MORTALITY

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MAIN FINDINGS

» The life expectancy of the Hungarian population was among the worst in Europe, alongside the Soviet region and some Eastern European countries at the time of the regime change in the late 1980s. Life expectancy at birth for males was 65.1 years and for females 73.7 years in 1990. During the period of transition male life expectancy decreased by more than half a year to 64.5 years and it only surpassed its 1990-value in 1995. Female life expectancy stagnated during this period.

» The first signs of recovery from the prolonged mortality crisis appeared in 1994. Since then, male life expectancy at birth has increased on average by 0.35 year annually, while for females the same increase was only 0.24 year. Currently man can expect to live 72 years and women 78.8 years. Due to the different rate of improvement the gap between male and female life expectancy fell from 8.7 years in 1994 to 6.7 years in 2013.

» Despite the improvement in life expectancy, Hungary is not catching up with low-mortality countries. Life expectancy at birth for the Hungarian population – both males and females – is still lagging behind by the same degree as in 1990. Taking 1994 as baseline, a slight catching-up can be observed for males, however no signs of this for females. Hungary lags behind Austrian mortality trends by about 20-25 years and is still among the countries with lowest life expectancies in the European Union.

» The seven-year increase in male life expectancy was mainly due to improvements in the age-specific mortality of young adults aged 15–39 years and middle aged population aged 40–64 years, which contributed to the growth by 1.7 and 2.8 years respectively. The increase for females was smaller, and it was due to the improvement of mortality among young and middle-aged adults (0.7 and 1.3 year) on the one hand, and those aged 65 years and over on the other. The improvement of infant mortality contributed to the increase of life expectancy by 0.7 year for both sexes.

» The increase in male life expectancy can be mainly attributed to a significant improvement in cardiovascular mortality that increased life expectancy at birth by 2.8 years. The decline in external-cause mortality added 1.7 year, and in particular the decrease in suicide contributed 0.5 year to the improvement. Compared to the effect of cardiovascular mortality, the contribution of cancer-related deaths was moderate (0.6 year).

Monostori, J. - Őri, P. - Spéder, Zs. (eds.)(2015): *Demographic Portrait of Hungary 2015.* HDRI, Budapest: 75–94.

» More than half of the increase in female life expectancy – 2.9 years – came from improvements in cardiovascular mortality. The decline of external-cause mortality also played an important role (adding 0.8 year to life expectancy). However, the gain from cancer-related mortality was only 0.3 year, which is the net result of a deterioration in deaths related to cancers of the trachea, bronchus and lung (-0.3 year) and a simultaneous 0.6-year improvement in mortality caused by other neoplasms.

» Regarding the most important causes of deaths, cardiovascular mortality of Hungarian males and females has been improving at the same rate as in other EU countries in the region; however the decrease among females halted in recent years. The rate of the decline is not sufficient to reduce the gap with countries that have low cardiovascular mortality.

» Cancer mortality is especially high in Hungary as compared to Europe as well as to other countries in the region, and this is only partly explained by the high level of lung cancer mortality in international comparison.

» Mortality from causes associated with alcohol consumption is high in Hungary; however trends show a steady decline. The decline in mortality due to external causes is similarly significant, and its level seems no longer outstanding in regional comparison.

» Disparities in life expectancy by educational level are especially large: in 2012 life expectancy at birth for females with higher education was 5.8 years higher than that of women with primary education. The same figure for males was 12.5 years. Inequalities by educational level have slightly diminished among males but increased among females over recent years.

» Differences in life expectancy by marital status appear mainly between married and non-married individuals. Married men and women have longer life expectancies and more favourable mortality from all major causes of death.

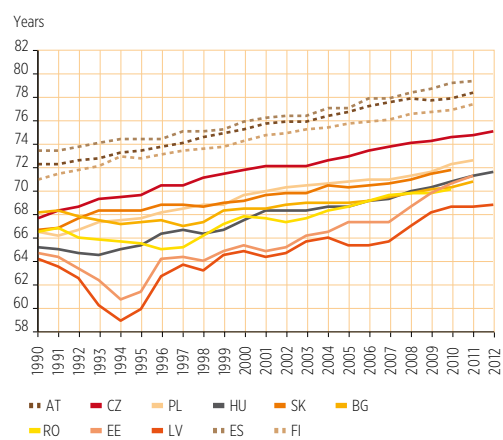
INTRODUCTION

Hungary is a country with high mortality similary to other Eastern and East-Central European countries as well as the Baltic States. The common features of these countries are generally considered to be high levels of mortality from cardiovascular diseases as well as from diseases associated with alcohol consumption, and (not completely unrelated to this) "external" causes of death (Caselli et al. 2002, Willekens 2014). Moreover, while mortality conditions in Western European countries are converging, in the countries of Eastern and Central-Eastern Europe as well as in the Baltic States mortality levels are becoming increasingly diverging (Mackenbach 2013). Nevertheless, former socialist countries are similar in that social inequalities in mortality have been much greater in these countries – at least since the 1990s – than in Western, Northern or Southern European countries (Mackenbach et al. 2015).

THE DEVELOPMENT OF MORTALITY OVER TIME

The most commonly used indicator of mortality is *life expectancy at birth*[G], which is calculated using life tables. At present multiple sources are available for the international comparison of life expectancy at birth. International organisations use different statistical methods, therefore there are some variations in the published data. For the overview of the Hungarian trends we use mortality rates calculated on the basis of data published by HCSO, and for international comparisons data published by the WHO. Various studies examined long-term trends in mortality in Hungary. There seems to be a general agreement in the literature that Hungary – similarly to other East European countries – deviated from the trajectory of improving life expectancy observed in developed European and overseas countries from the mid-1960s up to the period prior to 1989. While life expectancy increased by 0.2–0.3 year annually in developed European countries, the life expectancy of Hungarian males deteriorated from 67.5 years to 65.1 years between 1966 and 1990s (HCSO, Demographic Yearbook, 2013). Among East-Central European countries with similar historical traditions, Poland was characterised by stagnation during this period, and in Czechoslovakia and East Germany life expectancy was increasing – although at a lesser degree than in Western countries – even during the years of state socialism. Female life expectancy was improving across East-Central Europe, although much more moderately than in the Western part of the continent. Life expectancy for females increased only slightly from 72.2 to 73.7 years in Hungary between 1966 and 1990, which can be considered a modest development at best.

Figure 1: Male life expectancy at birth in selected European countries, 1990–2012

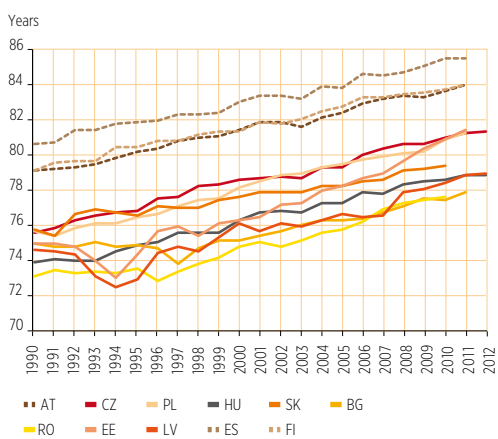


Source: HFA-DB; edited by authors.

In 1990 life expectancy of the Hungarian population were among the worst – apart from the countries of the former Soviet Union – in Europe. Male life expectancy at birth in Hungary was the third lowest (after Latvia and Estonia) among the countries that currently belong to the European Union. For females, life expectancy was lower only in Romania (73.1 years) than in Hungary *(Figures 1 and 2)*.

The decades-long mortality crisis of Hungarian males did not end with the start of the socio-economic transition. Male life expectancy decreased by about half a year due to the socio-economic crisis in the early 1990s (from 65.1 years to 64.5 years between 1990 and 1993), while female life expectancy remained essentially unchanged (73.7 and 73.8 years). After the crisis, life expectancy increased by just over 0.3 year on average annually for males and just under 0.3 for females. As a result the gap between male and female life expectancy has decreased from 8.6 years in 1990 to 6.7 years; however this is still higher than the 4–5-year difference observed in countries with a more favourable mortality profile.

Figure 2: Female life expectancy at birth in selected European countries, 1990–2012



Source: HFA-DB; edited by authors.

The improvement that has been observed in Hungary is not unique. Similar progress has taken place in Western European countries where the improvement got underway in the 1960s and has continued uninterrupted since then. Comparing the difference between life expectancies in Austria and Hungary, for instance, it appears that the difference was seven years for males and five years for females in 2010, the same as twenty years earlier. (A slightly more favourable picture emerges if 1994 is taken as baseline: in this case the gap seems to be slightly closing for males.) Overall, the European picture have not changed much. The mortality of the Hungarian population is still among the least favourable ones in the European Union. Mortality in Hungary is lagging behind Austria by 20–25 years. Life expectancy of the Hungarian population is even lower than that of the Visegrad countries and it is similar to that in the Baltic States as well as Romania and Bulgaria *(Figures 1 and 2)*.

CONTRIBUTION OF SPECIFIC AGE GROUPS TO THE DEVELOPMENT OF LIFE EXPECTANCY

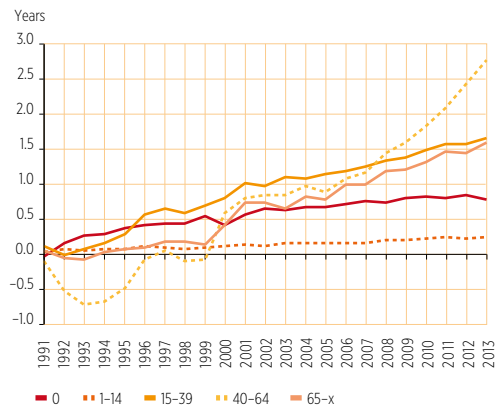
The "contribution" of specific age groups to the temporal changes in life expectancy can be determined by the decomposition of mortality tables. Here *(see Figures 3 and 4)* we present the results of the analysis that decomposed the differences in life expectancy for all ages by the contribution of specific age groups using abridged mortality tables from 1990 and subsequent years. By identifying the role of specific age groups, it is possible to examine the dynamics of change over time and put forward some conclusions for the future. The analysis was carried out for both sexes, and in order to have a clearer overview,

results were presented by broad age groups (0, 1–14, 15–39, 40–64, 65–x years). Each age group is associated with a specific life phases: infancy (0 years), childhood (1–14 years), young adulthood (15–39 years), middle age (40–64 years) and old age (65–x years). The analysis uses abridged mortality tables that were published each year by the Hungarian Central Statistical Office. Male life expectancy at age 0 increased by seven years from 65.1 to 72.1 years between 1990 and 2013. The improvement of infant mortality contributed to this change with – a far from insignificant – 0.7 year. Our figure *(Figure 3)* clearly shows that most of the gain from the improvement of infant mortality was realised between 1990 and 2000, after that the rate of improvement slowed down. At present, infant mortality in Hungary is just above the European average, potential gains from its improvement are modest. The life-expectancy gain from the improvement of childhood mortality was only 0.2 year and no further gain can be expected for this age group in the future. It is well-know that the mortality crisis in Eastern Europe affected the middle-aged population the most; therefore mortality trends of this age group, particularly vulnerable to socio-economic shocks, deserve special attention. In Hungary, the decrease in the mortality of young adults and the middle-aged contributed 1.7 year and 2.8 years respectively to the improvement of male mortality. Most of the improvement is associated with the 40–64 age group, whose mortality was deteriorating until 2000 and thus having a negative effect on life expectancy in that period. These results highlight the age-specific nature of the decline in life expectancy in the early 1990s, and demonstrate that it was only after the turn of the millennium when the mortality crisis ended for all age groups. Improvements in premature (under 65 years) mortality contributed 5.4 years to the increase of life expectancy.

Improvements in the mortality of people aged 65 years or over were more moderate and resulted in a gain of only 1.5 year, which occurred predominantly after the turn of the millennium – unlike the gains among the middle aged.

The rapidly rising trends of gains for the middle-aged and elderly male population suggest that there are still significant reserves for future improvement in adult mortality.

Figure 3: Contribution of specific age groups to changes in life expectancy, 1990-2013, males

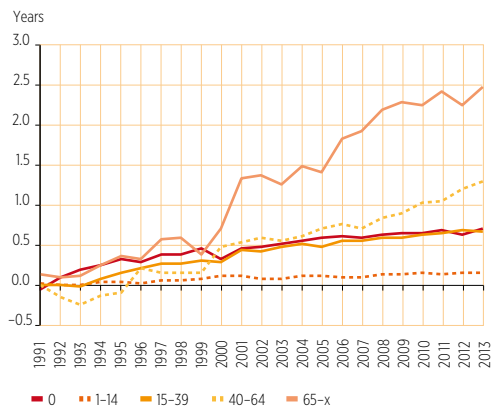


Source: Abridged life tables for Hungary, 1990–2013; HCSO. Authors' calculation.

Female life expectancy increased by 5.3 years from 73.7 to 79.0 years between 1990 and 2013. Just like in the case of men, women also gained 0.7 year and 0.2 year from the improvement of infant and child mortality, respectively. Similarly to males, the main source of gain in female life expectancy was the improvement of adult and elderly mortality. However, among women the contribution of the population aged 64 years and over was more substantial (2.5 years) than that of the middle-aged (1.3 year) – who were also affected by the economic crisis – and young adults (0.7 year) altogether. The sharp rise observed in the mortality gain of the middle aged population – those aged

40–64 years – since 1999 *(Figure 4)* suggests that the decreasing mortality in this age-group may provide some potential for a further improvement. Mortality decline among older women produced a gain of only half a year in the 1990s; however a new era has started after the turn of the millennium characterised by the unprecedented improvements in the survival of older women.

Figure 4: Contribution of specific age groups to changes in life expectancy females, 1990-2013



Source: Abridged life tables for Hungary, 1990–2013; HCSO. Authors' calculation.

ROLE OF SPECIFIC CAUSES OF DEATH IN THE DEVELOPMENT OF LIFE EXPECTANCY

To examine the role of specific causes of death, we have used the decomposition method presented earlier. The analysis focuses on the main groups of causes of death and also examines cardiovascular mortality. Furthermore, some cancers and particular external causes are also highlighted in order to demonstrate the role of certain risk factors, or because they are particularly important in the Hungarian context.

Obviously, the number of death cases provides us only with a very rough picture *(Table 1)*. The most remarkable change compared to 1990 is the decline in the number of cardiovascular deaths: this decreased by a quarter among men and by more than a tenth among women. This favourable trend can be mainly attributed to a very substantial decline in deaths caused by cerebrovascular diseases. There was also an improvement in mortality related to the diseases of the digestive system, for example the number of deaths associated with alcohol-related liver diseases fell substantially. The number of deaths due to external causes fell by more than half for both sexes: the frequency of suicides, which represent a large share in this group, also declined proportionately. By contrast, the prevalence of cancer-related mortality rose considerably among women, mainly due to the increase in the number of deaths caused by lung cancer. The number of deaths related to ischaemic heart diseases also increased among women between 1990 and 2013.

The cause-specific decomposition of differences in life expectancy makes it possible to identify the contribution of age groups by cause of death. For men, the results of the decomposition show *(Figure 5)* that the seven-year gain between 1990 and 2013 mainly, but not exclusively, came from the decline in cardiovascular mortality (2.8 years, 40% of the total gain). This result characterises the period that is often referred to as the cardiovascular revolution of the epidemiological transition, attributed to effective healthcare interventions, extension of screening programmes, and lifestyle changes. The decline in cardiovascular mortality is made up by comparable gains in ischaemic mortality that includes deaths caused by myocardial infarction (1.0 year), gains in cerebrovascular mortality (0.9 year) and other heart diseases (0.9 year).

Table 1: Number of deaths by main and some selected causes for males and females in 1990 and 2013

Cause of death	Males		Females	
	1990	2013	1990	2013
Infectious and parasitic diseases	646	396	317	508
Neoplasms	17,644	18,060	13,577	15,214
Malignant neoplasm of trachea, bronchus, lung	5,416	5,418	1,492	3,173
Malignant neoplasm of stomach and small intestine	1,806	990	1,180	710
Malignant neoplasm of female breast	–	–	2,097	2,167
Malignant neoplasm of colon, rectum and anus	2,146	2,865	2,090	2,242
Endocrine, nutritional and metabolic diseases	774	1,244	1,357	1,672
Diseases of the circulatory system	36,375	27,600	39,865	35,379
Cerebrovascular diseases	9,556	5,427	11,662	7,401
Ischaemic heart diseases	15,316	14,635	12,875	17,469
Diseases of the respiratory system	4,079	3,822	2,565	3,187
Diseases of the digestive system	5,511	3,741	3,504	2,649
Alcohol-related liver diseases	2,951	2,065	1,129	640
External causes of morbidity and mortality	8,459	3,981	4,816	2,143
Suicide	2,980	1,588	1,153	505
Total	*76,936*	*61,894*	*68,724*	*64,884*

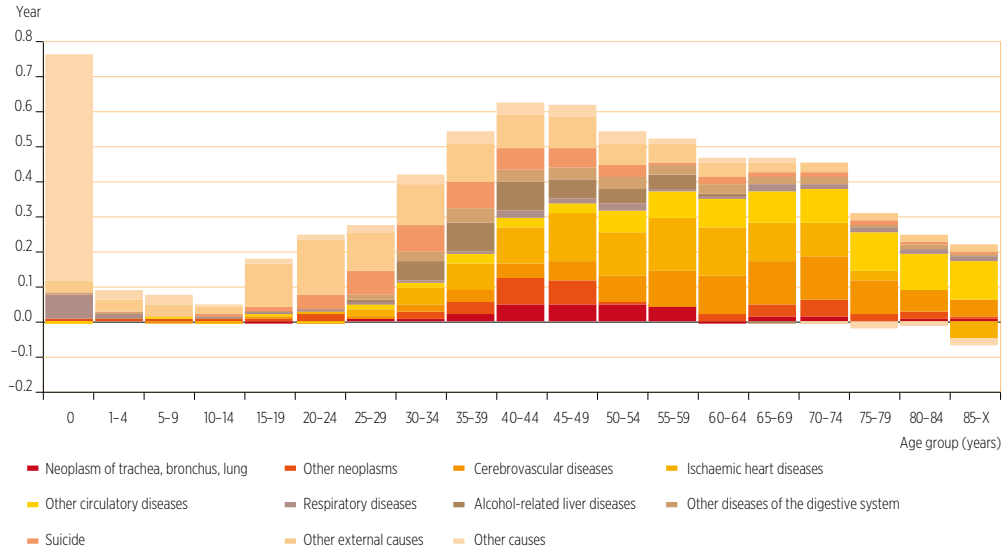
Source: Vital statistics, HCSO; edited by authors.

The decline in mortality due to external causes has resulted in an improvement of 1.7 year, or nearly a quarter of the total gain (24.7%) has come from a decline in this cause of death. In particular the fall in suicide has contributed 0.5 year (7.4%) to positive developments in life expectancy; however the level of self-harm in Hungary remains high in international comparison. The improvement in mortality from external causes is mainly due to the remarkable fall in accident-related mortality (1.2-year gain in life expectancy). The contribution of other causes is much more limited. The improvement in diseases of the digestive system has increased life expectancy by 0.7 year. Within this, the decrease in deaths caused by alcohol-related liver diseases has increased male life expectancy in Hungary by 0.4 year. Nevertheless, there is no sign of a turn similar to the cardiovascular revolution in mortality associated with neoplasms; their decline has resulted in a gain of only 0.64 year over a quarter of a century.

As far as other main causes of death are concerned, the decline in mortality due to respiratory diseases has contributed 0.2 year, and the decrease of infectious mortality 0.1 year to the increase of life expectancy. In conclusion, there has been an improvement in all main causes of deaths since 1990, there has been only a small loss associated with ischaemic heart disease among the over-85s.

The pattern of age-specific gains differs by cause of death. The improvement in infant mortality – apart from a small contribution of infectious mortality– is mainly due to fall of mortality from diseases and congenital anomalies that do not occur in other age groups,therefore they were not included in this analysis. The moderate improvement associated with the decline of child mortality is mainly due to a fall in accidental mortality. The contribution of changing mortality of young adults to the increase of life expectancy – 1.1 year in total – can also be attributed to the improvement in accident-

Figure 5: Contribution of specific age groups by cause of death to changes in life expectancy, males, 1990–2013

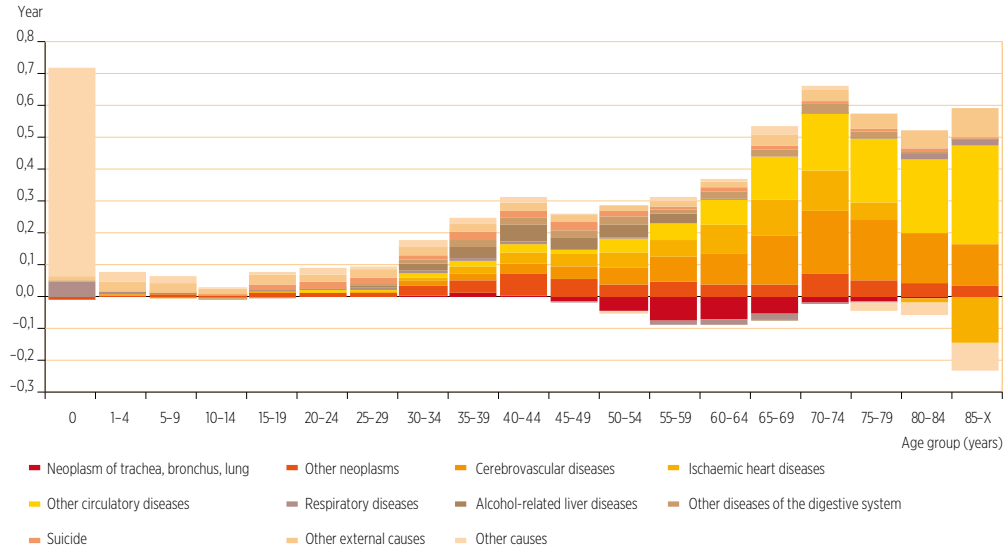


Source: Abridged life tables for Hungary, 1990–2013; HCSO. Authors' calculation.

related mortality. The contribution of middle-aged adults (2.7 years) can be partly attributed to a decrease in cardiovascular mortality (1.3 year), in particular to a fall in infarction mortality and, to a lesser extent, to declining stroke mortality. There are similar gains from mortality caused by the diseases of the digestive system (0.4 year), external causes (0.3 year) and neoplasms (0.3 year). Three quarters of the gain (1.6 year) in the oldest group is due to improvements in cardiovascular mortality (1.2 year); the contribution of external causes and neoplasms is small in comparison (both 0.2 year).

In addition to the extent of changes, the composition of gains by age group and by cause of deaths are also very different among women as compared to men *(Figure 6)*. The first two points have already been discussed. In terms of the cause-specific gains, the main difference between females and males is that a higher proportion of female life expectancy gains come from improvements in cardiovascular mortality (2.9 years, 54.5%). However, most of the gains were realised by older age groups. The role of external causes was also important (0.8 year), however its contribution to the increase of life expectancy is more limited (15%) than among males. Gains from the improvement of cancer mortality represent only 0.3 year, resulting from a deterioration in mortality caused by the malignant neoplasms of trachea, bronchus, lung (-0.3 year), and an improvement (of 0.6 year) in mortality caused by other neoplasms. Therefore, similarly to men, gains from cancer mortality are limited, and cancer mortality attributable to smoking –have decreased life expectancy.

Figure 6: Contribution of specific age groups by cause of death to changes in life expectancy, females, 1990–2013



Source: Abridged life tables for Hungary, 1990–2013; HCSO. Authors' calculation.

THE DEVELOPMENT OF CAUSE-SPECIFIC MORTALITY IN EUROPEAN COMPARISON

The driving force behind the increase in life expectancy in Europe has been the steady decline in cardiovascular mortality over the last four decade. Mortality associated with heart- and circulatory diseases is falling across Europe; however the process started at different times and followed different dynamics in each country, resulting in substantial differences in current levels of cardiovascular mortality and also perspectives for the near future.

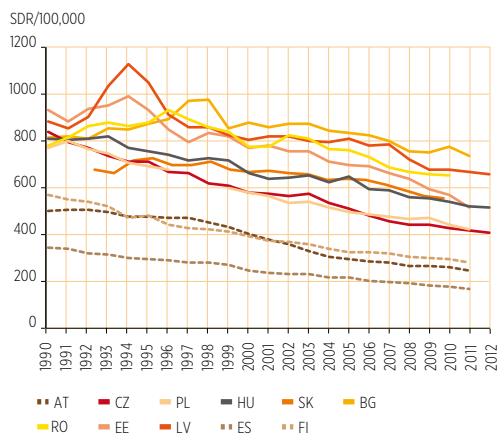
The decline in cardiovascular mortality started in the 1970s in most Western European countries, or in the 1980s in the "delayed" countries. In the former socialist countries, this turn took place in the period between 1990 and 1998: in Poland and the Czech Republic around 1990, after 1995 in Hungary and the Baltic States, and in Bulgaria only after 1999 *(Figures 7 and 8).* In the years following 1989 cardiovascular mortality increased substantially in some countries (primarily the Baltic States, Bulgaria and Romania) and the more or less steady decline started only later on. In Hungary the increase after 1989 was moderate but noticeable among males. The 2000s were characterised by a decline in all countries, with a particularly dynamic fall in the Baltic countries. Although it is important to note that in some countries – Poland and the Czech Republic in particular – where the rate of cardiovascular mortality was comparable to that in Hungary in 1990, the decrease continued at a similar rate throughout the 2000s. However, because the declining trend had started earlier in these countries, it has resulted in much lower levels of cardiovascular mortality than in Hungary.

The rate of decline in cardiovascular mortality among Hungarian women was very similar to that in other countries of the region for a long period however the decrease seems to have halted in recent years (similar phenomenon was observed

only in Latvia). The slight increase over the last two years cannot be considered a permanent break in the declining trend because similar slowdowns lasting one to two years were observed elsewhere and also in earlier periods in Hungary.

In Western countries – that are represented in our figures by neighbouring Austria, the European frontrunner Spain, and Finland that was in a similar situation to Hungary in the 1970s – both male and female cardiovascular mortality are much lower than in Hungary or its immediate region. The cardiovascular mortality of Hungarian men is twice as high as that of Austrian men and it surpassed the mortality level of Spanish men by 150%. Similarly, cardiovascular mortality was twice as high among Hungarian women as among Austrian ones, and three times higher than that of Spanish women in 2011.

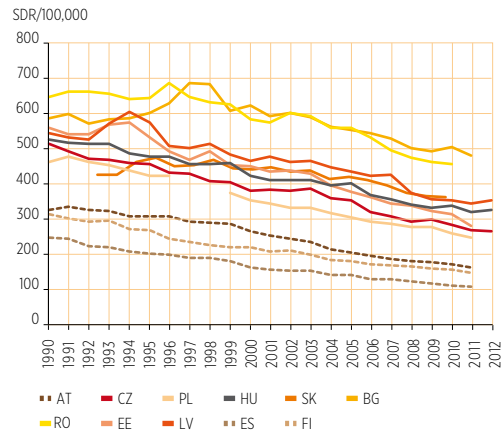
Figure 7: Trends in cardiovascular mortality in selected European countries, males, 1990–2012



Source: European Mortality Database (MDB).

Higher levels of cardiovascular mortality characteristic of the region were previously attributed – to a lesser extent – to higher exposure to traditional risk factors (physical inactivity, unhealthy diet, smoking and alcohol consumption), and more importantly to blood pressure management practices, particularly a much less frequent use of statins (Helis et al. 2011).

Figure 8: Trends in cardiovascular mortality in selected European countries, females, 1990–2012



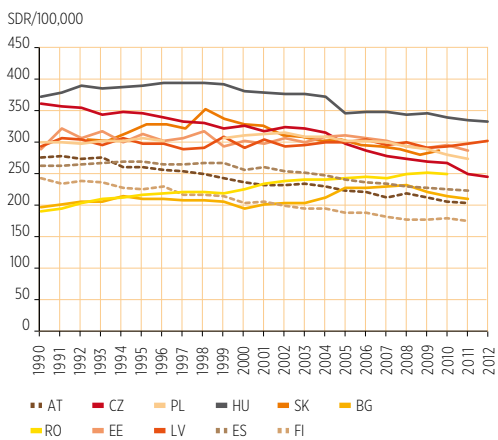
Source: European Mortality Database (MDB).

A special characteristic of the Hungarian mortality compared to the neighbouring region as a whole is, that in addition to the high cardiovascular mortality, the level of cancer mortality is also especially high.

The level of cancer mortality for men is among the highest ones in Europe *(Figure 9)*. However, long-term trends can only be evaluated by taking into account the effect of the introduction (in 2005) of a new classification system for establishing causes of death. As a result, the number of deaths where neoplasms were recorded as the underlying cause of death fell (the analysis of cause-specific mortality is based on these records). Nonetheless, post-2005 data still show that cancer mortality for men is about 20% higher than in other Eastern European and Baltic countries characterised otherwise by high cancer mortality, and can be up to twice

as high as in countries with lower cancer mortality. Neoplasm mortality is relatively low in some countries in the region (Romania and Bulgaria), nevertheless it is rapidly increasing. For Hungarian men – apart from a sudden drop in 2005 probably due to registration and classification reasons – cancer mortality has decreased very slightly since the second half of the 1990s. The slow progress in Hungary and a number of other countries can be primarily attributed to a slow decline in lung cancer mortality. Many other countries have also seen a decline in mortality caused by other types of cancer (colorectal cancer in particular), however this has not contributed to the Hungarian trend.

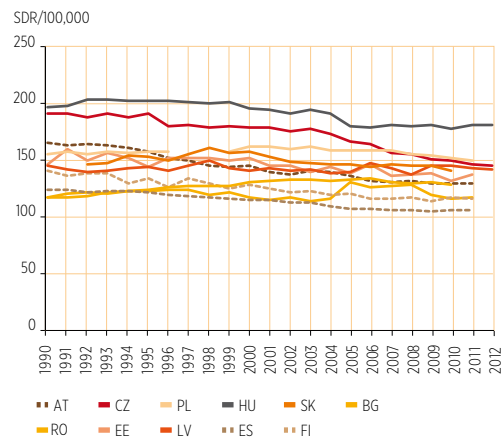
Figure 9: Trends in cancer mortality in selected European countries, males 1990–2012



Source: European Mortality Database (MDB).

For women, there has been a marked decline in cancer mortality in a number of countries, at least over the last decades; however trends are clearly increasing in Latvia, Bulgaria and Romania. The Hungarian trend – apart from changes in 2005 – has been characterised by a long-term stagnation resulting from a slight increase in lung cancer mortality and a decline of mortality related to some other types of cancer. Cancer mortality for Hungarian women is 70% higher than in European countries with the lowest cancer mortality and 10–20% higher than in other countries in the region characterised by higher levels of cancer mortality *(Figure 10)*. It is important to note that mortality attributable to colorectal and breast cancer – previously characterised by a slight decline – is now stagnating. Therefore, in addition to combating smoking, promoting prevention activities would also be required to reduce the very high current levels of cancer mortality.

Figure 10: Trends in cancer mortality in selected European countries, females, 1990–2012

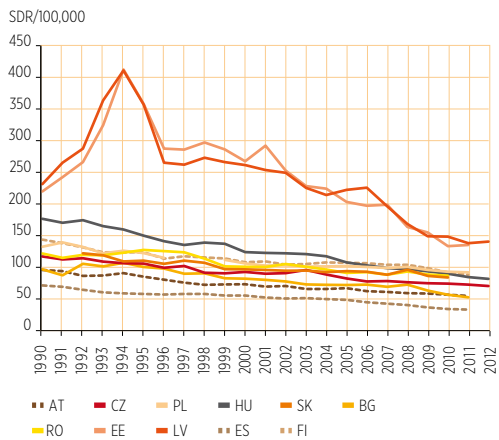


Source: European Mortality Database (MDB).

The third main group of causes of death is represented by external causes that include transport and other accidents, as well as homicides and suicides. For men, external mortality halved between 1990 and 2012 *(Figure 11)*. In Hungary both the rate of suicide and other related causes of mortality have been steadily declining over the last decades. The decline in the last two decades was by and large uninterrupted and has continued in recent years.

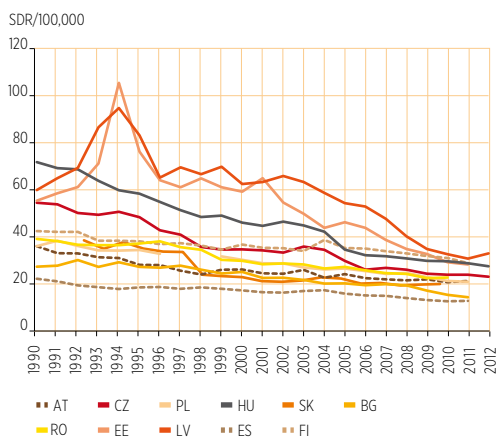
Although the current level of this kind of mortality is twice as high in Hungary as in European countries with the best values, however it is not substantially different from other countries in the region, and the decline has also been more dynamic than that observed elsewhere (except for the Baltic States are still characterised by very high mortality in this respect).

Figure 11: Trends in external mortality in selected European countries, males, 1990–2012



Source European Mortality Database (MDB).

Figure 12: Trends in external mortality in selected European countries, females, 1990–2012



Source: European Mortality Database (MDB).

For women, external mortality fell to a third between 1990 and 2012 *(Figure 12)*. In addition to the decline in suicide and transport accidents, the decrease in the level of other accidents (e.g. accidental falls) also contributed to this. For these causes of death clear regional patterns cannot be observed: rates are similarly low both in Austria and Bulgaria. Countries previously characterised by high external mortality (including Hungary) are experiencing a rapid decrease, while in countries where this kind of mortality was lower the decline is slower. Mortality due to external causes is converging across European countries.

Next we will examine trends in mortality related some to some selected causes of death *(Figures 13 and 14)* that might have a smaller effect on life expectancy in themselves, however can be regarded as "indicators" of major factors affecting overall mortality level. Out of these, we will concentrate on those lifestyle factors (diet, smoking and alcohol consumption) that have the greatest effect on mortality and health status.

Mortality attributable to diabetes can be a potential indicator for healthy diet (obviously many more causes of deaths are connected with poor diet, particularly heart disease, but that is strongly influenced by many other factors too). In 2005 diabetes mortality in Hungary was relatively high in regional comparison (by which we now mean the EU12 countries) as well as in a wider European context. Nevertheless, by 2011 diabetes mortality moved closer to the European average for both sexes, although it still exceeds it: by 50% for men and 60% for women *(Figures 13 and 14)*.

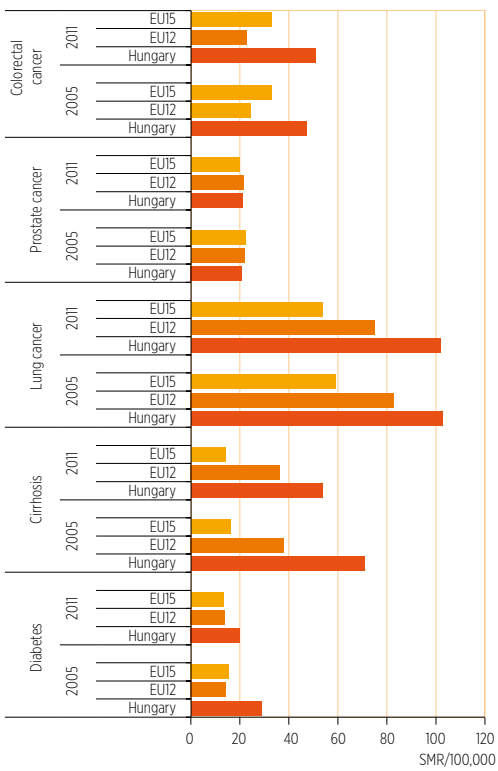
Chronic liver disease and liver cirrhosis are associated with alcohol consumption. Mortality caused by these diseases can be considered very high in a regional and in a wider European comparison as well. Mortality associated with these causes fell substantially among both males and females between

2005 and 2011; however for men it is still 48% and for women 21% higher than the regional average, and approximately three times higher than the Western European levels for both sexes. Nevertheless, mortality associated with alcohol consumption (unlike diabetes mortality) has been steadily falling for a long time and if this trend continues, it might get close to the regional or European averages in the near future *(Figures 13 and 14)*.

Trends in lung cancer mortality, used as an indicator for smoking, show a different picture. Hungarian rates – for both men and women – are above the regional and wider European average. While lung cancer mortality for men declined in the region and in older EU Member States between 2005 and 2011, for Hungarian men it increased slightly and now it is 35% higher than the EU12 and 90% higher than the EU15 average. For women, lung cancer mortality increased in Hungary and in the regions used for comparison between 2005 and 2011. However, this sort of mortality rate for Hungarian women was nearly twice as high as the – otherwise very similar – regional and European average *(Figures 13 and 14)*.

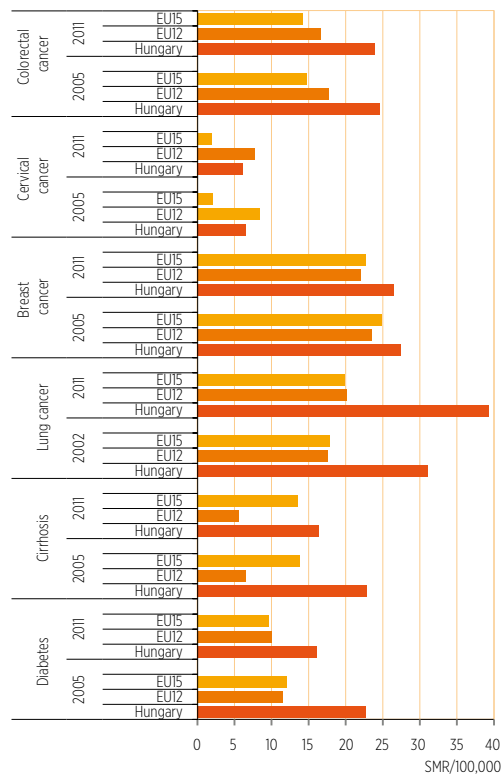
The quality of health care and its contribution to mortality decrease can be examined via the analysis of causes for which screening can reduce premature mortality (cervical cancer, breast cancer, colorectal cancer) or by examining diseases that can be managed effectively by treatment that also includes screening (e.g. prostate cancer). A mixed picture emerges from the analysis

Figure 13: Mortality by selected causes of death in Hungary, older and newer EU Member States, males, 2005 and 2011



Source: European Mortality Database (MDB).

Figure 14: Mortality by selected causes of death in Hungary, older and newer EU Member States, females, 2005 and 2011



Source: European Mortality Database (MDB).

of these death causes. For example, prostate cancer mortality shows a positive picture: the mortality rate in Hungary was slightly below the regional average and only just surpassed the level observed in the older EU Member States in 2011. However, breast cancer mortality changed very little between 2005 and 2011, and it was somewhat higher than the regional and EU15 average at both time points. There are larger differences in cervical cancer mortality: this is lower than the regional average but significantly higher than in the EU15, and it did not decrease between 2005 and 2011. The high level of colorectal cancer mortality can also be a cause for concern: this hardly changed for men and increased for women between 2005 and 2011. This type of mortality was 70% higher for females and 125% higher for males in Hungary as compared to the old EU Member States in 2011 *(Figures 13 and 14)*.

In summary, mortality associated with traditional risk factors was still very high in Hungary in the early 2010s. However, a remarkable shift can be observed in the importance and contribution of individual risk factors to the development of mortality. There is a slight decline in diet-related mortality, a stagnation in mortality associated with smoking, and a very substantial decline in mortality related to alcohol consumption. This suggests that alcohol consumption is being gradually replaced by smoking as the number one risk factor. It is not possible to quantify the risk associated with diet, however some data suggest a slight decrease, while others highlight the continued importance of the problem *(see Chapter 6)*.

MARITAL STATUS AND MORTALITY

Differences in mortality by marital status, and in particular the fact that the married have higher life expectancy than the non-married has been known since the mid-19th century. According to empirical data mortality is lowest among the married, followed by the never married, and it is higher among those whose marriage ended for any reason (i.e. the divorced and the widowed). It is also well-documented that the protective effect of marriage is greater on males than on females. These observations are generally interpreted within two explanatory frameworks. According to the "selection" approach, healthier individuals are more successful in finding a partner and marry, while poor health status reduces the probability of marriage and increases the likelihood of divorce. The other "social causation" approach explains the positive effect of marriage on life expectancy by better access to social/material resources by married couples, by their (possibly) stronger social network, and healthier lifestyle due to the constant control of the spouse.

Mortality differences by marital status are presented directly, using *age-standardised mortality rates*[G] standardised to the European Standard Population (ESP-1976). The number of population by sex and age necessary to calculate the standardised rates come from the corresponding population censuses, and mortality data are taken from the population register for the same years. Standardised rates were calculated for the population aged 25 and over, and for years 1990, 2001, and 2011.

Based on these mortality rates, it can be concluded that the most marked mortality differences are between the married and the non-married groups. Mortality is more favourable among the married population than among the non-married for both sexes. The protective effect of marriage can also be clearly observed for different death causes *(Tables 2 and 3)*, and despite a decline in the propensity to marry, it continues to exist.

Table 2: Standardised mortality rates for males aged 25 and over by marital status, in 1990, 2001 and 2011[a)]

Causes of death	Married	Never married	Widowed	Divorced	Total
		1990			
Neoplasms	554.4	559.7	679.7	885.6	581.0
Circulatory system	1121.5	1672.0	1645.2	2078.4	1261.4
Respiratory system	114.3	260.3	216.1	236.2	139.1
Digestive system	141.2	294.1	330.4	374.3	179.8
External causes	186.5	435.6	512.3	525.0	248.8
Other	97.4	245.9	185.4	278.7	125.0
Total	2215.2	3467.6	3569.1	4378.2	2535.0
		2001			
Neoplasms	534.7	599.1	800.9	799.0	589.1
Circulatory system	835.6	1209.0	1475.3	1412.4	991.5
Respiratory system	60.8	140.5	138.9	146.3	80.6
Digestive system	134.4	302.4	552.9	341.5	188.2
External causes	119.5	279.7	362.9	353.5	177.9
Other	75.2	179.0	179.1	169.5	102.0
Total	1760.2	2709.8	3509.9	3222.2	2129.2
		2011			
Neoplasms	458.0	622.9	641.7	641.8	513.2
Circulatory system	656.8	1233.6	1191.0	1183.3	814.9
Respiratory system	76.6	193.7	175.4	141.2	103.4
Digestive system	89.9	190.0	215.6	205.7	126.3
External causes	80.4	200.4	309.3	226.0	123.3
Other	90.1	232.1	153.3	178.6	120.9
Total	1451.8	2672.8	2686.3	2576.6	1802.0

[a)] Authors' calculation, standardised to European Standard Population.

Table 3: Standardised mortality rates for females aged 25 and over by marital status, in 1990, 2001 and 2011[a)]

Causes of death	Married	Never married	Widowed	Divorced	Total
		1990			
Neoplasms	286.0	360.4	332.2	420.2	306.8
Circulatory system	700.8	1005.5	879.2	1194.1	824.3
Respiratory system	43.5	128.0	58.0	78.1	53.6
Digestive system	72.7	70.4	151.3	124.4	84.0
External causes	76.8	150.9	137.6	153.9	102.7
Other	76.0	141.6	86.5	104.2	77.0
Total	1255.8	1856.9	1644.7	2075.0	1448.5
		2001			
Neoplasms	266.0	356.3	348.1	386.9	302.3
Circulatory system	457.2	754.7	716.6	770.6	639.8
Respiratory system	23.2	76.3	36.2	47.4	33.1
Digestive system	61.0	92.8	115.3	110.3	77.5
External causes	42.5	83.5	84.5	98.1	64.6
Other	48.4	110.2	79.2	81.1	66.5
Total	898.4	1473.7	1380.0	1494.5	1183.8
		2011			
Neoplasms	244.2	332.1	326.8	347.9	279.1
Circulatory system	348.3	690.4	558.8	629.6	503.1
Respiratory system	32.8	93.3	55.4	58.7	47.6
Digestive system	41.3	73.4	69.6	68.8	53.6
External causes	31.0	56.9	53.0	57.3	40.5
Other	70.4	170.3	98.8	108.8	90.4
Total	767.9	1416.4	1162.4	1271.0	1014.3

[a)] Authors' calculation, standardised to European Standard Population.

Nevertheless, mortality differences shifted among the non-married groups between 1990 and 2011. In 1990, the standardised rate (per hundred thousand) for divorced men aged 25 and over (4,378.2) was nearly twice as high as the same rate for married men (2,215.2), while these mortality rates of the never married and the widowed were very similar (3,467.6 and 3,569.1 respectively) and approximately 60% higher than that of married men. A decade later, mortality of the widowed was the highest (3,509.9), twice the rate of the married population (1,760.2), however the rate of the divorced was not very different (3,222.2) either, while the group of the never married came second after the married (2,709.8).

Despite the moderate variances, differences in the mortality of the married, divorced and widowed were still significant in 2001, but a decade later they were not any more. Differences in female mortality by marital status are also split along married and non-married groups for both total and cause-specific mortality. Excess mortality for the non-married compared to the married is generally smaller for women than for men. Among non-married women, mortality of the widowed was consistently the lowest in all three periods. In 1990 and 2001 mortality of the divorced and in 2011 mortality of the never married was the highest. Differences in mortality by marital status were significant in 1990 and 2011, however in 2001 the difference between the never-married and the divorced was not significant in this respect.

In summary, it can be concluded that the main difference in mortality by marital status occurs between the married and the non-married, which is consistent with international and Hungarian experience. Differences among non-married groups are more varied and their implications for total mortality are more limited. However, it is important to highlight the limitations of analysing mortality differences by marital status. The typology is based on officially registered marital status categories. In addition to information on the duration of partnership, other factors have not been taken into account either. Furthermore it should be noted that data on population size and death cases come from two different sources, and combining them might increase the risk of bias.

SOCIAL DIFFERENCES IN LIFE EXPECTANCY

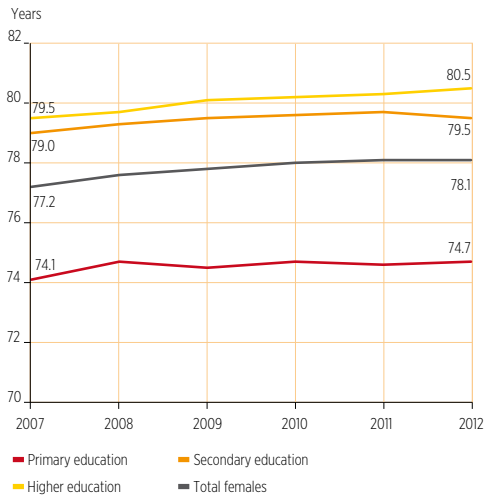
International comparative data for life expectancy are only available for recent years and only by level of education. According to the European Statistical Office (Eurostat) life expectancy at birth for women with primary education was 74.7 years in 2012, equal to that in 2008. By contrast, life expectancy at birth for females with higher education was 80.5 years in 2012, nearly a year higher than in 2008. Life expectancy for females with secondary education is almost identical to that of women with higher education: it was only a year shorter in 2012 (79.5 years), however its improvement between 2008 and 2011 seems to have halted in 2012, when it fell by 0.2 year (from 79.7 years) compared to the previous year *(Figure 15)*.

Differences in female life expectancy by educational level were generally growing across Europe between 2007 and 2012. In Hungary the gap between those with primary and those with higher education increased from 5.4 years to 5.8 years.

There was also a relative increase during the same period in the majority of countries we have comparable data for *(Figure 15)*, and differences decreased only in Estonia, Romania, Italy and Croatia. Overall, differences are greater in the East-Central European region than in Western European countries: while in the latter

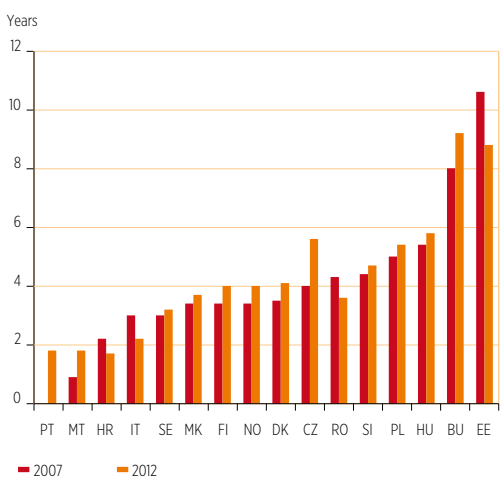
group the gap in life expectancy between women with primary and higher education is 2–4 years, in the other one it is 4–8 years *(Figure 16)*.

Figure 15: Life expectancy at birth by educational level, females, 2007–2012



Source: Eurostat.

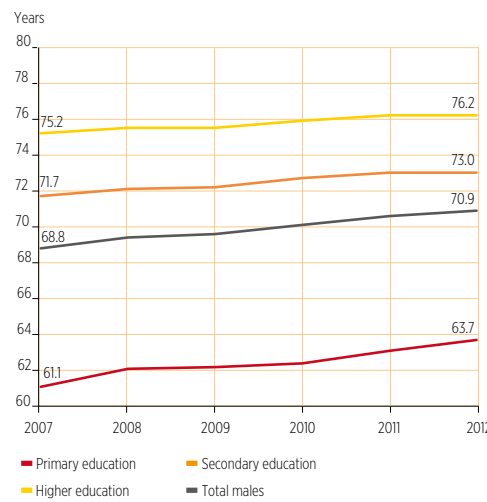
Figure 16: Gap in life expectancy at birth between women with higher education and those with primary education in some European countries, in 2007 and 2012



Source: Eurostat.

For men, the level of education has a stronger effect on the length of life. In 2012 life expectancy for men with primary education was estimated to 63.7 years, while for those with higher education it was 12.5 years longer, namely 76.2 years. In 2008 the difference between the two corresponding values was 13.4 years, therefore the very large difference decreased somewhat. At the same time – unlike the trend observed for women – life expectancy for men with secondary education is much shorter than that of men with higher education: their life expectancy was around 73 years in 2012. Between 2008 and 2012 there was a small increase for men in all corresponding groups (by 0.7; 0.9; and 1.6 year), *(Figure 17)*.

Figure 17: Life expectancy at birth by educational level, males, 2007–2012

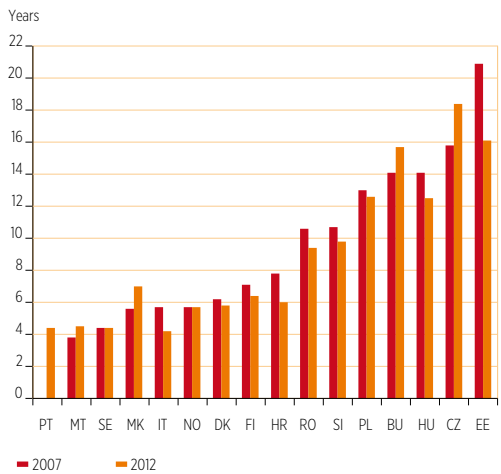


Source: Eurostat.

Between 2008 and 2012 differences in male life expectancy by educational level were generally declining except for Bulgaria and the Czech Republic. Nevertheless, in Western European countries this difference (between those with primary and those with higher education) is generally less than five years, while in the Eastern Euro-

pean region it typically exceeds 10 years. The differences within the male population in Hungary are somewhat larger than those found in Slovenia, Romania and Poland, however slightly smaller than in Estonia, the Czech Republic and Bulgaria *(Figure 18)*.

Figure 18: Gap in life expectancy at birth between men with higher education and those with primary education in some European countries, in 2007 and 2012



Source: Eurostat.

CONCLUSION

The overview of mortality and cause-specific mortality has highlighted that life expectancy has been improving in Hungary over the past two decades, driven by the "cardiovascular revolution". However, this positive development should be interpreted with caution: the speed of changes is slow in Hungary, and the country is among those East-Central European and Baltic countries that are developing less dynamically (Bulgaria, Romania). Similarly to other countries in the region, Hungary seems to be gradually emerging from the group of countries characterised by high external-cause mortality.

With regards to mortality associated with risk factors the situation of Hungary is special within the region. While there has been a slow decline in mortality associated with alcohol consumption, the contribution of other risk factors to high mortality has been consistently above the regional average. The mortality of the low-educated is particularly high – similarly to other countries in the region – and inequalities have not decreased over recent years either.

GLOSSARY

Standardised mortality rate: The age-specific rates of a given population weighted by the number of an external standard population (reference population) in the corresponding age groups. The rate can be expressed over 1,000 or 100,000 persons. In international practice the age structure of the European population is most often used as the reference population. The standardised mortality rate by marital status presented in the chapter was calculated by using the "European Standard Population" introduced in 1976 by the WHO. Due to changes in the age structure of the population and population ageing, a revised European Population Standard was introduced later; however this new standard was not used in the calculations presented in this chapter.

Life expectancy at birth: It is a synthetic indicator of mortality, calculated on the basis of the mortality of a hypothetical population by using the age-specific death rates prevailing in the given year. Life expectancy can be calculated for any specific age or period between two specific ages. Life tables can be constructed for each age (full life table) or age group (abridged life table).

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Eurostat (Population/Mortality): http://ec.europa.eu/eurostat/web/population-demography-migration-projections/deaths-life-expectancy-data/database

HFA-DB (European Health for All Database): http://data.euro.who.int/hfadb/

Human Mortality database: http://www.mortality.org/

Hungarian Central Statistical Office (Life expec-tancy at birth by sex, 2002–2013): https://www.ksh.hu/docs/hun/eurostat_tablak/tabl/tps00025.html