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EDITORIAL

Trends in European life expectancy: a salutary view

David A Leon

London School of Hygiene & Tropical Medicine, Keppel Street, London WC1E 7HT, UK. E-mail: david.leon@lshtm.ac.uk

Making a difference to the health of populations, however small, is what most people in public health hope they are doing. Epidemiologists are no exception. But often caught up in the minutiae of our day-to-day work, it is easy to lose sight of the bigger picture. Is health improving, mortality declining, are things moving in a positive direction? Getting out and taking in the view (metaphorically as well as literally) can have a salutary effect. It broadens our perspectives and challenges our assumptions. Looking at recent trends in European life expectancy is a case in point.

Since 1950 estimated life expectancy at birth of the world's population has been increasing. Initially, this was accompanied by a convergence in mortality experience across the globe—with gains in all regions. However, in the final 15 years of the 20th century, convergence was replaced with divergence, in part due to declines in life expectancy in sub-Saharan Africa.[1] However, this global divergence was also the result of declining life expectancy in Europe.[2,3] Home to 1 in 10 of the world's population,[4] and mainly comprised of industrialized, high-income countries, Europe has over 50 states. These include Sweden and Iceland that have consistently been ranked among the countries with the highest life expectancies in the world. But while for the past 60 years all Western European countries have shown increases in life expectancy, the countries of Central and Eastern Europe (CEE), Russia and other parts of the former Soviet Union have had a very different, and altogether more negative experience.

Trends in life expectancy between 1970 and the latest year available are shown in the Figure 1 for an illustrative selection of countries. These data were taken from one of two open sources : (i) the WHO Health for All Database[5] or (ii) the Human Mortality Database,[6] depending on which one had the longest time series. Differences between the sources are minimal for the purposes of this editorial. It is important to emphasize at the outset, that with one exception (discussed below), the trends shown in the Figure 1 are overwhelmingly driven by changes in mortality in adult life, not in infancy or childhood and are not the result of artefact.

Former communist countries of Eastern Europe

Between 1970 and the end of the 1980s, life expectancy at birth in the former communist countries of CEE (Czech Republic, Hungary, Poland and Slovakia), Russia and the Baltic states (Estonia, Latvia and Lithuania) stagnated or declined (Figure 1). This led to an increasing gap between them and Western European countries as the latter steadily improved. However, within a few years of the collapse of the Berlin wall in 1989, life expectancy started to steadily increase in the countries of CEE. This vividly illustrates that mortality can decline rapidly in response to political, social and economic change. Interestingly, once underway, the post-1989 increase in life expectancy in these countries has continued at a steady rate that is very similar to Western Europe. These parallel trajectories mean that the East–West gap, measured in terms of absolute differences in years of life expectancy, is proving very difficult to eliminate, despite earnest hopes to the contrary.[7]

The trajectories of Russia and other Soviet countries, including the three Baltic States in the Figure 1, were strikingly different to those of the CEE countries. The anti-alcohol campaign introduced in 1985 by the last Soviet President, Mikhail Gorbachev,[8] was accompanied by a brief increase in life expectancy.[9] Soon afterwards there was a precipitate decline, induced by the collapse of the Soviet Union in 1991. This was particularly dramatic in Russia: between 1990 and 1994 male life expectancy fell by 6 years to a low of 57 years.[10] There was then a short-lived period of recovery until 1998 at which point Russia once more declined.[11,12] In the Baltic states, which by then were independent countries looking westwards for membership of the European Union, life expectancy improvements flattened out and for Lithuanian and Latvian men even reversed. In the most recent period, improvements have at last been seen in all the former Soviet countries of Europe, with the possible exception of Ukraine. But it will take a longer period of improvement to be convinced that Russia, Latvia and Lithuania have embarked upon a sustainable upward trajectory given their recent history.

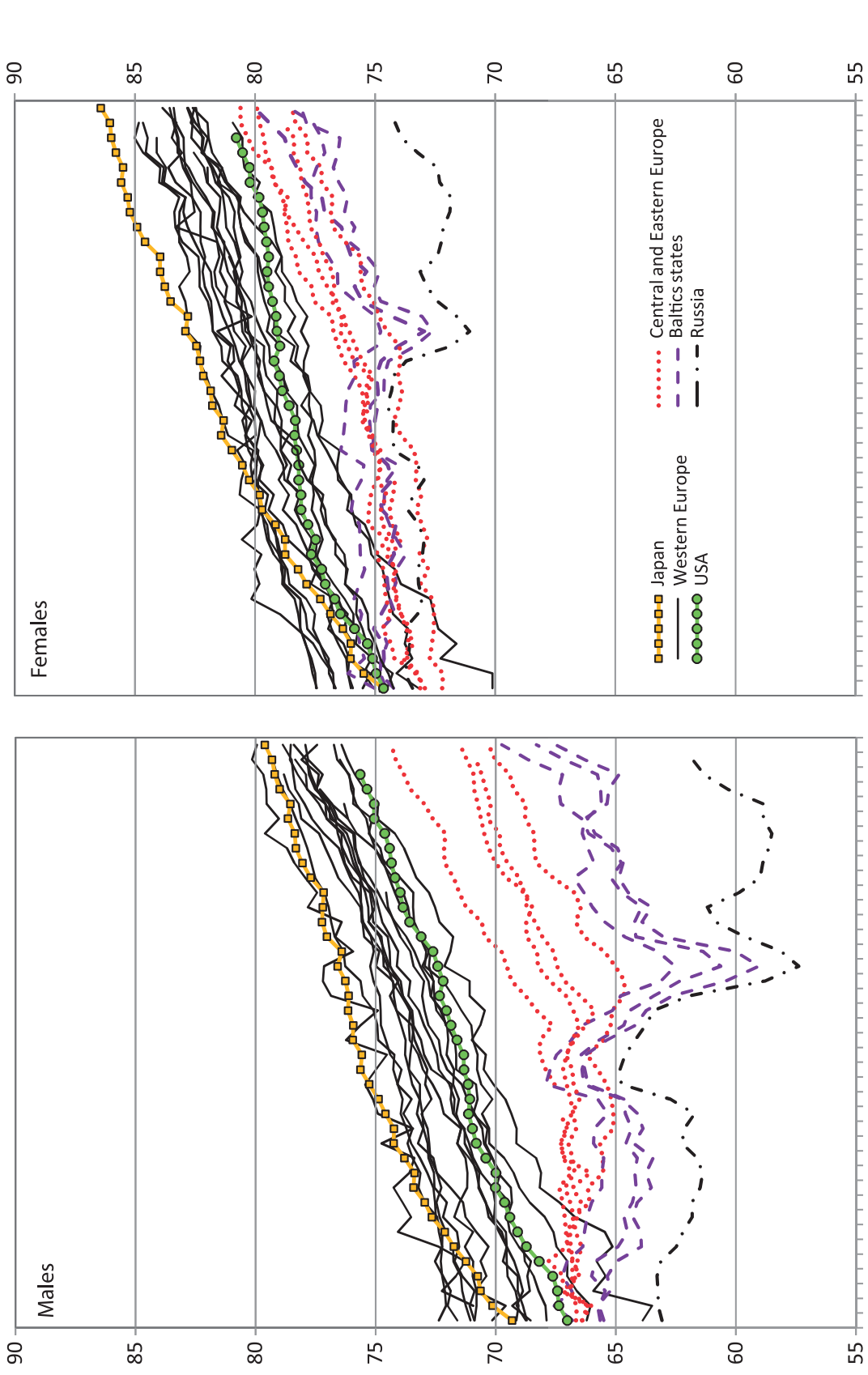

Figure 1 Trends in life expectancy at birth (years) for selected countries by sex, 1970–2009. *Sources:* (i) WHO Health for All Database: Belgium, Finland, France, Germany, Greece, Iceland, Ireland, Netherlands, Norway, Spain, Sweden, UK, Czech republic and Hungary. (ii) Human Mortality Database: Denmark, Italy, Portugal, Estonia, Latvia, Lithuania, Poland, Russia, Slovakia, Japan and USA

Notwithstanding the different consequences of the collapse of communism in the CEE countries, the post-Soviet experience shows that abrupt political, economic and social change can also have serious adverse effects on population health. The stress[13] and chaos[14] induced in Russia and other Soviet countries by the collapse of the Soviet Union and the transition from communism[15] was very different to that in the CEE countries. It brought in its wake a dramatic and relatively long-lasting decline in life expectancy.

It is shocking that in 2008 life expectancy in Russia had only just come back to the level it was 40 years previously. Within Russia the seriousness of this situation is acknowledged. At the end of 2008, the Russian Ministry of Health announced a set of ambitious targets for health improvement of the population.[16] These included increasing overall life expectancy to 75 years by 2020. However, given that in 2008 it was 68 years (males and females combined), this would require a considerably greater rate of increase than has been observed in any country shown in Figure 1. Certainly, the steep upward trend seen in the past few years is unlikely to continue at its current rate. This is because it appears to be primarily driven by a reduction in alcohol-related deaths at working ages, rather than by broader improvements in adulthood that characterize the steadier increases in life expectancy in the rest of Europe.

Western Europe, Japan and the USA

The picture for Western Europe is very different. Since 1970, life expectancy in these countries has typically increased by between 6 and 8 years. There is variation in slopes between these countries, but within a broader European perspective the upward trends are remarkably similar, particularly from the 1980s onwards. This parallelism is rarely remarked upon. However, as I discuss at the end of this editorial, it is worthy of further consideration.

To place Europe in a broader international context, Figure 1 also includes the trends for Japan and the USA. For males, the slope of increase in these two countries is very similar to that shown by the bulk of Western European countries, although Japan is near the top, while the USA is at the bottom of the range. However, for females there is a very striking contrast. On the one hand, Japanese life expectancy for females has been increasing at a considerably sharper pace than any country in Western Europe. On the other hand, since the early 1980s life expectancy for US females has been increasing at a much slower pace. Indeed, for both sexes life expectancy in the USA does not compare favourably with Europe. In 2007, it was at the same level as the lowest of any Western European country (Portugal for males and Denmark for females). This simple observation once again underlines that gross domestic product (GDP) and health care expenditure per capita are not good predictors of population health within high-income countries.

There are two notable exceptions to the broadly parallel upward trend in Western Europe. Female life expectancy in Denmark and the Netherlands, like the USA, experienced an extended period of relative stagnation in the 1980s and 1990s; although not the entire explanation, the relative timing of the smoking epidemic among women in all three countries appears to have an important explanatory role.[17,18] Over the past decade, a steeper upward trend has been resumed in Denmark and the Netherlands although the rate of improvement among US women remains largely unchanged.

Portugal is a particular outlier on the European landscape. In Figure 1, it can be identified as the Western European country with the lowest male and female life expectancy in 1970. In that year it was around 65 years for males, and 70 years for females. However, by 2009, it had reached 76 and 82 years, respectively—a huge increase. These substantial gains are partly explained by massive reductions in the infant mortality rate (IMR). In 1970, Portugal had the highest IMR (50 per 1000 live births) of any of the European countries as shown in Figure 1. Today, at 4 per 1000, Portugal's IMR is almost the same as in Sweden.

Understanding Eastern Europe

Despite the dramatic nature of trends in life expectancy seen in CEE, Russia and the Baltic states, they have not attracted as much attention as they deserve. Nevertheless, demographers[2,19–23] and epidemiologists[10,12,24–27] have made some progress in dissecting these extraordinary phenomena. First of all, the fluctuations in life expectancy in Eastern Europe have been the result of huge variations in mortality at working ages. This is striking, as in times of social upheaval and change it is usually assumed that it is the young and the old who are going to be the most vulnerable.

In terms of proximal drivers, there is now a consensus that one of the most important influences on life expectancy trends in the former Soviet countries has been hazardous alcohol consumption. This has been inferred from analyses of trends in cause-specific mortality,[10,28] individual-level analytic studies[11,26,29,30] and what is known about the high prevalence of hazardous drinking patterns in the region.[31] From these investigations, there is also emerging evidence that hazardous and heavy drinking of spirits[32] may account for a larger fraction of circulatory disease deaths than has been previously thought.[29,33]

On a population level, heavy and hazardous alcohol consumption has been found always to be greater among men than women.[34,35] This is certainly true

in the former Soviet Union.[36] To this extent, it is unlikely that alcohol provides a major explanation for the low life expectancy of Russian women compared with other European countries. Their high mortality becomes even more puzzling given that historically Russian women have not tended to smoke, although this is changing in younger generations.[37] Understanding the poor health and life expectancy of Russian women is a neglected research priority.

Alcohol[38] and smoking[39] have also been implicated in explaining much of the higher premature mortality of men in the CEE countries compared with Western Europe. Changes in diet[7,27] and its effects upon coronary heart disease, in particular[27,40–42] after 1989 have been advanced by some researchers as the key to explaining the increases in life expectancy seen in these countries from the 1990s. However, it is unlikely that any single factor whether lifestyle, public health or medical is going to provide an explanation for these steady improvements that are occurring at the same rate as most Western European countries. Although most CEE (and Baltic) countries only joined the European Union on 1 May 2004, prior to this, accession governments were obliged to bring their legislation and regulation into line with that of the European Union. Thus, changes would have been underway in the 1990s in areas ranging from housing to safety in the workplace, many of which could plausibly have had a positive impact on health.

The broader picture

One of the most striking features of the trends discussed in this editorial is the higher life expectancy among females compared with males. Behavioural factors are very likely to lie behind an important fraction of these differences. A recent analysis has suggested that smoking-related deaths accounted for around 40–60% of the gender gap in all-cause mortality, while alcohol-related mortality typically accounted for 20–30% of the gender gap in Eastern Europe and 10–20% elsewhere in Europe.[43] Nevertheless, it is striking that the rate of improvement is very similar in both sexes, at least in Western Europe.

The decline in cardiovascular disease mortality has been occurring in Western Europe for decades. In contrast, until recently in Eastern Europe it had been increasing.[44] For reasons that are still poorly understood, the declines in high-income countries started almost simultaneously in all age groups, and within 10–15 years of each other from the early 1970s onwards. The precise contribution of improved treatments and changes in risk factors to the decline in coronary heart disease in these countries is difficult to determine with any certainty. However, detailed studies of a range of western countries suggest that between one-quarter and a half of the decline may be due to treatment.[45] How far the stagnation in life expectancy in Eastern Europe until the 1990s can be attributed to a failure to adopt modern approaches to treatment for cardiovascular disease and other conditions, is unknown. However, using the broader concept of avoidable mortality it has been suggested that differences in health care and treatment do explain some of the East–West differences in mortality.[46,47]

The celebrated Preston life expectancy curves,[48] recently republished with commentaries in this journal,[49] show that across the decades of the 20th century, at any one level of national wealth, countries tend to achieve progressively improved health. Preston suggested that this is explained in terms of a diffusion of knowledge between countries, not only in terms of better medical treatments, but also with respect to improvements in public health and health-related personal behaviours. However, the 'Iron Curtain' almost certainly impeded the diffusion of knowledge and understanding about the prevention and treatment of non-communicable diseases in Eastern Europe and the Soviet Union.[3,50] Even today, the necessary skills and strategies to deal with non-communicable diseases are less developed in Eastern Europe than in many other parts of the continent.

One of the striking features of Western European trends is how similar they are. Moreover, since the early 1990s the CEE countries have been following the same rate of improvement, with some suggestion that this is now also the case for females in the former-Soviet Baltic States. Why is this? The differences between countries in their health service organization, national wealth, culture and associated individual behaviours are many. Some of these may explain the vertical displacement of each line, but they do not seem to have a strong effect on the rate of increase in life expectancy. There are a few exceptions, related in particular to the timing of the smoking epidemic among women in Denmark and perhaps the Netherlands. This parallelism may be a product of the sort of diffusion of knowledge and ideas that occurs in a connected world implied by Preston, whereby improvements in public health or medical treatment and personal behaviours all make small but incremental contributions whose net effect is to reduce mortality. At any point in time the precise combination of factors that are driving life expectancy upwards may differ between countries.

There are of course more distal influences that may also contribute to these parallel increases in life expectancy. These reflect longer term parallel improvements in levels of education and standard of living of most European populations. Over time these will result in people reaching their seventh or eight decades in better health than previous generations. Certainly, this has been recently argued as an explanation for increasing longevity and the postponement of age-related declines in health.[51] However, further work is needed to understand why the countries of Western Europe, and more recently of CEE, are not

more obviously converging but are instead moving broadly upwards in parallel.

Inequalities within countries

National trends do not of course reveal what is happening to mortality within countries. From the best performing Nordic countries[52] to the former communist states of Europe,[53] the improvements in mortality that have occurred in the past few decades have been most among the socio-economically advantaged, and least or non-existent among the disadvantaged. Interestingly, recent analyses have found that life expectancy at the age of 50 years among members of the Russian Academy of Sciences has been increasing steadily over the past 60 years, almost in parallel and only just below that of the fellows of the Royal Society in the UK.[54] Russian Academicians have apparently managed to isolate themselves from the massive fluctuations in mortality experienced by the bulk of the Russian population. This striking observation calls into question the contention that the health of even the advantaged suffer in societies that are inequitable.[55]

Future prospects

Some argue that there is no evidence that the world has yet to reach a limit of human life expectancy.[56] However, with the global increase in obesity,[57] there is widespread concern that the increase in life expectancy in Europe and other high-income countries may come to an end.[58] It has been argued that in the USA the positive effects of smoking decline may be overwhelmed by the negative effects of increasing obesity.[59] Within Europe there is some evidence that there is a flattening out of the decline in coronary heart disease mortality in younger age groups in the UK[60] and the Netherlands.[61] However, it is unclear how robust these trends are and whether they are related to rising obesity levels.

In this issue of the journal, Neil Pearce[62] considers the challenges created by ubiquitous exposures, whose health effects may be difficult to study using conventional methods. However, he also reminds us that the classical analysis of time trend and ecological data must also remain a central part of our armamentarium. This is well illustrated by even the most cursory examination of the recent trends in life expectancy in Europe. Despite what many may have assumed, and without being complacent, current trends in European life expectancy are in a positive direction. But while the European experience since 1980 underlines the centrality of the social, political and economic determinants of health, many intriguing and important questions remain unanswered about the drivers of these extraordinary trends.

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