

## Methodology

The sections of this document:

- set out the definition of the statistics;
- provide examples of volatile substances which have been reported for deaths registered in Scotland;
- explain why some of these deaths are also counted as ‘drug-related’; and
- give some reasons why these figures may over-estimate (by, probably, under 20%) the number of deaths that were due to the abuse of volatile substances.

## The Definition of the Statistics

The definition which is used for these statistics was introduced by the Office for National Statistics (ONS) for [“Deaths related to volatile substances and helium in Great Britain: 2001 to 2016 registrations”](#), which ONS published on 26 March 2018. National Records of Scotland (NRS) provided ONS with the numbers of such deaths that were registered in Scotland.

Deaths are counted as being due to volatile substance abuse (or helium, as appropriate) if both the following conditions are satisfied:

- at least one volatile substance (or helium) was mentioned on the death certificate or was reported, by a pathologist or a procurator fiscal, as being present in the body; and
- the underlying cause of death was one of those which is listed in the table which appears below.

**International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) codes which are used to identify deaths which will be counted if a volatile substance or helium was mentioned on the death certificate or reported to be present in the body**

<b>Description</b>	<b>ICD-10 Codes</b>
Mental and behavioural disorders due to psychoactive substance use (excluding tobacco)	F11 – F16, F18- F19
Accidental poisoning by and exposure to noxious substances (excluding alcohol)	X40 – X44, X46 – X49

Intentional self-harm (excluding alcohol)	X60 – X64, X66 – X69
Assault	X85 – X90
Event of undetermined intent (excluding alcohol)	Y10 – Y14, Y16 – Y19

Information about how NRS collects and processes data on all deaths registered in Scotland (including how NRS allocates codes for the underlying causes of deaths) is available from the [Deaths – Background Information](#) section of this website.

### **Examples of volatile substances**

The following are the volatile substances which were each believed to have been implicated in, or to have contributed to, the cause of at least half a dozen of the volatile substance abuse deaths which were registered in Scotland between 2000 and 2017:

- butane;
- isobutane;
- lighter fluid / fuel; and
- propane.

Some other volatile substances (chloroform, dimethyl ether, isoflurane, nitrous oxide and sevoflurane) were each implicated in two or three deaths in that period, with more (not listed here) each implicated in one death. There were also ‘volatile substance abuse’ deaths for which no particular substance was mentioned: for example, the death certificate referred to ‘hydrocarbon’, ‘solvent’ or ‘volatile substance’, but did not specify any particular one, and NRS was not subsequently given (e.g., by a pathologist or a procurator fiscal) any further information about the substances which were involved in the death.

### **Some of these deaths are also counted as ‘drug-related’**

Some deaths involve both volatile substances and drugs, and so may be counted in both these statistics and the figures for drug-related deaths. Examples are deaths for which the causes were given as:

- ‘methadone, etizolam and volatile substance intoxication’;
- ‘combined drug intoxication (heroin, methadone, etizolam, amphetamine and volatile substances)’;
- ‘adverse effects of methadone, butane, propane, etizolam and phenazepam’;
- ‘heroin, cocaine and butane gas toxicity’; and

- 'combined toxic effects of methadone and butane'.

NRS counts all the above deaths as drug-related, in terms of its standard definition, because, in each case, it was informed that at least one substance which was controlled under the Misuse of Drugs Act (e.g. cocaine, heroin, methadone) was present in the body.

More of the deaths which are counted in these statistics are also counted in the figures for drug-related deaths on the basis of the ONS 'wide' definition. This is because the poisoning deaths which are counted by the ONS 'wide' definition are not restricted solely to cases where a drug which was controlled under the Misuse of Drugs Act was present in the body. For example, helium is not a controlled substance, so deaths due to poisoning by helium alone would not be counted as drug-related in terms of NRS's standard definition. However, as the ICD-10 rules specify that deaths due to poisoning by helium alone should be coded as X44, X64, X85 or Y14 (with the precise code depending upon what, if any, intent there was), which are all codes that are included in the ONS 'wide' definition, all such deaths are counted in the latter definition.

### **These figures may over-estimate the number of deaths which were due to the abuse of volatile substances**

There are a number of reasons why figures produced using the above definition may over-estimate (by, probably, under 20%) the number of deaths which were due to the abuse of volatile substances. In the first two cases, the extent of over-estimation is likely to be slight (perhaps around 4% and 1%, respectively); in the third, it cannot be quantified precisely, but seems likely to be at most 15%

First, a small proportion of the deaths which involve volatile substances may not actually be due to the abuse of volatile substances (e.g. a person who died as a result of the toxic effect of a volatile substance while using it, for a purpose for which it was intended, in a very poorly-ventilated area). The information that NRS receives does not contain enough detail about the circumstances of each death to allow NRS to exclude such deaths from these figures. However, ONS's publication states that 4% of volatile substance deaths in England and Wales would not be deemed due to substance abuse, so it seems likely that the extent of such over-estimation in Scotland would be small.

Second, in the case of some of the deaths for which volatile substances were reported as being present, it was thought that the volatile substance did not actually cause (or contribute to) the death. An example is a death for which the cause was given as "methadone intoxication" and the pathologist reported that butane was present in the body but was not considered to have had any direct contribution to the death. In that case, it appears that death was due solely to an overdose of methadone (the person may have abused butane, but the pathologist did not think that it was a factor in the death). However, because butane was reported to be present in the body, that death falls within ONS's definition of volatile substance abuse deaths, and so is counted in these figures. The tables give the numbers of deaths for which a volatile substance (or helium) was implicated in, or contributed to, the cause of the death. The figures show that 195 of the 197 volatile substance

abuse deaths that were registered from 2000 to 2017 had at least one volatile substance implicated in, or contributing to, the cause of death. It follows that the extent of any over-estimation is likely to be only about 1%.

Third, in cases where a volatile substance was implicated in, or contributed to, the cause of death along with other substances (as in the examples given earlier), it may be that the person would have died from the effects of those substances, even if he/she had not abused a volatile substance. That seems particularly credible in cases where the person had taken several other substances (as in some of those examples). As, NRS's database does not include any information about (e.g.) how much of each substance was involved, and the potential lethality of taking certain substances together, there is no way in which the likely extent of any such over-estimation can be quantified precisely. However, as 31 out of the total of 197 volatile substance abuse deaths that were registered from 2000 to 2017 were also counted as drug-related deaths (in terms of NRS's standard definition), it seems likely that that extent of any over-estimation is at most 15%.