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Is East-West Life Expectancy Gap Narrowing in the Enlarged European Union?*

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Abstract: The fall of the Berlin Wall in 1990 and EU enlargement in 2004 are two major political events in the recent history of the Central and Eastern European region. By systematically comparing the changes and differences in life expectancy at birth between the seven new member countries from Central and Eastern Europe and more advanced countries of the EU-15, this article attempts to identify the vanguards and laggards in the health convergence process before and after the 2004 EU enlargement. The results of decomposition analysis highlight the changing patterns of age- and cause-specific contributions to the differences in life expectancy. Finally, we focus on the variations in the progress in reducing the burden of cardiovascular diseases and external causes of death, which were known to be responsible for the long-term mortality crisis during the period of communist rule. Our findings suggest that the collapse of the communist regimes led to immediate positive changes in the Central European countries. At the same time, health disadvantages persisted and even worsened in the Baltic countries. Later on, joining the EU in 2004 was not accompanied by immediate systematic convergence of life expectancy. However, very rapid progress in the initially worst performing Baltic countries after 2007 and especially during the 2010s, may suggest a delayed positive impact of EU enlargement leading to decreasing longevity disadvantage. The convergence process after 2004 was generally slower in the initially better-performing four Central European countries. Despite these country-specific variations, Czechia, Poland, and, especially, Estonia remain clear health vanguards in the region. Further progress requires much more systematic efforts to combat cardiovascular diseases and the persisting burden of excess male mortality at adult working ages.

Keywords: European Union · Enlargement · Life expectancy · Mortality · Convergence

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1 Introduction

The first of May 2004 marked an important date in European Union history when seven post-communist countries from Central and Eastern Europe (CEE) joined the Union alongside Slovenia, Malta, and Cyprus. The seven CEE countries share many common features related to political, socioeconomic, and demographic developments during the periods of communist rule, post-communist transition, and while preparing for and entering the EU. The three Baltic countries (Estonia, Latvia, and Lithuania) were part of the Soviet Union. Czechia and Slovakia (forming Czechoslovakia until 1992), Poland, and Hungary were tied with the USSR within the Warsaw Pact political-military bloc. Between the end of the 1940s and the fall of communism in 1989-1990, all seven countries maintained authoritarian one-party political systems and centrally planned economies. Although highly centralised health systems functioning under this political regime were effective in combatting infectious diseases and ensuring a rapid increase in life expectancy during the first two post-war decades, they could not ensure further health improvement by reducing the burden of non-communicable diseases (*Meslé* 2004). Lack of progress or even worsening in cardiovascular mortality was one of the major reasons for stagnation or increasing mortality in the CEE region (*Meslé* 2004; *Zatonski et al.* 1998). This unfavourable trend contrasted with steady life expectancy improvements in Western Europe, where since the 1970s, the "cardiovascular revolution" was the major contributor to life expectancy progress (*Meslé* 2004). By the end of the 1980s, the life expectancy gap between the Western and Eastern bloc countries reached 7-10 years. The health crisis observed in the Eastern bloc was especially pronounced among males with substantial excess mortality at adult working ages with a predominant role of alcohol-related and external causes of death (*Meslé* 2004).

The fall of communism in the late 1980s was followed by a political and socioeconomic transition that brought substantial challenges for the whole CEE region, especially for the countries of the former USSR, including the three Baltic republics. In the first half of the 1990s, it resulted in a vast socioeconomic crisis in Estonia, Latvia, and Lithuania, which coincided with a deepening health crisis with life expectancies reaching the lowest values since the end of the 1950s (*Meslé* 2004; *Jasilionis et al.* 2011). Although economic progress accelerated in the early 2000s, life expectancy improvements were slower and uneven (*Jasilionis et al.* 2011). Socioeconomic and health trends were more favourable and sustainable in the four Central European countries (*Rychtarikova* 2004).

One of the common components of the political and socioeconomic transformations observed in the seven countries in the 1990s and early 2000s was their orientation towards European integration. During 1997-2002 all seven countries were invited to start negotiations to join the EU, which were successfully completed by official entry to the Union in May 2004. The negotiation process involved implementing the EU rules and laws in national legislation and meeting specific political, social, and economic criteria. Social and economic convergence has always been an important dimension of European integration and enlargement

policies, promoting the advantages of EU membership to candidate countries and highlighting perspectives of catching up with EU living standards. This model is primarily based on the so-called Beta-convergence model assuming faster growth of initially poorer countries and regions, which allows them to eventually catch up with the more affluent countries and regions (*Forgó/Jevčák* 2015). The convergence model was successful among the 15 member states (EU-15, including the UK), showing notable declines in economic, social, and health disparities.

Although health systems mainly remain the responsibility of the individual member states, health dimensions, including life expectancy and cause-specific mortality, have been increasingly considered for assessing the convergence process of the EU countries. Health and health inequalities within and across the EU countries have become essential in monitoring social cohesion and sustainable growth. However, it is difficult to assess to what extent the EU accession may contribute to health trends in the new member states because many structural changes (including in their health care systems) began before they joined the EU. The enlargement process started well beyond just one accession year and involved a long-term and complex negotiation process and related membership support programmes.

Several studies attempted to identify the longevity convergence process across member states and regions following the enlargements of the European Union (*Mackenbach* 2013; *Maynou et al.* 2015; *Hrzic et al.* 2020, 2021). For example, *Hrzic et al*. (2020) found that a) new member states (after 2004) with initially higher mortality showed faster progress than those with lower initial mortality conditions, and b) this trend did not lead to mortality convergence at the EU level. Similarly, another study relying on regional data found no significant short-term effect on mortality convergence between the "new" and "old" EU members (*Hrzic et al.* 2021).

By systematically comparing the differences in life expectancy at birth between the seven new member countries and more advanced countries of the EU-15, this article attempts to identify the vanguards and laggards in the health convergence process before and after 2004 EU enlargement. The study also explores variations in the progress of reducing the burden of cardiovascular diseases and external causes of death, which were known to be responsible for the long-term mortality crisis during the period of communist rule.

2 Life expectancy trends before and after EU enlargement in 2004: moving towards a convergence?

It is often suggested that many common features of mortality patterns in most of the Central and Eastern European region are inherited from a long-term mortality crisis during the period of communist rule (*Meslé* 2004). Despite some similarities in the directions of life expectancy trends before the fall of the Berlin Wall, further changes went in remarkably different directions in the countries of the former USSR and Central European countries of the socialist Warsaw bloc. The differences in both

life expectancy levels and trends are quite visible when comparing two aggregates among newcomers: Baltic countries vs Central European countries.[1]

Figure 1 reveals several observations. Firstly, this figure illustrates the origins and development of the East-West life expectancy divide in Europe. Until the start of life expectancy stagnation in the early 1970s, Baltic females maintained a longevity advantage over both the EU-15 and Central European countries. Central European females had lower life expectancy levels in the 1960s, but did not experience pronounced stagnation. Female life expectancy in this region continued to increase, but progress was slower than in the EU-15 countries. Unlike females, after almost catching up with the EU-15 in the mid-1960s, males in the Central European and Baltic regions experienced marked longevity declines. This worsening trend was much more pronounced in the Baltic countries, especially in the 1970s and the first half of the 1980s. However, Baltic male life expectancy suddenly rebounded following Gorbachev's anti-alcohol campaign in the mid-1980s (*Meslé* 2004). As a result of these contradictory changes and fluctuations in the 1980s, male and female life expectancy in the Central European and Baltic countries temporarily converged to very similar levels in 1990.

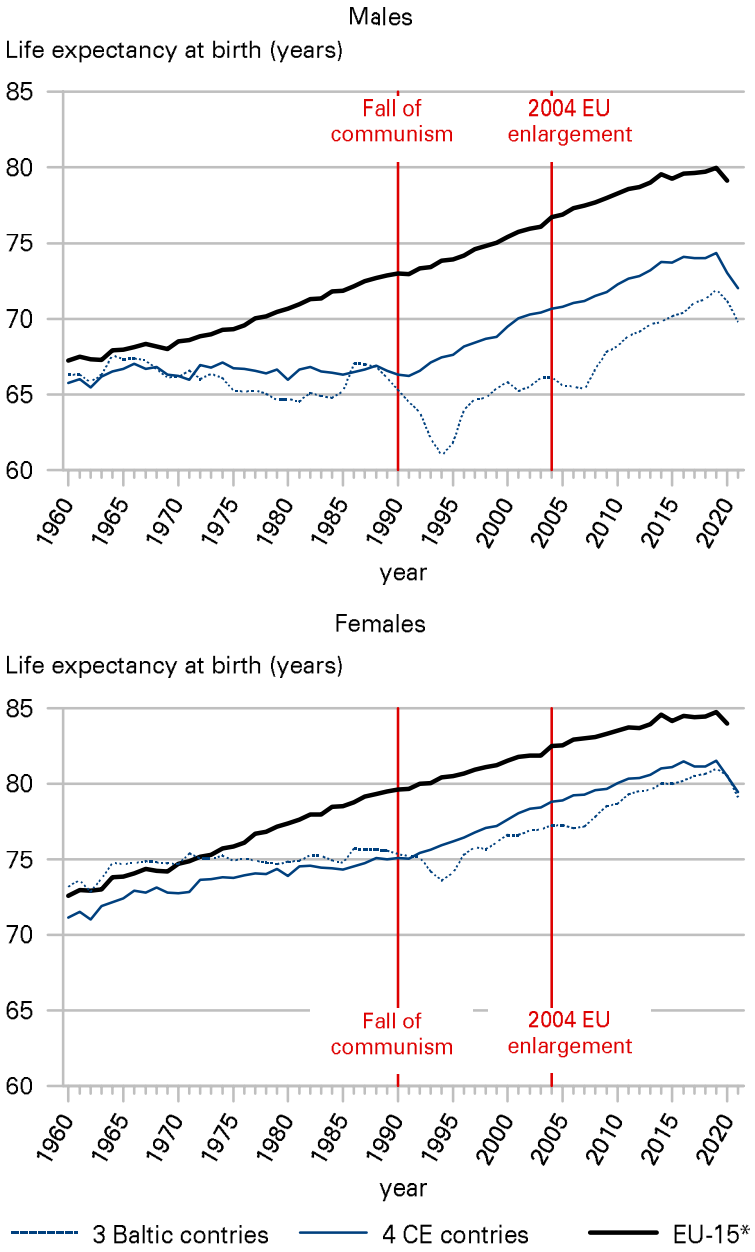
Secondly, we can also observe that the fall of communism coincided with the beginning of long-term and systematic progress in Central Europe. By contrast, a massive drop in life expectancy was observed in the Baltic countries in the first half of the 1990s (Fig. 1). The subsequent improvement in the Baltic countries was interrupted by a short-term stagnation or worsening life expectancy during 2000-2007. These contradictory trends led to a notable increase in life expectancy disparity between the two regions jumping from 1 year in 1990 to 4 years in 2014 for males. Among females, the slight advantage of Baltic females disappeared, leading to a gap of about one year in favour of Central European females in 2014. However, progress during 2014-2019 was faster in Baltic countries leading to diminishing the gap between them and the Central European countries to 2.4 and 0.5 years for males and females, respectively. Because the life expectancy decrease during 2019-2021 was more pronounced in the Central European countries, the Baltic countries managed further to reduce this longevity gap (Fig. 1).

It is also interesting to assess the performance of the two regions compared to the EU before the 2004 enlargement (EU-15).[2] Despite some fluctuations, the life expectancy disadvantage of the Baltic and Central European countries was steadily increasing throughout the 1970s and 1980s, reaching 7-8 years for males and 4.3-4.6 years for females in 1990 (Fig. 1). Between 1990 and 2004, this gap increased further

[1] Baltic countries: Estonia, Latvia, Lithuania. Central European countries: Czech Republic, Slovakia, Poland, and Hungary.

[2] On 30 April 2004, before the enlargement, the EU included 15 countries: France (since 1957), Netherlands (since 1957), the UK (since 1973), Ireland (since 1973), Belgium (since 1957), Germany (since 1957 (West Germany until 1990), Luxembourg (since 1957), Italy (since 1957), Denmark (since 1973), Greece (since 1981), Spain (since 1986), Portugal (since 1986), Sweden (since 1995), Finland (since 1995), and Austria (since 1995). The United Kingdom officially withdrew from the EU on 31 January 2020.

Fig. 1: Male and female life expectancy at birth in the Baltic countries, Central European countries, and the EU-15*, 1960-2021



Note: Life expectancy for EU-15* refers to the weighted average of 15 "old" EU member states (as of 30 April 2004), including the United Kingdom (officially withdrew from the EU on 31 January 2020).

Source: *The Human Mortality Database* 2022; *EUROSTAT* 2022.

for the Baltic countries (up to 10.6 years for males and 5.3 years for females) but slightly decreased for the Central European countries (down to 6.1 years for males and 3.7 years for females). During 2004-2019, the longevity gap between them and the EU-15 decreased in all seven countries, but this progress was faster in the initially worst performing Baltic region. In 2019, Baltic and Central European females were in the same position regarding the life expectancy disadvantage compared with the EU-15 (3.7 years). At the same time, the gap among males was still higher for the Baltic countries (8.1 vs 6.1 years). Provisional life expectancy estimates show that life expectancy declined during the Covid-19 pandemic in 2020 (*Islam et al.* 2021) and, especially in 2021, was more pronounced in the Central and Eastern European countries leading to the increasing gap between them and the EU-15 (Fig. 1).

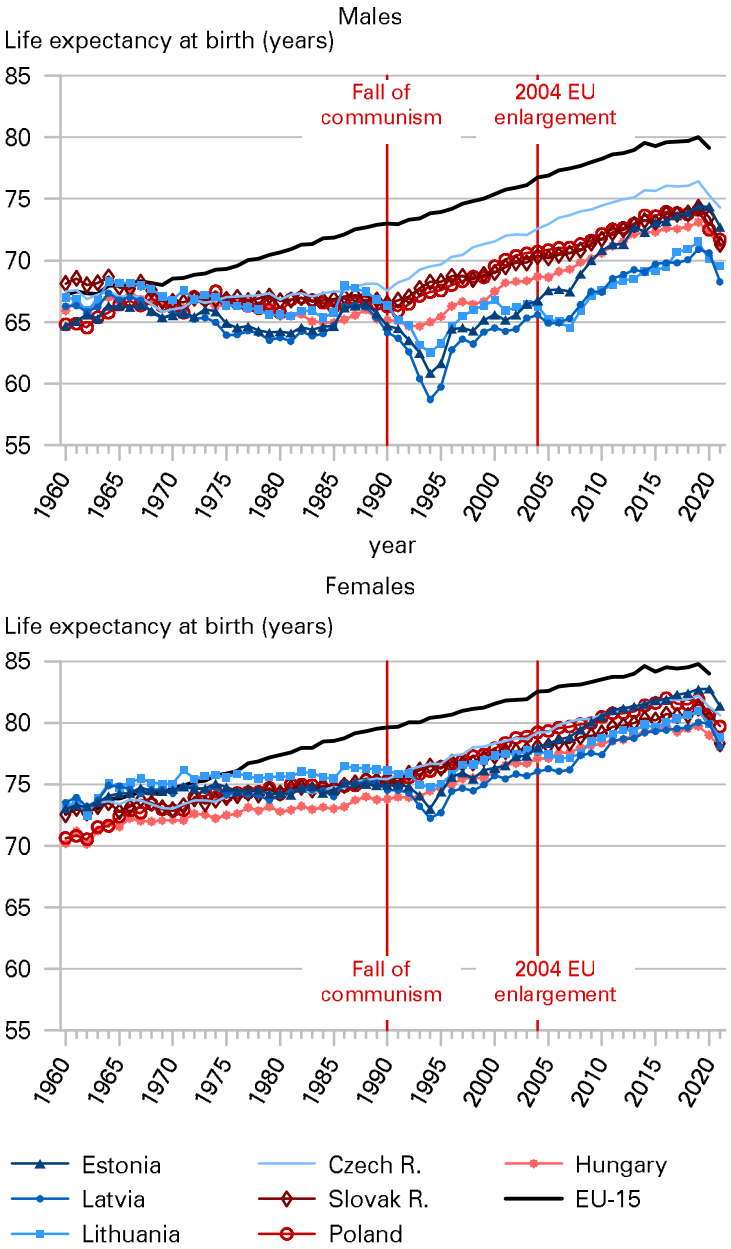
Figure 1, showing aggregated figures for the two regions, conceals important specificities of individual countries and variations in life expectancy at birth within each region (Fig. 2). For example, Czechia experienced some gradual improvements in the 1980s, unlike Hungary, Slovakia, and Poland. During the same period, Lithuanian females were above all six other Eastern and Central European countries, whereas Hungarian females were the lowest.

However, the most significant variations and inter-country differences can be observed during the 1990s and 2000s. The maximal inter-country gap in male life expectancy at birth in 1990 was 3.4 years, whereas the corresponding difference for females was only 1.6 years. In 1990, the highest male life expectancies were observed for Czechia and Slovakia, whereas the lowest figures were found for Latvia and Estonia. When compared to the EU-15, the disadvantage in male life expectancy at birth across the seven countries ranged from a low of about five years for Czech males to 6-9 years in the remaining countries, with Hungary, Estonia, and Latvia taking the worst position (8-9 years versus the EU-15).

In the first half of the 1990s, which were marked by enormous political and socioeconomic transformation, diversity in life expectancy trends increased. Between 1990 and 1994, the maximal life expectancy gap between the seven countries almost tripled for males (reaching 10.8 years) and doubled for females (4.4 years). The widening of inter-country differences in life expectancy was primarily due to an impressive decrease among the Baltic population (and at a much smaller scale in Hungarian males), which contrasted with notable health improvements in Czechia, Slovakia, Poland, and in Hungarian females. Except for Polish and Hungarian females, life expectancy gains in these countries were more pronounced than in the EU-15 (Fig. 2). Consequently, the longevity disadvantage compared to the latter countries started declining in Czechia, Poland, and Slovakia. These first signs of life expectancy convergence towards the EU-15 levels coincided with the increasing disadvantage of the three Baltic countries. During this period, the male life expectancy gap with the EU-15 reached 12, 13, and 15 years in Lithuania, Estonia, and Latvia, respectively.

Although the three Baltic countries enjoyed rapid health recovery during the second half of the 1990s, life expectancy at birth remained well below the pre-transitional levels. Health improvements slowed down among Slovak males. At the same time, in Czechia (both sexes), Poland (both sexes), Hungary (both sexes), and

Fig. 2: Male and female life expectancy at birth in seven selected new EU member countries and the EU-15, 1960-2021



Note: Life expectancy for EU-15* refers to the weighted average of 15 "old" EU member states (as of 30 April 2004), including the United Kingdom (officially withdrew from the EU on 31 January 2020).

Source: *The Human Mortality Database* 2022; *EUROSTAT* 2022.

Slovakia (females), progress resumed at about the same pace as in the early 1990s (Fig. 2). Consequently, the life expectancy gap with the EU-15 declined in all countries except Slovakia. Despite the reduction in this gap, the longevity disadvantage of Baltic and Hungarian males remained huge, ranging from about 8 years in Hungary and Lithuania to 10-11 years in Estonia and Latvia.

Between 2000 and 2004, positive health changes observed among males in the second half of the 1990s slowed down in most countries under study. Strikingly, Lithuanian males even experienced a notable decline in life expectancy. Consequently, the male life expectancy gap with the EU-15 either remained at about the same level as in 2000 or increased further (in Lithuania). At the same time, significant life expectancy gains were observed for females in Estonia and Poland. These improvements exceeded those observed in the EU-15 and contributed to further diminishing female life expectancy disadvantage (from 5.2 to 3.7 years in Estonia and from 3.6 to 3.3 years in Poland). The gap remained almost at the same level in Czechia and Hungary, whereas it increased in Lithuania, Latvia, and Slovakia.

At the time of enlargement in 2004, Latvian males and females had the lowest life expectancy at birth (65.6 and 76.0 years, respectively). Among the seven newcomers, the highest indicators were observed for Czech males (72.6 years) and Czech and Polish females (79.2 years). For males, Estonia and Lithuania showed a slightly better situation than Latvia, whereas Slovakia, Poland, and Hungary took intermediate positions between the Baltic countries and the leading Czechia. The male life expectancy disadvantage compared with the EU-15 ranged from 4-6 years for Czechia and Poland to 10-11 years for the three Baltic countries. On the female side, there was no such big divide between the Baltic and Central European region countries. The life expectancy disadvantage was about 3 years for Poland and Czechia and 5-7 years for the remaining countries.

On average, all seven new member states showed greater health gains during the fifteen years after joining the EU (2004-2019) than the EU-15 (Fig. 2). Between 2004 and 2019, the most remarkable life expectancy gains were observed in Estonia (7.7 years for males and 4.7 years for females). The second largest improvements in life expectancy concerned Latvian and Lithuanian males (5.3 and 5.2 years). Progress was the smallest among Polish and Czech males (3.4 and 3.8 years) and Hungarian and Polish females (2.6 and 2.7 years). The higher life expectancy gains in the seven new EU members allowed them to reduce their life expectancy disadvantage compared with the EU-15. The most remarkable progress in convergence was observed in Estonia, cutting down the longevity gap by almost 45 percent for males (from 10.0 to 5.6 years) and even more for females (from 4.6 to 2.0 years). All other countries showed smaller-scale convergence.

Meanwhile, there was almost no improvement for Polish males and only a little progress for Hungarian females. In 2019, the male life expectancy disadvantage ranged from a low of 3.6 and 5.6 years in Czechia and Estonia to a high of 8.5 and 9.1 years in Lithuania and Latvia. The corresponding figures for females ranged from 2.0 and 2.6 years for Estonia and Czechia to 4.7 and 5.1 years for Latvia and Hungary.

Fifteen years after joining the EU, Czechia remained a clear leader in male life expectancy (76.4 years) among the newcomers. With about 5 years less than

Czechia, Latvia and Lithuania were still in the worst position. The only significant change in the ranking of the seven countries concerns Estonian males, for whom life expectancy levels overcame those observed in Hungary, Poland, and Slovakia. For females, the picture was much less systematic. In 2019, a clear leader in female life expectancy was Estonia (82.7 years), followed by Czechia and Poland, both showing a life expectancy of about 82 years. The lowest female life expectancy was observed in Hungary and Latvia (79.7 and 80.0 years), whereas Lithuania and Slovakia maintained a moderate advantage over these two countries.

In total, despite some signs of longevity convergence with the EU-15 after 2004, the speed of progress varied a great deal across the seven countries. A clear leader in the speed of convergence was Estonia in overcoming Central Europe (despite starting from a lower position). The question remains whether this convergence process was directly associated with EU enlargement because the Central European countries and (partially) Estonia had already seen longevity improvements before 2004. However, the progress in Lithuania and Latvia accelerating in the 2010s suggests possible delayed effects.

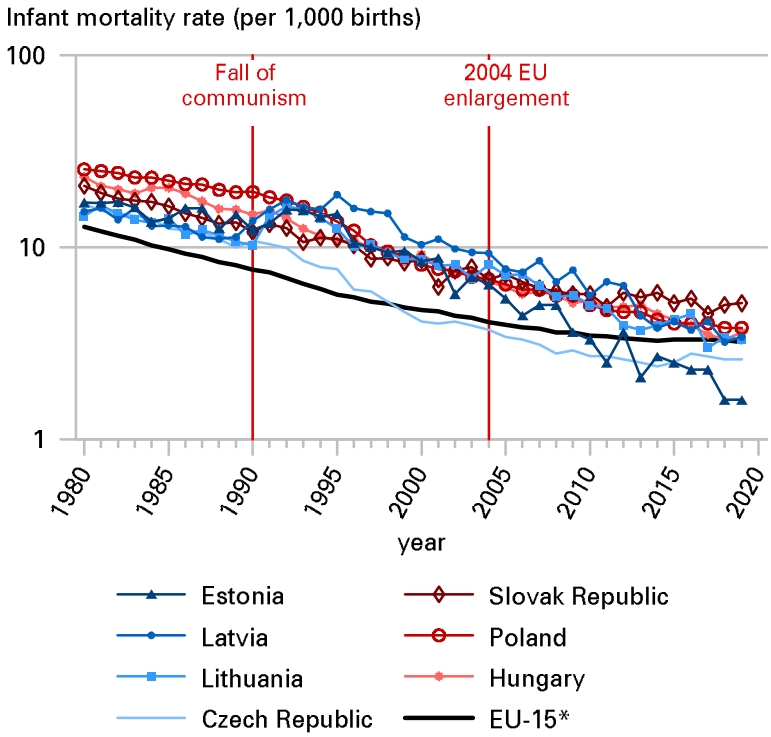
3 Changes in age- and cause-specific mortality and their contributions to life expectancy improvement before and after the 2004 EU enlargement

This section examines changes in the age- and cause-specific contributions to the total gap in life expectancy at birth between the seven countries under study and the EU-15. The first sub-section describes annual infant, adult, and old-age mortality trends. The second sub-section provides an overview of dynamics in mortality due to cardiovascular diseases and external causes of death, two principal causes of death responsible for long-term health stagnation and mortality crises in the CEE region. Finally, the third sub-section discusses changes in the most important age groups and causes of death responsible for the total life expectancy gap between the seven CEE countries and the EU-15.

3.1 Trends and differences in infant, adult, and old age mortality before and after 2004

Figure 3 suggests that all seven countries achieved considerable progress in reducing infant mortality and substantially reduced the gap with the EU-15. By the end of the period covered, some successful countries such as Czechia and Estonia outperformed the EU-15. Despite some variations in the timing and speed of the progress, the remaining five CEE countries also showed a systematic convergence towards the EU-15 levels, especially during the period 2004-2019. During the 1980s, the most significant disadvantage in infant mortality was observed in Hungary, Poland, and Slovakia, whereas the remaining four countries showed only moderate excess infant mortality rates (50 percent or less). International comparisons in infant mortality can be biased by differences in definitions of infant deaths and

Fig. 3: Infant mortality rates for seven new members and the EU-15*, 1980-2019



Note: Infant mortality rates for EU-15* refers to the weighted average of 15 "old" EU member states (as of 30 April 2004), including the United Kingdom (officially withdrew from the EU on 31 January 2020).

Source: *The Human Mortality Database* 2022; *EUROSTAT* 2022.

live births (*Gourbin/Masuy-Stroobant* 1993, 1995). EU-15 and Central European countries theoretically apply the WHO definition during the period. In the three Baltic countries, this international definition was introduced in the early 1990s (*Anderson/Silver* 1986; *Meslé* 2004). Consequently, a sudden increase in the rates, showing a jump up to 2.5-3 times, was observed in the three countries. Therefore, it is very probable that Baltic infant mortality rates were already comparable to those of Central Europe before 1991.

Beginning in the mid-1990s, excess infant mortality started declining in all seven countries (Fig. 3). Czechia was a clear vanguard in this process, catching up and outperforming the EU-15 at the end of the 1990s. Estonia showed an even more rapid decline in infant mortality and, by the end of the 2000s, reached both the levels of Czechia and the EU-15. Despite being the laggards at the beginning of the 1990s, Latvia and Lithuania experienced remarkable progress during 2004-2019, outperforming Slovakia, Poland, and Hungary. Meanwhile, slower improvements and even stagnation in infant mortality in Slovakia during 2009-2019 led to this

country holding the worst positions at the end of the period covered. Compared to the EU-15, infant mortality in Slovakia remained about 60 percent higher, whereas the corresponding disadvantage in Poland was close to 20 percent.

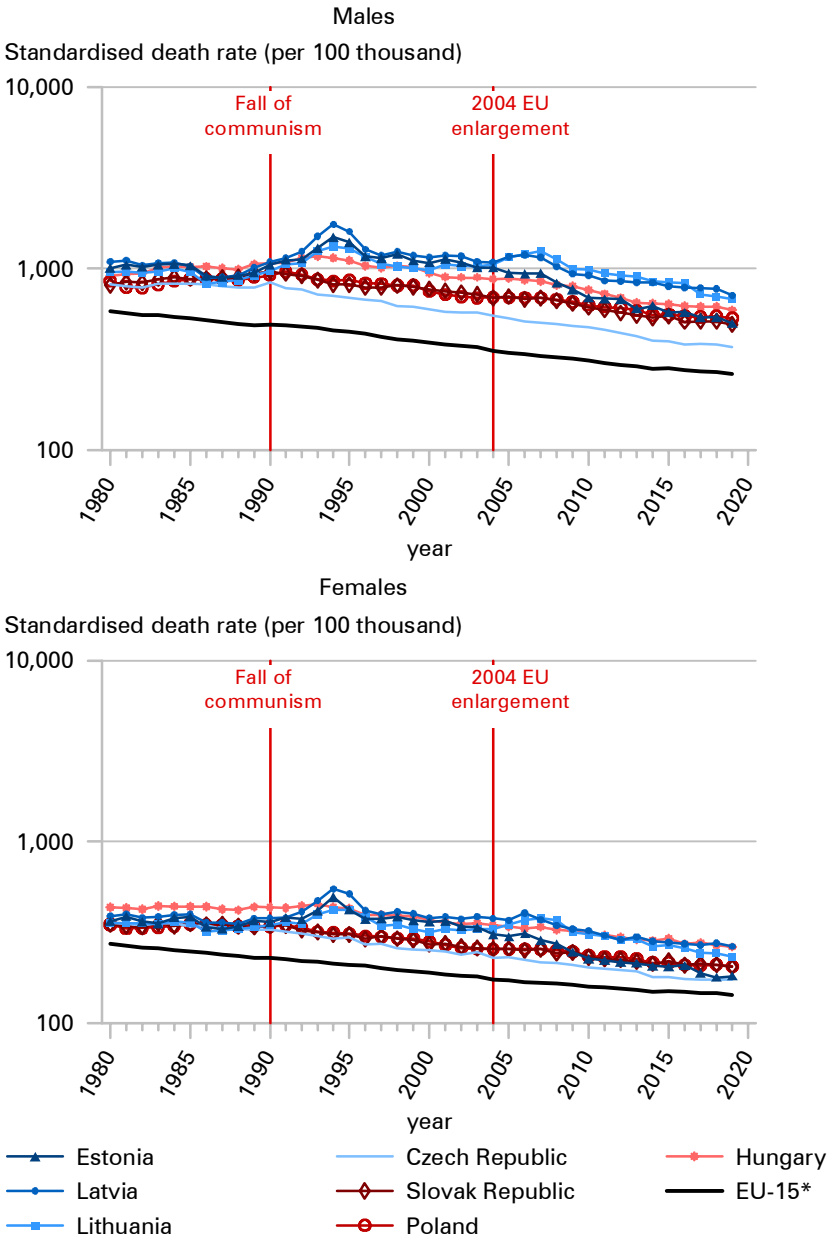
Excess mortality at adult working ages was considered one of the primary reasons for long-term stagnation or even downward trends in life expectancy in the majority of the former communist countries (*Meslé* 2004). Figure 4 illustrates that, according to the data for the 1980s, the seven countries showed quite similar levels of adult mortality exceeding the levels of the EU-15 by 1.4-2.3 times for males and 1.4-1.9 times for females. Czechia was the best-performing country for both sexes, whereas the highest mortality was observed for Latvia (males) and Hungary (females). During the first half of the 1990s, by contrast, the three Baltic countries and (to a lesser extent) Hungary experienced adult mortality increases with notable reductions in Poland, Slovakia, and (especially) Czechia. Compared to the EU-15, the excess mortality in Estonia, Latvia, Lithuania, and, to a lesser extent, in Hungary suddenly increased, reaching 2.6-4.0 times for males and 2.0-2.5 times for females in 1994. At the same time, this disadvantage remained at about the same level in the three other Central European countries. However, thanks to substantial progress during the second half of the 1990s, the three Baltic countries managed to reduce their excess adult mortality (by about 15 percent in Estonia and Lithuania and about 25 percent in Latvia). By contrast, the remaining countries maintained the same disadvantage versus the EU-15 as observed in 1990.

At the time of the 2004 EU enlargement, the three Baltic countries and Hungary showed about 2.5-3.0 times higher mortality than in the EU-15, whereas the corresponding disadvantage for females was 1.8-2.2 times. The gap was much smaller for the three remaining countries: it ranged from 1.6 times for Czech males to 2 times for Slovak and Polish males. The corresponding gaps for females in these countries varied from 1.3 to 1.5 times.

From there, during the past fifteen years (2004-2019), adult mortality trends in the seven CEE countries showed substantial variations (Fig. 4). The most inconsistent changes were in Latvia and Lithuania, where adult mortality worsened sharply until 2007 and decreased rapidly (with a temporary slowdown in the first half of the 2010s). Estonia experienced more systematic progress, catching up with Poland and Slovakia and overcoming Hungary. After 2007, Hungary also significantly improved, but at a slower pace than Estonia. Meanwhile, Estonian females overcame Poland and Slovakia and converged with the lowest mortality observed in Czechia. Finally, slowdowns in mortality reductions were observed in Hungary and Latvia at the end of the period covered.

Since 2004, the most impressive convergence in adult mortality towards the level of the EU-15 was observed in Estonia, cutting the excess mortality by about one-third (from 2.9 to 1.9 times) for males and from 1.8 to 1.3 times for females. By contrast, there was almost no reduction in the relative mortality gap compared with the EU-15 in Poland and Slovakia and only a little progress in the remaining countries. In 2019, excess male mortality was still around 1.9-2.7 times greater in all countries except Czechia (1.4 times). The corresponding relative disadvantage

Fig. 4: Standardised death rates for the ages 25-64 comparing seven new members to the EU-15, 1980-2019



Note: Standardised death rates for EU-15* refers to the weighted average of 15 "old" EU member states (as of 30 April 2004), including the United Kingdom (officially withdrew from the EU on 31 January 2020).

Source: *The Human Mortality Database* 2022; *EUROSTAT* 2022.

among females ranged from 1.2-1.4 times in Czechia, Estonia, Slovakia, and Poland to 1.6-1.8 times in Lithuania, Latvia, and Hungary.

During the period of communist rule, old age mortality had a relatively minor impact on life expectancy changes, especially for males (*Meslé* 2004). The measurement of the impact of old age mortality was further complicated by data quality problems leading to implausible mortality patterns, such as strikingly high female and male life expectancy at age 65 in Lithuania, persisting up to the early 1990s (Fig. 5).

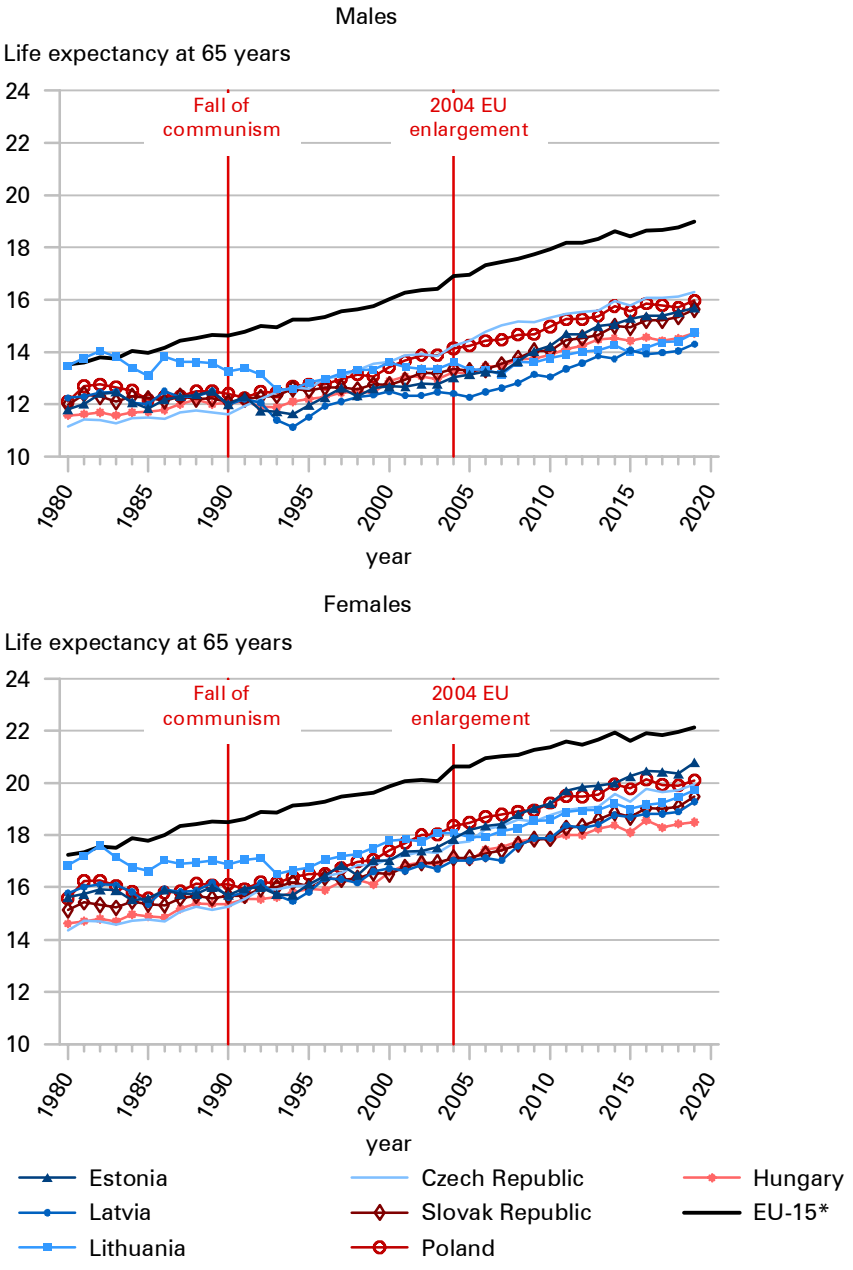
The situation changed in the 1990s and 2000s when older ages played an increasingly important role in both temporal changes and inter-country differences in mortality. The country-specific trajectories of changes in life expectancy at age 65 differ from those for infant and adult mortality (Fig. 5). Czechia, starting from the lowest level in 1990 and showing gradual initial progress, appeared among the leading countries in 2019. At the same time, Slovakia (both sexes) and Lithuania (males), which showed the highest life expectancy at age 65 at the beginning, landed in the worst positions at the end of the period. Despite some stagnation during the 2000s, Lithuanian females, who had the same initial advantage, remained in the middle between the worst and best-performing countries. Furthermore, assuming that old age mortality (at least until the end of the 1980s) was underestimated, real progress was probably even more sizeable. Poland, showing quite systematic increases in life expectancy at age 65 since 1990, experienced some stagnation during 2016-2018.

During 2004-2019 exceptional progress in life expectancy at age 65 was observed in Estonia, reaching the best female position among the seven countries. Among males, Estonia and Slovakia were the only countries with longevity gains exceeding those in the EU-15. Among females, all countries except Hungary showed greater longevity increases. In particular, Estonian females had almost two times greater gains than the EU-15 countries (2.9 vs 1.5 years). Overall progress was the smallest in Lithuania and Hungary.

In 2004, the gap in life expectancy at age 65 among males varied between a low of 2.7 years in Czechia to a high of 4.5 years in Latvia. Czechia also maintained the same (but still the smallest) gap in 2019. At the same time, Estonia was the only country achieving quite a substantial reduction of the disadvantage (from 3.9 to 3.3 years). By contrast, there was an increase in the longevity gap in Latvia, Lithuania, Poland, and Hungary. The highest life expectancy disadvantages were in Hungary (4.2 years), Lithuania (4.2 years), and Latvia (4.7 years). The changes were quite different among females, with all countries (except Hungary) showing at least a slight decrease in the longevity gap. The most impressive convergence was observed in Estonia, showing a drop from 2.8 years in 2004 to 1.4 years in 2019. Substantial progress in closing the gap also occurred among Latvian, Czech, and Slovak females. Hungarian females showed a slight increase in disadvantage, reaching the worst position in 2019 (3.7 years).

Age-specific analyses suggest that all countries achieved systematic convergence only in infant mortality. Following EU enlargement in 2004, further progress in reducing mortality gaps at adult working ages was relatively small. The

Fig. 5: Life expectancy at age 65 years in seven new members and the EU-15*, 1980-2019



Note: Life expectancy for EU-15* refers to the weighted average of 15 EU member states, including the United Kingdom (officially withdrew from the EU on 31 January 2020).

Source: *The Human Mortality Database* 2022; *EUROSTAT* 2022.

only exception concerns Estonia, which achieved more noticeable improvements and converged with the EU-15. However, despite this trend, Estonia (with Latvia and Lithuania) maintained very high male mortality at these ages (2-3 times exceeding mortality in the EU-15) until the end of the covered period. Between 2004 and 2019, significant progress was achieved in reducing the longevity gap for females (except in Hungary) in old age. By contrast, no significant signs of convergence were observed for males (except Estonia).

3.2 Changes in mortality due to cardiovascular diseases and external causes of death

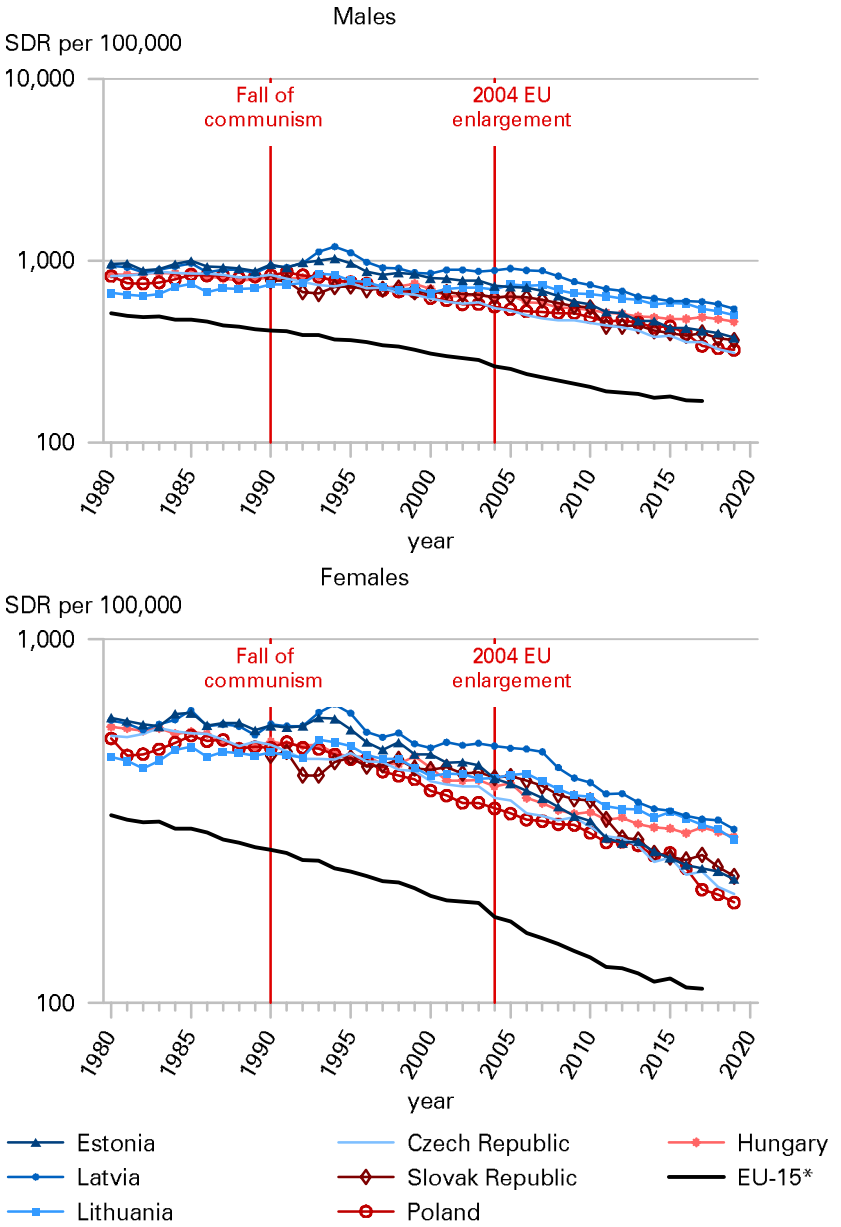
One of the key determinants explaining the East-West mortality divide is related to the failure of former communist CEE countries to complete the second stage of health transition, which is related to combatting human-made and degenerative (primarily cardiovascular) diseases (*Meslé* 1991, 2004). While the so-called "cardiovascular revolution" of the 1970s fuelled further regular life expectancy increases in Western countries, former communist countries were unable to reduce the burden of cardiovascular mortality, which led to long-term stagnation or even a decrease in life expectancy in the region. Figure 6 indicates that during the 1980s, the disadvantage in CVD mortality compared with the EU-15 increased in almost all seven CEE countries.

The early 1990s brought another increase in CVD mortality divergence. Sudden worsening and considerable fluctuations in cardiovascular mortality in the three Baltic countries led to a rapid and sizeable increase in the mortality disadvantage compared with the EU-15 (Fig. 6). At the same time, thanks to continuous improvements in cardiovascular mortality (almost at the same pace as in the EU-15), the four Central European countries did not see any further widening of the mortality gap.

The first half of the 2000s marked the continuation of mortality reductions in Czechia and Poland and a gradual start of progress among females in Estonia. However, even in these three successful countries, this progress was not faster than in the EU-15. At the same time, a lack of progress (stagnation) or even some growth in cardiovascular mortality was observed in Lithuania, Latvia, Slovakia, and Hungary. Consequently, the mortality disadvantage versus the EU-15 increased in almost all countries, reaching 2.6-3.3 times for the Baltic males and 2.4 times for Hungary and Slovakia (Fig. 6). Among females, an increase in mortality disadvantage was observed in Latvia (from 2.5 to 2.9 times), Lithuania (from 2.1 to 2.4 times), Slovakia (from 2.2 to 2.4 times), and Hungary (from 2.1 to 2.3 times). During the same period, the corresponding gap remained almost constant only for Czechia and Poland. Like in the mid-1990s, this period was marked by growth in disparities between the seven countries (Fig. 6).

During 2004-2019, most of the seven countries achieved significant but still very uneven success in reducing cardiovascular mortality (Fig. 6). Among males, overall mortality decreases ranged from 27-32 percent in Hungary and Lithuania to 41-47 percent in the remaining countries. During this period, Estonian females achieved

Fig. 6: Standardised death rates for cardiovascular diseases in seven new member states and EU-15*, 1980-2019



Note: Standardised death rates (SDR) for EU-15* refers to the weighted average of 15 "old" EU member states (as of 30 April 2004), including the United Kingdom (officially withdrew from the EU on 31 January 2020). Due to the limited availability of data on causes of death, the EU-15* series ended in 2017.

Source: *The Human Mortality Database* 2022; *EUROSTAT* 2022; *The Human Cause of Death Database* 2022; *WHO* 2022

the most impressive progress in reducing the gap between them and the EU-15 and almost caught up with Czechia and Poland (Fig. 6). Czechia (both sexes) and Poland (females) maintained their leading positions with the lowest cardiovascular mortality among the seven countries.

According to the figures for 2017, the relative mortality disadvantage versus the EU-15 remained very high, exceeding two times in all countries (except the Polish females showing a ratio of 1.9 times). The highest mortality excess of 2.8-3.5 times was observed in Lithuania, Latvia, and Hungary. Furthermore, mortality disparity within the seven new member states increased, especially between the best-performing Czechia and the laggards Latvia and Lithuania.

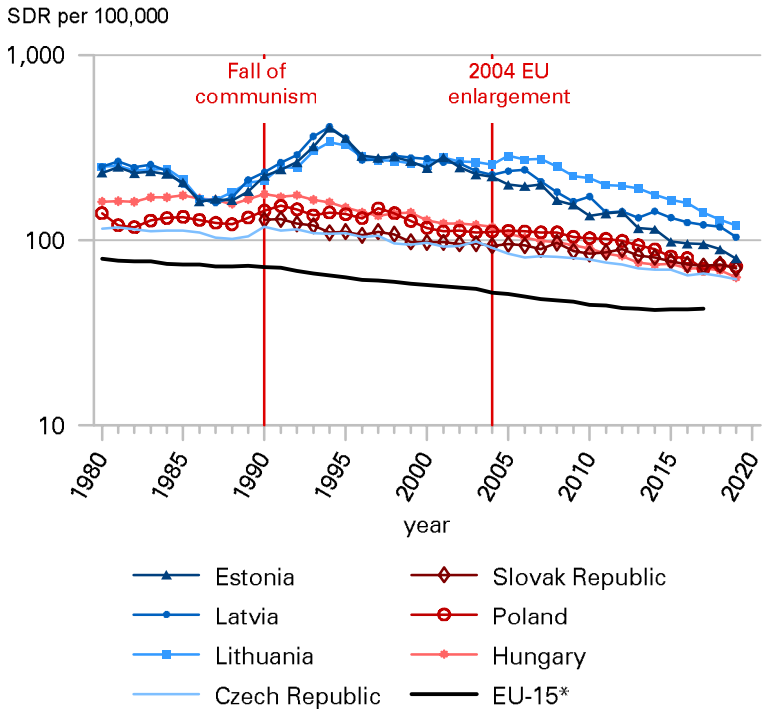
It can be concluded that progress in the convergence of cardiovascular mortality towards the levels of the EU-15 has been quite uneven in time and across the seven countries. Soon after the fall of the Berlin Wall, positive changes almost immediately occurred in the Central European countries, whereas the three Baltic countries saw a rapidly worsening situation. It seems that the preparatory stage of entering the EU in 2004 did not produce any positive effect on convergence. Despite the continuation (four Central European countries) and onset (Baltic countries) of progress in reducing CVD mortality after 2004, all seven countries did not achieve significant convergence towards the levels observed in the EU-15. Strikingly, the relative mortality disadvantages compared with the EU-15 even slightly increased in the worst performing countries (Latvia (females), Lithuania (both sexes), and Hungary (both sexes)).

External causes of death were also important components of the long-term mortality crisis during the period of communist rule, especially in the countries of the former USSR (*Shkolnikov et al.* 2004; *Meslé* 2004). These causes of death were mainly responsible for the excess premature mortality, primarily affecting males at working ages (*Meslé* 2004).

Male mortality due to external causes of death varied in the 1980s and (especially) the early 1990s (Fig. 7). Between 1990 and 2004, the three Baltic countries showed remarkably similar levels and changes in external cause mortality. A deep socioeconomic crisis related to the rapid transition to a market economy in the first half of the 1990s led to a rapid increase in mortality in these countries and a record-level gap in male mortality (5-6 times compared with the EU-15). The subsequent partial improvement in mortality during 1995-1998 and further stagnation led to the most disadvantaged positions of the three countries in the enlarged EU in 2004 (*Meslé* 2004; *Jasilionis et al.* 2011). Compared with the EU-15, the disadvantage in male mortality due to external causes of death ranged from 4.1 and 4.2 times in Estonia and Latvia to a striking 4.8 times in Lithuania. During the same period, about two times smaller but persisting gaps (about 1.7-2 times) remained at about the same level in Czechia, Slovakia, and Poland (Fig. 8). Hungary was the only country showing a moderate decrease in relative disadvantage (from 2.6 times in 1990 to 2.2 times in 2004).

Unlike prior years, 2004-2019 saw much more rapid improvements. The declines in excess external mortality compared with the EU-15 can be observed in all countries (Fig. 7). However, the progress was quite uneven. For example, during

Fig. 7: Standardised male death rates for external causes of death in seven new member states and EU-15*, 1980-2019



Note: Standardised death rates (SDR) for EU-15* refers to the weighted average of 15 "old" EU member states (as of 30 April 2004), including the United Kingdom (officially withdrew from the EU on 31 January 2020). Due to the limited availability of data on causes of death, the EU-15* series ended in 2017.

Source: *The Human Mortality Database* 2022; *EUROSTAT* 2022; *The Human Cause of Death Database* 2022; *WHO* 2022.

2004-2007, mortality increased in Lithuania, leading to the record (5.7 times) excess compared with the EU-15. Despite a significant improvement, disadvantages in external causes remained very pronounced in all countries, ranging from 1.6-1.7 times for the four Central European countries to 2.2 times in Estonia and 2.8 and 3.3 times in Latvia and Lithuania, respectively.

The trends in excess external-cause mortality in seven countries point to several facts. First, the fall of communist regimes and subsequent transition to a market economy in three Baltic countries led to a vast mortality crisis reflected by violent mortality. In the Central European countries, similar political and socioeconomic changes had smaller, neutral, or even negative impacts (leading to diminishing their excess mortality compared with the EU-15). At the same time, entering the European Union in 2004 coincided with a temporal growth in mortality excess in Latvia and Lithuania. However, no immediate significant changes in the gap were observed in the four Central European countries. The potential effect of entering the EU in 2004

may be observed for the three Baltic countries showing a more rapid decline of the gap between them and the EU-15 from 2007 onwards.

3.3 Age- and cause-specific contributions to the differences in life expectancy between the seven new EU member states and EU-15

Figures 8 and 9 illustrate temporal changes in age- and cause-specific contributions to the total life expectancy gap between each of the seven new member states and the EU-15 in 1990, 2004, and 2017 (the latest available data on causes of death for all EU-15 countries). The seven countries are ranked according to the size of the male and female life expectancy gap in 2017.

Figure 8 shows that between 1990 and 2004, in Latvia, Lithuania, Estonia, and Hungary the total male life expectancy gap between them and the EU-15 increased. The gap remained at the same level in Slovakia and decreased in Czechia and Poland. The most significant increase in the life expectancy disadvantage compared with the EU-15 was observed in the three Baltic countries, especially Lithuania. Between 2004 and 2017, male life expectancy gaps decreased in all countries under study. The most notable reductions occurred in Estonia, showing a decrease of 4.2 years for males and 2.9 years for females. The life expectancy convergence towards the EU-15 was also notable for Latvian males and females (a decrease of 1.6 and 2.0 years) and Lithuanian males (a decrease of 1.6 years). By contrast, the remaining countries saw only a moderate decline.

The decomposition results show that mortality differences at adult working ages (25-64) played a major role in explaining the total gap in male life expectancy at birth between the seven countries and the EU-15 (Fig. 8). Although between 1990 and 2004, all countries except Estonia and Latvia saw reductions in the relative importance of these ages, their contributions remained very high, ranging from 47 percent in Czechia to 68 percent in Lithuania. The next period (2004-2017) was associated with a further decline in the role of adult ages. However, the contributions still constituted at least 50 percent for all countries except Czechia (36 percent) and Slovakia (45 percent).

At the same time, the male life expectancy gap between the seven countries and the EU-15 became more dependent on mortality differences at old ages (65 and over). Although this share systematically grew in all seven countries, this increase was especially pronounced in Czechia and Slovakia, where the corresponding shares exceeded 50 percent in 2017 (Fig. 8). In 2017, the contributions of old age ranged from 38 percent in Latvia and Lithuania to 62 percent in Czechia. In addition, the contributions of the mortality differences at younger ages (0 and 1-24 years) were far less significant and (in most cases) showed a declining trend.

Figure 9 shows that between 1990 and 2004, the female life expectancy gap between Czechia, Poland, Estonia, and Hungary and the EU-15 decreased. This progress was uneven across countries, with the most significant decrease in the gap in Poland and Czechia (by 0.8 years). At the same time, the difference increased by about 1.3 years in Latvia and Lithuania. During the following period between 2004 and 2017, the most pronounced decline (almost by three years) in the life

expectancy gap was observed in Estonia. Much more modest progress in reducing the disadvantage compared with the EU-15 occurred in the remaining countries, especially Hungary.

Compared to males, both patterns and the changes in the contributions of different age groups to the total difference in female life expectancy at birth were different. In 1990, the biggest contributions came from mortality differences in the age group 65+ (Fig. 8). Among all countries, only in Lithuania was the percentage of this age group smaller than 50 percent. By 2017, the shares of this age group increased further, ranging from 58-59 percent in Baltic countries to 87 percent in Czechia. Despite some decreases, the shares of contributions to mortality differences at adult ages (25-64 years) remained substantial (explaining at least one-third of the difference in life expectancy) throughout the period in all countries except Slovakia and Czechia, showing 26 percent and 16 percent contributions of this age group in 2017.

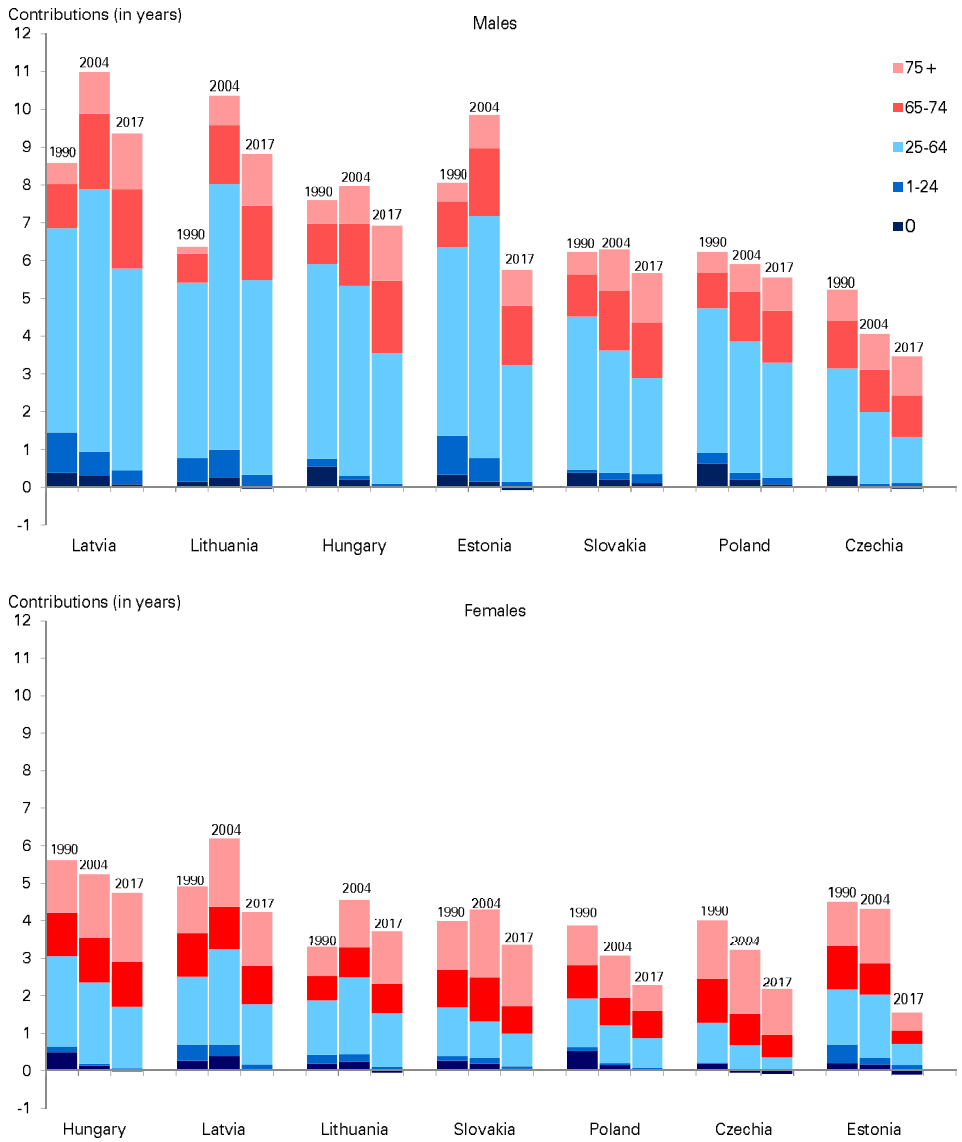
Figure 9 provides further details about the major causes of death responsible for the male and female life expectancy gap between each of the seven countries and the EU-15. As expected, in all countries, the most important contribution to the gap came from differences in cardiovascular mortality. However, the size of contributions and directions of their changes varied by country and sex. According to the data for males in 1990, the shares of these causes of death in all countries except Czechia varied from 46 to 54 percent, whereas the contribution in Czechia was higher (64 percent). By 2004, the contributions of CVD slightly increased in Latvia, Czechia, Slovakia, and Hungary and diminished in Lithuania, Estonia, and Poland. Between 2004 and 2017, the relative (%) shares of CVD increased again in all countries except Slovakia and Poland. In 2017, this share ranged from a low of 44 percent in Poland to a high of 69 percent in Czechia.

Despite its decreasing role, external causes of death remained the second important cause for the male life expectancy gap between the three Baltic countries and the EU-15. Meanwhile, in Central European countries, external causes of death became less important than neoplasms in 2004 or even in 1990 in the case of Czechia. The remaining causes, apart from digestive system diseases in Lithuania, Hungary, Czechia, and Slovakia, had a much smaller impact.

Increasing contributions of cardiovascular diseases were also observed for females (Fig. 9). For almost all countries under study, neoplasms were the second most important group of causes of death, positively contributing to the gap between them and the EU-15. The only exception concerns Lithuanian and Latvian females showing higher shares of external causes of death. The absolute and relative contributions of cancers increased in time in all countries except Czechia. The absolute contribution of neoplasms increased especially in Hungary, exceeding one year in 2004 and 2017. The observed pattern of cause-specific contributions showing negative impacts of infectious, respiratory, and other (remaining) causes of death should be interpreted with caution as they may indicate a possible influence of differences in coding practices and other specific problems related to the cause of death data (especially in the oldest age groups) (*Danilova et al.* 2021). The

redistribution of ill-defined causes of death (including senility) did not improve or significantly change the decomposition results.

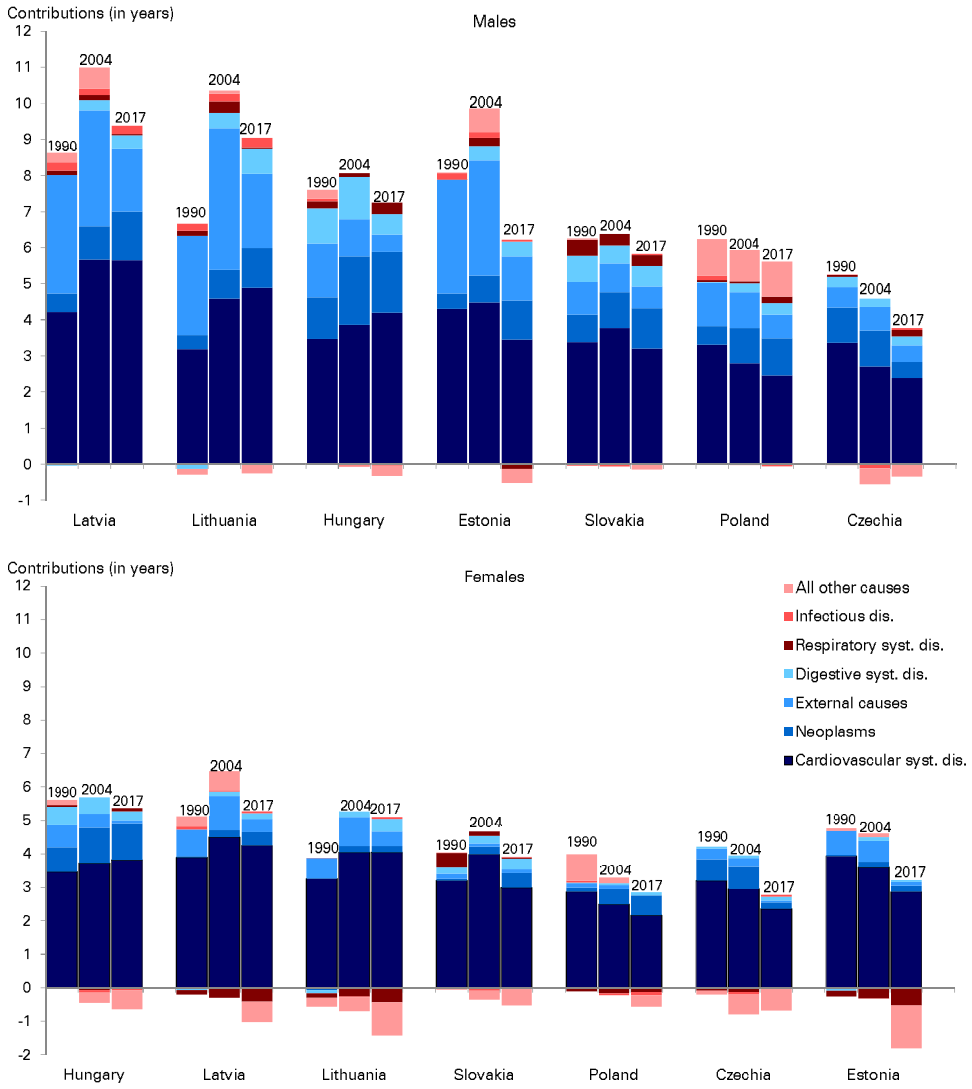
Fig. 8: Age-specific contributions to the differences in life expectancy between the seven new member states and EU-15, 1990, 2004 and 2017



Note: a) Life expectancy for EU-15* refers to the weighted average of 15 "old" EU member states (as of 30 April 2004), including the United Kingdom (officially withdrew from the EU on 31 January 2020); b) countries are ranked according to the size of male and female life expectancy gap in 2017, respectively.

Source: *The Human Mortality Database* 2022.

Fig. 9: Cause-specific contributions to the differences in life expectancy between the seven new member states and EU-15, 1990, 2004 and 2017



Note: a) Life expectancy for EU-15* refers to the weighted average of 15 "old" EU member states (as of 30 April 2004); b) countries are ranked according to the size of male and female life expectancy gap in 2017.

Source: *The Human Mortality Database* 2022; *The Human Cause of Death Database* 2022; *WHO* 2022.

Age and cause decompositions suggest that the life expectancy disadvantages in Baltic and Central European countries were mainly driven by excess mortality at adult working ages for males and higher mortality at ages above 65 years for females.

Although this general pattern remained unchanged after 2004, the importance of old ages increased, whereas the share of adult working ages decreased. Higher cardiovascular mortality for both sexes and notable excess mortality due to external causes for males remained the main cause-specific contributors.

4 Discussion

Two major events (the fall of the Berlin Wall in 1990 and EU enlargement in 2004) in the recent history of the Central and Eastern European countries made huge and multidimensional impacts on their political and socioeconomic trajectories. Due to the complex nature of these changes, the exact effects of these two events on the trends in population health are hardly identifiable. This study describes the consequences of these two political events in the context of life expectancy convergence of the seven new EU member countries towards the levels observed in the "old" EU member countries (EU-15).

Our study suggests that both political events can be associated with country-specific life expectancy trends in very specific ways. Firstly, the fall of the Berlin Wall led to positive changes in life expectancy in the four Central European countries, allowing them to maintain the same level or even slightly decrease the longevity gap between them and the EU-15. On the contrary, the three Baltic countries experienced an abrupt socioeconomic crisis, leading to record decreases in life expectancy in the mid-1990s. Despite a recovery in the second half of the 1990s, the three countries maintained a vast life expectancy disadvantage compared with the EU-15 for another decade or even more. Secondly, the process of accession to the EU in 2004 did not produce immediate effects on reducing the life expectancy disadvantage. We assume that this accession process included two periods a) preceding the accession (the negotiation process including the adoption of EU laws and implementing necessary reforms) and b) the short period following the accession. Both periods did not witness any onset of systematic convergence of life expectancy towards the EU-15 levels. Only subsequent rapid progress in the initially worst-performing Baltic countries suggests a delayed positive impact of EU enlargement leading to decreasing longevity disadvantage in the 2010s. Meanwhile, the convergence trend after 2004 was slower in the initially better-performing four Central European countries.

Despite some signs of slowdown in the speed of improvements, Czechia remained a prominent leader in male life expectancy in the region. At the same time, the most impressive progress in the speed of convergence during 2004-2019 was observed among Estonian females, who managed to cut their life expectancy disadvantage compared with the EU-15 by about 45 percent in fifteen years. Among females, these two countries and Poland continued leading the way, reaching life expectancy levels of about 82 years and even above in 2019. This success contrasts with various and often uneven trajectories in the remaining four countries, especially among males. Lithuanian and Latvian males maintained substantially lower life expectancy despite their rapid recent progress.

Country-specific differences in the life expectancy gap versus the EU-15 are even more pronounced when considering patterns of age- and cause-specific contributions. The longevity disadvantage of the seven countries has become increasingly dependent on mortality at older ages and cardiovascular diseases. However, for most countries (especially Latvia and Lithuania), excess male mortality at adult ages and external causes of death also play decisive roles.

The variations in the magnitude of longevity improvements are related to the contradictory changes in mortality due to the leading causes of death (cardiovascular diseases (for both sexes) and external causes of death (for males)). For example, Estonia's most rapid health improvement was more related to the important reductions in cardiovascular mortality than relatively moderate achievements in combatting external deaths. After 2004, with the only exception of Estonia, none of the remaining countries achieved a pronounced convergence towards the EU-15 levels in mortality due to cardiovascular diseases. However, the magnitude of the remaining mortality disadvantage was still enormous (around two times or more). Although almost all (especially Baltic) countries showed progress in reducing their mortality disadvantage for external causes of death, the gap between them and the EU-15 remained unacceptably high.

Due to numerous inconsistencies and inter-country variations, interpreting the overall longevity progress in the seven countries is not straightforward. The main challenge concerns associating the observed changes with the effect of EU enlargement. The complex enlargement process and subsequent effects cannot be attributed to a single year. According to EU regulations, to become a member state of the Union each country completes a set of formal steps starting with a formal application. After the application is approved, the country receives candidate status and enters a negotiation stage to harmonise their national laws and economies to the respective EU legislations and norms. After these negotiations, the candidate country is ready to become a formal European Union member state. Pre-accession and negotiation processes also involve various EU programmes aimed at building administrative capacities and technical support (e.g., PHARE programmes). It is also important to note that the pre-accession process started earlier (in 1998) in the three leading countries (Czechia, Estonia, and Poland) and Hungary. Latvia, Lithuania, and Slovakia entered the accession negotiations with a two-year delay.

Finally, the 15-year period of 2004-2019 is too short to observe the direct effects of EU accession benefits on the aggregated health indicators such as life expectancy. It should be mentioned that the EU's role in health is very fragmented and mainly falls under the responsibility of the individual member states. However, the EU contributes to population health indirectly via social cohesion and other social policy programmes. The success of individual new member countries is also very dependent on the initial conditions preceding the accession in 2004.

The findings of our study suggest that Czechia, Poland, and (more recently) Estonia are clear vanguards in the health convergence process towards the EU-15. Despite recent deceleration in the speed of progress, Czechia has been the most successful country, maintaining steady life expectancy improvements since the late 1980s (*Fihel//Pechholdová* 2017). At the same time, Estonia, which started from

the worst position in the early 1990s, showed the most impressive longevity gains between 2004 and 2019. Finally, Polish females (but not males) were exchanging the leading position with Czechia in the 2000s and formed the leading group with Estonia and Czechia in the 2010s. Since 2017, Estonian females have taken the lead in life expectancy regarding the level and pace of improvement.

These three vanguard countries differ in the timing and age- and cause-specific patterns of life expectancy improvements. This suggests that there are important differences in the initial conditions and determinants of health progress. Firstly, Poland and Czechia experienced far less dramatic socioeconomic and structural changes in the early 1990s, which also obviously concerned the maintenance and effectiveness of health systems, including the access to and delivery of medical care. Secondly, Estonia (like Latvia and Lithuania) inherited specific problems, including a vast burden of external diseases leading to enormous excess mortality at adult working ages. These problems were much less pronounced in the Central European countries, especially Czechia. Following the economic crisis of the early 1990s, sudden growth in external deaths and deterioration in cardiovascular mortality in Estonia predetermined an enormous decrease in Estonian life expectancy in the mid-1990s. This mortality crisis was responsible for the sudden growth in the health disadvantage of Estonia compared to Czechia and Poland.

The early 1990s marked the breakthrough in cardiovascular mortality trends in Poland, whereas more systematic progress in Estonia gradually started in the late 1990s (*Meslé* 2004; *Zatonski et al.* 1998, 2008; *Bandosz et al*. 2012; *Grigoriev et al.* 2014). It has been suggested that initial progress in combatting cardiovascular diseases in Czechia was more related to improvements in medical treatments, such as the growing use of cardiovascular drugs and invasive heart surgeries. By contrast, fewer positive changes occurred in lifestyle-related major cardiovascular risk factors, including alcohol consumption, smoking, diet, and cholesterol (*Rychtarikova* 2004). Other authors claim that improved lifestyle-related factors played a more important role than medical treatments. For example, it was estimated that more than 50 percent of the reduction in mortality due to ischaemic heart diseases in Poland between 1991 and 2005 was related to favourable changes in health behaviour-related factors, while the corresponding contribution of medical treatments was about 33 percent (*Bandosz et al.* 2012). At the same time, health surveys for Estonia indicate that despite some positive changes, including important reductions in smoking among males and the near disappearance of the use of animal fat for cooking, there was no progress in reducing many cardiovascular disease risk factors such as high alcohol consumption, smoking among females, and low physical activity (*Tekkel et al.* 2007). Estonia also maintained clear leadership in the Baltic region and among former communist countries in the speed and implementation of reforms in its health care sector, especially in building family-doctor-based primary care, modernising and optimising the secondary and tertiary health care sectors, and introducing effective health insurance (*Habicht et al.* 2018; *Fidler et al*. 2007; *Dobrev et al.* 2008).

Most of the aforementioned changes in Estonia and other successful new EU member states started well before EU accession in 2004. Therefore, further health improvements and subsequent life expectancy convergences towards the

EU-15 can be considered a continuation of the prior positive mortality trends. However, as in the case of the political-administrative convergence of the EU's new member states, a pre-accession period of harmonisation and implementation of numerous administrative EU requirements in the national laws may have had indirect (via legal and administrative reforms) positive consequences on population health (*Greer* 2006). During the second half of the 2000s, the new EU member states started receiving substantial direct economic assistance via EU structural funds and other EU programmes (*Forgó/Jevčák* 2015). Once again, their positive effects on population health can often be detected only indirectly, for example via improvements in health care infrastructure or road safety. Such indirect effects also concern the requirement to harmonise excise taxes for alcohol and tobacco (i.e., gradually increase to the EU required levels), which led to significant increases in the prices of these harmful products in all countries (*Eurostat* 2022). Combined with important national incentives combatting alcohol consumption, these measures helped to achieve radical reductions in adult deaths in the three Baltic countries (*Jasilionis et al.* 2011; *Štelemėkas et al.* 2021).

Despite a robust economic convergence towards EU-15 levels, it is difficult to predict the further success of individual countries in achieving similar progress in reducing their disadvantages in life expectancy at birth. By 2019, the seven countries became even more diverse according to social and health criteria. It is worrying that Lithuania and Latvia, achieving the most rapid progress in the GDP convergence to the EU average, remained in the worst positions according to most social indicators (highest social exclusion, poverty, and income inequality) (*Eurostat* 2022). Furthermore, the relative shares of government expenditures for social protection and health in these two countries also remained among the lowest in the EU (*Eurostat* 2022).

The observed signs of convergence of life expectancy to the levels of the EU-15 countries can be interpreted in the framework of the convergence-divergence framework explaining the process of health transition (*Frenk et al.* 1991; *Meslé/Vallin* 2002; *Vallin/Meslé* 2004). This framework suggests that each important breakthrough in population health leads to increasing disparities between and even within countries (*Vallin/Meslé* 2004). The most striking example of such divergence in developed countries concerns the East-West mortality divide due to the failure of the former communist countries to follow the success of Western countries in combatting the leading cardiovascular diseases ("cardiovascular revolution") observed in the 1970s (*Meslé* 2004). However, the health transition theory also provides some optimism, suggesting that the divergence phase will eventually be over, leading to subsequent convergence in life expectancy trends (*Meslé/Vallin* 2002; *Vallin/Meslé* 2004). In this context, converging trends in life expectancy and improvements in cardiovascular mortality among the seven new EU member countries look promising. However, only Estonia managed to significantly outperform the EU-15 in the pace of reductions in cardiovascular mortality.

By contrast, the other leading countries (Czechia and Poland) did not achieve such a pace of progress. Thus, the majority of the countries maintained sizeable disadvantages in cardiovascular mortality. The further substantial progress in

catching up with more advanced countries of the EU-15 still requires much more systematic efforts and resources directed towards combatting cardiovascular diseases and ensuring effective prevention of external causes of death, especially for the laggard countries. The success of Estonia offers grounds for some optimism, suggesting that radical and thoughtful reforms in the health care system combined with appropriate inter-sectorial policy measures are an appropriate solution even during economic uncertainty. However, this will be a difficult and complex task considering the magnitude of the remaining health disadvantage. Covid-19 pandemics, emerging geopolitical threats and their possible consequences for socioeconomic and health conditions in the region create even more uncertainties for the future. Higher life expectancy losses in the seven countries during 2020-2021 also contributed to a new increase in divergence of life expectancy between them and the EU-15. This unfortunate trend indicates the fragility of health care and social systems and calls for better monitoring and strengthening of these sectors in the region.

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