

ABOUT MORTALITY DATA FOR POLAND

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GENERAL

The Central Statistical Office (CSO) is the main body responsible for population statistics in Poland. Demographic data at the national level are collected through a network of 16 regional statistical offices (CSO, 2008).

Demographic data are published on a regular basis in annual population yearbooks. In addition, the CSO of Poland publishes special reports or statistical abstracts devoted to specific demographic processes (e.g. mortality by causes of death, detailed data from the population census, etc.). Very detailed data on deaths, births, and population for the most recent years are freely available via internet databases maintained by the CSO (<https://stat.gov.pl/en/>).

Since the end of the Second World War, eight national censuses have taken place in Poland:

1. The 1950 census (3 December 1950)
2. The 1960 census (6 December 1960)
3. The 1970 census (8 December 1970)
4. The 1978 census (7 December 1978)
5. The 1988 census (7 December 1988)
6. The 2002 census (20 May 2002)
7. The 2011 census (31 March 2011)
8. The 2021 census (31 March 2021)

In addition, a Summary Population Census was conducted on February 14, 1946. Three micro-censuses (based on sample surveys) were conducted in 1974, 1984, and 1995.

During the period 1958-1994, data on deaths and births were classified using national definitions that were not fully comparable with international classifications. During the 1990s, the CSO of Poland took several steps to meet international standards for classifying demographic data. The most important change concerns the introduction of the World Health Organization (WHO) definition of births and infant deaths in July 1994. The CSO Poland revised the data on infant deaths (according to the WHO definition) back to 1970.

Source of data

The current HMD series cover the period starting from 1958 onwards. Data are available on births, deaths, and population counts for earlier periods, including the inter-war period. However, these data vary notably in their degree of completeness, quality, and level of

detail, especially for the post-war years which have been affected by very large migration waves and border changes. Very significant border changes occurred during the early 1920s and immediately after the Second World War. Extension of the series back to the 1950 census is further complicated by problems with the 1960 census (see the section on Data quality issues), large irregular migration waves, and the lack of detailed data.

Official data on births, deaths, and population are published by the Central Statistical Office of Poland (in computerized data files). These data also include computerized datasets containing unpublished demographic data for the period of communist rule (1958-1988). Some of the original data used for HMD were collected from the state archives by Agnieszka Fihel (University of Warsaw, Poland).

TERRITORIAL COVERAGE

There were no territorial changes in Poland during the period covered by the available data (1958-2023).

DEATH COUNT DATA

Coverage and completeness

To our knowledge, during the period 1958-2023, registration of deaths was complete and covered the whole territory of Poland.

Specific details

The most important limitation of the data on deaths concerns a more restrictive definition of infant deaths than that used by WHO that was in force until the 1st of July 1994. According to the pre-1994 Polish definition, early neonatal deaths (i.e., within the first 7 days of life) were not registered if the birth weight was less than 601 g (CSO, 2007). This definition was different from that proposed by WHO and led to an under-estimation of infant deaths in Poland. Since the 1st of July 1994, the WHO definition of a live birth has been used in Poland. This shift in registration procedures has resulted in a $\approx 20\%$ increase, on average, in infant death rates (CSO, 2007). The CSO of Poland has produced an adjusted series of infant deaths (to conform to the WHO definition) for the years 1970-1994 (used for the HMD).

Evidence from the post-communist countries show that estimates of mortality at older ages should be treated with caution due to age overstatement and age heaping problems (Anderson & Silver, 1997). Kannisto suggested that the Polish mortality data are of "conditionally acceptable quality" (Kannisto, 1994). We did not find any serious evidence of age heaping or age overstatement problems in Poland (see Figure 2 in Appendix 2). Life table estimates for ages above 65 also look plausible when compared with the high quality Swedish data.

POPULATION COUNT DATA

Coverage and completeness

Seven population censuses (1960, 1970, 1978, 1988, 2002, 2011, and 2021) were conducted in Poland during the period of observation (1958-2022). The Central Statistical Office of Poland produced a series of post-censal population estimates (as of December 31st) for the inter-censal years 1970-1977, 1978-1987, 1988-1999, 2002-2010, 2011-2020 and 2021 onwards. The reference date for estimates during 1996-1999 was January 1st. The official population estimates for 2000-2002 were recalculated backwards from the results of the 2002 census. The population estimates for the period 1958-1960 are pre-censal estimates calculated according to the HMD Methods Protocol. Due to discontinuities between different series, official post-censal population estimates have been used for the periods 1978-1987 and since 2011, while for the years 1960-1977 and 1989-1999 new inter-censal estimates were calculated following the HMD Methods Protocol. For the most recent inter-censal period 2002-2010 and for the two years preceding the 2002 census (2000-2001) we used inter-censal population estimates recalculated back from the most recent census of 2011. These estimates by single year of age have been produced by Krzysztof Tymicki (Institute of Statistics and Demography, Warsaw School of Economic) in cooperation with the Central Statistical Office. It should be noted that these population estimates are not official population estimates and they have never been published by the CSO. The officially published age-specific inter-censal population estimates revised according to the 2011 census are published only for the year 2010 whereas the official data for the years 2002-2009 refer to previously published post-censal population estimates based on the 2002 census. The latter series are based on previously used definitions of population (permanent or temporary resident concepts). Due to high and irregular migration during the inter-censal period, the HMD methodology of inter-censal estimation was not applicable either. The officially published age-specific population estimates revised according to the 2021 census are published only for the year 2020 (as of December 31), whereas the official data for the years 2010-2019 refer to previously published post-censal population estimates based on the 2011 census.

Specific details

During the period covered by the HMD (1958-2023), there were four different definitions of population used for demographic statistics (CSO, 2007). During the years 1958-1982, population statistics referred to the currently resident (*de facto*) population. From 1983 to 2005, population statistics covered the population registered as permanent or temporary (at least 2 months) residents. Starting in 2006, the definition was modified so that temporary residence referred to those in the country for at least 3 months. Finally, a more recent change was introduced with the 2011 census. Following this census, a new concept of “usual residence” was introduced in population statistics. The new official definition includes as usual residents all the individuals who are living in Poland (whether as permanent residents or as immigrants holding and not holding permanent residence

cards) and even those (officially) declaring their intention to live in Poland for at least one year. This definition excludes people who officially declared to the authorities their departure abroad for a period of more than one year. Judging from the official data on population estimates, we assume that emigrants who do not officially declare their departure to the authorities are still considered as usual residents (despite de facto residing abroad for longer than one year).

The new definition creates a spurious increase in population numbers. The transition from the previously used permanent or temporary residence concept (population estimates until 2000) to the usually resident concept (unofficial inter-censal population estimates based on the 2011 census) for the year 2000 and onwards is thus treated in the HMD as a territorial change in order to make the appropriate adjustments to the formulas for calculating death rates (see the HMD Methods protocol for a description of the method), with the goal of ensuring consistency between the numerators and denominators of the rates.

For most years, data are available by single years of age up to an open-ended interval (90+, 95+, 100+, and 101+). Unfortunately, for some years during the 1970s, the data were available only up to age 75+ (1972 and 1974). Therefore, we calculated our own inter-censal population estimates instead of using the official data for the period 1970-1977. It should be noted that the December 31st population estimates for 1978 (instead of the census counts as of 7.12.1978) are treated as a “pseudo-census point” for the end of the inter-censal interval and used the 1970 census counts for the start of the interval. We then applied our standard inter-censal survival method (as described in the HMD *Methods Protocol*) to derive January 1st population estimates for 1971-1978.

The official population estimates, births, and deaths published by the CSO do not include the recent refugees from Ukraine who arrived to Poland under the Temporary Protection Directive (Council Implementing Decision 2022/382 of 4 March 2022). The statistics on this refugee population residents are maintained in a special population register dedicated to persons with temporary protection status (so-called PESEL-UKR). These data are not included into the central population register dedicated to the Polish citizens and foreign citizens living in Poland on permanent basis (so-called PESEL).

BIRTH COUNT DATA

Coverage and completeness

To our knowledge, the registration of births is considered complete and covers the entire territory of Poland.

Specific details

Until the 1st of July 1994, the definition of a live birth differed from the WHO definition (CSO, 2007). A live birth was defined based on the following criteria: evidence of life (i.e., respiration after separation from mother's body) and birth weight of 601 grams or greater.

Infants who did not meet these criteria and died within their first week of life were not counted as live births or as infant deaths but rather were counted under the separate category of “unable to live, born with signs of life” (CSO, 2007). Only if these newborns survived more than seven days were they registered as live births and infant deaths. Thus, due to this stricter definition, a portion of the live births and infant deaths was not recorded as such.

Since the 1st of July 1994, the WHO definitions of a live birth and an infant death have been used by CSO Poland (CSO, 2007). A live birth refers to “the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life (e.g. beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscle) whether or not the umbilical cord has been cut or the placenta is attached”. Each product of such a birth is considered live born.

DATA QUALITY ISSUES

Problems around the population census of 1960

The 1960 census counts show a notable dip in the number of males at ages 20, 21, and 22 (Figure 1). The reason for such a sudden drop in official male population counts is unknown. These ages correspond to the conscript ages (at that time) and it is possible that male conscripts were excluded from official population counts. Such practice was also discovered in some other countries (see Background and Documentation file for Northern Ireland, for example). In addition, the corresponding dip in male counts is not visible in the 1970 census data. The CSO Poland also produced a revised population estimate for 1960 (as of December 31st, 1960). The revised data do not show any drop in male counts at these ages (Figure 2). Therefore, for estimation of the inter-censal population estimates for 1960-1969, we used the revised population estimate for 1960 (as of December 31st, 1960) as a “pseudo-census point”.

Problems regarding official population estimates

There are some discrepancies between different series of official post-censal population estimates (Figure 3). First, there is a discontinuity between the population estimate for 1969 based on the 1960 census data and the population estimate for 1970 based on the 1970 census data. This is related to unregistered emigration during the 1960s. Therefore, we calculated our own inter-censal population estimates for the period 1960-1969. It should be noted that we used the December 31st population estimate for 1960 (instead of the census counts as of December 6th, 1960) as a “pseudo-census point” for the start of the inter-censal interval and the 1970 census counts for the end of the interval. We then applied our standard inter-censal survival method (as described in the HMD *Methods Protocol*) to derive January 1st population estimates for 1960-1970.

Second, there is a very sudden drop in the official total population estimate between 1999 and previously published post-censal estimates for the years 2000 onwards (Figure 3). According to these official data, the total number of males decreased by about 246

thousand between these two years. This discontinuity is due to the fact that population estimates for 1988-1999 are the post-censal estimates based on the 1988 census, whereas the corresponding figures for 2000 onwards refer to the series of revised population estimates recalculated backwards based on the latest census of 2002. The difference between the two series of population estimates is mostly due to large levels of unregistered emigration during the 1990s, which was not accounted for in the official statistics. This problem was resolved by re-calculating inter-censal population estimates for the period 1988-2000 following the HMD Methods Protocol, which eliminates the discontinuity between the two series of the data.

There is another disruption when comparing old post-censal total official population counts for 2002-2009 (based on the 2002 census) and newly published official figures for 2010 (recalculated back from the 2011 census) (Figure 3). Despite substantial emigration (including unregistered emigration) following the EU enlargement in 2004, there is an unexpected increase in the population between 2009 and 2010. This jump is explained by the introduction of the new population definition in the 2011 census (the usual resident population concept) which included people *de facto* residing abroad previously not counted. For example, this definition included Polish citizens *de facto* residing abroad but who did not report their departure to the Polish migration authorities. A similar discontinuity (sudden decrease in population counts) can be observed between a) the 2021 census based pre-censal (December 31, 2020) estimate and b) the 2011 census based post-censal estimates for December 31, 2011-2019) (Figure 3). The maximal aggregated difference between the two series was observed for December 31, 2020, when it reached 148 thou. Therefore, the HMD inter-censal method (assuming proportionate redistribution of net-migration) using the official estimates for December 31, 2011 and December 31, 2020 as pseudo census points was applied to produce coherent estimates. Despite this moderate adjustment, note that these population estimates still include a large proportion of unregistered emigrants *de facto* residing abroad. This broad concept of usual residence has been used since the 2011 census.

Figure 1. Official age-specific census population counts (as of December 6th, 1960) by sex

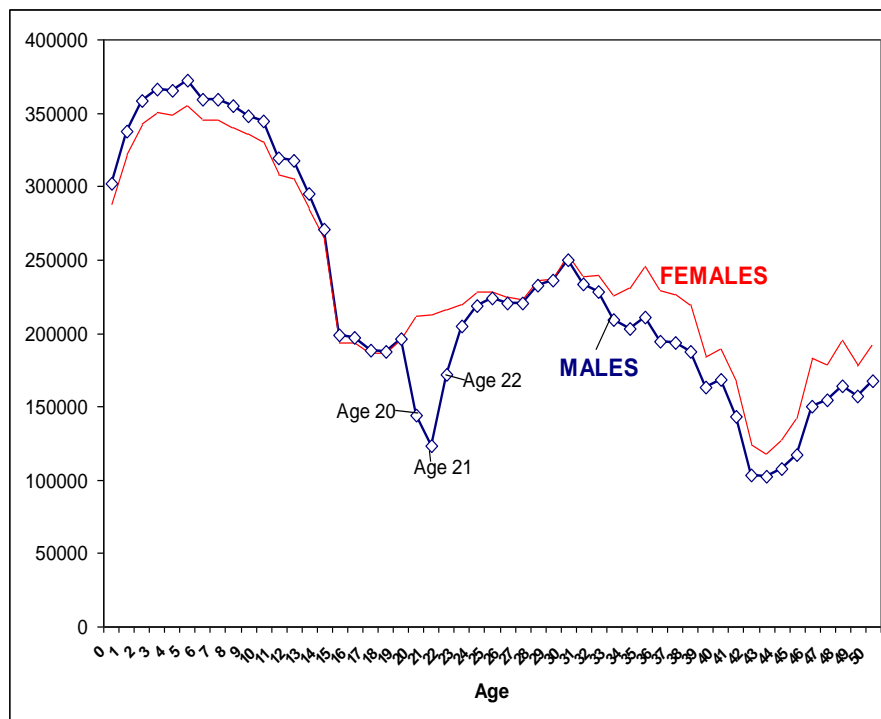


Figure 2. Official age-specific male census counts (as of December 6th, 1960) and population estimates (as of December 31st, 1960)

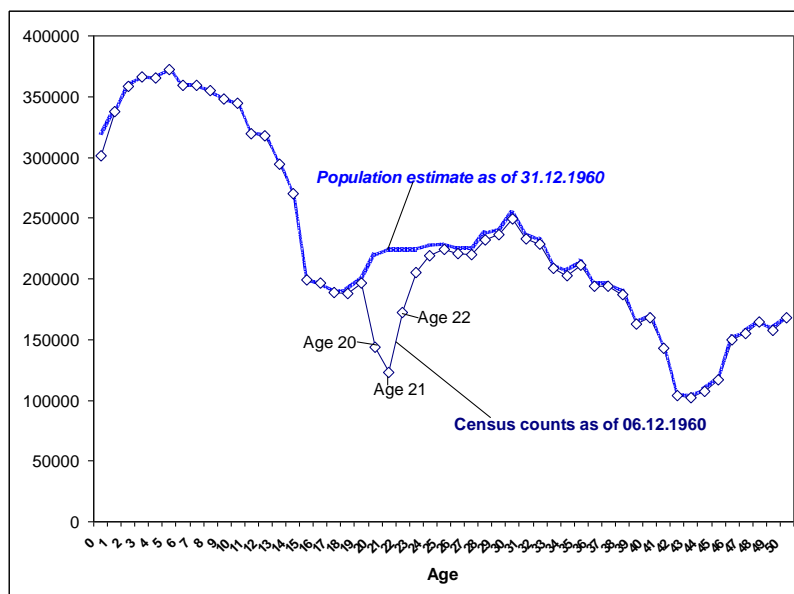
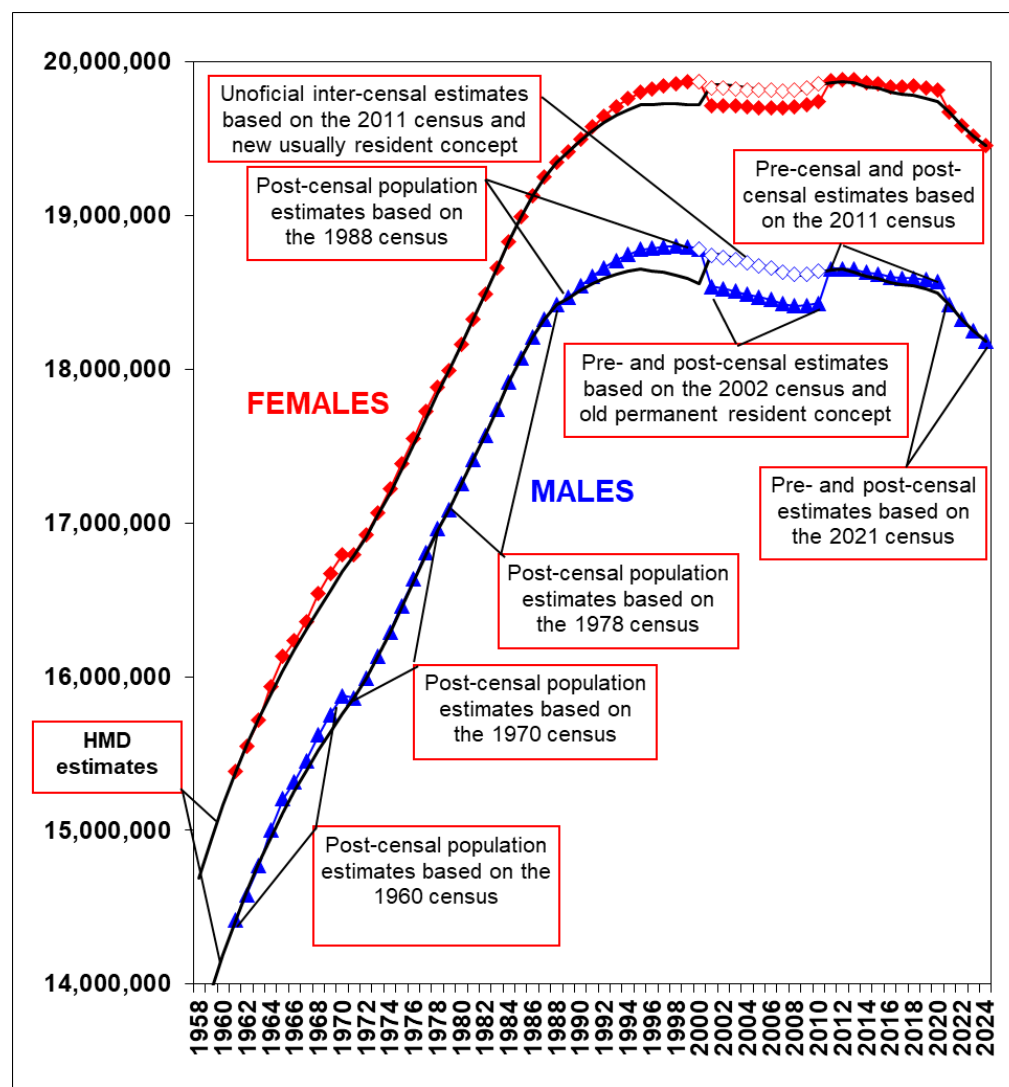


Figure 3. Trends in the officially published and unpublished* January 1st population estimates and HMD population estimates by sex, Poland, 1958-2024.



Sources: CSO Poland, various years (see the reference file for Poland).

* unpublished inter-censal age-specific population estimates for the period 2000-2010 produced by Krzysztof Tymicki (Institute of Statistics and Demography, Warsaw School of Economic) in cooperation with the Central Statistical Office.

NOTES: Official population figures refer to December 31st of the corresponding prior years. The disruption between 2000 and 2001 is attributable to the change in population definition.

REVISION HISTORY

Changes with the August 2018 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 a_0 , 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://www.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 they have not been, and will not be, updated.
- A pre-censal estimation procedure has been implemented to better estimate population for the years 1958-1960.
- Revised (final) count of live births for 2018 replaced previously published provisional number of live births.

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APPENDIX 1:

DESCRIPTION OF THE DATA USED FOR THE LEXIS DATABASE

DEATHS

Period	Type of Data	Age grouping	Comments	RefCode(s)
1958-1969	Number of deaths by sex, single year of age, and birth cohort (Lexis triangles, except for the open-ended interval).	0, 1, 2, ..., 99, 100+, unknown	No adjustment has been made for the underestimation of the number of infant deaths	18
1976, 1979	Number of deaths to the <i>de facto</i> population by sex and 5-year age groups (5x1 rectangle) except first four ages by single year of age and last open-ended interval.	0, 1, 2, 3, 4, 5-9, ..., 80-84, 85+, unknown	Infant deaths adjusted to follow the WHO definition	20, 21, 38
1970-1975 1977-1978 1978-1982	Annual number of deaths by sex and single year of age (1x1 rectangle).	0, 1, ..., 99, 100+, unknown	Infant deaths adjusted to follow the WHO definition	19, 38
1983-1987	Annual number of by sex and single year of age (1x1 rectangle).	0, 1, ..., 99, 100+, unknown	Infant deaths adjusted to follow the WHO definition	19, 38
1988-2005	Annual number of by sex, single year of age, and birth cohort (Lexis triangles, except for the open-ended interval).	1988-1993: 0, 1, 2, ..., 99, 100+, unknown 1994-2006: 0, 1, 2, ..., 109, 110+, unknown	Infant deaths for 1988-1994 adjusted to follow the WHO definition	22 23 24 39
2006-2014	Annual number of by sex, single year of age, and birth cohort (Lexis triangles, except for the open-ended interval).	0, 1, 2, ..., 99, 110+, unknown		24, 32, 40
2015-2023	Annual number of by sex, single year of age, and birth cohort (Lexis triangles, until the last open-ended age interval 110+).	0, 1, 2, ..., 99, 110+, unknown		46, 50, 51, 63, 66

POPULATION

Period	Type of Data	Age grouping	Comments	RefCode(s)
1960	Population estimates (as of December 31 st) by sex and single year of age. Actually present (<i>de facto</i>) population.	0, 1, ..., 84, 85+, unknown		34
1970	Census counts of population (as of 8.12.1970) by sex and single year of age. Actually present (<i>de facto</i>) population.	0, 1, ..., 99, 100+, unknown		3
1978-1982	Annual population estimates (as of December 31 st) by sex and single year of age. Actually present (<i>de facto</i>) population.	1978, 1980-1982: 0, 1, ..., 99, 100+ 1979: 0, 1, ..., 89, 90+		8
1983-1987	Annual population estimates (as of December 31 st) by sex and single year of age. Population registered for permanent or temporary (at least 2 months) residence.	1983-1986: 0, 1, ..., 99, 100+ 1987: 0, 1, ..., 94, 95+		8
1988	Census counts of population (as of 7.12.1988) by sex and single year of age. Population registered for permanent or temporary (at least 2 months) residence.	0, 1, ..., 99, 100+, unknown		5
2000	Official pre-censal population estimates (as of December 31 st) based on the 2002 census by sex and single year of age. Population registered for permanent or temporary (at least 2 months) residence.	0, 1, ..., 94, 95+, unknown	Used only to estimate the territorial adjustment factor.	17

POPULATION (CONTINUED)

Period	Type of Data	Age grouping	Comments	RefCode(s)
2000-2010	Annual pre-censal (2000-2002) and inter-censal (2003-2010) population estimates (as of December 31 st) by sex and single year of age. Usual resident population concept.	0, 1, ..., 99, 100+	Unpublished estimates produced by Krzysztof Tymicki (in cooperation with the Główny Urząd Statystyczny (Central Statistical Office))	35
2011	Annual post-censal official population estimates (as of December 31 st) by sex and single year of age. Usual resident population concept.	0, 1, ..., 99, 100+	Based on the 2011 census.	41
2020	Annual pre-censal official population estimates (as of December 31 st) by sex and single year of age. Usual resident population concept.	0, 1, ..., 99, 100+	Based on the 2021 census	60
2021-2023	Annual post-censal official population estimates (as of December 31 st) by sex and single year of age. Usual resident population concept.	0, 1, ..., 99, 100+	Based on the 2011 census	61, 62, 69

BIRTHS

Period	Type of Data	Comments	RefCode(s)
1958-1970	Annual counts of births by sex. Currently present (<i>de facto</i>) population.	No adjustment has been made for the underestimation of the number of live births	25, 26, 27
1971-1994	Annual counts of births by sex. Population registered for permanent or temporary (at least 2 months) residence.	Unpublished estimates based on the official adjustment of infant deaths	27, 28
1995-2023	Annual counts of births by sex. Population registered for permanent or temporary (at least 2 months) residence.		31, 43, 54, 56, 64, 67

BIRTHS BY MONTH

Type of data: Annual live birth counts by month

Period covered: 1985-2023.

RefCode(s): 44, 45, 48, 57, 65, 68.

APPENDIX 2:

Mortality rates for selected ages. Poland, both sexes, 1958-2006.

