ABOUT MORTALITY DATA FOR SWITZERLAND

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GENERAL

The first federal population census in Switzerland was conducted in 1850, and the Swiss Federal Statistical Office was founded in 1860 (Calot, 1998: p.5). The first modern census was that of 1860; since then, decennial censuses have been taken, with the exception of 1888 and 1941 (Goyer and Draaijer, 1992: p. 457). In 1870, vital statistics were standardized at the national level.

Source of Data

Most of the data included in the Human Mortality Database (HMD) for the period up to 1996 come from a 1998 publication of the Swiss data, directed by Gérard Calot, Director of the Observatoire Démographique Européen (ODE) and Inspector-General of the Institut National de la Statistique et des Études Économiques (INSEE) (Calot, 1998). This publication includes graphical presentations of demographic data and a CD-ROM with the data upon which those graphics are based. Several tables that were not included in the graphical presentation are also included on the CD-ROM (e.g., death counts). Data for recent years were provided in an electronic format by the Swiss Federal Statistical Office. Other data come from the Kannisto-Thatcher Database (Andreev, 2001), which also originally came from the Swiss Federal Statistical Office and is currently maintained by the Max Planck Institute for Demographic Research (www.demogr.mpg.de).

Specific Episodes in Swiss Demographic History

Calot (1998) notes that:
- The influenza epidemics in 1918-19, 1926-27, and 1969-70 resulted in an increase in deaths and a decrease in births nine months later.
- The 1965 cohort is the largest cohort due to high birth rates during that year and a high number of immigrants who were born in that year (but immigrated later).
- The most rapid declines in age-specific probabilities of dying (especially among females) occurred between 1940 and 1950.
- Since 1880, there has been an excess of male mortality relative to female mortality.

TERRITORIAL COVERAGE

To the best of the authors' knowledge, there have been no territorial changes in Switzerland during the period covered by the HMD data. According to Thompson (1999, p. 125), the European powers added three cantons in 1815, "two French-

speaking ones (Neuchâtel and Geneva), and the bilingual Valais, thereby completing the boundaries of present-day Switzerland."

Switzerland is currently divided into 26 cantons; the 26th canton was added when Jura was formed out of Bern in 1980 (Goyer and Draaijer, 1992).

DEATH COUNT DATA

Coverage and Completeness

Swiss death count data represent the de jure resident population rather than the de facto population. Deaths to residents may be under-represented, especially before 1987, due to incomplete coverage of those residents who died while outside of Switzerland.

Official death counts for 1876 to 1996 were published on a CD-ROM, Swiss Demographic Data (Calot, 1998). However, deaths by single year of age were not included beyond age 98. Therefore, whenever possible death counts by single year of age from age 99 to the maximum age attained have been obtained from additional sources. It has not been possible to obtain reliable data for ages 99+ for the years prior to 1950. Therefore, death counts for age 99 and over during the period 1876 to 1949 are included as an open age interval. Deaths for years until 1968 come from this CD-ROM.

There were some problems with the completeness of death registration prior to 1900 (see note in the "Data Quality Issues" section). Other than these problems, the data are believed to be of high quality.

In 2018 the death counts for 1986-2014 were supplemented with the late registration deaths data made available by the Swiss FSO.

For the years 1969-2021, death counts classified by age-period and period-cohort with no open age group were provided in an electronic file from the Swiss Federal Statistical Office.

POPULATION COUNT DATA

Coverage and Completeness

Population counts in Switzerland refer to the de jure resident population; this includes both citizens and foreign residents who have been in the country for at least 12 months. It excludes persons who have lived in Switzerland for less than 12 months (Calot, 1998 p. 223). Until December 31st 2010, asylum seekers were also excluded from the resident population statistics. Since this date, asylum-seekers who have lived in Switzerland for at least 12 months are included in the resident population. This definition change has a trivial effect on population

counts for purposes of mortality estimates, and is not accounted for with a territorial adjustment.

There were some problems with the completeness of the 1880 census (see note in the "Data Quality Issues" section).

Specific Details

- The "official" population estimates for 1861 to 1997 were published on the Swiss Demographic Data CD-ROM (Calot, 1998).
- For the years 1998-2001, the Swiss Federal Statistical Office provided additional electronic files (unpublished tables) with population estimates by sex and completed age.
- Data for the years 2001-2009 (December 31st) use official population counts published on the Swiss Statistics website for ages 0-98, and Eurostat population counts (Jan 1st, years 2002-2009) to complement for ages 99-110+.
- Data for the years 2010-2021 (December 31st), ages 0-110+, were provided electronically by Swiss Statistics.
- From 1850 to 2000, the census provided important information every 10 years on the structure of the population in Switzerland. In 2010, a fundamental change took place, and the population census was replaced by a system based on information from existing administrative registers. Since then, the census is conducted and evaluated on an annual basis in a new form by the Federal Statistical Office (FSO). Annual intercensal population estimates (called ESPOP statistics) were replaced in 2010 by the annual Population and Households Statistics (STATPOP), based on registers. STATPOP is based on two official registers: the official and harmonized register of persons of the Swiss Confederation, the cantons and the communes and the Federal register of buildings and dwellings. Data are transmitted through electronic channels. (Swiss Statistics, 2012).

BIRTH COUNT DATA

Coverage and Completeness

Switzerland follows World Health Organization guidelines for the definition of live births. Birth counts refer to the de facto population until 1986 and to the de jure population since 1987.

Prior to 1900, there were some problems of under-registration of live births (see the section on "Data Quality Issues). Other than this, the data are believed to be of high quality.

Specific Details

- The publication of the Swiss Demographic Data (Calot, 1998) includes the total annual number of live births but these data are not disaggregated by sex.
- The number of live births by sex for the period 1871-2001 used in the HMD come from additional electronic files (unpublished tables), sent by the Swiss Federal Statistical Office.
- Birth counts for years 2003-2021 were retrieved from the Swiss Statistics website.

DATA QUALITY ISSUES

- The HMD estimates for the probability of dying before age 1 (q_0) differ somewhat from those published by the Swiss Federal Statistical Office (Calot, 1998), particularly for the years 1876-1879 (their estimates being about 6-7% lower than those of the HMD). The discrepancy results from the fact that the Swiss Federal Statistical Office uses the partial quotients method to calculate the probabilities of death rather than the method followed by the HMD (see the Methods Protocol for details).
- There are also some strange patterns of implied migration (i.e., based on comparing the difference between subsequent population estimates for a cohort after accounting for the deaths occurring to that cohort during the interval) in the periods 1876-1879 and 1952-1959. In the former case, there appears to be a high level of immigration of infants (at age 0), and in the latter case, implied migration appears to be very erratic over the age range with large peaks (at ages 29 and 34) and valleys (at ages 24 and 39). The Swiss Federal Statistical Office provides the following explanation for these patterns[1]:
  - The pattern of migration in the period 1876-1880 results from some inconsistencies in the figures used to compute the estimates. For some cohorts, there was an inconsistency between the number of registered live births and the population counted in the census some years later (for example the 1876 cohort). There were also some problems with the registration of deaths. There are no historical statistics on migration flows at that time, but there is no reason to believe in a sudden immigration of families with infants. Live births were underestimated in 1876 (and mortality increased in the first years of life, by about +20%, because of a shortage of food). So, it seems that some infant deaths were recorded while their births had never been recorded in the birth registration. Also, there was a change in the registration system in 1876 which had a corrupting influence on the coverage of live births. Finally, population counts from the 1880 census are not reliable.
  - The patterns observed in the 1950s have also been documented by Gérard Calot. The population estimates were produced using, in addition to the sources mentioned earlier, some estimates of the Swiss

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[1] Personal communication, April 6th, 2003, translated into English and summarized with the help of Stéphane Cotter.

population for 1946-1980 in five-year age groups. These data are not consistent with the population counts at completed ages recorded in the censuses, as the computed totals do not always match the published totals, and they are not consistent with the estimates of migration during the years 1950-1960 or with the recorded deaths.

- Population estimates for ages 80+ from approximately 1990 until December 2010 were discovered to be overestimated by 5-10% when changes were made in the estimation methodology at the Swiss Federal Statistical Office[2]. This overestimation does not affect HMD estimates, however, since these ages are mostly replaced with estimates from the extinct cohort method and the modified survivor ratio method[3].

REVISION HISTORY

Changes with the December 2017 revision:

Life tables: All life tables have been recalculated using a modified methods protocol. The revised protocol (Version 6) includes two changes: 1) a more precise way to calculate a0, the mean age at death for children dying during the first year of life and 2) the use of birth-by-month data (where and when available) to more accurately estimate population exposures. These changes have been implemented simultaneously for ALL HMD series/countries. For more details about these changes, see the revised Methods Protocol (at http://v6.mortality.org/Public/Docs/MethodsProtocol.pdf), particularly section 7.1 on Period life tables and section 6 and Appendix E, on death rates. The life tables calculated under the prior methods (Version 5) remain available at v5.mortality.org but will not be further updated.

Changes with the May 2018 revision:

Deaths: the mortality statistics for years 1986-2016 were supplemented with the late registration deaths for this period, amounting to 112 net additional deaths between 1986 and 2014, as compared to the previous updates for years in this range. These additional deaths were distributed throughout the entire time interval and across the entire age range. In some years and some ages, minor deaths redistribution occurred between adjacent years.

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[2] Swiss Statistics switched from the ESPOP instrument to STATPOP on December 31st, 2010. Population estimates were available from both systems on this date and showed ages 80+ to be overestimated. STATPOP is considered to be a more rigorous framework (Swiss Statistics, 2012).
[3] More information is available on request.

ACKNOWLEDGEMENTS

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APPENDIX:

DESCRIPTION OF DATA USED FOR LEXIS DATABASE

DEATHS

Period	Type of Data	Age Grouping	Comments	RefCode†
1876-1949	Annual number of deaths to resident (de jure) population, by sex, age, and birth cohort (Lexis triangle) to age 99+	0, 1,…98, 99+	Only the open age interval for age 99+ is included due to data problems (see comments under "Deaths at Age 99+").	2
1950-1968	Annual number of deaths to resident (de jure) population, by sex, age, and birth cohort (Lexis triangle)	0, 1, …maximum age	ages 0-98 from Calot (2), ages 99+ from Kannisto Thatcher Database (3)	2, 3
1969-2021	Annual number of deaths to resident (de jure) population, by sex, age, and birth cohort (Lexis triangle)	0, 1, …maximum age		24, 32, 36, 40, 44, 48

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

POPULATION

Period	Type of Data	Age Grouping	Comments	RefCode
1876-1989	Annual population estimates for permanent resident (de jure) population as of January 1st, by sex and age to age 99+	0, 1, …98, 99+		1
1990-2000	Annual population estimates for permanent resident (de jure) population as of December 31st, by sex and age to age 99+	0, 1, …98, 99+	BFS (ESPOP system)	26
2001-2009	Annual population estimates for permanent resident (de jure) population as of Dec 31st, by sex and age to age 110+	0, 1, …98, 110+	Ages 0 – 98 from BFS (ESPOP system) (Dec 31st), ages 99-110+ from Eurostat (Jan 1st, year incremented by 1)	27
2010-2021	Annual population estimates for permanent resident (de jure) population as of December 31, by sex and age to age 110+	0, 1, … 110+	BFS (STATPOP system)	31, 35, 39, 43, 47

BIRTHS

Type of data: Annual live birth counts by sex.

Period covered: 1871 - 2021

RefCode(s): 6, 9, 21, 23, 25, 33, 37, 41, 45, 49

BIRTHS BY MONTH

Type of data: Annual live birth counts by month

Period covered: 1871 - 2021

RefCodes: 30, 34, 38, 42, 46, 50