

Understanding population health: lessons from the former Soviet Union

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This article is based on the Milroy Lecture given at the Royal College of Physicians on 10 March 2005 by Martin McKee CBE FRCP FMedSci Professor of European Public Health, London School of Hygiene and Tropical Medicine

Clin Med
2005;5:374–8

ABSTRACT – The collapse of the Soviet Union was a massive natural experiment that has provided many insights that help our understanding of the determinants of population health. This paper identifies a series of lessons learnt from this experience:

- 1 **Rapid transition can damage health.**
- 2 **When undertaking comparative research, it is essential to have a common understanding of what different terms mean in different places.**
- 3 **When looking at exposures and outcomes, it is important to appreciate that the delay between exposure to a risk factor and the appearance of disease can range from almost none to several decades.**
- 4 **Contrary to the views of some commentators, modern healthcare has made a substantial contribution to the health of populations in industrialised countries.**
- 5 **Science can flourish only where it is free from ideology.**
- 6 **Public health and basic science achieve most when they work together.**
- 7 **Without functioning democracy, the outlook for better health is poor.**

KEY WORDS: alcohol, healthcare, Russia, transition, USSR

Gavin Milroy visited the territory that would later become the USSR only once. In 1885, he was invited to join a Sanitary Commission despatched to the Crimea. Florence Nightingale had previously drawn attention to the high mortality rate among the military. Milroy and his colleagues identified the immediate causes of the high mortality as cholera, fever, diarrhoea and dysentery, but their most important conclusions related to the underlying factors: damp, impure air and impure water.¹ Importantly, they noted that, although extreme, the conditions they were confronted with were not unique and could be found in poor rural areas untouched by war in other parts of the world. The lessons that Milroy was to learn from this experience were to inform his subsequent work in the UK and the West Indies. I will

argue that the former USSR offers many more lessons for health policy in the rest of the world.

Rapid transition can damage your health

The first lesson is that rapid transition can damage health. For the past two decades the people of central and eastern Europe have been experiencing a period of massive social and economic change. The process of reform launched by Gorbachev in 1985 progressively discarded the norms that had existed since the Bolshevik revolution in 1917. The promotion of *glasnost* and *perestroika* envisaged a gradual process of change while introducing some elements of a market economy. This all changed with the failed 1991 coup leading to the break-up of the Soviet Union.² The pace of transition accelerated and 15 Soviet republics became independent countries. The economic consequences were calamitous. A trading system based on barter could not withstand the opening of borders. Much of the region experienced a rapid process of de-industrialisation that is in some ways a mirror image of industrialisation in western Europe in the 19th century.

To understand the consequences for the populations involved, it is first necessary to say something about the role that alcohol has played in Russian, and subsequently Soviet life.³ The Tsars derived up to a third of their revenues from the state monopoly on sales of alcohol and, in the Soviet period, alcohol was one of the few available consumer goods. Alcoholism was widespread and largely tolerated. This changed briefly in 1985 when Gorbachev introduced a wide-ranging anti-alcohol campaign,⁴ setting in train a massive natural experiment that added greatly to the understanding of the role that alcohol plays in premature mortality.

Between 1985 and 1986, male life expectancy at birth increased by two years,⁵ but the improvement was short-lived (Fig 1). By the end of the 1980s the authorities could no longer enforce the anti-alcohol laws and there was massive illegal production of alcohol. After the Soviet Union broke apart, as the economy was going into free fall, the deterioration in life expectancy accelerated in all the independent republics, again fuelled by alcohol-related mortality.⁶

Not everywhere was affected to the same extent.

The worst affected regions were those experiencing the most rapid pace of economic change.⁷ Furthermore, the gap in life expectancy between regions that had suffered most and those that had suffered least was explained almost entirely by deaths attributable to heavy alcohol consumption. Other studies reveal that those dying were individuals with the least education and social support.

The situation in Russia is not, however, unique. In western Europe, the 19th century was also a period of massive social change. The opportunities created by the industrial revolution were drawing huge numbers of people into the rapidly expanding cities. As both Dickens⁸ and Engels⁹ have described in different ways, some prospered but others were less fortunate. Overall, the industrial revolution led to an improvement in the health of the British population, but mortality was much higher among the new urban underclass than among their relatives who remained in the countryside.

Another form of transition can be seen elsewhere, as indigenous peoples have confronted European settlers. They too have frequently resorted to substance abuse, often using alcohol (eg Native Americans and Inuit).¹⁰ Where alcohol is difficult to produce, glue and petrol offer a substitute. In parts of western Europe facing de-industrialisation, young people with few prospects have turned to heroin.¹¹

In all these situations, those who have experienced the most rapid and uncontrolled transition and have the least social support have suffered most. In a global economy where the pace of change seems ever more rapid, this is an important lesson.

Words mean what I choose them to mean

The diagnosis of myocardial infarction

The second lesson draws on Lewis Carroll, whose character Humpty Dumpty famously said 'Words mean what I choose them to mean'.¹² An example is the diagnostic label 'myocardial infarction' (MI). Although this is one of the most common causes of death worldwide, and although vast sums have been spent on research into its causes, our knowledge is still surprisingly incomplete. The most important studies into its causes

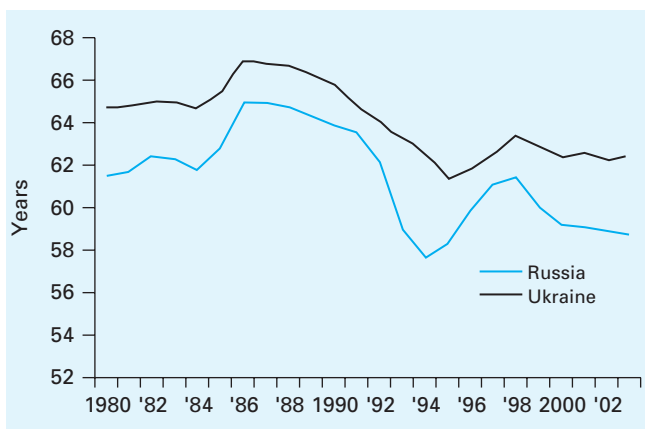


Fig 1. Male life expectancy at birth in Russia and Ukraine (1980–2002).⁷

Key Points

The break-up of the USSR was a massive natural experiment, with major consequences for population health

This experience provides lessons for other parts of the world

Rapid transition can damage health, with those who are already vulnerable at greatest risk

Action is needed to tackle the underlying determinants of health and the healthcare systems in the countries of the former Soviet Union

Success is, however, likely to be limited unless there is greater democracy

have been conducted in a few parts of the industrialised world, with the implicit assumption that the findings will be applicable everywhere else. Yet what is termed MI in the former Soviet Union has some important differences. Deaths occur at a younger age and deaths from MI are about twice as likely to be sudden as elsewhere.¹³ The risk factors identified in studies in other areas are less able to explain the risk of having an MI in the Russian population. This was first noticed in the Lipid Research Clinics study, which followed up cohorts from Moscow and Leningrad from the 1970s onwards. The protective effect of high density lipoprotein, reported from the west, could not be identified in this population.¹⁴ More recently, the INTERHEART study has used a standardised approach to examine the contribution of nine risk factors for MI in 52 countries, including Russia.¹⁵ The authors concluded that the:

effect of these risk factors is consistent in men and women, across different geographic regions, and by ethnic group, making the study applicable worldwide.

Yet the results obtained suggest that central and eastern Europe is an outlier, with the risk factors explaining just over 70% of the variation, compared with 100% in North America.¹⁶ Moreover, this study included only those who survived to reach hospital, which is a much smaller proportion of all those who die from MI than in North America.

So what is meant by the term MI? The definition used in many key epidemiological studies includes cases of sudden cardiac death. In some cases a careful autopsy will discover a ruptured plaque in a coronary artery, but the diagnosis often remains presumptive. One interpretation is that all sudden deaths labelled as MI contain a mixture of cases, some where there has been a coronary occlusion and some where the cause of death was an arrhythmia due to another cause. It may be that many of the additional sudden cardiac deaths that occur in Russia fall into the latter category.

This is, however, a difficult distinction to make as fatal arrhythmia is essentially a diagnosis of exclusion and would require a detailed dissection of the coronary arteries to ensure that there is no occlusion. One study that looked carefully at the hearts of young Russian men who died suddenly found few with

evidence of atheromatous disease but many with changes to mitochondrial enzymes consistent with alcohol-induced damage.¹⁷ Coronary artery disease is not the only cause of sudden cardiac death. Other causes include alcohol and cocaine,¹⁸ when working with populations where either is common, it is important to have a clear understanding of the nature of the disease in question.

Long and short timescales

The third lesson is that influences on health act over different timescales. Many examples related to alcohol involve very short timescales – unsurprising as the lag between behaviour change (heavy drinking) and death can be remarkably fast. It was the observation that deaths from ischaemic heart disease among young Russian men peaked at weekends that suggested that alcohol and, in particular, binge drinking, may be important because conventional cardiovascular risk factors could not explain this regular weekly phenomenon.¹⁹

In contrast, many other influences on health act over a much longer timescale. During the 1990s, deaths from lung cancer among men were falling across the ex-USSR even though cigarettes were pouring into the country (Fig 2). A detailed analysis revealed that the generation that had been teenagers during the World War II had carried with them a very high rate of smoking.²⁰ The Red Army went to enormous efforts to get cigarettes to the front line, even at the expense of food. After the war, the priority was industrialisation of the Soviet Union. Consumer goods of all kinds, including cigarettes, were a low priority. Teenagers during the late 1940s and early 1950s were much less likely to smoke. In 1953, when Stalin died and Krushchev came to power, consumer goods again became important, so that the next generation of teenagers reverted to high smoking rates. The recent decline in mortality represents a progression of cohorts who have been carrying a progressively lower lifetime risk of lung cancer. Now that those who were in their teens in the late 1950s, whose lifetime risk is higher than those who were teenagers a decade earlier, are reaching the peak age for this disease, it can be predicted with confidence that the

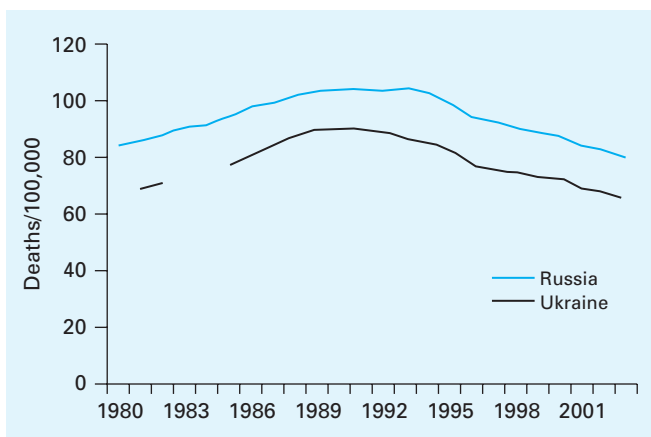


Fig 2. Age-standardised mortality from lung cancer in Russia and Ukraine: males, all ages.⁷

recent downward trend in lung cancer mortality will soon reverse.

Healthcare makes a difference

The fourth lesson is that healthcare makes a difference. For many years, public health professionals were taught that healthcare contributed little to population health. This was based on the landmark analysis of Thomas McKeown²¹ who, writing in the mid-1960s, argued that the largest part of the improvements in life expectancy over the preceding century had predated the introduction of modern medicine. He illustrated this with the case of tuberculosis, from which the death rate fell long before either BCG or chemotherapy was available. McKeown was probably correct about the limited role played by medicine at the time he was writing, but things have changed. Since the 1960s, many new classes of drugs have appeared, in particular to manage a range of chronic disorders such as hypertension and asthma, as well as the introduction of improved surgical techniques and safer anaesthetics.

In the USA, Rutstein developed the concept of avoidable mortality,²² subsequently taken up in Europe by Holland²³ and Mackenbach.²⁴ They showed that mortality was falling at a faster rate for those causes where death was potentially avoidable with timely and effective care than where the role of healthcare was much more limited.

The Soviet Union was different. In the mid-1960s, death rates from avoidable mortality were almost the same as in the UK.²⁵ By the early 1970s, when many of the new pharmaceuticals and surgical procedures were being widely implemented in the UK, they began to diverge. Rates in Russia remained high while they fell steadily in the UK. Russia was able to place a man in orbit around the earth, but was never able to develop an indigenous pharmaceutical industry. Its economic and intellectual resources were diverted into the military-industrial complex in an attempt to keep up with the Americans. As a consequence, it made extensive use of physical therapies, such as light or magnetic treatments, all of which were entirely ineffective but had the great benefit of giving the impression that something was being done. The divergence between the two countries provides a stark example of the benefits of modern healthcare.

It would, however, be wrong to suggest that the Soviet health system was a complete failure. In the post-war period it made remarkable progress in developing a system of basic healthcare for a very dispersed population, doing much to control infectious diseases.²⁶ Unfortunately, its achievements have become clear from what happened when the system fell apart, as in some of the former Soviet republics in the Caucasus and Central Asia.

The example of diabetes

This situation is exemplified by the fate of those with diabetes. Since 1991 deaths from diabetes among people under 50 have increased about eight times in some parts of the former Soviet Union. Interviews with surviving relatives of those who died in Ukraine²⁷ and with people with diabetes, their family members

and health professionals in Kyrgyzstan²⁸ reveal a scene of disorganisation. There was no shortage of insulin but it was rarely in the right place at the right time. The main message is that effective management of diabetes requires more than insulin. It needs a system that will enable people at risk of complications to be diagnosed and treated early by health professionals who know what they are doing. This has huge relevance for other parts of the world.

AIDS

The global community is raising money to provide essential drugs to treat another chronic illness, AIDS. With enough money, the drugs can be made available in the way that insulin already is in the former Soviet Union. What will not be made available so easily are the drugs and the expertise to diagnose and manage the complications of AIDS.

Both AIDS and diabetes are examples of the challenges that all healthcare systems face in the future. They are complex chronic diseases requiring a range of inputs from different professionals, with the patients themselves playing a critical role in self-management. When it goes wrong, people die. That this is not simply a matter of money becomes clear when looking at the USA, which has the most expensive healthcare system in the world but where death rates among the young from diabetes and other chronic diseases are not only three or four times higher than in Europe but actually rising.²⁹

Beyond mortality

Mortality statistics do not tell the whole story, although they do have two benefits:

- they are widely available, and
- the event of death is generally unambiguous.

The widespread use of mortality data has focused attention on the plight of men in the former Soviet Union, given their much shorter life expectancy than women.³⁰ If, however, measures of health derived from surveys are used to calculate both total and healthy life expectancy, it is clear that, while overall life expectancy is much shorter for Russian men than for women, healthy life expectancy is remarkably similar for both.³¹ More Russian women survive into old age, but many do so in poor health.

The need for transparency

The fifth lesson relates to the importance of scientific openness. Soviet science had one role: to further the communist cause. This ideological domination stifled innovation and made a major contribution to the failure of the Soviet system to respond to emerging challenges.³² The Soviet Union has gone but science is again under threat, this time in the USA. The interference by the Bush administration in science has been catalogued in detail, revealing how the political process has intruded into two areas: first, where the interests of powerful corporations were threatened, such as those of the oil companies and, secondly, where

there were conflicts with the beliefs of the religious right.³³ For example, three highly qualified independent experts were rejected as members of a committee examining the effect of lead on children in favour of others with long-standing industry links, including one whose research was limited to work on rats and who argued, contrary to the established scientific consensus, that levels up to seven times those currently permitted were safe.³⁴ Researchers applying to the National Institutes of Health have been advised by programme officers that funding applications containing words such as 'gay' can expect extra scrutiny.³⁵ These policies have led a group of leading American Scientists to write that:

*stacking these public committees out of fear that they may offer advice that conflicts with administration policies devalues the entire federal advisory committee structure.*³⁶

As in the USSR, this is leading to mistaken social policies and environmental damage.³⁷ History is repeating itself.

Working together: public health and basic science

The sixth lesson returns to the legacy of Milroy. In endowing this lecture, on a public health topic but awarded by the Royal College of Physicians, he provided a way for epidemiologists and basic scientists to come together. There are many examples of the benefits of so doing. One is our understanding of the mechanisms that link alcohol and heart disease. A systematic review of the biological responses to alcohol consumption revealed effects on lipid metabolism, platelet aggregation, fibrinolysis and myocardial irritability, all of which helped to explain why regular moderate consumption reduces the risk of cardiac death while episodic heavy drinking increases it.³⁸ These findings had not previously been brought together.

A second example is research showing that high density lipoprotein acts differently on cholesterol metabolism in fibroblasts in cell culture in blood from Russian and American subjects, suggesting the presence of an as yet unidentified cofactor.³⁹

A third example is research demonstrating the presence of significant amounts of hepatotoxic long-chain alcohols in home-made beverages in Hungary, offering a potential explanation for the very high rate of cirrhosis in that country.⁴⁰

The future?

There is one final lesson: that democracy is good for health.⁴¹ This seems intuitive: if individuals and communities believe they can make a difference, they are more likely to invest in the future. They will not do so if they believe that, whatever they do, ruling elites will continue to govern in their own interests and not those of their populations. From this perspective, the future of many parts of the former Soviet Union seems bleak,⁴² especially in countries such as Uzbekistan and Turkmenistan.⁴³ The countries of the former Soviet Union are at a crossroads. Some, such as Georgia and Ukraine, have recently chosen the pathway to democracy and, hopefully, better health. Others have yet to decide whether they will follow.

The political transition in the former Soviet Union has been a massive natural experiment with enormous implications for health. It offers many insights into the determinants of population health that are relevant far beyond this region.

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