

# Work-related and occupational asthma in Great Britain 2016

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# Summary

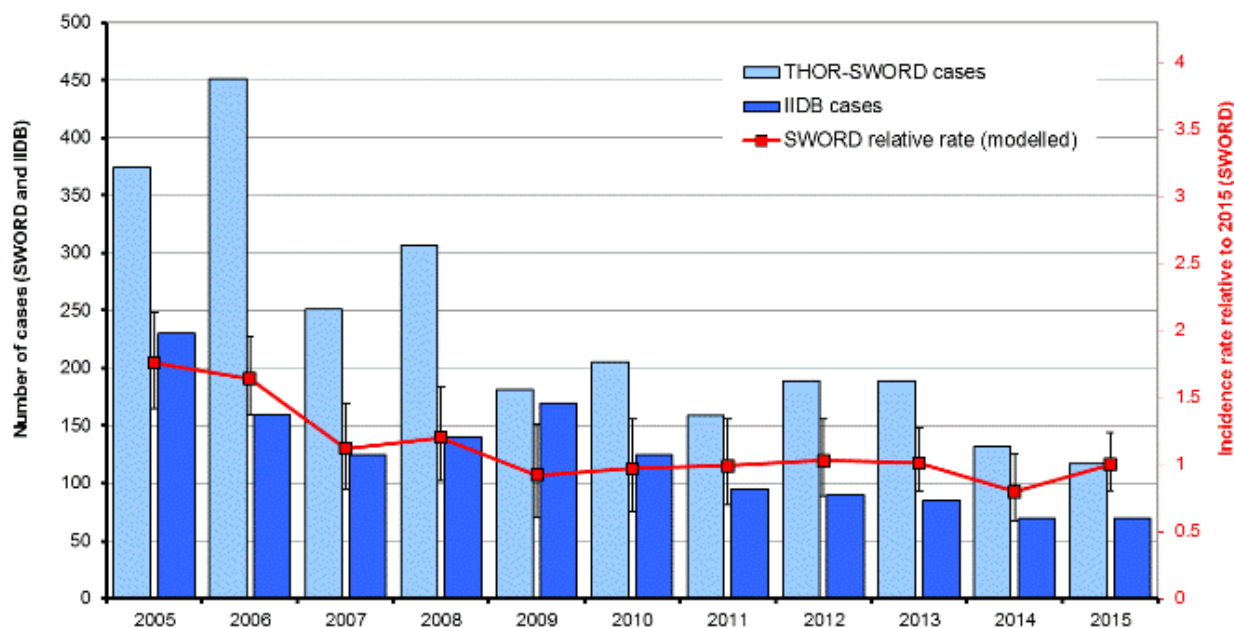
The document can be found at: [www.hse.gov.uk/statistics/causdis/asthma/](http://www.hse.gov.uk/statistics/causdis/asthma/)

Work-related asthma describes all adult asthma where there is an association between symptoms and work, including work-aggravated asthma and a smaller numbers of cases of occupational asthma often caused directly by exposure to respiratory sensitisers in the workplace.

The latest information shows:

- There are currently an estimated 14,000 (95% confidence interval: 10,000 – 17,000) new cases of “breathing and lung problems” each year caused or made worse by work according to the Labour Force Survey (LFS). A substantial proportion of these may be work-related asthma.
- Annual numbers of individual case reports of occupational asthma by chest physicians in SWORD and via the Industrial Injuries Disablement Benefit (IIDB) scheme are much lower.
- In 2015 there were 117 estimated new cases of occupational asthma reported within SWORD and 70 new cases assessed for IIDB. These are likely to underestimate of the true scale of occupational asthma.
- Analyses of SWORD data do not provide strong evidence of a downward trend in the annual incidence of occupational asthma since 2007, although annual IIDB cases have tended to reduce.
- The occupations with the highest rates of new cases per year within SWORD were 'vehicle paint technicians' and 'bakers and flour confectioners'.
- The most common causes of occupational asthma continue to be isocyanates, and flour/grain.

**Figure 1: Occupational asthma in Great Britain, 2005-2015**



# Introduction

There is no universally accepted definition of "occupational asthma", though it is typically defined as adult asthma caused by workplace exposures and not by factors outside the workplace.

The wider definition of "work-related asthma" includes all cases where there is an association between symptoms and work such as "work-aggravated asthma" which typically refers to pre-existing cases made worse by non-specific factors in the workplace.

The majority of occupational asthma cases are allergic in nature and typically involve a latency period between first exposure to a respiratory sensitiser in the workplace and the onset of symptoms. Asthma cases caused by irritants typically occur within a period of hours following exposure to high levels of an irritant gas, fume or vapour in the workplace.

Estimation of the overall scale of the disease, trends in incidence, and identification of high risk occupations and activities, relies on a variety of sources of data each with different strengths and weaknesses.

## Overall scale of work-related and occupational asthma

There were an estimated 14,000 (95% confidence interval: 10,000 – 17,000) new cases of "breathing and lung problems" each year that were caused or made worse by work according to the Labour Force Survey (LFS) over the last three years was [Table-2 lfsilltyp [www.hse.gov.uk/statistics/lfs/lfsilltyp.xlsx](http://www.hse.gov.uk/statistics/lfs/lfsilltyp.xlsx)].

Although associated with considerable uncertainty, various other data sources – including reports from GPs and estimates based on epidemiological studies – suggest that a substantial minority of these cases (at least 1000 and perhaps considerably more) may be consistent with work-related asthma (see the Technical Notes).

Annual numbers of individual case reports of occupational asthma by chest physicians within the SWORD scheme (part of The Health and Occupation Reporting (THOR) network) and the Industrial Injuries Disablement Benefit (IIDB) scheme are much lower than this.

In 2015 there were 117 estimated new cases of occupational asthma reported within SWORD, compared with 132 in 2014 and an average of around 220 cases per year over the last decade.

In 2015, there were 70 new cases of occupational asthma assessed for IIDB compared with 70 in 2014 and an average of 113 cases per year over the last decade (see table IIDB01 [www.hse.gov.uk/statistics/tables/iidb01.xlsx](http://www.hse.gov.uk/statistics/tables/iidb01.xlsx)).

There is likely to be some overlap between the SWORD and IIDB occupational asthma cases. However, IIDB numbers tend to be lower than SWORD since the scheme may tend to pick up fewer cases arising from substances or in occupational settings where the link with asthma is less well established or well known. Furthermore, the self-employed are not covered by the IIDB scheme and the level of compensation available for even those who are severely disabled may not provide sufficient incentive for all eligible individuals to apply.

Reports to SWORD include only those cases of asthma that were serious enough to be seen by a chest physician. The majority, but not all, of eligible chest physicians are included in the scheme, and some of those who are included do not report any cases. A previous analysis suggested that non-participation and non-response led to an underestimation of the true incidence of specialist diagnosed occupational asthma in 2005-2007 of about 40%.<sup>1</sup>

The THOR data (THORR02 – see [www.hse.gov.uk/statistics/tables/thorr02.xlsx](http://www.hse.gov.uk/statistics/tables/thorr02.xlsx)) suggest that occupational asthma affects workers of a wide range of ages: percentages of total cases falling into the age groups 25-34, 35-44, 45-54 and 55-64 years were 15%, 29%, 29% and 18% respectively.

## Trends in annual new cases

Data from SWORD can be used as the basis for inferences about time trends in the annual incidence of occupational asthma. However, such inferences cannot be made solely on the basis of the number of estimated annual cases since various factors can influence these numbers as well as true changes in incidence.

Relative changes in annual incidence based on the latest statistical modelling by the University of Manchester<sup>2</sup> which takes account of some of these factors (including the number and type of participating specialists, their reporting habits, and seasonal effects associated with the time of year they report) give the best guide available to date about year-on-year changes. These are shown in Figure 1 (red line) alongside the estimated annual number of cases (light blue bars) and annual IIDB cases (dark blue bars).

- Although there is an apparent downward trend in number of annual estimated cases since 2007 the statistical modelling does not provide strong evidence of a downward trend in incidence over this period. The estimated average decrease of -3.3% per year (95% confidence interval: -6.6, 0.1) was not statistically significant.
- A statistically significant downward trend in incidence over the longer period 1999-2015 (estimated average decrease: -7.0% per year; 95% confidence interval: -8.2% to -5.8%) is largely a result of changes in incidence in the early part of this period prior to 2007.

These analyses do not take account of a possible tendency for reporters to include fewer cases than they should once they have been reporting for some time (so called "reporting fatigue"). Investigations to date into reporter fatigue within SWORD have found some evidence for it among "sample reporters" (those physicians that report into the scheme for one month of the year only) but little among "core reporters" (those that report every month). This tends to further argue against a downward trend since 2007.

There has been a fall in the annual number of IIDB cases of occupational asthma since 2005. There were 230 cases in 2005 compared with less than 100 cases per year during the last four years.

The current list of agents for which benefit is payable within the IIDB scheme has remained constant for the period shown in Figure 1 with one minor exception - the addition of latex to the list of agents in March 2005. However, this has had little impact on the overall numbers, with 10 or fewer assessed cases each year in this category (Table IIDB08 [www.hse.gov.uk/statistics/tables/iidb08.xlsx](http://www.hse.gov.uk/statistics/tables/iidb08.xlsx)). The number of cases in the open category (which includes cases due to any other sensitising agent where claimants have been able to demonstrate that this was the likely cause) has also fallen recently: there were 5 cases in 2015 compared with 85 in 2005.

## Causal agents for occupational asthma

Figure 2 shows the most commonly cited agents for cases of occupational asthma in the SWORD and IIDB schemes during the two most recent three year periods. Both SWORD and the IIDB scheme figures continue to show isocyanates and flour/grain as the agents responsible for the highest proportion of new cases of occupational asthma, followed by wood dusts.

The role of isocyanates and flour/grain in occupational asthma is further supported by more detailed questioning about the causes of work related illness included in the 2009/10/ 2010/11, and 2011/12 LFS.

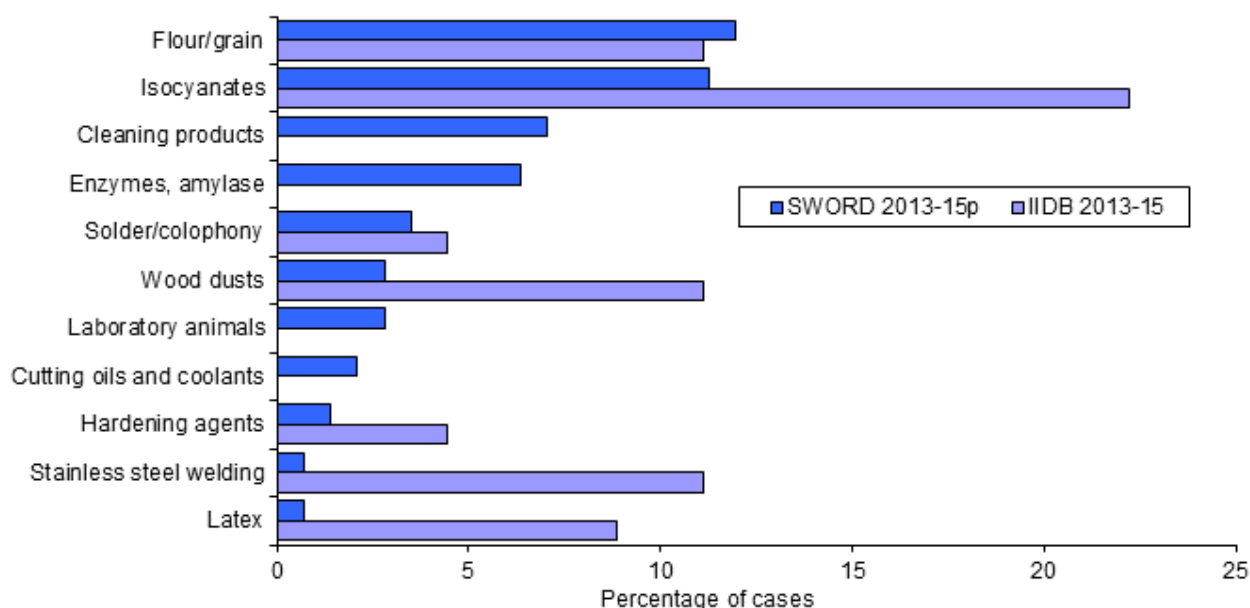
Based on data from these surveys, of those with breathing and lung problems:

- approximately 13% thought that "Airborne materials from spray painting or manufacturing foam product" had contributed to their ill health;
- a further 7% cited "Dusts from flour or grain/cereal, animal feed or bedding (straw)"; and,
- a further 10% thought that "Airborne materials while welding, soldering or cutting/grinding metals" had contributed to their ill health.

These estimates broadly apply to the prevalent cases of breathing and lung problems, currently estimated to be 141,000 (95% Confidence Interval: 123,000 – 159,000), based on data from the latest three years.

Tables THORR06 ([www.hse.gov.uk/statistics/tables/thorr06.xlsx](http://www.hse.gov.uk/statistics/tables/thorr06.xlsx)) and IIDB08 ([www.hse.gov.uk/statistics/tables/iidb08.xlsx](http://www.hse.gov.uk/statistics/tables/iidb08.xlsx)) show a full breakdown of the THOR and IIDB cases by agent, with IIDB09 ([www.hse.gov.uk/statistics/tables/iidb09.xlsx](http://www.hse.gov.uk/statistics/tables/iidb09.xlsx)) giving numbers for 14% and 50% disablement.

**Figure 2: Most common agents for occupational asthma 2013-2015**



Detailed analyses of the SWORD data have provided evidence of reductions in incidence due to certain specific agents. For example, there is evidence of a decline in occupational asthma due to both glutaraldehyde and latex, which have more reported cases in the healthcare sector than elsewhere. These declines are likely to be associated with the elimination of glutaraldehyde-based disinfectant use and recent interventions to reduce exposure to latex<sup>3</sup>.

## Occupation and industry

Industrial and occupational analyses of SWORD cases can also give some insight into the types of workplaces and activities that are currently causing occupational asthma in the British workforce.

THORR04 ([www.hse.gov.uk/statistics/tables/thorr04.xlsx](http://www.hse.gov.uk/statistics/tables/thorr04.xlsx)) and THORR05 ([www.hse.gov.uk/statistics/tables/thorr05.xlsx](http://www.hse.gov.uk/statistics/tables/thorr05.xlsx)) show the average number of SWORD cases reported per year during the period 2013-2015, by occupation and industry respectively, together with estimated rates per 100,000 workers.

SWORD shows that the overall occupational asthma incidence (across all occupations or all industries) was 0.5 cases per 100,000 workers per year during 2013-2015 (data shown in tables THORR04 and THORR05).

### Occupation

Table THORR04 shows that two major groups of the Standard Occupation Classification have rates greater than the average for all occupations: 'Process, Plant and Machine Operatives' (2.7 per 100,000) and 'Skilled Trades Occupations' (1.4 per 100,000).

For comparisons of more detailed occupation unit groups pooling of data over a larger number of years is necessary. Based on SWORD data for 2006-2015, highest rates were seen in the following occupations:

- 'Vehicle paint technicians' (61.5 per 100,000),
- 'Bakers and flour confectioners' (45.2 per 100,000), and,
- 'Metal making and treating process operatives' (45.0 per 100,000).

These occupations have consistently had among the highest rates of occupational asthma based on SWORD reporting.

Caution is required in drawing conclusions about trends for individual occupations over time. The earlier comments relating to trends in the overall rate of asthma apply, and in addition, particular outbreaks of occupational asthma in certain industries – for example, in relation to metal working fluids – will also have a large impact on figures at this level.

## Industry

Table THORR05 shows that during 2013-2015 the manufacturing industry as a whole had a substantially higher rate (2.8 per 100,000 workers) than the average for all industries.

More detailed industry divisions with the highest rates of occupational asthma as seen by chest physicians were:

- 'Manufacture of food products' (6.9 per 100,000),
- 'Manufacture of fabricated metal products, except machinery and equipment' (4.9 per 100,000), and
- 'Manufacture of motor vehicles, trailers and semi-trailers' (4.5 per 100,000).

Over the longer period 2008-2015, the divisions with the highest rates were:

- 'Manufacture of motor vehicles, trailers and semi-trailers' (10.0 per 100,000),
- 'Manufacture of basic metals' (10.0 per 100,000),
- 'Manufacture of chemicals' (7.4 per 100,000), and
- 'Manufacture of food products' (6.8 per 100,000).

Again, particular outbreaks of occupational asthma will also have a large impact on figures at this level.

Rates by occupation and industry are calculated by using a denominator based on the number of workers identified in the Labour Force Survey in the relevant occupational or industrial sector. Thus the denominator is representative of the whole sector whereas the number of cases reported is limited by underreporting (see above). As a consequence the rates identified should be seen as minimal estimates. Numbers and rates for each major occupational group and industrial section are shown, and where the number of actual cases over a three year period is greater than or equal to 10, case numbers and rates are shown for the unit group for occupations, and divisions for industry.

Caution must be applied when interpreting the rates at the occupational unit group and industry division level of detail, as there may be occupations and industries that are relatively small; therefore the actual rates of disease incidence may be high, but they are not included in SWORD tables because the number of cases is below the inclusion threshold.

# Technical notes

## Disease definition

Individuals with asthma have chronic inflammation in the bronchi (air passages). As a consequence the bronchial walls swell causing the bronchi to narrow, which can lead to breathlessness. Muscles around the air passages also become irritable so that they contract, causing sudden worsening of symptoms in response to various stimuli, including exposures encountered at work. The inflammation can also make mucus glands in the bronchi produce excessive sputum which further blocks up already narrowed air passages. If the inflammation is not controlled with treatment, as well as causing acute attacks, it can lead to permanent narrowing and scarring of the air passages<sup>4</sup>.

There is no universally accepted definition of "occupational asthma". It can be defined as adult asthma caused by workplace exposures and not by factors outside the workplace. The wider definition of "work-related" asthma includes all cases where there is an association between symptoms and work, and includes "work aggravated asthma", meaning pre-existing or coincidental new onset adult asthma which is made worse by non-specific factors in the workplace.

Asthma caused by specific work factors is of two broad types: "allergic occupational asthma" and "irritant-induced occupational asthma". The former accounts for the majority of cases and typically involves a latency period between first exposure to the specific cause (the "respiratory sensitiser") in the workplace and the onset of symptoms. The latter typically occurs within a period of hours following exposure to high levels of an irritant gas, fume or vapour in the workplace.

The causal mechanisms for occupational asthma vary from one substance to another. Because the range of industries which use substances with the potential to cause asthma is quite broad, and not all employees in these industries will necessarily be exposed, it is difficult to estimate with any confidence the total number of workers at risk. Estimation of the overall scale of the disease, trends in incidence, and identification of high risk occupations and activities, relies on a variety of sources of data each with different strengths and weaknesses.

## Data sources

A number of data sources provide information about the incidence of work-related and occupational asthma in Great Britain – i.e. the number of newly diagnosed cases each year. Information about cases of occupational asthma referred to consultant chest physicians or occupational physicians is available from The Health and Occupation Reporting (THOR) network SWORD and OPRA schemes, and information about newly assessed cases for Industrial Injuries and Disablement Benefit (IIDB) is available from the Department for Work and Pensions (DWP). Although these sources record a substantial number of actual cases occurring each year, they both underestimate the overall incidence of occupational asthma and substantially underestimate the incidence of work-related asthma.

The Labour Force Survey (LFS) provides estimates of all work-related respiratory disease, and while a substantial proportion of this is likely to be work-related asthma, actual estimates are not available.

Relatively few actual cases of asthma are reported each year within the THOR-GP scheme meaning that estimates of the scale of GP reported occupational or work-related asthma are imprecise.

Information about the overall scale of disease is also available based on attributable fractions from epidemiological studies.

## Evidence about the overall scale of work-related and occupational asthma

Given that a substantial proportion of the annual incidence of work-related respiratory disease as estimated by the LFS is likely to be asthma, this suggests that the annual incidence of work-related asthma may be substantially higher – perhaps an order of magnitude higher – than the incidence of occupational asthma suggested by the SWORD and IIDB schemes.

An investigation of THOR-GP data from 2006-2012 indicates that about 30% of the total number of respiratory disease cases were asthma, and of these, about half were reported as aggravated by work and a further third (i.e. about 10% of the total) were reported as being caused by a particular workplace agent. These estimates are imprecise, however, if 10% of GP-diagnosed respiratory disease was occupational asthma, as this investigation tentatively suggests, and if a similar proportion of total self-reported work-related respiratory disease was also occupational asthma, then this would imply that there are about 5 times as many cases each year than estimated by SWORD.

Estimates of the proportion of cases of asthma attributed to workplace exposures from epidemiological studies suggest that the incidence of work-related asthma may be higher still. For example, a recent European population-based study estimated the incidence of work-related asthma (including irritant-induced occupational asthma) to be 25 to 30 cases per 100,000 people per year<sup>5</sup> (equivalent to 7500 to 9000 new cases per year). Other studies have estimated that occupational factors account for approximately 9-15% of asthma cases in adults of working age<sup>6</sup>. Applying these latter proportions to the estimated incidence of adult asthma in developed countries<sup>7</sup> would imply rates of work-related asthma in Great Britain even higher than based on the European study.



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An account of how the figures are used for statistical purposes can be found at [www.hse.gov.uk/statistics/sources.htm](http://www.hse.gov.uk/statistics/sources.htm).

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