

Presentation

The Death Statistics according to Cause of Death provide annual information on deaths which have occurred in the country, dealing with the basic cause of death, in accordance with the International Classification of Diseases of the World Health Organisation. The 10th revision of said classification has been used since 1999.

These Statistics were originally integrated within Vital Statistics. As of 1987, it was decided to make the statistics separate, due to their essentially health-related nature, providing the basis of numerous health indicators.

Participating in the compilation of this publication were the Civil Registers, Autonomous Communities that have an agreement with the INE to carry out these Statistics, and the National Statistics Institute itself. We are especially grateful for the effort made by the doctors classifying the cause of death.

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Introduction

I Background

The Death and Late Foetal Death Statistics according to Cause of Death have their own identity, although within the framework of Vital Statistics (VS), which refer to births, marriages and deaths which have occurred in Spain and which make up one of the most traditional statistics compiled by the National Statistics Institute (INE). The first volume was published in 1863 by the National General Board of Statistics, and contains data on the period from 1858 to 1861, which was obtained from parish registers. Since then, uninterrupted information on demographic phenomena has been published in Spain, except during the years 1871 to 1885, when the civil register was implemented, and from which subsequent data for these statistics was to be obtained.

The classification of deaths by cause of death goes back to the information corresponding to 1861-1870, thereby giving rise to what is currently known as the Death Statistics according to Cause of Death. This first classification had only five groups of causes, and it was only as of the 1900 publication that the 14-group and 99-heading classification for causes of death by Dr. Bertillón, began to be used in Spain. The corresponding distribution was revised the same year, during the First International Conference for the Revision of the Classification of Causes of Death, in which a ten-year revision system was also approved.

The first three revisions were supervised by Dr. Bertillón. The following two were coordinated by the National Statistics Institute and the Organisation for Hygiene of the League of Nations, which were adopted in Spain in 1931 and 1941, respectively.

As of the 6th revision and until the 10th, currently in force, responsibility for its preparation was confided in the Provisional Committee of the World Health Organization, and was implemented in our country in the years 1951, 1961, 1968, 1980 and 1999, respectively, and was known as the International Classification of Diseases (ICD).

Since their origin, the Death Statistics according to Cause of Death have been enriched with new classifications. Thus, the age, sex and province of registration variables were included in the year 1903. However, worth noting due to their qualitative importance are the modifications which took place as a result of the last two reforms of the vital statistics as a whole.

In 1957, with the new law of the Civil Register, the INE proposed a new collection system to answer to the growing demand for demographic-health information regarding the phenomenon of death. For these purposes, some new statistical death and abortion bulletins entered into force, which were more complete than the previous ones, which in turn had been limited to collecting that data that appeared in the Civil Registry Books. However, not all of the variables introduced could be used, due to the fact that they had a high percentage of non-response, as a result of the difficulty that the informants had in completing them.

Due to these difficulties, in 1975, a new reform was carried out, which considered three fundamental aspects: the simplification of the bulletins, the change in some concepts and the modification of the results tables.

The most important conceptual variation is that which affects the statistical significance of live birth. Traditionally, for Vital Statistics, the legal criterion of *live birth* was used, which is covered in article 30 of the Civil Code: *a foetus will only be classified as born if it has a human-like appearance and lives for twenty-four hours completely outside the mother's womb*. Consequently, the deaths group did not include those babies born alive but dying before twenty-four hours had elapsed, as according to the above definition, in the Civil Register, these were registered as abortions.

Although the legal criterion remains unaltered, as of 1975, the births and deaths statistics adjust to the internationally recognised demographic concepts. As of this moment, a live birth is considered to be any foetus who is biologically born alive, and therefore, a foetus who is born alive and dies afterwards is counted as a death, irregardless of the hours lived.

This change in criterion does not substantially influence the global deaths figures, but it does considerably modify some specific mortality rates (infant, neonatal, perinatal, etc.) in such a way that, prior to 1975, these health indicators were giving a skewed version of reality.

Subsequent to this reform, in 1980, the statistical birth and abortion bulletins were revised into a single birth bulletin where data on live births and deaths before 24 hours were obtained.

Regarding the results tables, the most important modification was that introduced into the classification of causes of death, which until then had been carried out to three digits of the ICD, descending as of that year to four digits, which is the maximum specification facilitated by this classification.

Another important variation refers to the classification of deaths by place of residence rather than by place of death, as had been done previously.

As of 1975, the Death Statistics according to Cause of Death were published separately.

Lastly, also as of the year 1987, a single volume compiles results on an Autonomous Community level, which until that time had been published in the form of appendices, one for each Autonomous Community.

II Objectives

The Death Statistics according to Cause of Death constitutes one of the most important sources of information in the Health area.

Deaths are a consequence of a host of biological, economic, health and social causes. Therefore, it is necessary to have information available, not only on the number of deaths that occur in a country over a certain period, but also on all those circumstances which surround the event, to enable action on the part of the Health Administrations and the remaining social forces.

This fact, together with the scarce availability of reliable and exhaustive indicators to evaluate the level of health of the population, has caused the demand for these Statistics to continue to increase. Its main objectives are the following:

1. To provide information on mortality by dealing with the basic cause of death, according to the ICD, its distribution by age group, sex and other classification variables.
2. To ascertain late foetal deaths, by dealing with the cause of death according to the ICD.
3. To measure perinatal mortality, thereby providing the basis for obtaining indicators that allow for evaluating the coverage and quality of health services.
4. To make it possible to construct historical series to study the evolution of the prevalence of certain causes of death, as well as other studies that meet the information requirements established by the Health Administrations.
5. To carry out territorial comparisons regarding the behaviour of mortality, by group of causes of death.
6. To provide a basis with which to construct health indicators recommended by International Organisations.

III Definitions and Concepts

Death

As set out previously, for the purposes of these statistics, death is considered to be the death of any person born alive, irregardless of the hours lived.

Late foetal death

From a theoretical perspective, late foetal death is the death, before complete expulsion or extraction from the body of the mother, of a viable product of conception. This viability is precisely what serves to differentiate between late foetal deaths and abortions. Currently, the World Health Organisation (WHO) has identified the viability of the foetus with those born dead that weigh at least 500 grams, and failing this data, with a gestational age of at least 22 weeks.

Although in Spain it is only obligatory to inform the Civil Register of foetal deaths of more than 180 days of gestation (article 45 of the Law of 8 June 1957), for the purposes of these statistics, late foetal deaths are considered to be those that have been recorded at the Civil Register, either because they fulfil the criteria mentioned in the previous paragraph, or because the data regarding weight and weeks of gestation is unknown.

Cause of death

Cause of death is understood to be the set of all diseases, morbid states or injuries that caused death or contributed to death, and the circumstances of the accident or the violence that caused said injuries.

Basic cause of death

Disease or injury that started the chain of pathological events which directly led to death, or the circumstances of the accident or violence which produced the final injury.

Of the four causes of death which should appear, and which the statistical bulletin should be informed about (immediate, intermediate, initial or fundamental and other processes), that known as the basic cause is selected to be encoded, which generally coincides with the initial or fundamental cause, and only in case of doubt, does one resort to selection rules established by the WHO in its 10th revision of the ICD for its determination.

IV Collection and treatment of information

The process established to collect the data of the Death Statistics according to Cause of Death begins when the Provincial Delegations of the INE send the statistical death (SDB) and statistical birth (SBB) bulletins to all Civil Register offices of their province.

All persons resident in Spain have the obligation, by law, to fill out the Questionnaires for the Declaration of Births, Marriages and Deaths to the Civil Register. In the case of death which occurred after the first 24 hours of life, it is necessary to present the Official Medical Death Certificate that the doctor has filled out and which shows the causes of death. In the case of a late foetal death, or of a live birth leading to death before 24 hours of life, as there is no official abortion certificate, the certification is incorporated in the text of the Questionnaire for the Declaration to the Register.

In both cases, in addition to the aforementioned questionnaires, the corresponding SDB or SBB is filled out.

The section on statistical bulletins referring to the causes of death should be filled out and signed by the same doctor who certified death or who attended the birth. The rest of the data is provided by family members or persons obligated by law to make the declaration.

Therefore, sometimes in large municipalities, in order to facilitate the process, when acquiring the medical death certificate at a chemist's, the corresponding statistical bulletin is handed in at this time. Thus, the doctor may simultaneously

fill out the certificate and the section on SDB causes of death. In other municipalities, funeral homes provide these forms. In any case, the SBB are available at the maternity departments of hospitals.

Civil Registers issue SDB and SBB monthly to the Provincial Delegations of the INE, where revision, filtering, encoding and recording work of the demographic variables begins, and as of 1994, also of the cause of death of the SBB. This information is used for the immediate updating of other statistical files.

As of 1983, the INE has been establishing partnership agreements with the Autonomous Communities. Currently, these agreements include the encoding and recording process of the health variables of the deaths occurring within their territorial scope.

To this end, the Provincial Delegations provide the Autonomous Communities with the monthly information, in electronic format, together with the SDB and SBB, depending on whether they have a partnership agreement for both statistics. Subsequently, the Provincial Delegations return the aforementioned statistical bulletins, and the electronic information, including the health variables.

The statistical bulletins are sent to the Central Services of the INE, as well as the corresponding computerised files that are transferred by teleprocessing.

It is necessary to note that the INE coordinates the encoding tasks of all of the Autonomous Communities, advising and providing technical support, as well as carrying out a continuous follow-up for the purpose of ensuring the homogeneity of criteria. Likewise, the recording process that the Autonomous Communities use should comply with the format and norms established by the INE.

The treatment of the cause of death in the process for the compilation of the results tables is carried out exhaustively, studying all cases of possible incompatibilities between this and the rest of the demographic information, using the first source of the data, the statistical bulletin, in such a way that the degree of reliability is as high as possible.

V Scope of the Statistics

POPULATION

This includes all deaths that occur in the country, irregardless of the place of origin of the person who has died. It does not include deaths of Spaniards or residents in Spain that occur outside of Spain.

GEOGRAPHICAL

The Death Statistics according to Cause of Death covers the entire country.

TEMPORAL

The reference period is annual, although information is provided by month of death.

VI Publication of Results

The complete results of these Statistics are disseminated online (www.ine.es) in the INEbase/Society/Health/Deaths according to Cause of Death section, as of the year 1999. This contains 4 groups of tables on national, Autonomous Community, provincial, and provincial capital levels, and different mortality indicators (standardised rates and potential lost years of life).

For the first 3 groups, the tables are structured in the following order: general, child, perinatal and lastly, late foetal deaths, mortality tables.

8 tables are provided on general mortality on a national level. The first contains information on deaths according to cause of death (detailed list of ICD-10), classified by sex and age group. The following use the shortlist of causes of death for their tabulation, by offering absolute and relative figures. The classification variables are age group, sex, month of death, size of municipality, nationality and place of residence.

20 tables are provided on general mortality on an Autonomous level. The shortlist of causes of death is used for the tabulation. The first contains the data from all of the Autonomous Communities, classified by sex and age group. The following contain the deaths from each Autonomous Community of residence, classified by province, sex and age group.

On a provincial and provincial capital level, a table on general mortality is included, classified by province or capital of residence, sex and shortlist of causes of death.

For the tables relating to child mortality (children under 1 year of age), mortality of children under 1 week of age, and late foetal deaths, specific mortality lists are used. These tables are classified on a national level, according to specific age brackets (in the case of late foetal deaths, weeks of gestation are considered). On an Autonomous and provincial level, data is offered by sex and Autonomous Community or province of residence.

In addition, beginning with the data from the year 2005, specific tables are published regarding deaths by suicide on national, Autonomous Community, provincial and provincial capital levels.

8 tables are provided on a national level; the last two with relative figures. The classification variables are sex, age, method employed, size of municipality of residence or of death, Spanish or foreign nationality and month of death.

12 tables are provided on Autonomous Community and provincial levels, classified by place of death or residence, sex, age, method employed and month of death.

Lastly, a table is offered, classified by provincial capital of death and sex.

Similarly, the series from these statistics are available in the TEMPUS database, which can be accessed via the Internet (www.ine.es/inebase).

On the other hand, the duly anonymised microdata file is also available, once the data supply commitment conditions are signed.

VII Standardised Rates

A fundamental objective in the statistical analysis of the mortality of a country is to be able to make comparisons between different geographical areas that respond in different ways to the phenomenon in question.

Until 1985, data was only published on proportional mortality, in other words, mortality according to cause per 1,000 deaths, as well as gross rates, or the equivalent, deaths according to cause per 100,000 inhabitants. These indicators offer a synthetic analysis of the frequency with which the phenomenon of mortality appears in the population.

On a global scale, these rates have a descriptive value which is of indisputable interest, given that they provide a measurement of the evolution of the phenomenon over time.

The gross mortality rates present, however, an important limitation when making comparisons between different groups that have different age structures, as is the case of the different Autonomous Communities.

Under these circumstances, gross mortality rates may be reconstructed, based on a common age and sex structure, or on a common mortality, obtaining standardised rates by age and sex, by the direct method in the first case, and by the standardised mortality ratio in the second case.

This latter method, though offering the advantages of greater ease of calculation and giving lower standard errors than those provided by the direct method when low incidence and/or small population characteristics are applied, does have the disadvantage of only allowing, by its own definition, the establishment of comparisons of each of the different rates obtained, with that corresponding to the standard population, but not with each of the remaining ones.

As the objective is to make the comparison possible for mortality by cause (ICD chapters) between Autonomous Communities, the direct method has been used.

For the purpose of verifying whether the standardised rates from different Autonomous Communities are significantly different from a statistical point of view, variation coefficients have been calculated in all cases. In this way, the interpretation of said rates may be evaluated for low incidence causes of death and Autonomous Cities with small populations, as is the case of Ceuta or Melilla for the cause of death, *congenital malformations, deformities and chromosomal anomalies*.

Methodology

With the data from the year 1999, the national population referring to 1 July 1999 (total, males and females) is considered to be the standard population.

The standardised mortality rate by cause j , for Autonomous Community k , for sex l , is given by:

$$TES_{kl}^j = \sum_i \frac{M_{kil}^j P_{il}^s}{P_l^s}$$

where:

M_{kil}^j represents the specific mortality rate by cause j , in age group i , Autonomous Community k and sex l .

P_{il}^s is the standard population in age group i and sex l .

P_l^s is the standard population in all age groups and sex l .

Consequently, the numerator reflects the number of deaths expected to occur in the standard population, if said population were subjected to specific mortality rates by cause j , in Autonomous Community k and sex l .

As a measure of variability of each standardised rate, its corresponding variation coefficient has been obtained.

$$C.V._{kl}^j = \frac{S}{TES_{kl}^j}$$

S^2 is the variance of the standardised rate, and the following is obtained:

$$S^2 = \sum_i \left[\frac{P_{il}^s}{P_l^s} \right]^2 \cdot S^2 (M_{kil}^j)$$

where the variance of the specific rate M_{kil}^j is:

$$S^2 (M_{kil}^j) = \frac{1}{P_{kil}^j} M_{kil}^j (1 - q_{kil}^j)$$

P_{kil}^j is the population in age group i , Autonomous Community k and sex l .

q_{kil}^j is the estimated probability of death by cause j , in age group i , for Autonomous Community k and for sex l . The following is obtained:

$$q_{kil}^j = \frac{n_i M_{kil}^j}{1 + (n_i - a_{kil}) M_{kil}^j} \cdot \frac{D_{kil}^j}{D_{kil}}$$

n_i is the longitude of the n^{th} age bracket.

a_{kil} is the average number of years lived in the n^{th} age bracket, by deaths in age group i , in Autonomous Community k and for sex l .

D_{kil}^j is the number of deaths by cause j , in age group i , in Autonomous Community k for sex l .

D_{kil} is the number of deaths in age group i , in Autonomous Community k for sex l .

VIII Potential lost years of life

Both gross and standardised mortality rates, which facilitate making comparisons between different groups, are affected by the major weight represented by deaths at an elderly age, which does not enable evaluating the incidence of deaths at young ages.

The health effect that mortality has is different if it occurs at young ages than if it occurs at advanced ages of life, and it is therefore necessary to measure premature mortality through some alternative indicator that detects the causes of death that theoretically could be avoidable, and that lead to a reduction in the life expectancy of individuals.

Potential lost years of life (PLYL) have been selected as a measurement of mortality which could theoretically be avoided, this bearing in mind the years that a person will no longer live if s/he dies at an age which is not the usual age for dying that has been theoretically established for this group.

The calculation of this indicator has been carried out, with the data from 2006, for the age bracket between 1 and 79 years of age (the upper limit was previously considered to be 69 years of age), which implies relinquishing, on the one hand, deaths occurring at higher ages, and on the other hand, child mortality, due to the fact that the causes of death of children under 1 year of age are, in general, very specific, requiring a separate study.

Methodology

For the calculation of PLYL, the ICD chapters have been considered which refer to the national total and each one of the Autonomous Communities.

Results are expressed as:

- Total PLYL by cause j, in Autonomous Community k and sex l.

$$APVP_{kl}^j = \sum_i D_{kil}^j a_i$$

- Percentage of PLYL attributable to cause j, in Autonomous Community k and sex l.

$$\frac{APVP_{kl}^j}{APVP_{kl}} \cdot 100 = \frac{\sum_i D_{kil}^j a_i}{\sum_i D_{kil} a_i} \cdot 100$$

- Adjusted rate (direct method) per 1,000 inhabitants of PLYL, by cause j, in Autonomous Community k and sex l.

$$\sum_i a_i \cdot \frac{D_{kil}^j}{P_{kil}} \cdot \frac{P_{il}^s}{P_{l(1-79)}^s} \cdot 1000$$

- Average No. of PLYL attributable to cause j, in Autonomous Community k and sex l.

$$\frac{APVP_{kl}^j}{D_{kl}^j} = \frac{\sum_i D_{kil}^j a_i}{\sum_i D_{kil}^j}$$

where:

D_{kil}^j is the number of deaths by cause j, in age group i, in Autonomous Community k and with sex l.

D_{kil} is the number of deaths in age group i, in Autonomous Community k and with sex l.

D_{kl}^j is the number of deaths by cause j, in Autonomous Community k and with sex l in all age groups.

a_i is the number of years remaining from age i to the age limit considered.

P_{kil} is the population in age group i, from Autonomous Community k and with sex l.

P_{il}^s is the standard population (national population referring to 1 July 1999) in age group i and sex l.

$P_{l(1-79)}^s$ is the standard population between 1 and 79 years of age with sex l.