

About Lithuania Data on Causes of Death

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General

The Lithuanian statistical office was established in 1921 under the name *Central Statistical Bureau*. Lithuania was incorporated into the Soviet Union as the Lithuanian Soviet Socialist Republic (SSR) in 1940, and until 1989 the Central Statistical Bureau was part of the *Central Statistical Office* of the Union of Soviet Socialist Republics (USSR). The first data on vital events covering the entire territory of Lithuania became available in 1953. However, the completeness of the data is unclear because a guerrilla war against the Soviet army lasted until the mid-1950s in some rural areas (Kiaupa et al., 2000). At the end of the 1950s, the Statistical Office of the Lithuanian SSR took several steps toward improving the registration system following several orders from the central and local authorities, especially concerning registration of deaths (Stukonis, 1958). The statistical data on vital events were kept in special “secret” files (*“Report on the Natural Increase and Migration in the Lithuanian SSR”*), which were compiled on an annual basis. Although the Statistical Office of the Lithuanian SSR has published population yearbooks since 1966, the data were made available only at the aggregate level, and they were restricted to “internal use”. Four population censuses (1959, 1970, 1979 and 1989) took place in Lithuania during the period of Soviet rule (1940-1989). Continuous population data series based on census data and intercensal estimates became available for Lithuania starting in 1959. However, detailed data on population (e.g., by single years of age) were never published during the Soviet period (except for census years). They are available only from unpublished manuscripts or tables. After restoration of independence in 1990, the main body responsible for population statistics in Lithuania was the Department of Statistics of the Government of the Republic of Lithuania (renamed as *Statistics Lithuania* in 2004). One of the first priorities became to improve the quality and comparability of national demographic data by following international standards, which were often ignored during the Soviet period. For example, the World Health Organization (WHO) definition of live birth was adopted in 1991, and the International Classification of Diseases replaced the Soviet classification in 1992. More detailed data on vital events have become available to scientists and the public from publications such as the Demographic Yearbooks of Lithuania or other more specialized statistical abstracts published annually by Statistics Lithuania. Data on population by single years of age and by urban/rural residence have been published in the special statistical abstracts (“Lithuanian population by age groups”). Since the beginning of the 2000s, very detailed demographic data by various characteristics have been available in the online database maintained by Statistics Lithuania. Vital statistics have been regularly published and publicly available since 1991 but not during Soviet times.

Under the Soviet period, Lithuanian cause-of-death data were processed and tabulated according to the Soviet classifications (in total, four soviet classifications were used: SC-1965, SC-1970, SC-1981 and SC-1988). In 1993, the WHO ICD-9 was implemented and later on since 1998 the last 10th ICD revision was in use.

Population and birth count data come from the Human Mortality Database (HMD). They, however, differ from HMD for infant deaths and births, where we applied our own corrections for infant death under-registration. The cause-specific data were obtained from Lithuanian or Russian archives (before 1990), or from Statistics Lithuania or WHO for 1991 onwards.

Territorial coverage

There were no territorial changes in Lithuania during the period 1956-2012.

Part I – Vital statistics and populations censuses

1. Death count data

Coverage and completeness

It can be assumed that death registration has covered the entire territory of Lithuania since the end of the 1950s. The registration system improved in the late 1950s, following special orders from the central and local Soviet statistical and health authorities (Stukonis, 1958). In general, the vital registration system has been highly centralized in Lithuania. Since the beginning of the 1990s, several new laws and regulations have been passed regarding the registration of deaths, yet the main principles remain largely similar to those used during the period of Soviet rule. Data quality is discussed on the HMD website, see: <http://www.mortality.org/hmd/LTU/InputDB/LTUcom.pdf>

Specific details: infant mortality

Until the end of 1990, the definition of an infant death differed from the one recommended by the WHO. Early neonatal deaths (i.e., those occurring within the first 7 days of life) were not registered if the birth weight was less than 1000 grams, the period of gestation was shorter than 28 weeks or the body length was shorter than 35 centimetres. Due to this restricted definition, a significant proportion of early neonatal (and total infant) deaths was underreported. Since 1991, the WHO definition of an infant death has been used to register infant deaths. According to the WHO definition, a live birth is defined as any delivered child showing evidence of life (respiration and heartbeat) (Statistics Lithuania, 2000).

Beyond HMD checks, we discovered non-negligible underestimation of infant mortality and decided to make appropriate corrections for all years before 1991. The first correction was applied to the years before 1974 in order to take into account the 1974 reform of the neonatal death certificate. The second correction was applied to the years before 1991 in order to take into account the 1991 adoption of the WHO definition of live birth. For more details see: Katus Kalev, Jasilionis Domantas, Meslé France and Vallin Jacques in the forthcoming “Data collection and mortality estimates after World War 2”, in Meslé France, Vallin Jacques, *et al.*, *Mortality and causes of death in the Baltic countries. Trends, patterns and differentials*.

2. Population count data

Coverage and completeness

Four population censuses (1959, 1970, 1979 and 1989) were organized in Lithuania during the Soviet period (1940-1989). Two censuses (2001 and 2011) have been conducted since the restoration of Lithuania’s independence in 1990. Official population estimates as of January 1st are based on census data and vital statistics on deaths, births and migration, and they have been produced by the Statistical Office of the Lithuanian SSR and the Central Statistical Office of the USSR for the periods 1960-1969, 1971-1979, and 1980-1988. All the population data for the period 1970-2011 correspond to the “permanently resident” population. Earlier population estimates for the 1960s are based on data from the census of 1959 and from the number of births, deaths, and migration for the years 1959-1969. Both the census and population estimates correspond to the “actually present population”. In the HMD, however, due to data quality issues, the official population estimates have been used only for the period since 1989, while new intercensal estimates for earlier years (1960-1988) were calculated following

the standard HMD methodology. Data quality is further discussed on the HMD website, see: <http://www.mortality.org/hmd/LTU/InputDB/LTUcom.pdf>

3. Birth count data

Coverage and completeness

The registration of births in Lithuania is centralized and complete. Data quality is discussed on the HMD

website, see: <http://www.mortality.org/hmd/LTU/InputDB/LTUcom.pdf> In order to account for a change in the definition of a live birth from 1991, we inflated total births counts before 1991 by the number of infant deaths added for under-registration.

Part II – Information on CoD collection

4. Death certificate

The systems of cause-of-death collection were different during Soviet times and after independence in 1991.

A) During the Soviet period

When a death occurred, the relatives of the deceased had to obtain a medical death certificate from the appropriate medical institution (hospital, polyclinic, or medical expert from the *Sudebno-Meditzinskaja Expertiza* (Forensic Bureau)) and to bring it to the civil registration office of the district (ZAGS). In that office, they were then given a death certificate that allowed them to bury the corpse and to settle the inheritance. On its end, the ZAGS sent the medical death certificate to the central statistical bureau, which was in charge of coding causes and producing death statistics.

Until the end of the 1950s, cause-of-death registration remained somewhat problematic: only medical doctors were allowed to put the cause of death on the death certificates, yet there were very few of them in some regions. In rural Lithuania in 1956-57, 20 % of death certificates were not established by medical doctors. Consequently, cause of death in the mid-1950s was not specified for a non-negligible proportion of deaths in Lithuania. In 1957, the cause was still unknown or ill-defined for 20 % of deaths. The situation improved after 1958, when the Health Ministry and the Goskomstat decided to allow sanitary auxiliaries, the so-called *feldshers*¹, to establish cause-of-death certificates when no medical doctor was available.

As in most countries, the medical death certificate distinguished three levels of causes of death: initial cause, direct cause and associated cause. Tabulations relied only on the initial (underlying) cause. Each year a standardized table (*forma* n° 5) gave the number of deaths by sex, age group and cause for at least the urban, rural and total population. The national tables were then centralized and totalized with those coming from other Soviet republics at the level of the whole Union by the USSR's Goskomstat. *Forma* n° 5 is the main source of information on mortality used in our study.

B) After independence

The current registration system is regulated by the 2002 law² and the Civil Code³. Deaths must be declared by the family of the deceased or, failing that, any person or institution informed about the death (neighbours, owner of housing, medical institution, police commissariat, etc.). The declaration must be made within 3 days after the death and be based on a medical certificate delivered by a physician or forensic expert. On the basis of medical death certificate, the Civil Registry Offices of cities, towns, or *rayon* (district) municipalities issue a death (burial) certificate that is compulsory for burying or cremating the corpse. In towns or rural areas where there are no such offices, the heads of the local communes (*seniunija*) are in charge of the registration. In the case of death abroad, such registration falls under the responsibility of the Lithuanian consular institutions (embassies). The Civil Registry Office records the death in the Central Database of Population Register. Every 24 hours, death record

¹ Professionals of the Soviet health care system with intermediate medical qualification (between midwives and medical doctors).

² Law on Registration of Death and Other Critical States, Nr. 43-1601, April 4, 2002.

³ Law on Civil Code, Nr. VIII-1864, July 18, 2000.

information (together with medical death certificate data on causes of death) is downloaded by Statistics Lithuania via on-line access.

According to the 1998 order of the Ministry of health “*Concerning the procedure of confirmation of the medical certificate of death*”, the information about causes of death is confidential. However, the confidentiality is not really applied to the family, which in many cases delivers the medical certificate to the local authority and can access the information.

5. Cause-of-death coding

The codification of causes of death during the Soviet system was centralized at the republic level by the Lithuanian statistical office. In the current system, the coding of causes of death is carried out by the physician or forensic medical expert who has issued the medical death certificate. Afterwards, codes are checked by specialists of Statistics Lithuania. If the latter have doubt, they ask the physician or forensic expert to re-examine his or her coding.

6. Classifications in use and collected data

6.1 Classification changes

The Soviet Union never used the *International Classification of Diseases, Injuries and Causes of Death* (ICD) of the World Health Organization (WHO), but instead relied on its own classification. This consisted of about 100 groups of causes until 1964 and was then expanded to about 200 items. Since the foundation of the USSR, seven different versions of the Soviet classification were successively in use, five of which were after WW2. The USSR health ministry and the GOSKOMSTAT were jointly responsible for any changes in the medical death certificate and in the rules for registration and codification⁴, as well as for adopting successive revisions of the classification.

During the period studied here, which begins in 1956, four successive versions of the Soviet classification were used in the Baltic countries: those adopted in 1952, 1965, 1970, and 1981. Furthermore, two less important changes were made in the meantime: in 1957, the 1952 version was slightly changed in regard to maternal deaths; and in 1988, the 1981 version was shortened by cancelling the distinction between work accidents and other accidents. After independence, the Soviet classification of causes of death remained in use for 2 years until the adoption of ICD-9 in 1993. Finally, it was decided to use ICD-10 in 1998.

Two peculiarities characterized the Soviet system of registering and classifying causes of death, and they deserve additional comments:

1. In spite of some tendencies toward growing closer to each other, the Soviet classification always maintained important differences from the ICD. In particular, the number of items increasingly became much less those that of the ICD. While the number of items in the Soviet classification evolved from 100 to 200 during the period of interest, that of the ICD grew from more than 2000 (ICD-7) to more than 5000 (ICD-9).
2. From 1964 to 1987, some items in the Soviet classification were excluded from the regular statistical tables (*forma 5*): corresponding causes (cholera, plague, suicide, homicide and work accidents) were kept secret for political reasons. To make sure the sum of deaths by cause fit with the total registered deaths, deaths attributed to these “hidden” causes were mixed with deaths of ill-defined or unknown causes. However, hidden causes were computed separately in a special top secret table (*forma 5b*). The reason why Soviet authorities decided to keep these causes of death secret is not a mystery: in 1970, for example, the age-standardized male mortality rate by homicide in the Soviet Union was eight times higher than the European average. The Soviet power preferred to prevent any internal or external

⁴ As far as we know, for the post-WW2 Soviet period, new rules were edicted in at least 1954, 1964, 1966, 1974, 1980, 1984, 1986, 1989.

observers from accessing such information, as it was considered too politically dangerous.

6.2 Collected data

Table 1 summarizes information about the data collected for the reconstruction.

Table 1. Overview of the collected data for Lithuania

Period in use	Classification	Acronym	Number of items	Number of age groups	Age group format	Data type
1956-1964	4 th Soviet Classification	1952-SC	116	18	0 year, 0-27 days, 1-2 year, 3-4, 5-6, 7, 8-9, 10-14, 15, 16-17, 18-19, 20-24, 25-29, 30-39, 40-49, 50-59, 60-69, 70+ (and unknown age)	Paper
1965-1970	5 th Soviet Classification	1965-SC	210	23	0 year, 0-27 days, 1 year, 2, 3, 4, 5-9, 10-14, ..., 80-84, 85+ (and unknown age)	Paper
1970-1980	6 th Soviet Classification	1970-SC	185	23	0 year, 0-27 days, 1 year, 2, 3, 4, 5-9, 10-14, ..., 80-84, 85+ (and unknown age)	Paper, but electronic in 1971, 1976 and 1980
1981-1987	7 th Soviet Classification	1981-SC	185	23	0 year, 0-27 days, 1 year, 2, 3, 4, 5-9, 10-14, ..., 80-84, 85+ (and unknown age)	Electronic
1988-1992	7 th Soviet Classification, revised	1988-SC	175	23	0 year, 0-27 days, 1 year, 2, 3, 4, 5-9, 10-14, ..., 80-84, 85+ (and unknown age)	Electronic
1993-1997	9 th International Classification of Diseases	ICD-9	5,600	19	0 year, 1-4, 5-9, 10-14, ..., 80-84, 85+ (and unknown age)	Electronic
1998	10 th International Classification of Diseases	ICD-10	>10,000	19	0 year, 1-4, 5-9, 10-14, ..., 80-84, 85+ (and unknown age)	Electronic
1999	10 th International Classification of Diseases	ICD-10	>10,000	29	0 year, 0 day, 1-6 days, 7-27 days, 28-365 days, 1 year, 2, 3, 4, 5-9, 10-14, ..., 90-94, 95+ (and unknown age)	Electronic
2000	10 th International Classification of Diseases	ICD-10	>10,000	19	0 year, 1-4, 5-9, 10-14, ..., 80-84, 85+ (and unknown age)	Electronic
2001-2014	10 th International Classification of	ICD-10	>10,000	29	0 year, 0 day, 1-6 days, 7-27 days, 28-365 days, 1 year, 2, 3, 4, 5-9, 10-	Electronic

	Diseases				14,..., 90-94, 95+ (and unknown age)	
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6.3 Data sources

The data for period 1956-1958 were obtained from the Lithuanian National Archives. Data for years 1959-1990 were gathered from the Russian State Economical Archives (RGPE).⁵ Data for years 1991-1998 and 2000 were obtained from the Lithuanian statistical office, and the remaining data (year 1999, years 2001-2012) were downloaded from the WHO mortality database.⁶

6.4 Specific treatment of the raw data

For the years covered by ICD-9 (1993-1997) and by ICD-10 (since 1998), data were available at least at the 3-digit level (and often at the 4-digit level); but taking into account the small number of deaths, the reconstructions between these two classifications and between ICD-9 and the last Soviet classification were performed on the basis of abridged lists (214 groups of items for ICD-9 and 211 for ICD-10) (see Annex 2).

Deaths of unknown age were redistributed among each cause of death proportionally to deaths of known age.

Estimated non-registered infant deaths were redistributed proportionally within perinatal causes and congenital anomalies (items P00-Q99 in ICD-10).

7. Specific transition documents

No documents related to the transition were produced by the statistical office. No double coding was used in the years of transition.

Part III – Reconstruction information

8. Reconstruction of coherent time series

A total of six transitions were carried out, while the available death statistics by cause were regulated successively by seven classifications. The overview of the transitions is given in Table 2.

Table 2. Elementary associations by type and transition

Transition	Type of associations				
	1:1	1:N	N:1	N:N	Total
From 1952-SC to 1965-SC	24	7	0	26	57
From 1965-SC to 1970-SC	81	4	9	28	122
From 1970-SC to 1981-SC	128	3	4	14	149

⁵ Fund n° 1562 : opus 27 (ed. 833, 1023, 1187, 1328, 1464, 2632, 2638, 2655-2658, 5873, 5874, 5881, 9742, 9743, 9752, 9753), opus 33 (ed. 980, 1361, 1700, 6627, 6984, 7320, 7652, 7933), opus 34C (ed. 174, 356, 529, 701, 882), opus 44 (ed. 2625, 2655-2658), opus 45 (ed. 2368, 2369, 5873, 5874, 5881, 9742, 9743, 9752, 9753), opus 46 (ed. 1587, 1588, 1595, 1596), opus 47 (ed. 1430, 1431, 1438, 1439), opus 48 (ed. 1289, 1290, 1299, 1300), opus 49 (ed. 1859-1860, 1869-1871), opus 50 (ed. 1758, 1759, 1768-1770), opus 55 (ed. 1908, 1909), opus 56 (ed. 1936, 1937, 1947, 1948).

⁶ http://www.who.int/healthinfo/mortality_data/en/

From 1981-SC to 1988-SC	165	0	7	2	174
From 1988-SC to ICD-9	128	13	1	12	154
From ICD-9 to ICD-10	168	3	6	11	188

Specific problems

For the transition between 1952-SC and 1965-SC, four specific problems were encountered:

- 1) The period covered by 1965-SC (5 years 1965-1969) was too short, which made checking the results more difficult. The solution was to base the work on Russian data.
- 2) The number of items was much lower in 1952-SC (116) than in 1965-SC (210). It was found to be advantageous if we reconstructed the total death series first in the reverse direction (redistributing 1965-SC deaths into 1952-SC items) and then in the correct direction (redistributing 1952-SC deaths into 1965-SC items) automatically by age and sex.
- 3) The 1965-SC was not applied fully in 1965 but in 1966. These 1965 anomalies were treated by *a posteriori* corrections.
- 4) The 1952-SC was modified slightly in 1957 (item 110 was suppressed and items 108 and 109 were slightly reshaped). The solution here was not to treat it as the set of a new classification, but to instead just adjust 108 and 109 for the previous years and drop 110.

For the transition between 1965-SC and 1970-SC, no major specific problem occurred. The period covered by 1965-SC is short (5 years), but the Soviet classification grew increasingly closer to the ICD while the number of Soviet items was diminishing (from 211 to 185). This, however, did not represent any great difficulty, as the number of complex associations was low.

For the transition between 1970-SC and 1981-SC again, no particular difficulty was encountered.

Between 1981-SC and 1988-SC, the classification changes were limited to external causes. Most of them were just merged (the number of items dropped from 185 to 175), but some were more complex and required applying the regular process of reconstruction.

For the transition between 1988-SC and ICD-9, two specific problems occurred:

- 1) Moving from 175 items (1988-SC) to about 5600 items (ICD-9) while dealing with very small numbers of deaths. As a solution, we worked with a list of ICD-9 items reduced to 214 groups. These groups were built on the basis of 3-digit ICD-9 items, except in one case that concerned heart diseases, which required the 4-digit detail in order to fit with the “intermediate” list of 107 causes common to all countries of the MODICOD project.
- 2) The period covered by 1988-SC was too short (1988-1992) to check the continuity of the results efficiently. However, the problem was limited to external causes. The trends were reconstructed for almost all causes and were then re-checked for external causes when the 1981-1997 data were reclassified into 1988-SC.

The transition between ICD-9 and ICD-10 represented no specific problem. As for ICD-9, thousands of ICD-10 items were grouped into an abridged list (211 groups) that was compatible with the intermediate list of 107 items proposed for the MODICOD project.

A posteriori corrections

A posteriori corrections were applied for year 1965, when an incorrect transition to a new revision took place. At the end of the reconstruction process, total deaths by age groups were adjusted to fit with HMD data (from 1959), except at age 0 before 1991 (to take into account the correction of infant deaths for under-registration).

9. Redistribution of ill-defined causes of death

Ill-defined causes of death were redistributed proportionally among other causes of death and accidents for the whole period.

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List of acronyms

SSR - Soviet Socialist Republic

GOSKOMSTAT - Central Statistical Office of the USSR

RGPE - Russian State Economical Archives

ZAGS - *Zapis' aktov grazhdanskogo sostoiania*, Registry of Acts of Civil Status

MODICOD - Mortality Divergence and Causes of Death