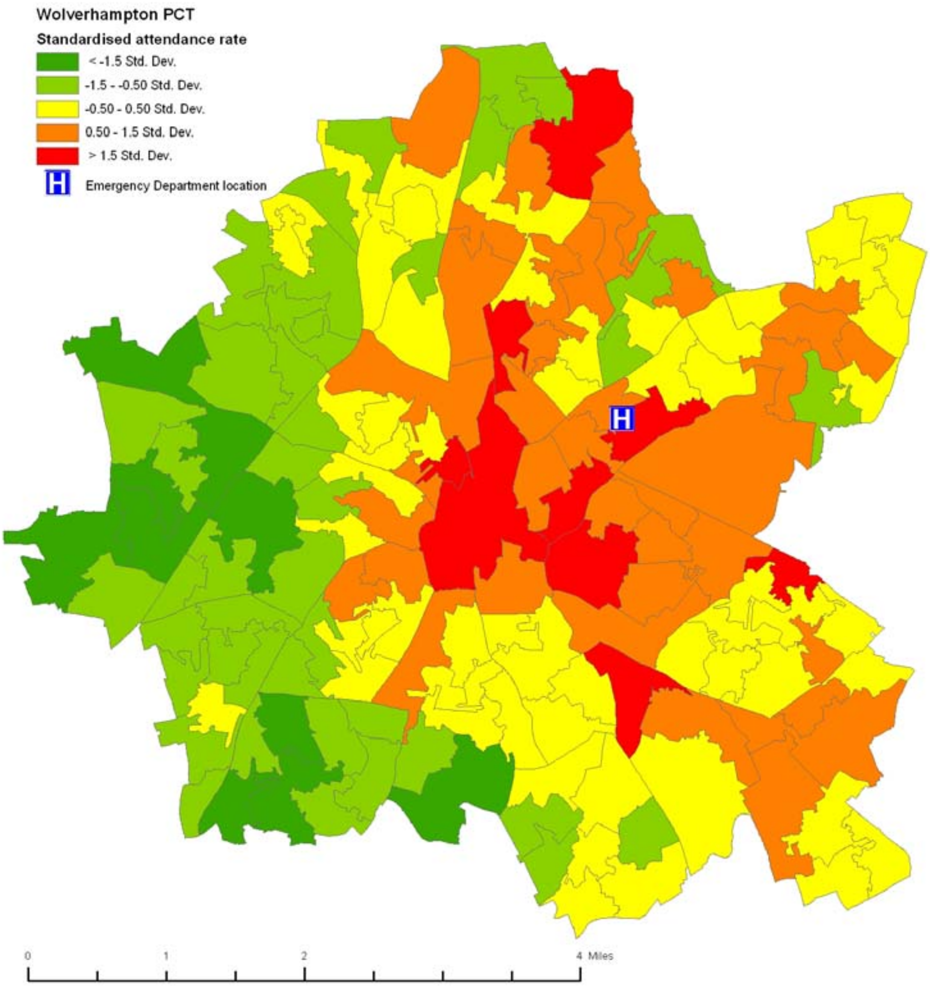
Map 9.19: Emergency Department attendance rate variation in Wolverhampton City PCT, 2007/2008



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Map 9.20: Emergency Department attendance rate variation in Worcestershire PCT, 2007/2008

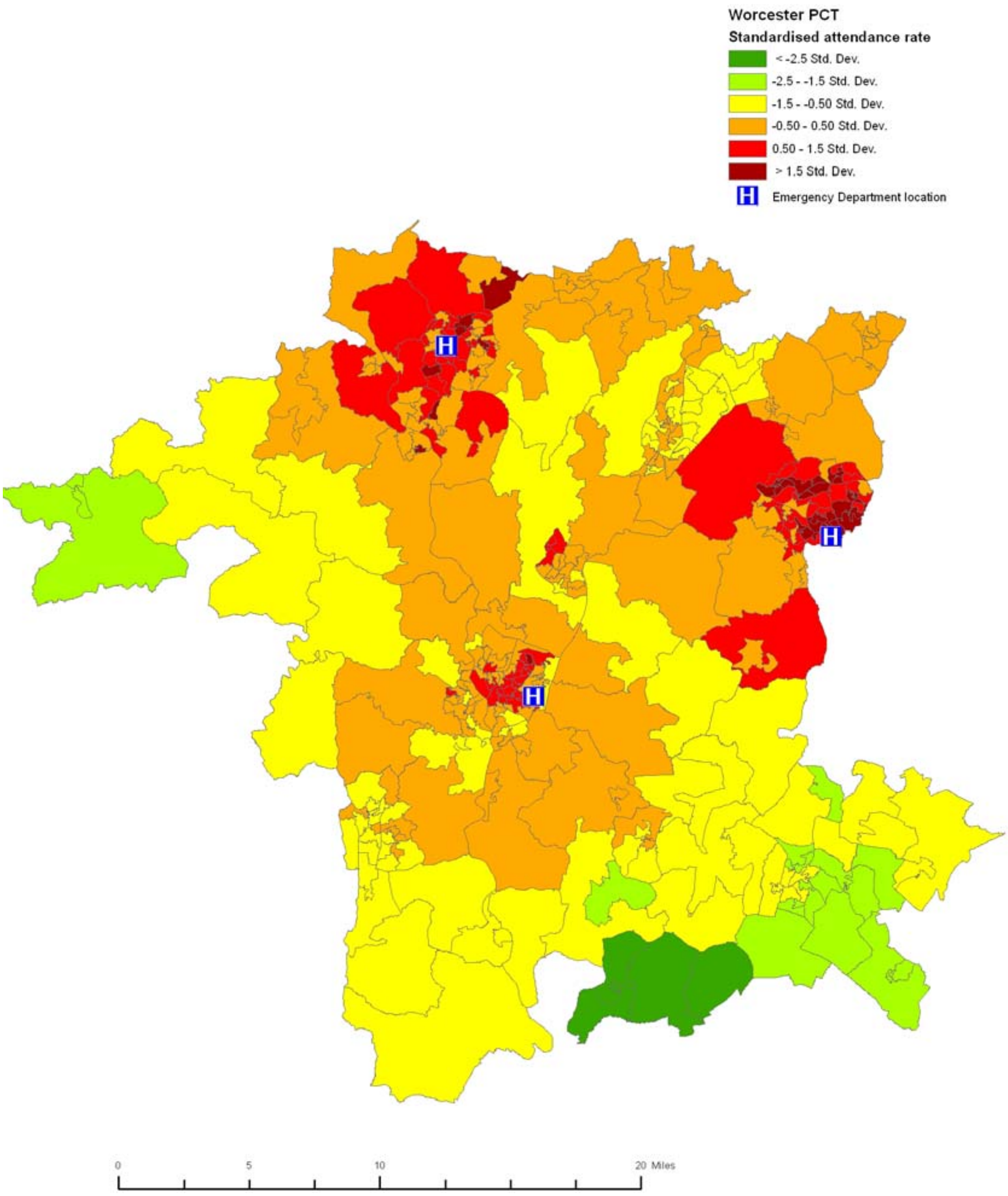

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Figure 9.1: Simple linear regression of distance from ED on standardised ED attendance rate of LSOAs in the West Midlands 2007/2008

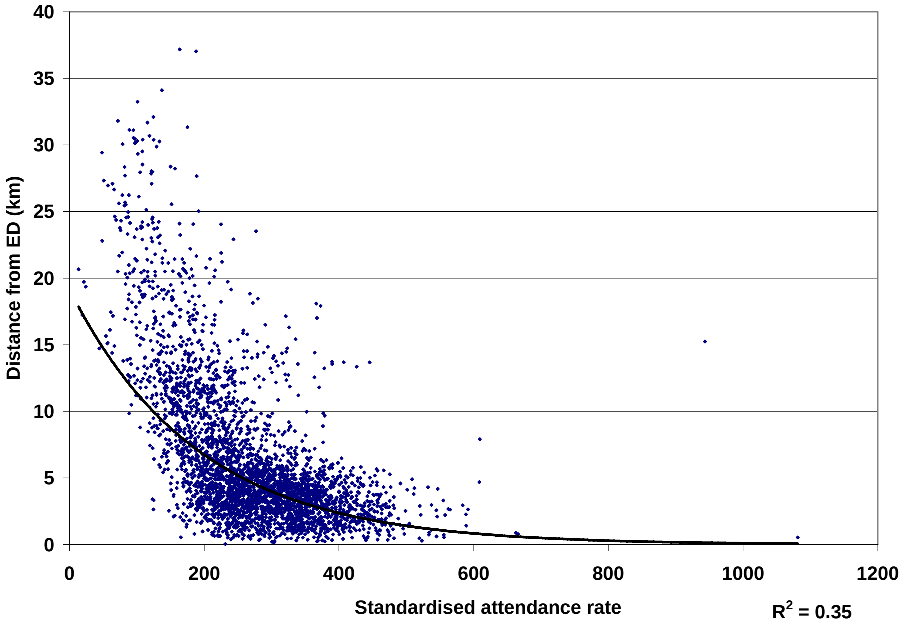

Figure 9.2: Simple linear regression of income deprivation on standardised ED attendance rate of LSOAs in the West Midlands 2007/2008

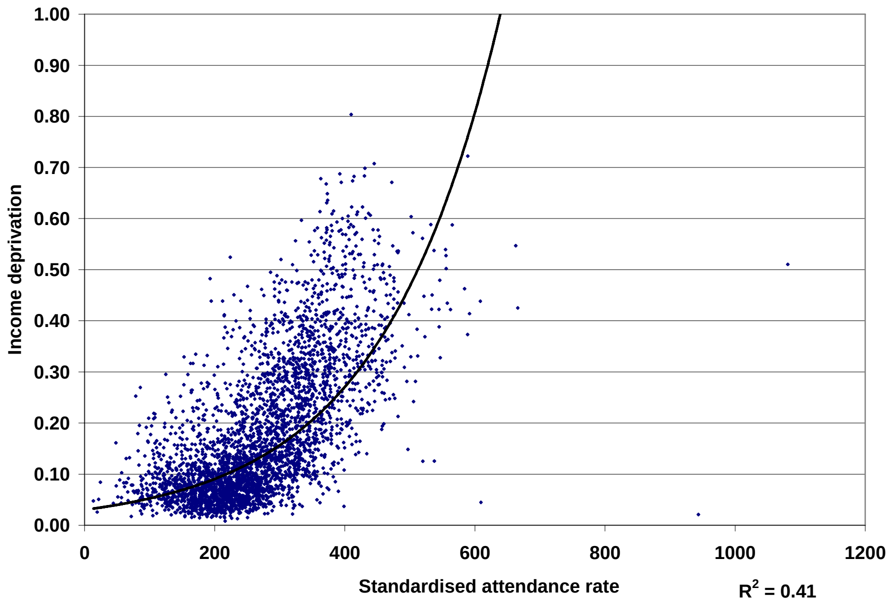

Table 9.1: Summary of the regression model results for distance from ED, deprivation and standardised attendance rate

Sq. root rate	Coef.	Std. Err.	t	P>t	Standardised coefficient
Km from ED	-0.251	0.010	-25.49	0.000	-0.474
Income deprivation	10.869	0.350	31.06	0.000	0.509
Distance / income	-0.123	0.067	-1.85	0.066	-0.035
Constant	15.944	0.079	202.41	0.000	

"This work is based on data provided with the support of the ESRC and JISC and uses boundary material which is copyright of the Crown and the ED-LINE Consortium"

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CHAPTER TEN: ACCIDENT AND EMERGENCY ACTIVITY IN THE WEST MIDLANDS

10.1 Introduction

The quality and reliability of Accident and Emergency (A&E) data has historically been poor particularly in comparison to hospital inpatient data. The cause of this is probably related to the coarse tariff structure used for A&E admissions; only three levels of care complexity and cost exist in this structure. This is in contrast to the relatively complex structure based on healthcare resource groups and length of stay, all with differing tariffs, used for hospital in patients which has resulted in continual improvements in this data quality and completeness.

As the pressure grows on Primary Care Trusts (PCTs) to reduce the volume of patients that require hospital care, both as part of limiting healthcare costs and as part of the government agenda to move care into the community and closer to patient's homes[1], they will increasingly need to know which patients are seeking hospital care and why. Only by being sure of these issues will PCTs be able to put appropriate plans in place to move care out of secondary care. Whilst this has started to be possible for hospital in patients and out patients the poor quality of the A&E data has presented perennial issues for commissioners in drawing definite conclusions about A&E activity.

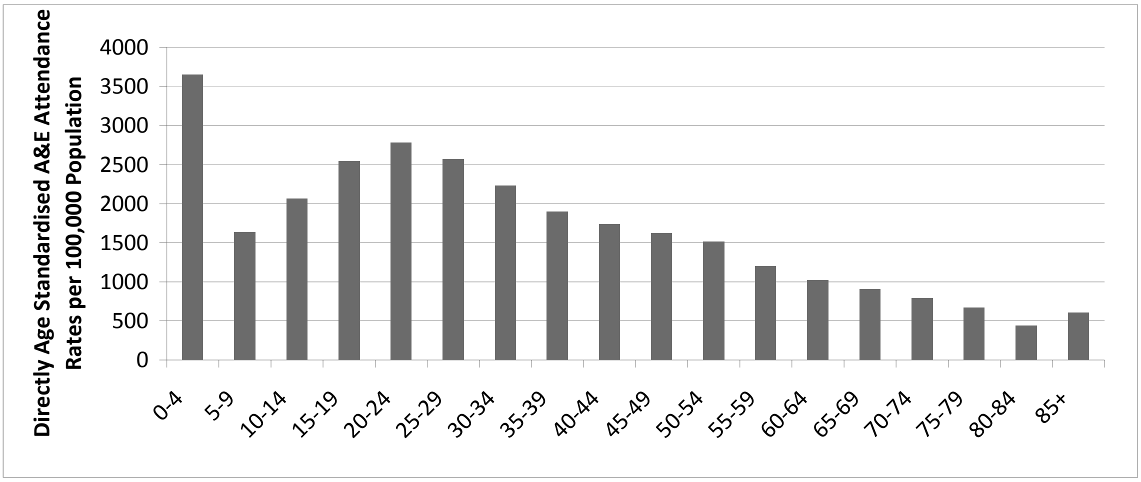
£92 million was spent by PCTs in 2007/8 on approximately 1.6million A&E attendances.

The data presented below is taken from the West Midlands region commissioning A&E dataset for the financial year 2007/8 (latest full year available).

10.2 Age and Sex Demographics of A&E Attendees

Directly age standardised attendance rates suggest that it is the very young (0-4 years) and young adults (15-29) have the highest rate of A&E attendance. This is in contrast to hospital admissions where the elderly have much higher rates (Figure 10.1). 51% of people attending A&E were male.

Figure 10.1: Directly Age Standardised A&E Attendance Rate for the West Midlands in 2007/8



Source: West Midlands region commissioning A&E dataset

10.3 When are People Attending A&E?

The number of people attending A&E is significantly greater in the spring and autumn than in the winter. This is initially counter-intuitive since hospital inpatient activity is greatest in the winter (Figure 10.2). However, this pattern may reflect the demographics of those using A&E (i.e. young children and young adults) that are likely to be substantially different from those referred directly into hospital.

Intuition may also suggest that A&E attendances should be greater at weekends because primary care services are often less accessible than during the week. However, the data shows that there is marked periodicity in A&E attendance with spikes of attendance on almost every Tuesday throughout the year (Figure 10.3). The average number of A&E attendances is significantly higher on Tuesday than any other day of the week (t-test p-value <0.0001) (Figure 10.4). The reasons for this periodicity are not immediately clear but have implications for primary care in terms of ensuring satisfactory number of community staff to prevent inappropriate A&E use and for secondary care in terms of capacity.

Figure 10.2: Mean number of A&E Attendances in the West Midlands by Month in 2007/8 with 95% Confidence Intervals

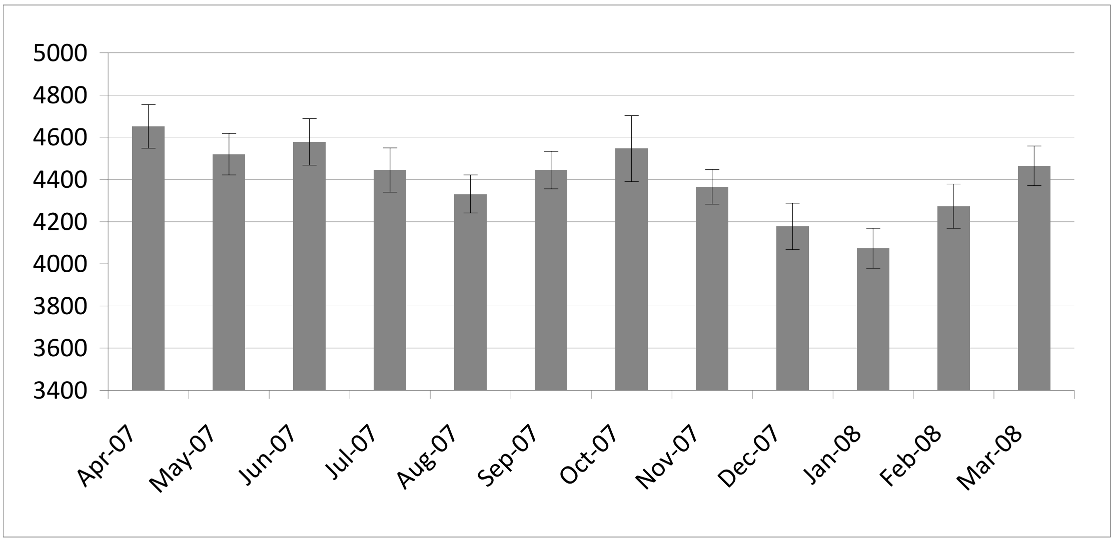


Figure 10.3: Frequency Chart of the Number of A&E Attendances per Day in the West Midlands in 2007/8

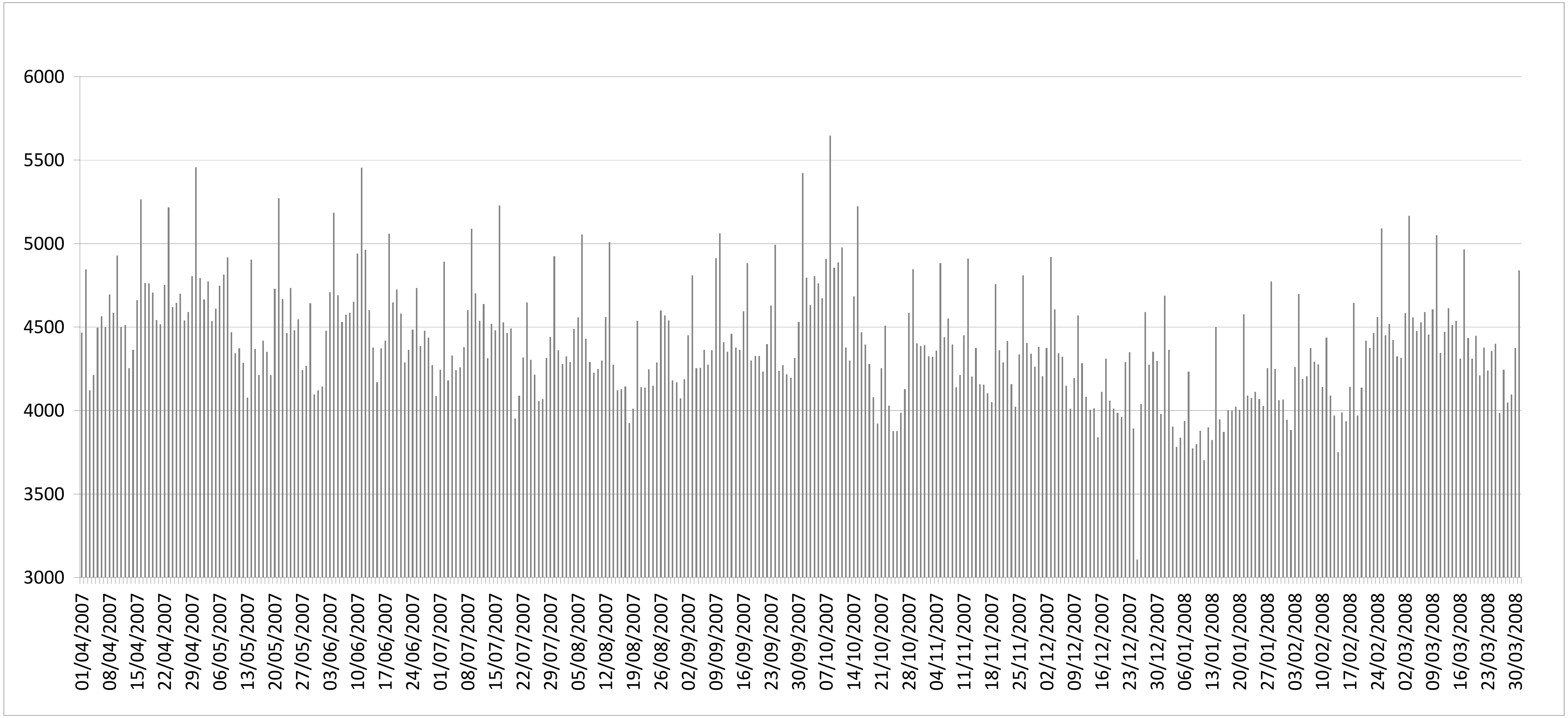
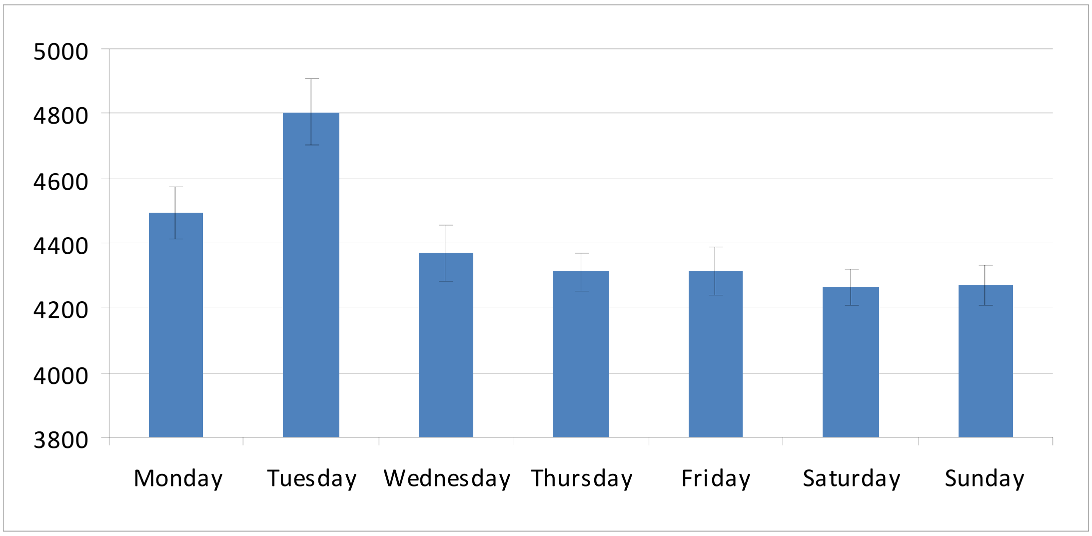


Figure 10.4: Mean number of A&E Attendances in the West Midlands by Day of the Week in 2007/8 with 95% Confidence Intervals

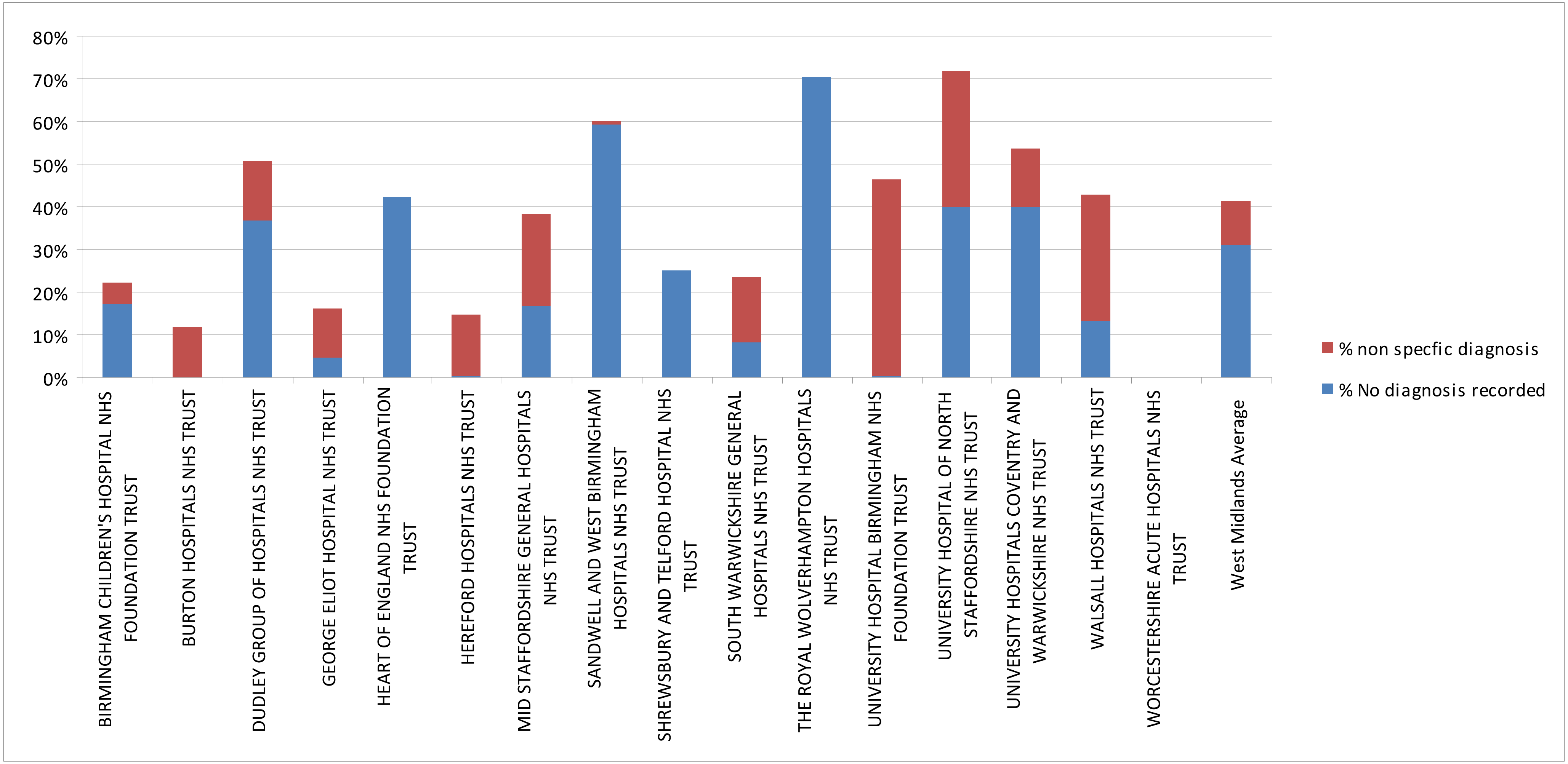


10.4 Do we know what is really happening whilst patients are in A&E?

In order to be able to provide alternative services to A&E or improve access to community services to reduce the need for A&E attendance it is vital to know what problems people are seeking advice for. In the West Midlands over 31% of all people attending A&E had no diagnosis recorded (i.e. field was blank) and a further 10% had a non-specific diagnosis (either coded as "diagnosis not classifiable" or "no actual diagnosis". The completeness of reporting varied substantially between trusts from 100% completeness to less than 30%, which severely limits the ability to compare the type of activity occurring between trusts. (Figure 10.5).

41% of A&E attendances had no diagnosis recorded. This equates to about 660,000 attendances that PCTs paid for (£37.7 million) but had no indication of why the patient attended.

Figure 10.5: Percentage of A&E Attendances that have no diagnosis or a non-specific diagnosis recorded



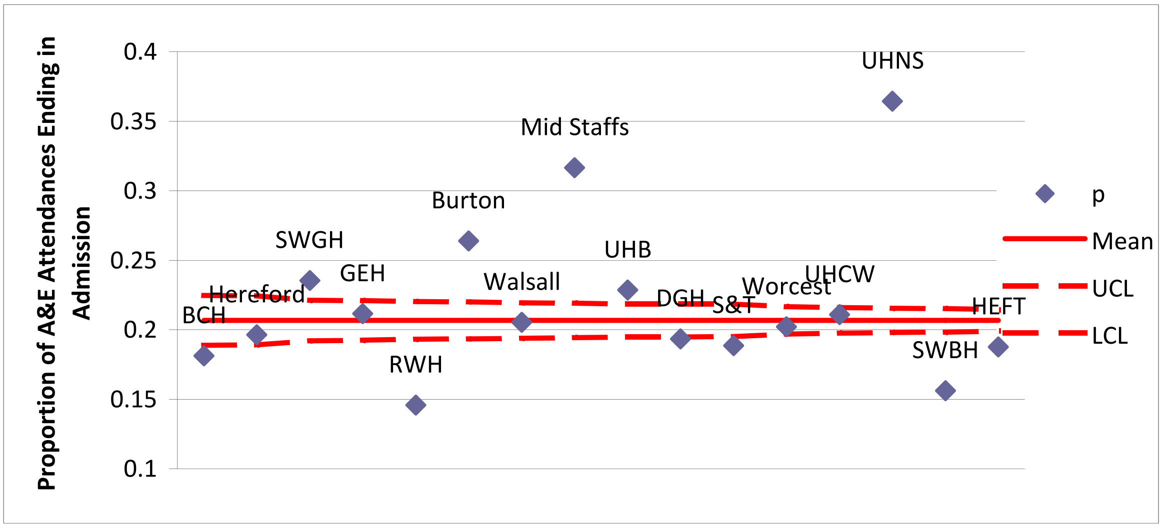
36.2% of people attending A&E did not have any investigation recorded. A further 12.8% did not require any investigation. Therefore up to 49.1% of people attending A&E may not have required any investigation.

41.0% of people attending A&E did not have the treatment they received recorded. 10.1% required no treatment and 20.0% required advice only. Therefore up to 71.2% of people attending A&E may not have required any treatment other than advice. This equates to over 800,000 attendances that PCTs paid for but had no indication of what treatment was received.

10.5 Admissions from A&E

The discharge of patients from A&E is a well recorded field and is very complete. The proportion people admitted to hospital following their A&E attendance differs significantly between trusts across the region and by a factor of over 2.5. Admissions to hospital, even short stays, are substantially more expensive than A&E attendances therefore commissioners should investigate assessment, referral and treatment pathways in departments with significantly higher than average admission rates.

Figure 10.6: Statistical Process Control Chart of the Proportion of A&E Attendances that End in Admission to Hospital in the West Midlands in 2007/8

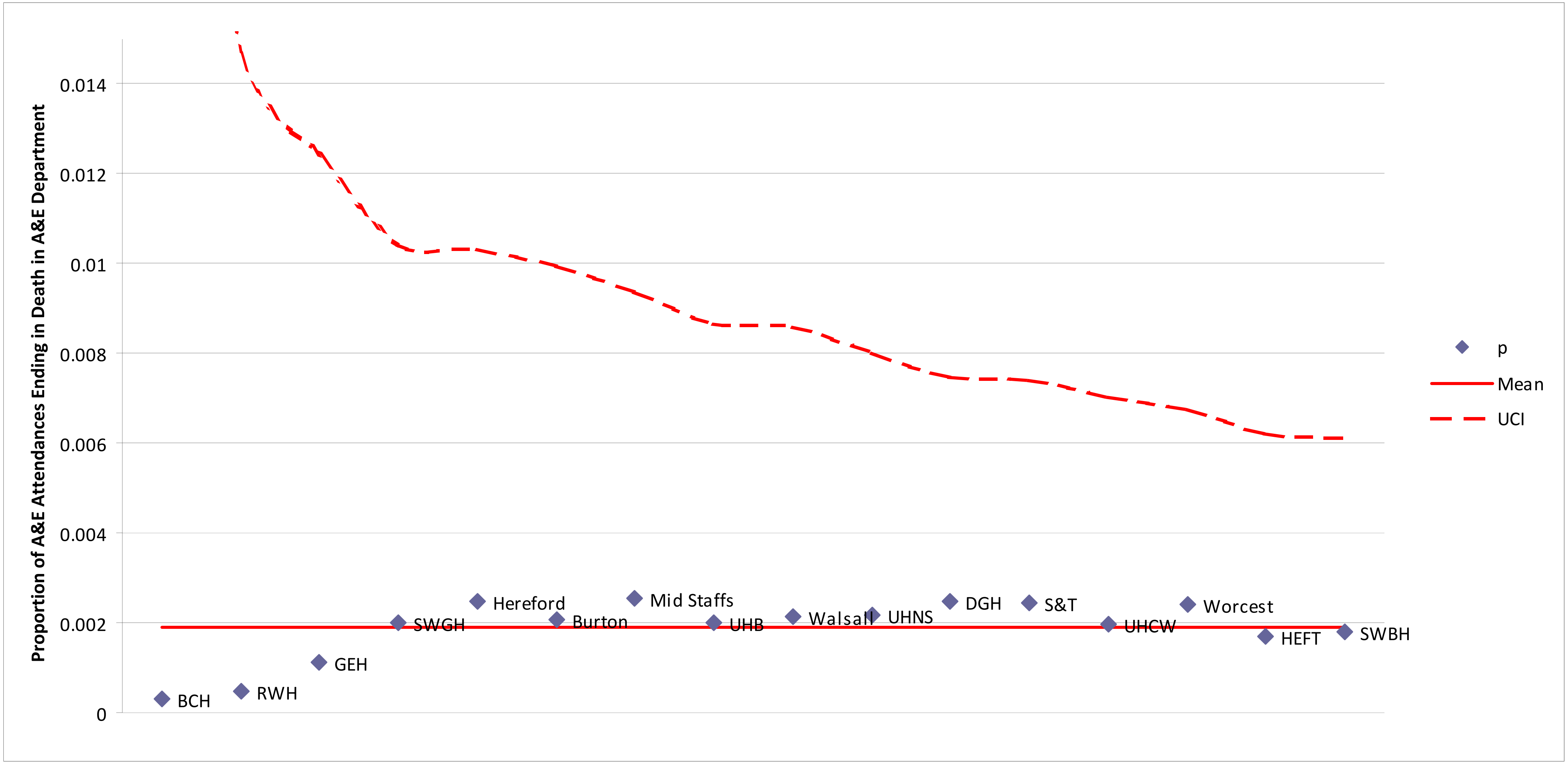


BIRMINGHAM CHILDREN'S HOSPITAL NHS FOUNDATION TRUST	BCH
THE ROYAL WOLVERHAMPTON HOSPITALS NHS TRUST	RWH
GEORGE ELIOT HOSPITAL NHS TRUST	GEH
SOUTH WARWICKSHIRE GENERAL HOSPITALS NHS TRUST	SWGH
HEREFORD HOSPITALS NHS TRUST	Hereford
BURTON HOSPITALS NHS TRUST	Burton
MID STAFFORDSHIRE GENERAL HOSPITALS NHS TRUST	Mid Staffs
UNIVERSITY HOSPITAL BIRMINGHAM NHS FOUNDATION TRUST	UHB
WALSALL HOSPITALS NHS TRUST	Walsall
UNIVERSITY HOSPITAL OF NORTH STAFFORDSHIRE NHS TRUST	UHNS
DUDLEY GROUP OF HOSPITALS NHS TRUST	DGH
SHREWSBURY AND TELFORD HOSPITAL NHS TRUST	S&T
UNIVERSITY HOSPITALS COVENTRY AND WARWICKSHIRE NHS TRUST	UHCW
WORCESTERSHIRE ACUTE HOSPITALS NHS TRUST	Worcest
HEART OF ENGLAND NHS FOUNDATION TRUST	HEFT
SANDWELL AND WEST BIRMINGHAM HOSPITALS NHS TRUST	SWBH

10.6 Deaths in A&E

The proportion of deaths occurring in A&E departments across the region does not differ significantly between trusts.

Figure 10.7: Statistical Process Control Chart of the Proportion of A&E Attendances that End in Death in the A&E Department in the West Midlands in 2007/8



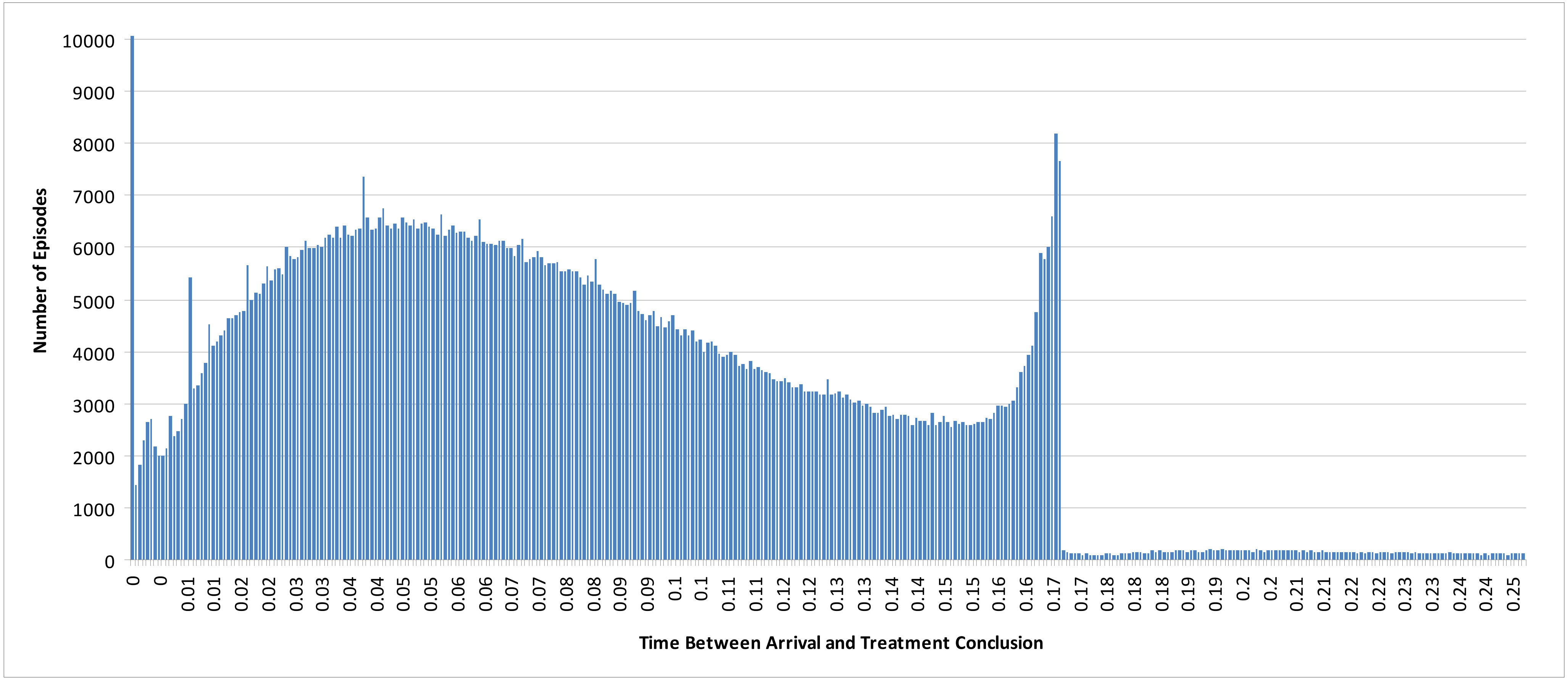
10.7 Waiting Times

The A&E four-hour wait target is an important and high profile performance measure for hospital trusts. Waiting time refers to the time between the patient arriving in A&E and being discharged or transferred and the national target is that 98% of patients wait less than four hours[2]. On average, 98.16% of patients waited less than four hours in the West Midlands in 2007/8 according to the results of the Healthcare Commission's Annual Health Checks[3].

Examining the data however reveals that 23.8% of people have insufficient details recorded to allow the waiting time to be calculated e.g. no arrival or discharge time and 6.7% have a waiting time of zero recorded. These are equivalent to about 492,000 people. With this level of data incompleteness there is no way that a commissioner can be reassured that their local trust's proportion of people waiting less than four hours is accurate.

The four-hour wait target has produced a spike in the frequency distribution of waiting times coming to a peak at 3 hours 59 minutes with a remarkably step drop off after 4 hours. The average number of people discharged in the five minutes before 4 hours (6849 per minute) and the five minutes after (130 per minute) are significantly different (t test p value <0.0001).

Figure 10.8: Frequency Distribution of A&E waiting times in the West Midlands in 2007/8



10.8 Conclusions

- The current A&E dataset is of variable quality and completeness but despite this it can produce useful information that can be used to help plan services.
- Completeness and accuracy particularly around diagnostics/investigations/treatments is very poor.
- Validity of 4-hour waits is questionable due to data completeness issues.
- There were large and significant differences in the rate of admission to hospital from A&E across hospital trusts.
- There was no significant difference between the death rate of patients in A&E departments across the region.

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CHAPTER ELEVEN: MENINGOCOCCAL DISEASE IN THE WEST MIDLANDS: 1999-2008

Please note data for 2008 is provisional

11.1 Introduction

The Regional Epidemiology Unit of the Health Protection Agency (West Midlands) collates and analyses data from the three local Health Protection Units and NHS Trust laboratories from across the region. In this chapter, data from the enhanced surveillance scheme for meningococcal disease will be used to identify trends and describe epidemiological patterns from 1999 to 2008.

The HPA West Midlands Enhanced Meningococcal Disease Surveillance system collects a wide range of information on patient risk factors, unlike the statutory Notification Of Infectious Diseases system (NOIDS), which only collects basic patient information.

Meningococcal disease which primarily consists of meningococcal meningitis and meningococcal septicaemia is a systemic infection caused by *Neisseria meningitidis*.

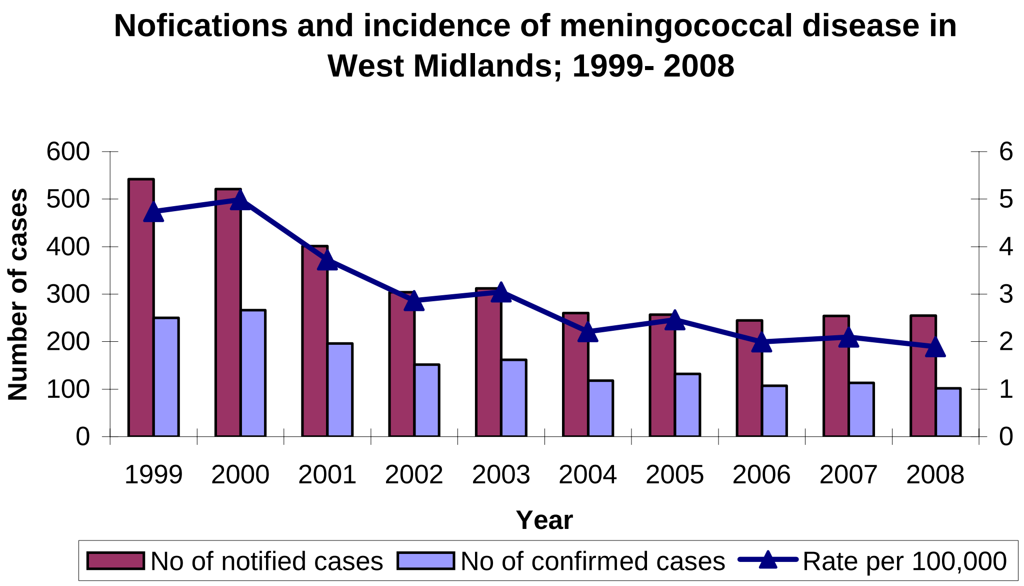
In England and Wales, meningococcal disease has been on a downward trend with about 120% fewer confirmed cases reported in 2008 (1262 cases) when compared with 1999 (2779 cases) [1].

A similar trend has been observed in the West Midlands with the highest number of cases reported in 1999 (250 confirmed cases at a rate of 4.7 per 100,000 population) and the least in 2008 (102 confirmed cases at a rate of 1.9 per 100,000 population) (Figure 11.1).

The incidence of meningococcal infection type B has consistently been higher than all the other types. Meningococcal type C has drastically decreased from 81 cases (32.4 per 100 population) in 1999 to just 2 cases (1.9 per 100 population) in 2008 (Figure 11.2). This is due to the phased introduction of the Meningococcal C (MenC) conjugate vaccine in 1999 in which the vaccine was offered to all children and adolescents 18 years and under [2]. MenC vaccine is now part of the routine Childhood Immunisation Programme in the UK.

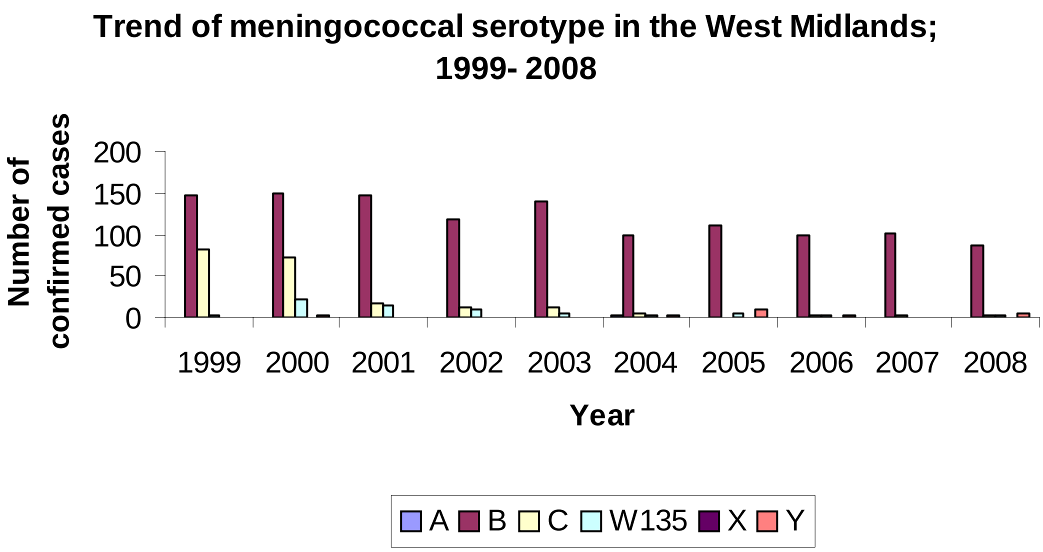
Overall, septicaemia accounted for approximately 50% of all confirmed meningococcal cases. However, in 2008, 33% of cases were septicaemia and 37% of cases were meningitis and about 15% were unknown. A clinical diagnosis of both septicaemia and meningitis has consistently accounted for less than 15% of all confirmed cases (Figure 11.3).

Figure 11.1: Notifications and incidence of meningococcal disease in West Midlands; 1999-2008



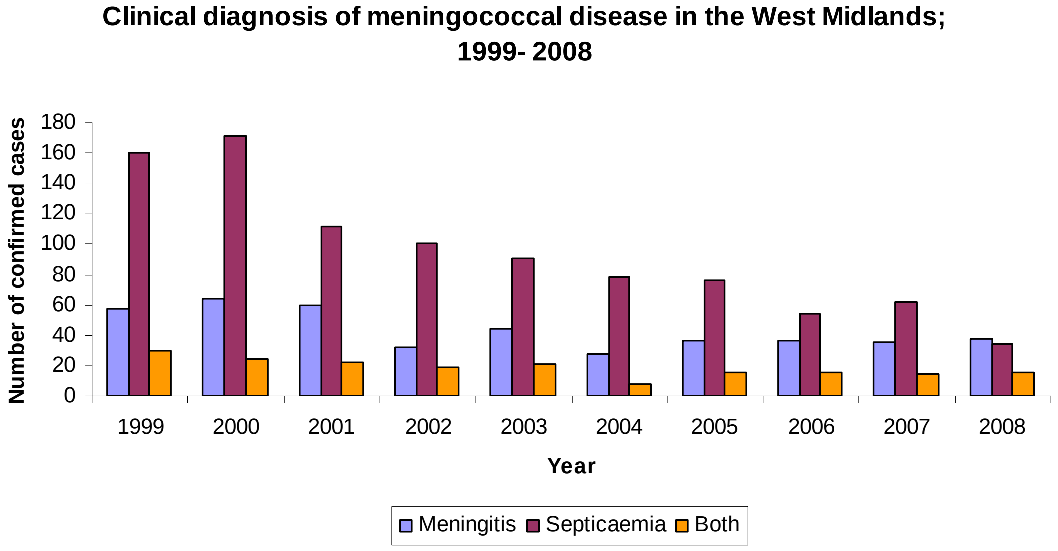
Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

Figure 11.2: Trend of meningococcal serotype in the West Midlands 1999-2008



Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

Figure 11.3: Clinical diagnosis of meningococcal disease in the West Midlands 1999- 2008

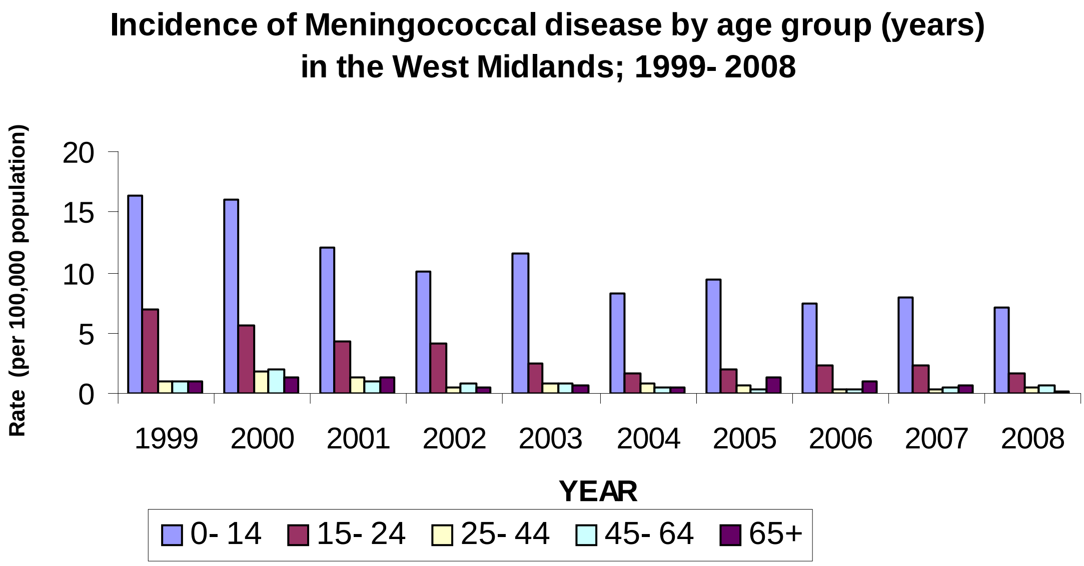


Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

11.2 Age, Sex and Ethnicity

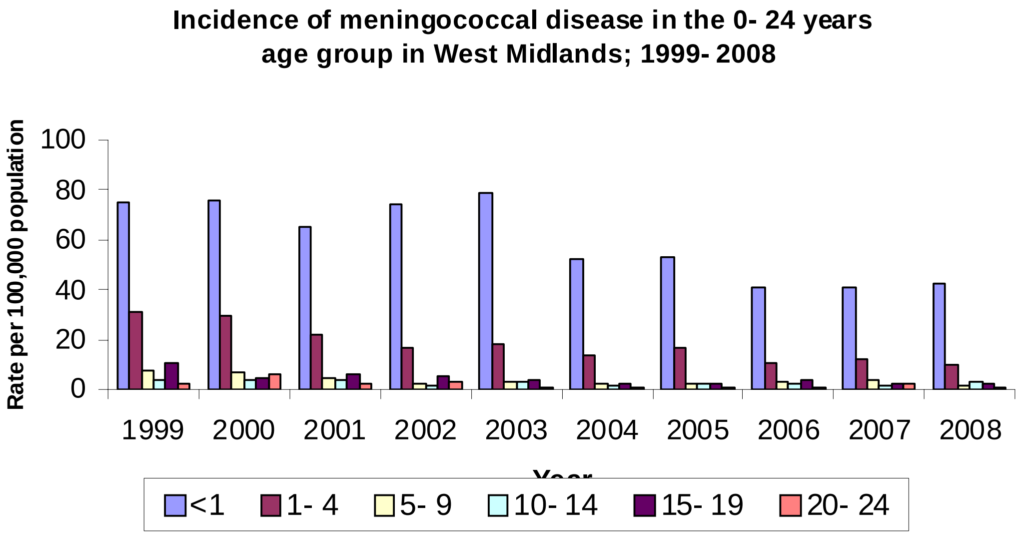
Ethnicity was known for about 58% of the cases, and of these, the white ethnic group accounted for 89% (830/932). The rate of infection is highest in the 0- 14 years age group but is predominantly in infants (<1 year) and pre school (1-4 years) children (Figures 11.4 and 11.5). Although the incidence rate over the years is almost consistently higher in males, higher numbers of cases were reported in females in the age group 25- 44 years and 65+ years (Figures 11.6 and 11.7).

Figure 11.4: Incidence of Meningococcal disease by age group (years) in the West Midlands 1999-2008



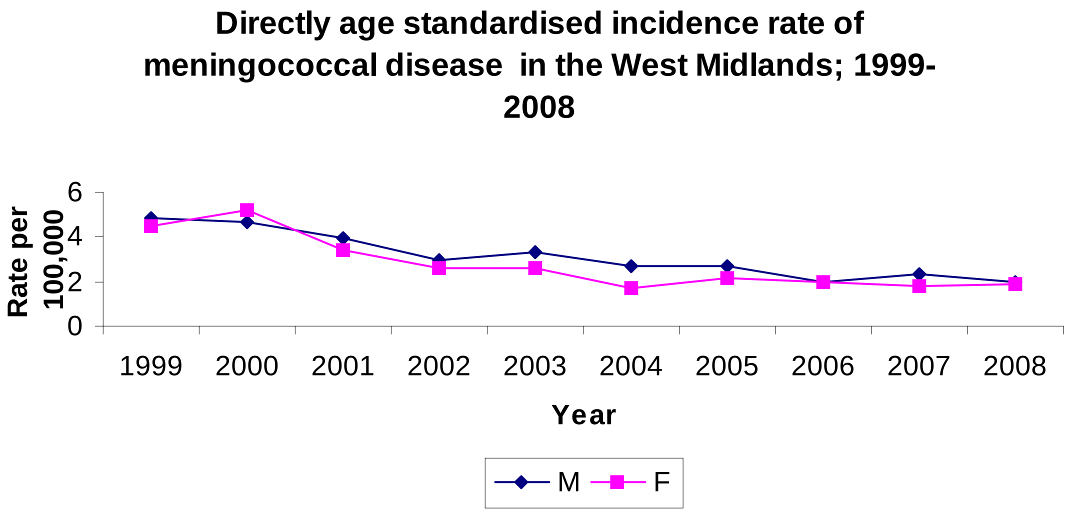
Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

Figure 11.5: Incidence of meningococcal disease in the 0-24 years age group in the West Midlands 1999-2008



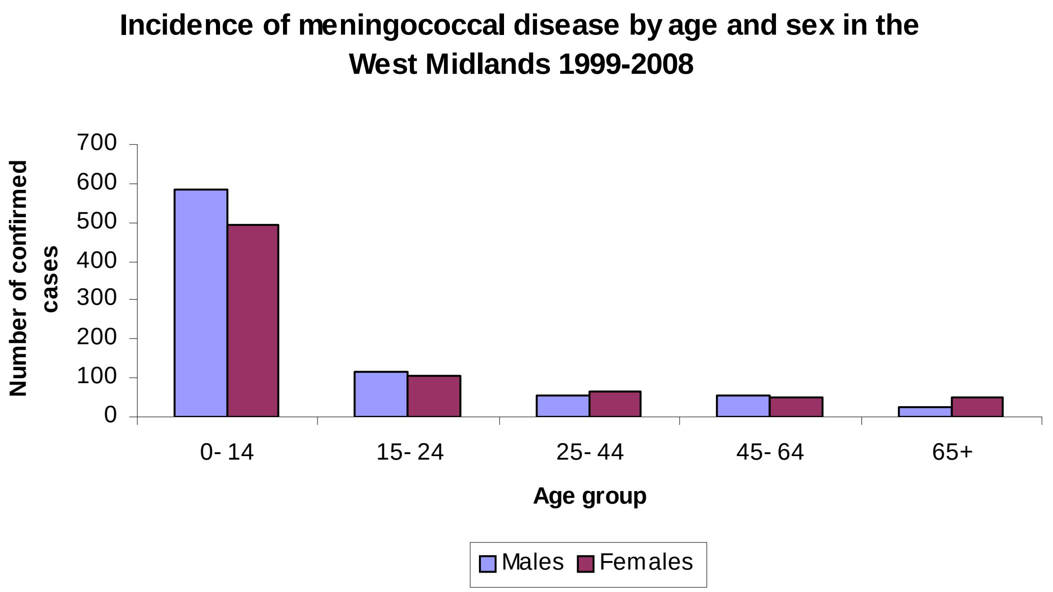
Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

Figure 11.6: Directly age standardised incidence of meningococcal disease in the West Midlands 1999-2008



Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

Figure 11.7: Incidence of meningococcal disease by age and sex in the West Midlands 1999 - 2008



Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

11.3 Meningococcal Disease by Primary Care Trust

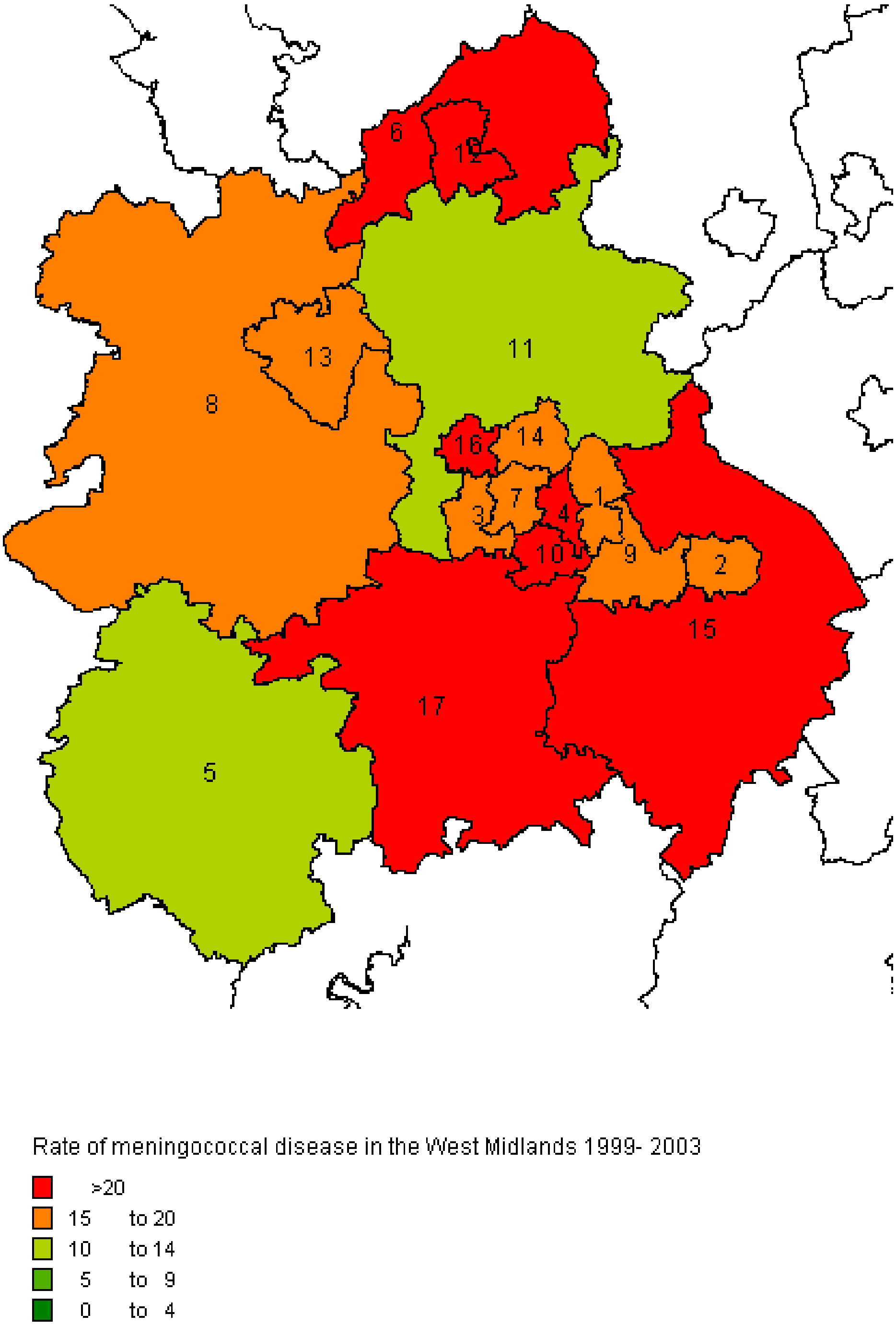
The rate of meningococcal disease decreased over the years in most PCTs but the decrease was significant in Dudley, North Staffordshire, Warwickshire and Wolverhampton (Table 11.1).

Table 11.1: Incidence of Meningococcal disease by PCT in the West Midlands; 1999 and 2008

	1999		2008	
PCT	**Rate per 100,000**	**95% Confidence intervals**	**Rate per 100,000**	**95% Confidence intervals**
Birmingham East and North PCT	2.81	**1.15- 4.47**	3.20	**1.46- 4.93**
Coventry PCT	4.28	**1.95- 6.60**	1.63	**0.20- 3.06**
Dudley PCT	1.64	**0.20- 3.07**	0.00	**0.00- 0.00**
Heart of Birmingham PCT	2.28	**0.46- 4.11**	1.52	**0.03- 3.01**
Herefordshire PCT	2.27	**0.05- 4.50**	1.68	**0.22- 3.58**
North Staffordshire PCT	6.70	**3.19- 10.21**	0.94	**0.36- 2.25**
Sandwell PCT	4.21	**1.83- 6.60**	3.48	**1.32- 5.63**
Shropshire County PCT	2.45	**0.64- 4.27**	2.06	**0.41- 3.71**
Solihull PCT	3.50	**0.91- 6.09**	1.47	**0.19- 3.14**
South Birmingham PCT	5.97	**3.35- 8.58**	2.35	**0.72- 3.98**
South Staffordshire PCT	3.72	**2.16- 5.27**	1.32	**0.41- 2.23**
Stoke on Trent PCT	6.89	**3.61- 10.16**	2.43	**0.49- 4.37**
Telford and Wrekin PCT	8.13	**3.71- 12.54**	1.86	**0.24- 3.95**
Walsall PCT	3.96	**1.50- 6.41**	3.54	**1.23- 5.85**
Warwickshire PCT	7.79	**5.38- 10.21**	1.90	**0.72- 3.08**
Wolverhampton PCT	5.85	**2.79- 8.92**	0.85	**0.33- 2.02**
Worcestershire PCT	4.40	**2.64- 6.16**	1.62	**0.56- 2.68**

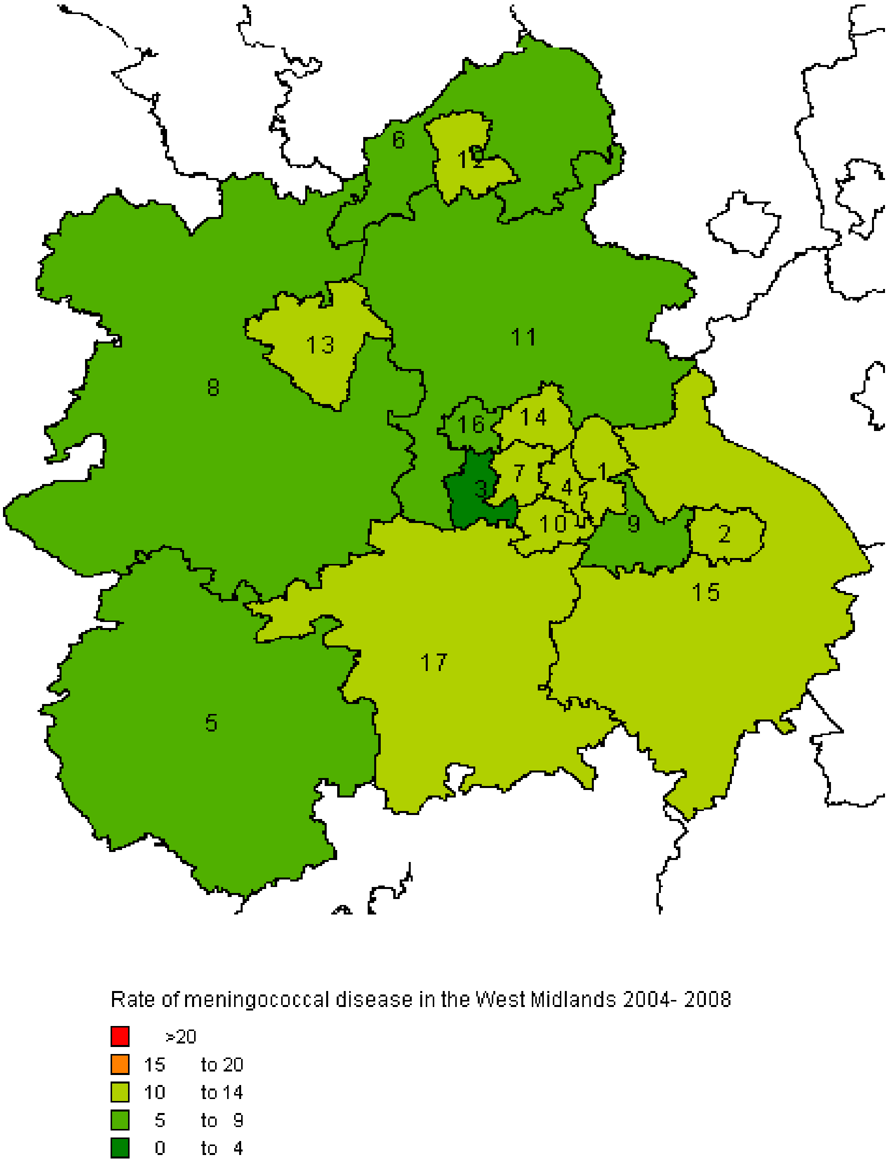
Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

Map 11.1: Incidence rate (per 100,000) of Meningococcal disease by PCT in the West Midlands; 1999- 2003*



*2006 PCT boundaries were used and data were merged accordingly

Map 11.2: Incidence rate (per 100,000) of Meningococcal disease by PCT in the West Midlands; 2004- 2008*



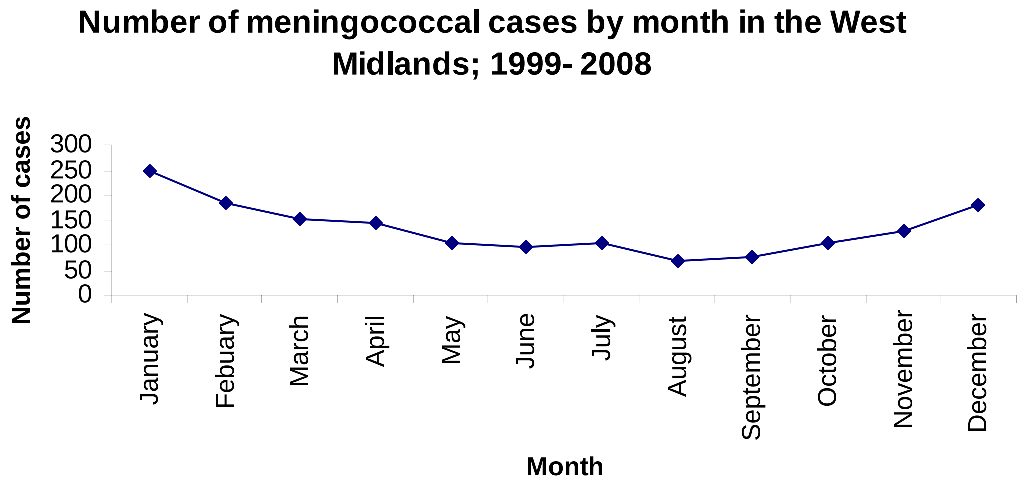
PCT KEY for maps 11.1 and 11.2

1	Birmingham East and North
2	Coventry Teaching
3	Dudley
4	Heart of Birmingham
5	Herefordshire
6	North Staffordshire
7	Sandwell
8	Shropshire County
9	Solihull Care Trust
10	South Birmingham
11	South Staffordshire
12	Stoke on Trent
13	Telford and Wrekin
14	Walsall Teaching
15	Warwickshire
16	Wolverhampton
17	Worcestershire

11.4 Seasonality

Meningococcal disease occurs mainly in the winter season. Its highest incidence is in January and then it gradually declines until it reaches its lowest point in September and then steadily increases through the winter (Figure 11.8). This pattern is seen through out the years 1999-2008.

Figure 11.8: Number of meningococcal cases by month in the West Midlands 1999-2008

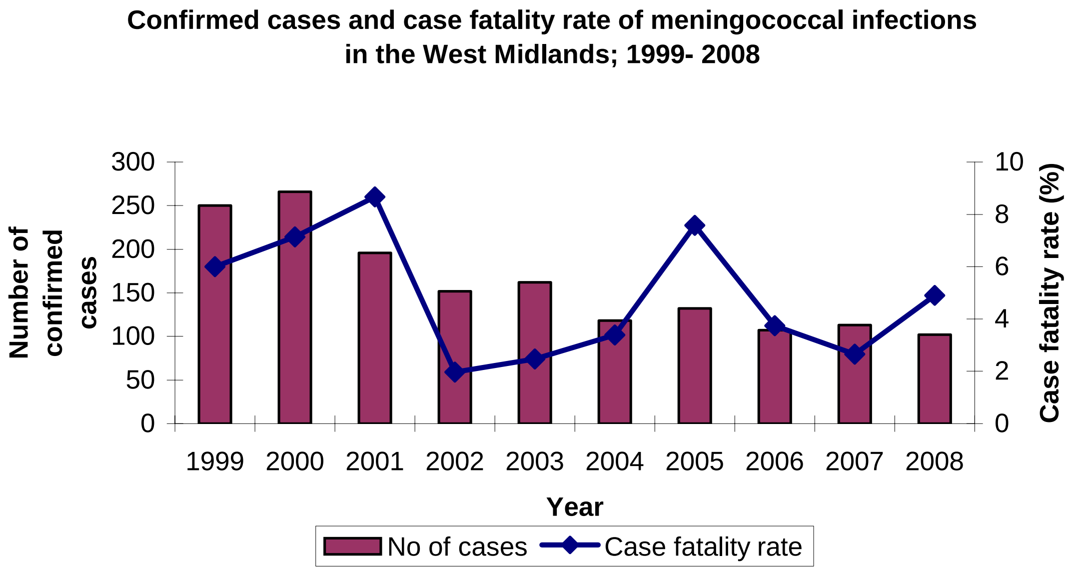


Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

11.5 Case Fatality Rate

The case fatality rate of meningococcal disease does not seem to have a particular trend but was highest in 2001 (8.7% CFR) lowest in 2002 (2% CFR), and has slightly increased to 4.9% in 2008 from 2.7% in 2007 (Figure 11.9).

Figure 11.9: Confirmed cases and case fatality rate of meningococcal infections in the West Midlands 1999-2008

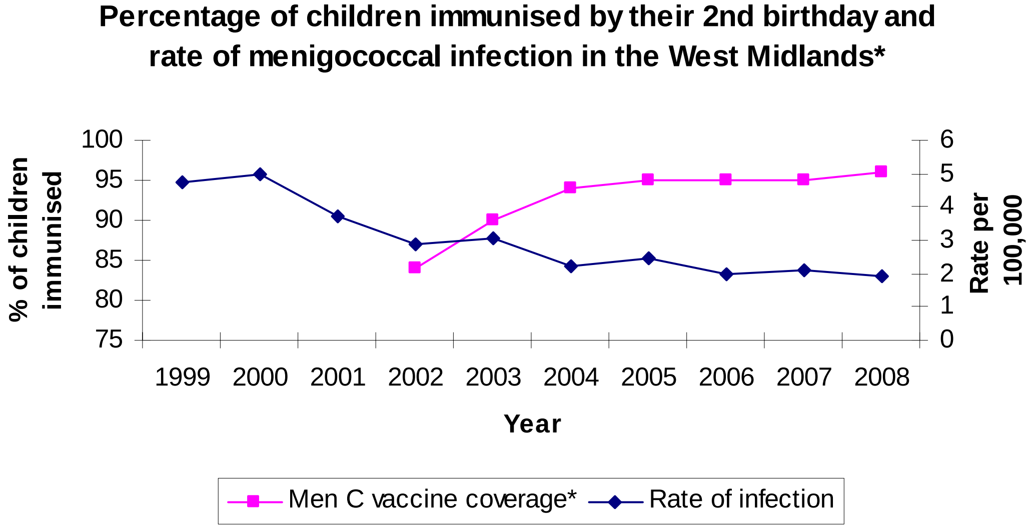


Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance system

11.6 Vaccination

Meningococcal C (MenC) Conjugate vaccine was introduced in 1999 and is now part of the routine childhood immunisation programme. Vaccine coverage has increased since its introduction and was approximately 96% in 2008. As vaccine coverage has increased, the rate of infection in the West Midlands has decreased, thus, a directly proportional relationship could be observed (Figure 11.10).

Figure 11.10: Percentage of children immunised by their 2nd birthday and rate of meningococcal infection in the West Midlands *



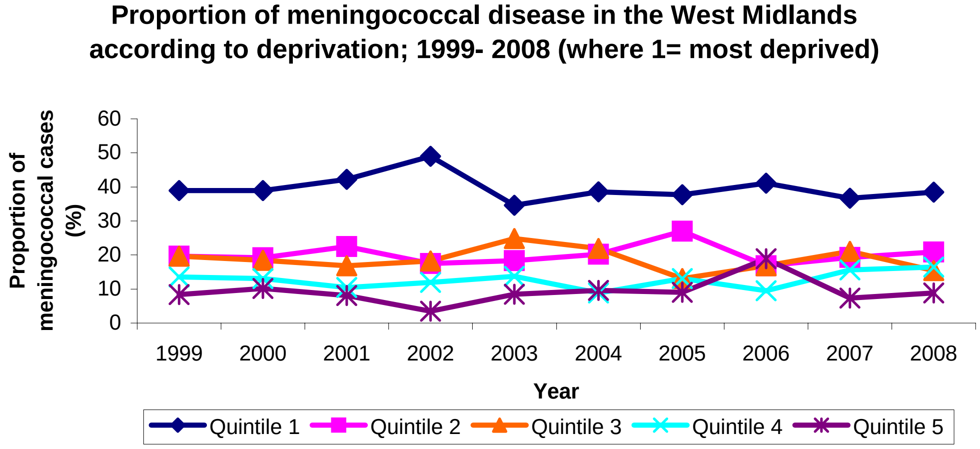
Source: HPA West Midlands Regional Epidemiology Unit

** No data on Men C Vaccine coverage was available prior to 2002*

11.7 Meningococcal Disease and Deprivation

The proportion of infection of meningococcal disease was highest in the most deprived population and lowest in the least deprived population. A linear trend could be observed as proportion of infection increased with deprivation (IMD 2007) (Figure 11.11).

Figure 11.11: Proportion of meningococcal disease in the West Midlands according to deprivation; 1999-2008 (where 1= most deprived)



Source: HPA West Midlands Enhanced Meningococcal Disease Surveillance System

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CHAPTER TWELVE: TUBERCULOSIS AND DEPRIVATION

12.1 Introduction

Tuberculosis (commonly called TB) is a disease caused by bacteria called Mycobacterium *tuberculosis*. TB usually affects the lungs, but can affect other parts of the body, such as the lymph nodes, the bones and coverings of the brain (meninges). Globally, an estimated 9 million new persons develop TB each year[1].

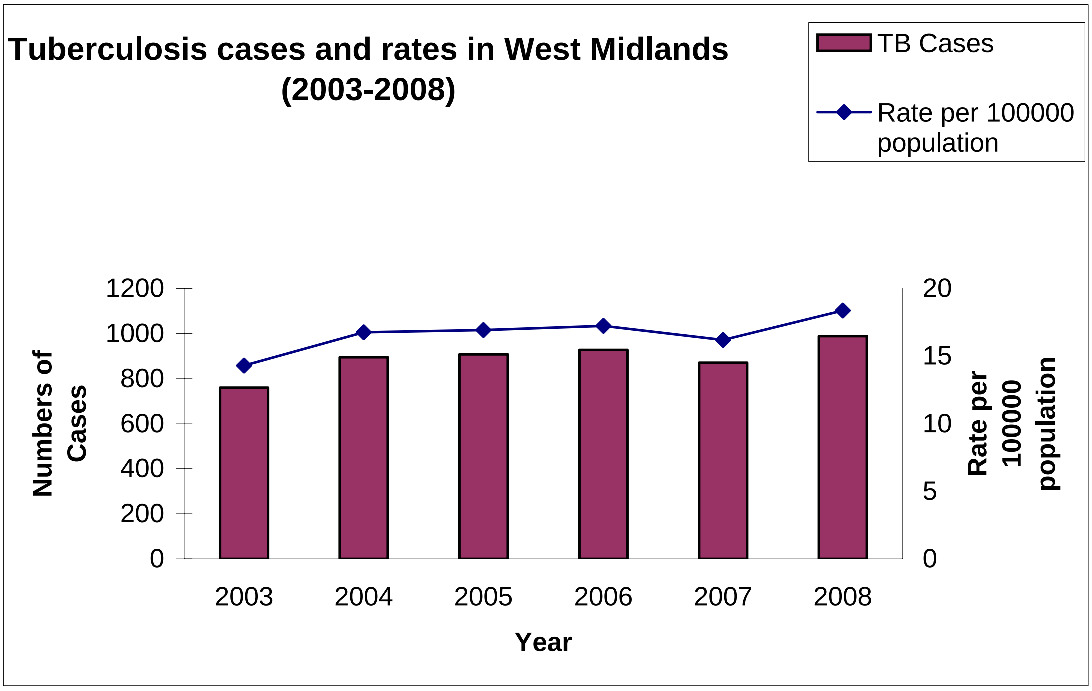
12.2 National Picture

The numbers of new TB diagnosis in the UK has seen a steady increase from the year 2000 (6,726 cases) until the year 2005 (8,478). It has stabilised at this level since. The incidence rate also has shown a similar trend increasing from 11.4 per 100,000 population in 2000 to 14.1 in 2005. More recently it was 13.8 in 2007[2].

12.3 Regional Picture

The number of TB cases as well as the rate of TB in the West Midlands has shown a steady increase over the last 6 years. The incidence rate of TB has increased from 14.3 in 2003 to 18.4 in 2008 (Figure 12.1).

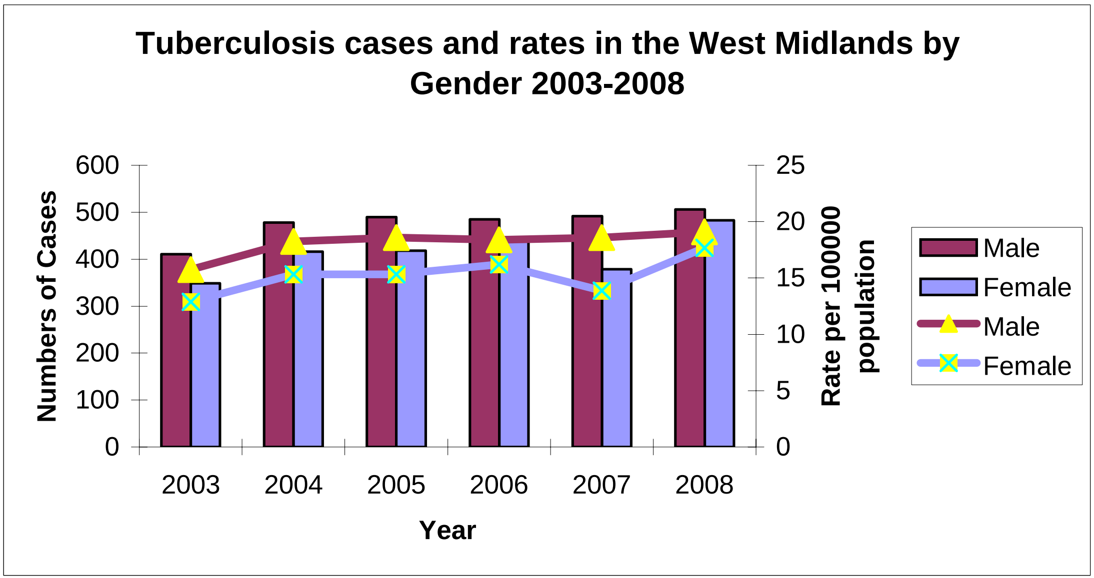
Figure 12.1: Tuberculosis cases and rates in the West Midlands (2003-2008)



Source: HPA West Midlands Enhanced TB Surveillance database

More cases occurred among men than women and the overall rate of infection was higher in men than women. The rate of TB in men increased from 15.7 per 100,000 population in 2003 to 19.1 in 2008. The rate for women also increased from 12.9 in 2003 to 17.7 in 2008 (Figure 12.2).

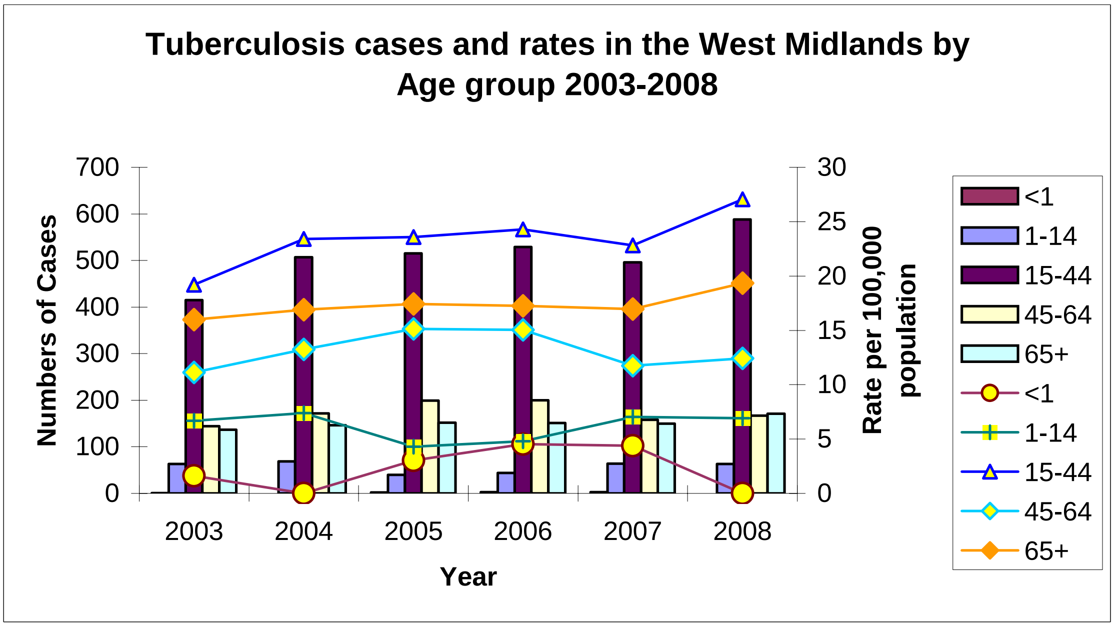
Figure 12.2: Tuberculosis cases and rates in the West Midlands by Gender (2003-2008)



Source: HPA West Midlands Enhanced TB Surveillance database

Majority of the cases occurred in the 15-44 year age group followed by the 45-64 year age group. The incidence rate has also shown an increase in the 15-44 year age group from 19.2 in 2003 to 27.0 in 2008. This is followed by the over 65-age band which has shown a steady rate from 2003 till 2007 and then slightly increased in 2008 (Figure 12.3).

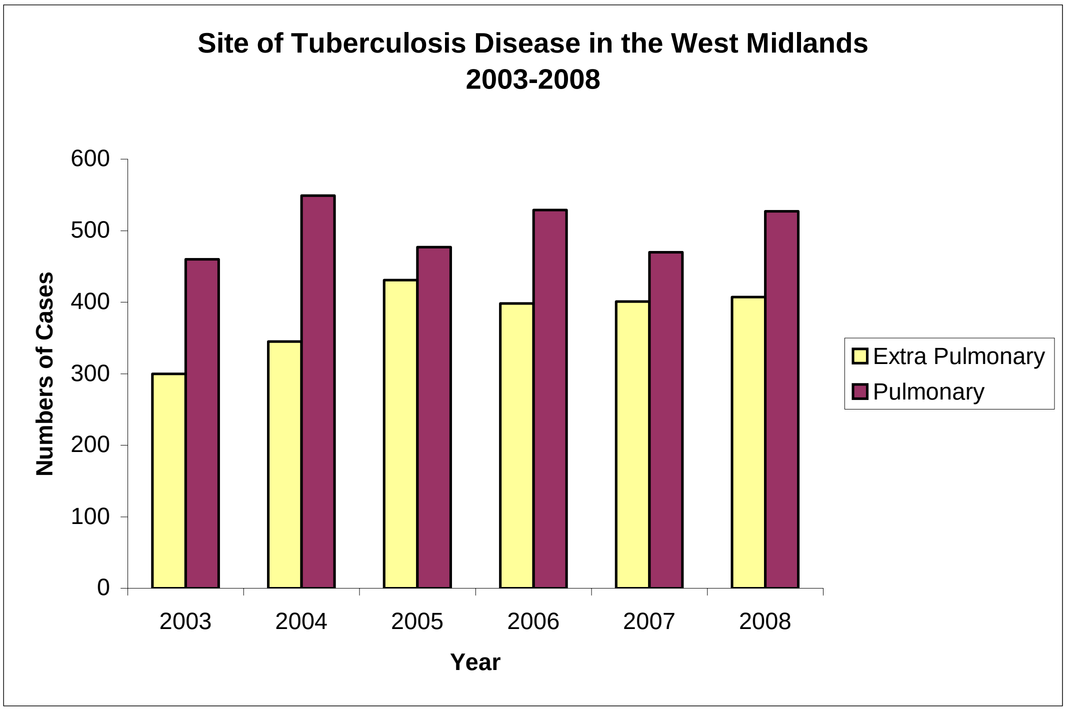
Figure 12.3: Tuberculosis cases and rates in the West Midlands by age group (2003-2008)



Source: HPA West Midlands Enhanced TB Surveillance database

More than half of the total cases (56%) reported in the six-year period between 2003 and 2008 were diagnosed as Pulmonary TB and 44% as extra-Pulmonary. The proportion of extra-pulmonary TB cases increased in 2005 compared with 2003 and 2004 and since has remained at the same level (Figure 12.4).

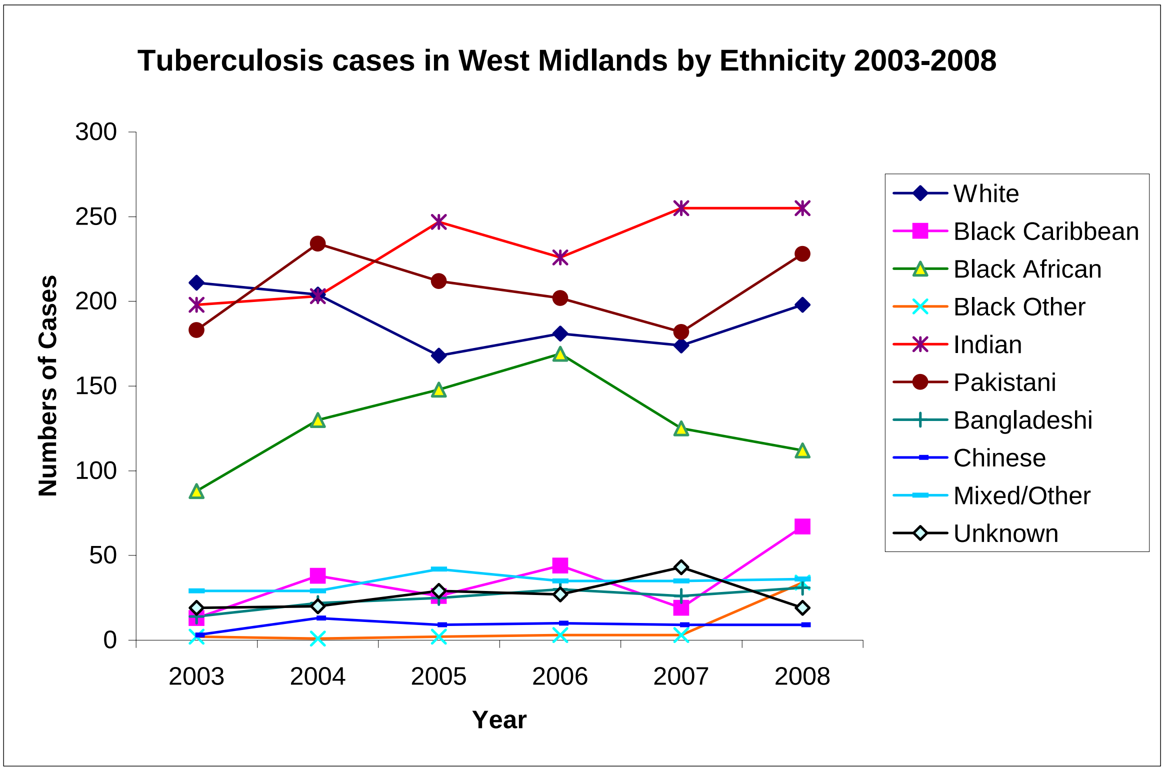
Figure 12.4: Site of Tuberculosis disease in the West Midlands 2003-2008



Source: HPA West Midlands Enhanced TB Surveillance database

Nearly one half of the cases occurred among Indian and Pakistani ethnic groups (26% and 23% respectively), followed by the White ethnic group (21%). (Figure 12.5)

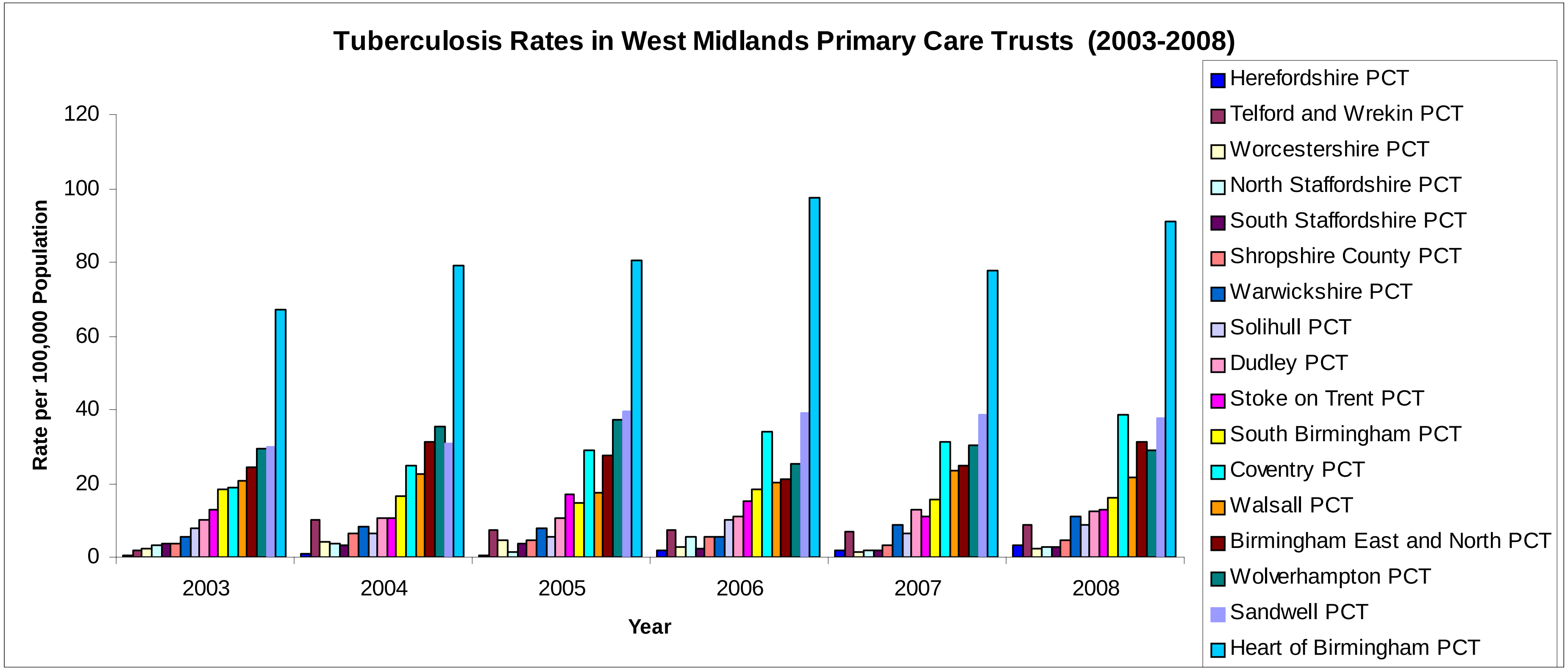
Figure 12.5: Tuberculosis cases in West Midlands by Ethnicity 2003-2008



Source: HPA West Midlands Enhanced TB Surveillance database

There were widespread variations in TB rates between PCTs with Heart of Birmingham PCT having the highest rates, followed by Sandwell, Wolverhampton and Birmingham East & North PCTs. The rate of TB has been steadily increasing in Coventry PCT from 2003 to 2008 (Figure 12.6).

Figure 12.6: Tuberculosis rates in West Midlands Primary Care Trusts (2003-2008)

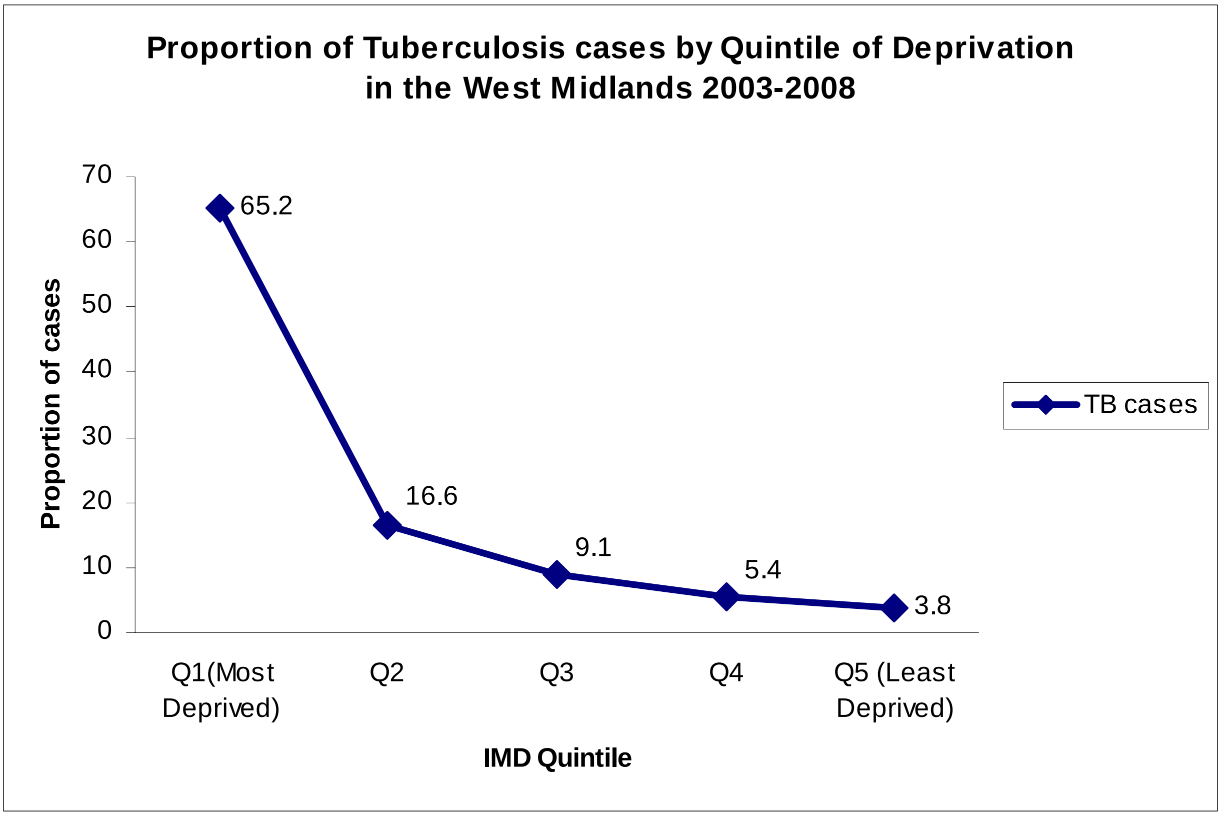


Source: HPA West Midlands Enhanced TB Surveillance database

12.4 Tuberculosis and Deprivation

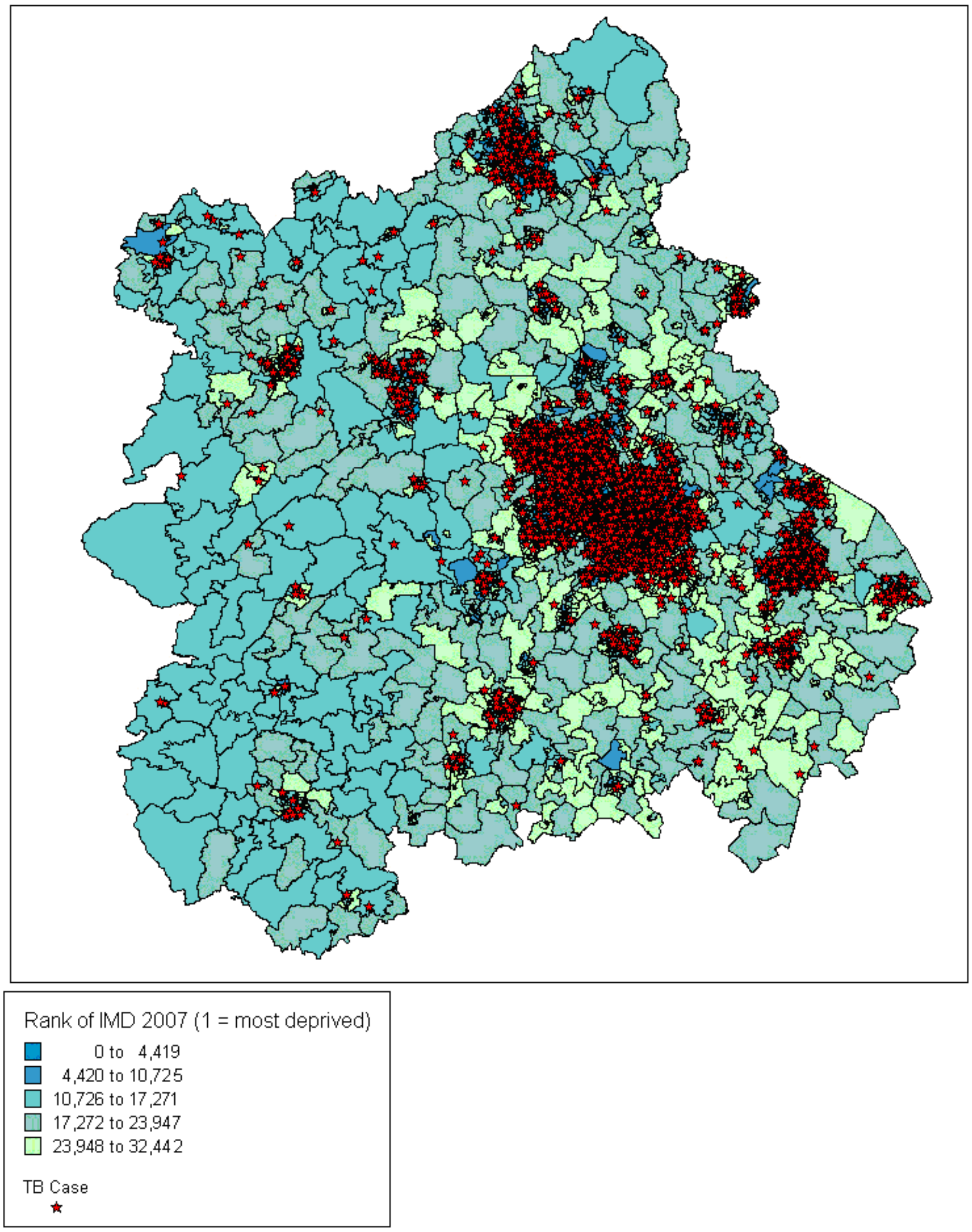
Deprivation was found to be a key determinant amongst the TB cases. Majority (65%) of the total cases reported during the six-year period of 2003 to 2008 were amongst people who lived in the most deprived quintile of IMD rank (Figures 12.7and 12.8).

Figure 12.7: Proportion of Tuberculosis cases by Quintile of Deprivation in the West Midlands 2003-2008



Source: HPA West Midlands Enhanced TB Surveillance database

Map 12.1: Tuberculosis cases in West Midlands by Lower Super Output Areas 2003-2008



As the deprivation decreased the proportion of TB cases also decreased and this was statistically significant for each quintile compared with its previous quintile (Table 12.1).

Table 12.1: Proportion of tuberculosis cases (with 95%CI) in the West Midlands by quintile of deprivation (IMD 2007 Rank*)

Rank of IMD	Quintile	Cases	Proportion	95%CI	
1-6496	Q1 (Most Deprived)	3486	65.2	63.9	66.4
6497-12993	Q2	886	16.6	15.6	17.5
12994-19489	Q3	485	9.1	8.9	9.8
19490-25985	Q4	288	5.4	4.8	6.0
25986-32482	Q5 (Least Deprived)	204	3.8	3.3	4.3
	Total Cases		**5349**		

* Methodology: All case records on the Enhanced TB surveillance database were extracted for the years 2003 till 2008. Records which had incomplete postcodes were excluded. Postcodes from the remaining records were matched against their Lower Super Output Areas (LSOAs) and their corresponding IMD ranks. A total of 5,349 records were found to be complete and were included in the analysis

12.5 Summary

The rate of TB has increased in the West Midlands between 2003-2008. TB is affecting predominately men of South Asian origin who are in the age group of 15-44. Majority (65%) of cases diagnosed in the West Midlands were amongst people who lived in the most deprived quintile of IMD rank.

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CHAPTER THIRTEEN: STILLBIRTHS, INFANT DEATHS AND SOCIAL DEPRIVATION, WEST MIDLANDS 1997– 2007/8

13.1 Introduction

The Perinatal Institute provides analyses of stillbirth and perinatal / infant mortality rates for each PCT and Acute Trusts in the West Midlands (WM), as well as neonatal activity and mortality reports to neonatal networks and units. Here, we present an update and overview of mortality trends for the region and compare them with national data where available. We also present mortality within the context of the high rates of social deprivation in the West Midlands.

To ensure that this report is as up to date as possible, we include the latest available provisional data, up to 2008 for stillbirths and 2007 for infant deaths.

More detailed analysis of underlying causes will be possible in 2010 with baseline data on all maternities collected from 2009 as part of WM NHS Investing for Health initiative.

DEFINITIONS
Stillbirth: A child born from 24 weeks of pregnancy which did not, at any time after being completely expelled from its mother, breathe or show any other signs of life.
***Neonatal death*:** Death within 28 days following live birth; *Early neonatal* = first week i.e. day 0 to day 6 incl. *Late neonatal* = from day 7 to 28.
***Perinatal death*:** Fetal death from 24 weeks gestation and neonatal death before day 7
***Infant death*:** Death in the first year following live birth (includes early, late and post-neonatal period).
Corrected rates (also referred to as 'adjusted' rates) - obtained after exclusion of congenital anomalies and births <22 weeks gestation and/or <500g weight

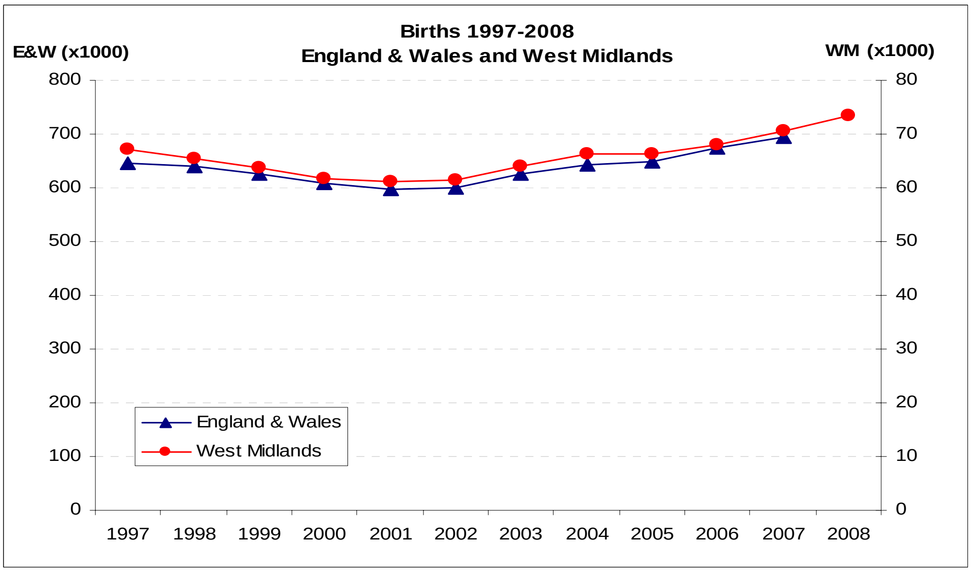
13.2 Births

Table 13.1: Births in West Midlands and England & Wales (E&W), 1997-2007/8

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
West Midlands	67,062	65,380	63,852	61,827	61,153	61,417	64,079	66,285	66,351	68,063	70,457	73,454
England & Wales	645,532	639,318	624,862	607,304	597,506	599,279	624,816	643,026	649,094	672,966	693,356	NA*

*Not Available

Figure 13.1: Births in West Midlands and England & Wales, 1997-2007/8



There has been a year-on-year increase since 2002 in birth rates in England & Wales. This is mirrored closely in the West Midlands, where the rise has continued in 2008.

13.3 Stillbirths

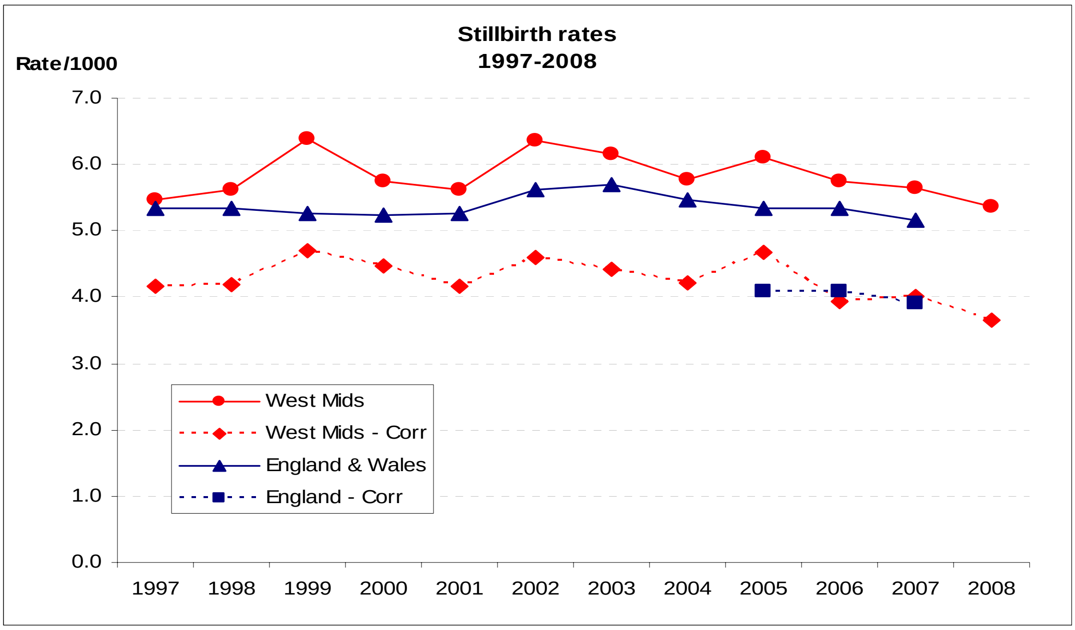
Table 13.2 and Figure 13.2 show the stillbirth rates for the West Midlands (WM) and England & Wales (E&W), overall as well as 'corrected' after exclusion of congenital anomalies and stillbirths <500g weight. (National corrected/'adjusted' rates are based on recent CEMACH reports [1]

Table 13.2: Stillbirth rates (per 1000) in West Midlands (WM) and England and Wales (E&W), 1997-2008

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
WM	5.5	5.6	6.4	5.7	5.6	6.4	6.2	5.8	6.1	5.7	5.6	5.4
WM corrected	4.2	4.2	4.7	4.5	4.2	4.6	4.4	4.2	4.7	3.9	4.0	3.6
E & W	5.3	5.3	5.3	5.2	5.3	5.6	5.7	5.5	5.4	5.3	5.2	NA*
England corrected	NA	NA	NA	NA	NA	NA	NA	NA	4.1	4.1	3.9	NA*

*Not Available

Figure 13.2: Stillbirth rates in West Midlands and England & Wales, 1997-2008



There appears to be a drop in overall stillbirth rates in the West Midlands and England and Wales in recent years. However they are similar to the rates recorded in 1997.

While the overall West Midlands stillbirth rate continues to be higher than in England & Wales, the corrected rate appears to be similar to those available for England and Wales (2005-7), with the 2008 WM data suggesting a further drop.

13.4 Neonatal Deaths

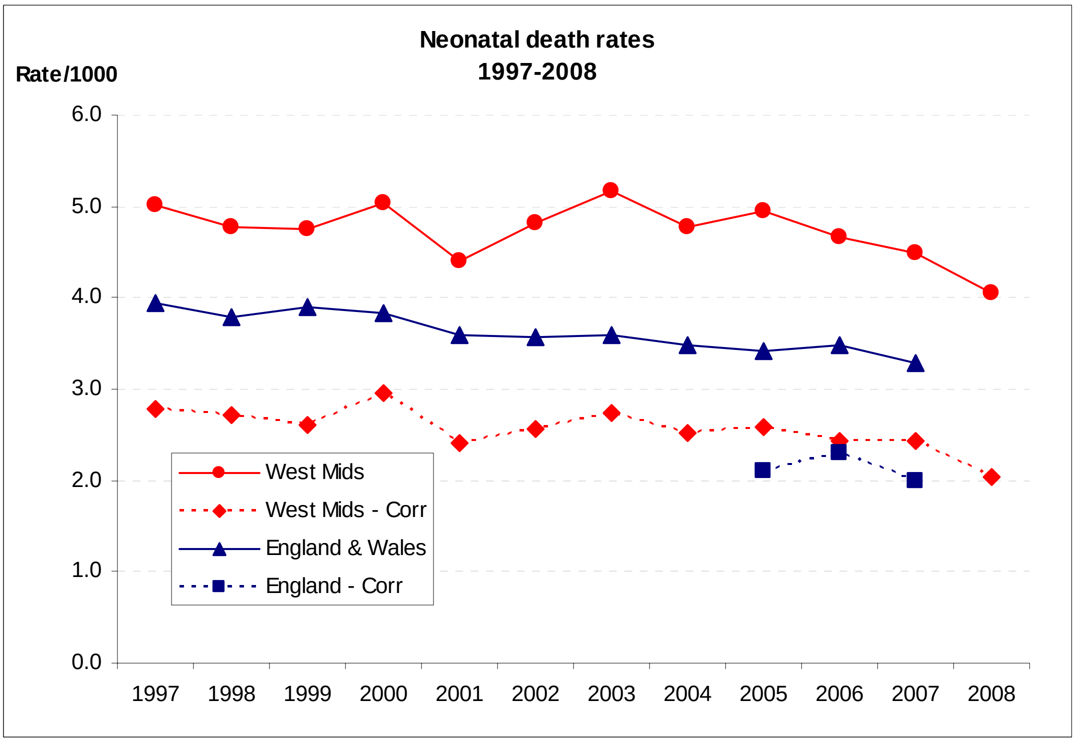
In addition to Infant Deaths (Section, 13.5), we also include here the trend in neonatal deaths (birth to day 28) as CEMACH reports do not include infant mortality rates [1]. The following table and figure compare regional and national data, including corrected/adjusted rates (i.e. after exclusion of congenital anomalies and births <22 weeks gestation and/or <500g weight).

Table 13.3: Neonatal death (rates/1000), West Midlands and England & Wales, 1997-2008

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
WM	5.0	4.8	4.8	5.0	4.4	4.8	5.2	4.8	4.9	4.7	4.5	4.1
WM corrected	2.8	2.7	2.6	3.0	2.4	2.6	2.7	2.5	2.6	2.4	2.4	2.0
E&W	3.9	3.8	3.9	3.8	3.6	3.6	3.6	3.5	3.4	3.5	3.3	NA*
England corrected									2.1	2.3	2.0	NA*

*Not Available

Figure 13.3: Neonatal deaths (rates/1000) West Midlands and England and Wales, 1997-2008



Neonatal mortality rates in the West Midlands are substantially higher than those reported for England and Wales. There is a consistent downward trend in the national rate that appears to be mirrored in the West Midlands since 2005.

For corrected rates, the gap is much smaller between the national and regional figures

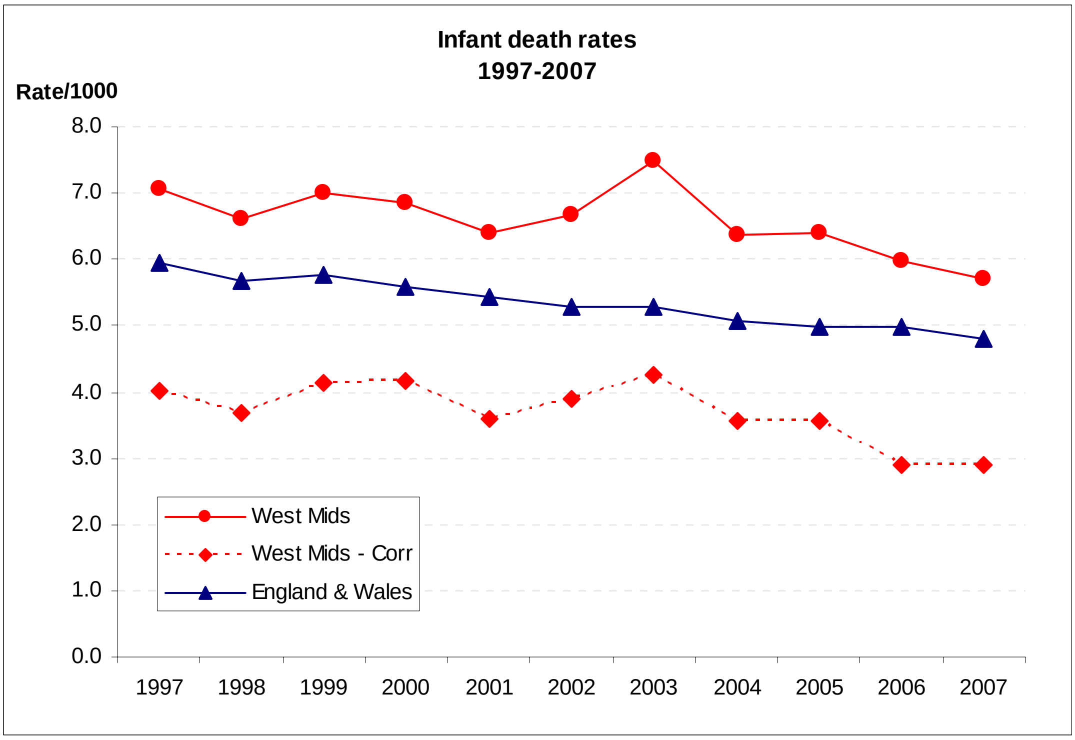
13.5 Infant Deaths

Table 13.4 and Figure 13.4 show infant rates for the West Midlands and England & Wales. Corrected rates (after exclusion of congenital anomalies and births <22 weeks gestation and/or <500g weight) are also shown for the West Midlands. (No national data on corrected infant deaths are available for comparison).

Table 13.4: Infant mortality (rates /1000) in West Midlands (WM) and England and Wales (E&W), 1997-2007

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
WM	7.1	6.6	7.0	6.8	6.4	6.7	7.5	6.4	6.4	6.0	5.7
WM corrected	4.0	3.7	4.1	4.2	3.6	3.9	4.3	3.6	3.5	2.9	2.9
E& W	6.0	5.7	5.8	5.6	5.4	5.3	5.3	5.1	5.0	5.0	4.8

Figure 13.4: Infant mortality (rates/1000) West Midlands (WM) and England and Wales (E&W), 1997-2007



There is a continuing drop in overall infant mortality rates in England and Wales, which is reflected in the West Midlands.

While the West Midlands infant mortality continues to be higher than the national rate, about 50% are due to congenital anomalies and pre-viable births, with the corrected rate currently running below 3/1000.

13.6 Classification of Deaths

Stillbirths

The figures below show the main categories of stillbirths according to ReCoDe classification [2], for all stillbirths and after correction by excluding congenital anomalies and stillbirths <500g.

Figure 13.5: Stillbirths classified by ReCoDe, West Midlands 2003-2008

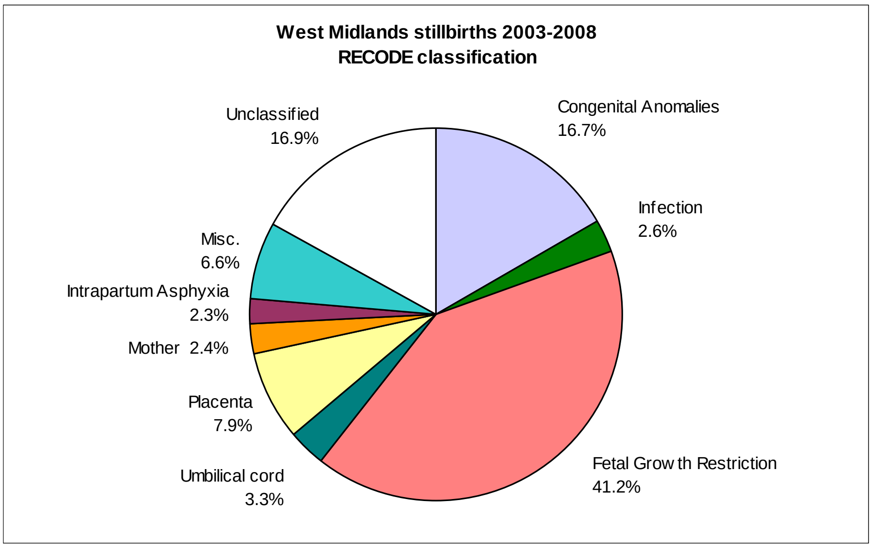
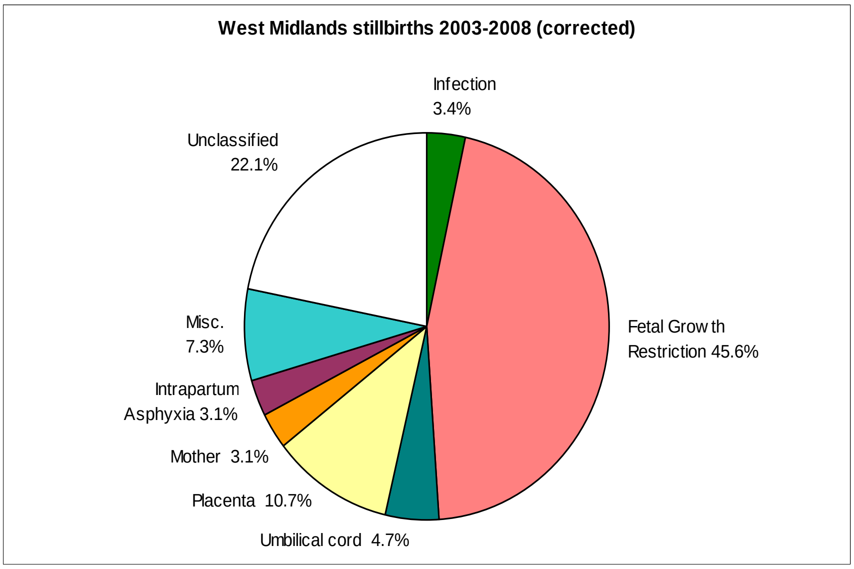


Figure 13.6: Corrected' stillbirths, West Midlands 2003-2008



The main categories of stillbirths are shown. Fetal growth restriction (defined as birthweight <10th customised centile) remains the single largest category (41%). This proportion increases to 46% after exclusion of congenital anomalies and stillbirths <500g, highlighting the importance of ongoing efforts to improve antenatal detection of fetal growth restriction.

Further analysis of stillbirths with congenital anomalies is presented in chapter 14.

Infant Deaths

The figures below show the main categories of infant deaths according to the Fetal and Neonatal Classification [3] for all deaths as well as 'corrected', i.e. by excluding congenital anomalies and births <22 weeks and/or <500g.

Figure 13.7: Infant Deaths by Fetal and Neonatal Classification, West Midlands 2003-2007

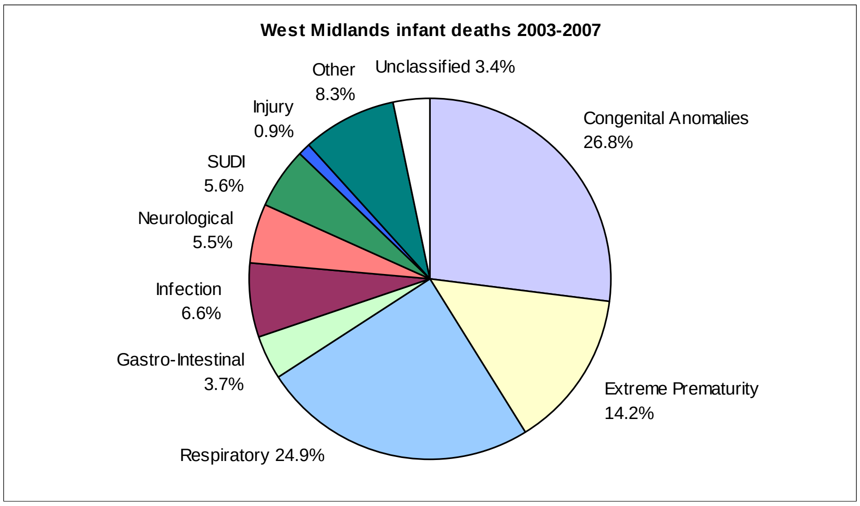
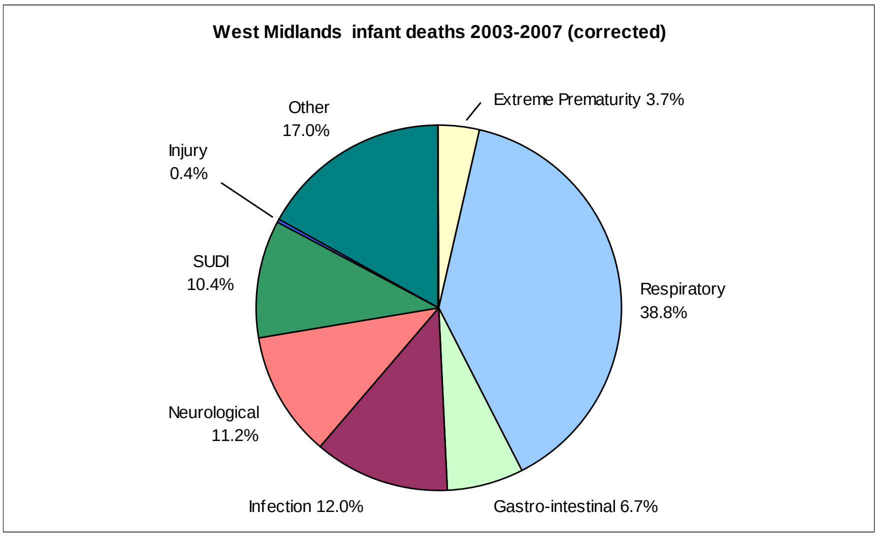


Figure 13.8: 'Corrected' Infant Deaths, West Midlands 2003-2007



The main categories of infant deaths are congenital anomalies, respiratory and extreme prematurity related deaths. Of the 'corrected' deaths, the (prematurity associated) respiratory conditions make the largest contribution (39%).

The Institute is currently working on a new infant death classification system, which can also take the antecedent factors into consideration.

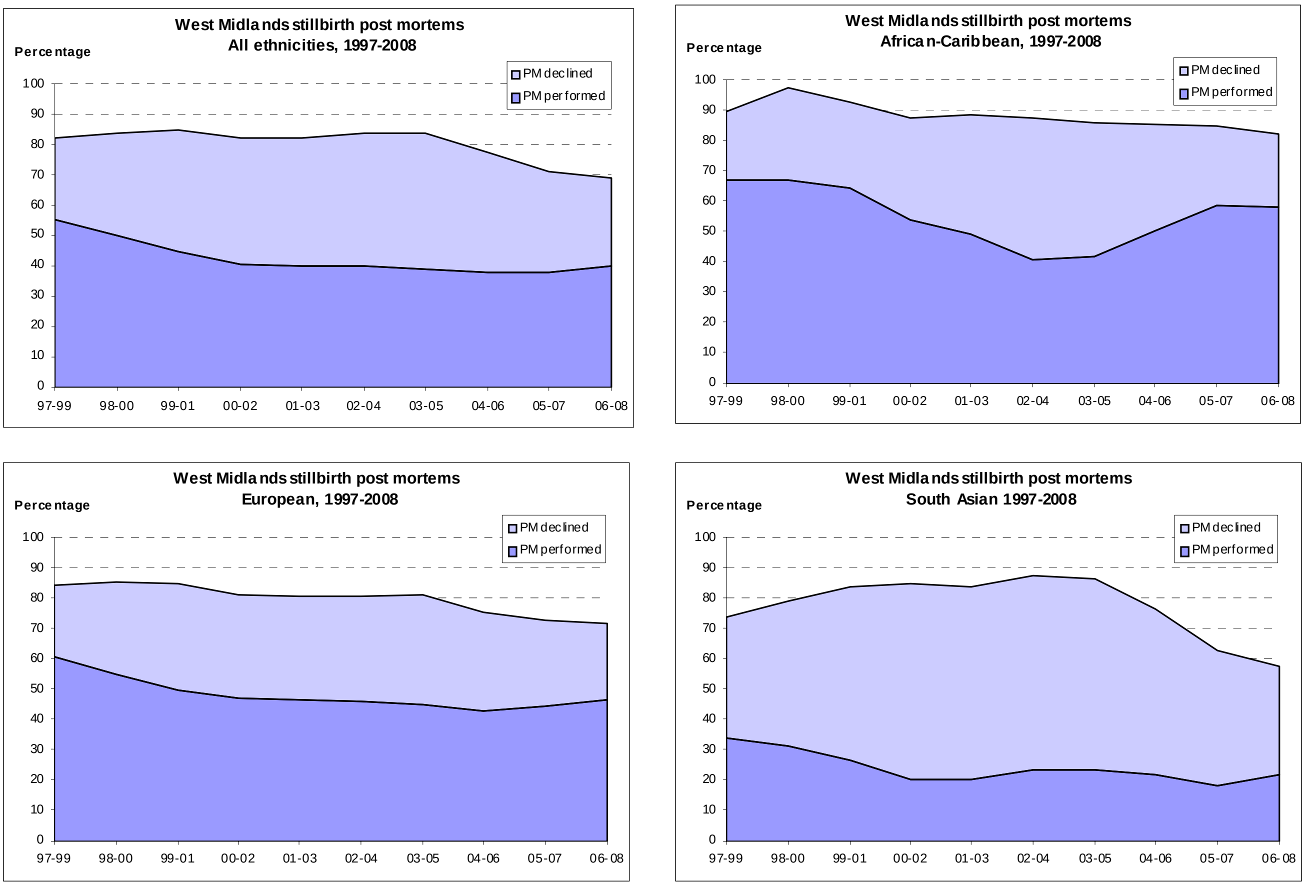
Further analysis of infant deaths with congenital anomalies is presented in chapter 14.

13.7 Post-mortems

The Perinatal Institute collects information about post-mortems for stillbirths and infant deaths, and whether they were offered and accepted or declined.

Post-mortems are an important means of establishing cause of death. Rates have been falling over the past decade and we know from previous analyses that uptake varies around ethnic groups [4]. In the Figures below, we present the overall proportions of post-mortems offered (top line), declined or performed, for the overall population as well as for the three main ethnic groups in the West Midlands. To avoid variation due to small numbers within subgroups, the data are presented as 3-year moving averages.

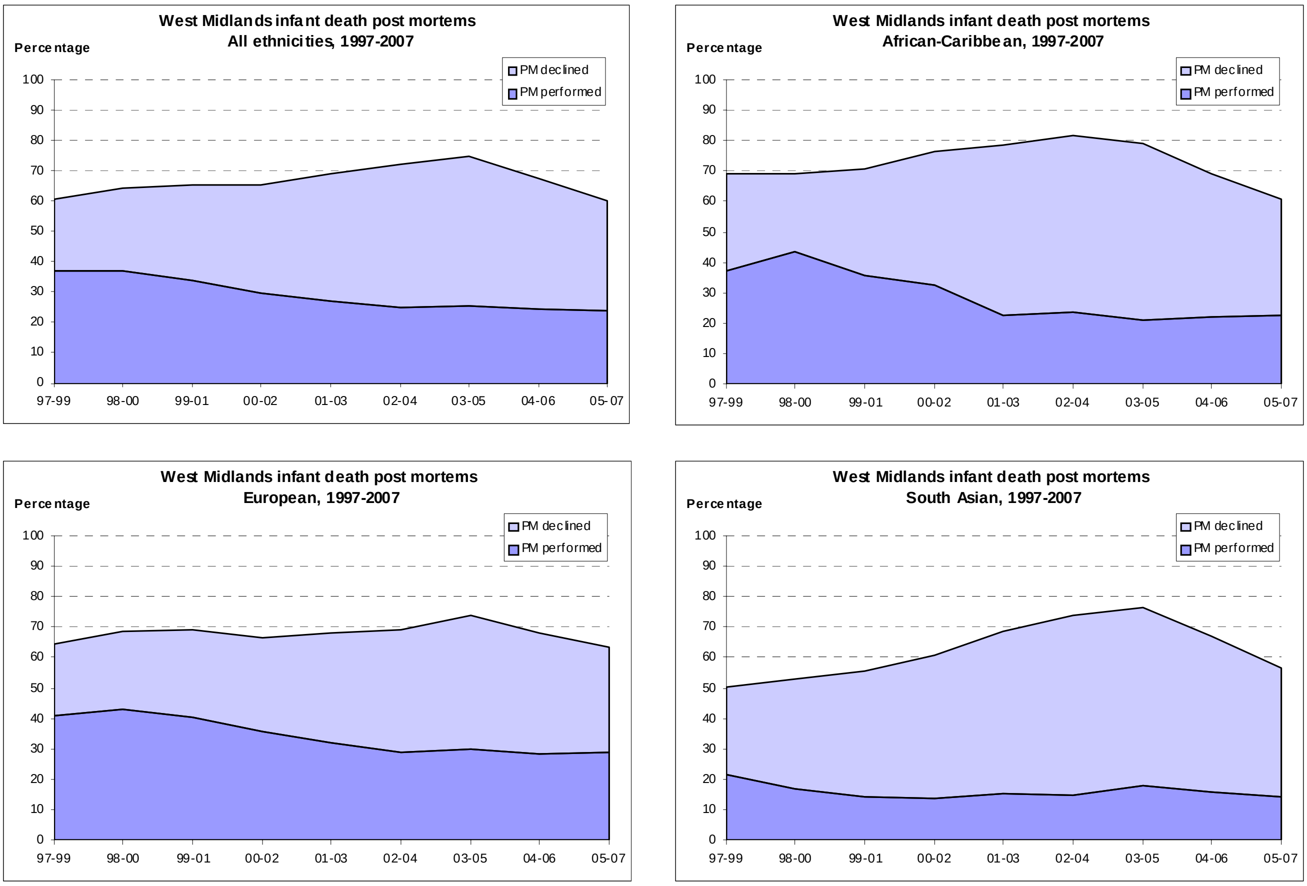
Figure 13.9: Stillbirths with post-mortem 1997-2008



The overall rate of post-mortems for stillbirths for 2006-8 is 40%, which has dropped from 55% in 1997-9.

The overall number of ‘offers’/consents sought for post-mortems has decreased since 2004.
South Asians have the lowest post-mortem rate. There has also been a recent sharp drop in the rate of offers of post-mortems in this group.

Figure 13.10: Infant deaths with post-mortem, 1997-2007



The rate of post-mortems for infant deaths is lower than those carried out for stillbirths. In part, this appears to be associated with a low 'offer' rate, which has dropped to less than 60% in all subgroups.

The rate of post-mortems for infant deaths was 24% for 2005-7, which has dropped from 37% in 1997-9. There is a higher decline rate, but there also appears to be a drop in the rate of consent sought in recent years, overall and within each subgroup.

As for stillbirths, the lowest post-mortem uptake for infant deaths is in the South Asian group, This is in part due to a high 'decline' rate.

Together, these trends highlight the need for the service to ensure that the appropriate, trained members of staff make every effort to offer and explain to the bereaved parents the value of a post-mortem in the case of a stillbirth or infant death.

13.8 Social Deprivation

The following tables show 3 year moving averages for mortality rates by deprivation, using an area-based score (Index of Multiple Deprivation, IMD 2007). Comparisons are made between the most deprived quintile (Q5) and the other quintiles (Q1-4) in the West Midlands, as well as the available national mortality rates.

Table 13.5: Stillbirth by IMD Quintile: 3-year moving average

	97-99	98-00	99-01	00-02	01-03	02-04	03-05	04-06	05-07	06-08
West Midlands	5.8	5.9	5.9	5.9	6.0	6.1	6.0	5.9	5.8	5.6
IMD Q5	6.9	6.9	7.0	7.0	7.6	7.9	7.8	7.3	7.2	7.0
IMD 1-4	5.2	5.3	5.3	5.2	5.1	4.9	4.8	4.9	4.9	4.6
England & Wales	5.3	5.3	5.2	5.4	5.5	5.6	5.5	5.4	5.3	NA

Table 13.6: Perinatal Mortality by IMD Quintile: 3-year moving average

	97-99	98-00	99-01	00-02	01-03	02-04	03-05	04-06	05-07	06-08
West Midlands	9.8	9.8	9.7	9.7	9.9	10.0	10.0	9.7	9.6	9.1
IMD Q5	11.6	11.6	11.9	12.2	13.0	13.4	13.4	12.4	12.1	11.5
IMD Q1-4	8.7	8.7	8.4	8.1	7.9	7.8	7.9	8.0	8.0	7.6
England & Wales	8.3	8.2	8.1	8.1	8.2	8.3	8.2	8.0	7.9	NA

Table 13.7: Infant Mortality by IMD Quintile: 3-year moving average

	97-99	98-00	99-01	00-02	01-03	02-04	03-05	04-06	05-07
West Midlands	6.9	6.8	6.8	6.6	6.9	6.8	6.7	6.3	6.0
IMD Q5	8.9	8.9	9.1	9.4	9.8	9.6	9.2	8.2	7.7
IMD Q1-4	5.7	5.6	5.3	4.9	5.0	5.1	5.1	5.0	4.9
England & Wales	5.8	5.7	5.6	5.4	5.3	5.2	5.1	5.0	4.9

In each category, mortality rates are consistently higher in WM than in England and Wales. This is mainly due to the elevated mortality rates in Q5, while rates in Q1-4 are similar or below the *overall* national average (NB: similar breakdown of national data is not available for comparison).

Q5 mortality rates are consistently higher in each mortality category, with no evidence of reduction in the gap since 1997-9. For the last triennium, the ratio of Q5 to Q1-4 was

Stillbirths: OR 1.5 (CI 1.4-1.7)
Infant deaths: OR 1.6 (CI 1.4-1.8)

In the following Figures 13.11 and 13.12, average stillbirth and infant mortality rates are plotted against the IMD (2007) scores for the 17 West Midlands PCTs.

Figure 13.11: Deprivation and stillbirth in West Midlands PCTs, 2003-2008

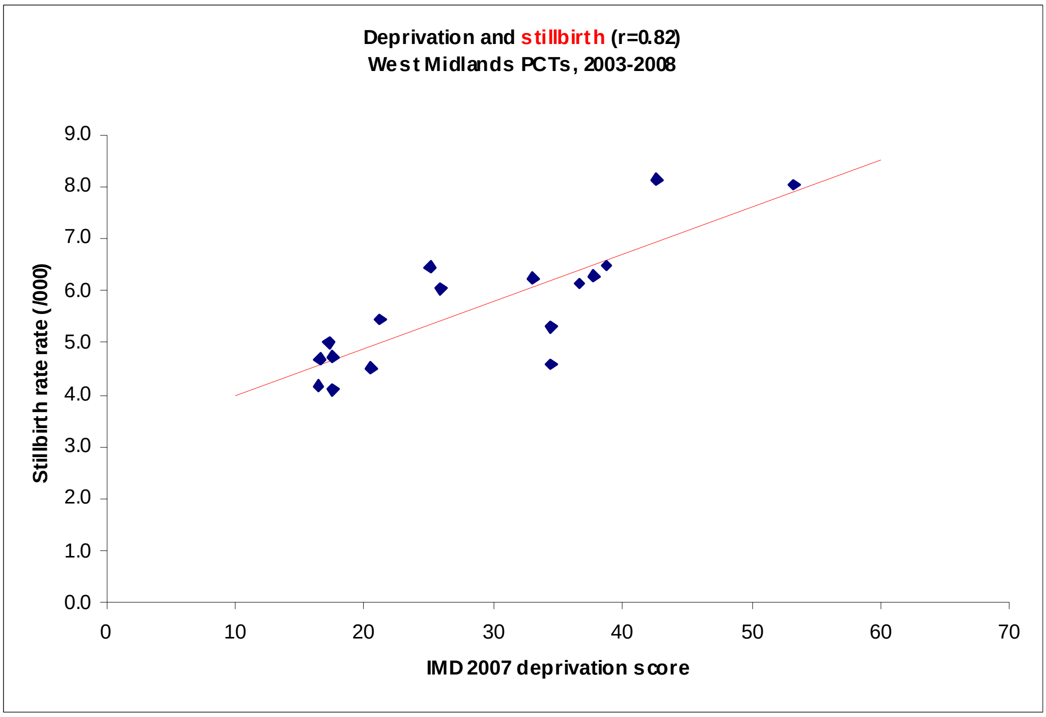
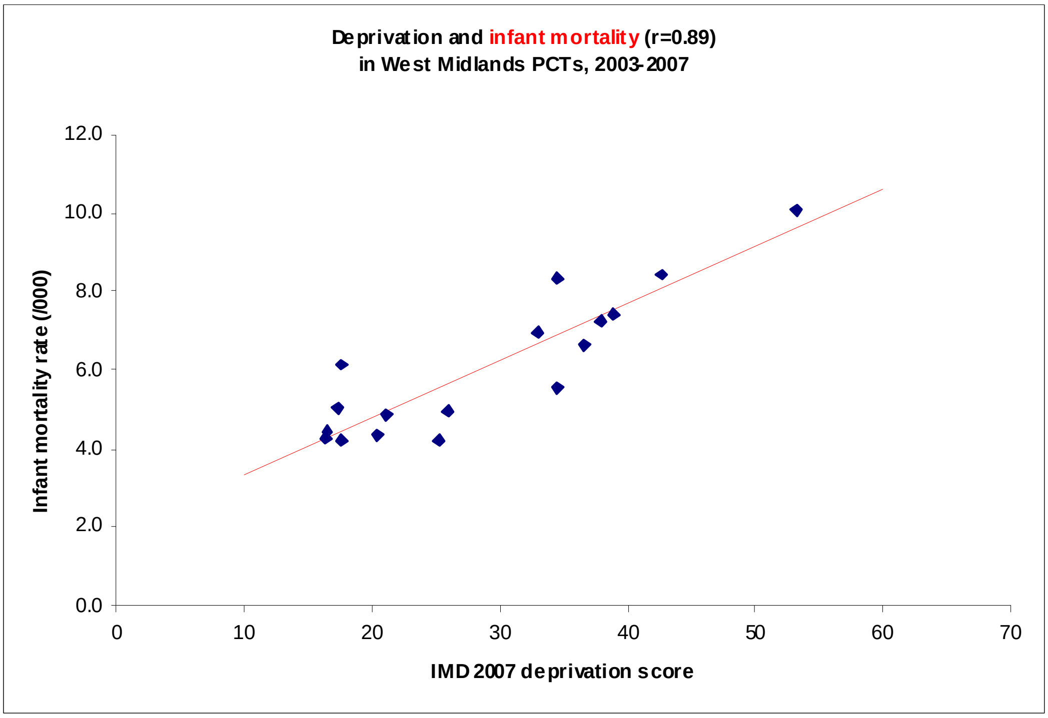


Figure 13.12: Deprivation and infant deaths in West Midlands PCTs, 2003-2007



The graphs show a strong correlation between PCTs' IMD scores and their respective stillbirth and infant mortality rates. For stillbirths, the correlation was $R = 0.82$, $p < 0.01$ and for infant deaths $R = 0.89$, $p < 0.01$.

This association highlights the importance of the public health role in efforts to reduce perinatal and infant mortality. More in depth assessment will be possible after the availability of baseline maternity information from the regional data collection commenced in 2009.

The Perinatal Institute provides mortality reports to each WM PCT which include stillbirth and perinatal / infant mortality analyses, put in the context of the background level of deprivation.

References

1. Confidential Enquiry into Maternal and Child Health (CEMACH) Perinatal Mortality 2007: UK. CEMACH, London 2009
2. Gardosi et al. Classification of stillbirths by relevant conditions at death BMJ 2005 331:1113-7.
3. Hey et al. Classifying perinatal death: fetal and neonatal factors. BJOG 1986;93:1213-23.
4. Perinatal Update 2006: Perinatal Institute, www.pi.nhs.uk/pnm/Update2006.pdf

Data Sources

- WM Perinatal Death Notification;
- ONS VS Tables;
- CEMACH 2005-7 Reports;
- ADBE; IMD 2007 (DPM);
- Births: Annual Birth Extract (ONS) & WM unit data for 2008.

13.9 Stillbirth, Perinatal & Infant Death Rates, West Midlands PCTs and LAs 1997-2007/08

Table 13.8. The table lists all Primary Care Trusts (PCT), Local Authorities (LA) and Wards in the West Midlands. It shows the average score of the 2007 Index of Multiple Deprivation (IMD, weighted according to number of births and households), proportion of births in the most deprived areas (Quintile 5), and average annual births for 1997-2007 and 2007. Rates (per 1000) for stillbirths, perinatal and infant deaths are presented for each PCT and LA, but not for Wards because of small numbers. **NB** Stillbirth and perinatal death rates for 2008, and infant death rates for 2007 are provisional.

	IMD	BIRTHS			STILLBIRTH			PERINATAL DEATH			INFANT DEATH		
	Score	% in Q5	avg / yr 97-07	2007	Rates 97- 02	03- 07	2008	Rates 97- 02	03- 07	2008	Rates 97- 02	03- 07	2007
WEST MIDLANDS	**29.9**	**39**	**65,084**	**70,457**	**5.9**	**5.9**	**5.4**	**9.8**	**9.8**	**8.7**	**6.8**	**6.4**	**5.7**
Birmingham LA (BEN, HoB, South)	**44.7**	**70**	**15,378**	**17,092**	**7.0**	**7.8**	**6.7**	**11.9**	**13.1**	**10.6**	**8.8**	**8.6**	**7.4**
Birmingham East and North PCT	**45.1**	**73**	**6,022**	**6,781**	**6.8**	**8.3**	**7.2**	**11.7**	**13.6**	**12.2**	**9.0**	**8.4**	**7.9**
Acocks Green	40.5	71	399	488									
Bordesley Green	54.6	100	791	856									
Erdington	41.4	56	303	330									
Hodge Hill	46.2	69	392	460									
Kingstanding	55.9	96	347	399									
Shard End	51.9	96	381	414									
Sheldon	34.7	44	249	237									
South Yardley	46.5	81	470	557									
Stechford & Yardley North	45.4	82	355	440									
Stockland Green	42.6	85	303	365									
Sutton Four Oaks	10.5	0	197	240									
Sutton New Hall	13.0	0	213	223									
Sutton Trinity	19.5	11	238	262									
Sutton Vesey	13.5	0	209	231									
Tyburn	46.2	79	311	397									
Washwood Heath	65.1	100	864	882									
Heart of Birmingham Teaching PCT	**52.8**	**86**	**5,241**	**5,710**	**7.8**	**8.5**	**5.9**	**13.3**	**14.4**	**9.4**	**10.0**	**10.1**	**8.7**
Aston	57.6	100	709	769									
Handsworth Wood	35.8	56	353	401									
Ladywood	53.5	84	244	296									
Lozells & East H&sworth	59.2	100	697	733									
Nechells	62.7	94	656	724									
Oscott	29.0	30	296	343									
Perry Barr	30.5	23	306	324									
Soho	56.4	97	560	607									
Sparkbrook	60.9	100	805	830									
Springfield	47.6	91	615	683									
South Birmingham PCT	**34.1**	**45**	**4,115**	**4,601**	**6.3**	**6.1**	**7.1**	**10.7**	**10.8**	**9.8**	**6.9**	**6.9**	**5.0**
Bartley Green	40.3	65	358	359									
Billesley	38.4	74	318	371									
Bournville	27.7	25	305	330									
Brandwood	37.0	47	297	340									
Edgbaston	30.0	32	190	223									
Hall Green	21.6	9	303	380									
Harborne	24.7	14	242	279									
Kings Norton	43.3	57	331	362									
Longbridge	38.0	61	351	382									
Moseley & Kings Heath	35.3	44	333	358									
Northfield	32.0	33	306	314									
Quinton	35.3	49	304	361									
Selly Oak	21.1	4	170	172									
Weoley	40.8	72	308	370									
Coventry Teaching PCT/LA	**32.6**	**42**	**3,879**	**4,388**	**6.2**	**4.4**	**5.5**	**11.0**	**7.6**	**9.0**	**8.0**	**5.5**	**4.6**
Bablake	17.1	0	145	146									
Binley and Willenhall	45.7	60	241	275									
Cheylesmore	20.7	0	164	178									
Earlsdon	10.3	0	124	106									
Foleshill	50.4	100	410	463									
Henley	44.1	51	291	322									
Holbrook	28.8	32	222	220									
Longford	37.2	49	254	285									
Lower Stoke	34.9	28	246	280									
Radford	33.8	47	241	347									
Sherbourne	45.9	89	287	405									
St Michael's	20.7	21	191	214									
Upper Stoke	34.5	50	245	301									
Wainbody	8.6	0	92	94									
Westwood	25.9	21	194	205									
Whoberley	17.1	0	165	155									
Woodlands	22.3	26	168	183									
Wyken	20.6	11	200	209									
Dudley PCT/LA	**27.2**	**31**	**3,525**	**3,608**	**6.1**	**5.9**	**6.6**	**8.8**	**8.5**	**8.8**	**5.6**	**5.0**	**3.9**
Amblecote	15.3	9	156	169									
Belle Vale	26.7	22	154	166									
Brierley Hill	34.7	61	203	197									
Brockmoor & Pensnett	35.5	48	171	145									
Castle & Priory	40.4	65	216	219									
Coseley East	28.8	16	153	155									
Cradley & Foxcote	28.8	18	183	188									
Gornal	24.1	27	129	119									
Halesowen North	22.7	18	139	149									
Halesowen South	12.1	1	85	95									
Hayley Green & Cradley South	18.9	17	98	118									
Kingswinford North & Wall Heath	9.6	0	103	94									
Kingswinford South	13.5	0	97	95									
Lye & Wollescote	29.7	27	181	183									
Netherton; Woodside & St Andrews	38.4	61	195	211									
Norton	11.7	0	95	104									
Pedmore & Stourbridge East	17.7	22	100	112									

	IMD	BIRTHS			STILLBIRTH			PERINATAL DEATH			INFANT DEATH		
	Score	%	avg / yr		Rates			Rates			Rates		
		in Q5	97-07	2007	97- 02	03- 07	2008	97- 02	03- 07	2008	97- 02	03- 07	2007
Quarry Bank & Dudley Wood	29.6	29	156	174									
St James's	32.5	58	175	179									
St Thomas's	43.5	72	247	262									
Sedgley	18.6	0	95	90									
Upper Gornal & Woodsetton	27.0	17	134	141									
Wollaston & Stourbridge Town	19.7	12	127	122									
Wordsley	14.3	0	134	121									
Herefordshire PCT/LA	**19.2**	**9**	**1,708**	**1,825**	**4.9**	**4.8**	**1.1**	**7.1**	**6.9**	**3.7**	**3.8**	**4.2**	**1.7**
Aylestone	20.0	0	52	76									
Backbury	15.8	0	25	29									
Belmont	29.9	55	169	175									
Bircher	13.6	0	17	13									
Bringsty	16.2	0	21	15									
Bromyard	20.3	0	57	59									
Burghill; Holmer & Lyde	11.8	0	23	30									
Castle	17.8	0	21	24									
Central	26.6	0	29	43									
Credenhill	16.1	0	34	29									
Frome	19.3	0	34	30									
Golden Cross with Weobley	18.7	0	25	27									
Golden Valley North	19.5	0	21	14									
Golden Valley South	17.2	0	24	22									
Hagley	12.2	0	35	33									
Hampton Court	17.8	0	20	31									
Hollington	18.3	0	16	19									
Hope End	13.1	0	37	32									
Kerne Bridge	14.4	0	27	27									
Kington Town	18.6	0	30	39									
Ledbury	11.8	0	95	98									
Leominster North	25.8	35	70	61									
Leominster South	24.5	0	55	68									
Llangarron	16.2	0	26	29									
Mortimer	19.8	0	29	25									
Old Gore	17.1	0	24	17									
Pembridge & Lyonshall w Titley	17.6	0	26	22									
Penyard	16.2	0	26	28									
Pontrilas	17.0	0	25	22									
Ross-on-Wye East	13.0	0	35	40									
Ross-on-Wye West	18.0	0	61	69									
St Martins & Hinton	24.3	22	146	187									
St Nicholas	15.1	0	67	79									
Stoney Street	17.0	0	23	26									
Sutton Walls	12.2	0	27	28									
Three Elms	18.4	0	116	126									
Tupsley	12.0	0	68	68									
Upton	17.4	0	22	19									
Valletts	19.9	0	28	30									
Wormsley Ridge	16.5	0	20	16									
North Staffordshire PCT	**20.1**	**15**	**2,020**	**2,059**	**4.2**	**4.9**	**7.9**	**7.6**	**8.2**	**14.5**	**5.2**	**4.9**	**8.3**
Newcastle-under-Lyme LA	**21.6**	**20**	**1,220**	**1,238**	**4.8**	**4.7**	**9.3**	**7.6**	**8.6**	**19.3**	**5.0**	**5.9**	**11.4**
Audley & Bignall End	17.0	0	55	57									
Bradwell	22.0	0	66	67									
Butt Lane	27.4	25	59	65									
Chesterton	27.0	49	109	86									
Clayton	16.3	0	31	36									
Cross Heath	37.8	59	76	79									
Halmerend	15.8	0	30	36									
Holditch	33.2	71	56	64									
Keele	5.0	0	9	11									
Kidsgrove	19.7	22	82	77									
Knutton & Silverdale	38.3	72	54	70									
Loggerheads & Whitmore	11.3	0	51	51									
Madeley	11.9	0	40	36									
May Bank	11.4	0	61	54									
Newchapel	15.6	0	36	44									
Porthill	15.1	0	46	46									
Ravenscliffe	15.8	0	41	49									
Seabridge	13.1	0	50	39									
Silverdale & Parksite	28.8	52	40	44									
Talke	23.1	0	32	30									
Thistleberry	20.9	0	46	47									
Town	29.0	33	43	46									
Westlands	8.1	0	43	43									
Wolstanton	18.7	0	65	61									
Staffordshire Moorlands LA	**17.4**	**6**	**847**	**872**	**3.1**	**5.0**	**5.5**	**7.6**	**7.1**	**6.6**	**5.7**	**3.1**	**3.4**
Alton	11.2	0	9	10									
Biddulph East	29.3	47	78	86									
Biddulph Moor	9.1	0	13	11									
Biddulph North	9.0	0	38	38									
Biddulph South	15.2	0	9	11									
Biddulph West	18.0	0	50	62									
Cellarhead	9.8	0	28	29									
Cheadle North East	24.4	0	39	37									
Cheadle South East	18.0	0	36	23									
Cheadle West	15.1	0	45	47									
Checkley	10.6	0	49	57									
Cheddleton	13.3	0	44	52									
Churnet	18.1	0	30	31									
Dane	22.8	0	14	11									
Forsbrook	12.8	0	35	35									
Hamps Valley	12.5	0	16	15									
Horton	13.8	0	13	10									
Ipstones	16.0	0	12	5									

	IMD Score	BIRTHS % in Q5	BIRTHS avg / yr 97-07	BIRTHS 2007	STILLBIRTH Rates 97- 02	STILLBIRTH Rates 03- 07	STILLBIRTH Rates 2008	PERINATAL DEATH Rates 97- 02	PERINATAL DEATH Rates 03- 07	PERINATAL DEATH Rates 2008	INFANT DEATH Rates 97- 02	INFANT DEATH Rates 03- 07	INFANT DEATH Rates 2007
Leek East	19.4	0	49	46									
Leek North	29.3	26	58	67									
Leek South	21.6	0	54	76									
Leek West	12.6	0	42	31									
Manifold	19.9	0	14	5									
Werrington	8.1	0	24	26									
Sandwell PCT/LA	**39.5**	**65**	**4,005**	**4,433**	**7.0**	**6.1**	**6.9**	**11.1**	**10.8**	**11.0**	**7.7**	**7.3**	**6.1**
Abbey	21.4	0	146	176									
Blackheath	34.0	70	148	157									
Bristnall	33.1	46	136	141									
Charlemont with Grove Vale	31.0	34	129	136									
Cradley Heath & Old Hill	37.8	61	162	194									
Friar Park	46.6	81	140	179									
Great Barr with Yew Tree	24.2	0	145	150									
Great Bridge	37.8	61	167	209									
Greets Green & Lyng	48.9	100	183	185									
Hateley Heath	42.9	86	161	174									
Langley	37.7	68	159	177									
Newton	26.6	22	130	126									
Old Warley	25.8	36	115	119									
Oldbury	36.6	62	195	199									
Princes End	48.6	86	214	216									
Rowley	34.9	59	146	158									
St Pauls	46.8	99	260	307									
Smethwick	42.4	73	177	204									
Soho & Victoria	55.2	100	279	322									
Tipton Green	39.2	60	182	206									
Tividale	37.0	66	171	200									
Wednesbury North	39.4	75	140	168									
Wednesbury South	40.3	49	143	141									
West Bromwich Central	47.0	81	181	189									
Shropshire PCT	**17.2**	**3**	**2,829**	**2,878**	**4.3**	**4.5**	**5.7**	**6.8**	**6.6**	**7.0**	**4.7**	**4.4**	**3.8**
Bridgnorth LA	**13.7**	**0**	**464**	**443**	**4.8**	**3.2**	**4.3**	**6.6**	**4.5**	**4.3**	**4.2**	**2.3**	**0.0**
Albrighton South	15.6	0	28	24									
Alveley	12.4	0	24	25									
Bridgnorth Castle	7.4	0	24	26									
Bridgnorth East	11.6	0	29	30									
Bridgnorth Morfe	14.6	0	29	35									
Bridgnorth West	15.4	0	26	23									
Broseley East	15.9	0	24	17									
Broseley West	15.3	0	25	34									
Claverley	11.0	0	12	9									
Ditton Priors	18.7	0	15	15									
Donington & Albrighton North	7.5	0	36	23									
Glazeley	16.8	0	15	19									
Harrington	16.7	0	12	16									
Highley	17.8	0	36	32									
Morville	13.5	0	14	12									
Much Wenlock	12.8	0	26	26									
Shifnal Idsall	15.8	0	24	19									
Shifnal Manor	7.3	0	20	19									
Shifnal Rural	13.0	0	17	21									
Stottesdon	19.2	0	13	6									
Worfield	16.2	0	12	12									
North Shropshire LA	**18.0**	**0**	**591**	**585**	**2.5**	**4.1**	**6.6**	**5.4**	**6.4**	**8.2**	**4.5**	**5.4**	**5.1**
Baschurch	10.5	0	12	17									
Clive & Myddle	13.2	0	23	28									
Cockshutt	13.7	0	11	10									
Dudleston Heath	20.6	0	13	16									
Ellesmere & Welshampton	17.4	0	37	33									
Hinstock	17.7	0	27	23									
Hodnet	18.9	0	28	25									
Hordley;Tetchill & Lyneal	18.2	0	10	6									
Market Drayton East	25.8	0	41	45									
Market Drayton North	14.3	0	54	74									
Market Drayton South	19.4	0	32	33									
Prees	20.1	0	25	23									
Shavington	21.6	0	10	14									
Shawbury	10.6	0	31	24									
Sutton	16.3	0	38	32									
Wem East	16.6	0	24	22									
Wem Rural	19.4	0	13	10									
Wem West	15.4	0	19	15									
Whitchurch North	23.5	0	33	35									
Whitchurch Rural	19.2	0	11	10									
Whitchurch South	20.6	0	33	34									
Whitchurch West	20.9	0	40	40									
Whixhall	19.4	0	11	5									
Woore	13.0	0	13	11									
Oswestry LA	**18.2**	**3**	**354**	**397**	**3.4**	**5.9**	**2.4**	**7.4**	**8.1**	**2.4**	**7.4**	**4.3**	**0.0**
Cabin Lane	10.9	0	36	33									
Carreg Llwyd	21.4	0	37	42									
Castle	21.9	48	25	30									
Gatacre	24.8	0	35	35									
Gobowen	24.0	0	32	29									
Kinnerley	16.2	0	12	20									
Llanyblodwel & Pant	16.7	0	16	20									
Maserfield	8.8	0	18	26									
Ruyton & West Felton	13.5	0	29	22									
St. Martin's	16.6	0	27	36									
Sweeney & Trefonen	15.7	0	34	53									
Weston Rhyn	19.2	0	26	30									
Whittington	18.2	0	26	21									

	IMD Score	BIRTHS % in Q5	BIRTHS avg / yr 97-07	BIRTHS 2007	STILLBIRTH Rates 97- 02	STILLBIRTH Rates 03- 07	STILLBIRTH Rates 2008	PERINATAL DEATH Rates 97- 02	PERINATAL DEATH Rates 03- 07	PERINATAL DEATH Rates 2008	INFANT DEATH Rates 97- 02	INFANT DEATH Rates 03- 07	INFANT DEATH Rates 2007
Shrewsbury and Atcham LA	**17.9**	**7**	**1,027**	**1,083**	**6.2**	**5.2**	**5.3**	**8.1**	**8.0**	**7.1**	**4.6**	**5.1**	**5.6**
Bagley	15.0	0	70	66									
Battlefield & Heathgates	21.4	0	71	81									
Bayston Hill	8.1	0	41	46									
Belle Vue	15.7	0	45	52									
Bowbrook	13.5	0	71	54									
Castlefields & Quarry	24.1	0	55	71									
Column	13.1	0	28	36									
Condover	13.3	0	20	21									
Copthorne	7.3	0	40	45									
Hanwood & Longden	16.8	0	18	15									
Harlescott	29.8	43	76	78									
Haughmond & Attingham	21.1	0	24	25									
Lawley	15.9	0	22	19									
Meole Brace	18.9	37	50	42									
Monkmoor	24.9	31	65	68									
Montford	13.5	0	22	21									
Pimhill	14.5	0	17	18									
Porthill	11.6	0	42	52									
Rea Valley	12.4	0	46	47									
Rowton	18.4	0	31	35									
Severn Valley	20.4	0	15	22									
Sundorne	22.7	0	64	61									
Sutton & Reabrook	15.5	0	37	45									
Underdale	18.3	0	60	63									
South Shropshire LA	**17.1**	**0**	**372**	**354**	**2.6**	**3.4**	**10.9**	**5.6**	**4.5**	**13.6**	**3.9**	**3.9**	**5.7**
Apedale	18.0	0	9	7									
Bishop's Castle with Onny Valley	18.1	0	20	16									
Bitterley with Stoke St Milborough	22.4	0	12	14									
Bucknell	17.1	0	9	6									
Burford	13.8	0	15	9									
Caynham with Ashford	13.4	0	9	4									
Chirbury	17.6	0	9	4									
Church Stretton North	7.5	0	10	6									
Church Stretton South	8.8	0	16	15									
Clee	19.0	0	21	21									
Cleobury Mortimer	11.3	0	29	28									
Clun	19.4	0	8	7									
Clun Forest	19.4	0	7	7									
Corve Valley	18.6	0	6	11									
Kemp Valley	20.5	0	10	12									
Ludlow Henley	26.4	0	32	33									
Ludlow St Laurence's	19.4	0	14	16									
Ludlow St Peter's	16.2	0	28	21									
Ludlow Sheet with Ludford	12.6	0	38	40									
Stokesay	19.9	0	31	42									
Upper Corvedale	19.3	0	10	11									
Wistanstow with Hopesay	16.6	0	12	9									
Worthen	17.6	0	18	15									
Cambrian	21.8	0	21	16									
Solihull PCT/LA	**20.0**	**24**	**2,072**	**2,160**	**6.0**	**4.3**	**5.3**	**9.3**	**6.9**	**10.2**	**4.7**	**4.4**	**4.6**
Bickenhill	22.7	19	132	128									
Blythe	5.4	0	132	158									
Castle Bromwich	16.9	0	75	67									
Chelmsley Wood	43.8	87	203	235									
Dorridge & Hockley Heath	4.2	0	94	103									
Elmdon	13.3	0	117	108									
Kingshurst & Fordbridge	42.5	80	196	211									
Knowle	5.6	0	72	56									
Lyndon	16.1	0	138	154									
Meriden	8.1	0	102	98									
Olton	10.3	0	106	114									
St Alphege	4.5	0	100	81									
Shirley East	9.0	0	109	114									
Shirley South	9.5	0	94	89									
Shirley West	12.3	0	123	127									
Silhill	9.5	0	89	94									
Smith's Wood	41.9	77	192	223									
South Staffordshire PCT	**17.5**	**12**	**6,425**	**6,914**	**5.8**	**4.9**	**4.2**	**9.2**	**8.9**	**6.9**	**5.7**	**6.1**	**6.0**
Cannock Chase LA	**21.5**	**16**	**1,109**	**1,126**	**5.9**	**4.3**	**0.0**	**8.9**	**8.6**	**0.9**	**4.6**	**5.9**	**7.1**
Brereton & Ravenhill	23.9	32	77	76									
Cannock East	30.1	50	86	88									
Cannock North	35.7	45	91	85									
Cannock South	30.4	25	89	91									
Cannock West	16.4	0	57	71									
Etching Hill & The Heath	21.5	30	73	60									
Hagley	24.0	0	53	63									
Hawks Green	8.0	0	101	92									
Heath Hayes East & Wimblebury	14.1	0	76	94									
Hednesford Green Heath	13.4	0	56	61									
Hednesford North	27.1	20	93	91									
Hednesford South	12.5	0	55	51									
Norton Canes	22.2	0	80	88									
Rawnsley	18.2	0	54	43									
Western Springs	17.3	0	69	72									
East Staffordshire LA	**21.3**	**25**	**1,253**	**1,405**	**5.1**	**5.1**	**8.9**	**7.7**	**10.2**	**12.3**	**4.8**	**7.9**	**6.4**
Abbey	12.5	0	24	28									
Anglesey	33.4	52	123	162									
Bagots	8.9	0	19	17									
Branston	9.2	0	92	91									
Brizlincote	6.7	0	55	45									
Burton	37.5	100	41	57									
Churnet	15.9	0	28	28									

	IMD Score	BIRTHS % in Q5	BIRTHS avg / yr 97-07	BIRTHS 2007	STILLBIRTH Rates 97- 02	STILLBIRTH Rates 03- 07	STILLBIRTH Rates 2008	PERINATAL DEATH Rates 97- 02	PERINATAL DEATH Rates 03- 07	PERINATAL DEATH Rates 2008	INFANT DEATH Rates 97- 02	INFANT DEATH Rates 03- 07	INFANT DEATH Rates 2007
Crown	12.9	0	22	19									
Eton Park	36.1	55	98	114									
Heath	17.5	0	66	70									
Horninglow	25.6	46	87	107									
Needwood	8.3	0	41	34									
Rolleston on Dove	6.5	0	29	51									
Shobnall	36.6	60	99	119									
Stapenhill	32.1	40	86	115									
Stretton	9.3	0	79	73									
Town	11.0	0	79	74									
Tutbury & Outwoods	11.2	0	53	57									
Weaver	13.5	0	20	15									
Winshill	23.2	25	95	107									
Yoxall	7.6	0	19	22									
Lichfield LA	**13.0**	**0**	**943**	**1,016**	**4.0**	**4.9**	**4.7**	**8.2**	**7.8**	**9.4**	**6.8**	**6.0**	**3.0**
All Saints	8.6	0	31	26									
Alrewas & Fradley	8.1	0	59	78									
Armitage with Handsacre	12.3	0	63	55									
Boley Park	5.2	0	46	37									
Boney Hay	17.9	0	32	28									
Bourne Vale	15.9	0	17	11									
Burntwood Central	9.6	0	28	18									
Chadsmead	26.9	0	51	51									
Chase Terrace	9.2	0	57	54									
Chasetown	24.4	0	37	43									
Colton & Mavesyn Ridware	12.8	0	14	16									
Curborough	21.9	0	54	48									
Fazeley	19.1	0	49	60									
Hammerwich	11.0	0	22	24									
Highfield	6.5	0	34	53									
King's Bromley	9.3	0	13	14									
Leomansley	9.4	0	56	106									
Little Aston	5.3	0	20	20									
Longdon	8.9	0	10	9									
Mease & Tame	10.8	0	32	31									
St John's	7.7	0	40	67									
Shenstone	10.6	0	27	21									
Stonnall	7.9	0	14	9									
Stowe	14.8	0	43	44									
Summerfield	17.9	0	56	57									
Whittington	7.5	0	40	36									
South Staffordshire LA	**12.5**	**0**	**940**	**925**	**6.8**	**4.8**	**1.0**	**10.1**	**8.1**	**1.0**	**5.8**	**4.6**	**5.4**
Bilbrook	14.2	0	40	57									
Brewood & Coven	10.7	0	47	49									
Cheslyn Hay North & Saredon	13.4	0	39	36									
Cheslyn Hay South	9.3	0	43	36									
Codsall North	10.2	0	34	41									
Codsall South	5.7	0	26	31									
Essington	18.8	0	44	43									
Featherstone & Shareshill	17.6	0	60	48									
Great Wyrley Landywood	15.7	0	49	42									
Great Wyrley Town	15.6	0	47	44									
Himley & Swindon	14.6	0	11	11									
Huntington & Hatherton	23.2	0	62	66									
Kinver	9.6	0	46	47									
Pattingham & Patshull	6.8	0	16	12									
Penkridge North East & Acton Trussell	10.4	0	22	23									
Penkridge South East	8.8	0	49	49									
Penkridge West	11.9	0	19	15									
Perton Dippons	8.0	0	18	13									
Perton East	2.5	0	23	29									
Perton Lakeside	9.4	0	73	58									
Trysull & Seisdon	10.8	0	14	16									
Wheaton Aston; Bishopswood & Lapley	12.1	0	31	32									
Wombourne North & Lower Penn	7.8	0	48	53									
Wombourne South East	7.0	0	25	27									
Wombourne South West	16.9	0	55	47									
Stafford LA	**14.2**	**5**	**1,223**	**1,426**	**5.2**	**5.8**	**4.0**	**9.5**	**10.2**	**6.7**	**6.4**	**6.0**	**6.4**
Barlaston & Oulton	15.4	0	26	35									
Baswich	3.2	0	31	28									
Chartley	8.7	0	12	9									
Church Eaton	10.6	0	17	20									
Common	17.1	0	55	74									
Coton	15.6	0	71	98									
Eccleshall	11.7	0	51	55									
Forebridge	19.6	0	47	60									
Fulford	12.7	0	37	50									
Gnosall & Woodseaves	9.5	0	59	65									
Haywood & Hixon	7.3	0	54	50									
Highfields & Western Downs	25.1	30	90	93									
Holmcroft	18.5	0	74	96									
Littleworth	13.9	0	63	74									
Manor	21.2	0	64	82									
Milford	7.2	0	31	44									
Milwich	15.4	0	14	19									
Penkside	26.1	55	55	83									
Rowley	8.1	0	45	48									
St. Michael's	8.1	0	67	65									
Seighford	9.7	0	21	18									
Stonefield & Christchurch	12.1	0	53	59									
Swynnerton	10.2	0	33	35									
Tillington	20.0	0	53	64									
Walton	12.5	0	48	50									
Weeping Cross	3.0	0	52	52									

	IMD	BIRTHS			STILLBIRTH			PERINATAL DEATH			INFANT DEATH		
	Score	%	avg / yr		Rates			Rates			Rates		
		in Q5	97-07	2007	97- 02	03- 07	2008	97- 02	03- 07	2008	97- 02	03- 07	2007
Tamworth LA	**21.1**	**23**	**957**	**1,016**	**7.8**	**4.0**	**4.7**	**10.9**	**7.8**	**9.4**	**6.3**	**5.7**	**6.9**
Amington	20.0	27	111	109									
Belgrave	26.1	45	101	107									
Bolehall	21.3	0	82	98									
Castle	18.5	12	100	94									
Glascote	33.0	73	127	124									
Mercian	19.0	0	66	71									
Spital	16.9	0	58	59									
Stonydelph	22.8	30	128	125									
Trinity	9.2	0	79	96									
Wilnecote	15.6	0	105	133									
Stoke on Trent Teaching PCT	**39.1**	**62**	**3,144**	**3,682**	**6.1**	**6.9**	**4.7**	**10.8**	**11.5**	**7.6**	**8.8**	**7.4**	**4.9**
Staffordshire Moorlands LA	**17.4**	**6**	**847**	**872**	**3.1**	**5.0**	**5.5**	**7.6**	**7.1**	**6.6**	**5.7**	**3.1**	**3.4**
Bagnall & Stanley	10.6	0	10	16									
Brown Edge & Endon	10.7	0	35	38									
Caverswall	18.5	0	10	7									
Stoke-on-Trent LA	**39.5**	**63**	**3,089**	**3,621**	**6.3**	**7.0**	**4.8**	**10.9**	**11.7**	**7.7**	**8.8**	**7.5**	**5.0**
Abbey Green	42.8	72	131	127									
Bentilee & Townsend	57.2	85	166	188									
Berryhill & Hanley East	38.6	60	111	136									
Blurton	43.4	85	153	175									
Burslem North	42.2	71	158	202									
Burslem South	52.5	81	223	279									
Chell & Packmoor	41.1	56	158	171									
East Valley	29.8	46	125	178									
Fenton	42.3	85	172	216									
Hanley West & Shelton	48.5	73	149	181									
Hartshill & Penkhull	23.5	12	131	119									
Longton North	29.8	31	179	186									
Longton South	37.8	72	190	221									
Meir Park & S&on	35.4	46	164	175									
Northwood & Birches Head	33.6	45	142	170									
Norton & Bradeley	36.0	58	115	129									
Stoke & Trent Vale	35.7	77	158	209									
Trentham & Hanford	13.6	0	102	124									
Tunstall	43.0	89	226	306									
Weston & Meir North	43.3	65	135	129									
Telford and Wrekin PCT/LA	**25.6**	**29**	**2,024**	**2,245**	**6.7**	**6.6**	**6.0**	**10.5**	**8.7**	**10.3**	**7.1**	**4.2**	**2.7**
Apley Castle	6.2	0	30	36									
Arleston	32.3	57	43	59									
Brookside	34.0	54	117	115									
Church Aston & Lilleshall	9.0	0	25	23									
College	40.5	79	46	51									
Cuckoo Oak	36.8	62	86	91									
Dawley Magna	26.0	38	130	144									
Donnington	35.9	61	76	91									
Dothill	18.7	0	30	30									
Edgmond	7.1	0	18	19									
Ercall	14.3	0	26	30									
Ercall Magna	16.8	0	21	23									
Hadley & Leegomery	29.2	32	153	197									
Haygate	29.6	0	36	39									
Horsehay & Lightmoor	9.4	0	42	54									
Ironbridge Gorge	15.5	0	23	30									
Ketley & Oakengates	25.0	0	112	141									
Lawley & Overdale	20.0	0	88	94									
Madeley	25.5	31	48	45									
Malinslee	46.4	82	103	106									
Muxton	16.3	0	95	110									
Newport East	13.8	0	25	32									
Newport North	9.6	0	26	25									
Newport South	11.0	0	21	24									
Newport West	11.7	0	21	22									
Park	14.1	0	18	22									
Priorslee	7.0	0	70	75									
St Georges	22.0	30	69	85									
Shawbirch	8.3	0	39	25									
The Nedge	25.7	17	127	140									
Woodside	45.8	100	132	124									
Wrockwardine	10.6	0	53	38									
Wrockwardine Wood & Trench	21.0	0	74	105									
Walsall Teaching PCT/LA	**35.3**	**56**	**3,414**	**3,541**	**4.9**	**5.2**	**6.0**	**8.8**	**9.9**	**10.0**	**7.4**	**8.3**	**10.2**
Aldridge Central & South	19.0	19	116	100									
Aldridge North & Walsall Wood	19.4	0	142	133									
Bentley & Darlaston North	37.9	76	199	210									
Birchills Leamore	50.2	90	253	237									
Blakenall	54.4	100	249	241									
Bloxwich East	39.7	57	152	136									
Bloxwich West	33.3	58	155	150									
Brownhills	25.1	12	162	152									
Darlaston South	40.6	92	188	197									
Paddock	18.8	26	120	139									
Palfrey	44.7	74	293	328									
Pelsall	18.2	16	106	101									
Pheasey Park Farm	13.2	0	92	86									
Pleck	46.0	92	261	307									
Rushall-Shelfield	26.2	13	127	137									
St Matthew's	45.8	81	216	226									
Short Heath	25.2	17	111	109									
Streetly	6.5	0	95	123									
Willenhall North	26.1	44	156	164									
Willenhall South	35.4	44	219	265									

	IMD	BIRTHS			STILLBIRTH			PERINATAL DEATH			INFANT DEATH		
	Score	%	avg / yr		Rates			Rates			Rates		
		in Q5	97-07	2007	97- 02	03- 07	2008	97- 02	03- 07	2008	97- 02	03- 07	2007
Warwickshire PCT	**16.2**	**7**	**5,621**	**5,993**	**4.3**	**4.6**	**2.2**	**7.1**	**7.1**	**5.1**	**4.8**	**4.3**	**4.0**
North Warwickshire LA	**16.9**	**4**	**649**	**627**	**4.5**	**3.5**	**4.6**	**7.0**	**6.7**	**6.1**	**3.3**	**4.8**	**3.2**
Arley & Whitacre	22.5	0	70	81									
Atherstone Central	29.4	48	52	44									
Atherstone North	15.9	0	34	32									
Atherstone South & Mancetter	22.4	0	35	35									
Baddesley & Grendon	17.0	0	39	40									
Coleshill North	8.9	0	37	38									
Coleshill South	13.7	0	25	27									
Curdworth	13.3	0	25	24									
Dordon	20.0	0	39	41									
Fillongley	16.3	0	26	35									
Hartshill	15.5	0	44	45									
Hurley & Wood End	18.3	0	43	40									
Kingsbury	9.7	0	39	32									
Newton Regis & Warton	13.1	0	34	24									
Polesworth East	16.3	0	37	29									
Polesworth West	11.5	0	37	33									
Water Orton	10.4	0	31	27									
Nuneaton and Bedworth LA	**25.0**	**21**	**1,435**	**1,519**	**5.4**	**6.5**	**1.3**	**8.4**	**9.5**	**6.3**	**5.2**	**5.3**	**6.6**
Abbey	36.1	43	113	125									
Arbury	17.2	0	68	78									
Attleborough	19.2	0	104	99									
Bar Pool	31.3	28	103	100									
Bede	31.8	27	65	72									
Bulkington	14.5	0	46	51									
Camp Hill	40.6	72	123	148									
Exhall	26.0	0	87	88									
Galley Common	15.0	0	116	130									
Heath	25.2	0	84	91									
Kingswood	30.8	28	89	86									
Poplar	25.5	19	104	135									
St Nicolas	8.9	0	53	49									
Slough	17.3	0	83	80									
Weddington	10.4	0	50	44									
Wem Brook	39.0	76	91	98									
Whitestone	5.1	0	58	45									
Rugby LA	**14.7**	**3**	**1,034**	**1,130**	**3.2**	**4.1**	**2.5**	**6.1**	**6.2**	**5.1**	**4.8**	**3.9**	**0.9**
Admirals	9.3	0	78	99									
Avon & Swift	12.7	0	22	19									
Benn	18.3	0	100	107									
Bilton	5.6	0	34	40									
Brownsover North	7.3	0	76	97									
Brownsover South	26.9	49	73	86									
Caldecott	13.0	0	50	59									
Dunchurch & Knightlow	7.4	0	41	34									
Earl Craven & Wolston	9.6	0	52	62									
Eastlands	6.1	0	54	51									
Fosse	12.5	0	32	37									
Hillmorton	13.3	0	49	49									
Lawford & King's Newnham	13.9	0	41	32									
Leam Valley	10.6	0	17	12									
New Bilton	20.7	0	80	105									
Newbold	26.3	0	83	96									
Overslade	24.4	0	59	59									
Paddox	8.4	0	37	33									
Ryton-on-Dunsmore	9.2	0	21	22									
Wolvey	8.5	0	35	31									
Stratford-on-Avon LA	**9.8**	**0**	**1,131**	**1,217**	**3.7**	**4.2**	**3.1**	**6.5**	**6.4**	**6.3**	**5.0**	**3.9**	**3.3**
Alcester	13.6	0	62	73									
Aston Cantlow	12.3	0	22	22									
Bardon	10.1	0	16	19									
Bidford & Salford	11.3	0	70	71									
Brailes	9.9	0	17	14									
Burton Dassett	12.2	0	29	32									
Claverdon	7.8	0	23	24									
Ettington	9.9	0	24	28									
Fenny Compton	8.3	0	30	26									
Harbury	6.1	0	52	41									
Henley	9.9	0	40	39									
Kineton	11.0	0	51	41									
Kinwarton	7.8	0	17	16									
Long Compton	13.7	0	20	29									
Long Itchington	8.3	0	24	40									
Quinton	11.9	0	30	33									
Sambourne	12.1	0	19	19									
Shipston	7.4	0	45	46									
Snitterfield	8.4	0	22	18									
Southam	7.5	0	78	64									
Stockton & Napton	7.6	0	31	35									
Stratford Alveston	6.1	0	52	91									
Stratford Avenue & New Town	12.6	0	57	80									
Stratford Guild & Hathaway	7.6	0	55	69									
Stratford Mount Pleasant	12.1	0	45	45									
Studley	11.8	0	57	62									
Tanworth	9.8	0	28	26									
Tredington	8.6	0	21	27									
Vale of the Red Horse	9.0	0	18	12									
Welford	11.7	0	16	16									
Wellesbourne	9.5	0	62	59									
Warwick LA	**12.9**	**2**	**1,371**	**1,500**	**4.5**	**3.7**	**1.3**	**6.9**	**6.0**	**2.6**	**4.8**	**3.6**	**4.7**
Abbey	7.4	0	74	86									
Bishop's Tachbrook	9.4	0	31	32									
Brunswick	24.5	0	108	123									

	IMD Score	BIRTHS % in Q5	BIRTHS avg / yr 97-07	BIRTHS 2007	STILLBIRTH Rates 97- 02	STILLBIRTH Rates 03- 07	STILLBIRTH Rates 2008	PERINATAL DEATH Rates 97- 02	PERINATAL DEATH Rates 03- 07	PERINATAL DEATH Rates 2008	INFANT DEATH Rates 97- 02	INFANT DEATH Rates 03- 07	INFANT DEATH Rates 2007
Budbrooke	8.8	0	63	68									
Clarendon	16.3	0	56	50									
Crown	24.6	31	74	75									
Cubbington	8.1	0	53	48									
Lapworth	13.1	0	29	39									
Leek Wootton	11.2	0	17	23									
Manor	8.7	0	74	84									
Milverton	10.8	0	86	83									
Park Hill	5.5	0	79	80									
Radford Semele	8.7	0	24	28									
St John's	6.5	0	60	48									
Stoneleigh	11.9	0	13	12									
Warwick North	13.5	0	95	106									
Warwick South	9.3	0	105	134									
Warwick West	17.4	0	120	163									
Whitnash	10.3	0	97	106									
Willes	15.5	0	111	112									
Wolverhampton PCT/LA	**36.7**	**59**	**3,089**	**3,386**	**5.2**	**6.2**	**5.9**	**10.1**	**10.8**	**10.8**	**8.0**	**6.7**	**5.4**
Bilston East	51.2	96	181	209									
Bilston North	37.5	57	140	170									
Blakenhall	36.7	60	151	164									
Bushbury North	29.8	38	130	141									
Bushbury South & Low Hill	53.3	86	256	285									
East Park	46.5	88	174	204									
Ettingshall	45.9	81	217	249									
Fallings Park	38.4	44	157	172									
Graiseley	36.7	59	168	189									
Heath Town	45.4	91	185	224									
Merry Hill	20.3	17	128	128									
Oxley	32.8	45	177	162									
Park	30.1	33	123	141									
Penn	13.0	0	128	129									
St Peter's	43.3	93	193	244									
Spring Vale	34.4	63	132	133									
Tettenhall Regis	14.8	0	114	98									
Tettenhall Wightwick	15.1	0	79	92									
Wednesfield North	28.7	44	111	114									
Wednesfield South	29.8	52	147	138									
Worcestershire PCT	**17.8**	**13**	**5,940**	**6,253**	**5.5**	**5.2**	**4.0**	**9.1**	**8.3**	**4.9**	**5.2**	**5.1**	**4.8**
Bromsgrove LA	**10.9**	**0**	**869**	**932**	**7.3**	**5.8**	**1.0**	**12.0**	**8.7**	**1.0**	**5.5**	**5.4**	**3.2**
Alvechurch	9.9	0	58	67									
Beacon	11.4	0	11	10									
Catshill	14.5	0	43	41									
Charford	23.0	0	88	115									
Drakes Cross & Walkers Heath	11.0	0	48	45									
Furlongs	7.0	0	30	29									
Hagley	3.7	0	31	41									
Hillside	5.0	0	39	37									
Hollywood & Majors Green	7.4	0	33	43									
Linthurst	4.2	0	20	20									
Marlbrook	10.7	0	38	40									
Norton	5.9	0	67	71									
St Johns	16.3	0	38	36									
Sidemoor	18.5	0	51	59									
Slideslow	3.5	0	60	84									
Stoke Heath	4.3	0	26	16									
Stoke Prior	12.2	0	13	7									
Tardebigge	10.4	0	25	27									
Uffdown	13.7	0	16	14									
Waseley	13.7	0	39	40									
Whitford	10.9	0	57	36									
Woodvale	6.8	0	17	22									
Wythall South	8.3	0	19	32									
Malvern Hills LA	**15.3**	**0**	**608**	**589**	**4.9**	**5.7**	**4.9**	**8.9**	**6.0**	**4.9**	**6.0**	**2.0**	**0.0**
Alfrick & Leigh	12.1	0	25	26									
Baldwin	14.3	0	13	15									
Broadheath	8.8	0	29	26									
Chase	14.7	0	48	44									
Dyson Perrins	11.6	0	27	23									
Hallow	9.5	0	14	16									
Kempsey	11.5	0	31	39									
Lindridge	16.7	0	17	18									
Link	15.4	0	54	63									
Longdon	13.3	0	16	19									
Martley	14.7	0	12	15									
Pickersleigh	31.6	35	91	95									
Powick	11.6	0	32	22									
Priory	10.2	0	26	15									
Ripple	12.6	0	12	12									
Teme Valley	14.8	0	16	9									
Tenbury	14.5	0	32	36									
Upton & Hanley	13.0	0	35	29									
Wells	7.5	0	21	15									
West	11.9	0	45	38									
Woodbury	8.8	0	15	14									
Redditch LA	**24.0**	**27**	**1,039**	**1,134**	**5.1**	**4.7**	**5.9**	**9.2**	**9.3**	**5.9**	**5.6**	**7.9**	**10.6**
Abbey	29.7	67	70	59									
Astwood Bank & Feckenham	10.6	0	55	68									
Batchley	28.4	63	120	161									
Central	28.7	0	85	100									
Church Hill	28.9	38	118	122									
Crabbs Cross	10.1	0	67	61									
Greenlands	31.1	41	115	135									

	IMD Score	BIRTHS % in Q5	BIRTHS avg / yr 97-07	BIRTHS 2007	STILLBIRTH Rates 97- 02	STILLBIRTH Rates 03- 07	STILLBIRTH Rates 2008	PERINATAL DEATH Rates 97- 02	PERINATAL DEATH Rates 03- 07	PERINATAL DEATH Rates 2008	INFANT DEATH Rates 97- 02	INFANT DEATH Rates 03- 07	INFANT DEATH Rates 2007
Headless Cross & Oakenshaw	16.9	0	91	101									
Lodge Park	28.0	48	67	79									
Matchborough	23.5	0	72	87									
West	8.0	0	54	48									
Winyates	25.4	28	124	113									
Worcester LA	**19.9**	**22**	**1,249**	**1,309**	**5.7**	**4.4**	**5.9**	**9.6**	**7.3**	**8.1**	**6.6**	**5.2**	**5.4**
Arboretum	18.7	0	76	81									
Battenhall	12.0	0	51	56									
Bedwardine	10.6	0	75	76									
Cathedral	26.5	24	120	151									
Claines	9.3	0	82	84									
Gorse Hill	39.8	83	80	82									
Nunnery	22.4	25	102	111									
Rainbow Hill	32.6	50	90	86									
St Clement	9.3	0	40	33									
St John	25.2	31	93	103									
St Peter's Parish	6.3	0	75	88									
St Stephen	14.1	0	53	54									
Warndon	44.9	80	96	112									
Warndon Parish North	7.2	0	116	105									
Warndon Parish South	6.8	0	101	87									
Wychavon LA	**12.7**	**0**	**1,145**	**1,164**	**5.6**	**3.9**	**0.8**	**8.6**	**6.0**	**3.3**	**4.9**	**2.7**	**1.7**
Badsey	10.0	0	24	24									
Bengeworth	15.8	0	60	74									
Bowbrook	7.6	0	24	33									
Bredon	4.7	0	20	25									
Bretforton & Offenham	7.9	0	21	20									
Broadway & Wickhamford	10.5	0	29	34									
Dodderhill	14.7	0	24	25									
Drakes Broughton	12.5	0	21	17									
Droitwich Central	20.4	0	26	22									
Droitwich East	13.0	0	49	46									
Droitwich South East	4.1	0	61	57									
Droitwich South West	12.4	0	49	54									
Droitwich West	26.0	0	79	103									
Eckington	11.9	0	21	20									
Elmley Castle & Somerville	9.5	0	20	11									
Evesham North	19.2	0	61	58									
Evesham South	12.7	0	60	56									
Fladbury	9.7	0	17	12									
Great Hampton	16.7	0	19	22									
Hartlebury	15.4	0	26	28									
Harvington & Norton	19.4	0	25	31									
Honeybourne & Pebworth	14.3	0	28	23									
Inkberrow	8.1	0	37	34									
Little Hampton	8.3	0	81	76									
Lovett & North Claines	8.6	0	50	54									
Norton & Whittington	7.0	0	44	45									
Ombersley	13.4	0	19	16									
Pershore	13.5	0	59	66									
Pinvin	11.5	0	27	23									
South Bredon Hill	8.4	0	16	11									
The Littletons	14.4	0	28	25									
Upton Snodsbury	10.6	0	21	19									
Wyre Forest LA	**22.3**	**18**	**1,014**	**1,109**	**4.5**	**7.4**	**5.2**	**6.6**	**12.1**	**5.2**	**2.7**	**6.1**	**5.4**
Aggborough & Spennells	15.7	0	80	65									
Areley Kings	27.2	45	58	66									
Bewdley & Arley	12.7	0	51	52									
Blakedown & Chaddesley	11.9	0	30	26									
Broadwaters	32.2	34	116	138									
Cookley	17.4	0	25	20									
Franche	13.4	0	63	68									
Greenhill	21.9	23	91	111									
Habberley & Blakebrook	19.3	32	58	58									
Lickhill	16.1	0	72	84									
Mitton	18.3	0	78	97									
Morton	13.6	0	15	16									
Offmore & Comberton	24.2	31	58	54									
Oldington & Foley Park	47.2	74	76	87									
Rock	14.5	0	19	17									
Sutton Park	22.0	0	85	110									
Wolverley	19.4	0	14	11									
Wribbenhall	14.7	0	41	45									

CHAPTER FOURTEEN: STILLBIRTHS, INFANT DEATHS AND CONGENITAL ANOMALIES, WEST MIDLANDS 2003 – 2007

14.1 Introduction

In the previous chapter (13), we presented stillbirth and infant mortality rates from all causes as well as 'corrected' rates, which exclude congenital anomalies and neonatal deaths at pre-viable gestations to allow comparison of rates between different populations.

This chapter examines lethal congenital anomalies in the West Midlands, and the contribution they make to stillbirths and infant deaths. We present overall rates, for the last five years, for each PCT in the Region, stratified for the 6 main congenital anomaly categories. We then focus on the largest category, chromosomal anomalies, represented mainly by trisomies 21 (Down's syndrome), 18 (Edwards'), and 13 (Patau).

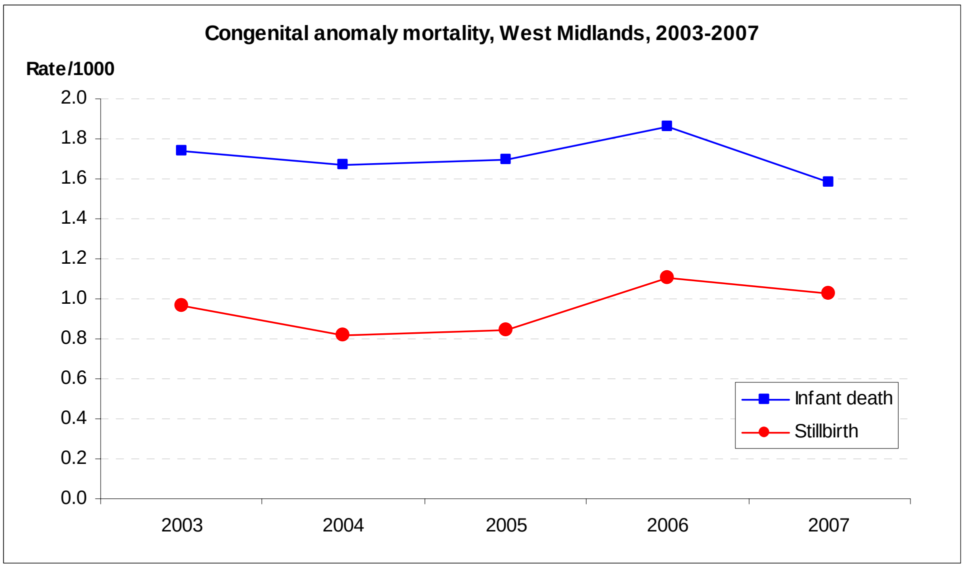
The information presented is obtained from the West Midlands Congenital Anomaly Register (WMCAR), which collects information from multiple sources in the Region, including antenatal ultrasound, laboratories, pathology departments, and delivery units. The Perinatal Institute maintains WMCAR together with registers of fetal losses and perinatal deaths, using these different sources to cross-validate the number of infants with lethal fetal anomalies. All anomalies are coded using the International Classification of Disease version 10 (ICD 10).

Further analysis of WM congenital anomalies & subgroups, and their association with consanguinity and other factors, will be possible with the recently commenced collection of the WM maternity dataset.

14.2 Mortality from Congenital Anomalies

As shown in the preceding chapter, 16.7% of stillbirths and 26.8% of infant deaths are due to congenital anomalies (Chapter 13, Figures 13.5 & 13.7).

Figure 14.1: Recent trend for stillbirths and infant deaths associated with congenital anomalies



Congenital anomaly related deaths are grouped into six categories, according to the Fetal and Neonatal classification:

Table 14.1: Congenital anomaly - major categories (fetal & neonatal classification)

	Category	Examples
1	Chromosomal defect	Down's syndrome (trisomy 21)
2	Inborn error of metabolism	Cystic fibrosis
3	Neural tube effect	Spina bifida
4	Congenital heart defect	Hypoplastic left heart syndrome
5	Renal abnormality	Renal agenesis
6	Other/ multiple malformations	Musculoskeletal disorders, central nervous system malformations; multiple malformations (syndromic/non-syndromic)

Figure 14.2: Stillbirths with major congenital anomalies, West Midlands, 2003-2007

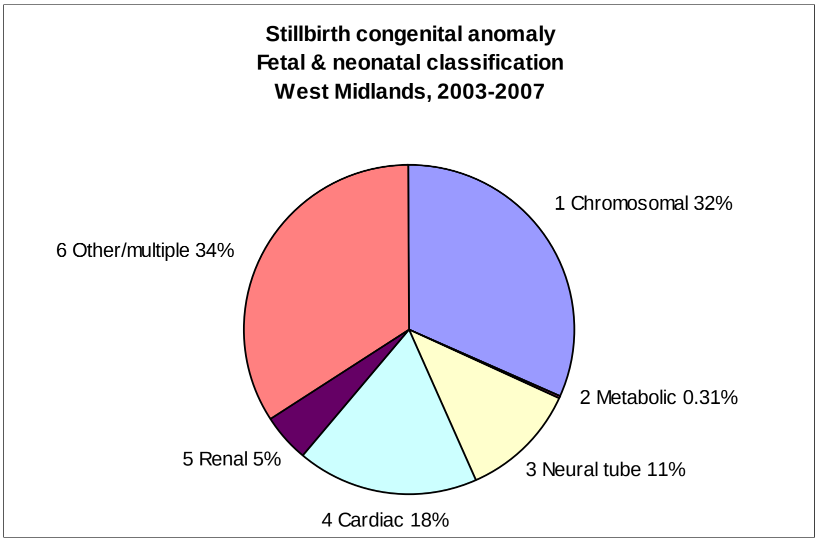
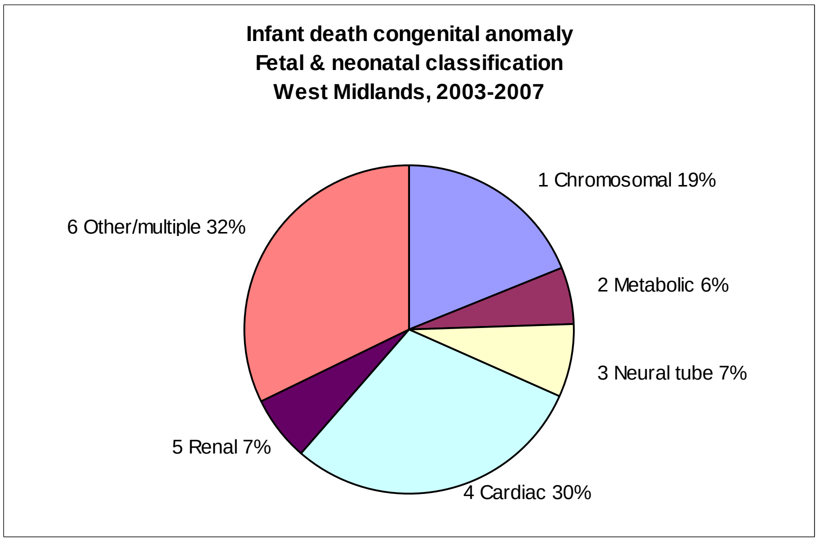


Figure 14.3: Infant deaths with major congenital anomalies, West Midlands, 2003-2007



In Tables 14.2 and 14.3, stillbirths and infant deaths due to congenital anomalies are presented for West Midlands PCTs by overall rate and within the six main anomaly categories (Table 14.1)

Table 14.2: Stillbirths due to major congenital anomaly groups, WM PCTs 2003-2007

PCT	Births 2003-07	Cong anom Deaths	Rate /1,000	Fetal/Neonatal anomaly categories*					
				1	2	3	4	5	6
Birmingham East & North	31,780	51	1.60	16	0	6	4	2	23
Coventry	20,338	14	0.69	3	0	1	4	1	5
Dudley	17,648	15	0.85	0	0	3	5	0	7
Heart of Birmingham	27,584	40	1.45	13	0	4	8	5	10
Herefordshire	8,579	6	0.70	3	0	1	0	0	2
North Staffordshire	10,152	6	0.59	3	0	0	0	0	3
Sandwell	20,935	22	1.05	4	1	4	2	1	10
Shropshire	14,057	5	0.36	1	0	0	2	0	2
Solihull	10,375	3	0.29	2	0	0	0	0	1
South Birmingham	21,445	25	1.17	9	0	1	3	1	11
South Staffordshire	32,682	27	0.83	11	0	4	6	0	6
Stoke on Trent	16,827	19	1.13	4	0	4	2	2	7
Telford & Wrekin	10,499	8	0.76	4	0	2	1	0	1
Walsall Teaching	17,404	11	0.63	2	0	1	2	0	6
Warwickshire	28,872	31	1.07	10	0	2	10	2	7
Wolverhampton	15,883	13	0.82	5	0	1	3	0	4
Worcestershire	30,193	23	0.76	11	0	2	5	1	4
WEST MIDLANDS	335,253	319	0.95	101	1	36	57	15	109

* Categories as listed in Table 14.1

Table 14.3: Infant deaths due to major congenital anomaly groups by WM PCTs, 2003-2007

PCT	Births 2003-07	Cong anom Deaths	Rate /1,000	Fetal/Neonatal anomaly categories*					
				1	2	3	4	5	6
Birmingham East & North	31,780	78	2.48	13	5	10	17	5	28
Coventry	20,338	31	1.53	3	4	3	10	1	10
Dudley	17,648	18	1.03	2	1	0	8	0	7
Heart of Birmingham	27,584	99	3.62	16	8	5	19	10	41
Herefordshire	8,579	5	0.59	0	0	0	2	0	3
North Staffordshire	10,152	12	1.19	2	0	0	6	1	3
Sandwell	20,935	38	1.83	9	2	0	10	4	13
Shropshire	14,057	11	0.79	5	1	0	3	0	2
Solihull	10,375	19	1.84	1	0	2	8	2	6
South Birmingham	21,445	33	1.55	9	1	4	7	4	8
South Staffordshire	32,682	44	1.35	9	3	4	14	0	14
Stoke on Trent	16,827	32	1.91	4	2	3	15	3	5
Telford & Wrekin	10,499	17	1.63	4	1	0	6	1	5
Walsall Teaching	17,404	36	2.08	6	3	2	14	2	9
Warwickshire	28,872	31	1.08	8	0	3	10	1	9
Wolverhampton	15,883	26	1.65	8	1	3	5	2	7
Worcestershire	30,193	40	1.33	9	0	1	16	1	13
WEST MIDLANDS	335,253	570	1.71	108	32	40	170	37	183

* Categories as listed in Table 14.1

Chromosomal abnormalities are the single largest category of congenital anomalies, and the largest proportion of these is trisomies, which include mostly Down’s syndrome (trisomy 21), as well Edwards (18) and Patau (13) syndromes.

14.3 Down's Syndrome (trisomy 21)

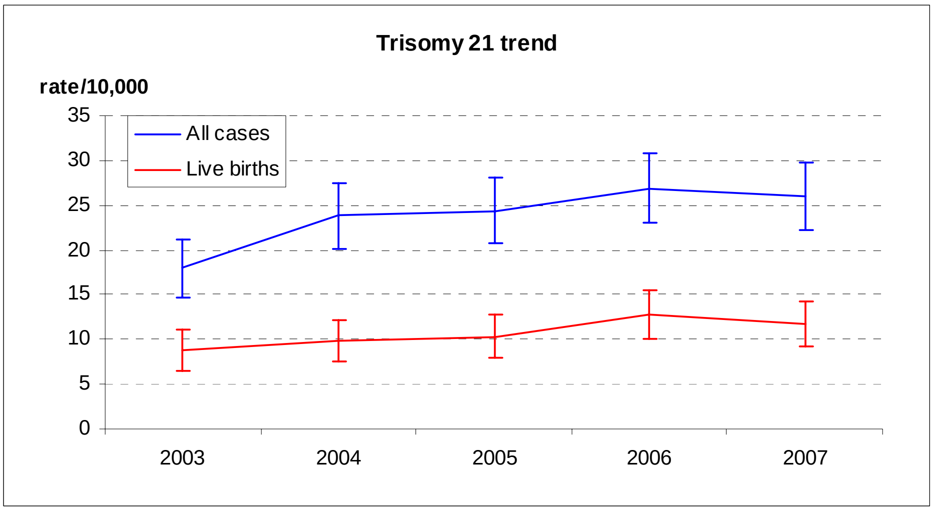
Down's syndrome is a chromosomal anomaly caused by an extra chromosome 21. It is the most common condition associated with autosomal aneuploidy at birth and a significant cause of learning difficulties. The prevalence of trisomy 21 is known to be associated with maternal age.

During the period reported here, the West Midlands had a second trimester serum screening strategy offered routinely to all women, with an uptake of approximately 60-70%. The antenatal detection rate for Down's syndrome has changed little in recent years and is approximately 55%.

Children with Down's syndrome have moderate to severe learning difficulties and other structural malformations are common, particularly congenital heart defects and duodenal atresia. Outcomes of pregnancy can be altered by termination following detection. Mortality in continuing pregnancies will be determined by the presence of additional structural malformations.

We report the incidence as 1. all cases (regardless of outcome, including terminations), and 2. live births only.

Figure 14.4: Trisomy 21 cases (all outcomes) West Midlands 2003-2007



The average incidence of Down's syndrome in the West Midlands between 2003 and 2007 was 23.9/10,000 births (1 in 419 births) (all outcomes), and 10.4/10,000 live births (1:958).

The incidence of Down's syndrome is increasing mainly because of an increasing age of the maternal population.

Figure 14.5: Trisomy 21 cases (all outcomes) West Midlands 2003-2007: incidence by maternal age

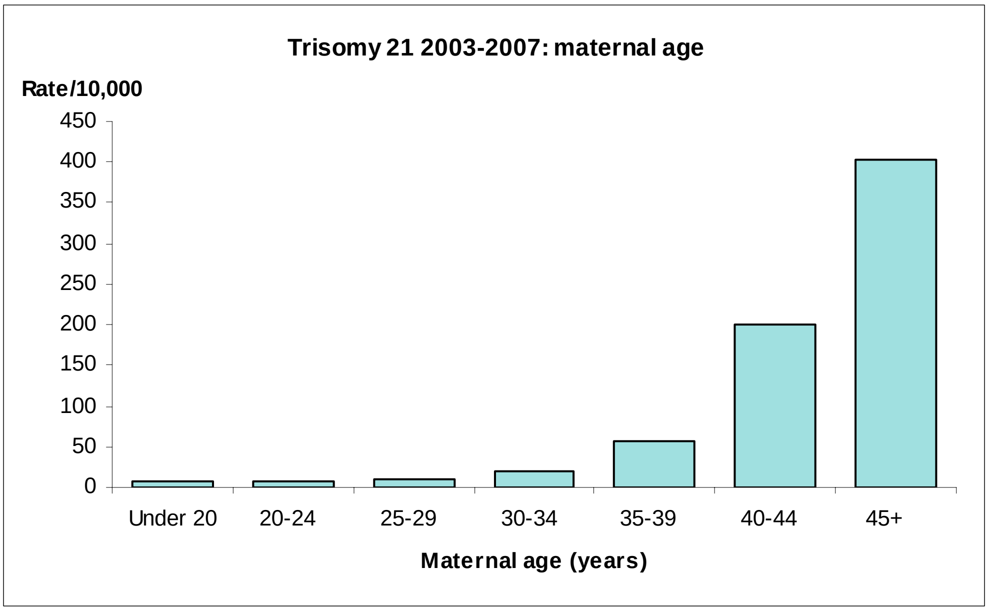
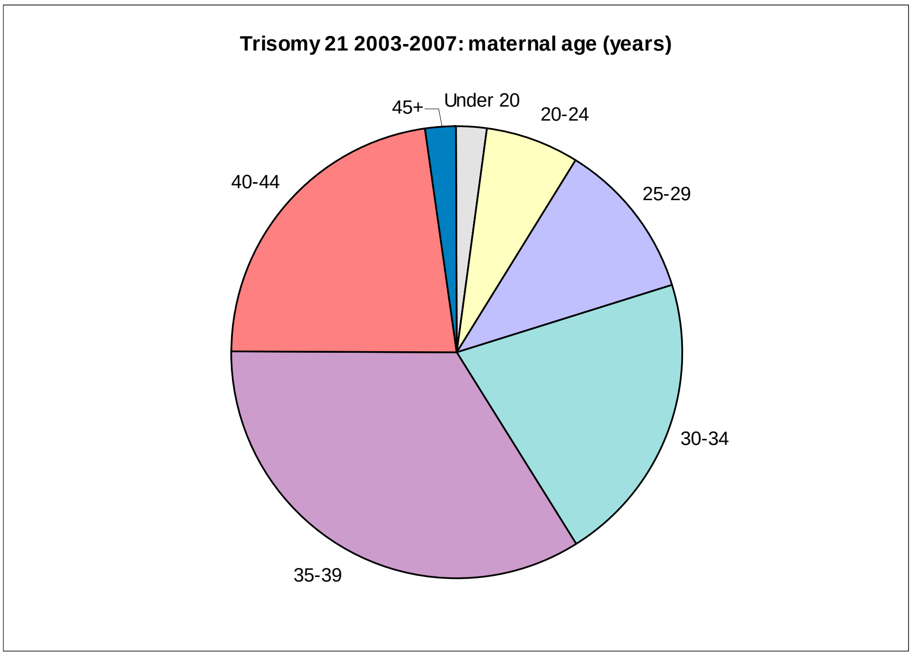
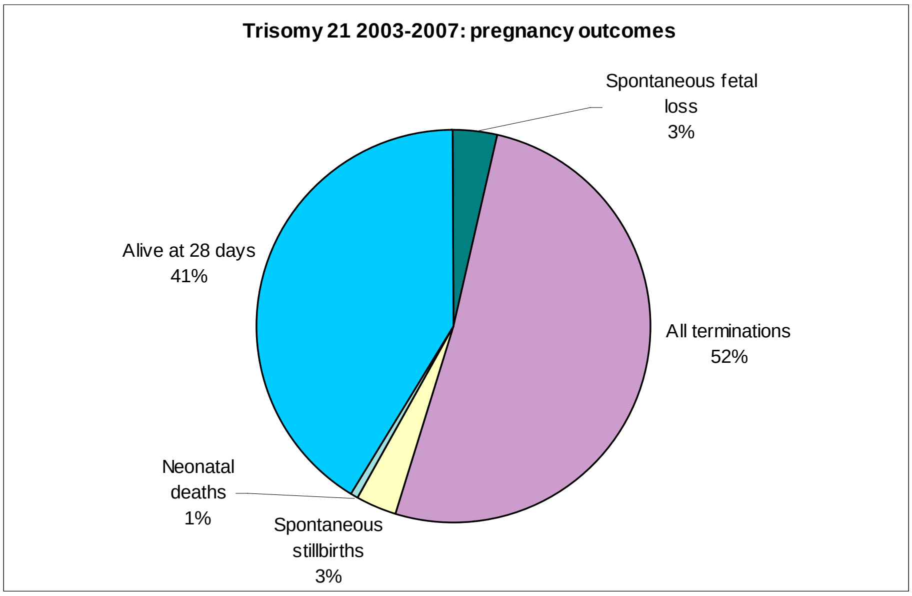


Figure 14.6: Trisomy 21 (all outcomes), West Midlands 2003-2007: proportions within maternal categories



Although most (53%) of births occur in mothers aged 25-35 years, the majority (57%) of trisomy 21 births occur in mothers aged 35-45. Maternal age is an important parameter in the calculation of risk for mothers choosing antenatal screening for Down's syndrome screening.

Figure 14.7: Trisomy 21 West Midlands 2003-2007: outcomes



Note: The category "all terminations' includes mostly terminations before 24 weeks gestation, but also terminations counted as stillbirths or neonatal deaths, if born alive.

The outcome of affected pregnancies is dependent on prenatal diagnosis, parental decisions about termination, and the presence of additional major structural anomalies. Of affected pregnancies, 43% result in live births.

Table 14.4: Trisomy 21 cases (all outcomes), West Midlands PCTs 2003-2007*

PCT	Total births	Down's cases	Rate /10,000	95%CI
Birmingham East & North	31,780	75	23.6	18.3-28.9
Coventry	20,338	46	22.6	16.1-29.1
Dudley	17,648	26	14.7	9.1-20.4
Heart of Birmingham	27,584	51	18.5	13.4-23.6
Herefordshire	8,579	21	24.5	14.0-34.9
North Staffordshire	10,152	25	24.6	15.0-34.3
Sandwell	20,935	40	19.1	13.2-25.0
Shropshire County	14,057	37	26.3	17.9-34.8
Solihull	10,375	31	29.9	19.4-40.4
South Birmingham	21,445	50	23.3	16.9-29.8
South Staffordshire	32,682	103	31.5	25.4-37.6
Stoke-on-Trent	16,827	26	15.5	9.5-21.4
Telford & Wrekin	10,499	25	23.8	14.5-33.1
Walsall	17,404	37	21.3	14.4-28.1
Warwickshire	28,872	85	29.4	23.2-35.7
Wolverhampton City	15,883	31	19.5	12.7-26.4
Worcestershire	30,193	92	30.5	24.3-36.7
WEST MIDLANDS	335,253	801	23.9	22.2-25.5

Table 14.5: Trisomy 21 cases (live births only) West Midlands PCTs 2003-2007*

PCT	Live births	Down's cases	% Live born	Rate /10,000	95%CI
Birmingham East & North	31,524	39	52%	12.4	18.4-29.2
Coventry	20,248	20	43%	9.9	16.2-29.3
Dudley	17,544	10	38%	5.7	9.1-20.5
Heart of Birmingham	27,357	37	73%	13.5	13.5-23.8
Herefordshire	8,541	11	52%	12.9	14.1-35.1
North Staffordshire	10,105	11	44%	10.9	15.1-34.4
Sandwell	20,810	25	63%	12.0	13.3-25.2
Shropshire County	13,997	15	41%	10.7	17.9-34.9
Solihull	10,327	13	42%	12.6	19.5-40.6
South Birmingham	21,318	22	44%	10.3	17.0-29.9
South Staffordshire	32,526	40	39%	12.3	25.6-37.8
Stoke on Trent	16,724	16	62%	9.6	9.6-21.5
Telford & Wrekin	10,432	12	48%	11.5	14.6-33.3
Walsall	17,317	15	41%	8.7	14.5-28.2
Warwickshire	28,751	21	25%	7.3	23.3-35.8
Wolverhampton City	15,789	12	39%	7.6	12.7-26.5
Worcestershire	30,037	29	32%	9.7	24.4-36.9
WEST MIDLANDS	333,347	348	43%	10.4	22.4-25.7

* Cases are listed by place of residence at delivery

14.4 Edwards' Syndrome (trisomy 18) and Patau's Syndrome (trisomy 13)

Edwards' syndrome is caused by the presence of an extra 18th chromosome (trisomy 18). It shares the same aetiology as Down's syndrome, but occurs less frequently, and is also associated with maternal age.

Patau syndrome is caused by the presence of an extra 13th chromosome (trisomy 13). It shares many of the same features as trisomy 18 in that the mortality rate is almost 100% and is associated with structural anomalies. However, its incidence is much lower than trisomy 18.

There is no national or regional screening programme for trisomies 18 and 13, but cases may be identified coincidently by serum screening undertaken for Down's syndrome. Despite the lack of a formal screening programme, the antenatal detection rate for trisomies 18 and 13 is much higher than for Down's syndrome. This is due to the high proportion of cases with additional structural malformations such as exomphalos, facial clefts, and limb abnormalities that are amenable to detection by ultrasound.

Trisomies 18 and 13 are considered to be two of the few universally lethal congenital anomalies. Some cases do survive past the neonatal period, but these are likely to have mosaic karyotypes.

The incidence of Edward's syndrome in the West Midlands (2003-2007) was
- 6.9/10,000 births (1:1,458) for all outcomes, and
- 0.9/10,000 live births (1:11,112).

The incidence of Patau syndrome in the West Midlands (2003-2007) was
- 2.4/10,000 births (1:4,244) for all outcomes, and
- 0.4/10,000 live births (1:23,811).

Figure 14.8: Trisomy 18 and 13 cases (all outcomes) West Midlands 2003-2007

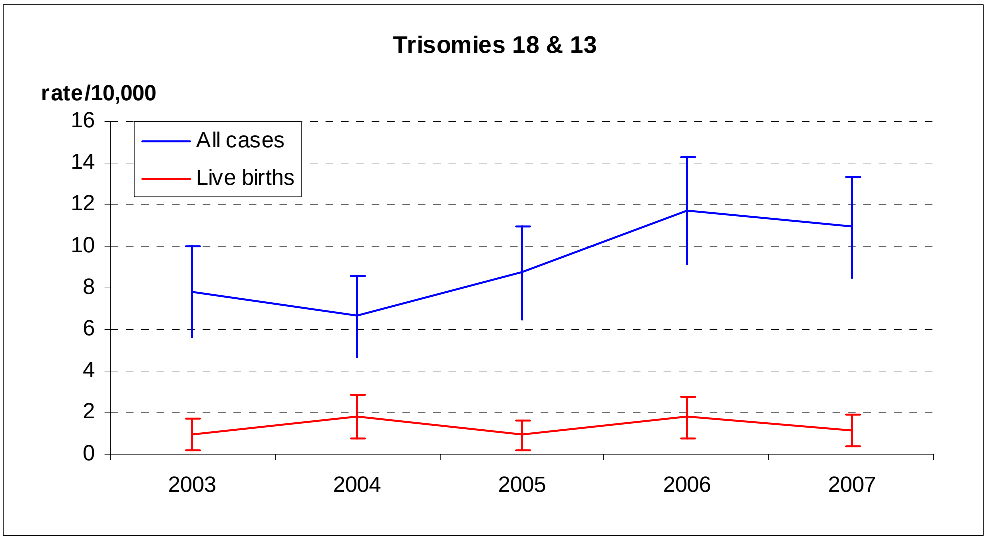
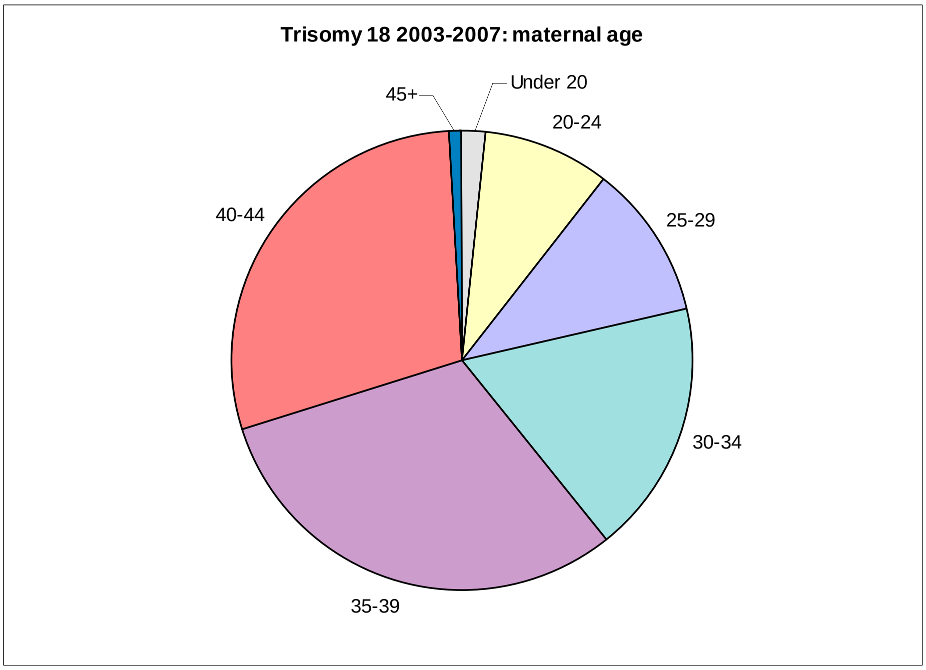


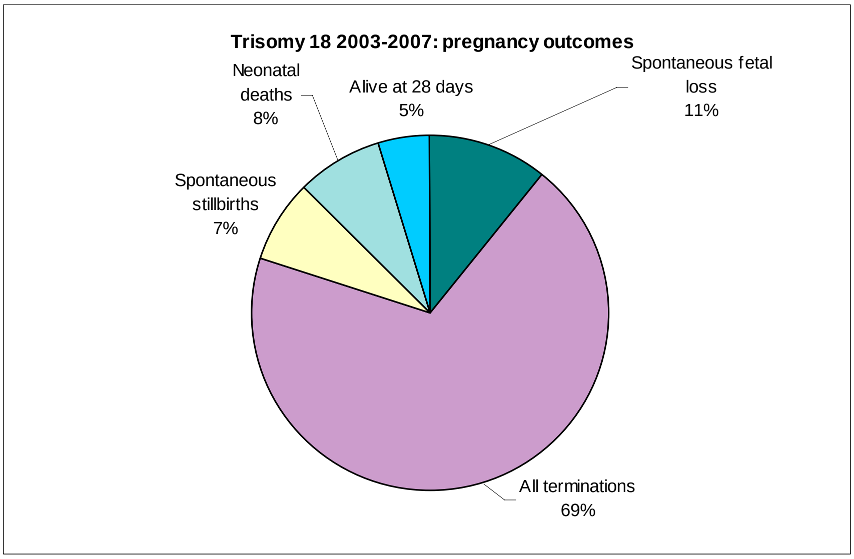
Figure 14.9: Trisomy 18 cases (all outcomes) by maternal age (years)

Figure 14.10: Trisomy 18 cases (all outcomes) within maternal age categories



The prevalence of trisomy 18 increases with maternal age. 61% of affected pregnancies occur in mothers aged 35 years or older

Figure 14.11: Trisomy 18 cases 2003-2007: outcomes



Note: The category "all terminations' includes mostly terminations before 24 weeks gestation, but also includes terminations counted as stillbirths or neonatal deaths, if born alive.

Unlike trisomy 21, trisomy 18 has a mortality rate approaching 100%. Cases of trisomy 18 that survive past the neonatal period are likely to be cases with mosaic karyotypes. The termination rate is 69%, higher than for trisomy 21 (52%) despite the absence of a formal screening programme for this anomaly.

Figure 14.12: Trisomy 13 cases 2003-2007: outcomes

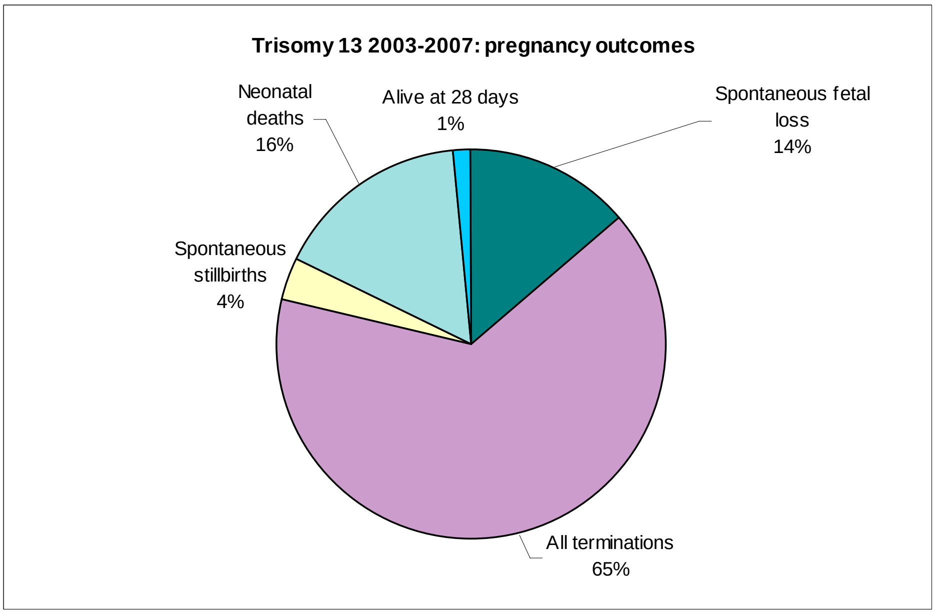


Table 14.6: Trisomies 18 & 13 (all outcomes), West Midlands 2003-2007

PCT	Total births	Cases	Rate /10,000	95%CI
Birmingham East & North	29	9.1	5.8-12.4	31,780
Coventry	12	5.9	2.6-9.2	20,338
Dudley	15	8.5	4.2-12.8	17,648
Heart of Birmingham	23	8.3	4.9-11.7	27,584
Herefordshire	3	3.5	0.0-7.5	8,579
North Staffordshire	10	9.9	3.7-16.0	10,152
Sandwell	13	6.2	2.8-9.6	20,935
Shropshire County	16	11.4	5.8-17.0	14,057
Solihull	13	12.5	5.7-19.3	10,375
South Birmingham	26	12.1	7.5-16.8	21,445
South Staffordshire	37	11.3	7.7-15.0	32,682
Stoke on Trent	15	8.9	4.4-13.4	16,827
Telford & Wrekin	12	11.4	5.0-17.9	10,499
Walsall	11	6.3	2.6-10.1	17,404
Warwickshire	27	9.4	5.8-12.9	28,872
Wolverhampton City	13	8.2	3.7-12.6	15,883
Worcestershire	34	11.3	7.5-15.0	30,193
WEST MIDLANDS	309	9.2	8.2-10.2	335,253

Data Sources

- West Midlands Congenital Anomaly Register
- WM Perinatal Death Notification
- ADBE data (ONS)