Mesothelioma deaths by Geographical Area, 2024

Mesothelioma deaths for Local and Unitary Authority areas in Great Britain 1981-2022

July 2024

Contents

Summary

The information in this document relates to Health and Safety Statistics published by the Health and Safety Executive in 2024. The document can be found at: www.hse.gov.uk/statistics/causdis

This fact sheet provides statistics on mesothelioma deaths in Great Britain by geographical area for deaths occurring in the period 1981 to 2022. Numbers of deaths for males and females are given for areas within the current local government structure down to Unitary Authority (UA) and Local Authority (LA) level.

Standardised Mortality Ratios (SMRs) are also provided with associated 95% Confidence Intervals in order to allow comparison of areas after taking into account the age distributions of the underlying populations.

The statistics are presented in tabular form in the following spreadsheet:

www.hse.gov.uk/statistics/assets/docs/mesoarea.xlsx

- MESOAREA01: Number of mesothelioma deaths and SMRs for males by geographical area in Great Britain.
- MESOAREA02: Number of mesothelioma deaths and SMRs for females by geographical area in Great Britain.
- MESOAREA03: Mesothelioma deaths and Standardised Mortality Ratios (SMRs) for males in Great Britain by area and five-year time periods 1981-2022.
- MESOAREA04: Mesothelioma deaths and Standardised Mortality Ratios (SMRs) for females in Great Britain by area and five-year time periods 1981-2022.

Results are also available as interactive maps at: https://arcg.is/1qO0G40.

Introduction

Previous descriptive analyses of mesothelioma death rates for geographical areas within Great Britain have highlighted the effect of geographically-specific sources of asbestos exposure [note 1]: geographical areas with the highest mortality rates tend to be those known to contain large industrial sites such as shipyards and asbestos product factories.

This factsheet provides an update of analyses of mesothelioma mortality by Unitary Authority (UA) and Local Authority (LA) area to include deaths occurring during the period 1981 to 2022, the longest period for which data are available according to the current UA and LA structure. It also provides more detailed analysis of temporal trends within these geographical areas using Generalised Additive Models (see Annex 1 for further details).

The analyses are based on the last area of residence of the deceased, as recorded on death certificates, and use Standardised Mortality Ratios (SMRs) which compare the mortality rate in a particular area with the mortality rate for GB, taking account of age differences (see Annex 1 for further details). SMRs are expressed as a percentage: values higher or lower than 100 indicate mesothelioma rates that are higher or lower, respectively, than for GB as a whole.

A number of Unitary Authorities were created in 2009 and these are detailed in Annex 2, along with changes in 2018, 2019, 2020 and 2021. Future updates will take account of more recent changes from April 2023.

The analyses of temporal trends for geographical areas within Great Britain should be interpreted in the context of increasing annual mesothelioma deaths in Great Britain as a whole over the period of the analysis. There were nearly 4 times as many deaths in the latest decade (2013-22) compared with the 1980s (Table 1).

Time period	Male deaths	Female deaths
1981-1992	7807	1287
1993-2002	12882	2031
2003-2012	18465	3496
2013-2022	20534	4210

Table 1: Male and female mesothelioma deaths 1981-2022(p) by time period.

Similar patterns are evident for both males and females, though annual male deaths have consistently outnumbered female deaths by around five to one due to higher and more widespread past asbestos exposures often in occupational settings (Figure 1).

Since Standardised Mortality Ratios (SMRs) compare the mortality rate in a particular region with that for GB as a whole, trends in SMRs for a particular area indicate whether rates for that area have increased relatively more or less rapidly than for GB as a whole. No change in the SMR for an area over time indicates that the mortality rates have increased in line with the trend for GB as a whole.

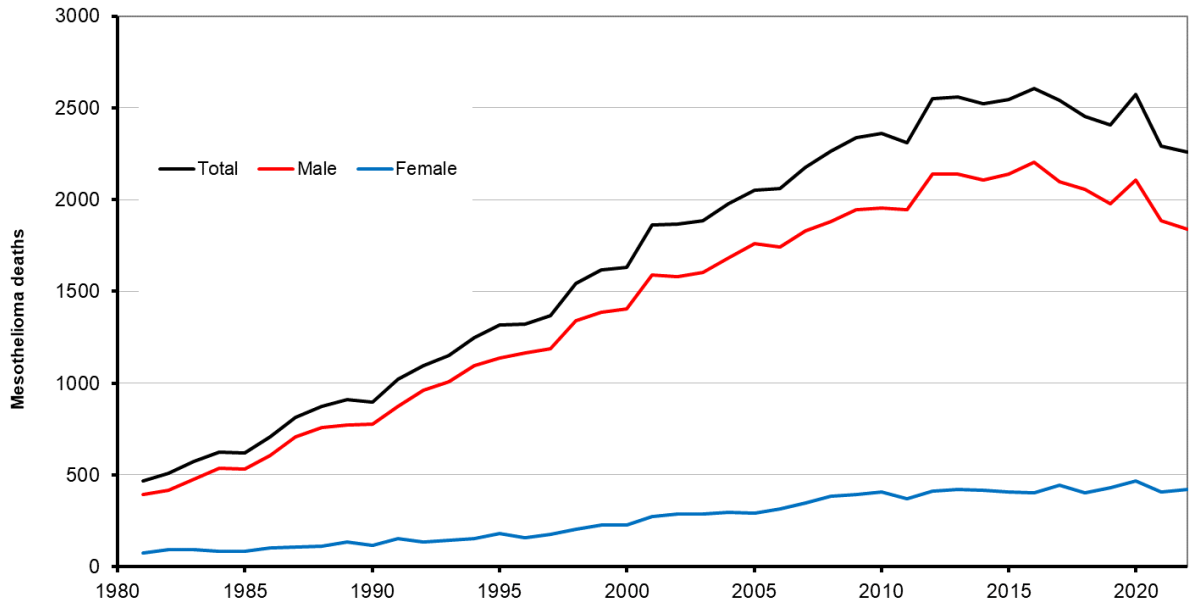

Figure 1: Male and female mesothelioma deaths 1981-2022(p)

All of the analyses presented in this factsheet are limited by the fact that death certificates record only the last address of residence of the deceased. A case of mesothelioma caused by work in one geographical area will only be assigned to that area in this analysis if the individual was resident there when they died. The long latency period of mesothelioma means that individuals may move between areas before the onset of the disease and thus there is considerable potential for dilution of the observed difference in risk between areas. The extent of this dilution will be strongest for those areas where there have been substantial migrations. Areas with the highest SMRs will be those which are genuine sources of risk, but their SMRs will understate the true risk level relative to the rest of Great Britain. Conversely, SMRs of other areas will overstate the level of risk associated with these locations. The areas recording the lowest SMRs will be those areas not associated with asbestos exposure and which are unlikely to be the final area of residence for individuals with asbestos exposure.

Results and Discussion

These analyses for the period 1981 to 2022 are based on 59,688 male and 11,024 female mesothelioma deaths from mesothelioma (a small number of individuals with an overseas address are excluded).

Full results are available in Excel tables at:

www.hse.gov.uk/statistics/assets/docs/mesoarea.xlsx

- MESOAREA01: Number of mesothelioma deaths and SMRs for males by geographical area in Great Britain.
- MESOAREA02: Number of mesothelioma deaths and SMRs for females by geographical area in Great Britain.
- MESOAREA03: Mesothelioma deaths and Standardised Mortality Ratios (SMRs) for males in Great Britain by area and five-year time periods 1981-2022.
- MESOAREA04: Mesothelioma deaths and Standardised Mortality Ratios (SMRs) for females in Great Britain by area and five-year time periods 1981-2022.

Maps showing SMRs for males and females for the overall period 1981-2022 are presented (Figures 2 and 4) along with additional maps highlighting those areas for which the mortality rate was statistically significantly higher or lower than for GB as a whole (Figures 3 and 5).

Results are also available as interactive maps available at: https://arcg.is/1qO0G40.

Temporal trends for Scotland, Wales and English regions are shown for males and females in Figures 6 and 7, and trends for selected LA and UA areas with higher SMRs are shown in Figures 8-12 for males and Figures 13-17b for females. Additional results for males are available and in Annex 3 (Figures 18-22).

Results for the overall period 1981-2022

The geographical areas with the highest male mesothelioma death rates for the period 1981-2022 were:

- 1 Barrow-in-Furness (SMR 399.3, 95% Confidence Interval 355.7 to 446.7, 305 deaths),
- 2 West Dunbartonshire (SMR 350.8, 95% Confidence Interval 312.4 to 392.7, 302 deaths),
- 3 North Tyneside (SMR 276.3, 95% Confidence Interval 254.2 to 299.7, 579 deaths),

- 4 South Tyneside (SMR 273, 95% Confidence Interval 248.2 to 299.6, 445 deaths),
- 5 Plymouth (SMR 261.1, 95% Confidence Interval 241.4 to 282, 648 deaths),
- 6 Portsmouth (SMR 260, 95% Confidence Interval 236.9 to 284.8, 464 deaths),
- 7 Medway (SMR 232.3, 95% Confidence Interval 212.5 to 253.5, 504 deaths),
- 8 Hartlepool (SMR 221.4, 95% Confidence Interval 191.8 to 254.2, 201 deaths),
- 9 Gosport (SMR 215.6, 95% Confidence Interval 184.4 to 250.6, 170 deaths),
- 10 Southampton (SMR 215.1, 95% Confidence Interval 195.1 to 236.5, 425 deaths).

The geographical areas with the highest female mesothelioma death rates were:

- 1 Barking and Dagenham (SMR 327.7, 95% Confidence Interval 263.5 to 402.8, 90 deaths),
- 2 Sunderland (SMR 316.2, 95% Confidence Interval 269.9 to 368.2, 166 deaths),
- 3 Newham (SMR 279.9, 95% Confidence Interval 221.9 to 348.3, 80 deaths),
- 4 West Dunbartonshire (SMR 234.3, 95% Confidence Interval 168.9 to 316.7, 42 deaths),
- 5 Leeds (SMR 227.1, 95% Confidence Interval 202 to 254.6, 296 deaths),
- 6 Barrow-in-Furness (SMR 213.9, 95% Confidence Interval 144.3 to 305.4, 30 deaths),
- 7 Basildon (SMR 210.5, 95% Confidence Interval 160.6 to 270.9, 60 deaths),
- 8 Havering (SMR 205.5, 95% Confidence Interval 166.1 to 251.5, 94 deaths),
- 9 Castle Point (SMR 201, 95% Confidence Interval 140.8 to 278.3, 36 deaths),
- 10 Blackburn with Darwen (SMR 189.6, 95% Confidence Interval 137.8 to 254.6, 44 deaths).

As in previous geographical analyses of mesothelioma deaths, the results presented here show that areas with the highest excess of mesothelioma in males tend to be those containing industrial sites known to have been associated with high asbestos exposures in the past, such as shipyards. However, occupational analyses suggest that asbestos exposures in the construction industry account for a substantial proportion of mesothelioma deaths. Such exposures are less likely to have been associated with specific geographical areas; rather, they are likely to have taken place over a wide range of areas.

The analyses of temporal trends show that most areas associated with shipbuilding activity tend to have much higher SMRs for early time periods than for later periods, although there are some exceptions. Mesothelioma rates in these areas thus tend to have risen more slowly over time than the overall rate for Great Britain. This may to some extent reflect the effect of risks being diluted due to the migration of those exposed in an industry which has declined substantially into lower risk areas. It may also suggest that annual mesothelioma deaths arising from such exposures may have peaked earlier than those arising from other sources of exposure.

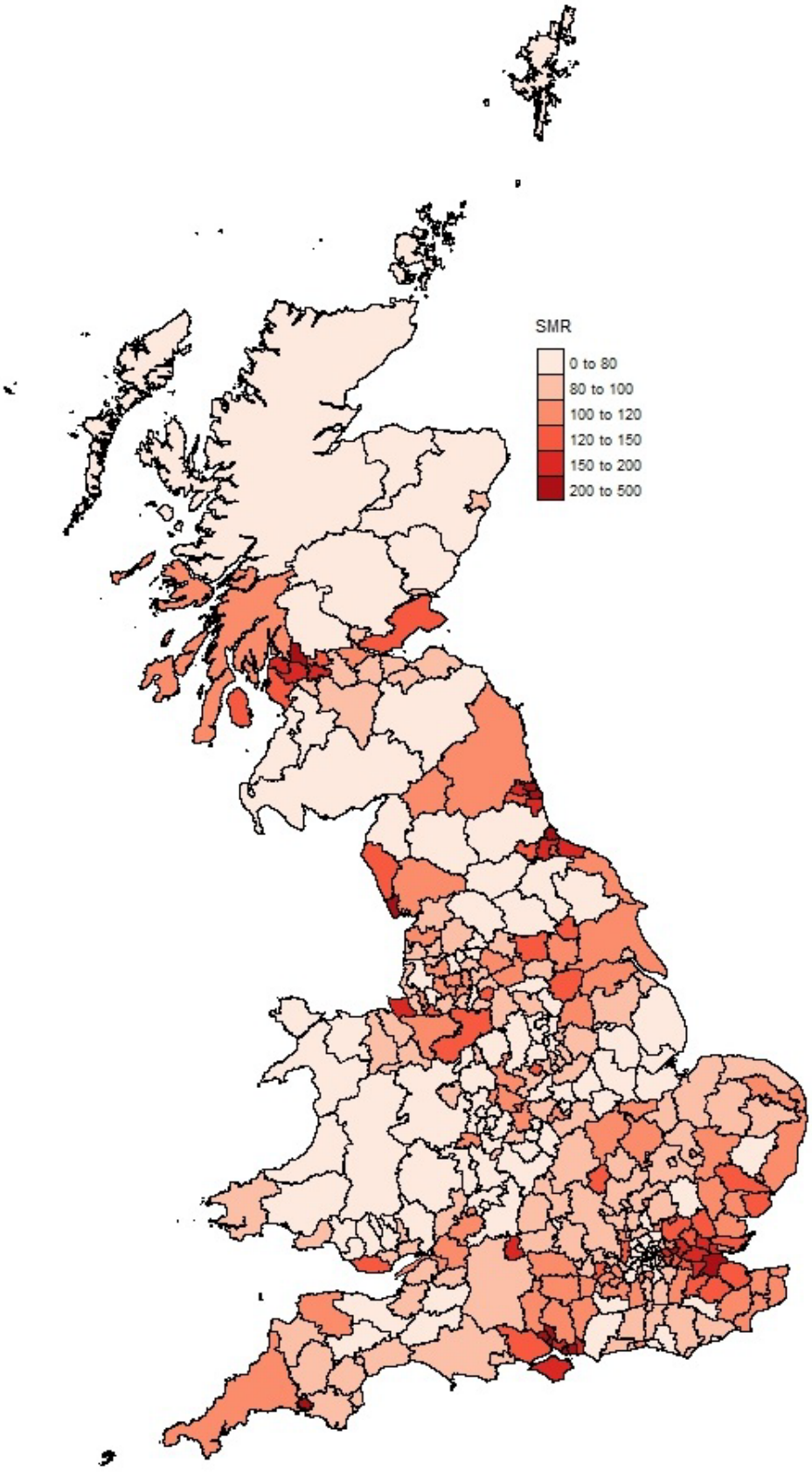

Figure 2 – Mesothelioma SMRs for males by geographical area for the period 1981-2022

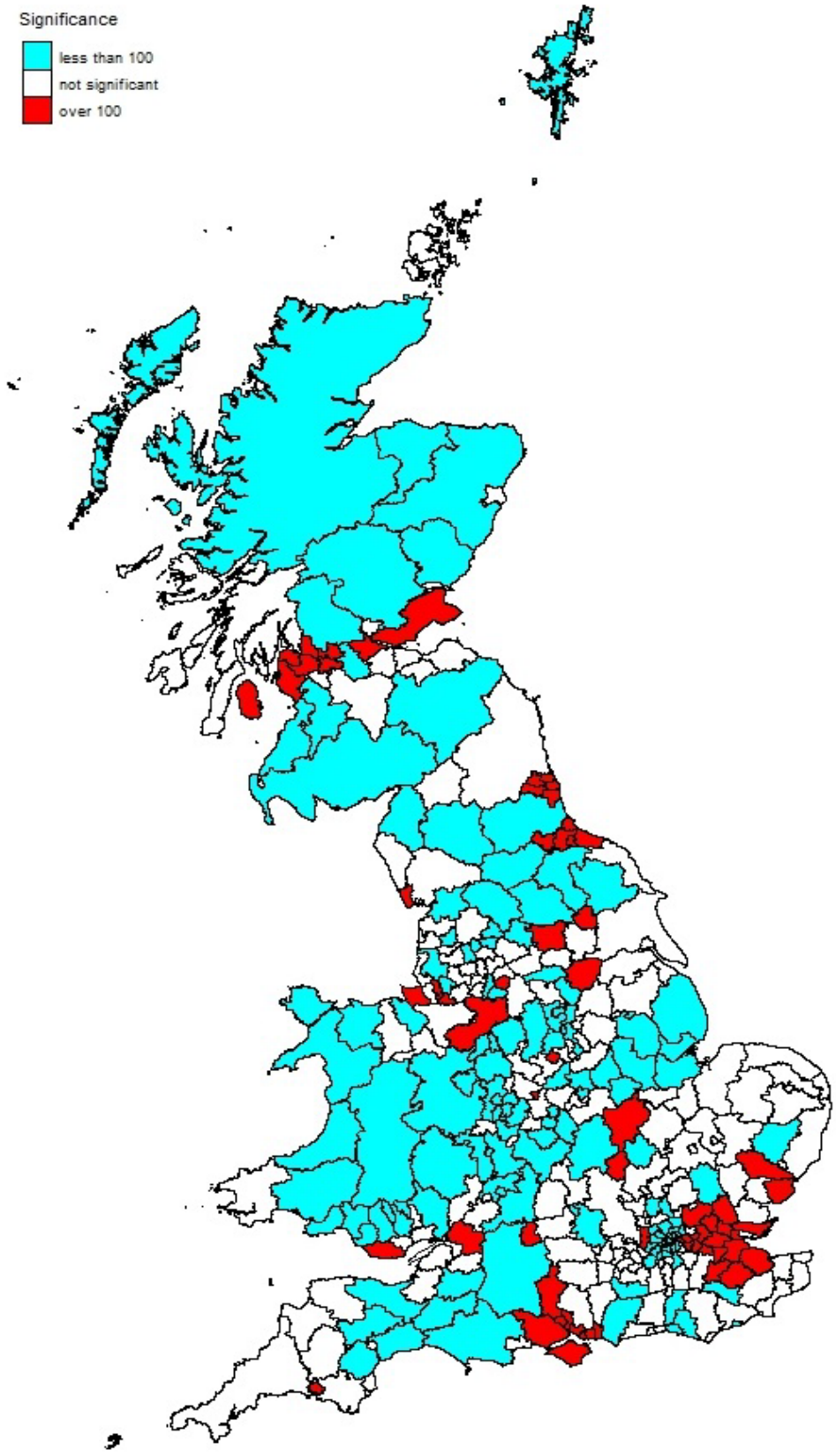

Figure 3 – Statistical significance of mesothelioma SMRs for males by geographical area 1981-2022

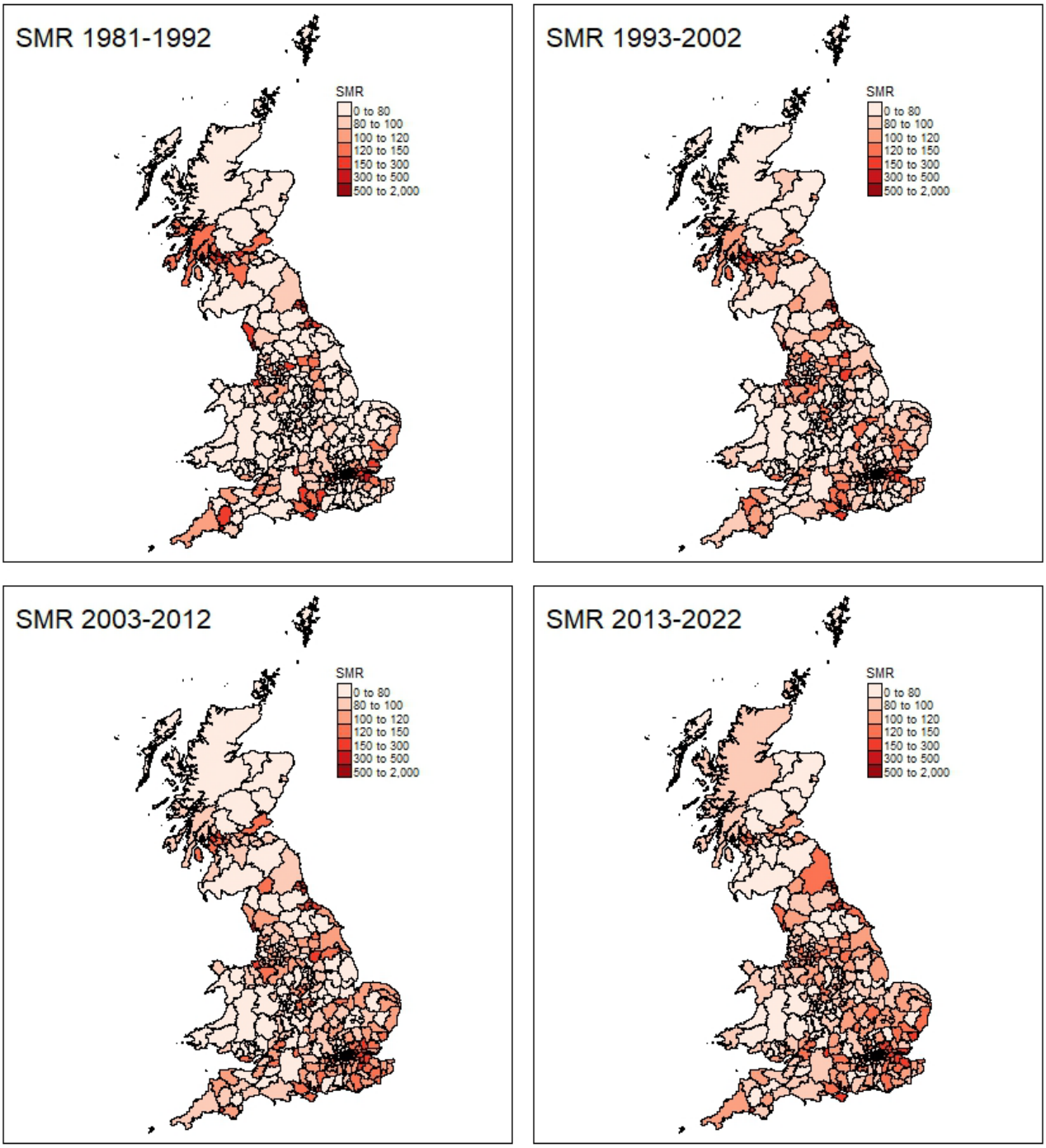

Figure 3A – Mesothelioma SMRs for males by geographical area by 10-year periods 1981-2022

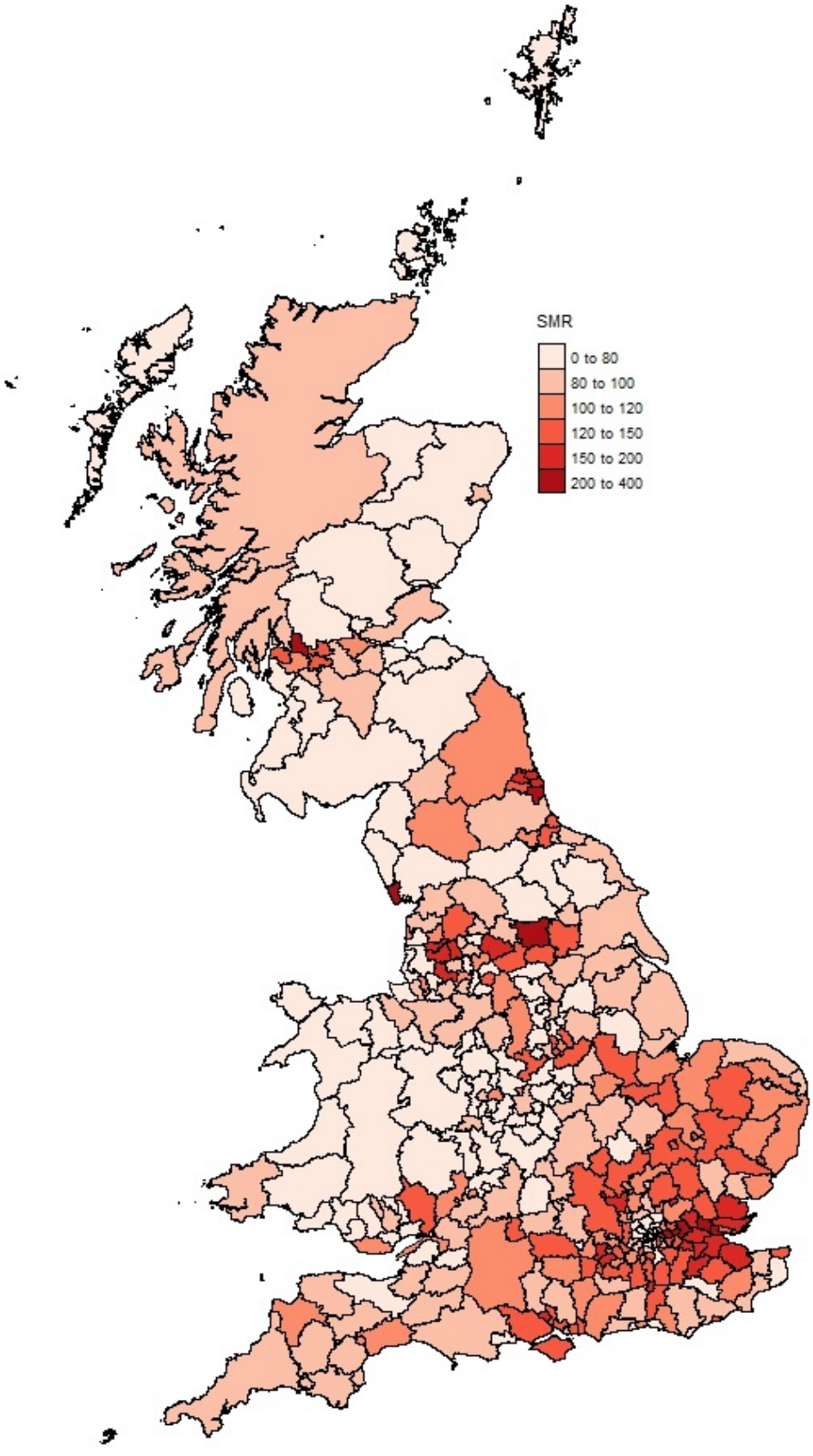

Figure 4 – Mesothelioma SMRs for females by geographical area for the period 1981-2022

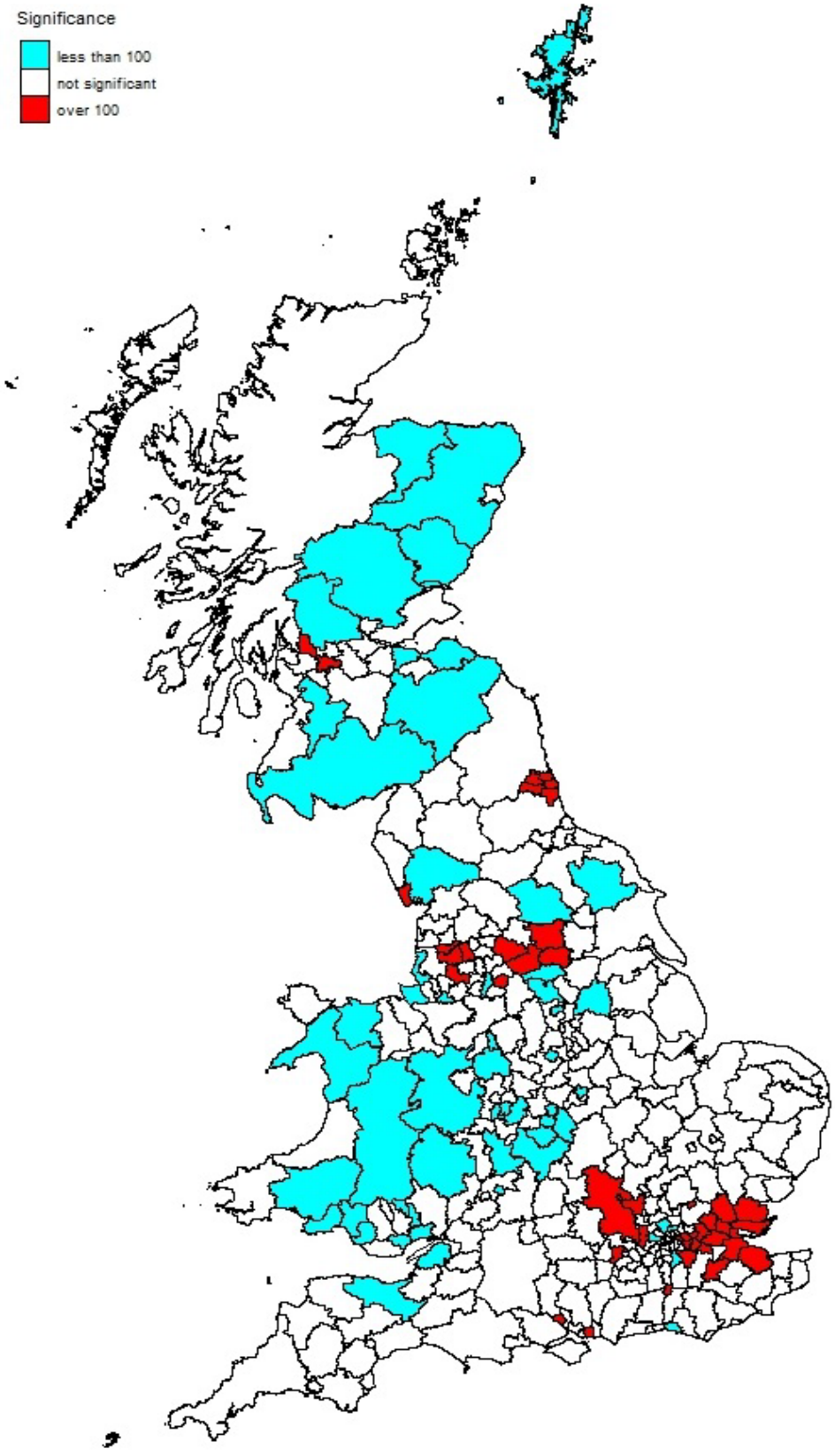

Figure 5 – Statistical significance of mesothelioma SMRs for females by geographical area 1981-2022

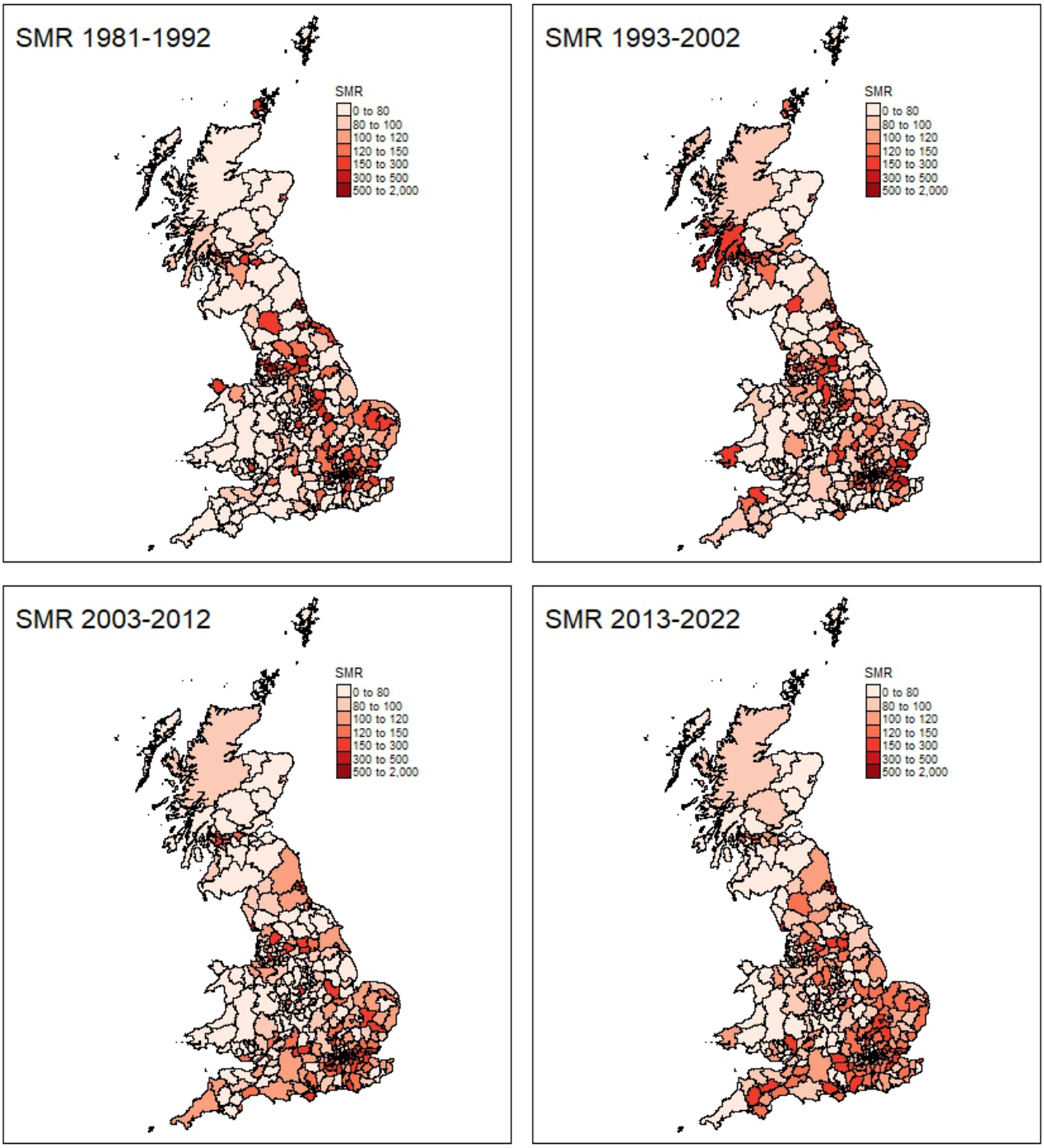

Figure 5A – Mesothelioma SMRs for females by geographical area by 10-year period1981-2022

Temporal trends – Scotland, Wales and English regions

Figure 6 shows the regional variation for male SMRs calculated annually along with 95% confidence intervals. Corresponding statistics for female are shown in Figure 7.

Trend lines with solid bold **black** lines indicate a statistically significant yearly trend, those with **green** lines indicate trends of borderline significance, and for those with **blue** lines trends were not significant. The dashed lines represent the 95% confidence intervals.

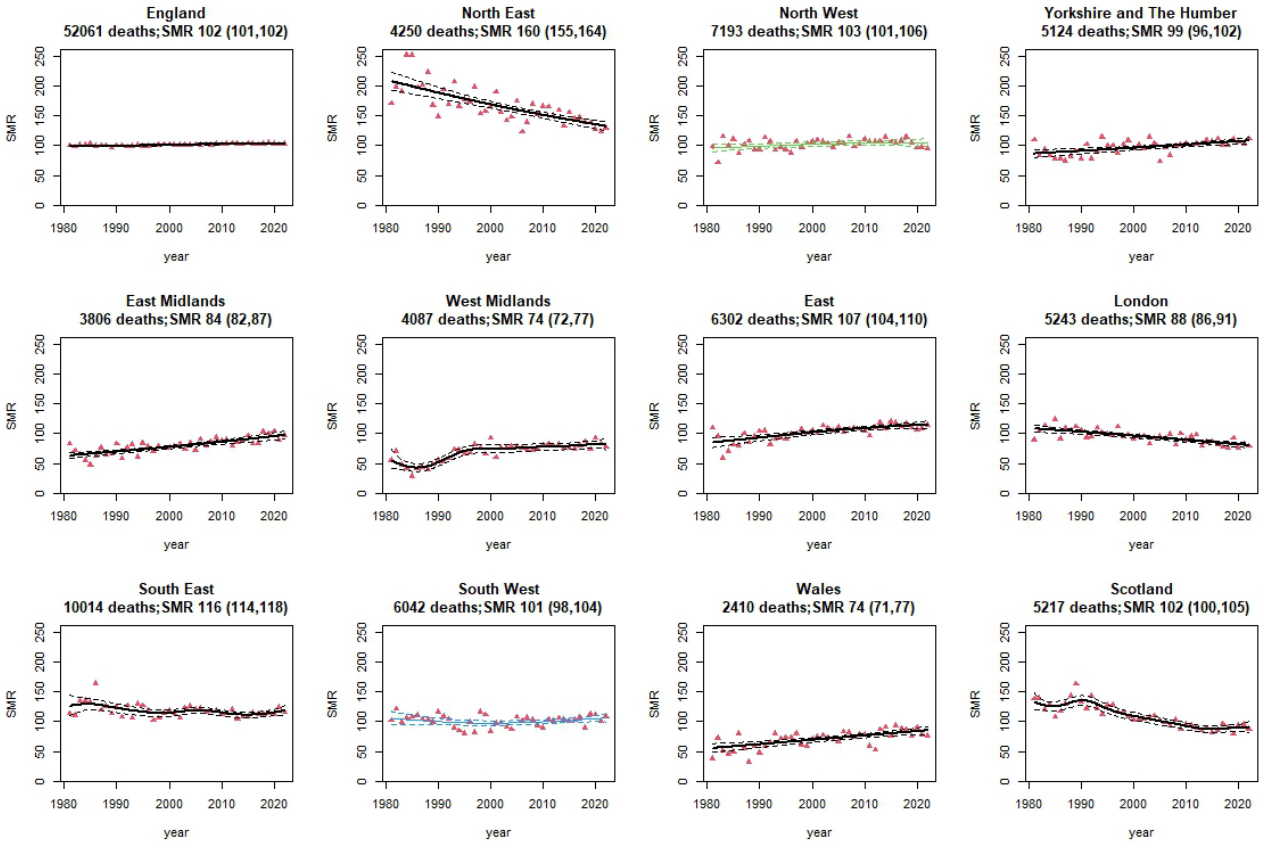

Figure 6 – Annual mesothelioma SMRs for males by region, 1981-2022

For males, the highest rates for the period as a whole (1981-2022) were seen in the North East, South East, East, North West and Scotland, and with the exception of the East and the North West, SMRs all show some decline over time. This indicates that mesothelioma rates for these regions have increased relatively less rapidly over the period than for GB as a whole.

Conversely, there was an increase in the SMRs over time for those regions with the lowest rates for the period as a whole (East Midlands, West Midlands and Wales). This indicates that mesothelioma rates for these regions have increased relatively more rapidly over the period than for GB as a whole.

England accounts for the majority of Great Britain and so SMRs show little variation from the standard SMR figure of 100.

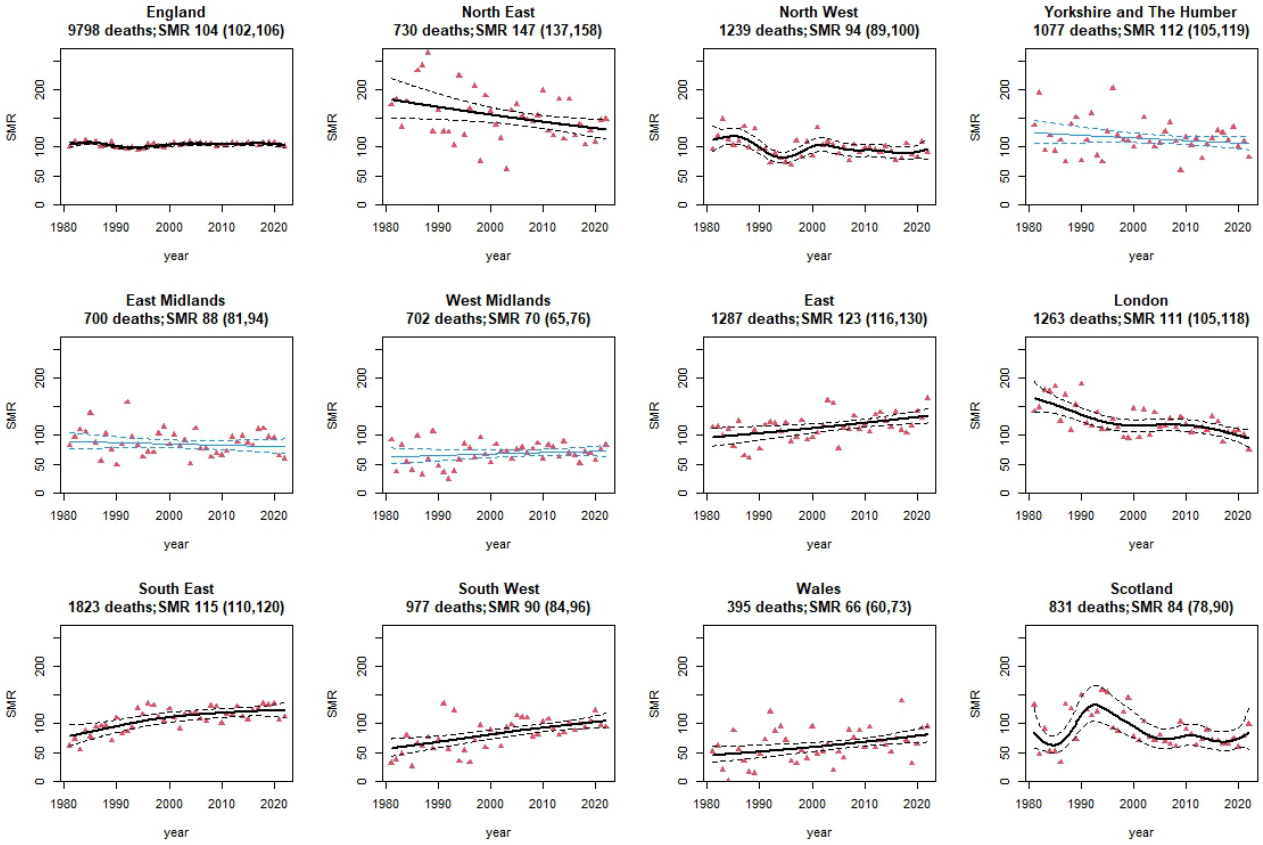

Figure 7 – Annual mesothelioma SMRs for females by region, 1981-2022

For females, the highest rates for the period as a whole were in the North-East, East followed by South East, Yorkshire and The Humber and London. There was evidence of an increase in the SMR over time for the East, South East and South West, with evidence of a decline for the North East and London.

Temporal trends for UA and LA areas, males

Temporal trends in annual male SMRs are shown in Figures 8-12 (and Figures 18-21 in Annex 3) for all UA/LA areas with significantly elevated SMRs for the period as a whole (1981-2021).

Figure 8 covers the top six areas. The top ten areas were all associated with shipbuilding.

Figure 9 covers the North East, Teesside and Tyne and Wear (North Tyneside and South Tyneside are included in Figure 8).

Figure 10 covers the coastal region of Hampshire (except for Portsmouth which is included in Figure 8).

Figure 11 covers parts of central Scotland, mainly around the Clyde (except West Dunbartonshire which is included in Figure 8).

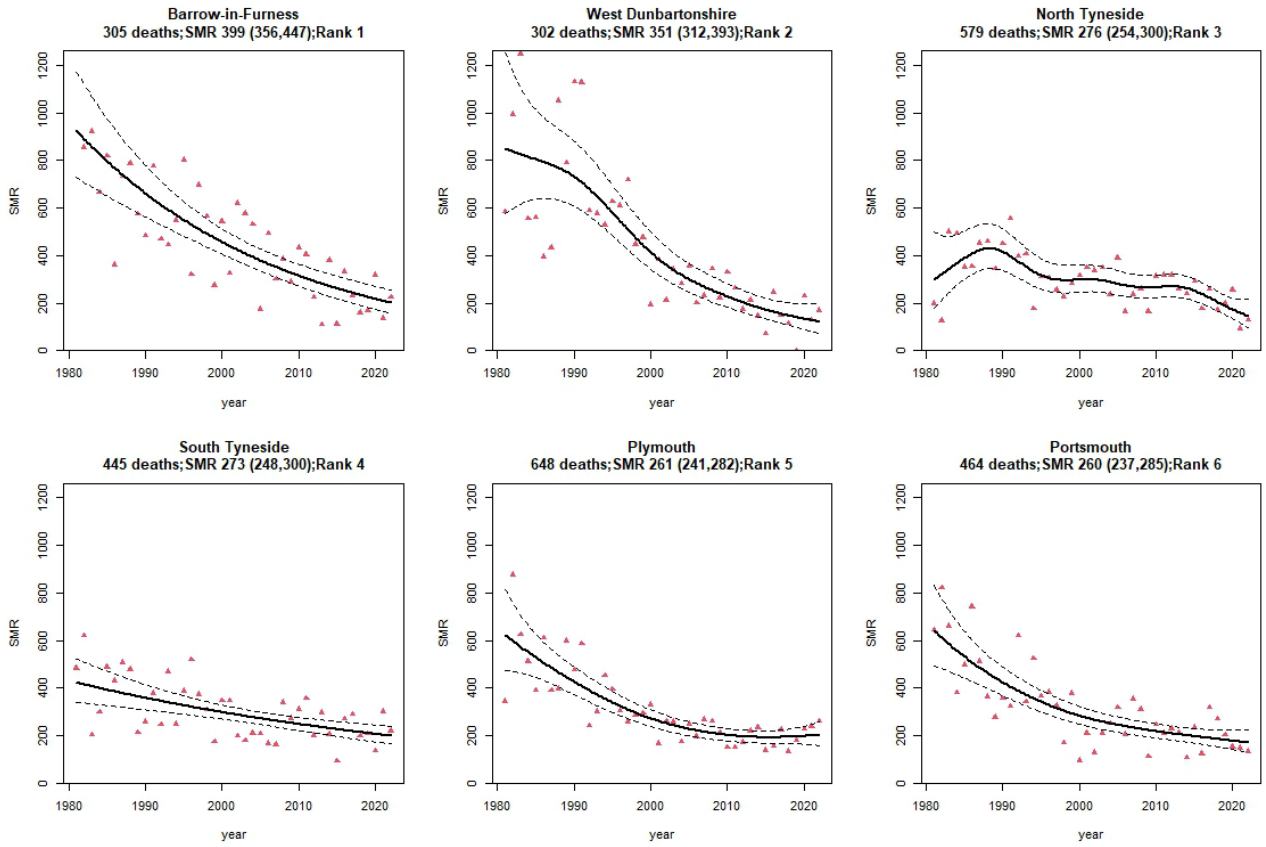

Figure 8 – Annual mesothelioma SMRs for males for the top six UA/LA areas, 1981-2022

Marked statistically significant downward trends were seen for several of these areas including Barrow-in-Furness (where the SMR reduced from over 900 to less than 300 over the period, and which has an SMR of 399.3 for the period as a whole), Plymouth, Portsmouth, Southampton and, to a lesser extent, South Tyneside. The decline in Renfrewshire (Figure 11) was from an SMR of around 350 in 1981 to one in 2022 that is not statistically different from 100.

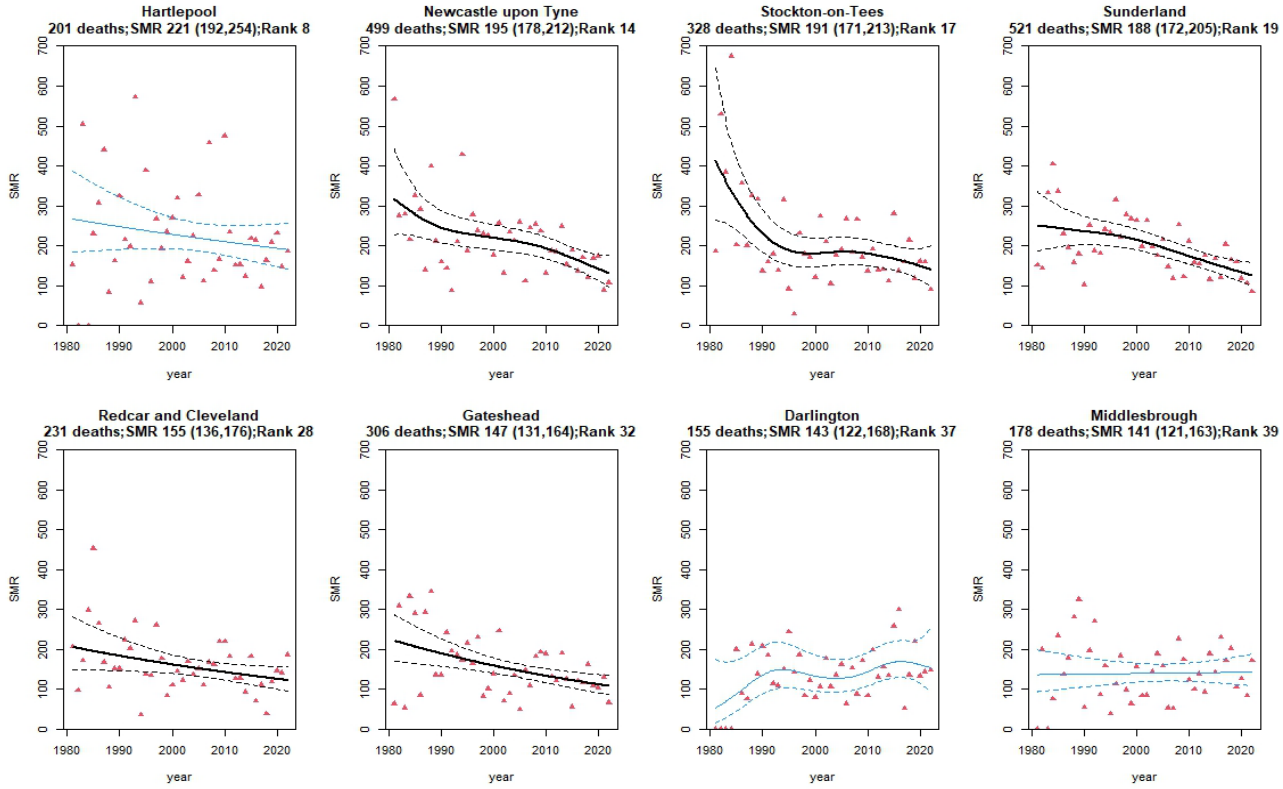

Figure 9 – Annual mesothelioma SMRs for males for UA/LAs in the North East, 1981-2022

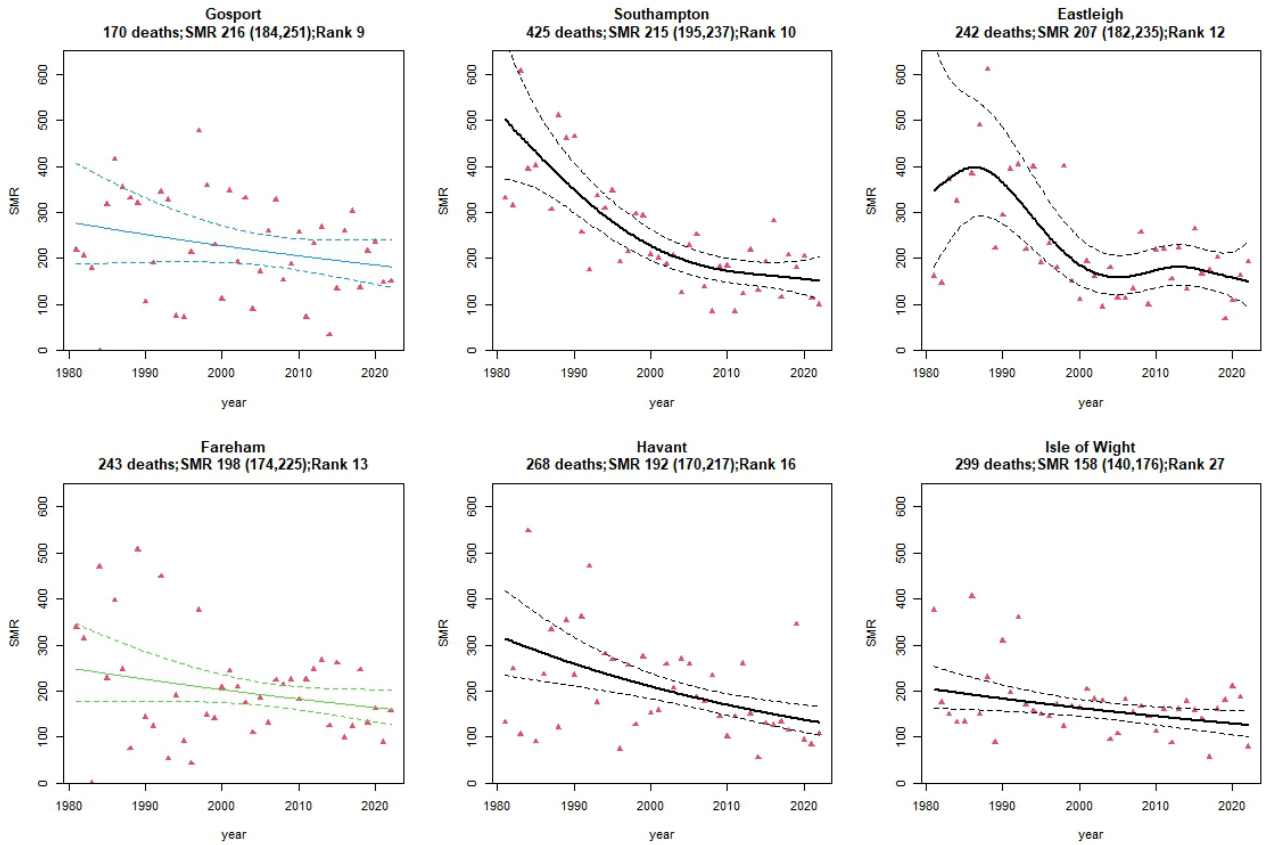

Figure 10 – Annual mesothelioma SMRs for males for UA/LAs Hampshire coast 1981-22

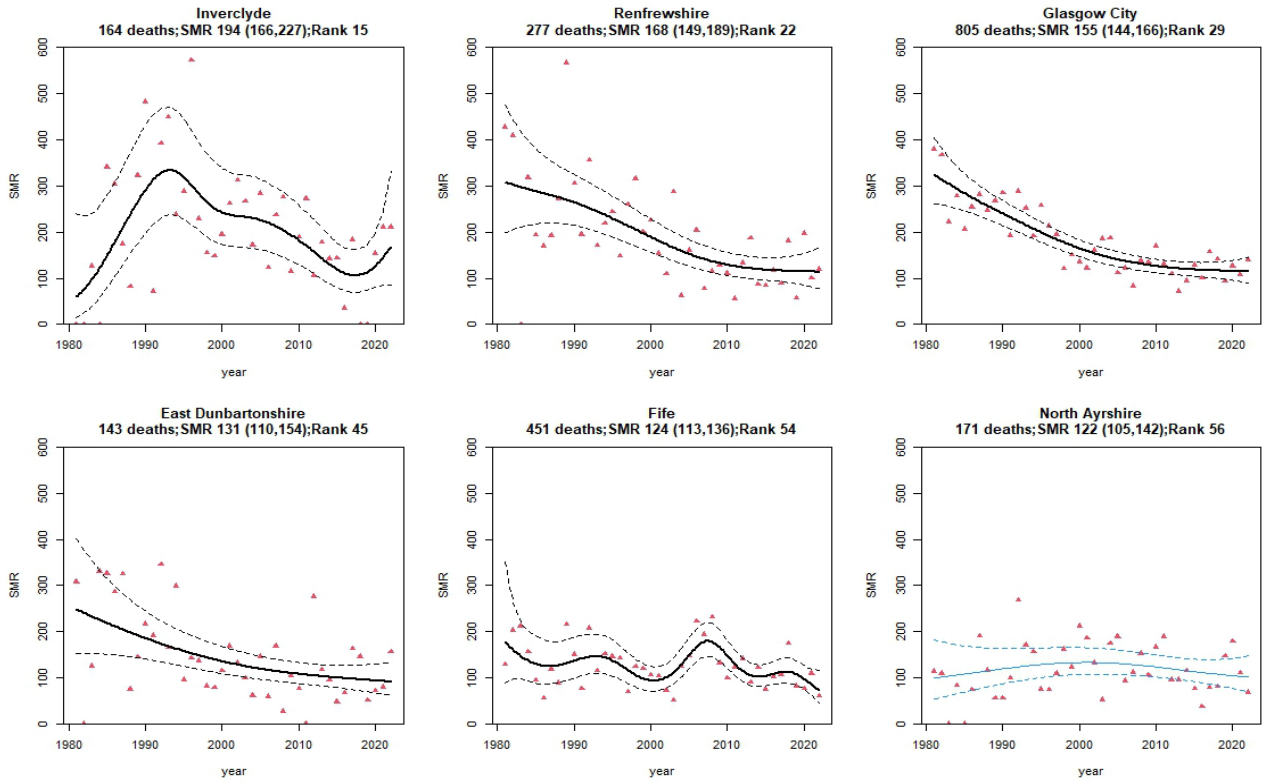

Figure 11 – Annual mesothelioma SMRs for males for UA/LAs in central Scotland, 1981-2022

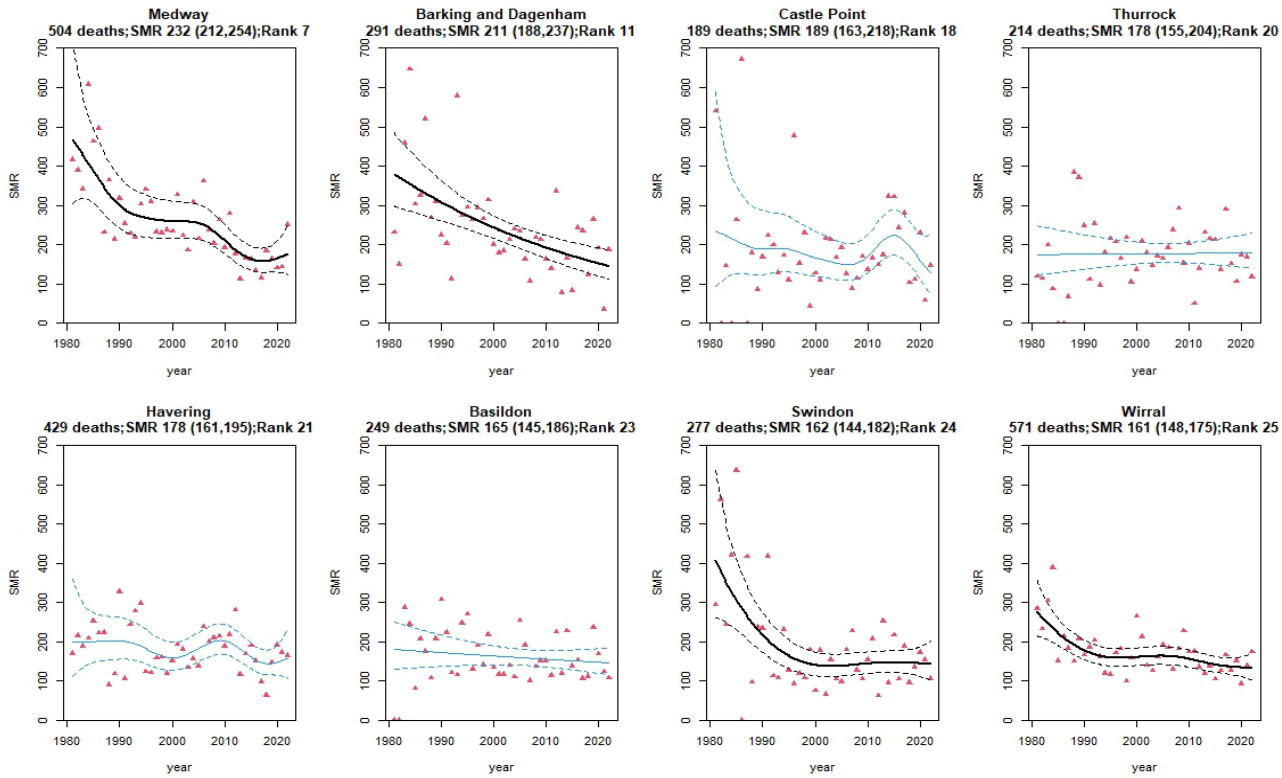

Figure 12 – Annual mesothelioma SMRs for males for other areas, 1981-2022

Several areas with high SMRs for males also had high SMRs for females including Barrow-in-Furness, Sunderland, Barking and Dagenham, and West Dunbartonshire.

Temporal trends for UA and LA areas, females

Temporal trends in annual female SMRs are shown in Figures 13-17 for all areas with significantly elevated SMRs for the period as a whole (1981-2022).

Figure 13 shows marked statistically significant declines in the annual SMRs for Barking and Dagenham, Sunderland. SMRs for Blackburn with Darwen were not significantly raised in more recent years.

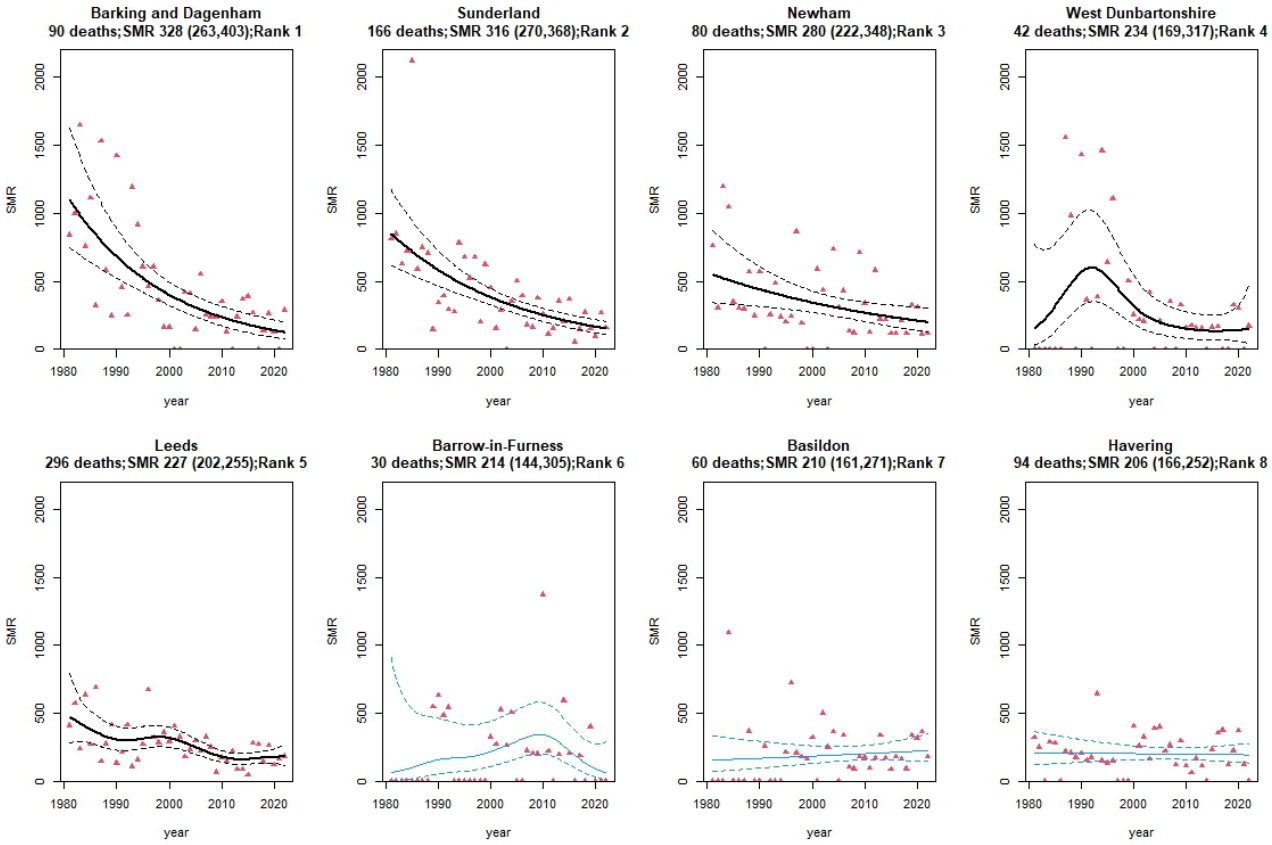

Figure 13 – Annual mesothelioma SMRs for females for the top eight UA/LA areas, 1981-2022

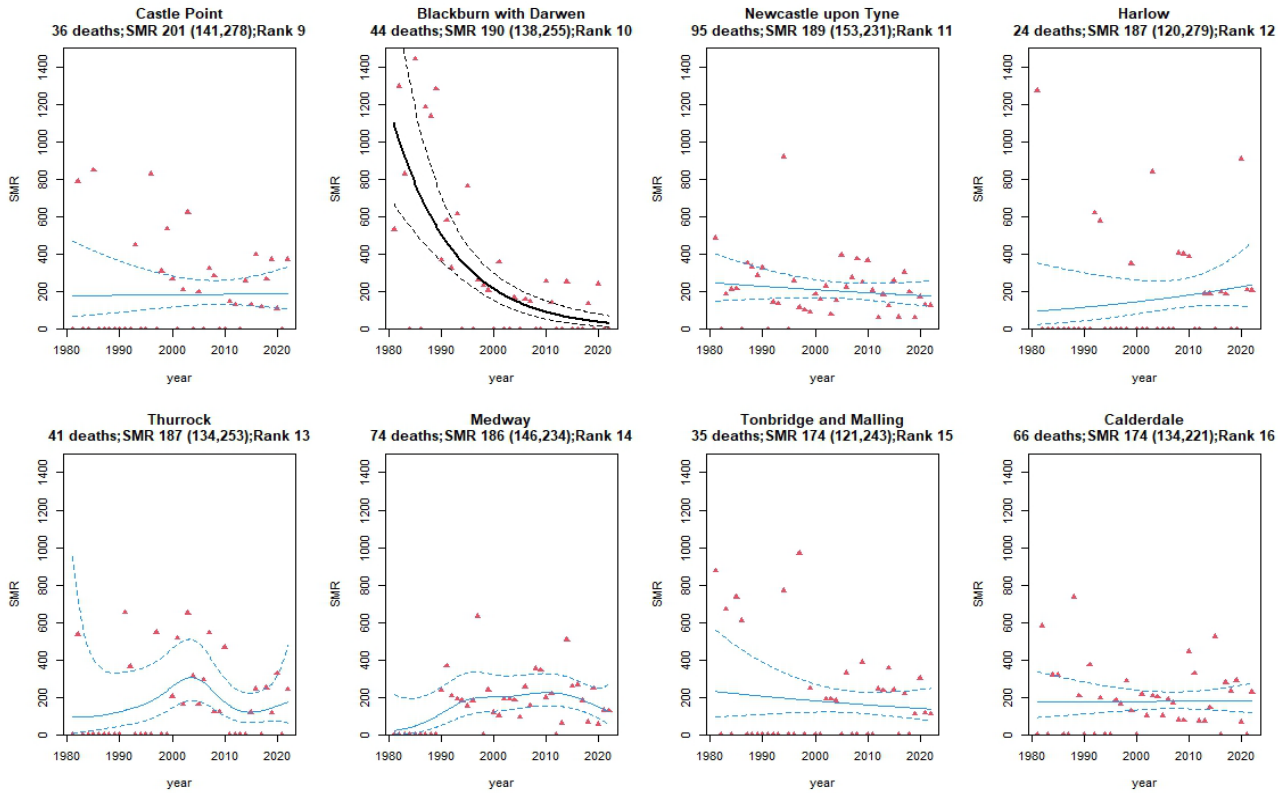

Figure 14 – Annual mesothelioma SMRs for females for areas ranked 9-16 in GB, 1981-2022

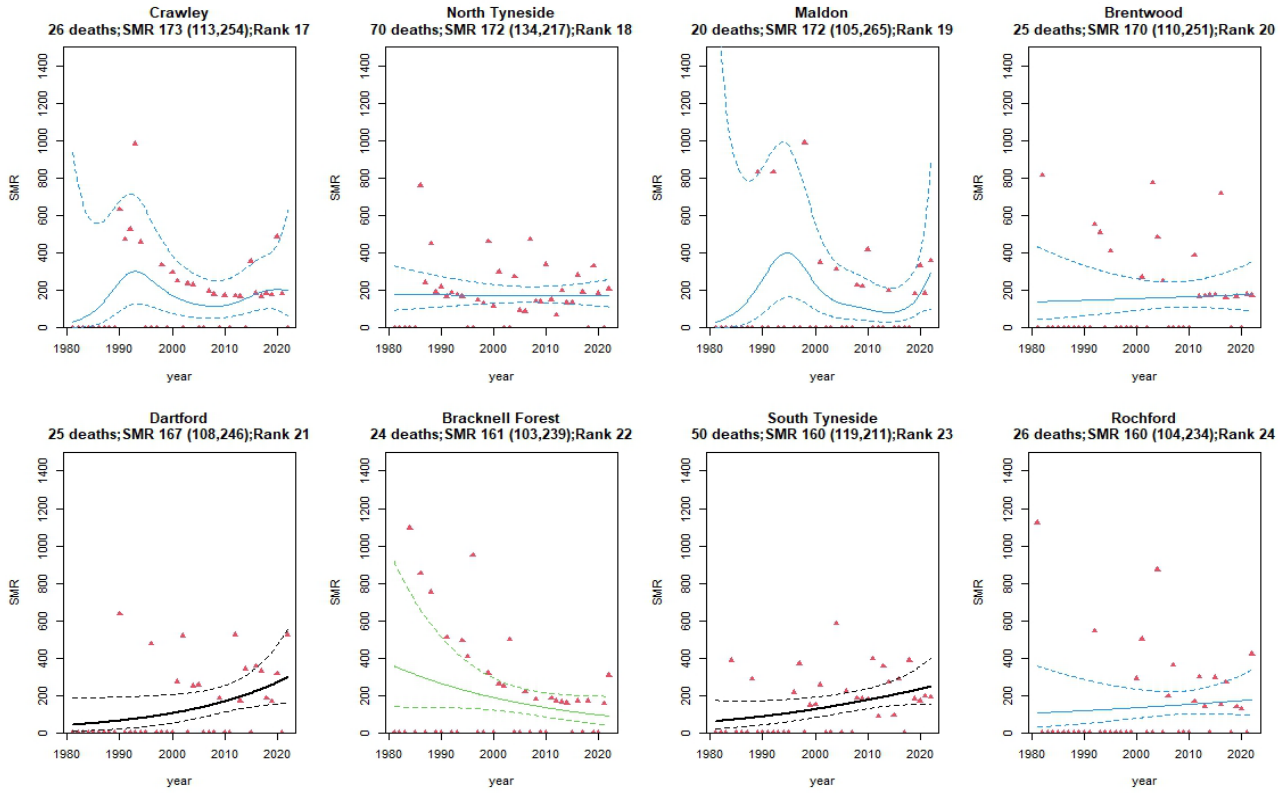

Figure 15 – Annual mesothelioma SMRs for females for areas ranked 17-24 in GB, 1981-2022

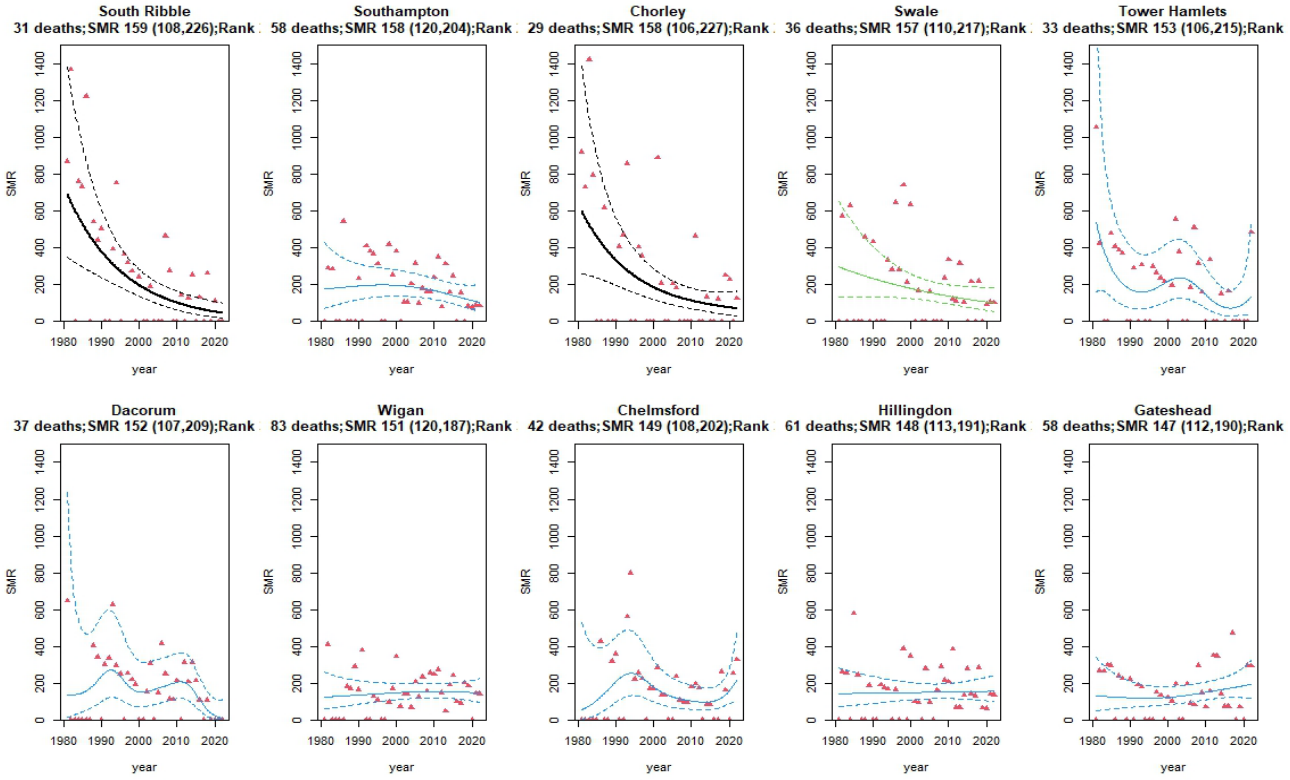

Figure 16 – Annual mesothelioma SMRs for females for other areas, 1981-2022

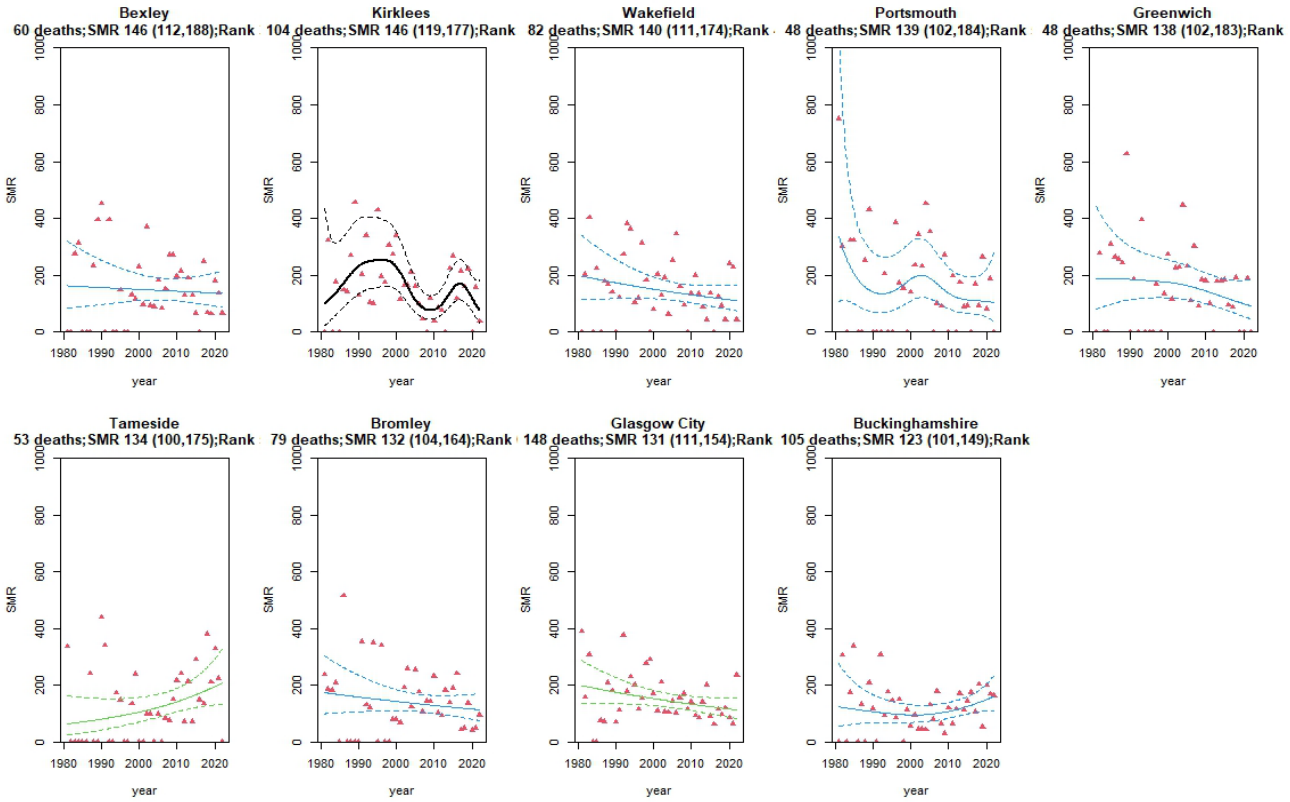

Figure 17 – Annual mesothelioma SMRs for females for other areas, 1981-2022 (part 2)

Annex 1 – Methodology

Mesothelioma deaths occurring during the period 1981-2021 were obtained from the Health and Safety Executive Mesothelioma Register. SMRs were derived using mid-year population estimates provided by the Office for National Statistics.

The method of age standardisation used in the production of SMRs is commonly referred to as the indirect method. Age-specific death rates in a standard population (in this case Great Britain by gender) are applied to the age structure of the population for each geographical area in order to calculate expected numbers of deaths. The ratio of the observed number of deaths to the expected number of deaths in the area is calculated and multiplied by 100 to give the SMR. The SMR of the standard population is 100. An SMR greater or less than 100 indicates a respectively higher or lower than expected mortality rate in a specific area. If the lower bound of the 95% Confidence Interval for the SMR is greater than 100 this indicates that the observed number of deaths was statistically significantly higher than expected. A worked example of the SMR calculation is provided below.

The statistical models involved fitting a smoothed term for the year in a Poisson Generalized Additive (GAM) model (GAM) to identify annual trends. In a most cases a Poisson error term was assumed; for a small number of cases a Negative Binomial or Normal (Gaussian) error term was assumed.

SMR calculation – worked example

Table A illustrates the calculation of an SMR for men in area A. The total population of Great Britain is used as the standard population, (column 1). The mesothelioma death rate per 1,000 in the population for each age group (column 3) is the total number of male mesothelioma deaths (column 2) divided by the total number of men in Great Britain (column 1) to give age-specific death rates in the standard population. These rates are applied to the total population in area A, given in column 4, to give the expected numbers of deaths in this area, in column 6. The total observed number of deaths, shown in column 5, (1,196) divided by the expected number of deaths (2,024), multiplied by 100 gives an SMR of 59.

Age group	All men			Men in area A		
	Population, (thousands)	Mesothelioma deaths	Death rate Per 1,000	Population, (thousands)	Mesothelioma deaths	Expected deaths
	(1)	(2)	(3) = (2) / (1)	(4)	(5)	(6)=(3)*(4)
0-4	28 554	0	0.000	6 926	0	0.0
5-9	29 683	0	0.000	8 514	0	0.0
10-14	32 324	0	0.000	9 286	0	0.0
15-19	35 061	1	0.000	8 729	0	0.2
20-24	34 931	1	0.000	7 833	0	0.2
25-29	32 949	5	0.000	7 907	2	1.2
30-34	31 188	16	0.001	7 770	7	3.9
35-39	29 220	76	0.003	6 443	17	16.7
40-44	27 454	199	0.007	6 222	32	45.1
45-49	24 983	402	0.016	6 243	76	100.4
50-54	24 398	705	0.029	6 391	136	184.7
55-59	24 001	1 145	0.048	6 269	179	299.1
60-64	22 155	1 436	0.065	5 367	183	347.9
65-69	19 554	1 499	0.077	4 997	222	383.1
70-74	15 232	1 315	0.086	3 729	177	321.9
75-79	10 232	930	0.091	2 176	112	197.8
80-84	5 176	472	0.091	1 007	40	91.8
85+	2 503	145	0.058	525	13	30.4
All ages	**429 600**	**8 347**		**106 334**	**1 196**	**2024.5**

Table A: Example of an SMR calculation

Annex 2 – Unitary and Local Authorities as of 2015

The following map shows all UAs and LAs as of 2015:

data.gov.uk/dataset/f96d4afa-1100-484d-9f38-abf79a830db7/local-authority-districts-counties-and-unitary-authorities-december-2015-map-in-great-britain.

This structure comprises the following local authorities that existed as part of the previous local government structure that applied from 1998. Changes in 2009 were as follows:

1. County Durham UA comprises the former districts of Chester-le-Street, Derwentside, Durham, Easington, Sedgefield, Teesdale and Wear Valley.

2. Northumberland UA comprises the former districts of Alnwick, Berwick-upon-Tweed, Blyth Valley, Castle Morpeth, Tynedale and Wansbeck.

3. Cheshire East UA comprises the former districts of Congleton, Crewe and Nantwich and Macclesfield.

4. Cheshire West and Chester UA comprises the former districts of Chester, Ellesmere Port & Neston and Vale Royal.

5. Shropshire UA comprises the former districts of Bridgnorth, North Shropshire, Oswestry, Shrewsbury and Atcham and South Shropshire.

6. Bedford UA comprises the former district of Bedford.

7. Central Bedfordshire UA comprises the former districts of Mid Bedfordshire and South Bedfordshire.

8. Cornwall UA comprises the former districts of Caradon, Carrick, Kerrier, North Cornwall, Penwith and Restormel.

9. Wiltshire UA comprises the former districts of Kennet, North Wiltshire, Salisbury and West Wiltshire.

More recent changes include:

10. Tyne and Wear (Met County) is now code E11000007, it was previously E11000004

11. In 2018 Fife changed from S12000015 to S12000047, and Perth and Kinross from S12000024 to S12000048 due to a boundary change.

12. In 2019 Glasgow City changed from S12000046 to S12000049, and North Lanarkshire from S12000044 to S12000050 due to a boundary change.

13. In 2019 the new unitary authority of Bournemouth, Christchurch and Poole (E06000058) was created from Bournemouth (E06000028), Poole (E06000029) and Christchurch (E07000048); along with the new unitary authority of Dorset (E06000059) replacing the old county minus Christchurch i.e. for East Dorset (E07000049), North Dorset (E07000050), Purbeck (E07000051), West Dorset (E07000052) and Weymouth and Portland (E07000053). New district councils were created for Somerset West and Taunton (E07000246) from Taunton Deane (E07000190) and West Somerset (E07000191); West Suffolk (E07000245) from Forest Heath (E07000201) and St Edmundsbury (E07000204); East Suffolk (E07000244) from Suffolk Coastal (E07000205) and Waveney (E07000206).

14. In 2020 Buckinghamshire unitary authority (E06000060) replaced the county (E10000002) and the 4 local authorities of Aylesbury Vale (E07000004), Chiltern (E07000005), South Bucks (E07000006) and Wycombe (E07000007).

15. On 1 April 2021, the non-metropolitan county of Northamptonshire (E10000021) and its seven districts were abolished, and two new unitary authorities were created:

North Northamptonshire (E06000061), consisting of the old non-metropolitan districts of Corby (E07000150), East Northamptonshire (E07000152), Kettering (E07000153), and Wellingborough (E07000156)

West Northamptonshire (E06000062), consisting of the old non-metropolitan districts of Daventry (E07000151), Northampton (E07000154), and South Northamptonshire (E07000155).

Annex 3 – Other areas with significantly raised male SMRs

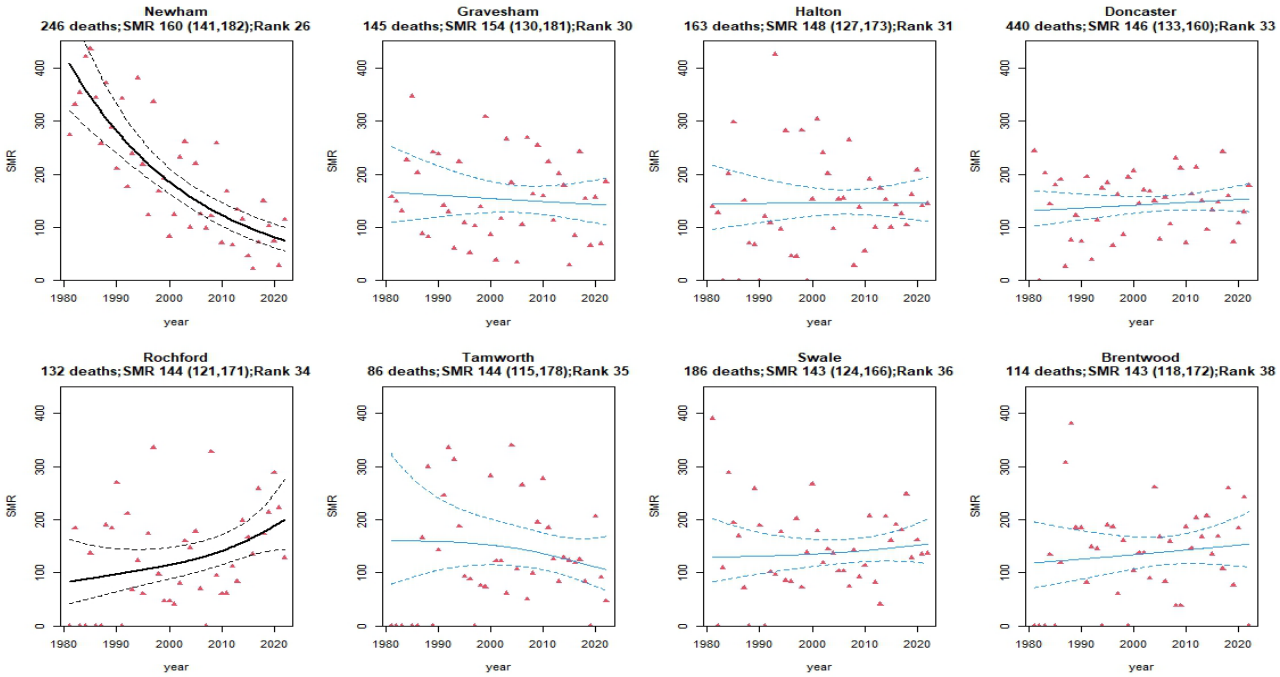

Figure 18 – Annual mesothelioma SMRs for males for other areas, 1981-2022 (part 2)

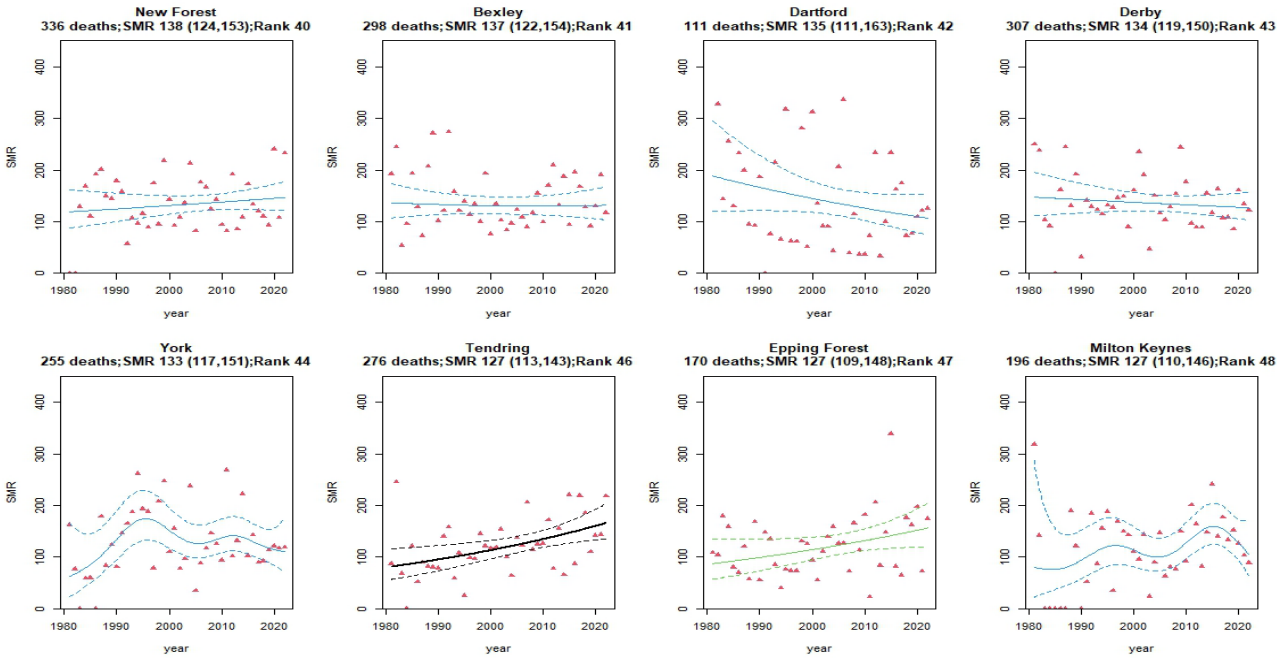

Figure 19 – Annual mesothelioma SMRs for males for other areas, 1981-2022 (part 3)

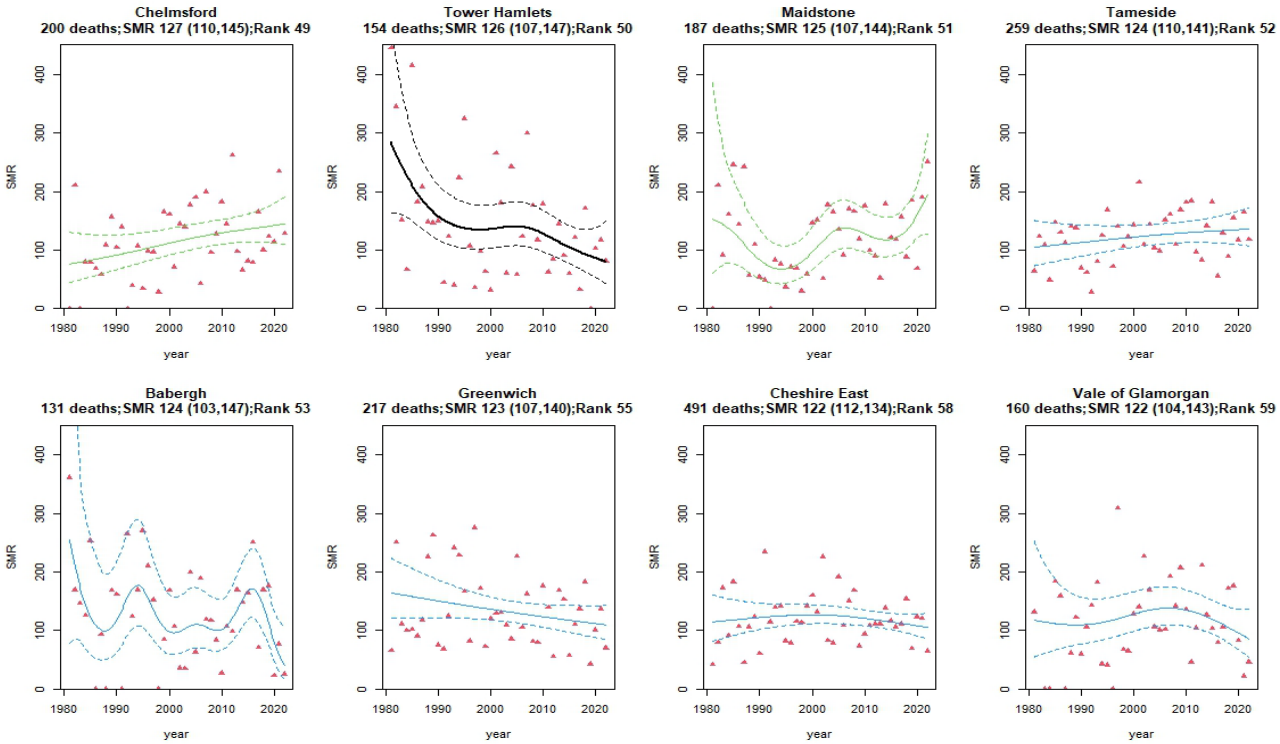

Figure 20 – Annual mesothelioma SMRs for males for other areas, 1981-2021 (part 4)

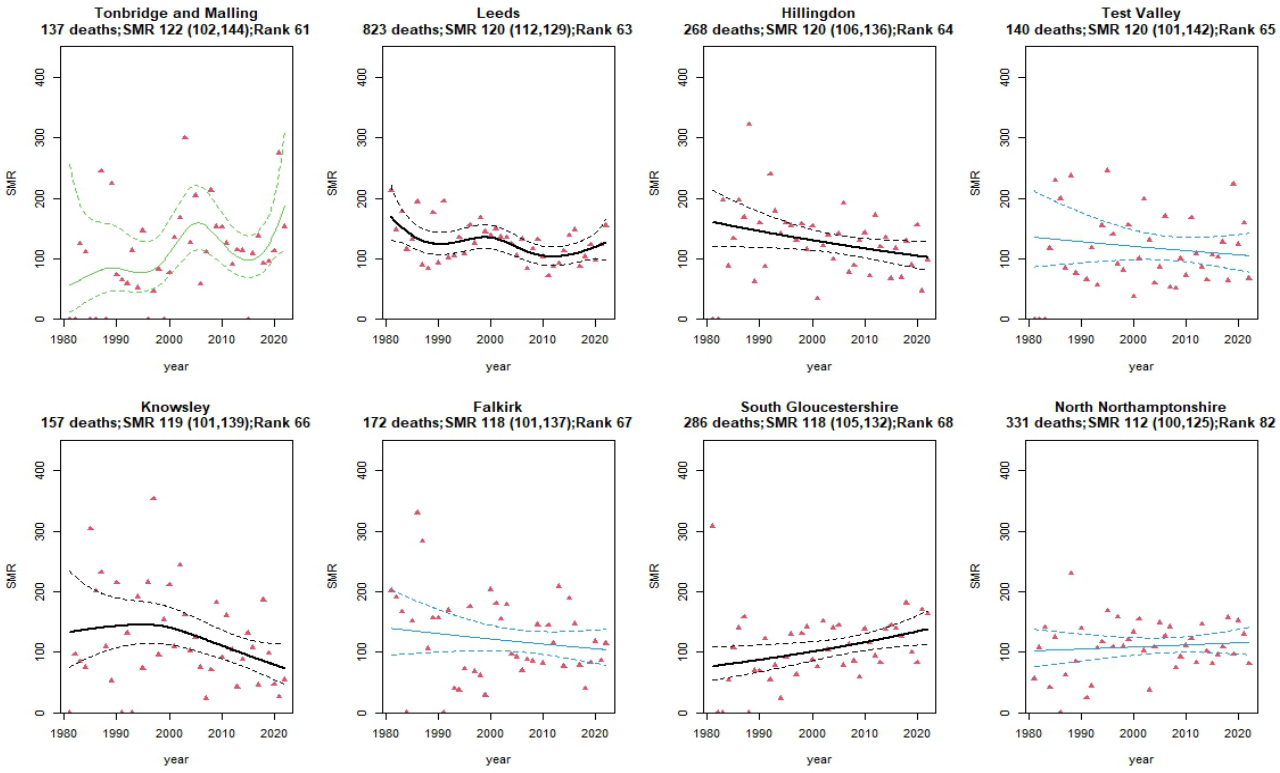

Figure 21 – Annual mesothelioma SMRs for males for other areas, 1981-2022 (part 5)

References

1. McElvenny D, Darnton A, Price M, Hodgson J. Mesothelioma mortality in Great Britain from 1968 to 2001. *Occup Med* 2005;55(2):79-87.

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