

Mesothelioma mortality by occupation statistics in Great Britain, 2026



July 2026



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Introduction

The information in this document relates to Health and Safety Statistics published by the Health and Safety Executive in 2026. The document can be found at:

www.hse.gov.uk/statistics/causdis

This fact sheet presents updated mesothelioma mortality statistics by last recorded occupation of the deceased within Great Britain from 2011-2024 and time trends over the longer period of 2001-2024. The document can be found at

www.hse.gov.uk/statistics/causdis/index.htm.

Background information about mesothelioma and statistics for mesothelioma deaths in Great Britain as a whole and by geographical area within Great Britain are also available at

www.hse.gov.uk/statistics/causdis/index.htm.

These statistics are based on the last occupation of the deceased, as recorded on death certificates. The Proportional Mortality Ratio (PMR) presented for each occupation compares the frequency that the occupation is recorded for mesothelioma deaths with the frequency that it is recorded for deaths from all causes of death as a whole. Additionally

PMRs provide a way of highlighting occupations that may be associated with higher-than-average mortality from mesothelioma. The analyses of temporal trends in occupational PMRs within Great Britain should be interpreted as an indication of how the proportion of deaths with a particular occupation recorded has changed over time, rather than the absolute numbers.

The PMR statistics are limited by the fact that only the last occupation of the deceased is recorded on death certificates which, given the typically long period that the disease takes to develop, may not always be the relevant occupation in terms of potential sources of past exposure to asbestos. The analysis is restricted to deaths occurring at ages 16-74 years since occupations are routinely coded using information from death certificates only for deaths in this range in England and Wales.

Overall deaths increased more than 35% over the period of analysis (i.e. since 2001), and around 10-fold since the late 1960s when consistent recording of mesothelioma in Britain began. However, deaths below age 75 years – those included in this analysis – have reduced over the last 10 years. Nevertheless, since the value of these statistics is in the relative comparison of the frequency of recording of different occupations on mesothelioma death certificates rather than in the absolute number of deaths for each occupation, the statistics still provide useful information about the occupations that are more likely to have been a source of past asbestos exposure.

Notes about interpreting the PMRs and their limitations

The observed number of deaths in a particular occupation does not represent the actual number of deaths that are attributable to asbestos exposures in that occupation.

PMRs summarise mortality among occupational groups relative to the average level for all occupations in Great Britain as a whole and do not represent absolute measures of risk.

PMRs are expressed as a percentage: values higher or lower than 100 indicate mesothelioma rates that are higher or lower, respectively, than the average for all occupations combined. The corresponding confidence interval should be used to assess whether such an effect could merely be due to random variation.

Occupations with the highest PMRs and where the lower limit of the associated Confidence Interval (CI) are above 100 constitute those that can most reliably be said to have an excess of mesothelioma deaths compared to the average for all occupations, and are, therefore, those most likely to be reflecting an effect due to past occupational asbestos exposure.

Last occupation of the deceased

These analyses are limited by the fact that death certificates record only the last occupation of the deceased. For example, a case of mesothelioma caused by work in the construction industry will only be assigned to that occupation in this analysis if the individual is still in that kind of work when they retired (or died). The long latency period of mesothelioma means that individuals may move between occupations before the onset of the disease and thus there is considerable potential for dilution of the observed difference in risk between occupations.

The dilution will be stronger for those kinds of work where there have been substantial reductions in the relevant workforce (e.g. shipyards, railway rolling stock). The occupations with the highest PMRs will tend to be those which are genuine sources of risk, but PMRs may understate the true relative risk level. PMRs of other occupations will overstate the level of risk (if any) associated with these jobs; occupations with the lowest PMRs will be those which do not entail asbestos exposure, and which are unlikely to be the final full-time occupation for individuals with asbestos exposure.

Role of environmental asbestos exposure

Occupation is recorded on death certificates for deaths at ages 16-74 as a matter of course: for mesothelioma deaths occupation is recorded regardless of whether the deaths

were caused by ‘occupational exposure’ to asbestos. This is particularly important to the interpretation of mesothelioma PMRs for women. Whilst some occupations are recorded as the last occupation on female mesothelioma deaths in appreciable numbers, those occupations that do show increased PMRs in women are generally not those where the direct handling of asbestos materials at work was likely to have been taking place routinely. Many of these deaths may reflect ‘background’ or ‘environmental’ asbestos exposure. This means exposures not directly related to work but potentially includes past exposures accrued indirectly in the built environment during work time.

Deaths occurring in the latest periods (i.e. 2011-2020 and 2021-2024) are still influenced by the cohort of people who were younger during the period of peak asbestos use in the 1960s and 1970s when there were far less stringent controls than that required today.

These analyses of female mesothelioma deaths suggest there is some variation in proportionate mesothelioma mortality among those who worked in jobs not involving the use of asbestos. For example, proportional mortality ratios are higher for teachers and administrative occupations than those for nurses, sales occupations and process operatives, and this may suggest the potential for asbestos exposure during work time was somewhat higher in these jobs in the past. The results by birth cohort (see tables: Males 2011-22 by SOC2010, and, Females 2011-22 by SOC2010) suggest that these effects may have been the case even after 1980. However, past exposures due to disturbance of asbestos in buildings may have contributed to the background risk seen across all of these kinds of jobs to some extent, and other sources of exposure – for example, in housing stock – are also likely to have contributed.

Earlier population-based research showed that, while still caused by asbestos, a majority of mesotheliomas among women (and a similar absolute number among men, though these constitute a smaller proportion of the larger male total) in Britain were not directly attributable to occupational or domestic asbestos exposures [1]. This, together with an overall increase in mesothelioma deaths among women, suggests there was an increase in the average ‘background’ risk among those who did not work with asbestos, but who lived through the period of peak asbestos use. During this period the opportunities for unwitting exposure may have been widespread. This average background risk – which has since reduced [2] – will reflect the average effect of past exposures via the buildings occupied in childhood and working life and any other sources of exposure in the environment. However, exposures contributing to this average risk could vary substantially from person to person and are likely to at least partly account for deaths with occupations not typically associated with asbestos exposure recorded on the death certificate. The background risk will also apply to men of the same generation.

Reliability of unit group coding

The coding of occupation is likely to be more reliable at the minor group (3-digit code) level than the unit group (4-digit code) level since the recorded information about the job title on

death certificates does not always give sufficient information to accurately assign a 4-digit code.

Interpretation of time trends in PMRs

Trends for a particular occupation over the period 2001 to 2024 indicate how the proportion of deaths with a particular occupation recorded has changed during this period, rather than the absolute numbers. Where PMRs are changing over the last 20 years, this will reflect the impact of past changes in historical exposure, given the long latency of the disease. For example, occupations with high PMRs overall (those most clearly indicating the role of past occupational exposure) and which show a downward trend may reflect the effect of heavy past exposures being reduced or eliminated after the period of peak asbestos usage in the 1960s and 1970s.

Changes in the PMRs for lower risks jobs over the last 20 years will also reflect changes in past exposure, and particularly the extent to which the effect of past background exposures (including any contribution that working in buildings made to this) is evident in mesothelioma outcomes over this period. For example, increases in the PMR for jobs not associated with the direct handling of asbestos at work may be because the effects of past background exposures are seen more clearly in the most recent mesothelioma outcomes rather than earlier ones. Other research suggests that background exposures that coincided with the period of peak asbestos use (prior to 1980) subsequently reduced [2].

The charts show trend lines with solid bold **black** lines to indicate a statistically significant annual 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.

Results

Full results of the PMRs by occupation in Great Britain are available at:

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

The spreadsheet contains tables for three time periods 2001-2010, 2011-2020 and 2021-24 with results shown according the version of the Standard Occupational Classification (SOC) used in each period. The number of mesothelioma deaths and PMRs with associated 95% confidence intervals is shown in each case.

SOC codes form a nested hierarchy: the first digit of any full 4-digit unit group code gives its major group, the first two digits gives it sub-major group and the first three digits gives its minor group.

Tables include ranks from highest to lowest PMR within each 1- to 4-digit level separately (groups with 10 or fewer observed or expected mesothelioma deaths are not included in the rankings due to the uncertainty associated with smaller numbers).

Males

SOC major group (1-digit)

Among males, there was one major group with a statistically significantly elevated mesothelioma PMR for the period 2011-2020, and this also showed a similar result for the period 2021-24:

Rank	Code	Major Group	Deaths 2011-20	PMR 2011-20	95% CI	Deaths 2021-24	PMR 2021-24	95% CI
1	5	Skilled trades occupations	4,167	164	159-169	958	167	157-178

The remaining eight major groups generally have consistently significantly lower PMRs compared to the average for all occupations.

Skilled trades occupations comprises a number of more specific occupations which have consistently shown statistically significantly elevated PMRs. This includes the only two 2-digit codes with statistically significantly elevated PMRs, and a number of 3- and 4- digit

codes with among the highest PMRs. Many of these occupations are associated with the construction industry.

Figure 1 shows temporal trends in mesothelioma PMRs for males for the nine SOC major (1-digit) groups. There was little evidence of any change in the PMRs over the period 2001-2024 at the major group level with the exception of Professional occupations, for which there was some evidence of reduction in the PMR over time. This major group was expanded under SOC2010 to include some occupations previously within Associate Professional and Technical occupations.

Mesothelioma mortality by occupation statistics in Great Britain, 2026

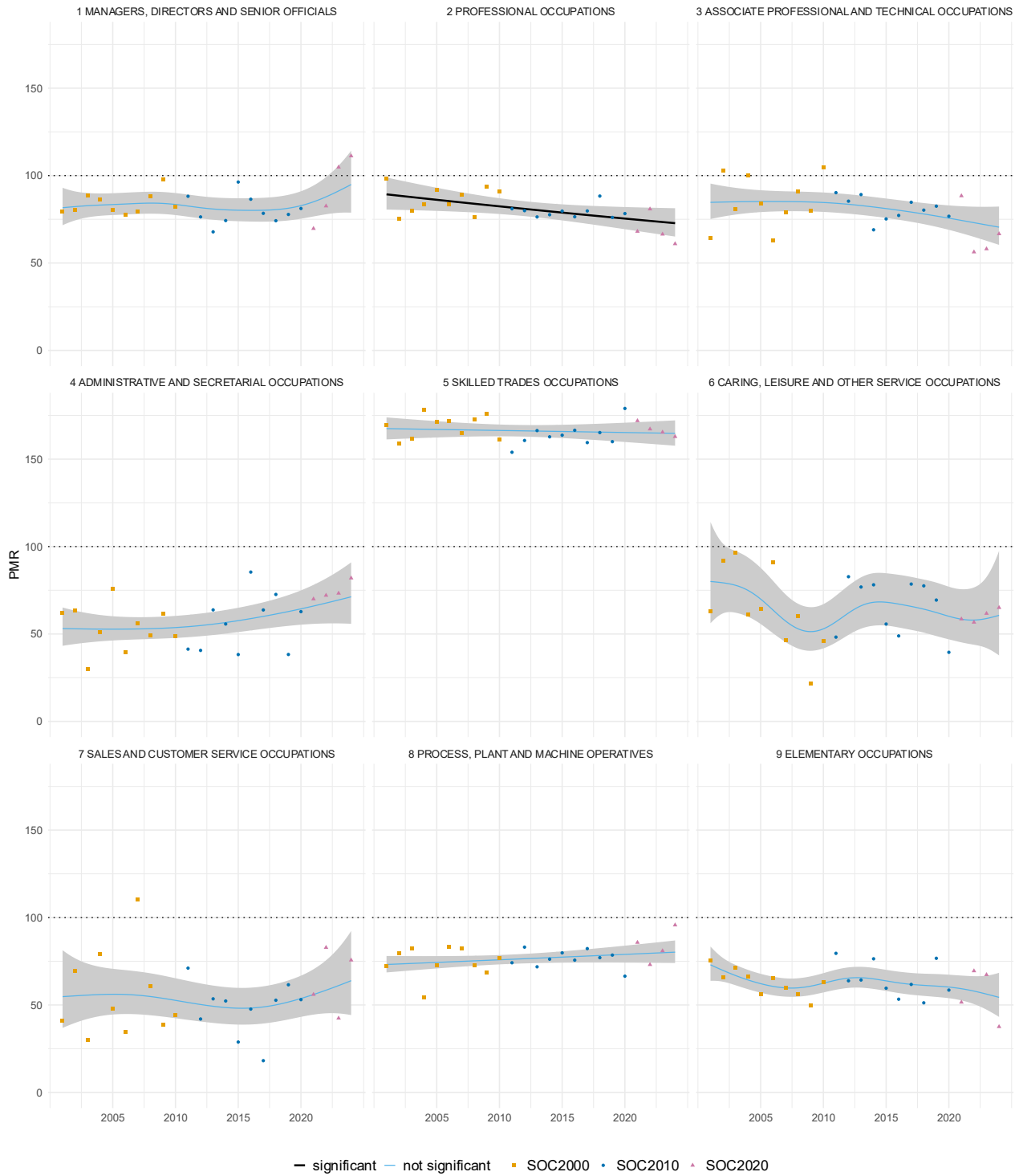


Figure 1: Mesothelioma PMRs by SOC major group, males, 2001-2024

SOC sub-major group (2-digit)

For males, there were two sub-major occupational groups with statistically significantly elevated PMRs for the period 2011-2020, both of which showed similar results for the period 2021-24:

Rank	Code	Sub-Major Group	Deaths 2011-20	PMR 2011-20	95% CI	Deaths 2021-24	PMR 2021-24	95% CI
1	53	Skilled construction and building trades	2412	246	236-256	590	266	245-289
2	52	Skilled metal, electrical and electronic trades	1496	146	139-154	302	134	119-150

SOC minor group (3-digit)

For males, there were 7 SOC minor groups with statistically significantly elevated mesothelioma PMRs for the period 2011-2020, all of which have at least some association with building-related activities:

Rank	Code	Minor Group	Deaths 2011-20	PMR 2011-20	95% CI	Deaths 2021-24	PMR 2021-24	95% CI
1	531	Construction and Building Trades	1995	274	262-286	492	303	277-331
2	524	Electrical and Electronic Trades	695	210	195-226	153	207	175-242
3	532	Building Finishing Trades	388	167	151-185	90	162	130-199
4	814	Construction Operatives*	189	158	136-182	46	169	124-226
5	521	Metal Forming, Welding and Related Trades	204	143	124-163	35	118	82-164
10	812	Plant and Machine Operatives*	398	125	113-138	57	227	172-294
11	522	Metal Machining, Fitting and Instrument Making Trades	406	124	113-137	82	119	94-147

*Minor Group 814 in SOC2010 renumbered 815 in SOC2020; Minor Group 812 in SOC2010 renumbered 813 in SOC2020.

Time trends for these groups groups are shown in Figures 2A and 2B below.

There is some evidence of an increase in the PMR over the period for 'Construction and Building Trades' (minor group 531) and reductions in the PMRs for 'Electrical and Electronic Trades' (minor group 524) and 'Metal Forming, Welding and Related Trades' (Group 521).

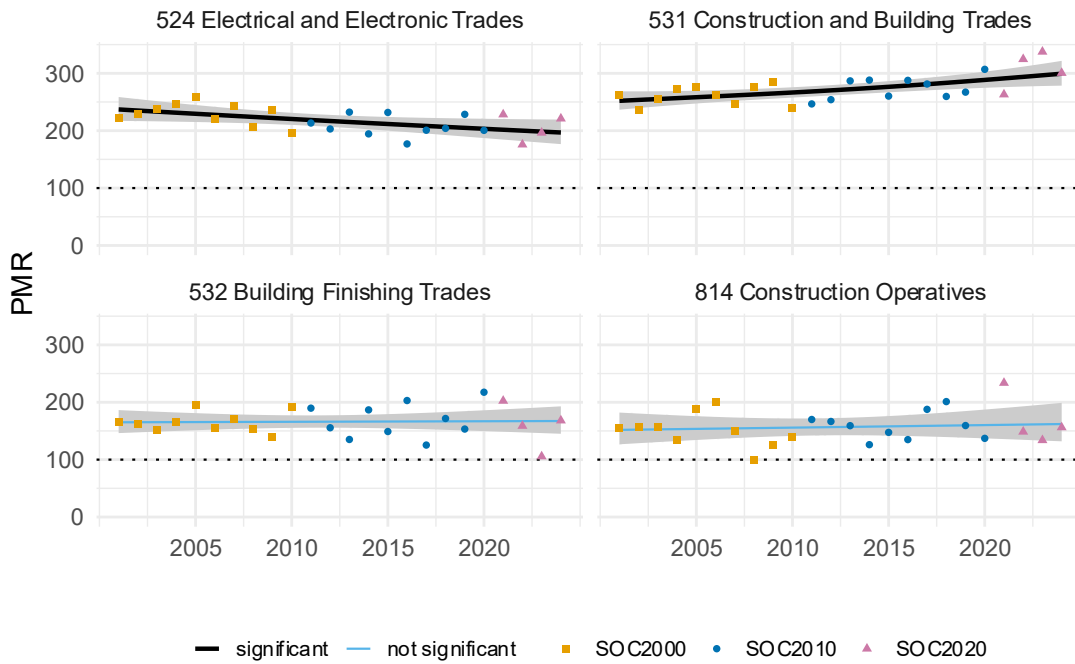


Figure 2A: Mesothelioma PMRs for selected SOC minor groups, males, 2001-2024

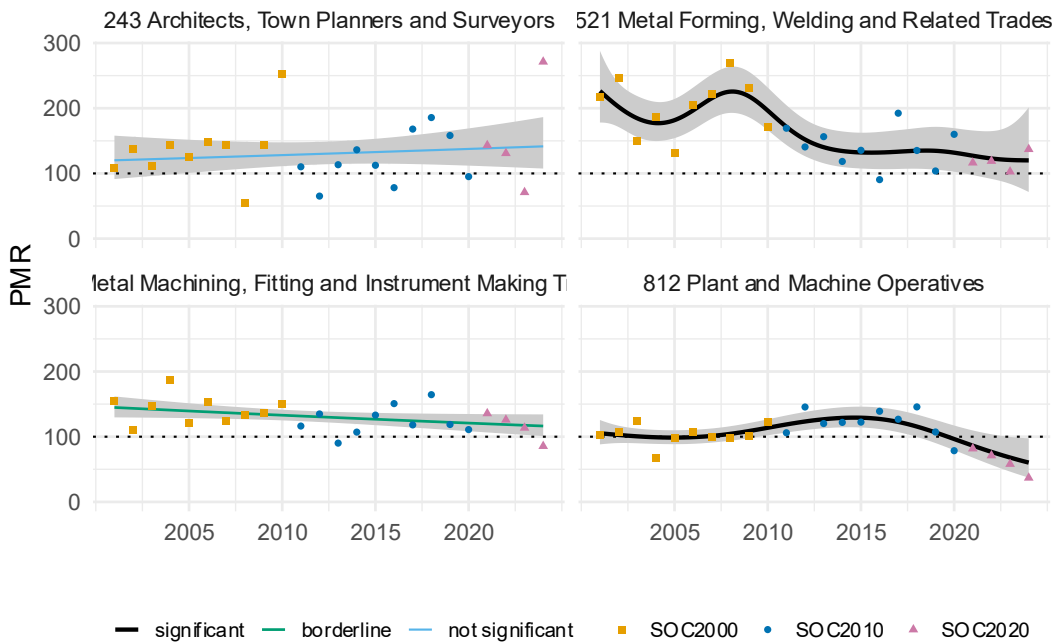


Figure 2B: Mesothelioma PMRs for selected SOC minor groups, males, 2001-2024

Females

Among females there were two major groups with statistically significantly elevated mesothelioma PMRs for 2011-2020, with similar results for the period 2021-24:

Rank	Code	Major Group	Deaths 2011-20	PMR 2011-20	95% CI	Deaths 2021-24	PMR 2021-24	95% CI
1	4	Administrative and secretarial occupations	400	125	113-138	125	141	117-168
2	2	Professional occupations	241	117	103-133	92	138	111-169

Both of these Major Groups showed evidence of an increase in the PMR over time (Figure 3).

The increases over time in the PMRs for these groups are driven by reduction in overall deaths within the 16-74 age range rather than an increase in the numbers of mesothelioma deaths occurring year-on-year, which have remained broadly level or reduced slightly (23 deaths per year on average in 2021-24 vs 24 per year in 2011-20 in Profession occupations; 31 deaths per year in 2021-24 vs 40 per year in 2011-20 in Administrative and secretarial occupations).

Mesothelioma mortality by occupation statistics in Great Britain, 2026

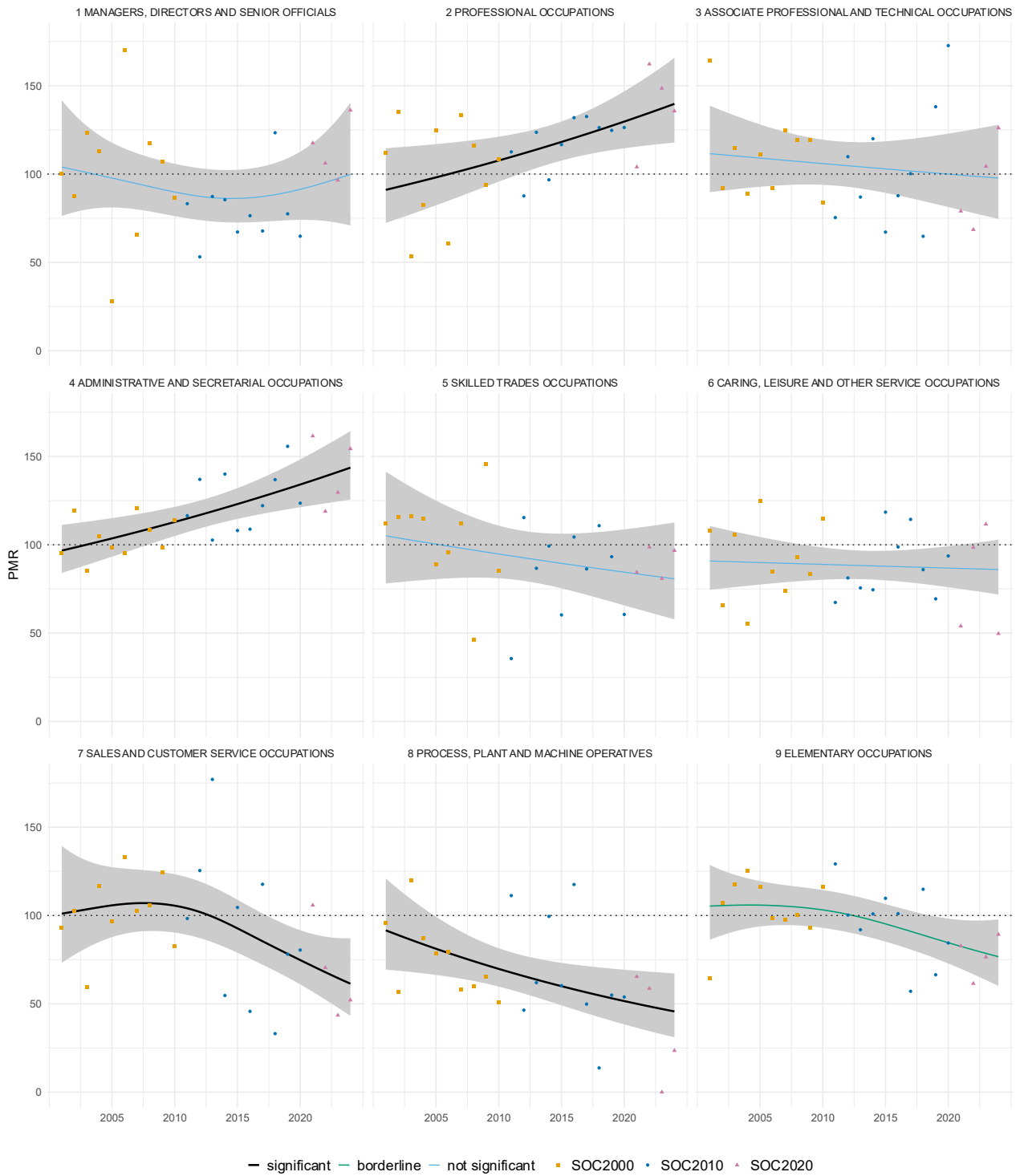


Figure 3: Mesothelioma PMRs by SOC major group, females, 2001-2024

SOC sub-major group (2-digit)

Among females there were three sub-major groups with statistically significantly elevated mesothelioma PMRs for 2011-2020 or 2021-24:

Rank	Code	Sub-Major Group	Deaths 2011-20	PMR 2011-20	95% CI	Deaths 2021-24	PMR 2021-24	95% CI
1	23	Teaching and educational professionals*	113	142	117-171	32	137	94-193
3	41	Administrative occupations	254	131	115-148	80	134	106-167
6	42	Secretarial and related occupations	146	116	98-137	45	156	114-209

*Note: for Teachers and Educational Professionals, for 2011 onwards the SOC2010 minor group code of 231 was used since this is equivalent to sub-major group 23 within the SOC2000 classification.

Sub-major groups 41 and 23 showed evidence of an increase in the PMR over the time period (Figure 4).

The increases over time in the PMRs for these sub-major groups are driven by reduction in overall deaths within the 16-74 age range rather than an increase in the numbers of mesothelioma deaths occurring year-on-year, which have remained broadly level or reduced slightly (8 deaths per year on average in 2021-24 vs 11 per year in 2011-20 in Teaching and educational professionals; 20 deaths per year in 2021-24 vs 25 per year in 2011-20 in Administrative occupations).

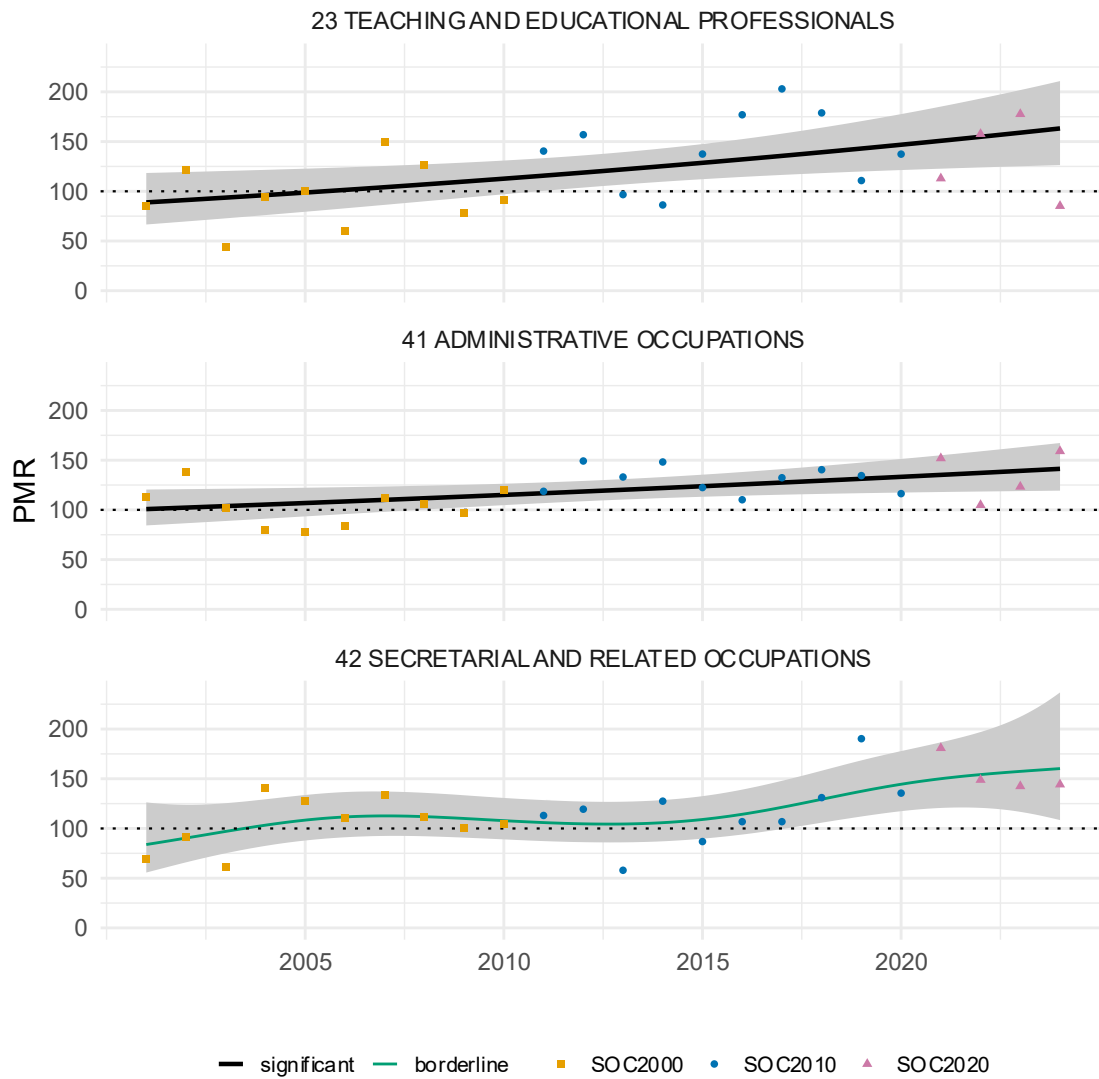


Figure 4: Mesothelioma female PMRs for sub-major groups 23, 41 and 42, 2001-2024

Note: for Teachers and Educational Professionals, for 2011 onwards the SOC2010 minor group code of 231 was used since this is equivalent to sub-major group 23 within the SOC2000 classification.

References

1. Rake C, Gilham C, Hatch J, et al. Occupational, domestic and environmental mesothelioma risks in the British population: a case control study. *British Journal of Cancer* 2009;100(7):1175-83.
2. Gilham C, Rake C, Hodgson J at al. Past and current asbestos exposure and future mesothelioma risks in Britain: The Inhaled Particles Study (TIPS). *International Journal of Epidemiology* 2018;47(6):1745-1756.

Annex 1 – Technical notes

Notes about the Standard Occupational Classification (SOC)

These statistics have been calculated for 1- to 4-digit codes, i.e. major, sub-major, minor, and unit groups, of the version of the Standard Occupational Classification relevant to time period in which deaths occurred (SOC2020 for the period 2021-24; SOC2010 for 2011-20; SOC2000 for 2001-10).

Detailed information about the Standard Occupational Classification is available from the Office for National Statistics:

www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassification/soc

Coding of last occupation of the deceased to the latest version of the Standard Occupational Classification (SOC2020) began in England and Wales for deaths registered in 2023 and this introduced changes to the way some jobs are categorised.

To provide a more robust analysis than possible based on two years of data (i.e. 2023-2024) we have combined data for years 2021 to 2024. However, this required recoding occupations for mesothelioma deaths occurring in England and Wales in 2021 and 2022 and all causes of death data used in the PMR analyses to the SOC2020 classification. Deaths occurring in Scotland for 2021-24 were also recoded.

National Records of Scotland (NRS) supplied mortality data, both mesothelioma and all cause deaths, by occupation coded to SOC2010 for 2021-24. The Office for National Statistics (ONS) supplied: i) mesothelioma deaths coded to SOC2010 for those occurring in 2021 to 2023 that were registered before April 2023, or coded to SOC2020 for deaths registered after April 2023; ii) all cause deaths by occupation by the year of registration coded to SOC2010 for 2021 and 2022 and coded to SOC2020 for 2023-2024.

PMRs for the period 2021 to 2024 were produced by recoding occupations for mesothelioma deaths to SOC2020 codes for any originally coded to SOC2010 in this period. For the large number of all cause deaths used as the denominators in the calculations we used a conversion routine supplied by ONS which was tested on census data.

For deaths registered after 1 April 2011, occupations have been classified according to the Standard Occupational Classification 2010 (SOC2010), and for deaths during 2001-2010 occupations have been classified according to the Standard Occupational Classification 2000 (SOC2000).

A small number of deaths in this analysis occurring during 2001-2010 originally coded to either SOC90 or SOC2010 were recoded SOC2000 using a probability matching algorithm provided by the ONS combined with additional checks made against the job description.

Proportional Mortality Ratios

In this analysis, mortality in the different occupational groups is represented by Proportional Mortality Ratios (PMRs) and associated 95% confidence intervals. A PMR for a particular occupation is the ratio of the observed number of deaths for that occupation to the expected number of deaths, with that ratio expressed as a percentage (i.e. multiplied by 100).

The expected number of deaths is calculated as the number of mesothelioma deaths that would have been recorded for that occupation if the proportion of mesothelioma deaths was equal to the proportion of total deaths from all causes in that occupation. Since mesothelioma incidence is also strongly related to age, the calculation also takes account of differences in the distribution of ages between occupational groups. A worked example of how the PMR is calculated for a particular occupation is given below.

Example PMR calculation

The table below illustrates the calculation of a PMR for men in “occupation X”. Column 3 gives the proportion of all mesothelioma deaths by age (=column 2 divided by column 1). This proportion is applied to the number of deaths from all causes by age in occupation X, given in column 4, to give the expected number of deaths from mesothelioma in this occupation in column 5. The total observed number of mesothelioma deaths in occupation X was 500 (not shown in table). Dividing this by the total expected number of deaths (sum of column 5 = 230 deaths) expressed as a percentage gives a PMR of 217 in this case.

Age group	Deaths				
	All occupations			Last occupation X	
	All causes (1)	Mesothelioma deaths (2)	Proportion from mesothelioma (3) = (2) / (1)	All-cause deaths (4)	Expected deaths (5) = (3) * (4)
16-19	16,500	1	0.000061	6,400	0.388
20-24	21,732	1	0.000046	7,833	0.360
25-29	18,072	5	0.000277	7,907	2.188
30-34	20,544	16	0.000779	7,770	6.051
35-39	27,300	76	0.002784	6,443	17.937
40-44	42,576	199	0.004674	6,222	29.082
45-49	61,236	402	0.006565	6,243	40.984
50-54	102,900	705	0.006851	6,391	43.787
55-59	187,416	1,145	0.006109	6,269	38.300
60-64	308,988	1,436	0.004647	5,367	24.943
65-69	433,956	1,499	0.003454	4,997	17.261
70-74	550,296	1,315	0.002390	3,729	8.911
All ages 16-74	1,791,516	6,800		75,571	230

Confidence intervals and statistical significance

A PMR calculated for an occupational group may be greater or less than 100 by chance. Confidence intervals are used to give an indication of the uncertainty associated with each PMR due to this random variation. A 95% confidence interval is such that, if the calculation could be repeated many times with different samples of the events, then the confidence interval will contain the true value of the PMR 95% of the time. If the lower confidence limit is greater than 100 then the PMR is said to be statistically significantly elevated. Likewise, if the upper confidence interval that is presented is lower than 100 then the PMR is said to be statistically significantly reduced. In this analysis, confidence intervals are calculated assuming Poisson variability in the mesothelioma count for each occupation.

Statistical modelling methodology

The statistical models used for the analysis of time trends in this report are Generalized Additive Models (GAMs). These models permit a flexible analysis of trends which do not

depend on assuming a particular mathematical relationship in advance, such as a linear decline over the entire time period. Instead, the GAMs allow the fitting of trends which take into account different patterns of change within different parts of the overall time period and smooth out some of the year-on-year variation. In most cases the models assume a Poisson error term. In a small number of cases a Negative Binomial or Normal (Gaussian) error term was assumed.

Age range for deaths included in this analysis

The analysis is restricted to deaths occurring at ages 16-74 years since occupations are routinely recorded on death certificates only for deaths in this range in England and Wales.

Overall deaths increased more than 35% over the period of analysis (i.e. since 2001), and around 10-fold since the late 1960s when consistent recording of mesothelioma in Britain began. However, deaths below age 75 years – those included in this analysis – have reduced over the last 10 years (see Figure A1 below). Nevertheless, since the value of these statistics is in the relative comparison of the frequency of recording of different occupations on mesothelioma death certificates rather than in the absolute number of deaths for each occupation, the statistics still provide useful information about the occupations that are more likely to have been a source of past asbestos exposure.

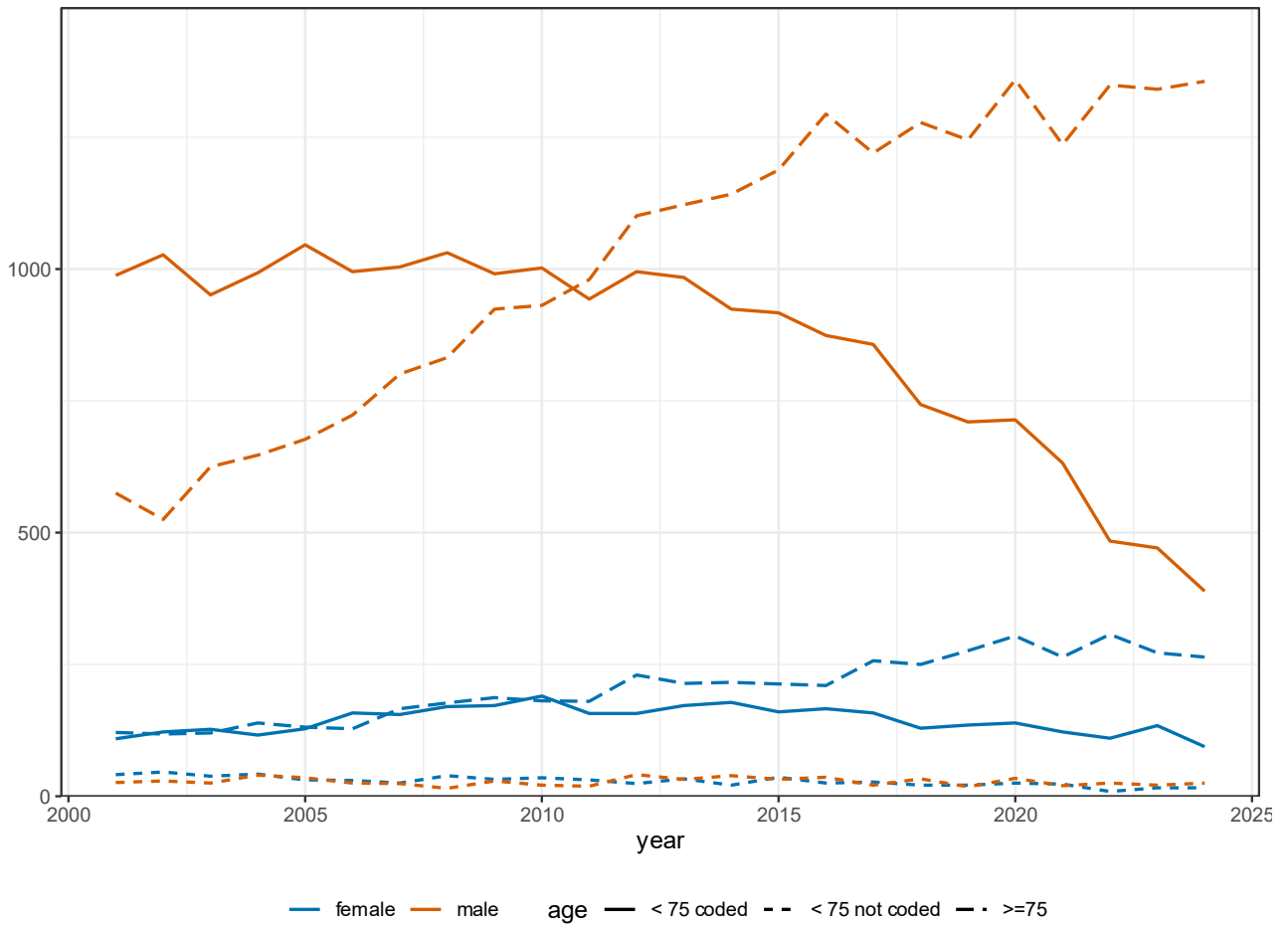


Figure A1: Male and female mesothelioma deaths 2001-2024 by age category

Annex 2 – Time trends in male mesothelioma PMRs for selected SOC unit groups (4-digit codes)

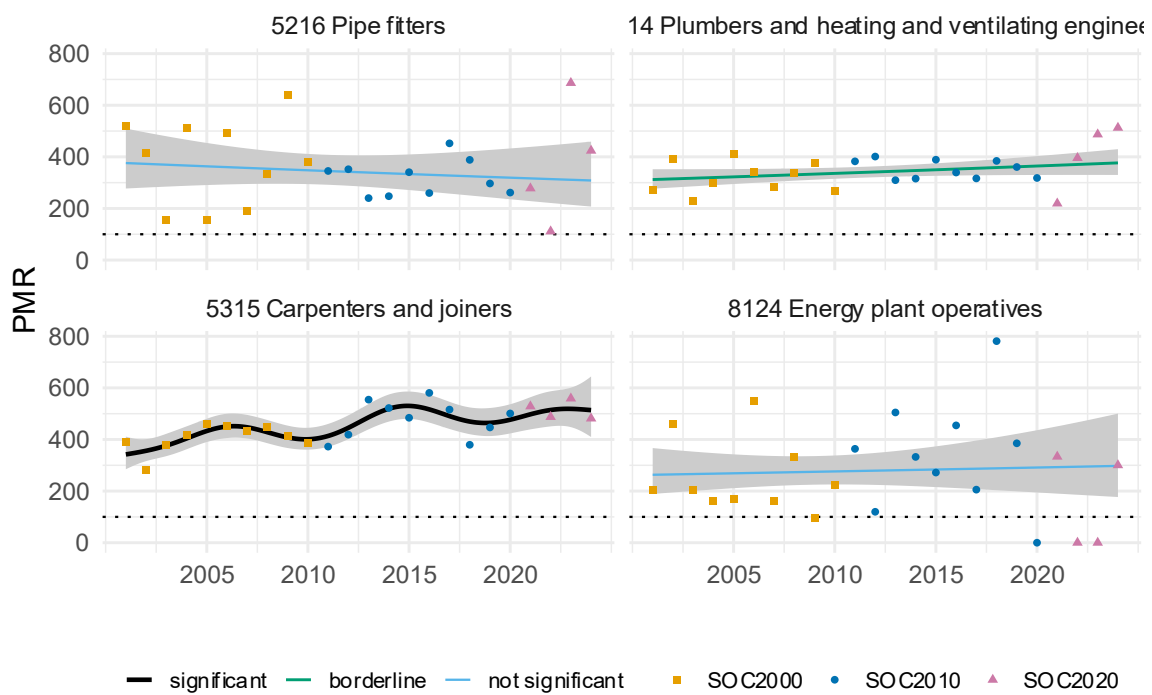


Figure A2.1: Mesothelioma PMRs for selected SOC unit groups, males, 2001-2024

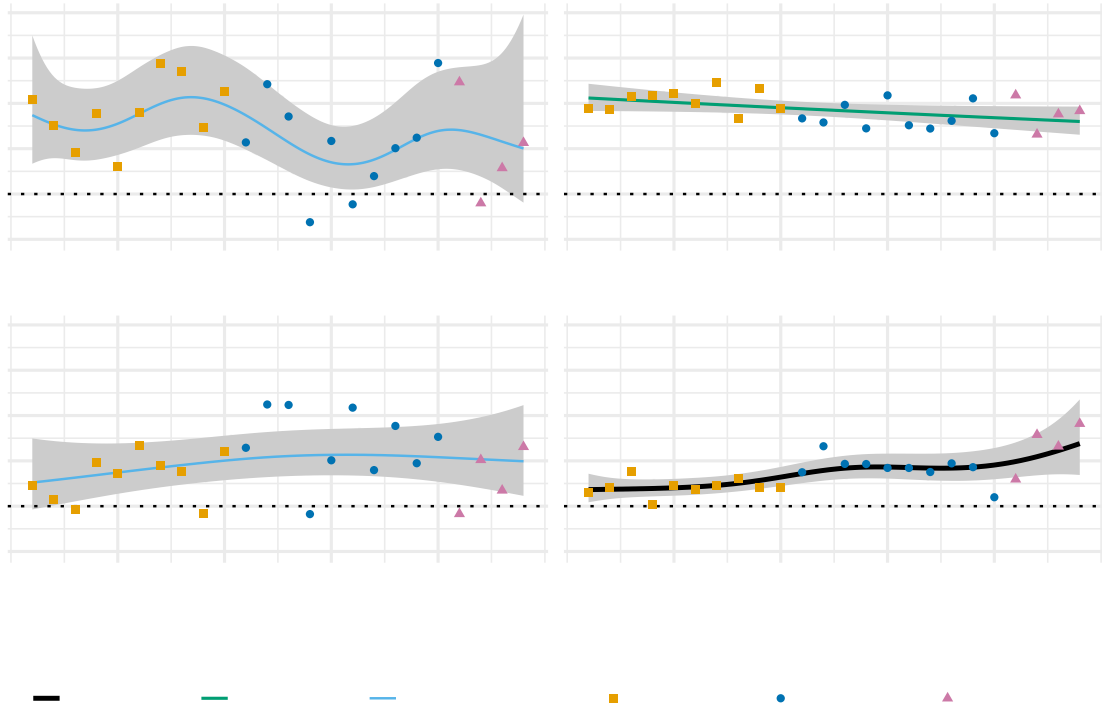


Figure A2.1: Mesothelioma PMRs for selected SOC unit groups, males, 2001-2024

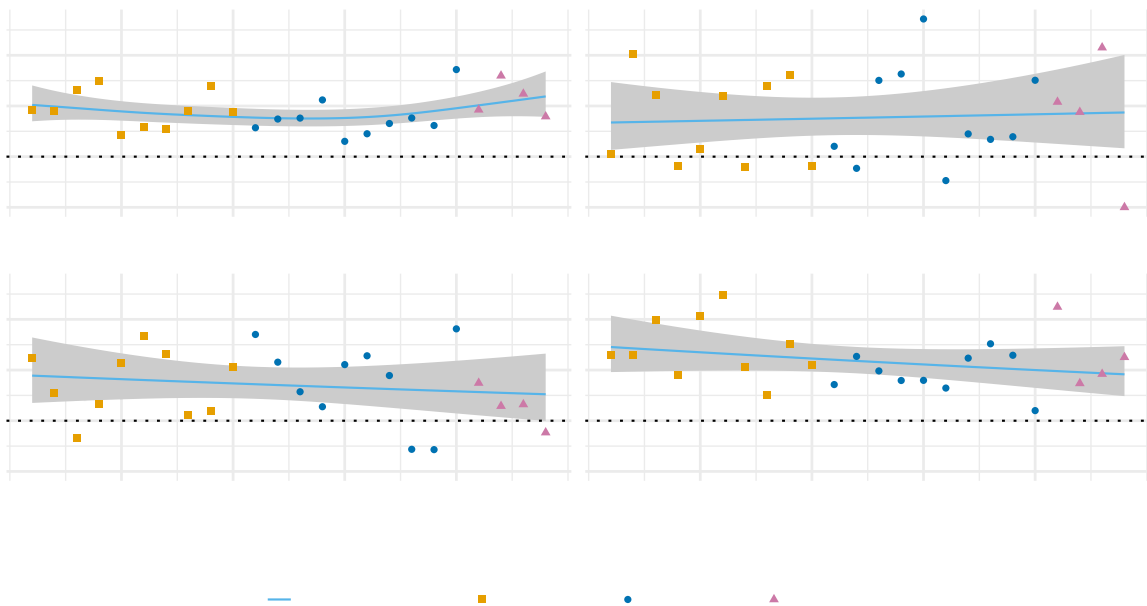


Figure A2.3: Mesothelioma PMRs for selected SOC unit groups, males, 2001-2024

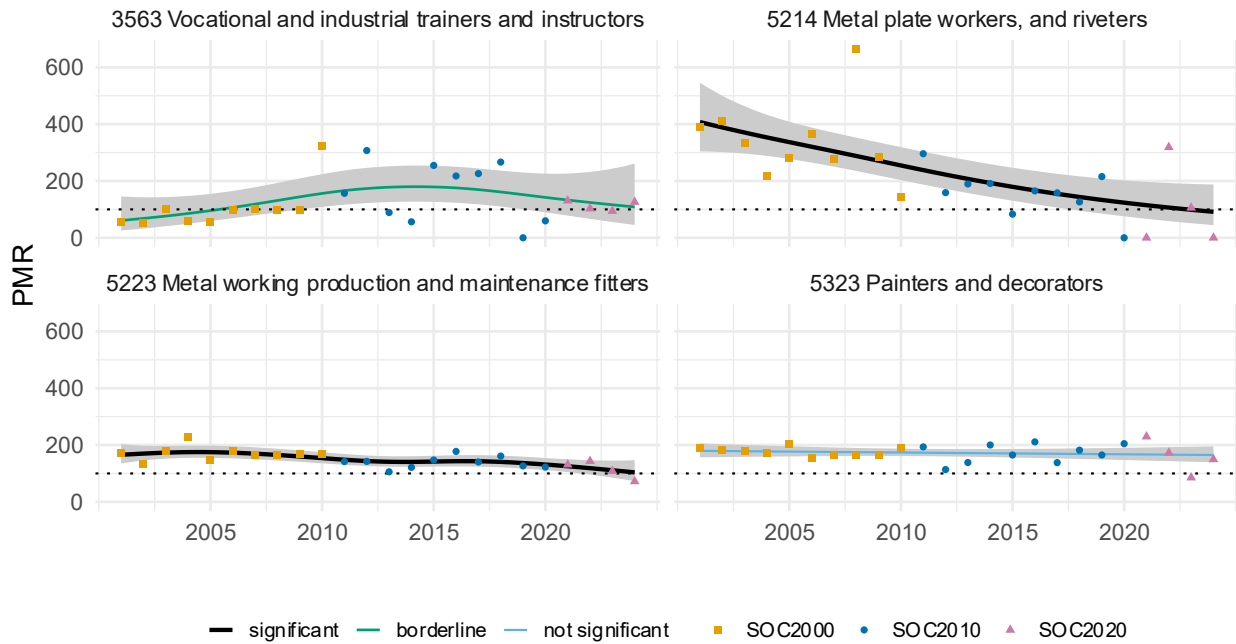


Figure A2.4: Mesothelioma PMRs for selected SOC unit groups, males, 2001-2024

Note: minor group 5214 (Metal plate workers, and riveters) has a similar code for SOC2000: 'Metal plate workers, shipwrights, riveters'. Shipwright/builder jobs, which made up at least 50% of deaths in 2001-2010, are now coded to code 5236 (Boat and ship builders and repairers).

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From 7 June 2024 the Accredited Official Statistics badge has replaced the previous National Statistics badge. These statistics were last reviewed by OSR in 2013. It is Health and Safety Executive's responsibility to maintain compliance with the standards expected. If we become concerned about whether these statistics are still meeting the appropriate standards, we will discuss any concerns with the OSR promptly. Accredited Official Statistics status can be removed at any point when the highest standards are not maintained, and reinstated when standards are restored.

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