

Causes of death in the EU

Eurostat has been collecting and disseminating mortality data by cause for the Member States of the European Union at national and regional (NUTS 2) level since 1994. This publication presents the results of an analysis of these figures for the 25 Member States over the period 2001-2003. It also reports on the death of European residents during the tsunami of December 2004.

Some of the main results at European level:

With most people nowadays dying old, **diseases of the circulatory system**, which are the main cause of death among older people (over 50% of deaths for persons aged 85 and over), are also the main cause for all sexes and ages in the European Union, accounting for 41% of deaths in 2003 (Figure 1). Those in the middle age ranges are more affected by **malignant neoplasms** (up to 44% of deaths in the 55-59 age group), which accounted for a quarter of deaths for all sexes and ages in 2003. A large proportion of deaths in the younger age groups are from **external causes** (mainly accidents and suicides): 67% in the 20-24 age group. Most of the new Member States are characterised by a high death rate due to diseases of the circulatory system, with the Baltic States also recording excess mortality from external causes.

Looking more closely at external causes, **transport accidents** account for almost 30% of deaths among 15-24 year olds. In the case of malignant neoplasms, **respiratory cancers** (larynx, trachea, bronchus and lung) are the largest group since these account for nearly one in 20 deaths in the EU as a whole and one in 12 among men. The **most common cancer** among women is **breast cancer** which contributed to almost 4% of all female deaths in 2003. All these causes can be influenced by preventive policies. The main group of diseases of the circulatory system is formed by **ischaemic heart diseases** which are responsible for over one in 6 deaths among persons aged over 70.

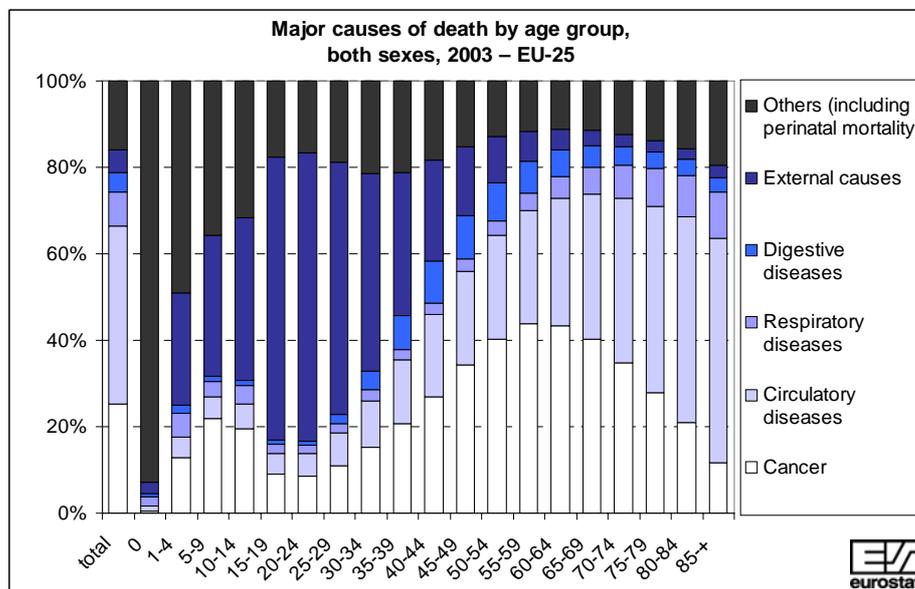


Figure 1: Main causes of death by 5-year age group

Finally, the specific collection of data following the catastrophic **tsunami** of 26 December 2004 in south-east Asia put the death toll for European residents at 1 385 (151 of whom are still listed as missing).

Statistics in focus

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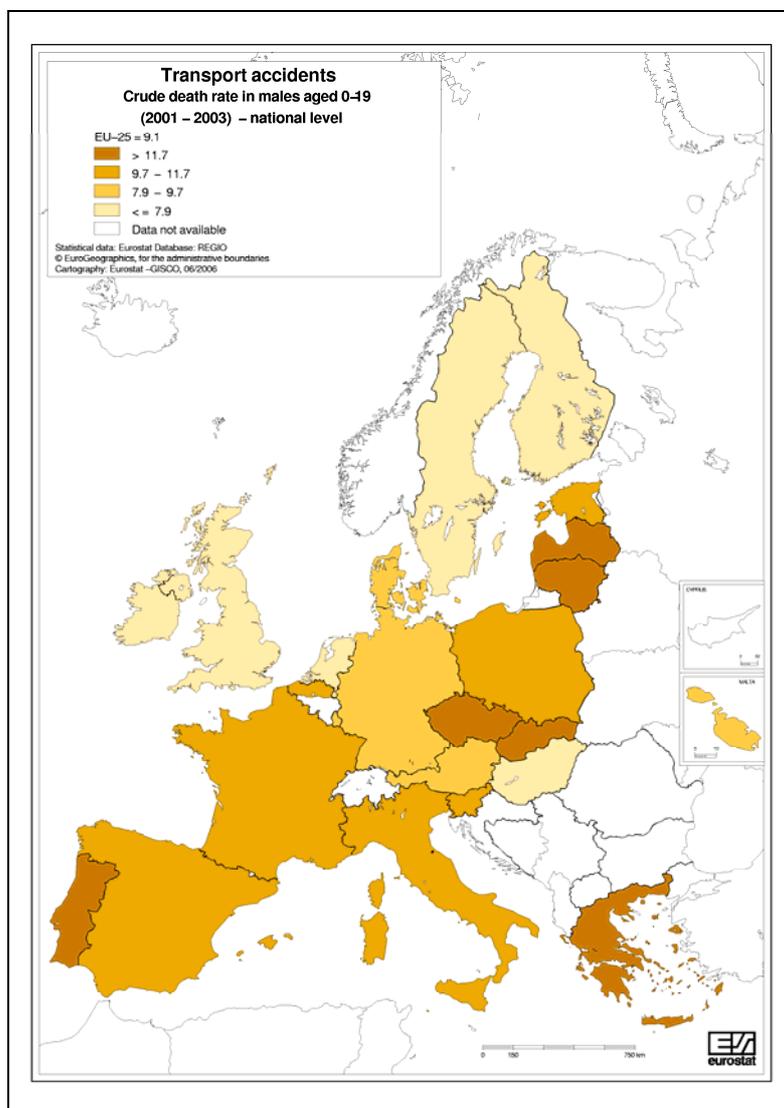
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With regard to females aged 0-19, 10 deaths per 100 000 inhabitants in Europe were caused by certain conditions originating in the perinatal period and 8 deaths per 100 000 inhabitants due to external causes of injury and poisoning. The crude death rate for

transport accidents among women is 4 per 100 000 inhabitants.

The second highest external cause is *suicide* which accounts for 14% of external causes among men and 10% among women aged 0 to 19 in the EU-25.



Map 1: Transport accidents among men aged 0-19

Suicides among 20-44 year olds

External causes of injury and poisoning remain the main cause of death among men aged 20 to 44 in all the Member States. Among women, it is the second cause after *cancers* (15 deaths per 100 000 inhabitants aged 20 to 44 for external causes as opposed to 23 for malignant neoplasms).

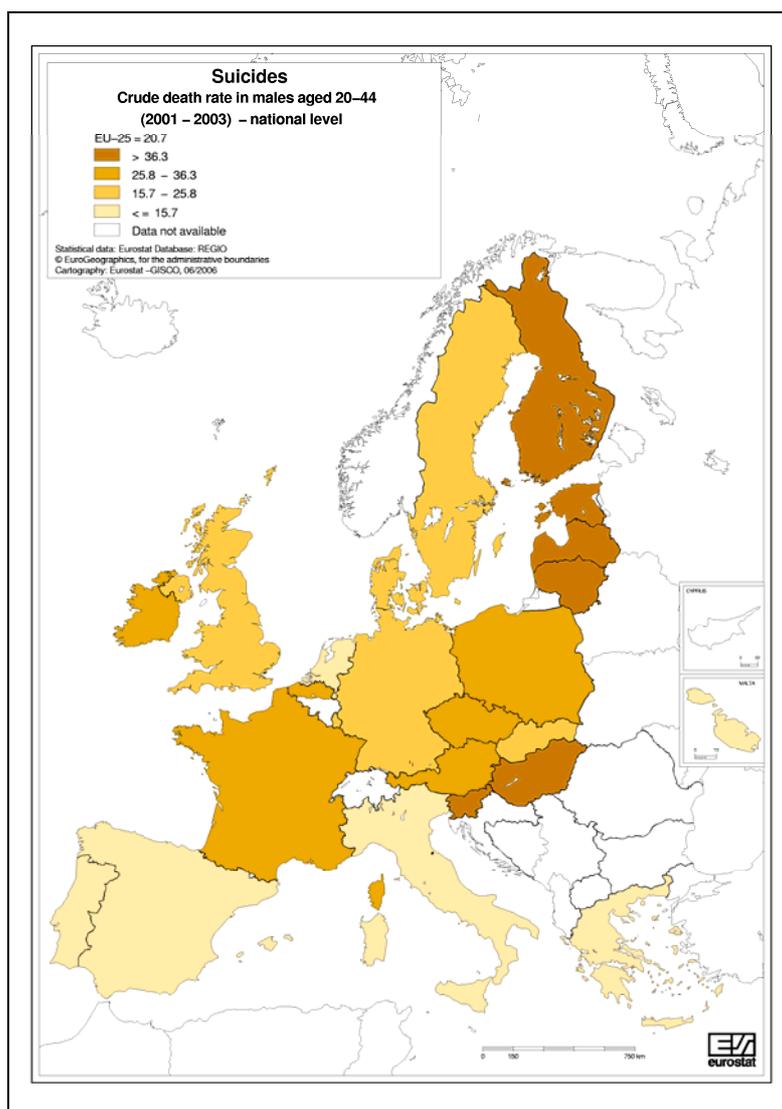
The proportion of transport accidents as one of the external causes is lower than for the previous age group, accounting for 35% of external causes among men and 34% among women. *The percentage of suicides* is higher (31% among men and 32% among women), making this the second largest cause of death in this age group.

For 20-44 year olds, both sexes combined, the lowest crude rates for external causes are found in the Netherlands (36 per 100 000 inhabitants) and Malta (40) whereas Latvia, Estonia and Lithuania have the highest rates (249, 255 and 276 respectively).

Map 2, which shows *suicides* among 20-44 year old men, reveals a significant geographical disparity. The frequency of suicide is lower in the Mediterranean basin where the lowest rates are observed in Greece (5 per 100 000), Italy (10), Malta (11), Spain (12) and Portugal (13) whilst the highest rates are mainly found in the north-east of Europe: Finland (43), Latvia (54), Estonia (55) and Lithuania (90).

Some of the disparities between countries can, however, be explained by investigation problems as well

as by cultural differences in the recognition of this form of death.



Map 2: Suicides among men aged 20-44

Malignant neoplasms among 45-64 year olds

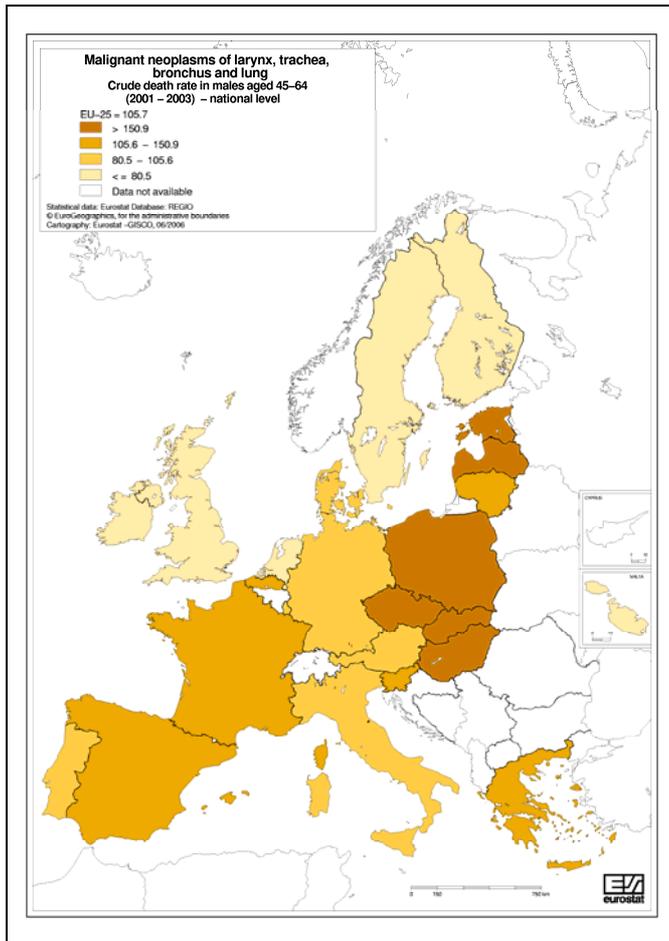
Malignant neoplasms (tumours) are the main cause of death among persons aged 45 to 64, for both men and women, followed by diseases of the circulatory system.

Map 3 shows that men are more affected by *malignant neoplasms of the larynx, trachea, bronchus and lung* with 106 deaths per 100 000 inhabitants in the European Union; about one in 8 deaths in this age group. The countries where this type of mortality is highest are, in the main, Lithuania (151 per 100 000), Estonia (152), Poland (162), Latvia (167), Slovakia (174), the Czech Republic (187) and Hungary (236). The lowest rates are in Sweden (39) and Finland (51).

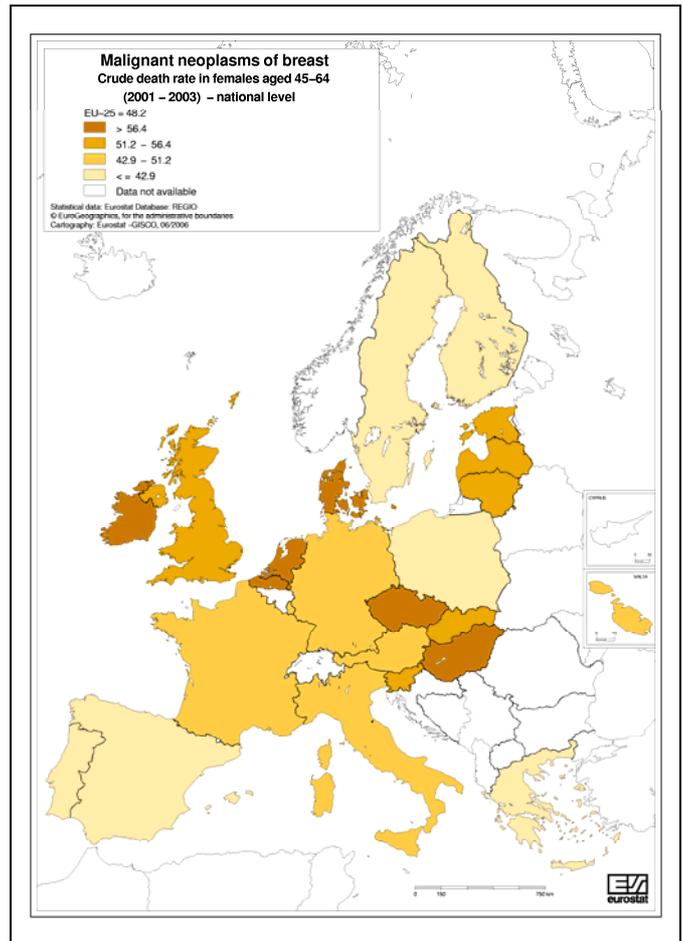
Women are also affected by malignant neoplasms of the larynx, trachea, bronchus and lung, but these neoplasms rank behind *malignant neoplasms of the breast* (29 deaths per 100 000 inhabitants in the EU for malignant neoplasms of the larynx, trachea, bronchus

and lung as against 48 for malignant neoplasms of the breast).

Map 4 shows that the highest death rates for malignant neoplasms of the breast are recorded in women in the Netherlands (60 per 100 000), the Flemish part of Belgium (64) and Denmark (66). Spain (38), Greece (38) and Finland (40) have the lowest rates. The Baltic States, which displayed high crude mortality rates for the groups studied above are, on the other hand, fairly close to the European average for deaths related to breast cancer.



Map 3: Malignant neoplasms of the larynx, trachea, bronchus and lung in men aged 45 to 64



Map 4: Malignant neoplasms of the breast in women aged 45 to 64

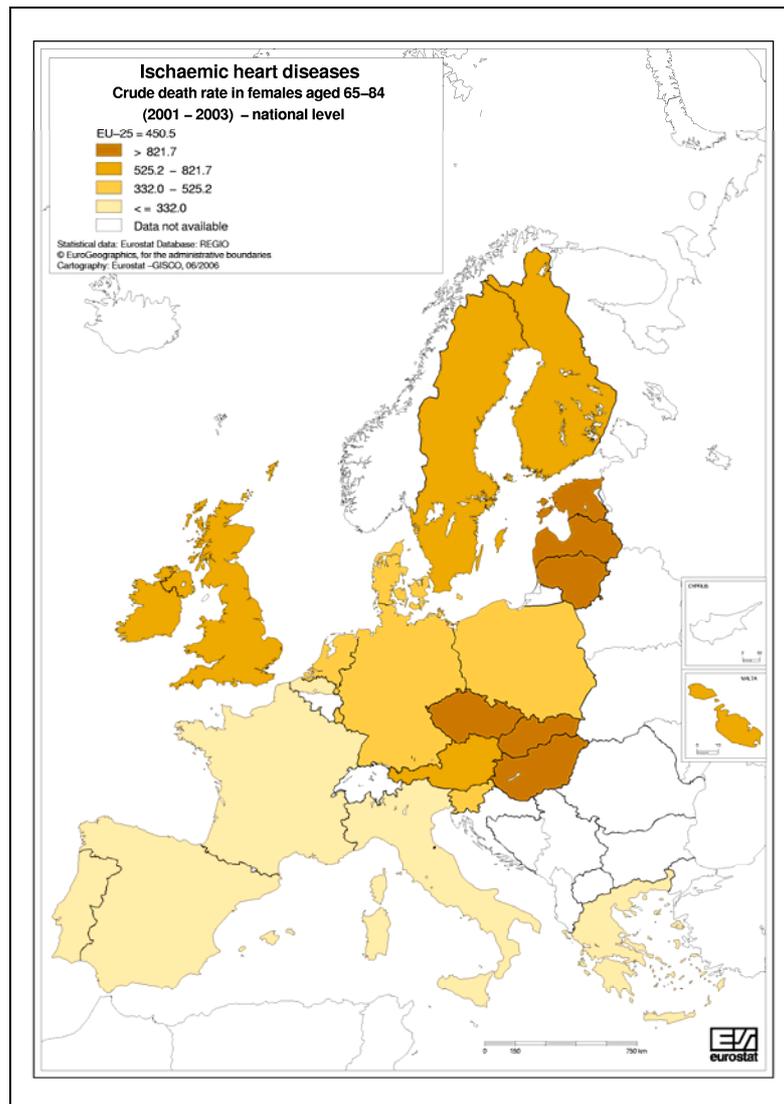
Ischaemic heart diseases among 65-84 year olds

The most frequent cause of death among the European population aged 65-84, for both men and women, is a *disease of the circulatory system*. This category includes *ischaemic heart diseases and other heart diseases* as well as *cerebrovascular diseases*. In the EU, it is estimated that almost one million people aged 65-84 died, on average, each year over the period 2001-2003 of a disease of the circulatory system. This form of death was highest in Lithuania (2 629 per 100 000 inhabitants), Hungary (2 786), Estonia (2 881), Slovakia (2 970), Latvia (3 061) and the Czech Republic (3 451) for both sexes combined, whereas France, Spain, Italy, the Flemish part of Belgium and the

Netherlands had the lowest rates (869, 1 021, 1 178, 1 189 and 1 299 deaths per 100 000 inhabitants respectively).

Ischaemic heart diseases make up 41% of all fatal diseases of the circulatory system.

Map 5 shows deaths from *ischaemic heart diseases* in women aged 65-84. Again, the Baltic countries and Slovakia have the highest rates at 1 214 deaths per 100 000 inhabitants for Latvia, 1 278 for Slovakia, 1 318 for Estonia and 1 335 for Lithuania. The lowest rates are found in France (169 per 100 000), Spain (247), Portugal (275) and Italy (293).



Map 5: Ischaemic heart diseases in women aged 65-84

Cerebrovascular diseases in persons aged 85 and over

Diseases of the circulatory system, in particular ischaemic heart diseases, are the most frequent cause of death among persons aged 85 and over, as for the previous age group. However, the rate for this type of death, both sexes combined, increases considerably beyond 84, as 4.8 times more people died, on average, of a disease of the circulatory system in this age group compared to the death rate among 65-84 year olds over the period 2001-2003 in the European Union. These persons have, in fact, survived beyond the life expectancy at birth threshold which was 75 for men and 81 for women in the EU in 2003. Death from ischaemic heart diseases therefore appears to be the most frequent form of death amongst the very old (2 822 deaths per 100 000 inhabitants among those aged 85 and over, both sexes combined), i.e. for persons who had not suffered from other causes of mortality which generally occur at an earlier age.

As the geographical breakdown of ischaemic heart diseases is almost the same as for the 65-84 age group, it is more relevant to conduct a study of the second largest cause of death from diseases of the circulatory system among persons aged 85 and over, i.e. *cerebrovascular diseases* (2 381 deaths per 100 000 inhabitants, both sexes combined).

Figure 3 shows cerebrovascular diseases among persons aged 85 and over. It can be seen that the crude female mortality rates are much the same as the male rates for all EU countries. The lowest rates are recorded in France, Slovakia, the Netherlands and the Flemish part of Belgium. Portugal, Greece, Latvia and the Czech Republic record the highest rates (the rate in the Czech Republic being 2.8 times higher than the European average).

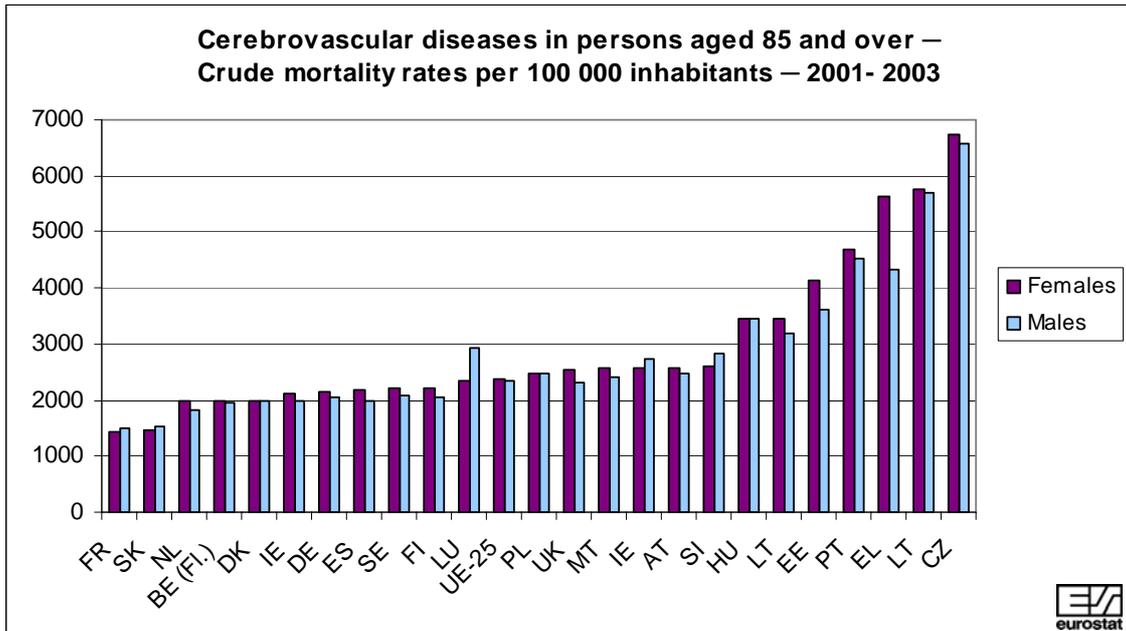


Figure 3: Cerebrovascular diseases among persons aged 85 and over

Deaths caused by the tsunami

European Union residents (most of whom were holidaying in the region) fell victim to the tsunami that struck south-east Asia on 26 December 2004. Therefore, the tsunami has an impact on the statistics on causes of death at both European and Member State level, particularly for *Sweden* where the number of citizens killed in the tsunami was comparatively high.

In the Member States, statistics on the causes of death are based on medical certificates which are completed by doctors for each death. However, some residents die in a country other than their country of residence and, in certain Member States, there is no procedure for collecting and inputting information on the cause of death in such cases. As a result, the death is registered in the statistics of the country in which this person lived as 'cause unknown' (or may even not be registered at all in the statistics on causes of death). Although the effects of this type of under-coverage have relatively little influence on the overall statistical picture, they do become important and visible in the case of accidents and catastrophes involving a large number of victims, such as aircraft accidents. Furthermore, the number of residents dying abroad can increase in tandem with the increased mobility of European citizens.

Given the scale of the catastrophe (the media reported thousands of victims from the EU), *there was a possibility that seriously insufficient or erroneous coverage could have long-term effects on the comparability of European statistics on the causes of death.*

Country	Number	
	death	missing
EU-25	1234	151
EU-15	1224	149
Belgium	10	1
Czech Republic	8	0
Denmark	45	1
Germany	150	0
Estonia	1	2
Greece	1	4
Spain	2	0
France	38	57
Ireland	4	0
Italy	16	53
Cyprus	0	0
Latvia	0	0
Lithuania	0	0
Luxembourg	2	0
Hungary	0	0
Malta	1	0
Netherlands	16	9
Austria	86	0
Poland	:	:
Portugal	0	0
Slovenia	0	0
Slovakia	0	0
Finland	178	7
Sweden	527	16
United Kingdom	149	1
Iceland	:	:
Norway	84	0
Switzerland	107	5
Bulgaria	0	0
Romania	0	0
Turkey	1	5

Sources: Ministries of Foreign Affairs, Health or the Interior, or statistical offices

Table 1: Number of persons killed or missing as a result of the tsunami

Given the practices in force for recording residents/citizens who die abroad, it was highly likely that the statistics would never provide a clear picture of the number of European victims of the catastrophic effects of the tsunami. To overcome this, Eurostat (with the active cooperation of the Member States) collected *specific data on the number of Europeans killed or missing as a result of the tsunami*. The data for most countries are provided by the Ministry of Foreign Affairs and mainly refer to European citizens.

The data and explanations provided by the Member States made it possible to compile initial estimates in May 2005 for the 25 EU Member States, acceding and candidate (except Croatia) or EFTA countries. On this date, the total number of confirmed deaths was around 850, and 1 350 people listed as missing. Based on the information available from the different national sources, it was estimated that the probable number of deaths for the EU and the six other countries was around 1 525.

For legal reasons, it can take up to one year before a missing person is declared dead and recorded in the national statistics on causes of death. Eurostat, therefore, launched a new data collection exercise in January 2006. According to the data updated in March 2006 for the EU-25, 1 234 deaths have been confirmed and 151 people are still listed as missing. Given the

extent of the research carried out into missing EU citizens and residents at the sites affected by the tsunami, it can be assumed that people still listed as missing are in fact dead. As a result, it can be concluded with a reasonable degree of accuracy that *the number of European victims of the tsunami is close to 1 600 persons*: around 1 390 victims from the EU Member States and 200 reported by Norway, Switzerland and Turkey (in round numbers).

These victims came from 20 countries, mainly the EU-15 countries, Norway and Switzerland. The following countries did not report any victims: Cyprus, Latvia, Lithuania, Hungary, Portugal, Slovenia, Slovakia, Bulgaria and Romania. The number of persons reported as dead or missing for the other countries is shown in Table 1.

The highest number of victims is reported by Sweden which accounted for almost one-third of all European victims (543 persons). The other countries with over 100 victims are: Finland (185), Germany and the United Kingdom (150 each) and Switzerland (112). These four countries account for another third of all European victims.

However, *less than 0.05% of deaths in the EU* and the accession, candidate and EFTA countries in 2004 can be attributed to the tsunami.

Marked differences between old and new EU Member States

Mortality in the Member States, all causes

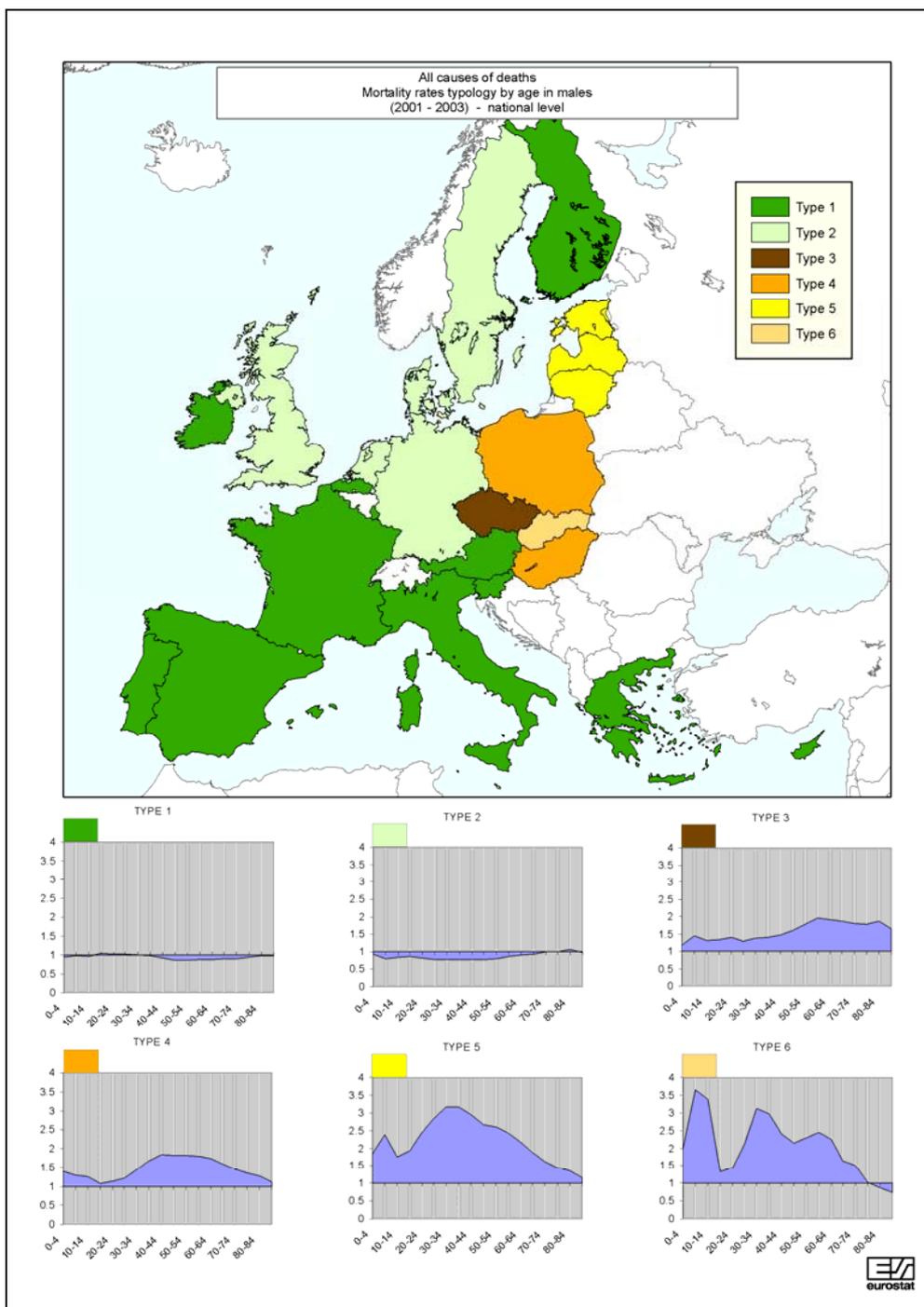
Differences in mortality rates can also be observed among the EU Member States when examining all causes of deaths, as one country may have an excessive death rate for its young population compared to the European average and a below-average death rate in its older population, or vice versa. A typology similar to the previous one has been used to analyse these national mortality profiles by age, by aggregating countries depending on their similarity in terms of mortality rate by age. The analysis has been conducted separately for men and women on the data for all causes of death combined.

Map 6 presents the *typology of male mortality*. This analysis shows six groups of Member States. **Type 1** represents Member States with a death rate which is very close to the European mortality rate: almost average infant mortality, followed by slightly excessive mortality among the 15-29 age group and then a slightly below-average death rate beyond 30. This is the case for the Flemish part of Belgium, Greece, Spain, France, Ireland, Italy, Cyprus, Luxembourg, Austria, Portugal, Slovenia and Finland, which account for half of the EU Member States. **Type 2** is defined by slightly below-average mortality from 0 to 74 years followed thereafter by slightly above average rates, and comprises the following Member States: Denmark, Germany, Malta,

Netherlands, Sweden and United Kingdom. **Type 4**, made up of Hungary and Poland only, shows excess mortality from 0 to 14, followed by around average mortality from 15-24, then excess mortality again thereafter (high from 35 to 69). **Type 5** typifies the Baltic States (Estonia, Latvia and Lithuania) with high excess infant mortality, particularly in the 5-9 age group, and very high excess mortality from 20 to 64. Finally, Slovakia and the Czech Republic are cases apart as each of these two countries is represented by its own type: **Type 6** for Slovakia which has very high excess mortality mainly from 0-14 and from 30-64 but a below average death rate beyond 80, and **Type 3** for the Czech Republic which is characterised by excess mortality for all age groups, becoming high after 45.

To conclude, it can be seen that types 1 and 2 cover the EU-15 Member States plus Cyprus, Malta and Slovenia. The other new Member States are spread across the other four types.

For *women*, the composition of the groups is a bit more varied as types 1 and 2 encompass the EU-15 Member States (excluding Denmark) along with Cyprus, Poland and Slovenia. Denmark and Malta are classified in type 3 with Hungary (corresponding to type 4 for men). The other new Member States are spread across types 4 (type 3 for men), 5 and 6.



Map 6: Typology of Member States according to age-specific mortality rates and ratio in relation to the European average mortality rate by age, for men

Mortality in the Member States by group of causes of death

The aim of this last section is to identify which causes of death are the most useful for differentiating the Member States in terms of mortality, all ages and sexes combined. To do so, a specific data analysis (Factor Analysis) has been used based on the number of deaths corrected by the age structure of the national population, broken down into 17 groups of causes of death (see the codes and titles in the box on page 10). *This analysis makes it possible to present Member States on a two-dimensional plane (Figure 4) broken down by the main groups of causes of death in these countries.*

Thus, with the help of the diagram and the results on the actual impact of each group of causes in the similarities observed (which are also provided by analyses), it can be seen that the Member States on the left of the diagram, following the horizontal axis, are characterised by a higher death rate from diseases of the circulatory system. On the other hand, the countries on the right have an above-average proportion of deaths due to mental and behavioural disorders (including drug-related deaths) and, to a lesser extent, to diseases of the respiratory system. The vertical axis contrasts countries with a high death rate due to

external causes of injury and poisoning, which are situated in the upper section of the diagram, to others which have a tendency to have a higher death rate for diseases of the respiratory system.

In this diagram, the Baltic States are still very close to each other - they are characterised by a high death rate for both diseases of the circulatory system and external causes that account for two-thirds of all deaths. Three other groupings stand out: Slovakia, the Czech Republic, Hungary and Poland, along with Greece and Germany, also have high death rates from diseases of the circulatory system (around 50% of deaths); the United Kingdom, Ireland, Malta and, to a lesser extent, the Flemish part of Belgium, Spain, the Netherlands, Luxembourg and Denmark are characterised by a high death rate due to diseases of the respiratory system (around 10% of deaths); and the final, more diffuse, grouping encompasses the remaining EU-15 countries and Slovenia. Furthermore, the accession, candidate (excluding Turkey) and EFTA countries, which were not taken into consideration in the factor analysis, have been shown on the diagram depending on their characteristics by groups of causes. It can be seen that the EFTA countries (Norway, Iceland and Switzerland) are close to Finland, Portugal and Sweden (fairly high number of deaths due to mental and behavioural disorders). The candidate countries can be found on the left of the plane, with the most marked features being a high death rate from diseases of the circulatory system

for Croatia, and a very high rate (over 60%) for Bulgaria and Romania.

The groups of causes shown in the diagram are:

- c1 Infectious and parasitic diseases
- c6 Neoplasms (cancers are the second cause of death in the EU but without any notable geographical variations)
- c25 Diseases of the blood(-forming organs), immunological disorders
- c26 Endocrine, nutritional and metabolic diseases
- c28** Mental and behavioural disorders
- c31 Diseases of the nervous system and the sense organs
- c33** Diseases of the circulatory system
- c37** Diseases of the respiratory system
- c42 Diseases of the digestive system
- c45 Diseases of the skin and subcutaneous tissue
- c46 Diseases of the musculoskeletal system/connective tissue
- c48 Diseases of the genitourinary system
- c50 Complications of pregnancy, childbirth and puerperium
- c51 Certain conditions originating in the perinatal period
- c52 Congenital malformations and chromosomal abnormalities
- c55 Symptoms, signs, abnormal findings, ill-defined causes (this cause is shown on the diagram but has not been taken into account in the factor analysis)
- c58** External causes of injury and poisoning

Groups of causes not featured in the diagram only have a minor influence on the groupings and differences between Member States.

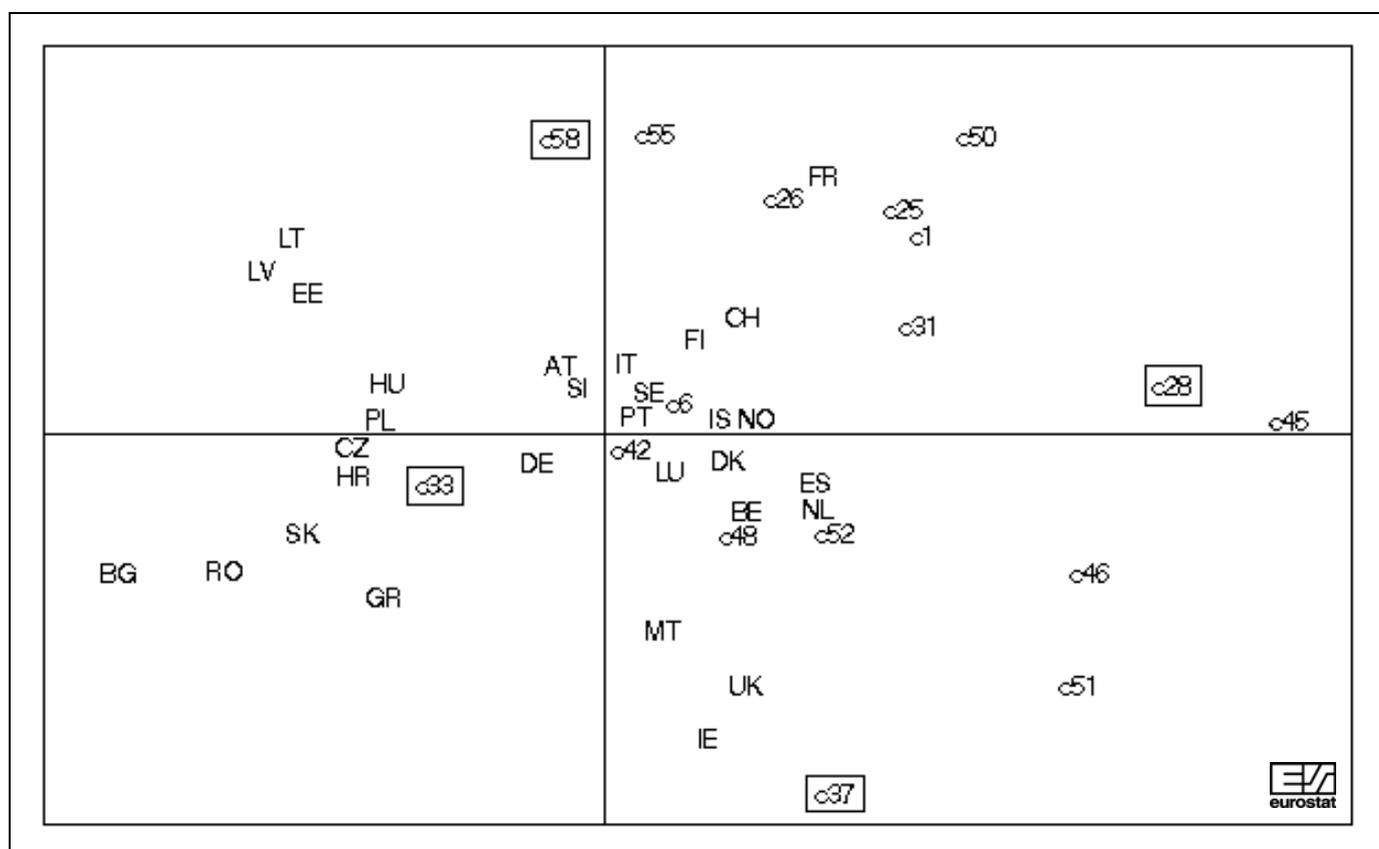


Figure 4: Member States, all ages and sexes combined, by groups of causes of death, 2003 (factorial plane – see methodological notes)

➤ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

The spatial analysis scale used in this publication is the **national** level, with the exception of Belgium, which is represented only by the Flemish region (code BE2 of Eurostat's NUTS Nomenclature of Territorial Units for Statistical Purposes), as the latest national data for the whole of Belgium date back to 1997. The data have been aggregated over the period 2001-2003, with the exception of some countries for which the 2003 (or 2002) data were missing: Denmark and Slovakia (1999-2001); the Flemish part of Belgium, France and Italy (2000-2002). The data for Cyprus are only available at global level, and are not broken down by cause of death. The causes and groups of medical causes of death chosen have been selected from the **summary list of 65 causes compiled by Eurostat**, which is based on the International Statistical Classification of Diseases and Related Health Problems (ICD) developed and maintained by the WHO.

The mortality indicator analysed in this "Statistics in Focus" is the **crude rate**. Depending on the type of breakdown used (sex, age or cause of death), it provides insights into:

- mortality in relation to the total population,
- differences in mortality between men and women, either between countries, by cause of death or by age category,
- the level of mortality for each age category.

In this publication, the results are presented according to a spatial analysis of the causes of mortality for each of the age groups (selected according to a **hierarchical ascending classification of 5-year age groups** conducted on European data): transport accidents in 0-19 year olds, suicides among 20-44 year olds, malignant neoplasms among 45-64 year olds, ischaemic heart diseases for the 65-84 age group and cerebrovascular diseases among person aged 85 and over. For mapping purposes, the data were grouped into four classes of seriousness, depending on the number of spatial units concerned, for each statistical series, with 25% per class.

The number of deaths caused by the **tsunami** of December 2004 has also been collected by Eurostat from the national authorities via the statistical offices of each Member State and this is shown in the form of a table of killed and missing persons (who can now be considered as dead, but whose bodies have not yet been identified).

Finally, in order to provide an overview of geographical differences in the death rate, two summary analyses have been compiled:

The first is a **hierarchical ascending classification of the death rate by age for all causes combined** in the Member States. The typological map portrays standard mortality profiles, so the colour does not reflect the level of seriousness. This map of typologies by age contains a number of graphs showing, on the vertical axis, mortality ratios in relation to the European average and, on the horizontal axis, the age classes. Thus, the age classes which appear below value 1 have a higher mortality rate than the European average, and vice-versa.

The second is a **factor analysis** on the death rate in the Member States, by groups of causes of death, all sexes and ages combined, and the **factorial plane** obtained is presented in the last part of this publication. This analysis studies the correspondence between two qualitative variables (in this case the Member States and groups of causes), which are cross-referenced in a contingency table containing the frequency of

causes of death in relation to the total death rate, after correction for the effects of the age structure of national populations (standardisation in accordance with the WHO European population). This involves looking for the best simultaneous representation for these two variables. The factorial plane obtained is then studied with the help of the results calculated during the analysis. These results indicate the contribution of each value of the variable to the formation of the axes. They are, therefore, very useful for identifying which values of the variable have a more important effect in the analysis than others, which is not always possible when only looking at the diagram as certain outlying points may only make a very small contribution. In this diagram therefore, **the situation of a Member State on the plane indicates its correlation with the causes influencing the orientation of the axes and the causes in its proximity.**

Crude death rates have been used to study deaths among age categories:

$$TBM = \frac{D}{E} \times 100000 \text{ where}$$

TBM = crude death rate per 100 000 inhabitants (in the age category in question)

D = number of deaths recorded in the population for a given period

E = size of the population in the same period

An **ascending hierarchical classification** is an iterative algorithm which groups the two most similar individuals or classes of individuals in each loop (in this publication, individuals are represented either by age categories or by Member States depending on the analysis). Ward's method was the classification method chosen from those available. This method tends to obtain the largest possible inter-class inertia. The distance (in this case in terms of death rates) between 2 classes is calculated as follows:

$$D(A, B) = \frac{\left\| \overline{X}_A - \overline{X}_B \right\|^2}{\frac{1}{N_A} + \frac{1}{N_B}} \text{ where}$$

D = distance between 2 classes A and B

\overline{X}_A = average of class A

N_A = population of class A

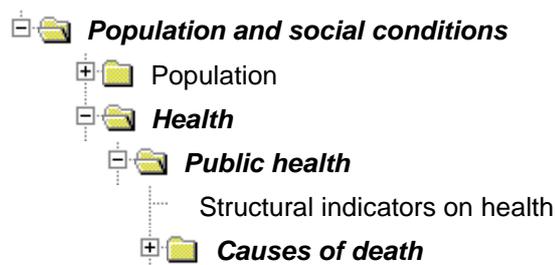
List of codes used for the Member States, accession, candidate and EFTA countries: Belgium (BE), Czech Republic (CZ), Denmark (DK), Germany (DE), Estonia (EE), Greece (EL), Spain (ES), France (FR), Ireland (IE), Italy (IT), Cyprus (CY), Latvia (LV), Lithuania (LT), Luxembourg (LU), Hungary (HU), Malta (MT), Netherlands (NL), Austria (AT), Poland (PL), Portugal (PT), Slovenia (SI), Slovakia (SK), Finland (FI), Sweden (SE), United Kingdom (UK), Bulgaria (BG), Croatia (HR), Romania (RO), Turkey (TR), Iceland (IS), Norway (NO), Switzerland (CH).

Further information:

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