

Methodology

The different parts of this document provide information on:

- a) How accidental deaths are identified;
- b) Changes to the collection of the data during 2009;
- c) Changes to the coding of the data from the beginning of 2011;
- d) how the statistics for 1979 to 1999 were produced, and why they differ from previously- published figures for those years;
- e) 5-year moving annual averages, and the likely ranges of values around the moving annual average;
- f) Categories of causes of accidental deaths.

a) How accidental deaths are identified

The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10), which National Records of Scotland (NRS) uses to code the causes of deaths, has many different categories of external causes of morbidity and mortality (i.e. causes which are external to the person - e.g. accidents and acts of violence). ICD-10 groups these as follows: (i) accidents; (ii) intentional self-harm; (iii) assault; (iv) events of undetermined intent; (v) legal intervention and operations of war; (vi) complications of medical and surgical care; (vii) sequelae of external causes of morbidity and mortality; and (viii) supplementary factors related to causes of morbidity and mortality classified elsewhere.

The deaths which are counted, for the purpose of these statistics, as accidental are the ones for which the underlying cause of the death was given one of the following ICD-10 codes:

- V01 to X59 - accidents;
- Y85 - sequelae of transport accidents; and
- Y86 - sequelae of other accidents.

The cause of a death is classified, for statistical purposes, as accidental in cases where NRS believes this to be appropriate, on the basis of what was recorded on the death certificate or of information from other official sources (such as the Crown Office and Procurator Fiscal Service [COPFS], a pathologist, or the doctor who certified the death). For example, COPFS may indicate that a death which it has investigated is believed to have been the result of an accident. If NRS has no information about any intent behind the act that caused a death, NRS will count it as

an accident (rather than as an 'event of undetermined intent') if it was the result of (e.g.) a transport vehicle crash, a fall in a place that seems unlikely to be a venue for suicide (such as down stairs), a fracture for which no cause was specified but which seems likely to be due to a fall (in cases where the person was aged 75 or over), drowning while diving or having fallen from a boat, or hanging (in cases where the person was aged 15 or under).

In order to be of use for the purpose of statistical classification, information about any intent behind a death must reach NRS before it freezes its statistical database for the calendar year, in the spring of the following year (e.g. NRS froze its statistical database for 2017 at the end of April 2018). There will be deaths for which information that subsequently comes to light would have resulted in a different classification, had NRS been informed before it froze the statistical database. NRS does not revise its statistical classification of deaths after it has frozen its database, because that would change the figures whenever new evidence came to light, possibly many years later. These statistics will underestimate the true number of accidental deaths because, at the time that NRS froze the data for the year, some deaths that were, in fact, accidental would have been classified as due to events of undetermined intent as NRS did not then know whether they were the result of an accident, an assault or intentional self-harm.

b) Changes to the collection of the data during 2009

In 2009, there was a change in the procedure used by COPFS to tell NRS which deaths should be counted as suicides, and this could also have affected the number of deaths which NRS counts as accidental.

Since then, there has been a large increase in the percentage of poisoning deaths described as accidental, and a fall in those described as being due to events of undetermined intent. This has had a slight (in percentage terms) effect on recent years' numbers of accidental deaths. Procurators Fiscal (PFs) have a responsibility to investigate all sudden, suspicious, accidental and unexplained deaths. How NRS classifies the nature of a traumatic or suspicious death registered in Scotland is usually informed by the view of the PF who, at the conclusion of the investigation, will notify NRS as to whether such a reported death was due to an accident, assault, intentional self-harm or undetermined intent. The last category should be specified in cases "where the evidence is insufficient for the PF to form a view, on the balance of probabilities, as to which of the other categories is appropriate".

The current procedure is described briefly in the [methodology document](#) for the probable suicide statistics . This document also contains a separate note on '[How the statistics may have been affected by changes in the views of Procurators Fiscal on the nature of deaths](#)'.

c) Changes to the coding of the data from the beginning of 2011

At the start of 2011, NRS implemented a World Health Organisation update to the ICD, as a result of which drug abuse deaths from acute intoxication that would previously have been counted under mental and behavioural disorders are now counted under poisoning - so some of them will be counted as accidental deaths. Examples of these cases are people who were known or suspected habitual drug abusers, for whom the cause of death was certified as 'adverse effects of heroin', 'methadone toxicity' or 'morphine intoxication'. Under the new coding rules, if NRS was informed that the overdose was believed to be accidental, such deaths are coded as being due to 'accidental poisoning by ...', whereas under the old coding rules they would have been counted as being due to 'mental and behavioural disorders due to use of ...'. Therefore, it is assumed that (for 2011 onwards) deaths which have both (i) the underlying cause coded as 'X40-X49 Accidental poisoning ...' and (ii) a 'drug abuse' (F11 to F19) code used for one of the factors that contributed to the death would not have been counted as accidental under the old coding rules.

The change to the coding rules also affected deaths for which the cause was given as 'acute alcohol intoxication'. Such deaths are now coded as being due to 'accidental poisoning by alcohol' whereas under the old coding rules they would have been counted as being due to 'mental and behavioural disorders due to use of alcohol'. As there were hardly any deaths for which the underlying cause was coded 'X45 - 'accidental poisoning by alcohol' in the years from 2000 to 2010, inclusive, it is assumed that (for 2011 onwards) deaths for which the underlying cause is coded 'X45' would not have been counted as accidental under the old coding rules.

A note on the changes to the way in which causes of death are coded is available on the [Death Certificates and Coding Causes of Death](#) page of our website.

d) How the statistics for 1979 to 1999 were produced, and why they differ from previously-published figures for those years

NRS has used ICD-10 codes for the causes of all deaths that have been registered since the start of 2000. ICD-9 was used for deaths registered from 1979 to 1999. There are some marked differences between the structures of ICD-9 and ICD-10, and between the categories that have been included under the heading of 'accidental deaths' in the statistics that have been published at different times.

In order to provide a consistent series, the deaths which are counted as 'accidental' (for the purpose of the figures for 1979 to 1999 that are given here) are those for which the underlying cause had one of the following ICD-9 codes:

- E800 to E869; and
- E880 to E929.

These are the ICD-9 codes which cover the same categories of causes of death as are included in the 'accidental deaths' part of ICD-10. Therefore, using these ICD-9 codes gives figures which are on the same basis as the ones that NRS (and, previously, GROS) has produced for 2000 onwards.

Previously, other bases have been used to produce what were described, at the time, as statistics of accidental deaths for years in the period from 1979 to 1999. Those figures actually cover different categories of the causes of death. For example:

- several tables in the Registrar General's Annual Report for 1999 gave figures for deaths from 'accidents and adverse effects', which covered ICD-9 codes E800-E949. They included all the causes of death that ICD-10 has under 'complications of medical and surgical care' (the ones whose ICD-9 codes are E870-E879 and E930-E949, and whose ICD-10 codes are Y40-Y84), so their coverage was much wider than that of the 'accidental death' figures for 2000 onwards.
- Table 6.1 in the Registrar General's Annual Report for 2000 gave death figures for 1999 (and some earlier years) which were described as 'accidents' and which covered ICD-9 codes E800-E929. These included some of the causes of death that ICD-10 has under 'complications of medical and surgical care' (the ones whose ICD-9 codes are E870-E879, and whose ICD-10 codes are Y60-Y84), so their coverage was wider than that of the 'accidental death' figures for 2000 onwards.

It follows that the statistics of 'accidental deaths' for 1999 and earlier years that were published previously were on a different basis from those that are given here.

e) 5-year moving annual averages and likely ranges of values around the moving annual average

The number of accidental deaths can fluctuate markedly from year to year, particularly for the smaller Health Board and Council areas. Therefore, all the tables include 5-year moving annual averages, as these should provide a better indication of the overall long-term trend than the figures for the individual years.

As well as the figures for Scotland as a whole and the 5-year moving annual average, [Chart 1](#) also shows the likely range of values around the moving annual average. This likely range of statistical variability in the figures is estimated by assuming that the numbers represent the outcome of a Poisson process, with the underlying rate of occurrence in each year being the same as the value of the 5-year moving annual average which is centred on that year. 'Upper' and 'lower' boundaries of an approximate '95% confidence interval' around the moving annual average are calculated by adding/subtracting twice the standard deviation. (For a Poisson distribution, the mean and the variance are the same, so the standard deviation is simply the square root of the moving average.)

In the years up to the mid-1990s, the long-term trend was clearly downwards, so the moving annual average fell fairly steadily. As a result, the moving annual average would usually be higher than the underlying rate of occurrence of the time, so many of the figures for individual years were around the lower boundary of the likely range of values. However, with effect from the mid-1990s (when the moving annual average 'levelled off'), there appears to have been very little subsequent change in the underlying rate of occurrence of accidental deaths. As a result, in the period from

1995 to 2011 (inclusive), almost all the year-to-year fluctuations in the numbers have been within the likely range of values: only one of the 17 years had a figure which was outwith that range, which is consistent with what one would predict, based on statistical theory (as only about 5% of observations would be expected to fall outwith an approximate 95% confidence interval).

f) Categories of Causes of Accidental Deaths

This section describes how the categories of the causes of accidental deaths that appear in [Table 2](#) are defined in terms of the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10), and provides notes on some of them.

More detailed breakdowns of the numbers of deaths in each category (by age, sex and specific cause of death) in a given year are available from that year's edition of Vital Events Reference Table 6.4, which can be found within the [Vital Events Reference Tables](#) section of this website. For example, that table provides the numbers of deaths separately for each of several different types of transport accident (e.g. 'pedestrian injured in collision with car'), and for each of several different types of fall (but only to the extent that National Records of Scotland (NRS) has received the information that it needs to distinguish between the different types).

Transport accidents (ICD-10 codes V01-V99) - mainly road accidents, but includes deaths occurring in Scotland in accidents involving other forms of transport. In some cases, the information that NRS obtains, from the death certificate or elsewhere, does not indicate the type of transport accident or how the person was involved. For example, NRS may be told that the person was injured in a road accident, but not the type(s) of vehicle that were involved or whether the person was a pedestrian or in (say) a car. The deaths from accidents involving road vehicles that are included here may differ slightly from those that are counted in Transport Scotland's road accident statistics, for a number of reasons which include (a) NRS's figures are based on the date on which the death was registered, whereas Transport Scotland's are based on when the accident occurred; and (b) NRS's figures include deaths caused by accidents (e.g.) on private roads and drives, and in car parks and farmyards, whereas Transport Scotland counts only deaths from accidents which occurred on public roads.

Falls (ICD-10 codes W00-W19) - in only about 1-in-7 of these cases (on average) does the information that NRS obtains, from the death certificate or elsewhere, indicate the type of fall (e.g. on or from stairs or steps, or on the same level involving ice or snow). In most cases, the death certificate refers only to a 'all' or to an injury which is likely to be the result of a fall (such as 'fractured neck of femur') - if the latter, and the deceased was aged 75 or over, NRS assumes that the injury is the result of an accidental fall, and counts the death accordingly (following advice from its Medical Adviser).

Drowning and submersion (ICD-10 codes W65-W74) - includes drowning in a bath as well as drowning outdoors.

Other accidental threats to breathing (ICD-10 codes W75-W84) - includes inhalation of gastric contents, choking on food and other accidental obstruction of the respiratory tract.

Exposure to smoke, fire and flames (ICD-10 codes X00-X09) - includes deaths caused by the collapse of, or jumping or falling from, a burning building or structure.

Exposure to forces of nature (ICD-10 codes X30-X39) - most of these deaths are the result of exposure to excessive natural cold.

Poisoning by, and exposure to, noxious substances (ICD-10 codes X40-X49) - there is a break in the series between 2010 and 2011, due to a change in the rules for coding 'drug abuse' deaths from 'acute intoxication', and 'alcohol intoxication' deaths, as explained in the [Changes to the coding of the data from the beginning of 2011](#) section of this document.

Other specified causes of death (ICD-10 codes W20-W64,W85-W99,X10-X29,X50-X58) - includes accidents involving falling objects, machinery, firearms, machinery, household appliances, and water and air transport.

Sequelae of accidents (ICD-10 codes Y85-Y86) - this means the late effects of accidents, a year or more afterwards. An example would be when serious injuries sustained in a road accident cause other medical problems and lead eventually to death.

Exposure to unspecified factor (ICD-10 code X59) - these are accidental deaths for which the death certificate refers to an injury (e.g. 'head injury', 'fractured pelvis' or 'spinal fractures'), and any consequential medical problems, but does not indicate the kind of accident that had occurred, and NRS has not received any information about it from other sources. When an injury could be the result of (e.g.) an assault, a road accident or a fall from a height, NRS cannot count the death against a specific cause (unless the deceased's age is such that NRS can assume that it was due to a fall).