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A STATISTICAL ANALYSIS OF DATA ON EXPOSURE TO XYLENE AT SELECTED WORKPLACES IN THE U.K.

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Abstract—The results of sampling surveys carried out by the Health and Safety Executive (HSE) during 1987–1988 at a random selection of 49 premises, where xylene was used, are reported. A total of 465 personal exposure samples were collected, from which 369 8-h time weighted average (TWA) exposures were calculated. These had a geometric mean (GM) of 2.2 ppm (GSD, ±2.9; range, <1–202 ppm). At that time HSE already had data for personal exposure to xylene in 122 premises collected between 1980 and 1987. These data yielded 511 8-h TWA personal exposures to xylene with a GM of 7.5 ppm (GSD, ±4.3; range, <1–610 ppm). These GMs are significantly different ($P<0.01$), suggesting that the pre-existing data were somewhat biased. This is discussed in the context of the use of these data in setting the Occupational Exposure Limits for xylene and the significance to standard setting of any bias in HSE data.

INTRODUCTION

Occupational Exposure Limits (OELs) need to protect workers' health adequately and yet reflect the needs of industry. To meet these apparently conflicting aims when setting OELs the Health and Safety Executive (HSE) needs, in addition to data on the toxicity of the substance in animals and man, information on:

—the actual exposure of workers to the substance(s) considered across U.K. industry;
—the relationship(s) between exposure, processes and work practices; and
—the potential for further control and the likely costs.

Such information should be objective, representative, reliable (in relation to fact, currency and quality of data) and unbiased. These are difficult standards to meet and the difficulty is exacerbated by the general paucity of exposure data of any quality, when set against the extent of use of many common substances.

As an example consider xylene. It is a multi-use industrial solvent for which there is difficulty in obtaining current and statistically representative exposure data.

Xylene occurs in petroleum deposits and exists in three isomeric forms (ortho-, para- and meta-dimethylbenzenes). All three isomers are available as pure products, but commercial xylene is a mixture with the meta-isomer predominating. Xylene is now mainly produced by catalytic reforming of petroleum feedstocks and chiefly blended to gasoline but a large quantity is separated by a range of methods into the individual isomers. These are used as intermediates in the production of a variety of products, including terephthalic acid, phthalic anhydride and xylene sulphonic acid salts (Ransley, 1984). Large quantities of xylene are also used as a solvent in a wide range of products, including surface coatings (the main solvent use), inks, pesticide formulations, adhesives, cleaning and degreasing agents, pharmaceutical and chemical processing, and DIY products.

Xylene is used in tens of thousands of premises in the U.K. in 40 industry sectors (Beaumont, 1993). Two examples of large sectors where xylene is commonly encountered are motor vehicle workshops (*ca* 30 000 sites) and in printing (*ca* 10 000 sites). A further indication of its scale of use is that, when in 1988, its OEL was being reviewed HSE knew of over 3000 proprietary products containing xylene. This was by no means an exhaustive list and it contained no fuels and few DIY products. Is it possible to obtain for standard setting data on exposure to, and control of, a substance of such widespread and varied usage?

When assembling a view of exposure to a given substance in U.K. workplaces for the purposes of standard setting, published information is rarely useful. Often it has not been obtained in the U.K. (so there may be process, work pattern and cultural differences), is old and, commonly, has data from only a few people. At least one of these factors is evident in various reviews of xylene use (e.g. NIOSH, 1975; WHO, 1981; Santodonato, 1985; Bonde, 1992) and in the many published NIOSH surveys of individual premises (Maloney and Grooms, 1987). Also, most published studies of a given substance tend to be related to its toxicity, so that although there may be data on animal and human toxicity (such as case reports) or on its epidemiology, there are rarely many exposure data. [For example, of the many references in the HSE Toxicity Review of xylene (Bell *et al.*, 1992) very few contain exposure data.]

To get a broad view of exposure to xylene in the U.K. it is helpful to divide the xylene industry into four categories.

(1) *Maufacture, distribution and sale of xylene and gasoline*

Most refinery processes occur in closed systems and essentially open air plant; this forms the basic method of exposure control. Exposures are likely to occur with liquid transfer processes, spillages and sampling, or when the plant integrity is breached, either purposefully or accidentally. Such exposures can be controlled by attention to plant design, the use of properly designed transfer systems, exhaust ventilated sampling points, permit to work systems, emergency procedures or provision of personal protective equipment. Companies in this sector usually have in-house exposure data which are made available for standard setting. In the particular case of gasoline, the results of an extensive European survey of exposure has been published (CONCAWE, 1987).

(2) *Manufacture of chemicals or pharmaceuticals*

The isolation and use of xylene as a precursor chemical, or as a reaction solvent, is usually carried out on a regular basis in large enclosed plant, or intermittently in batch reactors. For enclosed plant the problems and controls are similar to those described in (1) above. In the case of batch processes, liquid transfers, sampling, spillages, maintenance or product isolation (especially of solids) may all be areas of potential exposure. Most of these have well-known controls (such as non-manual transfer systems, ventilation at loading and unloading or ventilated sampling points). Again the industries involved often have in-house data.

(3) *Manufacture of formulated products*

This includes the production of paints, adhesives and cleaners, and is generally a batch process. The process often involves weighing, or dosing, individual components to mixers (blenders), mixing for some period, then unloading to packaging lines, or to some intermediate container, for transfer to separate packaging lines. The conditions will vary considerably from workplace to workplace with respect to the extent of manual or automatic processing, the load and frequency of work, the number of persons involved and so on. The presence or otherwise of control measures may show a similar wide variation. Larger companies are again likely to have in-house data.

(4) *Application of formulated products*

Xylene is generally present in end-user products as a solvent, hence its purposeful loss—from coatings and adhesives, for example—is often an integral part of the final process. In these circumstances, exposure to xylene and the opportunities for effective control can be very variable. As an example consider the major end-use, painting: this may be by brush, roller, dipping or various types of spraying; it may be manual, semi-automatic or automatic; it may be applied to small objects, or large structures; it may be continuous or sporadic; it may be external or internal to a building, or within a confined space; and ventilation control or RPE, or both, may be necessary. The largest proportion of workers exposed to xylene are in the end-user sector. With a few exceptions, such as the Paint Research Association's Survey of solvent exposure during painting (Cottrell *et al.*, 1985) most of the information on exposure to, and control of, solvents in this sector comes from HSE records.

So, for a view of exposure to xylene across industry, the sector with most workers, the widest selection of processes and premises and in which some of the highest exposures are likely, is also the one most dependent on HSE data.

It is for this reason that much of the information needed for setting OELs has been supplied by HSE from its own records; visit reports by occupational hygiene inspectors, which include sampling surveys, are particularly valuable in this respect. Some concern has been expressed, within HSE however, that its data may be biased since most of the reports relate to reactive visits either made in response to a request from an inspector, or as part of a series planned to gather information on a particular process or material. In either case the data could not be considered to be representative in the statistical sense.

Against this background HSE initiated pilot studies to investigate the feasibility of obtaining statistically acceptable samples of exposure data for the whole of U.K. industry for xylene and mercury. The development of these occupational exposure surveys has been described by Beaumont (1993). This paper describes and analyses the results from the xylene survey and compares them with the pre-existing, possibly biased, data, held on HSE databases. This is set in the context of the use of this data for setting OELs in the U.K.

PREMISES, PROCESSES AND PERSONNEL

Xylene survey

Forty-nine premises were visited. As described by Beaumont (1993), these were chosen randomly from a larger group of 210 premises, which in turn, were examples of premises using a limited number of processes. The premises ranged from those wholly devoted to work involving potential exposure to xylene, to those with segregated areas, or rooms, for the process concerned. Some were purpose built and some were adapted for the purpose.

At 41 (84%) of the 49 premises chosen, the main process was some type of surface coating. The processes seen were: spray painting (32 of 49); paint dipping (nine of 49); manual painting (six of 49); application of adhesives (two of 49); and restoration, or scenery painting (four of 49); more than one process was used in some premises.

The number of persons exposed to xylene, either directly (using the process) or indirectly (working nearby), ranged from 1 to 57. In 28 (57%) of the premises five or fewer workers were monitored.

Pre-existing HSE data

Details of surveys of exposure to xylene at 122 premises were extracted from copies of Occupational Hygiene Reports held in HSE files. Most were also on the HSE Occupational Hygiene Visit Reports (OHVR) database and some on the then developing HSE National Exposure Database (Burns and Beaumont, 1989). These surveys (1980–1987) had been made primarily because visiting factory inspectors had considered that there was a potential problem relating to xylene exposure, or as part of national planned visits to gather information on exposure at particular processes or plant.

At 77 (63%) of the premises the main process in use was some sort of coating process. The major processes were: spray painting (64 of 122); dipping/curtain coating (14 of 122); manual painting (one of 122); silk screen printing (22 of 122); other printing (two of 122); rubber processes (four of 122); histopathology (five of 122); and hand degreasing (four of 122). In most premises, processes other than the main one were carried out and mixing and cleaning occurred in many.

The number of persons surveyed at each site ranged from 1 to 22. In 89 (73%) of the premises five or fewer workers were monitored. (Since not all the personnel present were tested, this does not necessarily represent how many workers were exposed.)

SAMPLING AND ANALYSIS

Xylene survey

For the xylene survey the key elements of the sampling strategy were as follows:

- —as far as possible all potentially exposed personnel were included whether exposure was direct or indirect;
- —full 8-h shift samples were obtained, or sufficiently representative samples taken, to allow the calculation of 8-h TWA exposures;

—depending on the nature of the airborne xylene either, or both, active (pumped) and passive (diffusive) sampling techniques were used; and

—details of the premises, such as processes, ventilation (general and local), other control features, respiratory and other personal protective equipment, were recorded.

Air samples were obtained by equipping workers with either or both Perkin-Elmer diffusive tubes containing Tenax or NIOSH tubes containing charcoal through which air was drawn at a pre-set rate by belt-mounted Rotheroe and Mitchell C500 pumps. In each case the absorption tubes were fitted as close as possible to the workers breathing zone (that is, on lapels).

Samples obtained using diffusive sampling were subsequently analysed by thermal desorption to a gas chromatograph fitted with a flame ionization detector. Samples obtained by pumped sampling were analysed by solvent desorption followed by gas chromatography. In most cases xylene could be detected down to *ca* 0.1 ppm. (For details of sampling and analytical methods see HSE, 1987, 1989.)

Pre-existing HSE data

Because of the varying reasons for the collection of the data the sampling strategies were not uniform but the most general strategy was to:

—sample directly exposed workers;

—take sufficient samples to allow the 8-h TWA exposures to xylene to be estimated (though few full 8-h samples were taken);

—use active sampling (some passive sampling was used, but most of the surveys occurred before this method had been fully validated); and

—record only sufficient detail on premises, processes and control methods as was necessary for the intended audience. (In many cases the inspector who requested the survey was well acquainted with the premises and such detail was redundant.)

Sampling methods were as described previously, but low results were generally quoted as <1 ppm.

STATISTICAL ANALYSIS

A number of results in the pre-existing data were reported as ≤ 1 ppm and were treated as being 1 ppm. In the xylene survey results were quoted down to 0.01 ppm, with no value $\leq x$ ppm. Therefore, to allow a fairer comparison with the pre-existing data, these results were rounded to the nearest integer, with all values ≤ 1 ppm being considered as 1 ppm. The nature of the distribution of the 8-h TWA results was examined by drawing probability plots, and appropriate means and standard deviations, medians, modes, ranges and confidence intervals calculated.

Where significance tests have been used, these were standard single-sided t-tests performed on the log-normalized data after an F-test.

RESULTS

Xylene survey

A total of 465 personal air samples were taken; 224 (48%) from directly exposed workers and 241 (52%) from indirectly exposed workers. From these, 369 8-h TWA exposures were derived, 143 (39%) for directly exposed workers and 226 (61%) for indirectly exposed workers [Fig. 1(a)]. The 8-h TWAs were approximately log-normally distributed with a geometric mean of 2.2 ppm (GSD, ± 2.9; range, <1–202 ppm) and most exposures were low (51% ≤ 1 ppm; 84% ≤ 5 ppm; 90% ≤ 10 ppm; 98% ≤ 50 ppm). For directly exposed workers only, the GM was 3.7 ppm (GSD, ± 3.8; range, 1–202 ppm). The statistical data are summarized in Table 1.

Engineering controls were applied to reduce airborne solvent concentrations at 90% (44 of 49) of the premises, usually exhaust ventilated booths or enclosures. Dilution ventilation was used less frequently. It was reported that the controls were often poorly designed and poorly maintained.

Spray painting of large items was often carried out outside the ventilated area, probably because of difficulties in moving the items around the workshop. Because of this, and because of the relatively large quantities of paint applied, high concentrations of airborne xylene were often produced, but most painters spraying

(a)

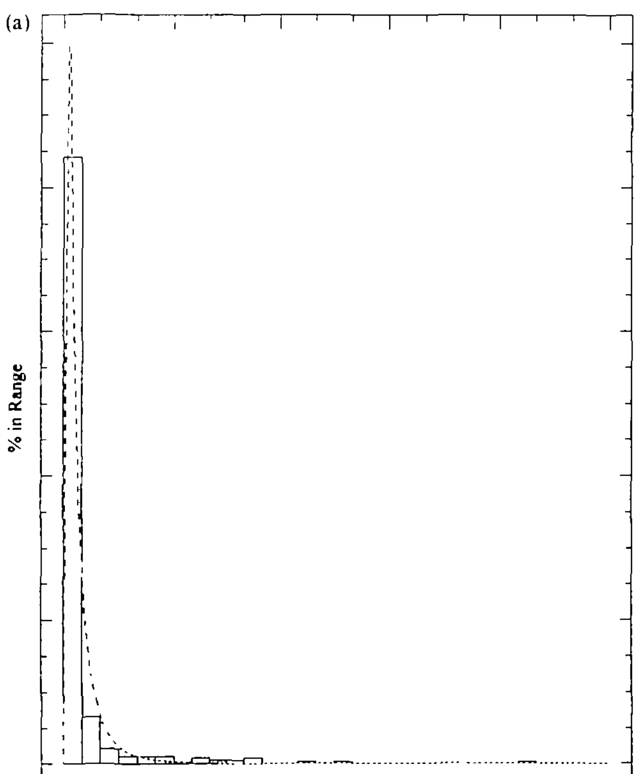

Fig. 1a. Distribution of personal exposures (8-h TWA) to xylene in the xylene survey.

Table 1. Summary of HSE data on exposure to xylene

Data	Pre-existing data	Xylene survey All	Xylene survey Directly exposed	All data
Number of premises	122	49	49	171
Number of visits	129	49	49	178
Number of premises:				
(a) spray painting	60 (49%)	32 (65%)	32 (65%)	92 (54%)
(b) coating/painting	74 (61%)	42 (85%)	42 (84%)	116 (68%)
Number of samples	890	465	224	1355
Number of 8-h TWAs	511	369	143	880
Range of exposures (ppm)	<1–610	<1–202	<1–202	<1–610
GM (ppm) ± GSD	7.5 ± 4.3	2.2 ± 2.9	3.7 ± 3.8	4.5 ± 4.3
Median	5	2	3	3
% of 8-h TWAs ≤ 100 ppm	94	99	99	96
% of 8-h TWAs ≤ 50 ppm	88	98	96	92
% of 8-h TWAs ≤ 10 ppm	62	90	86	74
% of 8-h TWAs ≤ 1 ppm	18	51	—	32

Note: as explained in the Statistical Analysis section the pre-existing and xylene survey data were made comparable by rounding all data from the latter and expressing results ≤1 ppm as 1 ppm. For the actual 8-h TWAs from the xylene survey the GM was 1.1 ppm ($n = 465$; GSD, ±6.2; range, 0.01–202 ppm; median, 1.2 ppm.)

large items used some form of respiratory protection (six of eight premises), ranging from air-fed visors to ori-nasal cartridge respirators. Respiratory protection was used much less often by workers spraying medium-sized and small items (eight of 24) and hardly ever by dipping process workers and manual painters.

In 36 of 49 (73%) of the premises exposure to mixtures of solvents occurred. Twenty-five solvents, other than xylene, were identified in air samples, the most common being toluene (23 of 49). At 11 of 49 (22%) of the premises xylene was not the major airborne contaminant, but at only one visit was exposure to mixed solvents close to or above the combined exposure limit calculated using the additive formula (HSE, 1995).

Pre-existing HSE data

Eight hundred and ninety personal exposure sample results were available, allowing the estimation of 511 8-h TWA exposures to xylene. Directly and indirectly exposed workers were not identified, but from the job descriptions given it was apparent that at least 471 (92%) of the 8-h TWAs referred to directly exposed workers and most of the other results probably also referred to directly exposed workers. The distribution of the 8-h TWAs is shown as a frequency histogram in Fig. 1(b). This was approximately log-normal with a GM of 7.5 ppm (GSD, ±4.3; range, <1–610 ppm). The exposures were relatively low when compared with the OEL of 100 ppm 8-h TWA (18% ≤1 ppm; 50% ≤5 ppm; 63% ≤10 ppm; 88% ≤50 ppm; 94% ≤100 ppm).

Of the 63 8-h TWA exposures above 50 ppm, 28 (44%) were associated with paint spraying of large objects, or the internal walls of the buildings and effective RPE was usually worn. Other processes where 8-h TWA were above 50 ppm were: rubber coating (five of 63); paint dipping (12 of 63); printing [gravure (six of 63); silk

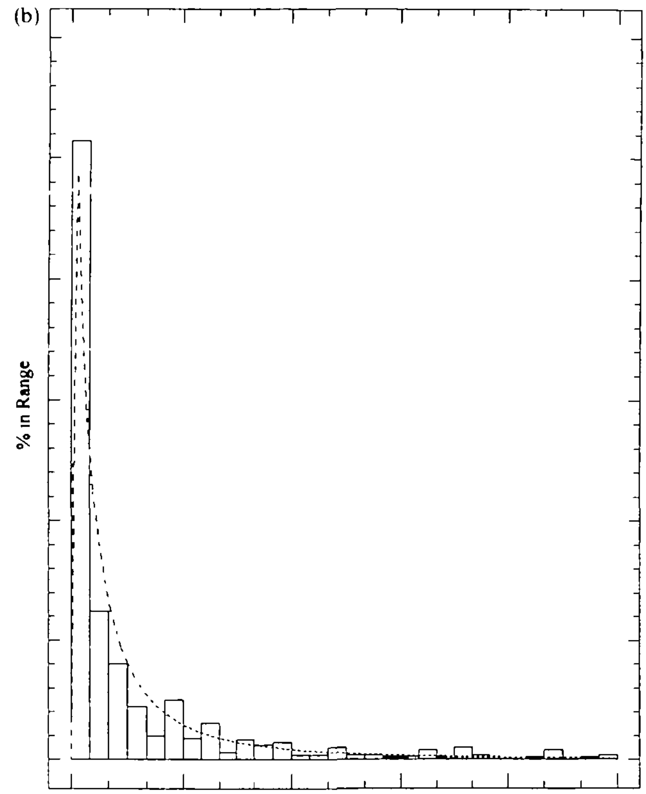

Fig. 1b. Distribution of personal exposures (8-h TWA) to xylene in the pre-existing HSE data.

screen (seven of 63)]; and paint manufacture (four of 63); six of 63 were associated with cleaning processes.

No details were recorded on engineering controls for eight (7%) of the premises and at four (3%) all the work was done outside. Control in the form of local exhaust ventilation (LEV) was applied at the main process in 53 (43%) of the premises. Of the remainder, 28 (23%) had general air conditioning, or some form of forced ventilation (roof or wall fans) and 29 (24%) had only natural ventilation (open doors and windows).

Some form of respiratory protection was worn by sprayers in 32 of 34 premises spraying large items. This ranged from air-fed RPE to (in one case) a totally inadequate mask designed for use against low hazard dusts. Some form of RPE was worn by sprayers in nine of 21 (43%) premises spraying medium to small objects.

In 99 of 122 (81%) of the premises, exposure to a mixture of airborne solvents was specifically noted. From the processes described it is likely that most of the others also involved exposure to several solvents. Some 46 other solvents were recorded with toluene being the most common co-pollutant. The additive formula factor was equalled or exceeded (maximum five times) at about 12 of 122 (*ca* 10%) premises. OELs for other solvents (methylethylketone, dichloromethane, methylisobutylketone and toluene) were exceeded in seven premises.

DISCUSSION

Exposure to substances hazardous to health in U.K. workplaces is regulated by *The Control of Substances Hazardous to Health Regulations*, 1994 (HMSO, 1994). The fundamental requirement of these regulations is that exposure to substances hazardous to health should be prevented, or, where this is not reasonably practicable, adequately controlled. The adequacy of control of exposure by inhalation can be judged by comparing exposure to U.K. OELs listed in the annually updated guidance note EH 40 (HSE, 1995). The U.K. has two types of OEL—Occupational Exposure Standards (OESs) and Maximum Exposure Limits (MELs). These are defined as follows (HSE, 1995):

An OES is the concentration of an airborne substance, averaged over a reference period, at which according to current knowledge, there is no evidence that it is likely to be injurious to employees if they are exposed by inhalation, day after day, to that concentration; and a MEL is the maximum concentration of an airborne substance, averaged over a reference period, to which employees may be exposed by inhalation under any circumstances.

The reference periods for both types of OEL are usually 8 h and 15 min.

OESs and MELs are set on the recommendation of the Advisory Committee on Toxic Substances (ACTS) following assessment, by the Working Group on the Assessment of Toxic Chemicals (WATCH), of the toxicological, epidemiological and other data. The committees have to consider, first, what *type* of limit is appropriate, OES or MEL, and second, at what *concentration* the limit should be set.

The possibility of setting an OES is analysed before considering a MEL. In making the decision the following criteria must be met (HSE, 1995).

Criterion 1—the available scientific evidence allows for the identification, with reasonable certainty, of a concentration averaged over a reference period, at which there is no indication that the substance is likely to be injurious to employees if they are exposed by inhalation day after day to that concentration; and

criterion 2— exposures to concentrations higher than that derived under criterion 1 and which could reasonably occur in practice, are unlikely to produce serious short- or long-term effects on health over the period of time it might reasonably be expected to take to identify and remedy the cause of excessive exposure; and

criterion 3— the available evidence indicates that compliance with the OES, as derived under criterion 1, is reasonably practicable.

For a substance to be assigned a MEL it must meet either of the following criteria:

criterion 4— the available evidence on the substance does not satisfy criterion 1 and/or 2 for an OES and exposure to the substance has, or is liable to have, serious health implications for workers; or

criterion 5— socio-economic factors indicate that although the substance meets criteria 1 and 2 for an OES, a numerically higher value is necessary if the controls associated with certain uses are to be regarded as reasonably practicable.

The criteria make it clear that the reasonable practicality of the OEL, and socio-economic factors associated with this, have to be taken into account in standard setting. Decisions on these aspects are crucially dependent on accurate and up-to-date information on exposure, processes, work practices and the potential for, and likely costs of, any further controls needed. Any bias in the exposure data available for standard setting thus has the potential to affect adversely the choice of OEL type and its value.

The rationale behind U.K. OELs is summarized in a series of Criteria Document Summaries; the summary for xylene was published in 1993 (HSE, 1993). In the U.K., xylene has OESs of 100 ppm (8-h TWA) and 150 ppm (15-min TWA). In the context of its use in setting this OEL the data collected here are interesting on two levels. The comparison of data from the xylene survey and the pre-existing HSE data gives an indication of bias in the latter, and analysis of the data gives an insight into xylene exposures in the user sector.

With respect to the first point, bias in the HSE exposure data, we must recognize when making comparisons using statistical techniques, that the data are not homogenous. This is reflected in the GSDs, which, for 8-h TWAs for directly exposed workers in the xylene survey and pre-existing data, are 3.8 and 4.3, respectively. Given the wide range of premises, processes and conditions covered, this is not surprising, and is an inevitable problem when trying to summarize such data. Even so, several features of the data described here suggest that the HSE information is somewhat biased. Consider the comparisons made below.

(1) A standard single-sided t-test shows that the GM for the data from the xylene survey (2.2 ppm) is significantly different ($P < 0.01$) from the GM for the pre-existing data (7.5 ppm).
(2) A fairer comparison might be between the GM for the directly exposed workers in the xylene survey (3.7 ppm) and the pre-existing data (7.5 ppm); these too are significantly different ($P < 0.01$).
(3) The 8-h TWA exposures in the xylene survey had a narrower range (< 1–202 ppm) than those in the pre-existing data (< 1–610 ppm).
(4) Two and 20% of the 8-h TWA exposures to xylene were greater than 50 ppm in the xylene survey and pre-existing data, respectively.
(5) Some form of LEV was in use in 90% of the premises in the xylene survey, but only 43% of the premises for which pre-existing data were available.
(6) One or more personal 8-h TWA exposures to xylene exceeded 100 ppm in only one factory in the xylene survey, but in 13 (10.7%) of the premises in the pre-existing data.
(7) For paint spraying, the pre-existing data had a distinct bias towards premises where large to medium-sized objects are sprayed. Thus in the pre-existing data 36 of 122 (30%) of the premises visited involved the spraying of large items; 16 of 122 (13%) medium-sized items; and eight of 122 (6.6%) small items. By comparison, premises spraying large, medium-sized or small items, in the xylene survey were six of 49 (12%), 16 of 49 (33%) and 10 of 49 (20.4%), respectively.

Thus the pre-existing HSE data for xylene did have some bias. The reason for this probably lies in the fact that inspectors have targeted premises where subjectively

Table 2. Summary of all 8-h TWA exposures to xylene measured during paint spraying

Data	Size of item sprayed*		
	Small	Medium	Large
Number of results	51	57	107
Median (ppm)	2	5	17
GM (ppm)	2.4	5.6	14.4
CI (95%)	1.9; 2.9	4.4; 7.1	11.2; 18.5
GSD	±2.4	±3.0	±4.8
Range (ppm)	1–33	1–72	1–610
% ≤100 ppm	100	100	87
% ≤50 ppm	100	97	75
% ≤10 ppm	94	77	44
% ≤1 ppm	35	11	6

*The division into small, medium and large workpieces was subjective. Small items included: decorative items, small engineering parts, polystyrene and wood mouldings, light fittings; medium included window and door frames, tyres, conveyor components, lockers and cabinets, 45 gallon drums, hot water cylinders; large included cars and lorries, aircraft, ships, buildings, bridges, structural steel and pipework, and shipping containers.

they would expect a problem with xylene exposure. One measure of this would be the absence of LEV. Hence 57% of the existing data was from premises with no LEV but only 10% of the random selection in the xylene survey. Similarly, HSE national surveys have tended to concentrate on potential problem industries, or processes, hence the high percentage (30%) of premises where large items were sprayed, compared with only 12% in the xylene survey.

The underlying HSE philosophy of targeting worst cases is understandable, but, if the example of xylene is typical, it can lead to some bias in the available exposure data. How important is this to standard setting?

The GMs of 2.2 and 7.5 ppm are both low when set in the context of an 8-h TWA OEL for xylene of 100 ppm. So in this case, the difference in the GMs is not important to standard setting, but a significant difference in the GMs from such data would become important if the GMs were closer to the existing OEL. In practice, the insight that the data gives into conditions in the user sector is more useful in considering reasonable practicability than summary statistics such as the GM, or the median. So, in this sense, the bias in HSE data is actually useful for standard setting, since it is likely to reveal worst case situations. (See for instance the information on spray-painting different sized objects in Table 2.) Analysis of these can give much information about the problems of exposure control, the opportunities for improving conditions and the likely costs. In the case of xylene about 45% of 8-h TWAs above the OEL were associated with the spray painting of large items, or the inside walls of buildings, and control of exposure by methods other than respiratory protection was difficult. The other results above 100 ppm were associated with processes (milling, cleaning, printing and paint dipping) for which control methods are available, but were not being applied.

Combination and knowledgeable analysis of all the available data on xylene exposure could therefore give a reasonable view of the situation and opportunities for control, even though the data may not be strictly representative in the statistical sense. However, any bias could be much more significant when the amount of information is limited.

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