

About France Data on Causes of Deaths

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General *(by France Mesle, Jacques Vallin)*

In 1833, France established its first statistical agency in the Ministry of Trade. This informal office was renamed Statistique générale de la France (SGF) in 1840 when it took over the responsibility for conducting population censuses. In 1941, the SGF was replaced by the Service National des Statistiques (SNS), which shifted the focus of statistical work toward the use of administrative records. Today, the official statistical agency for France is the Institut national de la statistique et des études économiques (INSEE, www.insee.fr), which replaced the SNS on April 27, 1946 (INSEE, 2008). National population data and vital statistics have been collected since the first decade of the 19th century, although relatively complete data became available near the end of the 19th century.

Current data on death by sex, age, and cause have been available in France at the national level since 1925. La Statistique Générale de la France regularly published cause of death data until the war (SGF 1925-1936), followed by le Service National de la Statistique (SNS 1940-42), l'Institut National de la Statistique et des Etudes Economiques (INSEE 1943-53, 1954-67), and l'Institut National de la Santé et de la Recherche Médiale (INSERM 1968-). Moreover, since 1963, complete records – based on the Detailed List of the International Classification of Diseases (ICD) – are available on magnetic tape (Meslé and Vallin, 1996).

Specific Episodes in French Demographic History

The remarkable rise in French life expectancy during the 20th century was interrupted by the two world wars, as well as by the Spanish flu epidemics during 1918-1919. France entered World War I (WWI) on August 3, 1914, and the armistice was signed on November 11, 1918. Later, France entered World War II on September 3, 1939; although the war in Europe did not end until “V.E. day” (May 8, 1945), French war operations ended in June 1940.

Notably, the impact of the two world wars differed for men and women. World War I (1914-18) had a much greater impact on mortality among men than women, although mortality among women increased as a result of the flu epidemic. In contrast, during World War II (1939-45), mortality increased among women as well as among men (both of whom are found in the resistance), mainly due to bombing by the Allies and because of the exceptional infant mortality in 1945, as a result of problems with the milk supply.

Territorial Coverage

Several changes in territorial coverage have occurred in France during the 20th century. The data for 1925 to 1938 correspond almost exactly to the current territory of France. During World War II, the French territory was again reduced in size (Alsace-Lorraine was re-annexed by Germany during the entire war, as was Corsica from 1943 to 1944 due to military operations). The current territory of mainland France

(Francemétropolitaine)¹ has been in place since 1946; it comprised 90 départements until 1960, after which the Paris region was split (making 95 départements), and then Corsica was split into two départements (making the current total 96).

All data in the Human Cause-of-Death Database (HCD) refer to the period when territorial coverage was unchanged.

Part I – vital statistics and population censuses

(by France Mesle, Jacques Vallin)

1. Death Count Data

Coverage and Completeness

The data cover all deaths to residents (regardless of where they occur) as well as deaths to non-residents that occur in France (Eurostat, 2003). Vallin and Meslé (2001) made adjustments for military deaths during World War I and II (1914-19 & 1940-45 among males; 1942-45 among females; for details see also Chapter V in Vallin, 1973 and Section 3 in Gleit et al., 2005).

Data are thought to be very close to complete during the entire 20th century. Prior to 1975, newborns who were born alive but died before the birth was registered were reported as stillbirths rather than infant deaths. For 1899-1974, we use counts of infant deaths that have been corrected to include these “false stillbirths” (Vallin and Meslé, 2001; see the section on “Birth Count Data” for more details).

2. Population Count Data

Coverage and Completeness

Censuses were conducted in France every 5 years from 1801 to 1946, with a few exceptions (the 1871 census was delayed until 1872 due to the Franco-Prussian War). The 1916 and 1941 censuses were cancelled due to World Wars I and II. Since 1946, censuses have occurred on an irregular schedule (1954, 1962, 1968, 1975, 1982, 1990, 1999). Since the 1999 census, France is no longer conducting a traditional census. Instead, a partial enumeration has been conducted every year by five-year cycles starting in 2004 (20% sample in rural areas; ≈8% sample in urban areas; so that after five years, all rural areas and 40% of urban areas will have been enumerated). Consequently, every year when the result of the partial enumeration become available; the national statistics office revises the estimates for all previous five years. The HMD is updated with these revised estimates.

The data cover the entire national (de jure) population (including military). Vallin and Meslé (2001) made adjustments to the population estimates during World War I and II for military personnel (see also Chapter V in Vallin, 1973 and Section 3 in Gleit et al., 2005).

¹ INSEE currently provides demographic statistics (e.g., births, deaths, population estimates) for “Francemétropolitaine” (which excludes all overseas territories-départements, régions, collectivités and pays d'outre-mer) as well as for “France entière” (métropolitaine plus départements and régions d'outre-mer) (Pison, 2006). Current statistics for France have included départements d'outre-mer since 2002. For the HCD, we continue to use the data for Francemétropolitaine only in order to maintain continuity since 1946.

3. Birth count data

Coverage and Completeness

Birth counts cover the de facto national population: births to non-residents that occur in France are included, whereas births to residents that occur abroad are excluded (Eurostat, 2003). Some corrections have been made to the published birth counts prior to 1975 to account for under-registration of live births (see below).

Prior to 1975, some live births were reported as stillbirths because the infant died before the birth was registered. Faux mort-nés (false stillbirths) were identified by a question asked on the statistical stillbirth form since 1920: “Did the newborn breathe?” (The question was later expanded to include “or present any sign of life?”.) Response categories were: yes, no, unknown. Those marked “yes” were added back in with live births (Vallin, 1973; Vallin and Meslé, 2001:13).⁴ For 1920-52, the false stillbirths (“mort-né ayant respiré”) were not published not by sex; therefore, Vallin and Meslé (2001) estimated the sex distribution based on the observed distribution in 1953-57.

For 1899-1974, we use these corrected live births that include false stillbirths. The published data have included such corrections for faux mort-nés since 1975, but the registration procedures were not changed until 1993.

Part II – information on CoD coding *(by Magali Barbieri)*

4. Death certificate

Mortality statistics is produced from the death certificate drawn up by the doctor who certifies the death. Each time a person dies on the territory, a doctor fills out a form. This document pursues first of all an administrative objective: to ensure that the person did deceased and to allow his burial. It also pursues a public health objective through the description of the morbid sequence, that is, events that led to death.

It is in 1925 that the French General Statistics Office (Statistique Générale de France or SGF) became responsible for processing the cause-of-death information recorded on death certificates. Until then, this responsibility was left to the local administrative units (the « mairies de communes »), in charge of producing tabulations of deaths by cause. The cause was reported on the death certificate either by the general practitioner, by a coroner (mostly in cities), or by the family or other witnesses in case of sudden death. Starting in 1925, individual death certificates were sent every semester to the SGF henceforth in charge of coding, publishing and distributing cause-of-death statistics.

In 1937, a new decree required systematic medical certification of the cause of death. At the same time, the death certificate was modified to include an easy-to-tear-off section for recording the cause of death. The death certificate was to be sealed by a medical certifier. On the cause-of-death portion of the certificate was to be recorded not only the main cause of death but any other medical information deemed useful to document the morbid process. While the rest of the death certificate was sent by the « Mairies » to the SGF, the cause-of-death section was torned off and sent to the Departmental Health Services (Direction Départementale de la Santé). The latter section did not include any information identifying the deceased other than the cause of death and related medical circumstances as well as his

or her sex and age (i.e. neither his/her name nor a specific place of residence). The Health Services officer in each département was to transcribe the information received on a specific form, collate all the forms for his département and send them to the SGF on a trimester basis.

A decree taken in 1955 established a new death certificate that closely followed the recommendations formulated by the World Health Organization. This certificate was designed to better document the morbid process and to provide the information necessary to distinguish between the immediate, the initial and the contributing causes of death. First implemented on an experimental basis, the new certificate was generalized in 1958.

Up to 1968, the cause-of-death portion of the death certificates continued to transit from the communes to the central vital statistics bureau through administrative officers at the level of the départements. The Statistique Générale de France, in charge of processing birth and death records, was renamed Service National de la Statistique (SNS) in 1941. The SNS was the first to publish cause-of-death statistics. The whole system of statistical production and publication was reorganized at the end of World War II, leading to the founding of the Institut National de la Statistique et des Études Économiques (INSEE) in 1945. At first, coding of the cause-of-death information was transferred from the central vital statistics bureau at INSEE to its 21 local divisions, introducing an important source of heterogeneity.

Starting in 1968, statistical processing of the the cause-of-death portion of the death certificate became the responsibility of the National Institute for Health and Medical Research (Institut National de la Santé et de la Recherche Médicale, or INSERM). The quality of cause-of-death coding improved significantly as it became the sole responsibility of a team of well trained and highly qualified nosologists. Though the process has been revised several times since then to accommodate progress in medical science and changes in public health concerns, its basic principles have remained relatively constant.

Death certificates are still made up of two sections with the first section including all information relative to the deceased except for his or her cause-of-death, i.e. name, date of birth, sex, marital status, and place of residence of the deceased and his or her date and time of death, and the second section is filled out with the cause of death and sealed for confidentiality by a certifying physician. Both sections are recorded by a local vital statistics officer in the « Mairie ». The officer separates the two sections. He also creates a third document, called « bulletin de décès » which records all information on the general portion of the death certificates except for the name of the deceased. He sends the « avis de décès » (the portion of the certificate which includes all information relative to the deceased except for his or her cause of death) to the National Statistical Office (renamed National Institute for Statistics and Economic Studies, or Institut national de la statistique et des études économiques, INSEE, in 1946) and the cause-of-death portion (or « Acte de décès ») with the « bulletin de décès » to the Departmental Health Services (Direction départementale de l'action sanitaire et sociale, or DDASS) which opens the « acte de décès » to monitor epidemics and sends both the « acte de décès » and the anonymized « bulletin de décès » to INSERM.

5. Coding system

Causes of death are thereby coded by INSERM which also identifies the underlying cause and publishes detailed cause-of-death statistics. The only major innovations since 1968 have been the establishment of a new certificate for neonatal deaths (over the first four weeks of life) in 1997 and the setting up of an electronic system to facilitate processing of cause-of-death information in 2000. This automatic coding system was introduced simultaneously with the 10th Revision of the International Classification of Diseases. The system is called Styx. It is consistent with that used in the United States (called ACME – see

the background and documentation file for the U.S. Cause of death series for details). Last, a project for electronic certification of causes of death is underway in order to reduce the time between the occurrence of death and the processing of the medical death certificate. This new program was initiated in 2004, one year after a major heat wave killed 15,000 people in France, a tragic demographic catastrophe partly attributed to the very slow processing of death statistics.

IRIS system.

6. Specific details of ICD revisions

Table 1 indicates when the successive revisions of the International Classification of Diseases (ICD) have been implemented in France. Note that the coding of causes of death at the national level in France started in 1925 with implementation of the 3rd Revision of the ICD.

Table 1. Periods of implementation of each ICD Revision in France

ICD Revision	Years Covered
3rd	1925-1930
4th	1930 ² -1943
5th	1944-1949
6th	1950-1957
7th	1958-1967
8th	1968-1978
9th	1979-1999
10th	2000-present

France adopted ICD10 in 2000.

The ICD, on which all cause of death statistics are based, has been revised many times since its original definition at the end of the past century. These revisions are as following.

ICD-3. Third Revision (adopted in 1920), used in France from 1925 to 1930.

ICD-4. Forth Revision (adopted in 1929), used in France from 1930 to 1943.

ICD-5. Fifth Revision (adopted in 1938), used in France from 1944 to 1949.

ICD-6. Sixth Revision (adopted in 1948), used in France from 1950 to 1957.

ICD-7. Seventh Revision (adopted in 1955), used in France from 1958 to 1967.

ICD-8. Eighth Revision (adopted in 1965), used in France from 1968 to 1978.

ICD-9. Ninth Revision (adopted in 1975), used in France from 1979 to 1999.

ICD-10. Tenth Revision (adopted in 1993), used in France from 2000.

²In 1930, causes of death were coded into both ICD-3 and ICD-4 (though in both cases, only the abridged classification system was used to publish cause-of-death statistics).

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Each successive revision brought changes in the number and definitions of items, more or less dramatically disrupting the continuity of the statistical series. To harmonize all these series six transitions were done by France Meslé and Jacques Vallin up to Ninth Revision, which was in use at that time. For now, Tenth Revision has now been used in France for twenty years and will soon be replaced by ICD-11, which has been adopted by the World Health Organization (WHO).

In 1930, when the 4th ICD Revision was first implemented, death counts were published in a relatively small number (43) of categories of the 3rd and the 4th ICD Revisions. This was not exactly a bridge-coding study since the two tables were produced independently and it is impossible to determine specifically how each death was coded in the two Revisions and cannot be used to compute detailed comparability ratios. A similar procedure was followed in 1944 to document the transition from the 4th to the 5th Revision of the ICD, and again in 1950 and 1951 for transition from the 5th to the 6th Revision. In each case, the tables are provided only for a broad grouping of cause-of-death categories (less than 50). The dual publication of death counts along two successive revisions of the ICD was however interrupted and no information is available to document the transition from the 6th to the 7th, the 7th to the 8th, and the 8th to the 9th Revision of the ICD.

The first and only actual bridge-coding study was carried out by INSERM for the transition between the 9th and 10th Revisions of the ICD. The study involved dual coding of a random sample of 10% of the death certificates into both classifications. However, given the relatively small number of total deaths in this country, the sample is too small to be very useful for a re-classification of deaths from ICD-9 to ICD-10 and it was decided not to produce an adjusted series of deaths for France.

7. Specifies of France cause-of-death classification

Death counts by cause, sex, and age at the national level are only available at the greatest level of detail (in terms of both age and cause) starting with ICD-7 in 1958. For the years 1950 and 1951, the published tables include deaths classified in ICD-6 along 587 3-digit categories of diseases and for the period 1952 to 1957, along 765 categories (also 3-digit only). For prior years, statistics are incomplete and cannot be used for the HMD. Between 1925 and 1936, death counts are only provided for a small number of categories (less than 50). There was no publication of cause-of-death statistics for years 1937 to 1939 and the original data have been lost. Then, from 1940 to 1949, data are missing for a handful of departments so that the statistics are not available at the national level. Consequently, this first HMD cause-of-death series for France is only provided for years starting with 1958, though work is under way to continue the series back to 1950.

Part III – reconstruction information

To perform transition from ICD9 to ICD10 in 2000 we are using list of items that was in use at that moment. Correspondence between ICD9 and ICD10 is established using all possible codes found in data and in nomenclature list of WHO. Such lists are called “full lists” meaning that they are exhaustive. However, since lists are subject to change in time (some new items appear as updates and some items disappear) the result of reconstruction procedure have to be harmonised with the newest version of classification – for the moment it is WHO 2016 ICD10 list.

Nevertheless, some changes are to be applied to Standard list of items as well as to mortality data. First, we have to pay attention that full list of items include only main (principal, underlined) causes of death. We do not consider asterisk, post-procedural codes, signs as symptoms because they could not provoke death alone, therefore, we eliminate them. The same is true for data. If some death was coded under code that do not signify underlined cause of death, such code was changed for the one present in the full list. Hence, some treatment was applied to the raw data, which is described in the section below. The recommendations for implementation of such changes are described in the Protocol for data validation.

8. Specific treatment of the raw data

8.1. Preparing ICD9 list and data (by Marketa Pechholdova)

Full ICD9 list for France includes **5190 items**. To compose such list different sources of information were used.

Creating full French list of items

Full French list was composed of two files. First file called “Cim9.dta” includes 5184 items – file provided by F. Mesle containing full icd9 list used in France. Second file “Common_icd9_list.dta” – file created from all existing icd9 codes used in France in the period of ICD9. The file contains 4265 items. 4 items are not contained in the cim9 list and were added. These are: 042.1, 043.1, 043.2, 043.9. After adding these 4 items, the full icd9 list contains 5188 items.

Some adjustments were made to French lists and data:

4-digit detail of item E848 was removed as it doesn't exist in any manual.

Item 7770 (asterisk code) was replaced by 2770

Item 7968 was replaced by 7969 (7968 was probably a mistake in French printed manual and subsequently in French data, in English manual the same item has code 7969).

The joined file with 5188 items is entitled cim9_common_icd9_list.dta.

Creating list of items from WHO ICD Translator

Source file is “Icdtrans.dta” – official document of correspondences given by the WHO. After eliminating asterisk codes and V codes, a total of 5176 items were extracted. These items were compared to the cim9_common_icd9_list.dta file.

While comparing (merging) icdtrans and French list, some modifications were made:

All AIDS codes were added;

Items 0629 and 7909 were added;

Items 2795 and 2796 were deleted, as they were not found in any manual.

The resulting file is called **FRA_icd9_full_list.dta** and contains 5190 items.

This file is the standard list for ICD9 data in France.

Adding titles

Text titles were added from the file `icd9_standard_list_corrected_titles.dta` (created previously from the Wolfbane page and corrected for more meaningful titles). Some items had missing titles due to: being 4-digit in Wolfbane list, but 3-digit in French ICD and Translator list, or due to the fact that they were missing in the Wolfbane list. The missing titles were completed either by own translation or from a web page Biobank (<http://biobank.ctsu.ox.ac.uk/crystal/coding.cgi?id=87&nl=1>). The completion of missing titles is documented in Excel file. For two items (0431,0432) titles were not found. The resulting items with titles are 5190 in total, and are in the file `FRA_icd9_full_list_titles.dta`.

Data correction.

As for testing data quality, there was only one inconsistency found for sex-specific diseases. One death referred to the code 072.0 “mumps orchitis” (which is normally male disease) was found for females in 1998. Therefore, it was recoded to 072.9 “Mumps without mention of complication”.

8.2 Preparing ICD10 list and data

I. Standard list correction.

To establish ICD10 full list of items for France the Standard list (created by Marketa Pechholdova) was used.

Some changes were applied to this list in order to keep it coherent with data appeared in statistics between 2000 and 2010. The summary of such changes is presented in Table 1. In general they are:

- Re-coding update codes that appeared between 2000 and 2010 into their old version (C80.0 C80.9, K85).
- Eliminating postprocedural codes that can not act as underlined cause of death and should be re-coded according to the Protocol (G97.8, I97.1, I97.8, J95.4, J95.8).

Table 1: Some corrections to the Standard list in order to make it consistent with data.

Item	Title	Year of occurrence	Number of death in the first year of occurrence	Problem	Action applied	Title
C80.0	Malignant neoplasm, primary site unknown, so stated	2000-2010		Update	replaced with C80	Malignant neoplasm without specification of site
C80.9	Malignant neoplasm, primary site unspecified	2000-2010	473	Update	replaced with C80	Malignant neoplasm without specification of site
G97.8	Other postprocedural disorders of nervous system	2006	1	Post-procedural code	replaced with Y83.9	Surgical procedure, unspecified
I97.1	Other functional disturbances following cardiac surgery	2004	1			
I97.8	Other postprocedural disorders of circulatory system, not elsewhere classified	2000, 2004, 2006	6, 2, 3			
J95.4	Mendelson syndrome	2000	4			
J95.8	Other postprocedural respiratory disorders	2000, 2004	1, 3			
K85.0	Idiopathic acute pancreatitis	2006-2010	2	Update	grouped to K85	Acute pancreatitis
K85.1	Biliary acute pancreatitis	2006-2010	43			
K85.2	Alcohol-induced acute pancreatitis	2006-2010	5			
K85.3	Drug-induced acute pancreatitis	2006-2010	3			

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	pancreatitis					
K85.8	Other acute pancreatitis	2006-2010	134			
K85.9	Acute pancreatitis, unspecified	2006-2010	624			
K91.8	Other postprocedural disorders of digestive system, not elsewhere classified	2004, 2006	2, 1	Post-procedural code	replaced with Y83.9	Surgical procedure, unspecified
K91.9	Postprocedural disorder of digestive system, unspecified	2004	1			
N99.8	Other postprocedural disorders of genitourinary system	2000	1			

Final list is called **Full list of items at 4-digit level**. It includes **10 121** items.

Data validation and correction.

In order to insure high quality of reconstructed data, the input data was also verified against set of checks described in the Protocol. Some small incoherencies were detected and required correction.

Summarising these changes are:

- Correcting sex-specific items (C62.9, C57.8, C57.9).
- Correcting age-specific items (Q00.0, R95, F53.0, F53.1)
- Correcting mistakes (C40, C80.3, C80.9, X59).

Table 2: Some corrections to the data in order to make it coherent.

Item	Title	Year of occurrence	Number of death in the first year of occurrence	Problem	Action applied	Title
Male-specific causes						
C62.9	Malignant neoplasms of testis, unspecified	2008	1	found among females	replaced with C80	Malignant neoplasm without specification of site
Female-specific causes						
C57.8	Overlapping lesion of female genital organs	2008	1	found among males	replaced with C80	Malignant neoplasm without specification of site
C57.9	Female genital organ, unspecified	2008	1			
Infant mortality						
Q00.0	Anencephaly	2001-2005	3	found in age older than 14 years (25, 30, 60, 70 years)	replaced with Q89.9	Congenital malformation, unspecified
R95	Sudden infant death syndrome	2002	113	found in age 70 years	replaced with R96	Other sudden death, cause unknown
Maternal mortality						
F53.0	Mild mental and behavioural disorders associated with the puerperium, not elsewhere classified	2000	1	found in age 90 years	replaced with F59	Unspecified behavioural syndromes associated with physiological disturbances and physical factors
F53.1	Severe mental and behavioural disorders associated with the	2010	1	found in age 80		

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	puerperium, not elsewhere classified			years		
Other mistakes						
C40_	Malignant neoplasm of bone and articular cartilage of limbs	2007-2008	1 1	mistake	replaced with C40.9	Bone and articular cartilage of limb, unspecified
C80.3	Does not exist	2000-2010	6604	do not exist	replaced with C80	Malignant neoplasm without specification of site
C80.6	Does not exist	2000-2010	3			
X59_	Exposure to unspecified factor	2007-2010	from 4 to 2973	mistake	replaced with X59.9	Exposure to unspecified factor causing other and unspecified injury

9.Reconstruction information

10.1 Transition from ICD9 to ICD10

Correspondence table.

Using WHO translator we received 2565 associations. Some of them particularly big, regrouping principal causes of each chapter together or 18 771 link. Therefore, we needed to break unnecessary links out. Such procedure was done after careful examination of associations to insure that we cut the weakest links that lead to simplifying of associations and not fragmentation. As a result we obtained 13 703 links. On the other hand, certain regrouping of small associations or creating additional links within the same association was done to insure balance and possibility to calculate transition coefficients. This resulted in extra 1 134 links. That together gave us correspondence table with 14 837 records.

The size of the correspondence file is 14 837 lines.

Full list of ICD9 of 1999 revision includes 5 190 items.

Full list of ICD10 of 2000 revision includes 10 121 items.

The number of associations is 3 868.

After associations were constructed, we verified 3868 series using program CheckDisruption to make sure that there is no big rupture.

how many elementary associations and which structure (number or 1:1, 1:N, N:1, N:N, including death counts)

Elementary associations and transitions coefficients should be provided as separate file

Describe specific problems

- If bridge coding is used, identify in detail how you proceeded (so far there is no standard procedure for using bridge coding in the reconstruction, the use will depend on the quality of the bridge coding etc.) Indicate how you used the bridge coding (i.e. separately for men and women, separately for infants and the rest of ages, separately for more detailed age groups etc.). Did you use all the correspondences of the bridge coding or did you apply some significance limits? Indicate whether you have used some validation algorithms to check for acceptance of sex- and age-restricted conditions.

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Redistribution of C97

Aposteriorly corrections

10. References

- Meslé F., and J. Vallin. 1996. Reconstructing Long-Term Series of Causes of Death: The case of France. *Historical Methods*, Spring, Volume 29(2): 72-87.
- Vallin, J. and F. Meslé. (1988). *Les causes de deces en France de 1925 a 1978*. Cahier Travaux et Documents no. 115, Paris: INED, 607 p.

11. Appendixes.

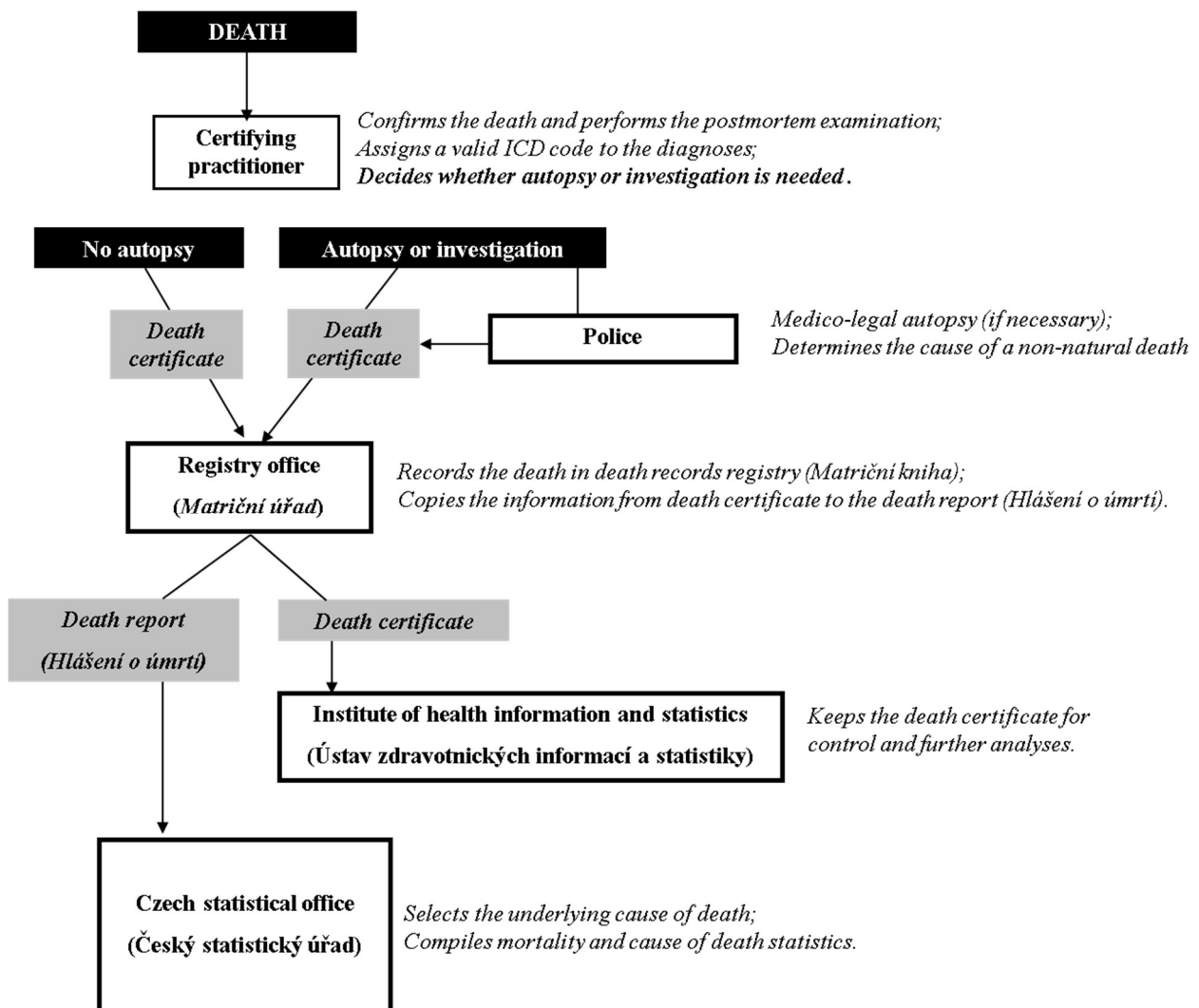


Figure 1 The transmission of the Czech death certificate

Collected data: Synoptic table

11.2 Deaths

Period	Type of Data	Age Grouping	Comments	RefCode(s) [†]
1958-2016	Annual number of deaths, by sex, detailed ICD code, and age groups with open interval for ages 100+.	0, 1-4, 5-9,... 95-99,100+,unk		30, 32, 34, 35

[†] The reference code is used in the raw data files (Input Database) to link data with sources.