Causes of death statistics - methodology

Statistics Explained

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This background article explains causes of death statistics, a data set that provides information on mortality patterns in the European Union (EU) .

The article provides information on the main features of these data, their historical development and current legal basis, some main methodological features, information concerning data quality and finally an overview of the uses of the data that come from this source.

This article is one of a set of background articles concerning the methodology for the production of health statistics in the EU and accompanies a number of statistical articles which make up an online publication on health statistics .

Main features

Statistical objectives

Statistics on causes of death , which are among the oldest medical statistics available, provide information on developments over time in the underlying causes of death and also highlight geographical differences. Statistics on causes of death play a key role in the general information system relating to the state of health. They may be used to determine which preventive and medical-curative measures or which investments in research might increase the life expectancy of the population.

As there is a general lack of comprehensive European morbidity statistics, data on causes of death are often used as a tool for evaluating health systems in the EU and may also be employed for evidence-based health policy.

Scope of the data

All deaths in the population are identified by the underlying cause of death, in other words 'the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury' (a definition adopted by the World Health Assembly). By relating all deaths in the population to an underlying cause of death, the risks associated with death from a range of specific diseases and other causes can be assessed.

The statistical population includes residents and non-residents. Resident means 'usual resident' in the place where a person normally spends the daily period of rest, regardless of temporary absences for purposes of recreation, holidays, visits to friends and relatives, business, medical treatment or religious pilgrimage. However, national legal requirements as well as national practices concerning the registration of residents dying abroad and domestic deaths of non-residents are not yet fully harmonised across Europe.

Development and legal basis

Development and history

Eurostat began collecting and disseminating causes of deaths data in 1994.

Up until 2010, the EU Member States provided data on the basis of a gentlemen's agreement, in other words, without a legal obligation. Specifications common with the World Health Organisation (WHO) were used in the data collection up to 2010, although Eurostat also collected regional data. Since 2011, these data have been provided under a specific legal basis.

Legal basis

A Regulation on Community statistics on public health and health and safety at work (EC) No 1338/2008 was adopted by the European Parliament and the Council in December 2008. Within the context of this Regulation, a European Commission Regulation 328/2011 on statistics on causes of death was adopted in April 2011 specifying in detail the variables, analysis (breakdowns) and metadata that EU Member States must deliver. The first data submitted according to the new legal bases were for reference year 2011.

Methodology

Main sources

Statistics on the causes of death are based on two pillars:

1. medical information contained on death certificates , which may be used as a basis for ascertaining the cause of death; and

2. the coding of causes of death following the International Statistical Classification of Diseases and Related Health Problems (ICD).

The medical certification of death is an obligation in all Member States. The information provided in the medical certificate is used to code the cause of death.

For calculating crude and standardised death rates , the annual average population available in Eurostat's demography database is used.

Statistical units

The statistical unit for causes of death statistics is the individual (the deceased person).

Deaths are reported by certifiers , in most cases a physician .

Main concepts and definitions

Reference period: calendar year.

Crude death rate

The crude death rate describes mortality in relation to the total population. Expressed in deaths per 100 000 inhabitants, it is calculated as the number of deaths recorded in the population for a given period divided by population in the same period and then multiplied by 100 000.

Crude death rates are calculated for 5-year age groups. At this level of detail, comparisons between countries and regions are meaningful. The crude death rate for the total population (all ages) however, is a weighted average of the age-specific mortality rates . The weighting factor is the age distribution of the population whose mortality is being observed. Thus, the population structure strongly influences this indicator for broad age classes. In a relatively 'old' population, there will be more deaths than in a relatively 'young' population because mortality is higher among older age groups.

Standard population and standardised death rates

For statistics concerning causes of death one of the key methods to control for different age distributions among populations and over time is age standardisation: a standard population is used to produce standardised death rates to compare mortality rates. As most causes of death vary significantly with people's age and sex, the use of standardised death rates improves comparability over time and allows rates for different geographical areas to be compared independently from the population's age structure . The standardised death rate is a weighted average of age-specific mortality rates where the weighting factor is the age distribution of a standard reference population: Eurostat uses the European standard population . Standardised death rates are calculated for the age group 0–64 ('premature death'), 65 and over, and for the total of all ages (the whole population).

The current European standard population is a revision of the former European standard population taking into account population projections that were made in 2010 for the period 2011–30. The current European standard population is an unweighted average of the individual populations of EU-27 plus EFTA countries in each 5-year age band (with the exception of under 5 and the highest age-group of 95 and over). It has been in use since the summer of 2013.

Infant, foetal, perinatal and neonatal mortality rates

- Infant mortality rates are calculated as the ratio of the number of deaths of children under one year of age to the number of live births. These value are expressed per 1 000 live births.

- The neonatal mortality rate is calculated as the ratio of the number of deaths at age day 0 up to (and including) day 27 compared with the number of live births. The value is expressed per 1 000 live births.

- The early neonatal mortality rate is calculated as the ratio of the number of deaths at age day 0 up to (and including) day 6 compared with the number of live births. The value is expressed per 1 000 live births.

- The late foetal mortality rate is calculated as the ratio of the number of stillbirths to the number of births . The value is expressed per 1 000 births.

- The perinatal mortality rate is calculated as the number of stillbirths plus deaths at age day 0 up to (and including) day 6 divided by the number of births. The value is expressed per 1 000 births.

In addition to the total number of stillbirths, two detailed groups of late foetal death are displayed.

- group 1 records stillbirths with a birth weight from 500 to 999 g or (when birth weight does not apply) gestational age from 22 to 27 weeks, or (when neither of the two applies) crown–heel length from 25 to 34 cm;

- group 2 reports stillbirths with a birth weight of 1 000 g and more or (when birth weight does not apply) gestational age after 27 completed weeks, or (when neither of the two applies) crown–heel length of 35 cm or more.

The sum of the two groups is not necessarily equal to the total number of stillbirths, as stillbirths with unknown birth weight, gestational age, or crown–heel length are not reported in either of the two groups but are recorded in the total number of stillbirths.

Main classifications

Causes of death are classified by the 86 causes in the European shortlist which is based on the International Statistical Classification of Diseases and Related Health Problems . EU Member States submit data to Eurostat either using this short list or the 4-digit level of the full classification.

Further methodological information

Methodological notes for individual countries are available in the annexes to the metadata file for causes of death statistics .

Further information on the national coding practices is also available.

Data quality

The validity and reliability of statistics on the causes of death rely, to some degree, on the quality of the data provided by certifying physicians. Inaccuracies may result for several reasons, including:

- errors when issuing the death certificate;

- problems associated with the medical diagnosis;

- the selection of the main cause of death;

- the coding of the cause of death.

Sometimes there is ambiguity in the main condition : besides the illness leading directly to death, the medical data on the death certificate should also contain a causal chain linked to the suffering of the deceased. Other substantial health conditions may be indicated, which did not have a link to the illness leading directly to death, but may have unfavourably affected the course of a disease and thus contributed to the fatal outcome. Indeed, there is sometimes criticism that the coding of only one illness as a cause of death appears more and more unrealistic in view of increasing life expectancy and associated changes in morbidity. For the majority of the deceased who were aged 65 years or older, the selection of just one out of a number of possible causes of death may be difficult and could be misleading. For this reason, some of the EU Member States have started to consider multiple-cause coding. Eurostat has supported EU Member States in their efforts to develop a joint automated coding system called IRIS for the improvement and better comparability of causes of death data across Europe.

Greece is currently using the ninth (rather than the 10th) version of the International Statistical Classification of Diseases and Related Health Problems. Furthermore, not all EU Member States apply the recommended updates.

Due to the fact that the data collection in 2011 was the first undertaken with a legal basis (which also introduced changes in the requested variables and breakdowns), the data starting from 2011 are not always comparable with the data for the period 1994–2010. This is in part due to the potentially different underlying populations as well as different groupings of causes of deaths.

==Data dissemination

Published data

Statistical data are available in various formats. Statistics Explained articles and publications provide data and analysis, while Eurobase provides a set of multi-dimensional databases and information in a simpler format as main tables .

Causes of death statistics are analysed by cause of death, age, sex and residency.

Causes of death are classified according to the 86 causes of death as found in the 'European shortlist' which is based on the International Statistical Classification of Diseases and Related Health Problems.

Concerning age, data are generally presented for 5-year age groups for the number of deaths and for crude death rates. Whenever data is considered as confidential, the data for such age groups are grouped with other age groups. In practice, this issue mainly occurs for age groups covering younger people, for example in the age groups within the range of 0 to 14 years. For standardised death rates, a distinction is made between i) persons aged less than 65 years and ii) those aged 65 years and over.

Concerning residency, most data are provided for two different populations:

1. deaths among residents of an EU Member State (or non-member country);

2. all deaths (regardless of residency) reported in an EU Member State (or non-member country).

The absolute numbers of deaths are published for i) deaths among residents and ii) all deaths reported in an EU Member State (or non-member country). Crude deaths rates and standardised deaths rates are calculated using data on deaths among residents.

For some data on stillbirths and neonatal deaths additional breakdowns are provided for the age of the mother.

Time coverage

All data are annual. For regional data, 3-year averages are also calculated from the annual data in order to eliminate outliers.

Time series for most EU Member States and EFTA countries start in 1994. Shorter series are available for Bulgaria (from 1995), Latvia and Slovakia (1996), Cyprus, Poland and Romania (1999) and Liechtenstein (2010).

As noted, above, due to the fact that the data collection in 2011 was the first with a legal basis the data starting from 2011 are not always comparable with the data for the period 1994–2010. Equally, 3-year averages will not be calculated until data are available for the period 2011 to 2013.

The time series for data concerning stillbirths starts in 2011.

Geographical coverage

As well as data for the EU Member States, Eurostat publishes data for the EFTA countries and some candidate countries .

Alongside the national data, regional data are also available for most EU Member States, normally at levels 1 and 2 of the NUTS 2010 classification. For 2011, regional data are currently presented only for crude death rates. It is expected that standardised death rates will be made available when a time series for three consecutive reference periods has been collected, allowing 3-year averages to be compiled: the first such data to be released will cover the period 2011–13.

Units

Causes of death data are presented in terms of the number of deaths, as crude death rates and using standardised death rates.

Data on infant and peri-neonatal deaths are presented in terms of the number of deaths and as mortality rates (per 1 000 births or per 1 000 live births). Infant mortality data are also presented with an analysis by age showing the proportion of deaths in each age group as a percentage of all deaths of infants.

Timing of data release

Eurostat asks for the submission of final data for the year N at N + 24 months, for example data for the year 2013 are requested to be provided by the end of December 2015.

See also

Online publications

- Health in the European Union – facts and figures
- Disability statistics — online publication

Causes of death statistical articles

- Causes of death
- Causes of death statistics by age group
- Healthy life years statistics
- Mortality and life expectancy statistics

General health statistics articles

- Health statistics introduced
- Health statistics at regional level

Main tables

- Health (t_hlth) , see:

Causes of death (t_hlth_cdeath)

Database

- Health (hlth) , see:

Causes of death] (hlth_cdeath)

Dedicated section

- Health

Publications

- 1 in 4 deaths caused by cancer in the EU28 — Lung cancer main fatal cancer — News release 179/2014
- Causes of death in the EU-28 in 2010 — Circulatory diseases main cause of death for men and women aged 65 years and over — News release 178/2013
- Circulatory diseases — Main causes of death for persons aged 65 and more in Europe, 2009 — Statistics in focus 7/2012
- Who dies of what in Europe before the age of 65 — Statistics in focus 67/2009
- Causes of death in the EU — Statistics in focus 10/2006
- Health statistics — Atlas on mortality in the European Union

Methodology

- Causes of death statistics (ESMS metadata file — hlth_cdeath_esms)

External links

- European Commission — Directorate-General for Health and Food Safety — Mortality
- European Commission — Directorate-General for Health and Food Safety — Public health — Indicators — Policy
- European Commission — Directorate-General for Health and Food Safety — Public health — ECHI — European Core Health Indicators
- International Statistical Classification of Diseases and Related Health Problems 10th Revision

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