

POPULATION AGEING

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POPULATION AGEING AND LONGEVITY IN BULGARIA (1947-2015)

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Abstract: *Male and female age-specific mortality rates and their impact on life expectancy and longevity in Bulgaria over the period 1947–2015 are investigated by using the general framework of life tables. A comprehensive picture of the demographic ageing is presented considering the processes in their interconnections. We have used the normal length-of-life model, the modal age at death, and some indicators of death concentration around the modal age, in order to get an insight into trends in mortality and survival at older ages. Our calculations were based on demographic data from the Human Mortality Database and the Eurostat database. Since the end of the last century, female and male life expectancy has increased again, after a long period of stagnation and decline. This increase has reached all ages, while maintaining gender differences at low and middle ages. It is more strongly related to decreasing mortality at older ages than at middle and young ages. However, the rate of increase in life expectancy is not fast enough to offset the previous long-lasting negative trends. The displacement of the modal age at death to higher ages is more prominent in women; this is related to an increasing frequency and concentration of deaths around the modal age, while premature mortality is relatively stable. There is a growing gender gap due to the constant increase in premature mortality of men.*

Keywords: ageing; mortality; life expectancy; longevity.

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Population ageing is a global tendency and a natural result of the long-lasting decline in fertility and mortality during the demographic transition, which first affected developed countries in Europe, and then spread over other continents. The transition experienced by those countries evoked some radical changes in the age structure and life expectancy of their populations: increasing share of middle-aged and older people which is mainly due to fertility decline; an increase in life expectancy as a result of mortality decline. During the transition, fertility decline was a main driver of the ageing process. Mortality decreased unevenly over time: the reductions were first concentrated at young ages, then at middle and older ages (Anson 1992). Such reductions had different effects on the age structure of the population: while the reduction in mortality at young ages contributed to the population “rejuvenation”, the reduction in mortality at older ages aggravated its ageing (Preston et al. 1989). As a result, infant and child mortality in developed countries today has reached very low levels, and the decline in mortality has shifted towards the older ages; this has been reflected in increased life expectancy in old age and longevity. In recent decades, fertility has remained below the replacement level, having shown no signs of any significant future improvement. Therefore, the ageing process in modern societies is determined by the old-age mortality reductions (Gavrilova & Gavrilov 2011).

A fundamental vehicle providing a good orientation about the long-lasting impact of demographic processes on the age structure of the population is *the stable population model*. Summarising the relations between fertility, mortality and the mean age of a stable population using charts has helped establish that: *fertility* reduction has always evoked population ageing; when *mortality* is high, survival improvement accounts for the population rejuvenation; when life expectancy at birth exceeds 65 years¹, any further mortality reduction would cause increasing ageing; at low fertility levels, any small changes in *the two* processes may greatly impact the population age structure (Goldstein 2009).

The reduction in mortality and the increase in life expectancy at older ages has been an increasingly more powerful actor in the aggravation of demographic ageing in modern societies. Changes in age-specific mortality rates have a direct impact on the age distributions of life-table survivors and deaths, and hence on life expectancy. While many decades ago the increase in life expectancy was mainly due to improved survival at young ages, today its growth is mainly due to better survival in middle and old age. The survival curve has become increasingly higher and “more rectangular”, shifting slowly to the right. Relevant changes have occurred in the age distribution of deaths (*the length-of-life distribution*). While at the beginning of the epidemiological transition, the more pronounced (more frequent) was its early mode (immediately after birth), today the dominating one is the late mode (in advanced age). The increase in the modal age at death (*modal length of life*) is accompanied by mortality compression around it. More than two-thirds of all deaths are concentrated around the late

¹ As is the case of Bulgaria after 1960 r.

modal age today. Therefore, this age is considered to be the *typical length of life* for a given mortality regime (Kannisto 2001).

Bulgaria has undergone a specific process of population ageing since the late 1950s, which is closely related to the completion of the demographic transition, and the country's entry into the next post-transition phase of sub-replacement fertility since the second half of the 1990s. Not only the relative share of the elderly aged 65+ has increased, but also the share of people over 80 years of age (see Figure 1 in the Appendix). The process of population ageing over the last few decades has been accompanied by population reduction due to a combination of narrowed reproduction regime with negative net migration. This resulted in the development of a hyper-aged age structure typical only of decreasing populations (Lillova 2012 [in Bulgarian]; Lillova 2014). The country experiences a negative "momentum" (around minus 25%, while for the Northwest and the North Central Region it stands at minus 30%), i.e. its population features a negative growth potential and over the forthcoming fifty years will decrease by an average of one fourth, while the population of the Northwest and the North Central Region will face a reduction by one third if the current demographic regime remains unchanged (Lillova 2016 [in Bulgarian]; Lillova 2013). Life expectancy for women and men has shown growth at all ages since the end of the last century, due to reductions in age-specific mortality. These positive trends lag behind the EU average. Nevertheless, they match the Eastern European model where there are still opportunities for further reductions in infant mortality and mortality at middle and older ages (Lillova and Sugareva 2014 [in Bulgarian]).

Various theoretical and applied aspects of mortality and life expectancy in Bulgaria over different periods have been studied by different Bulgarian scholars: Golemanov (1998, 2000, 2001, 2004); Golemanov et al. (1984) [the whole string in Bulgarian]; Griva and Sugareva (1984); Dikova (2014); Murgova (2003); Ruseva (2014); Sugareva (2011); Hristov and Golemanov (2005), Hristov (2003, 2012) [the whole string in Bulgarian] and many more. None of these studies cover a period of seven decades as is the period encompassed by this paper. The choice of such a period makes it possible to trace the trends existing in mortality and survival rates in their relationship, during the intensification of demographic ageing in our country.

The present paper analyses the development of mortality and life expectancy among men and women in Bulgaria, starting from the middle of the last century and spanning the period until today (1947-2015), with our attention being focused mainly on middle and older ages. Our aim is to find out what are the trends in mortality at those ages, how they affect life expectancy and longevity, and whether there are any peculiarities or gender differences. Probability of survival to a specific age depends cumulatively on the age-specific mortality rates for all lower ages, which determines the cumulative relation between life expectancy and age-specific mortality. This is why this analysis covers all age groups. By means of an appropriate division into sub-periods, visualisation and use of classic analytical models and indicators, we reveal typical particularities of the processes in their interrelation, and outline the general picture of the development of mortality, life expectancy and longevity over the period of intensive demographic ageing in the country.