

ABOUT MORTALITY DATA FOR GERMANY

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GENERAL

From 1949 to 1990, Germany it was split into two parts, which are referred to as the Federal Republic of Germany (FRG) and the German Democratic Republic (GDR). After unification in 1990, we distinguish in this report between “East Germany”, which refers to the area of the former GDR, and “West Germany”, which refers to the area of the former FRG.

Germany is a federal republic consisting of 16 states (known in Germany as *Laender*). The following *Laender* form West Germany : Baden-Wuerttemberg, Bayern, Bremen, Hamburg, Hessen, Niedersachsen, Nordrhein-Westfalen, Rheinland- Pfalz, Saarland, and Schleswig-Holstein, as well as West Berlin. East Germany consists of the following *Laender*: Mecklenburg-Vorpommern, Brandenburg, Sachsen-Anhalt, Sachsen, Thuringen and East-Berlin.

Population statistics are based on the census conducted in 1987 in West and in 1990 (population register census) in East Germany.

The official statistical system in Germany

There is close cooperation between the Federal Statistical Office and the statistical offices of the *Laender*. In Germany, the Federal Government and the *Laender* share the official commitments to statistical tasks according to the federal structure of the Federal Republic of Germany. The Federal Statistical Office compiles federal results from the *Laender* results and publishes them; the statistical offices of the *Laender* publish their results separately. There is a clear division of dissemination of statistical data between the Federal and the *Laender* offices. The Federal Statistical Office publishes data for the Federation as a whole with a geographical breakdown only to *Laender* level. The publication of regional data below the *Laender* level, even down to the level of local administrations, is the task of the statistical offices of the *Laender*.

Since 1876, the population statistics in Germany have been based on the same standard law for the registration of population changes in all parts (*Laender*) of Germany (*Personenstandsgesetz*). Between 1849 and 1876, these laws were similar across *Laender*. The “*Personenstandgesetz*” was slightly changed during 1945-1990, with separate practices in the FRG and GDR. Since October 3, 1990, the population statistics in both parts of Germany have followed the same laws.

The differences in the population statistics between the two parts of Germany prior to 1990 can be explained by the different definitions used for live birth and resident population. In the GDR, the term live birth was used when two signs of life occurred, in the West only one sign was required. A foreigner who stayed in the GDR up to 6 months was not included in the resident population, whereas in FRG the resident population included all persons in residence.

Since 2001, the division of the Berlin statistics into the eastern and western part is no longer available from the Statistical Office of Berlin (Statistisches Landesamt Berlin).

DATA SOURCES

All of the data included in the Human Mortality Database come from the Federal Statistical Office in Wiesbaden. The Input Database (Input DB) includes death and population counts for all years since 1990.

TERRITORIAL COVERAGE

There have been no territorial changes since 1990.

DEATH COUNT DATA

Coverage and Completeness

The annual statistics include all registered deaths of residents of Germany (Source: laws for the registration of births, marriages and deaths). Misreporting and incompleteness of the data are unknown. The quality of age reporting is high because since 1876, birth and death registration has been conducted by the registry office in all Laender of Germany, and death registration has required a birth certificate from the registry office.

BIRTH COUNT DATA

Coverage and Completeness

Definitions of Live birth

- 1991-1993: Child, whose breathing *or* heartbeat started after complete separation from the mother independent of cutting the umbilical cord and delivery of the placenta, and who had a minimal body weight of **1000g**.
- Since 1994 : Child, whose breathing *or* heartbeat started after complete separation from the mother independent of cutting the umbilical cord and delivery of the placenta, and who had a minimal body weight of **500g**.

Prior to 1994, there was under-estimation of stillbirths because the minimal birth weight for classification as a stillbirth rather than a spontaneous abortion (i.e., miscarriage) changed on March 31, 1994 from 1000g to 500g.

POPULATION COUNT DATA

Coverage and completeness

Population estimates are based on census counts. Between census years, the birth, death, and migration counts are used to calculate the population on the last day of each year (December 31st).

In the territory of the former GDR, the census took place on December 31, 1981, and October 3, 1990. In the West the last census took place in 1987. As a result, the end-of-the-year population estimates for census years are, in fact, census results. The census in 1990 in the East was a register census. The population register in the East was closed in 1992 because it was not compatible with the rules on data protection in the FRG. In the time period after 1988, the migration between the two Germanies is very important.

DATA QUALITY ISSUES

Quality of data on population counts

There is evidence that data quality depends on the time since the last census. Especially for the highest ages, there are reasons to believe that the data quality gets worse as time since the last census increases. The comparison of the reported population counts by the Statistical Office with the calculated population counts from the HMD (calculated from the death counts using the Methods Protocol) reveals growing differences.

In 2001, the official statistics changed the reported open-ended age interval from age 95+ to age 90+, perhaps because they were aware of the problems with the population counts at very old ages. Moreover, the official annual life table for 2001/2003 used a spline function to smooth values of q_x for ages 90+, again apparently in attempt to remedy the data problems. In previous years, no such smoothing procedure was used .

The data problem seems to have especially affected the data for West-German males. We would expect that the mortality rate at age 90+ would be higher for males than females. Yet, rates calculated using the official population estimates show that in some years during the 1980s and 1990s West German males presented rates that were similar to those for females (see Appendix 2). Furthermore, the results for external checks show an unexpected crossover between German and Swedish male life expectancy at age 80 beginning in the late 1990s.

For correction of this error, see Appendix 2.

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REFERENCES

Statistisches Bundesamt,ed. (1993). *Bevoelkerungsstatistische UEbersichten 1946 bis 1989*. Wiesbaden, Germany: Arbeitsunterlage. (Sonderreihe mit Beitraegen fuer das Gebiet der ehemaligen DDR, Heft 3)

Scholz, R.D. Statement about data needs for mortality analysis in Germany (unpublished); 1. Konferenz fuer Sozial- und Wirtschaftsdaten 13.1.-14.1.2003 in Wiesbaden

Jdanov, D.A.; Scholz, R.D.; Shkolnikov, V.M. (2005). Official population statistics and the Human Mortality Database estimates of populations aged 80+ in Germany and nine other European countries.

MPIDR Working Paper WP-2005-010. Rostock: MPIDR.

APPENDIX 1: DESCRIPTION OF DATA USED FOR LEXIS DATABASE

DEATHS

| Period | Type of Data | Age Grouping | Comments | RefCode(s) [†] |
|-----------|--|---|----------|-------------------------------------|
| 1990-2000 | Annual number of deaths to residents by age and birth cohort (Lexis triangles) | 0, 1, 2, 3, ... maximum age attained | | 0003, 0004, 0005, 0006, 0007, 0014, |
| 2001-2002 | Annual number of deaths to residents by age and birth cohort (Lexis triangles) | 0, 1, 2, 3, ... maximum age attained | | 0015, 0016 |

† 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(s) [†] |
|-----------|---|----------------------------|----------|-------------------------|
| 1990-2000 | Annual population estimates (as of December 31 st) by age | 0, 1, 2, 3,95+ | | 0009, 0010, 0011, 0017 |
| 2001-2002 | Annual population estimates (as of December 31 st) by age | 0, 1, 2, 3,90+ | | 0018, 0019 |

BIRTHS

Type of data: Annual number of live births by sex

Period covered: 1990-2002

RefCode(s): 0013, 0020, 0021

APPENDIX 2: CORRECTION OF POPULATION ESTIMATES AT AGE 90+

By D.Jdanov and R.Scholz

The data quality analysis of official population data has shown a problem at very old ages. We found a clear pattern of population overestimation for West German men in the 1980s-90s. This error also influenced population estimates for Germany as a whole.

As shown in Figure 1, the death rate for men age 90+ in West Germany is almost same as for women during the 1980s (and is even lower than the female rate in 2003). There is a surprisingly steep decrease in the official male old-age mortality during the inter-census period 1970-87 in West Germany. As a result, “official” death rates for men aged 90+ in 1982-87 are almost as low as those for women. Just after the West German census of 1987, there is a sudden jump in male death rates calculated from the official population. However, later in the 1990s, this male-female mortality difference narrows again. Thus, we suspect that the population of males age 90+ is overestimated, particularly in 1980-87 and after 1995. Nevertheless, data for younger ages look much more plausible (for details see Jdanov, Scholz, & Shkolnikov, 2005). Following the HMD Methods Protocol, we recalculate population estimates for cohorts that are at least age 90 at the end of observation using extinct cohort or survivor ratio methods. Therefore, we need to correct population estimates only for the last available year (upon which survivor ratio methods are based).

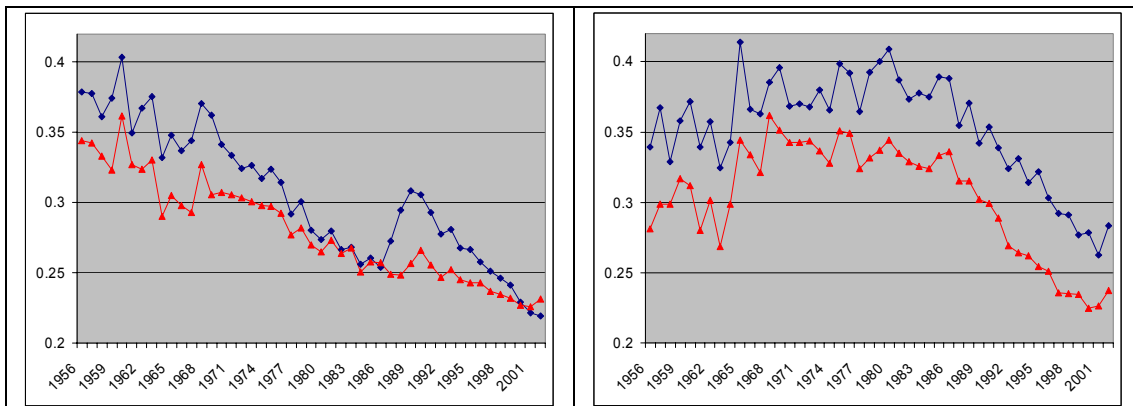


Figure 1. Trends in death rates at age 90+, calculated from the official population estimates, for the West (left) and East (right) Germany, males (blue line with rhombs) and females (red line with triangles).

So far, the mechanism of the overestimation of the elderly population in Germany remains unknown. The traditional problem of age overstatement (Coale and Kisker, 1986; Kannisto, 1988) cannot explain this problem in Germany (Jdanov, Scholz, & Shkolnikov, 2005).

To correct data for West German men age 90+ in 2003, we used data provided by Verband Deutscher Rentenversicherungstraeger (VDR). These data include population and death counts of all pensioners in Germany, which comprises approximately 95% of

the whole population aged 65 (total number of pensioners aged 65+ is about 24 million). For the correction we used the data for 2001 (population estimates as of 1 December 2001 that roughly correspond with official estimates as of 1 January 2002). Due to their nature, these data cannot be used as population estimates in the HMD. Nevertheless, they can be used for indirect estimation of statistical error.

First, we calculated the ratio of VDR data to estimates based on official data¹ (1st of December). The VDR statistics are based on pensions and not persons. Consequently, a single person can have duplicate records when a dual pension scheme exists (e.g., a person receiving both an insured person's pension and a survivor's pension). By restricting the data to only one kind of pension, each pension uniquely corresponds with one person. Both sexes reflect this effect, but in different ways: females at older ages are more often connected with a survivor's pension, whereas males tend to be connected with their "own" pension. In total, 3.9% of men and 30% of women received dual pension in 2001. The ratio of population estimates and death numbers is presented in the Figures 2 and 3. Figure 2 presents VDR data including all pensions. For the Figure 3, we used only information about "own" pensions (pensions of insured persons). Assuming that the official data overestimate the population of males at older ages, we would expect the ratio to decrease with age. In the first case, we see a shift in population structure (especially at old ages) and overestimation of population in VDR data more than official statistics (Figure 2). For this reason, we used only information about own pensions (Figure 3).

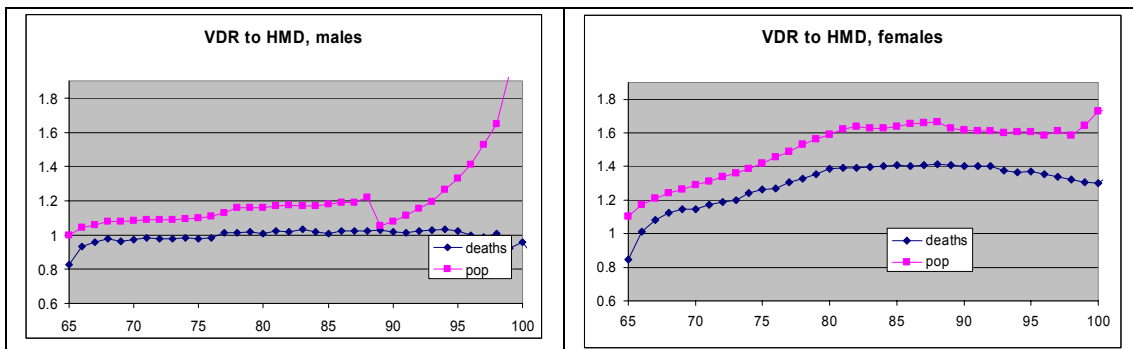


Figure 2. Ratio of VDR records based on *all* pensions (own and supplemental) to estimates based on official data

¹ We applied standard HMD methods for the period 1956-2003. It means that population estimates up to age 89 in 2003 are identical to original official data. Estimates for ages above 89 are produced by extinct cohort or survivor ratio methods (based on official data for 2003).

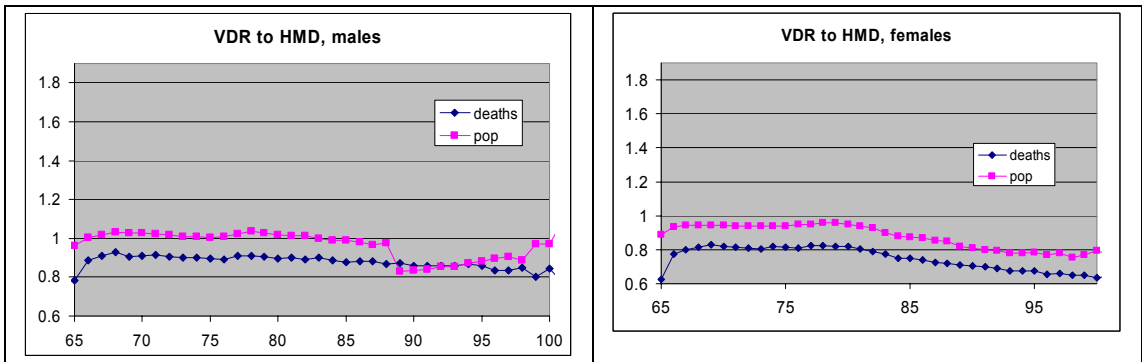


Figure 3. Ratio of of VDR records based on *own* pensions to estimates based on official

As we can see from the Figure 3, the ratio of population estimates for males shows a sudden drop at age 88-89. Data for females as well as death data do not show such discontinuities. Thus, because the ratio of population estimates for males is approximately 1.0 before age 88, the correction factor can be calculated as the ratio of VDR records based on own pensions to official population estimates among those aged 89+ (which corresponds with the population aged 90+ on 1st of January 2003). This ratio is 0.83 (i.e. the official population estimates for West German males aged 90+ in 2003 should be reduced by 17%). The results of applying of this correction for West Germany are presented on the Figure 4. Population estimates for Germany (as a whole) were calculated as the sum of East Germany and corrected West Germany.

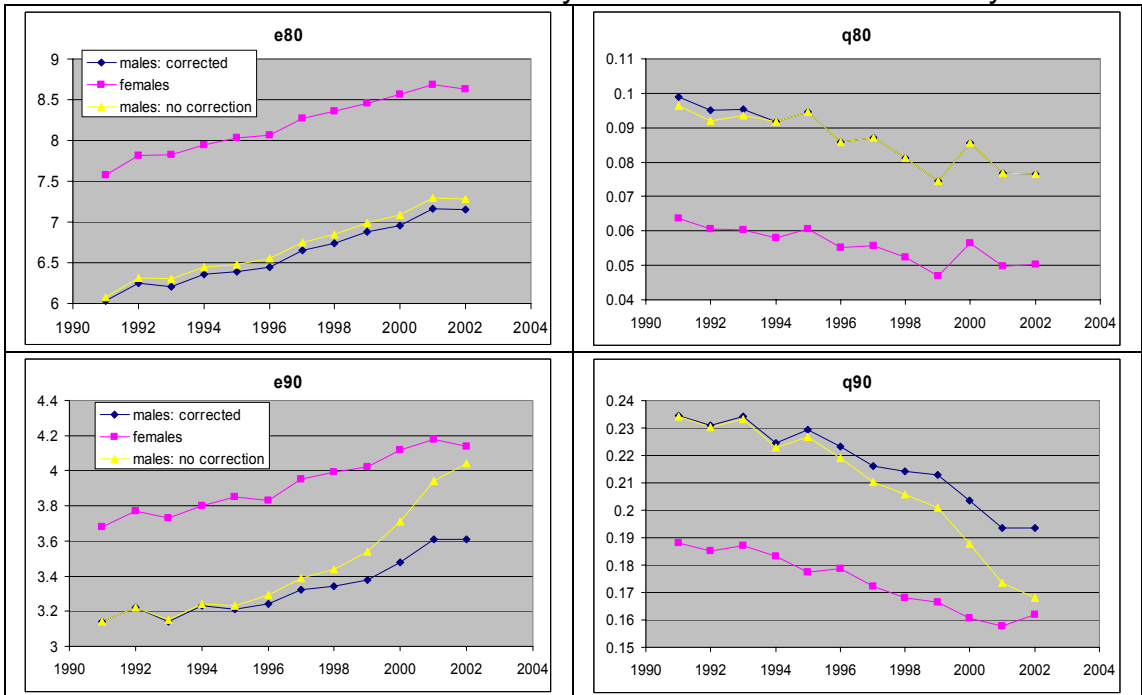


Figure 4. Life expectancy and probability of deaths for corrected and uncorrected data, West Germany

References

- Coale, A.J. and E.E.Kisker. (1986). Mortality crossovers: reality or bad data? *Population Studies*, 40: 389-401.
- Jdanov, D.A.; Scholz, R.D.; Shkolnikov, V.M. (2005). Official population statistics and the *Human Mortality Database* estimates of populations aged 80+ in Germany and nine other European countries. MPIDR Working Paper WP-2005-010. Rostock: MPIDR. (<http://www.demogr.mpg.de/Papers/Working/wp-2005-010.pdf>)
- Kannisto, V. (1988). On the survival of centenarians and the span of life. *Population Studies*, 42(3): 389-406.