ABOUT MORTALITY DATA FOR BULGARIA

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GENERAL

The National Statistical Institute (NSI) is the governmental unit that provides statistical information. It was established in 1900 as the Central Statistical Office.

Demographic vital statistics is available in published form since 1881, but its reliability has improved since 1900. The first demographic yearbook was issued in 1960.

Data exist both in published and electronic form. The latter can provide more detailed information.

The first population census was conducted in 1880. Reliability improved with the census carried out in 1900. Population censuses are usually conducted every 10 years. Those after the Second World War were carried out in 1946, 1956, 1965, 1975, 1985, 1992, and 2001.

Source of Data

Mortality data used in the database come from unpublished electronic sources provided by the National Statistical Institute (Sofia, Bulgaria). The reference file for Bulgaria gives relevant information.

Specific Episodes in the Demographic History of Bulgaria

Since 1947, there were two large emigration waves of Ethnic Turks. The first one was in 1950 and 1951, when about 100,000 and 55,000 persons left the country. The second wave was in 1989 and 1990, when some 300,000 persons left the country, and around 200,000 returned during the next 2-3 years.

Except for these waves, emigration was very low until 1989. During the 1990s many people have left the country, particularly at the beginning of the decade. The data from the 2001 population census indicate that 196,000 persons have left the country and 19,000 have entered the country during the 1990s.

In the beginning the 1950s, mortality in rural areas increased significantly as a result of the forceful collectivization carried out by the suppressive totalitarian regime. The overall mortality in the country also increased.

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Births were high in the end of the 1940s, during the post-war compensation period. Significant fluctuations were observed with the introduction of a population policy in 1967. It contributed to a temporary rise in the number of births. A similar temporary rise was observed in the beginning of the 1970s.

TERRITORIAL COVERAGE

There were no territorial changes in Bulgaria during the period included in the Human Mortality Database (HMD) (1947-2003).
Numerous such changes took place though prior to 1939.

DEATH COUNT DATA

Coverage and completeness

National death statistics encompass all deaths that occurred in the resident population.

The current concept of infant death (adopted in 1970) is different from the one used by the WHO. The major difference concerns a more restrictive definition of infant deaths: newborns weighing less than 1000 grams and surviving fewer than 6 days are counted as spontaneous abortions (i.e. miscarriage) rather than as infant deaths. Research suggests that the latter definition tends to underestimate the infant mortality rate (IMR) compared to that based on the WHO concept (Kingkade, Sawyer, 2001; Aleshina, Redmond, 2003; Gantcheva, Kolev, 2001).

Specific details

The major concerns about the reliability of death statistics are related to the under-registration of infant mortality. According to Aleshina and Redmond (2003), Bulgaria is the only European country outside of the Commonwealth of Independent States, where the more restrictive "Soviet" definition of infant mortality persists. Some researchers relying on indirect estimation techniques (e.g. comparing post neonatal and neonatal ratios) suggest that underreporting of infant mortality is very significant in the case of Bulgaria: for example, Kingkade and Sawyer proposed adjustment factors around 1.5 (depending on period) for the official data on infant mortality.

The second issue is related to the quality of mortality data at older ages. Like the cases of Russia and Lithuania (see the corresponding *Background and Documentation* files), the Bulgarian data also show age heaping at ages 60, 70, 80, 90 between of the end of 1940s and the end of the 1950s (more details are given in the chapter on "Data quality issues").

Besides the above mentioned problems, there are other discrepancies in the data on deaths. For example, in 1986 there is an unexplainable drop in number

of deaths among the 1900 cohort. Consequently, mortality rates among people aged 86 drops substantially in this particular year.

There are also problems with mortality estimates of mortality for 1994. Unfortunately, in this case, our method of splitting death counts in the open age interval 80+ into Lexis triangles does not provide plausible results. After applying that method, mortality rates for ages 80-89 show a sudden drop, while mortality for all ages after age 90 unexpectedly increases (Appendix 2, Figure 2 (C and D)).

POPULATION COUNT DATA

Coverage and completeness

Until 1964, NSI reports the actual population numbers. The actual population consists of the *de facto* population, plus residents who are temporarily abroad. Since 1965, the NSI reports the resident population. The numbers refer to the end-of-the-year population. Data by single years of age are available in electronic form.

The population census counts the actual and the resident population. Relevant publications distinguish between the resident population, the *de facto* population, and the actual population.

Specific details

Official population estimates are provided by age, ending with an open age interval at the highest ages. Until 1994, the open age interval was 100 and older. In 1995, it was 90 and older, whereas in 1996 and 1997 it was 80 and older. For 1998 and 1999, the data were provided with an even broader open age interval (75+ and 70+, respectively). The latter aggregations possibly indicate errors in population estimates at older ages. Furthermore, all the above-mentioned data for the 1990s are post-censal population estimates, which have not been revised according to the most recent census of 2001. The official population estimates for the end of the 1980s and 1990s show significant fluctuations and discrepancies due to unregistered emigration during the period. For more details about the quality population estimates, see the chapter on "Data quality issues".

Taking into account data quality problems, we decided not to use the official estimates for the period 1989-2000 for further calculations of the mortality surface. Thus, the official population estimates have been used for 1947-1988 and 2001-2003, while for 1989-2000 we calculated new inter-censal estimates according to the HMD methodology.

BIRTH COUNT DATA

Coverage and Completeness

Births refer to the resident population.

The definition of a live birth differs from the internationally accepted concept Births of babies weighing less than 1000 grams are counted as live births only if they survived for at least six full days. If they did not survive for six days, they are counted as a spontaneous abortion if the gestation period was shorter than 28 weeks, or as a stillbirth when the gestation period was longer than 28 weeks.

DATA QUALITY ISSUES

Problems with the official population estimates for the period 1986-2001

Bulgarian data on death and population counts cover the period of 1947-2003. However, for the estimation of mortality surfaces in HMD, the official annual population estimates were used only for the periods 1947-1988 and 2001-2004.

The official population estimates for Bulgaria show a sudden drop in the total population for census years 1985, 1992, and 2001 (Figure 1). For example, according to the official data, the total number of males decreased by about 252 thousand between the end of 1991 and 1992 (census year). The disruptions in the population trends are due to several reasons. First, it seems that population estimates have not been recalculated backwards based on the corresponding latest censuses. Thus, the available data consist of post-censal estimates rather than inter-censal population estimates. Second, there was a lot of unregistered emigration (especially during the period 1989-1992), which was not accounted for in the official statistics. Unfortunately, no revised population estimates (backward projections) according to the results of the latest census have been available to us.

Figure 1. Trends in the total number of males and females. Bulgaria, 1961-2003
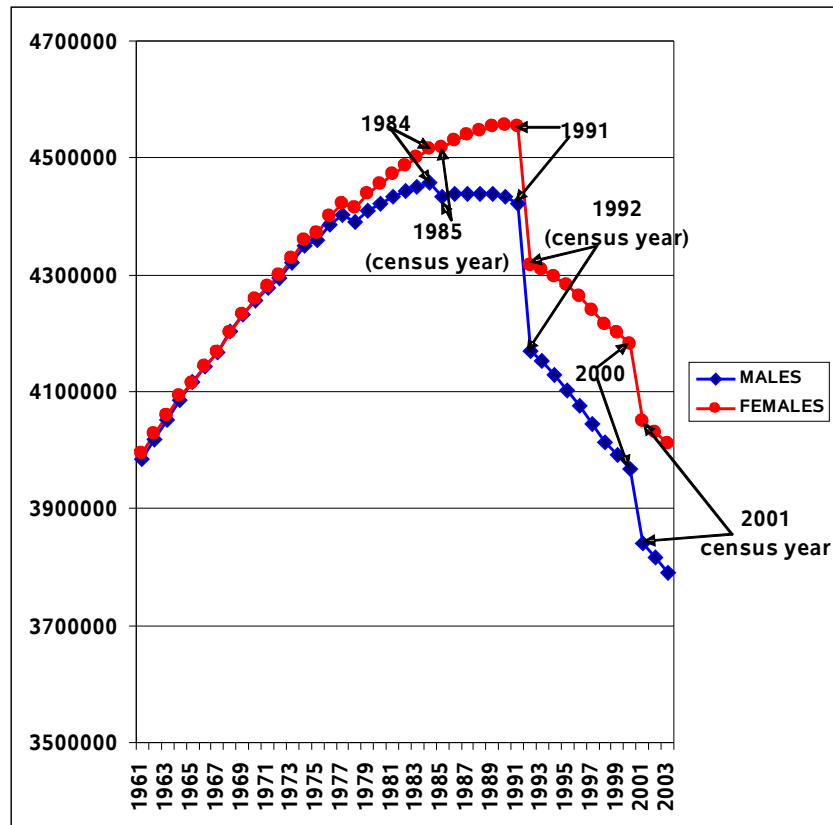
Underreporting of infant deaths

Under-reporting of infant mortality is the most serious problem related to the quality of mortality statistics in Bulgaria. Kingkade and Sawyer (2001) suggest that an unexpectedly high ratio between post neonatal and neonatal probabilities of dying indicate under-reporting of infant deaths. The latter ratio is about 0.85 for Bulgaria, while the corresponding figure is only 0.43 for Western Europe and about 0.50 for Central Europe and Baltic States (Aleshina, Redmond, 2003). Taking into account the discrepancies in the reporting of infant deaths, Kingkade and Sawyer (2001) propose that the infant mortality rate based on the internationally accepted definition would be at about 57% higher than that reported by the NSI of Bulgaria. However, the latter findings should also be treated with caution as they only indicate strange patterns that do not conform to those of other countries. It is difficult to prove whether such a substantial portion of infant deaths are being excluded or recorded as abortions (Aleshina, Redmond, 2003).

Age heaping in deaths

Age heaping at older ages is often considered one of the most serious problems with mortality statistics in the former USSR countries (Anderson, Silver, 1997). For example, Zakharov (2002) has shown that age heaping is very pronounced at ages 70, 80 and 90 in the Russian data for the period before 1970 (see the Russian *Background and Documentation* file in the HMD). Using the same procedures, we performed a similar analysis for Bulgaria. Our results suggest about possible age heaping for the years before 1960. Figure 2 (Appendix 2) shows that mortality at ages 60, 70, 80, and, especially, at age 90 is somewhat higher than for the most age groups in between the age categories ending with "0" or "5".

ACKNOWLEDGEMENTS

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Kingkade, W., Sawyer, C. (2001*). Infant mortality in Eastern Europe and Former Soviet Union before and after the breakup*. Paper presented at the IUSSP conference. Salvador de Bahia, Brazil: 23p.

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APPENDIX 1

DESCRIPTION OF DATA USED FOR LEXIS DATABASE

DEATHS

Period	Type of Data	Age grouping	Comments	RefCode(s)
1947-1992, 1995, 1997-1998, 2000-2001	Annual number of deaths to the resident population, by sex, year of birth, and single year of age (Lexis triangles)	0, 1, 2, … 100+, unknown		BGRR01 BGRR09
1993, 1996	Annual number of deaths to the resident population, by sex and single year of age (1x1 squares)	0, 1, 2, … 100+, unknown		BGRR01
1994	Annual number of deaths to the resident population, by sex and single year of age (1x1 squares)	0, 1, 2, …80+, unknown		BGRR01
1999	Annual number of deaths to the resident population, by sex, year of birth, and single year of age (Lexis triangles)	Triangles: 0, 1, 2, …89. 1x1: 90. 91, …, 100+		BGRR09
2002-2003	Annual number of deaths to the resident population, by sex, year of birth, and single year of age (Lexis triangles)	Triangles: 0, 1, 2, …100. Period-cohort: 100, 101, maxi-mum age attained.		BGRR10

POPULATION

Period	Type of Data	Age	Comments	RefCode(s)

		grouping		
1946	Census counts of population by sex and single year of age as of December 31. Actually present (de facto) population.	0, 1, 2, 3, …,90+		BGRR02
1956	Census counts of population by sex and single year of age as of December 1. Actually present (de facto) population.	0, 1, 2, 3, …,90+		BGRR02
1960-1964	Annual population estimates by sex and single year of age as of December 31st. Actually present (de facto) population.	0, 1, 2, 3, …,100+		BGRR03
1965-1988	Annual December 31st resident population by single year of age and sex	0, 1, 2, 3, …,100+		BGRR03
2001-2003	Annual December 31st resident population by sex	0, 1, 2, 3, …,100+		BGRR08

BIRTHS

Period	Type of Data	Age grouping	Comments	RefCode(s)
1947-2003	Annual live birth counts, by sex. Resident population.			BGRR04 BGRR05 BGRR06 BGRR07

APPENDIX 2

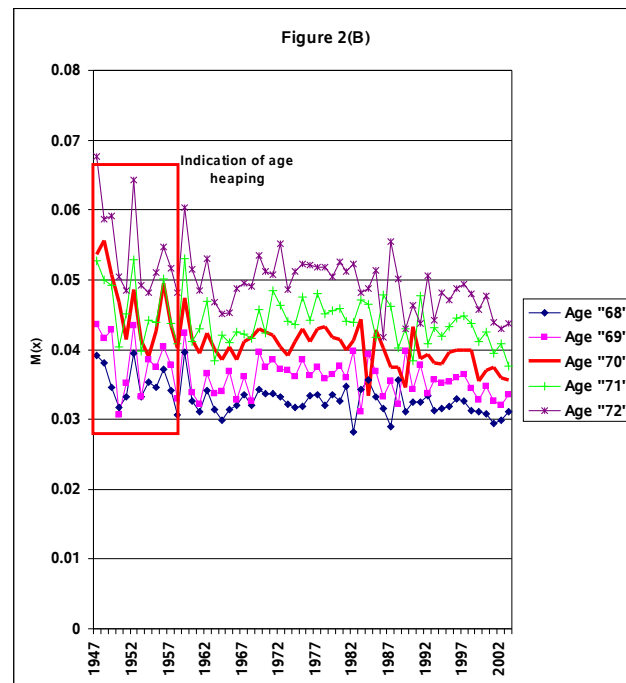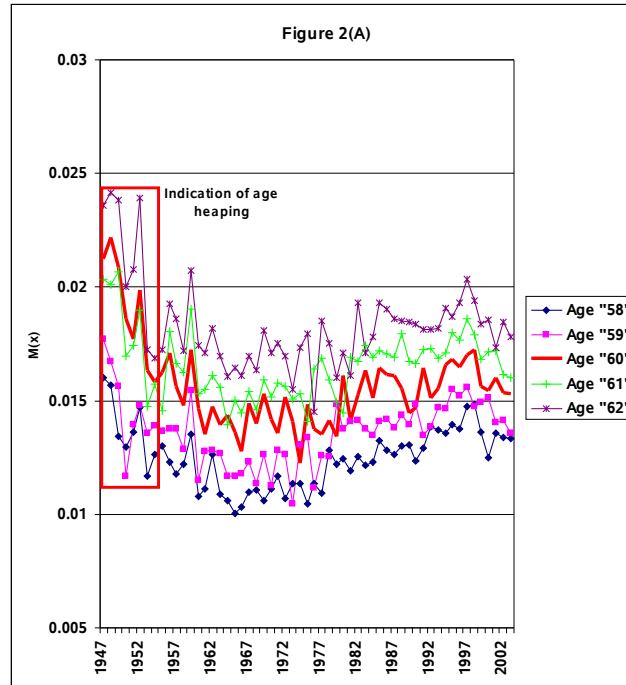**Figure 2.** Mortality rates for selected ages, Bulgaria, total population, 1947-2003

Figure 2 (continued). Mortality rates for selected ages, Bulgaria, total population, 1947-2003