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ORIGINAL ARTICLE

Epidemiological analysis of health situation development in Europe and its causes until 1990

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Abstract

The enormous health gap between the 'new' (eastern) and 'old' (western) parts of the EU has evolved over many decades. The epidemiological transition – that is the decrease in the relative importance of infant and early child mortality and the shift in the composition of mortality risks from communicable to non-communicable diseases – which started in the western part of the region at the beginning of the 20th century, was substantially delayed in most of eastern Europe. However, after the World War II, health improvement in the east initially out-paced the west, such that, by the mid-1960s, only 1-2 years separated the average life expectancy for both sexes between the east and west. This convergence was short-lived and it reversed dramatically between the mid 1960s and 1990. During this period, adult health status in the east stagnated or deteriorated, whereas in the west it improved steadily: by 1990, life expectancy at the age of 20 years was more than five years shorter in the east for men, and more than four years shorter for women. The biggest contributors to the health gap were cardiovascular diseases and injuries. A substantial fraction of the gap can, with confidence, be attributed to the higher volume and more irregular pattern of alcohol consumption in the east, and to the delayed onset of the tobacco smoking epidemics. Much of the remainder of the gap is likely to be attributable to the composition of the diet, but the contribution of different dietary factors cannot be estimated with confidence. Leading candidates are a high consumption of saturated animal fats, a low consumption of fresh fruit and vegetables (especially in winter and spring), a very low consumption of fats supplying omega 3 fatty acids – both vegetable oils and fish oils rich in alpha-linolenic acid – and a high consumption of salt. Behaviours unfavourable to health did not change in the east, as they did in the west in response to the credible dissemination of scientific findings linking disease and injury risks both to individual behaviours and to the social and economic circumstances that fostered those behaviours. The eastern countries failed to equip themselves with the science and with the forms of social organisation that were needed to effectively counter epidemics of chronic disease and injury. The poor health-related behavioural determinants resulted from the institutional infrastructures based on an authoritarian, conservative and medicalised model of health, which inhibited modern approaches to social problems, an almost exclusive focus of epidemiology on communicable as opposed to non-communicable diseases, a lack of understanding and access to modern epidemiology and public health, a lack of understanding and access to evidence-based medicine, and a lack of public health education and health promotion.

Key words

health gap, Europe, non-communicable chronic diseases, lifestyle risk factors

Presented paper sets background for the PONS study. It describes epidemiological situation development in Europe until 1990, in division to eastern countries of the EU, which are Member States since 2004 and 2007 (referred to as EU10) in comparison to health gain in the western part of Europe (referred to as EU15) [1].

INTRODUCTION

The experience that the former socialist economy (FSE) countries went through in the second half of the 20th century shows that health is important not only for its intrinsic value, but also as a constituent of social and economic progress. These countries witnessed a steady decline in the health and longevity of adult men and stagnation in the health improvement of adult women. This decline in levels of health occurred during peacetime, when there were systematic and marked health gains in most other parts of the world (Figure 1a, 1b).

The health losses were at the same time losses of human capital. Economic development in FSE countries was constrained by the poor health and premature death of their workforces.

The level of health that the post-communist societies of central and eastern Europe (CEE) inherited at the start of the 1990s was extremely poor. Apart from the declines and stagnation in the decades before 1990, during the fall of communism (1987-1994) the Baltic states and other former Soviet states (including Russia) experienced what can only be described as a health disaster. Young and middle-aged adults (aged 20-64 years) were subject to a dramatic reduction in life expectancy. Such marked reductions are very unusual during

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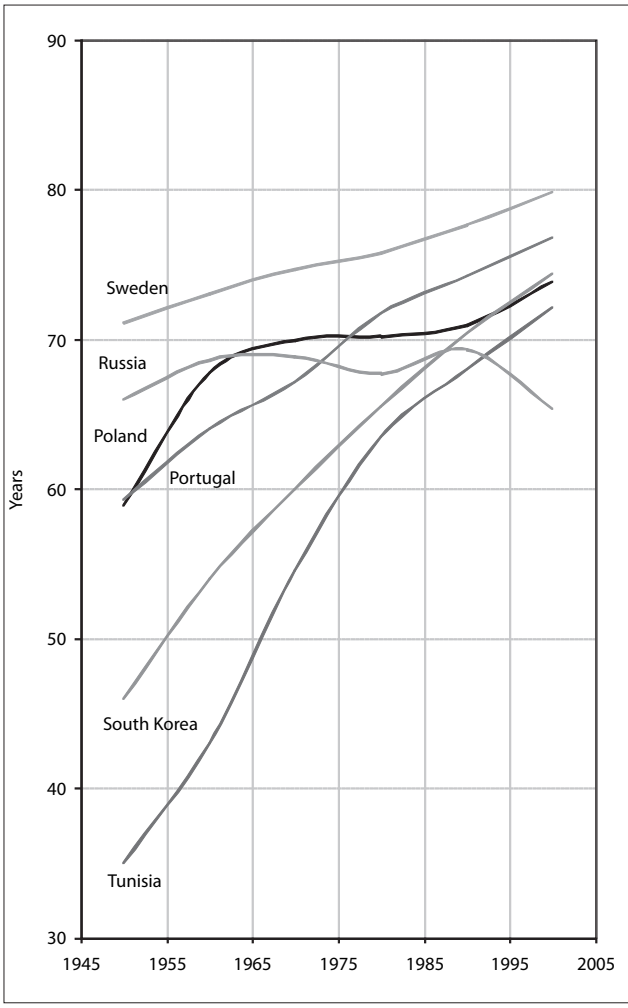

Figure 1a. Life expectancy at birth in selected countries, both sexes

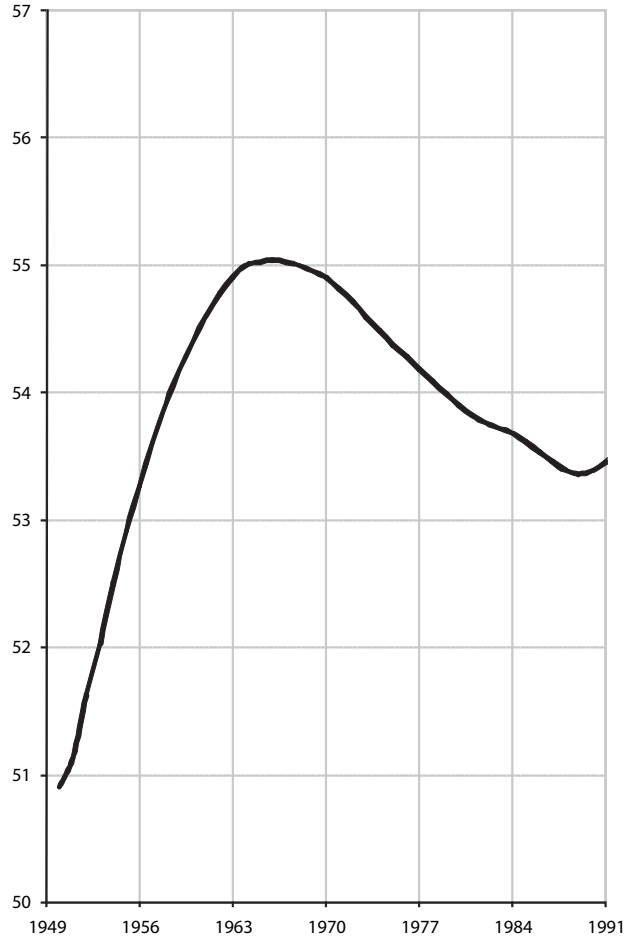

Figure 1b. Life expectancy at the age of 15 years in Polish men in the years 1950-1991

peace time, and the plunge observed in the countries of the former Soviet Union during this period has been the most pronounced such fall since the end of the World War II.

At the beginning of the 21st century, the gap in health status between the new EU members from eastern Europe (EU10) and the old EU members (EU15) can be illustrated by the following figures for 2002: male life expectancy at birth in the Baltic countries (Estonia, Latvia, and Lithuania) was about 12 years shorter than in nearby Sweden; in the age group 20-64 years, cardiovascular mortality was 6 times higher for Bulgarian women (122/100,000 person-years) than for French women (19/100,000 p-y); lung cancer deaths for Hungarian men (82/100,000 p-y) were more than 6 times higher than for Swedish men (13/100,000 p-y); death rates from liver cirrhosis for Hungarian (97/100,000 p-y) and Romanian (68/100,000 p-y) men were more than 10 times higher than for Dutch (5.5/100,000 p-y) and Greek (6.3/100,000 p-y) men; and, finally, fatal injuries for men in the Baltic states (Lithuania 333/100,000 p-y, Latvia 318/100,000 p-y and Estonia 314/100,000 p-y) were about 7-9 times higher than for men in the Netherlands (37/100,000 p-y) and the UK (45/100,000 p-y).

RESULTS

Development of health situation in central and eastern Europe (CEE) after 1945.

The epidemiological transition (decrease of the relative importance of infant and early child mortality, and the shift in relative weight from infectious to chronic disease mortality, which had started in the more developed European countries already at the beginning of the 20th century) was substantially delayed in most central and eastern European (CEE) countries. This is well illustrated by comparing child (under 5 years of age) mortality between England & Wales and Poland. In England & Wales, mortality in this age group decreased rapidly from the beginning of the 20th century to reach 4.9% of the total by 1950, compared to Poland, where 33% of all deaths were still in this age group in 1950 (Figure 2).

This temporal lag in the epidemiological transition is also apparent when comparing life expectancy at birth which, in Poland in 1950 (both sexes combined), was 12 years shorter (59.0) than in Sweden (71.1), and when comparing infant mortality, which was 5 times higher in Poland (109/1,000 live born) than in Sweden (22/1,000[1]). An important cause of adult death at this time was tuberculosis. In 1959, overall mortality from infectious and parasitic diseases was 10 times higher in men in Poland (97/100,000 p-y) than in Sweden (10/100,000 p-y) [2].

1. Own calculations with using data from Human Mortality Database.

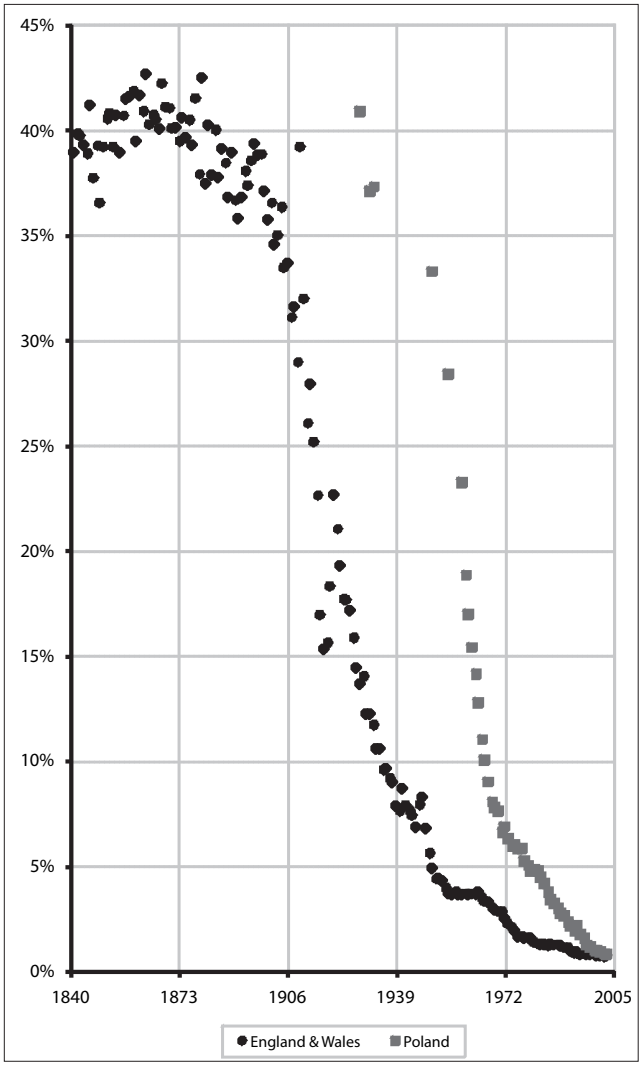

Figure 2. Deaths under 5 as a proportion of all deaths, England and Wales 1841 to 2003, Poland 1928 to 2003

Closing the gap in the 1950s

After recovery from World War II, the health improvement in the FSE countries of Europe out-paced the performance of most western European countries in the 1950s. Introducing the pioneer national health services brought medical care as a right to all citizens, making rapid and outstanding achievements in reducing infectious diseases. Infant mortality rates nearly halved in the communist countries (for example, in Poland from 109/1000 live born in 1950 to 55/1000 in 1960), and life expectancy at birth increased in some of them by almost 10 years (in Slovakia 9.7 years, in Poland 8.9 years, and in Bulgaria 7.8 years). Meanwhile, life expectancy at birth increased by only 2.5 years over the same period in West Germany [3].

By the mid-1960s, only 1-2 years separated the average life expectancy for both sexes between the FSE and the advanced market economy democratic countries (for example, 69.6 years in Poland and 71.8 years in England & Wales). The gap was almost closed.

Reversal of health trends: The growing gap between 1965 and 1990. From the mid-1960s, however, the relative performance between eastern and western Europe changed dramatically. Adult health status in the FSE countries stagnated or deteriorated, whereas in western Europe it improved steadily.

Thus, between the mid-1960s and the mid-1990s, the age-standardized mortality rates for men aged 20-64 years rose, for example, in Hungary (68%), Bulgaria (43%), Poland (37%) and former Czechoslovakia (25%), but fell, for example, in the Netherlands (25%), Sweden (20%), United Kingdom (32%) and Finland (34%). For women, an increase of about 14% in the age-standardized mortality rate in Hungary contrasted with decreases in Spain and Italy (43%), Finland and France (39%), and Greece (37%). Life expectancy at the age of 20 years fell for men in all the former socialist countries (for example, Hungary 3.8 years, Bulgaria 2.9 years, Poland 2.3) and rose by less than 1.5 years for females (Poland 1.1 years, Hungary 0.4 of a year, Bulgaria 0.2 of a year). Over the same period in western Europe, life expectancy at the age of 20 years increased significantly for both men (for example, Finland 4.4 years, France 4.3 years, Austria 3.9 years) and women (France 5.6 years, Finland 5.2 years, Italy 5.1 years).

The increase in premature adult mortality and the decline in life expectancy of men and the plateau in women in eastern Europe, compared with the steady decreases in premature adult mortality and the increases in life expectancy in western Europe, are summarized in Figures 3 and 4.

The biggest contributor to the divergence in adult mortality levels was cardiovascular disease, particularly ischemic heart disease, with the east-west differences being most pronounced in young and middle-aged men. For example, between 1965 and 1990, there were increases in male mortality from vascular causes at ages 20-64 years in Bulgaria (109%), Hungary (73%), Poland (83%), and former Czechoslovakia (41%), compared with declines in Finland (-48%), Austria (-31%), and Belgium (-54%).

The health gap was also due to differences in cancer mortality (some decline in western Europe in women, and some increase in eastern Europe, especially in men), and particularly to changes in fatal injury rates. Between 1965 and 1990, fatal injury in men aged 20-64 years increased, for example, by 40% in Bulgaria, 65% in Hungary and 57% in Poland, compared with decreases in most western European countries, for example Austria (-25%), and the Netherlands (-37%). Similar changes, although on a smaller scale, were also seen for women. Additionally, during the collapse of the Soviet Union, fatal injury rates leapt in the Baltic states by about 150% between 1987 and 1994 (similarly to other former states of the Soviet Union, including Russia), reaching the highest level ever recorded in Europe. Differences in mortality trends between the EU10 and the EU15 for selected causes are summarized in Figure 5.

The health gap in the 1990s

At the beginning of the 1990s, and before economic and political transformation, the health status of the FSE adult populations differed dramatically from that of western industrial countries. Figure 6 summarizes the health status by comparing the risk of dying for different age groups (0-15 years[2], 15-60 years, and 60-70 years) for the EU15, the EU10, and other world regions.

First, Figure 6 illustrates that the mortality risks in childhood are small in absolute terms in both the EU10 and the EU15 (although a little higher in the EU10), but both, together with Russia, are substantially lower than in other

2. To enable comparisons with the regions defined by the World Bank, there was a necessity to use 0-15, 15-60 and 60-70 age groups.

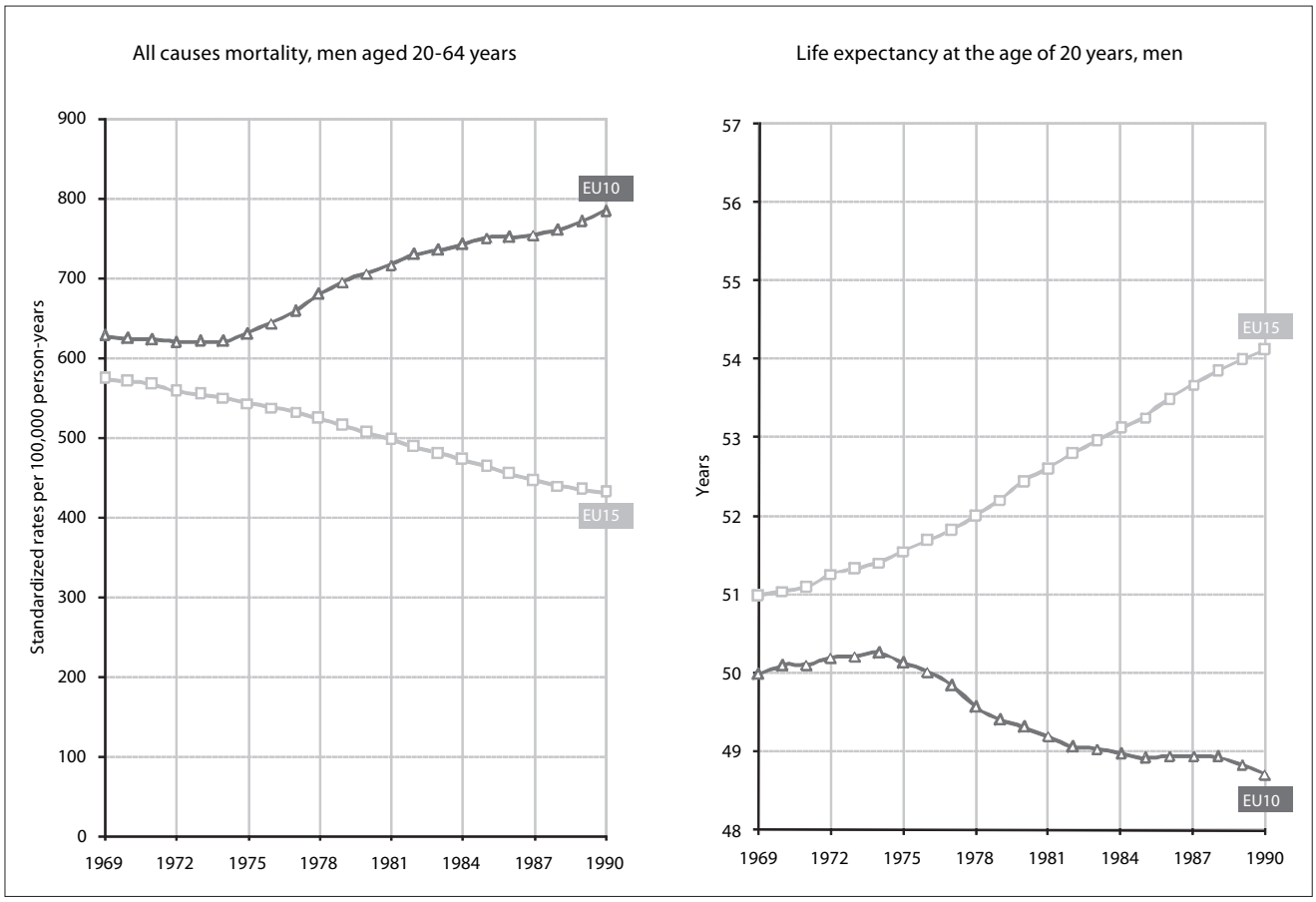

Figure 3. All causes mortality between ages 20 and 64 years and life expectancy at age 20 years in EU10 and EU15, men

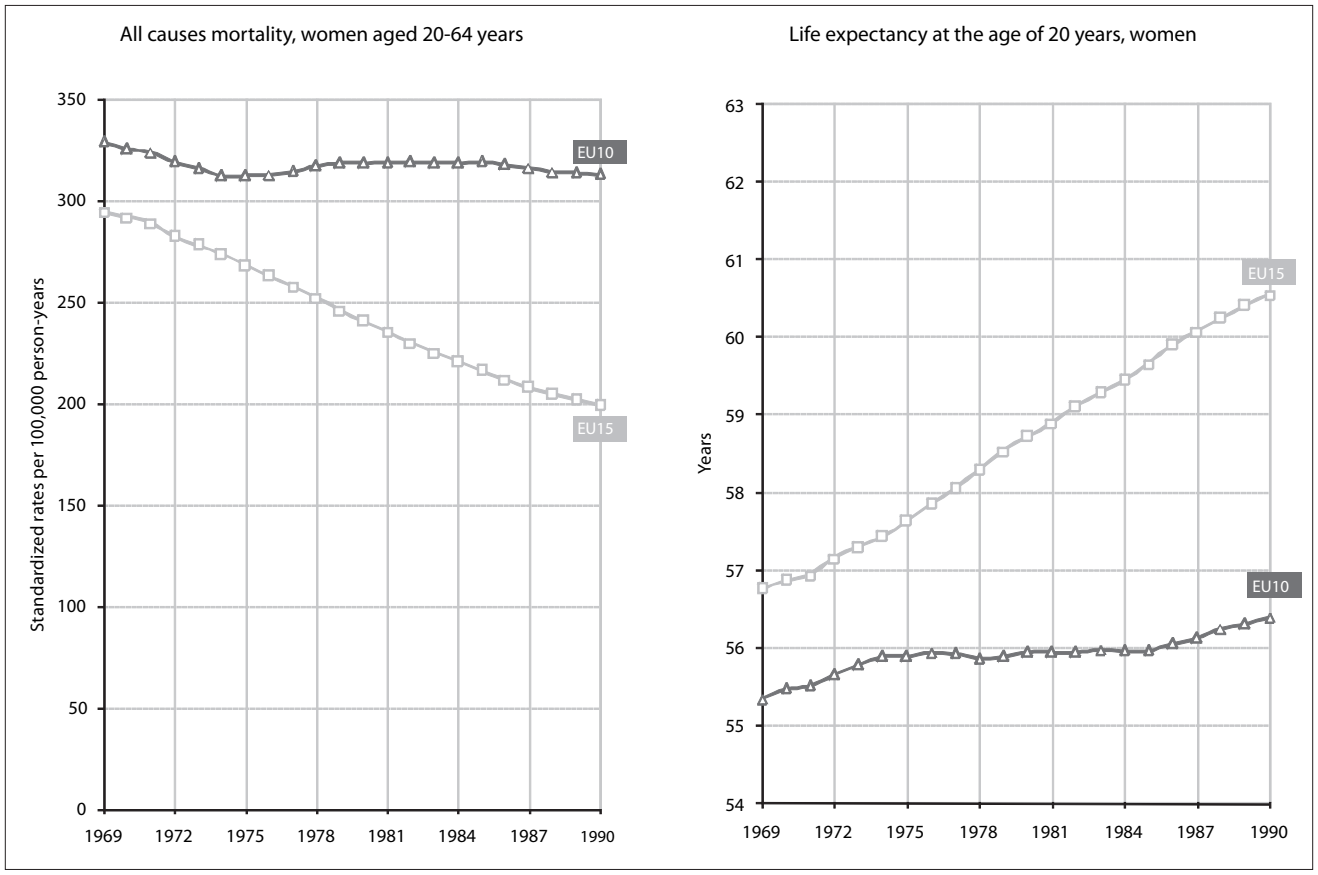

Figure 4. All causes mortality between ages 20 and 64 years and life expectancy at age 20 years in EU10 and EU15, women

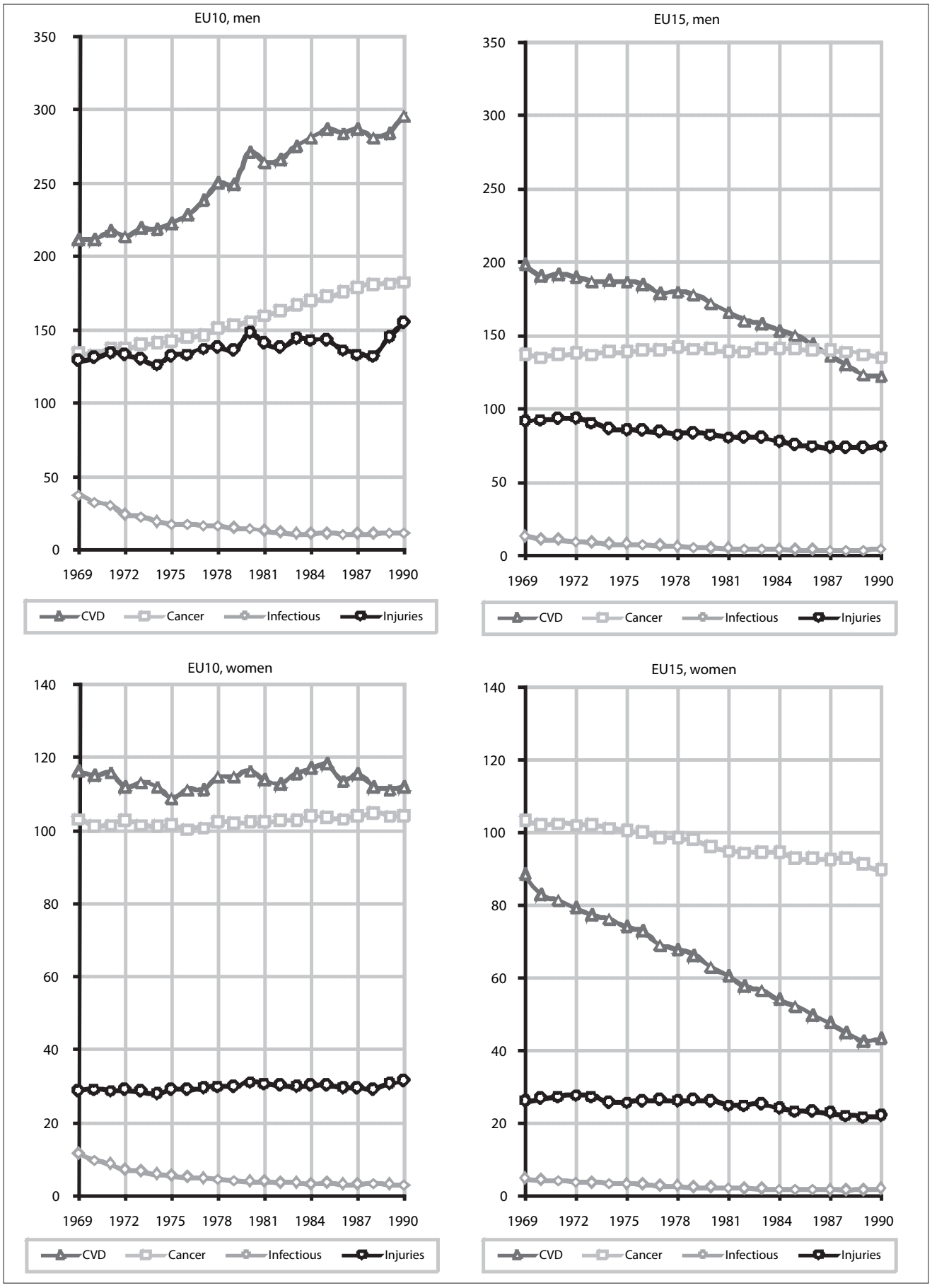

Figure 5. Time trends in mortality from selected causes in EU10 and EU15, age group 20-64 years

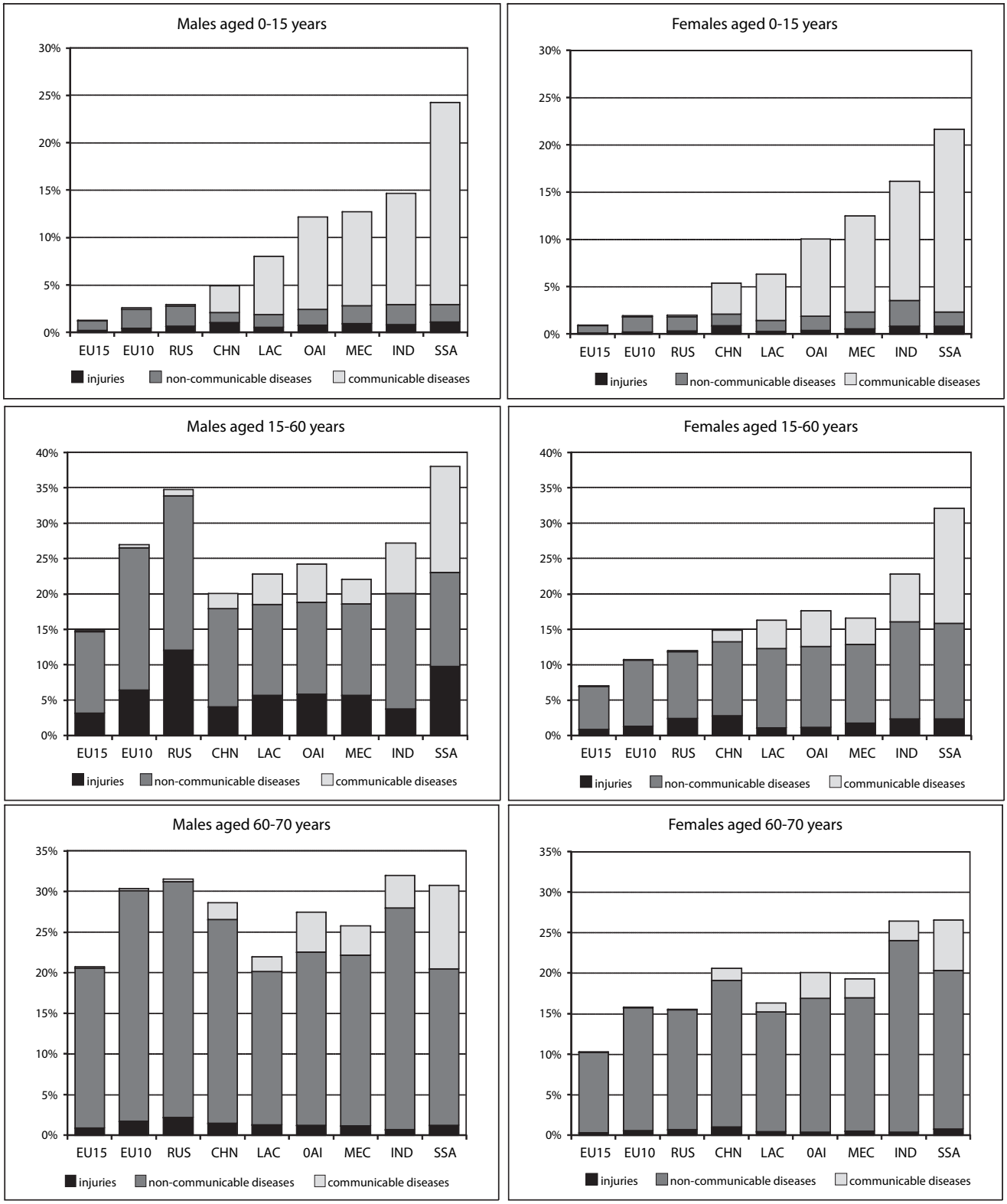

Figure 6. Risk of dying across specified age intervals from three major cause of death categories: EU10, EU15, Russia, China and major global regions (see footnotes for country groupings) based on data from Feachem et al., Oxford University Press, 1992.
EU15 – EU "old" memebers; EU10 – EU new members*; RUS – Russia; CHN – China; LAC – Latin America and the Caribbean; OAI – Other Asia and Islands; MEC – Middle Eastern Crescent; IND – India; SSA – Sub-Saharan Africa
* Bulgaria, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia

world regions; second, it shows dramatically high risks of premature mortality among adults in the EU10 and Russia – the risk of death between ages 15 and 60 years for men in the EU10 is exceeded only in the poorest region of the world, Sub-Saharan Africa; and third, it indicates that adult mortality risks were much greater in men than in women in the EU10. However, mortality risks in young and middle-aged women in the EU10 were still substantially higher than

in the EU15, and only slightly lower than in Latin America, China and other Asian countries.

DISCUSSION

Causes of the health gap

The proximal causes of the dramatic increase in adult premature mortality in eastern Europe between 1965 and 1990 seems to be due to 2 main factors: the harmful use of legal drugs (tobacco and alcohol) and adverse trends in nutritional and physiological risk factors for vascular disease affecting, particularly, blood pressure, lipid metabolism, and the structure and function of the cardiovascular system. Environmental exposures, including pollution of the ambient and occupational environments, and the intrinsic safety levels of motor vehicles and road traffic systems, are likely to have made only small additional contributions.

Health determinants (tobacco, alcohol and diet)

After the World War II, the consumption of tobacco and alcohol in eastern Europe increased steadily. Both products were easily accessible and their prices were kept at very low levels. In all eastern European countries, the consumption of spirits grew (e.g. in Poland, per capita alcohol consumption grew from about 3 litres in 1950 to 8.4 litres in 1980[3]), and the dominating style of drinking became the 'Russian' or 'binge-drinking' style. A good example of the governments' lack of consideration in public health was the attitude towards tobacco (similarly, as towards vodka). In the militarized societies of the eastern European countries, cigarette production became a state priority. In the army, everyone, including non-smokers, received a quota of cigarettes, and non-smoking soldiers were looked at with suspicion and harassed. The prices of cigarettes were low, and the product itself was widely available. Smoking was allowed everywhere and at any time, except where it interfered with occupational safety (fire hazard). This situation practically did not change until the end of the 1980s.

The closed societies of the Soviet Union were deprived of information on the harmful effects of smoking [4]. Awareness of the harm to health due to smoking was very low until the 1980s [5]. There were more smokers among the better educated, including medical doctors, and better-off people. This attitude, observed in eastern European countries almost until the end of the 1980s, among other reasons, placed them at the top of world tobacco consumption from the early 1960s until the end of the 20th century [6]. This affected the state of health of subsequent generations [7].

The high level of consumer subsidies for basic foodstuffs in eastern Europe meant that the prices of meat and dairy products remained low relative to incomes. This led to a high consumption of saturated animal fats, without any countering education on the dangers they posed to vascular health. Until 1980, calorific intake was higher in eastern than in western Europe (Food and Agriculture Organization statistics), probably resulting in obesity becoming a problem earlier in eastern than in western Europe. The lack of diversity and innovation in food supply also meant that, in the northern part of eastern Europe, vegetable oil consumption remained very low, and in the southern part of eastern Europe there was a dependence on a single type of vegetable oil – sunflower oil. The hypothesis that low intake of alpha-linolenic acid contributed to increased vascular risk is a topic of continuing research [8]. Although many of the socialist countries had reasonable domestic supplies of fresh fruit and vegetables in season, contrary to western European countries, there was a generalised failure to develop systems for the out-of -season supplies of fresh fruit and salad vegetables. Out-of-season consumption of protective plant foods was especially low. With the low intake of fresh foods there was a continuing reliance on traditionally preserved foods, a pattern associated with high salt intakes (15-20 g/day), which may have carried its own risks [9]. Many vegetables were consumed as pickles, and meat was consumed mostly in a highly processed form, using large amounts of salt and saltpetre, or by smoking, with sausages taking first place. These phenomena were also caused by low awareness of hazards associated with risky health behaviours, also among well-educated inhabitants of these countries [10].

Institutional determinants

The fact that the proximal causes of chronic disease and injury operated with so much greater force in the socialist countries suggests that the 'causes of the causes' - the distal or institutional determinants of health - were operating in a much less favourable way in these countries. We may need to wait for another generation to attain a full and balanced understanding of why the former socialist countries responded so ineffectively to the challenges posed by chronic disease and injury. But the importance of the topic demands some preliminary observations.

Milton Terris in his essay published in the Journal of Public Health Policy in 1988 [11], along with other scholars [12,13], remind us that after the World War II, an ideologically justified 'universal health system' was introduced in the state socialism countries and the Soviet Union, the so-called Semashko's model (Health Minister in Lenin's government) with full medicalization of health [14]. Each citizen had access to medical care, free of charge. State medicine, not the citizen, was responsible for health. Every disease or group of diseases had its own governmental institute. Health administration was dominated by physicians who kept all managerial positions in the Ministry of Health. Different to western Europe, the concept of preventive medicine was not based on inter-sectoral and multi-disciplinary approaches concerning all areas of policy, not only medical. Preventive medicine was fully integrated with therapeutic medicine and subordinated to it. Public health was defined as social medicine – the province of physicians.

Epidemiology, the basic science of public health, concentrated almost exclusively on infectious diseases. Different to the United States or the UK, the epidemiology of non-infectious diseases was very weak, and has been some 15-20 years behind the Anglo-Saxon and Scandinavian countries [13]. Lacking an epidemiologic information or perspective, eastern European countries did not take into account new developments in the health sciences that identified the risk factors affecting groups in the population whose mortality rates were rising. Their response to the problems of the epidemiologic transition was more of the same: centralism and isolation did not permit or foster the diffusion of information, knowledge, or power necessary to respond differently. A combination of factors encouraged a

3. Central Statistical Office in Poland (GUS).

medical bias towards the care of individual patients, based on the experience successfully applied to the control epidemics of communicable diseases. The orientation to prevention was primarily medical, stressing routine medical checkups. Health policy continued to promote an increased supply of doctors, polyclinics and hospital beds. An overlarge hospital sector, with a passive strategy of treatment and of long hospital stays, was unable to keep up with technological advances and consumed a large share of the very limited amount of funds allocated to health care.

The rapid developments of science and evidence-based medicine that occurred in the west in the 1960s and 1970s, researching the causes of non-communicable diseases, for example, the causal relation of smoking and lung cancer [15], or the relation between diet and cardiovascular diseases [16], went unnoticed in eastern Europe. At least, there were neither broad public discussions nor wide public health interventions with participation of the state or society.

The similarly rapidly developing research of clinical trials and the evidence-based treatment resulting from it (for example, the Cochrane Collaboration[4]), also remained unnoticed, or at least was not sufficiently introduced into broad clinical practice [13]. Medicine was more often defined as art rather than science.

The culture and perception of health in eastern countries was also shaped differently. While in the west much of the enthusiasm for health reform was grounded in the optimistic belief that it was within the capacity of people to improve their health by themselves (e.g. through exercise and physical education and preventive medicine) [17], in the Soviet sphere of influence, health was a matter of the state.

The countries which joined the European Union after 2004 (e.g. Poland) introduced the EU regulations in the area of food safety; however, the change of nutritional habits takes time [18].

The concept of Lalonde 'health fields'[5], developed in Canada during the 1970s, and later developed and defined in several documents [19,20], is hard to find in the health policy of eastern Europe. Different, for example, to the Scandinavian countries, it was not the whole government, but solely the health minister, who was responsible for health [21]. There were no multi-disciplinary schools to carry out research in the fields of public health (epidemiology, biostatistics, disease prevention, medical care organization, environmental health, health education, health promotion); there was no body of public health workers: engineers and environmental health workers, non-physician health and hospital administrators, health educators, non-physician and physician nutritionists, biostatisticians, social scientists, physician and non-physician epidemiologists, etc.

A lack of doctors or of hospital capacity was clearly not the problem. In the years in which the dramatic health decline in eastern Europe was observed, there was a very significant increase in the number of doctors (in 1990, the number of doctors per 1,000 amounted to 4.7 in the FSE [6] countries and 2.5 in the EME [7] countries), improvements in the level of their education and increases in the number of beds (in 1990, the number of hospital beds per 1,000 amounted to 11 in the FSE and 8 in the EME) to which every citizen had access. There was also a steady increase in access to new medical procedures and drugs [3].

However, there were serious qualitative weaknesses in public health institutions and in their supporting scientific infrastructures. The organisation of public health services remained frozen in the Soviet Shemashko model, based on a system of sanitary-epidemiological stations concerned mainly with infant, child and adolescent mortality, maternal mortality as well as infectious diseases and their health consequences. An authoritarian 'sanitary police' mentality prevailed, and creative and effective ways of addressing the lifestyle determinants of chronic disease and injury were not developed.

Political authoritarianism inhibited scientific approaches to social problems. Attempts were made to solve public health problems almost exclusively through creating new specialized hospitals and medical disciplines (e.g. oncology, cardiology, traumatology). In contrast, no attempts were made to link the health problems with social policy, which would have required the co-operation of citizens and their knowledge, consciousness, attitudes, and behaviour towards risk factors for chronic diseases. Similarly, but with some notable exceptions, such as the short-lived Gorbachev alcohol reforms and the Polish anti-alcohol legislation [13,22], there were few state interventions to improve public health, such as taxation or other price policies for tobacco and alcohol control, effective programmes to control drink-driving or population-based prevention-screening programmes.

Strategic investments in departments of public health needed to form effective responses to epidemics of chronic disease and injury remained at very low levels. Many of these institutional weaknesses still remain to be addressed. Scientific publications in cardiovascular and injury epidemiology remain very much lower than in the EU15 countries, and policies are still not generally in place to attract some of the brightest graduates into public health careers.

The extension of quantitative reasoning (summarised as 'evidence-based medicine'), which helped change the thinking of western physicians between the 1960s and the 1990s, advanced much more slowly in the socialist countries. Physicians who were less familiar with the quantitative logic of risk assessment were likely to have been less effective in their use of preventive medication (e.g. for raised blood pressure), and worse at educating their patients about chronic disease risk factors. Although relevant survey data are limited, public knowledge of chronic disease risk factors appears to have been substantially lower than in western countries [9,23].

CONCLUSION

The relentless rise of premature mortality revealed the inability of the former socialist countries to respond effectively to new challenges. Poor adult health became a

4. http://www.cochrane.org

5. Lalonde M: *A New Perspective on the Health of Canadians. A Working Document*. Information Canada, Ottawa 1974. Lalonde's health fields: human biology (genetic factors) determines men's health in 5-10%, physical environment in 5-10%, and social environment in 20-25%. The biggest influence on men's health is lifestyle – 40-60%, whereas most of lifestyle is determined by the physical and social environment, e.g., the price and availability of cigarettes. Only 10-20% of men's health is determined by medical services.

6. Former socialist economies.

7. Established market economies.

bigger and bigger burden for the economy. Human capital was wasted and economic advance handicapped. These failures in relation to health were part of the broader failures of the FSE countries to compete effectively within the world economy.

Key points. Compared with western Europe, the decrease in the relative importance of infant and early child mortality, and the shift from infectious to non-infectious disease mortality was delayed in eastern Europe in the first half of the 20th century;

- there was a dramatic improvement in health in eastern Europe in the 1950s up to the year 1965;
- the improvement was followed by a growing health gap between east and west Europe between 1965 and 1990;
- the proximal causes of the health gap are due to health determinants.
- high consumption of alcohol and tobacco;
- nutritional factors affecting structure and functioning of the cardiovascular system, including a low consumption of fresh fruit and vegetables and alpha-linolenic acid rich vegetable oil and fish, and a high consumption of processed foods rich in animal fat and salt;
- the distal causes of the health gap are due to poor health infrastructures;
- near exclusive focus of epidemiology on communicable as opposed to non-communicable diseases;
- lack of understanding and access to modern epidemiology and public health;
- lack of understanding and access to evidence-based medicine;
- Lack of public health education and health promotion.

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