WORLD BANK WORKING PAPER NO. 33

Millennium Development Goals for Health in Europe and Central Asia

Relevance and Policy Implications

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Abstract

This study aims to contribute to the debate about the appropriateness of health-related Millennium Development Goals (MDGs) for the countries of the Europe and Central Asia region. It is primarily addressed at policy advisors and senior analysts at the local, regional, and global level, who could influence the strategic directions of policymakers. The study is of particular relevance to international development institutions and UN organizations, who might have to reconsider the focus of their health-related development assistance to the countries of the ECA region.

The study examines how appropriate the health-related MDGs are for the countries of the ECA region by analysing the impact of the following four scenarios on life expectancy at birth:

- achieving MDG targets for infant, child, and maternal mortality;
- reducing infant, child, and maternal mortality to EU levels;
- reducing infant, child, and maternal mortality to the lowest subregional levels;
- reducing deaths from cardiovascular disease and external causes of death to EU levels.

Because national registration data on infant and child mortality in countries of Central Asia and the Caucasus underestimate the true figure, the first three scenarios were recalculated for these countries in an additional calculation, using survey-based World Bank data.

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Abbreviations and Acronyms

AIDS	Acquired Immune Deficiency Syndrome
CVD	Cardiovascular Disease
DHS	Demographic and Health Survey
DOTS	Directly Observed Treatment, Short Course
ECA	Europe and Central Asia
EU	European Union
HIV	Human Immunodeficiency Virus
MDG	Millennium Development Goal
OECD	Organization for Economic Cooperation and Development
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
WHO	World Health Organization
YPLL	Years of Potential Life Lost

Executive Summary

In 2000 the international community adopted the Millennium Development Goals (MDGs) as the basis for international development policies. Covering a range of sectors, they have the advantage of providing common, objectively verifiable measures of progress in world development. Yet the application of this common framework to diverse settings can create challenges. A particular example is the application of health goals to the countries of the Europe and Central Asia (ECA) region. Although this region faces formidable health challenges, with low levels of life expectancy relative to European Union (EU) levels, this is driven largely by high adult mortality, while levels of infant and child mortality (which feature prominently in the health Millennium Development Goals) are relatively low, compared to countries at a similar level of economic performance in other parts of the world.

This report examines how appropriate the health-related MDGs are for the countries of the ECA region by assessing the impact of achieving them on one of the widely used measures of aggregate health status: life expectancy at birth. It looks at the consequences of reaching the Millennium Development Goals 4 and 5, relating to infant, child (1–4 years-old), and maternal mortality. The report also explores other indicators that might be more relevant to the countries of this region. Achievement of Goal 6 of the MDGs (combating HIV/AIDS, malaria, and tuberculosis) has not been included in the analysis, because the impact of these diseases on life expectancy at birth is still relatively small. However, this may change in the near future due to HIV/AIDS and tuberculosis.

Four scenarios were considered: (1) reducing infant, child, and maternal mortality rates to the levels envisaged by the MDGs; (2) reducing infant, child, and maternal mortality rates to average EU levels; (3) reducing infant, child, and maternal mortality rates to the lowest levels in the subregion; and (4) keeping infant, child, and maternal mortality rates constant, and reducing mortality rates from cardiovascular disease and external causes of death to EU levels. The effects of the calculations were then compared with regard to life expectancy at birth.

Because it is well known that national registration data on infant and child mortality considerably underestimate the true figures in Central Asia and the Caucasus, survey-based data were used in an additional calculation of the first three scenarios in these countries. The results showed the extent to which the underestimation of under-5 mortality in official data seriously overestimates life

expectancy at birth. Consequently, achieving reductions of infant and child mortality in the first three scenarios would result in much more pronounced gains in life expectancy, when compared to national registration data.

For the whole of the ECA region, Scenario 4 (focusing on adult mortality) had the greatest impact on life expectancy at birth, resulting in an average gain of 7.75 years, and reaching 10.09 years in the Russian Federation. In contrast, reaching the MDG targets for infant, child, and maternal mortality resulted in an average gain of only 0.68–1.24 years, depending on whether national registration data or World Bank estimates of infant and child mortality were used for the countries of Central Asia and the Caucasus. Reducing infant, child, and maternal mortality to EU levels resulted on average in a gain of 0.85–1.97 years; while reaching the best subregional values for these indicators resulted in an average gain of 0.58–1.09 years.

The MDGs are important because they drive the choice of policies supported by the international community. Overall, the study confirmed the importance of adapting the health-related MDGs Goals to the countries of the ECA region, placing greater emphasis on adult mortality. The choice of goals at a global level is largely determined by what data are available. The absence, in many developing countries, of data on adult mortality thus precludes the use of life expectancy at birth as a global measure. It does not, however, preclude its use where data do exist, and, as this analysis shows, specific measures of adult mortality such as deaths from cardiovascular disease and external causes are appropriate additional measures of progress in improving health in this region.

The study also highlighted how different sources of data yield different values for commonly cited variables, raising important questions about how, in practice, progress towards the MDGs will actually be assessed.

Perhaps equally important, the study demonstrated the great variety in challenges to health among the countries of the ECA region. Although it might be tempting to formulate common goals for all countries of the ECA region, ultimately, development targets and policy interventions need to be adapted to the country context to become meaningful.

Implications for Policy Choices

The study has important implications for policy choices at the regional, subregional, and country levels. Despite the fact that averages mask variations that exist within countries, certain conclusions stand out:

- For the ECA region as a whole, proportionately more gains in life expectancy would accrue from the control of non-communicable diseases than from achieving the targets in the classic MDGs. This pattern holds in all subregions.
- There are proportionately more gains to be had from achieving the classic MDGs in Central Asia and the Caucasus subregions.

For priority setting, policy formulation, programs, and development assistance, the key messages from this study are:

- the importance of reducing morbidity and premature mortality from NCDs and external causes across the entire region;
- the need for particular attention to the classic MDG indicators (infant mortality rates, under-5 mortality rates, and maternal mortality ratios) in the countries of Central Asia and the Caucasus;
- the importance of establishing effective and sustainable surveillance, vital registration, and health information systems to provide valid data for local decisions and international comparisons, and
- the continued need for interagency collaboration in support of all these objectives.

CHAPTER 1

INTRODUCTION

In September 2000, the world's leaders adopted the United Nations Millennium Declaration, calling for stronger global efforts to reduce poverty, improve health, and promote peace, human rights and environmental sustainability. The UN General Assembly asked the Secretary-General to prepare a road map for achieving the commitments made in the Declaration—resulting in the Millennium Development Goals (MDGs). The Goals reflect key aims of various UN development conferences in the 1990s. They also built on the International Development Goals created by the Organization for Economic Co-operation and Development (OECD) in 1996. The Millennium Development Goals include all but one of the OECD International Development Goals (UNDP, 2003). The Millennium Development Goals were affirmed at the March 2002 Monterrey Conference on Financing for Development, the September 2002 Johannesburg Declaration on Sustainable Development, and the June 2003 G8 summit in Evian (UNDP, 2003). The Goals are now widely accepted as a framework for measuring development progress. Bilateral and multilateral institutions, including the World Bank, have made the MDGs a central focus of their development assistance.

The overall aim of the MDGs is to reverse the spread of poverty and disease by 2015. The eight goals are backed by a plan of action that sets out 18 quantifiable targets, each using specified indicators. Three goals and four targets are directly related to health (*Box 1*).

The focus of the health-related Goals, as of the MDGs in general, is on poor countries in the tropics. For example, 99 percent of worldwide maternal deaths occur in these countries (IMF et al., 2000). Problems are particularly grave in sub-Saharan Africa, which has the highest rates of under-five mortality, maternal mortality, and HIV/AIDS infection in the world. The incidence of HIV/AIDS and hunger in this region is still increasing instead of decreasing (UNDP, 2003) In sub-Saharan Africa, progress so far on achieving the Millennium Development Goals has been very limited. If progress continues at the current pace, this region will not reach the Goals for under-five mortality until 2165.

Concerns, however, have been raised as to whether the health-related Millennium Development Goals are appropriate to the transition countries of Eastern Europe and Central Asia. In these countries, under-five and maternal mortality are much lower than in countries at similar levels of economic development in other parts of the world. Adult mortality, on the other hand,

Box 1. The Millennium Development Goals

Goal 1: Eradicate extreme poverty and hunger
Goal 2: Achieve Universal Primary Education
Goal 3: Promote Gender Equality and Empower Women
Goal 4*: Reduce child mortality
Target 5: *Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate*
Indicators: Under-five mortality rate
Infant mortality rate
Proportion of one-year-old children immunized against measles
Goal 5*: Improve maternal health
Target 6: *Reduce by three-quarters, between 1990 and 2015, the maternal mortality rate*
Indicators: Maternal mortality ratio
Proportion of births attended by skilled health personnel
Goal 6*: Combat HIV/AIDS, malaria, and other diseases
Target 7: *Have halted by 2015 and begun to reverse the spread of HIV/AIDS*
Indicators: HIV prevalence among 15- to 24-year-old pregnant women
Contraceptive prevalence rate
Number of children orphaned by HIV/AIDS
Target 8: *Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases*
Indicators: Prevalence and death rates associated with malaria
Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures
Prevalence and death rates associated with tuberculosis
Proportion of tuberculosis cases detected and cured under DOTS
Goal 7: Ensure environmental sustainability
Goal 8: Build a global partnership for development

Source: World Bank Group. http://www.developmentgoals.org/About_the_goals.htm. Accessed on March 12, 2004.

*Examined in this study of "Appropriate health-related Millennium Development Goals for the Europe and Central Asia Region."

contributes most to the burden of disease and premature mortality. An analysis of life expectancy in Russia has shown that life expectancy would improve only slightly if the International Development Targets for under-five and maternal mortality were reached. Slight reductions of adult mortality, on the other hand, could result in more pronounced improvements in life expectancy (Lock et al., 2002). The situation may be similar in many other transition countries of the ECA region. Although infant, child, and maternal mortality rates are generally many times higher than the European Union averages, in particular in Central Asia and the Caucasus, the impact of adult mortality on life expectancies in the region is greater.

This study aims to contribute to the debate about the appropriateness of health-related MDGs for the countries of the ECA region. It is primarily addressed at policy advisors and senior analysts at the local, regional, and global level, who could influence the strategic directions of policy makers. The study will be of particular relevance to international development institutions and UN organizations, who might have to reconsider the focus of their health-related development assistance to the countries of the ECA region.

The study examines how appropriate the health-related MDGs are for the countries of the ECA region by analysing the impact of the following four scenarios on life expectancy at birth:

1) achieving MDG targets for infant, child, and maternal mortality;
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3) reducing infant, child, and maternal mortality to the lowest sub-regional levels;
4) reducing deaths from cardiovascular disease and external causes of death to EU levels.

Because national registration data on infant and child mortality in countries of Central Asia and the Caucasus underestimate the true figure, the first three scenarios were recalculated for these countries in an additional calculation, using survey-based World Bank data.

The following chapter 2 summarizes the findings of a literature review on the appropriateness of the health-related MDGs for the countries of the Europe and Central Asia region. Chapter 3 discusses the quality of the data used. Chapter 4 describes the methods used in the analytical part of the study. Chapter 5 details and compares the results of this analysis. Chapter 6 discusses the importance and the impact of HIV/AIDS on mortality patterns for the future and looks at how to move forward with more appropriate targets within the health-related MDGs for the countries for the ECA region. The concluding chapter 7 makes recommendations for policies, programs, and development assistance. The Appendix details the impact of the four scenarios on another measure of population health, Years of Potential Life Lost (YPLL).

Chapter 2

Literature Review

Apart form the work of Lock et al. on Russia (2002), surprisingly little has been published on the appropriateness of global development targets for health in the ECA region. A search using PubMed/Medline in June 2003 could not identify any other publication on the subject.

The analysis by Lock et al. illustrated the limited relevance of some of the health-related International Development Targets to Russia. The analysis covered the population of the Russian Federation in 1995–1999 and used life expectancy as the measure of population health. A reduction of infant and child mortality by two-thirds, and maternal mortality by three-quarters, was found to result in an increase of 0.96 years in life expectancy. In contrast, a 20 percent reduction in adult mortality resulted in an increase of 1.86 years in male life expectancy. A reduction of adult mortality to UK levels for cardiovascular diseases and external causes of death resulted in an increase in life expectancy at birth of 5.97 years for both sexes (Lock et al., 2002).

In many parts of the ECA region, adult mortality rates increased markedly during the early 1990s. Most of this excess mortality affected males before retirement age. The main causes of the increase in premature deaths were circulatory diseases and external causes of deaths, including injuries, homicides, and suicide. The reasons were complex but the stress of the social costs of transition and an increased consumption of alcohol, tobacco, and drugs were major contributing factors to increased mortality rates (UNICEF, 2001). Deaths due to cardiovascular diseases exceed the EU average in all countries of the ECA region, reaching levels of 807/100,000 in the Russian Federation in 2001, as compared to an EU level of 258/100,000 in 1999 (WHO, 2003).

The rapid spread of HIV/AIDS and the re-emergence of tuberculosis are two of the most serious threats to health in the ECA region, particularly in the countries of the former Soviet Union. Tuberculosis re-emerged in the ECA region during the 1990s after 40 years of steady decline. In the Russian Federation, for example, the incidence of tuberculosis increased from 34 per 100,000 in 1991 to 92 per 100,000 in 2001 (WHO, 2003). The spread of HIV/AIDS is no less worrying. By the end of 1995, only 8,616 HIV infections had been officially recorded in the whole of Central and Eastern Europe. By June 2001, this number had increased to over 200,000 (Kelly and Amirkhanian, 2003). Most of these cases were recorded in Ukraine and Russia, where the number

of HIV infections has grown exponentially over the last years. These two countries have currently the highest growth rates of HIV infections worldwide (Ruehl, Pokrovsky, and Vinogradov, 2002). Reported cases, however, are believed to be considerable underestimates. In Russia, the actual number of persons living with HIV was estimated to be 700,000 by the end of December 2002, while in Ukraine this number was 250,000 (Kelly and Amirkhanian, 2003), corresponding to about 1 percent of the population aged 15–49 in these two countries (UNAIDS 2002a and 2002b).

The HIV epidemic serves as a strong reminder of the relevance of Goal 6 of the MDGs (combating HIV/AIDS, malaria, and other diseases) to the countries of the ECA region. However, achievement of Goal 6 has not been included in this analysis, because the impact on mortality and thus life expectancy at birth is still relatively low, when compared with non-communicable diseases and external causes of death. In Russia, the estimated number of deaths from HIV in 2001 was 9,000 (UNAIDS, 2002b), while in Ukraine in the same year an estimated 11,000 people died from HIV (UNAIDS, 2002a). Given the large and increasing number of HIV infections and the very limited availability of antiretroviral treatment, it is clear that the unchecked HIV epidemic in the ECA region, in particular in Russia and Ukraine, will likely have a devastating impact on mortality patterns in the near future, especially when combined with the growth in tuberculosis.

In spite of the relevance of Goal 6 to the ECA region, the MDGs in general focus primarily on the problems of developing countries whose health policies have long focused on child and maternal health rather than adult health. There are two main reasons for this. One is that levels of childhood and maternal mortality have been, and continue to be, very high. The second is that these levels are visible. Data on infant, maternal, and to a lesser extent childhood mortality are collected in many countries where almost nothing is documented about adult mortality, either through routine collection systems or surveys, in particular the series of Demographic and Health Surveys. Thus, the 2000 World Health Report was forced to use childhood mortality to assess equity of outcome in its measure of health care system performance, because these data were much more widely available than data on adult mortality (WHO, 2000). This point has implications that go beyond the ECA region: in those few settings in the developing world where adult mortality has been studied it has also been found to be very high, with some, at least, of the causes increasingly resembling those seen in the former Soviet Union, in particular cardiovascular diseases and injuries (Moshiro et al., 2001; Walker et al., 2000).

A more critical problem with the health-related MDGs is that comparisons between countries are problematic because of significantly different starting points. Where infant and maternal mortality rates are very high, basic improvements in social services and primary health care can considerably reduce the numbers of deaths. As the mortality rates decline, however, more complex clinical interventions become necessary to further reduce infant and maternal mortality rates. Where these rates are already very low, it would be unrealistic to expect major reductions to be achieved so rapidly. This also has implications for those seeking to apply the principles set out by the WHO Commission on Macroeconomics and Health. This envisages the potential for rapid progress to be made through scaling up basic interventions, citing examples such as the supply of certain pharmaceuticals or insecticide treated bed nets. In the ECA region, however, while more needs to be done to scale up such basic interventions, much progress has already been made. For many health problems the challenge is to put in place complex packages that will move the health system on to the next step.

A final problem with measuring progress on achieving the health-related MDGs is that they are formulated in terms of country averages. Countries as a whole can progress well towards the Goals, but leave certain groups or areas behind when policies are not directly targeted at them. In some countries, the health-related Goals can be achieved more easily by improving the circumstances of those groups in the population that are already better off. This is well illustrated by the experience in developed countries, such as the United Kingdom, where improvements in overall health were accompanied by either stagnation or actual deterioration for the worst off, while gains were concentrated among those who already had the best health (Acheson, 1998). The danger is that the most disadvantaged and poor, such as women, rural populations or minorities such as the Roma are left behind (UNDP, 2003).

CHAPTER 3

DATA QUALITY

There are major variations in the completeness, validity and reliability of health data across countries in the Europe and Central Asia Region.

A major problem in some countries is the absence of accurate population data. Calculation of health-related rates depends on accurate data on population size. In some countries there is considerable uncertainty about population size and composition. Since 1989, wars and conflicts, combined with economic and social turmoil and the opening of borders, have triggered large-scale population movements that have often remained poorly quantified.

Even within the most recent data as reported by the countries to WHO, significant differences in population estimates can be found. When comparing the latest WHO population data with the mid-year population given for the same year in the WHO HFA database, differences in estimates of current population size amounted to about 670,000 for the Russian Federation, 630,000 for Moldova, 495,000 for Georgia, and 195,000 for Latvia. This emphasizes that population denominators in many countries of the region have to be treated with caution. Because most health indicators are based on population data, this also has implications for the accuracy of these indicators.

Another problem is that health information systems deteriorated or, in some cases, collapsed. Deaths resulting from conflicts were often not recorded. In some countries of Central Asia and the Caucasus, fees were introduced for vital registration such as death or birth, compromising the quality of official statistics (Badurashvili et al., 2001; UNICEF 2003; McKee et al., 2002). A recalculation of life expectancy in Georgia concluded that official data may overestimate life expectancy at birth by as much as eight years.

Even where health information systems are in place, there is often limited capacity to undertake meaningful analysis of health data. A study in Croatia showed that official mortality data were unreliable for the 1990s. One of the main problems was that the population denominator used before 1996 included not only people living in Croatia, but also Croatian citizens living permanently abroad (Bozicevic 2001).

In particular, serious concerns have been raised about the quality of data on infant and child mortality, in particular in Central Asia and the Caucasus.

For child mortality, this can be illustrated by the case of Tajikistan. The reported level of 1.16 deaths for ages 1–4 in 1999, as compared to an EU level of 1.02 per 1,000 live births of the same year and a level in Tajikistan of 20.56 in 1990, is almost certainly a significant underestimate. It is apparent that, given the sequelae of civil war in Tajikistan and the breakdown in many governmental functions, including presumably vital registration, the recent data on child mortality must be treated with considerable scepticism.

It is well known that in the countries of Central Asia and the Caucasus, official infant mortality rates, as recorded by national registration systems, are considerable underestimates. Three main factors that contribute to this discrepancy have been identified (UNICEF 2001; UNICEF 2003; McKee et al., 2002; Government of Tajikistan 2003; Aleshina and Redmond, 2003). The first factor is that in many countries of Central Asia and the Caucasus, the Soviet definition of live birth is still in use, reducing the infant mortality rate by 22–25 percent (Aleshina and Redmond, 2003). Armenia, Georgia, and Kyrgyzstan have now adopted the WHO definition of live birth, but in practice implementation has been only partial. In the remaining countries of Central Asia and the Caucasus, the Soviet definition is still in use (Aleshina and Redmond, 2003). The second factor contributing to official underestimates is the misreporting of births and infant deaths by medical staff. The two main problems are that live births are reported as stillbirths or miscarriages and that post-neonatal deaths are reported as child deaths, both resulting in an underestimation of the number of infant deaths. The third factor contributing to the discrepancy between official and survey data is that births and deaths of children are not reported by parents to the authorities, due to fees for registration. In Kazakhstan, Kyrgyzstan, and Tajikistan, fees for registration have been abolished in the last two years, but in Georgia there are still fees for the registration of births. Where mothers are not in a registered marriage, the charge is doubled, resulting in an increased risk of under-registration of children of single mothers (Aleshina and Redmond, 2003).

In view of these problems with the quality of data, UN organizations such as UNICEF and the World Bank have produced alternative data sets on infant and child mortality, using models that include data from surveys and other sources. The health-related MDGs, established on the basis of estimates of 1990 levels, and measurement of progress towards these targets by World Bank and UNDP are based on World Bank estimates of infant and child mortality and not on national registration data. Table 1 shows infant mortality rates according to national registration data, recent surveys, and World Bank estimates.

Table 1. Different Estimates of Infant Mortality in Central Asia and Caucasus

Country	Official infant mortality (per 1,000 live births), Source: [6]	Infant mortality according to survey data (per 1,000 live births), Source: [16]	Infant mortality estimated by World Bank (per 1,000 live births)
Armenia	15.4 (1996–2000)	36 (1996–2000)	37.1 (1996–2000)
Azerbaijan	17.2 (1996–2000)	74 (1996–2000)	78.9 (1996–2000)
Georgia	15.2 (1995–1999)	43 (1995–1999)	24 (1995–1999)
Kazakhstan	24.8 (1994–1999)	62 (1994–1999)	60 (1994–1999)
Kirgyzstan	29.1 (1993–1997)	61 (1993–1997)	61 (1993–1997)
Tajikistan	24.1 (1996–2000)	89 (1996–2000)	92.9 (1996–2000)
Turkmenistan	38.9 (1995–2000)	74 (1995–2000)	74 (1995–2000)
Uzbekistan	30.2 (1992–1996)	49 (1992–1996)	54.4 (1992–1996)
Subregional average	25.83	59.42	60.58

As the surveys generally estimate infant mortality rates based on reproductive histories of the five years before the survey, they are compared with the average figures for the corresponding periods where figures are given for individual years. In all countries, surveys and World Bank estimates for infant mortality show much higher values than the official data reported to WHO. In Azerbaijan, these differences are most pronounced. Survey data are 4.3 times and World Bank estimates 4.6 times higher than figures from national registration data.

The sources used to estimate infant and child mortality rates in the ECA region are listed in Table 2.

Surveys used in models aim to be representative of national populations or of women of reproductive age. The Demographic and Health Surveys (DHS) and the Tajikistan Living Standards and

TABLE 2. SOURCES OF CHILDHOOD MORTALITY ESTIMATES

Eastern European EU candidate countries	
Bulgaria	National registration data only
Czech Republic	National registration data only
Estonia	National registration data only
Hungary	National registration data only
Latvia	National registration data only
Lithuania	National registration data only
Poland	National registration data only
Romania	Reproductive Health Survey 1999
Slovakia	National registration data only
Slovenia	National registration data only
Southeastern Europe	
Albania	Multiple Indicator Cluster Survey 2000
Bosnia and Herzegovina	Multiple Indicator Cluster Survey 2000
Croatia	National registration data only
Macedonia FYR	National registration data only
Serbia and Montenegro	National registration data only
Turkey	Census 70; Census 75; Census 80; Census 85; Census 90; Demographic and Health Survey 93; Demographic and Health Survey 98; National Demographic Survey 66; Population and Health Survey 83; Population and Health Survey 88; World Fertility Survey 78
Remaining countries of the former Soviet Union	
Belarus	National registration data only
Moldova	Reproductive Health Survey 1997, Multiple Indicator Cluster Survey 2000
Russian Federation	Reproductive Health Survey 1996
Ukraine	Reproductive Health Survey 1999, Multiple Indicator Cluster Survey 2000
Countries of Central Asia and Caucasus	
Armenia	Demographic and Health Survey 2000
Azerbaijan	Multiple Indicator Cluster Survey 2000, Reproductive Health Survey 2001
Georgia	Multiple Indicator Cluster Survey 2000, Reproductive Health Survey 2000
Kazakhstan	Demographic and Health Survey 1995, Demographic and Health Survey 1999
Kyrgyzstan	Demographic and Health Survey 1997
Tajikistan	Multiple Indicator Cluster Survey 2000, Living Standard Measurement Survey 1999
Turkmenistan	Demographic and Health Survey 2000
Uzbekistan	Demographic and Health Survey 1996, Multiple Indicator Cluster Survey 2000

Note: not all of the surveys contained questions about infant and child mortality, and all use national registration data in addition to other sources noted

Measurement Survey (LSMS) in 1999 used direct estimates of infant and child mortality, asking participants to report in detail about pregnancy outcomes. The Multiple Indicator Cluster Surveys (MICS) used indirect ("Brass") estimates, based on the reported age of the mother, total number of children, and number of children who have died.

Although estimates based on survey data appear to be better reflections of real infant mortality rates in Central Asia and the Caucasus than national registration data, they cannot be considered to be entirely accurate. Surveys are associated with a number of errors, which can be distinguished as non-sampling and sampling errors.

Non-sampling errors result from misunderstandings and misreporting by respondents and mistakes by interviewers and researchers. The death of children is a difficult topic and mothers might be reluctant to answer survey questions or they might not report all deaths. This omission of dead children from birth histories is aggravated for female infant deaths, resulting in an underestimation of female infant mortality rates in some surveys. Other non-sampling errors resulting in an underestimation of infant deaths in surveys include the selection bias towards surviving women whose children had better chances of survival.

Sampling errors are a result of sample size and procedures. The width of confidence intervals shows the resulting uncertainty in survey estimates. As confidence intervals increase with low sample sizes and the number of births in Central Asia and the Caucasus tends to be lower than in developing countries, this is a problem especially relevant for this subregion. The Demographic and Health Survey in Kazakhstan in 1999, for example, provides a confidence interval of 45.3 to 78.5 per 1,000 live births. All values within this confidence interval have the same statistical validity at the specified level of confidence. The central values of confidence intervals, which are usually given as the survey estimates, might therefore be considerable underestimates or overestimates (Aleshina and Redmond, 2003).

Where indirect estimates of infant mortality are used, as in the Multiple Indicator Cluster Surveys, extra potential sources of error are introduced. The most widely used model, developed by Brass, rests on a number of assumptions that might not accurately reflect mortality and fertility trends in the ECA region (Aleshina and Redmond, 2003).

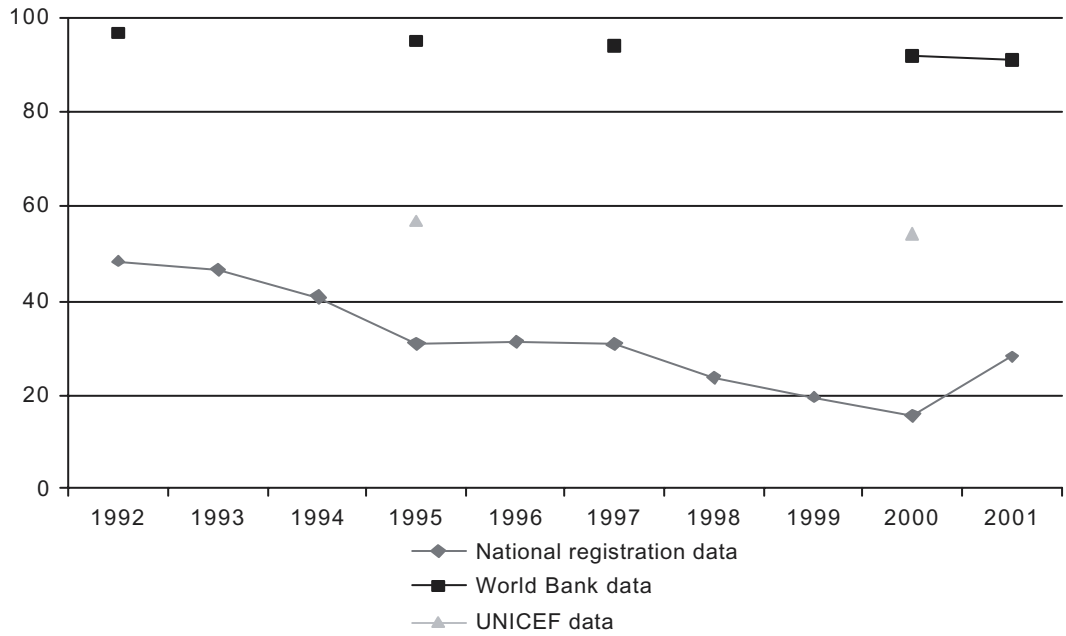
Going beyond the errors associated with surveys, different methods have been used to establish estimates of childhood mortality that make use of surveys and other data, and these methods are not always explicit. In effect, different UN organizations are presently using different datasets, and it is often unclear, or at least very difficult to discover, how exactly they were established. This illustrates the role that interpretation and subjective judgments play in establishing estimates. Figure 1, using the example of Tajikistan, shows how UNICEF and World Bank data on infant mortality rates differ.

Both UNICEF and the World Bank use an updated version of the methodology developed by Hill for the 1993 World Development Report. In this methodology, a series of data points are subjected to a regression analysis, based on the approach of weighted least squares. This model assumes a linear rate of infant and child mortality changes, allowed to change at "knot" points, depending on the number of independent observations available. A knot, defining a particular scope, is defined for every five years of vital registration or one Demographic and Health Survey or other similar survey. Although this methodology aims to provide a transparent means of estimation based on regression analysis, subjective judgements are involved at every step of the analysis (World Bank, 2003).

Another factor increasing the uncertainty about real infant and child mortality rates in Central Asia and the Caucasus is the scarcity of available surveys. As was noted in *Table 2,* coverage of this region by DHS surveys, for example, is limited. There has been no DHS conducted in Azerbaijan, Georgia, and Tajikistan, and only one in Armenia (2000), Kyrgyzstan (1997), Turkmenistan (2000), and Uzbekistan (1996), and two in Kazakhstan (1995, 1999).

A more fundamental constraint on the use of World Bank data is that data on some indicators, such as maternal mortality rates in 1990, are entirely missing and data on other indicators, such as infant mortality, are incomplete. Furthermore, given the almost complete absence of surveys in this region in the first half of the 1990s, those data for 1990 that are included are derived ultimately

FIGURE 1. INFANT MORTALITY RATES IN TAJIKISTAN ACCORDING TO WHO, WB, AND UNICEF



Sources: National Registration data: June 2003 version of the WHO HFA database; World Bank data: World Development Indicators 2003; UNICEF: UNICEF End of Decade Database (http://www.childinfo.org)

BOX 2. DATA QUALITY IN CENTRAL ASIA AND THE CAUCASUS

Validity

The problems of data quality in the ECA region are greatest in the eight countries of Central Asia and the Caucasus, where official infant and child mortality rates, as reported to WHO, are considered to be substantial underestimates. Surveys in these countries have revealed much higher rates of childhood mortality. Consequently, estimates of infant and child mortality differ substantially, with implications for the 1990 baselines used to establish the health targets for the Millennium Development Goals. Although surveys appear to provide a more accurate picture, they are associated with a number of errors that limit their capacity to gauge current levels of infant and child mortality. When calculating datasets based on survey data, additional subjective judgments are involved. In the absence of complete vital registration, the exact current levels of childhood mortality in the region remain unknown.

Credibility and ownership

There is currently no consensus on infant and child mortality rates in Central Asia and the Caucasus. Estimates differ not only between national governments and international organizations, but between UN organizations themselves. Although international organizations agree that survey data are more accurate than national registration data, it is often not transparent how exactly their estimates of current rates were derived. On a national level, vital registration data remain in general the official baseline against which countries are tracking their progress.

Availability of data

Despite the major problems associated with national registration data in this subregion, they are at present the only complete source of data on infant, child, and maternal mortality, and the only source of data on adult mortality.

from surveys undertaken 7 to 10 years later, so that the degree of uncertainty is considerable. Thus, in practice, if the intention is to track changes, WHO, recording national registration data, is the only complete source of the data required. However, because the quality of data in many countries is either poor or doubtful, the data have limited usefulness for serious policy decisions. Similar observations and concerns were made by Miller and Ryskulova (2004), who examined the completeness and quality of official data in a study of the epidemiologic surveillance systems in the region. They noted many critical gaps, and concluded that it is important for the achievement of the MDGs to have supplementary data that provides information for better understanding of the determinants of birth outcomes and interventions to improve maternal and child health.

Due to the uncertainties associated with surveys and survey-based estimates, surveys are only partial solutions to the problem of incomplete vital registration. As long as national registration is incomplete, the exact levels of childhood mortality in Central Asia and the Caucasus will remain unknown. In this context, the analysis of the impact of the health-related Millennium Development Goals on these countries in the current study was confronted with the choice of whether to use national registration data or survey-based estimates. It was decided to use both datasets in two parallel calculations. National registration data were used for all scenarios considered in this study. Where, in addition, survey-based estimates by the World Bank were available for the countries of Central Asia and the Caucasus, as was the case for infant and child mortality, an additional analysis based on these estimates was undertaken. Although neither of these two approaches may be entirely accurate, the aim was to make the best use of currently available data.

Chapter 4

Methods

This analysis is primarily based on population and mortality data by age, sex, and cause of death, as reported by national statistical offices to WHO in June 2003. The latest updates by WHO at this time were from February 10, 2003 for the population data and from December 31, 2002 for the mortality data. Using these data, life tables were calculated based on standard methods (Chiang 1968), the same as used in the study on the Russian Federation by Lock et al. (2002). The analysis covered all countries of the Europe and Central Asia region, with the exceptions of Bosnia and Herzegovina, Serbia and Montenegro, and Turkey, for which no recent population or mortality data were available.

Using the official data reported by the countries to WHO, life expectancies were tabulated. The effects on life expectancy at birth were then calculated for the following four scenarios:

1) achieving MDG targets for infant, child, and maternal mortality;
2) reducing infant, child, and maternal mortality to EU levels;
3) reducing infant, child, and maternal mortality to the lowest subregional levels;
4) keeping infant, child, and maternal mortality constant, and reducing deaths from cardiovascular disease and external causes of death to EU levels.

The regional and subregional averages were population-weighted. In countries that have already achieved or overachieved the target levels of the scenarios, the lower of the two figures was taken for the calculation. By this, no country was assumed to backslide behind their achievements and to make negative gains in life expectancy. Zero values in the subsequent tables on gains in life expectancy thus indicate that the target levels were achieved or overachieved. In the calculation of maternal mortality, current numbers of maternal deaths in the age groups 15–49 were reduced by the ratio between current maternal mortality rates and target rates.

As has been noted previously, achievement of MDG Goal 6 (combating HIV/AIDS, malaria, and tuberculosis) has not been included in the analysis, because the impact of these diseases on life expectancy at birth is still relatively small. However, it is important to recognize that this may change dramatically in the near future.

Scenario 1 explored the impact on life expectancy at birth of reaching the Millennium Development Goals for infant, child, and maternal mortality. The MDGs consider progress from a designated baseline, the year 1990. Infant mortality rates, child mortality rates, and maternal mortality ratios for 1990 were taken from the January 2003 version of the WHO HFA database to establish the MDG targets for 2015. The most recent available data for infant, child, and maternal mortality from the WHO HFA database were used to analyze the effects on life expectancy, if these indicators could be reduced to MDG levels.

In Scenario 2, life tables were recalculated on the basis of achieving the most recent EU levels for infant, child, and maternal mortality, showing the effects on life expectancy.

In Scenario 3, infant, child, and maternal mortality of each country were reduced to the lowest levels achieved within four subregional groupings:

1) Eastern European EU candidate countries;
2) Southeastern Europe (Albania, Croatia, Macedonia, FYR)
3) Central Asia and Caucasus;
4) The remaining countries of the former Soviet Union (Belarus, Moldova, Russia, Ukraine).

Scenario 4 kept infant, child, and maternal mortality rates constant, and reduced the deaths from cardiovascular disease and external causes of deaths to the current EU average.

Because of the known problems with data from Central Asia and the Caucasus, the analyzes for these countries were undertaken separately in the first three scenarios for infant and child mortality, using both national vital registration data as reported to WHO and World Bank estimates. In the latter case, live tables were adjusted with World Bank estimates of infant and child mortality rates. For Scenario 1, the targets for Goal 4 were established on the basis of WB estimates of infant and mortality rates for 1990. For Scenario 3, the lowest subregional rates of infant and child mortality were similarly established on the basis of World Bank estimates.

CHAPTER 5

RESULTS

Life Expectancies in the ECA Region

Using national registration data supplied to WHO, life expectancies were tabulated for the countries of the ECA region. In the case of Central Asia and the Caucasus, this analysis was complemented by an adjustment of life tables with World Bank estimates on infant and child mortality. Figures 2 and 3 show the results of these tabulations, grouping the countries into the following four subregions:

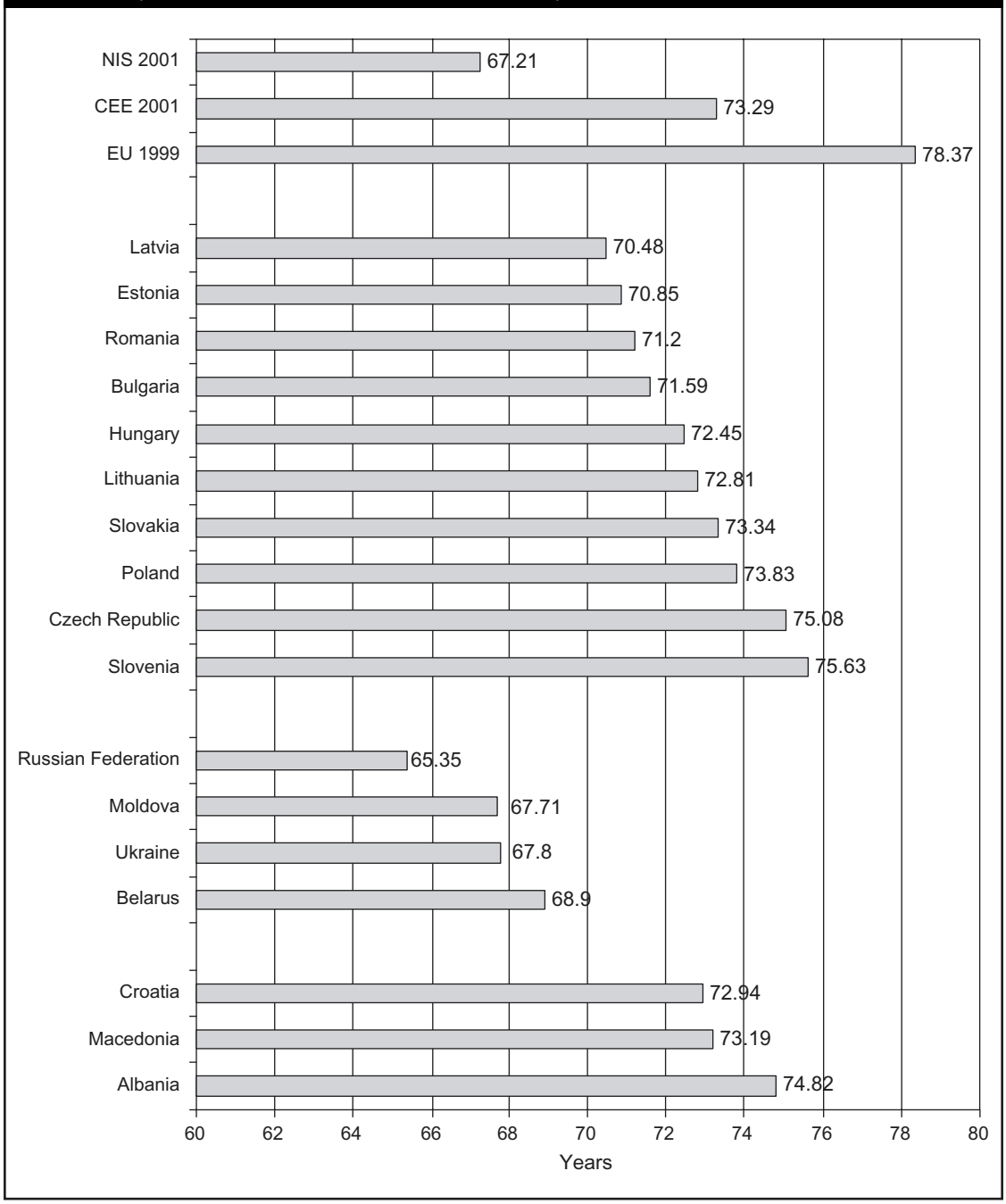
1) Eastern European EU candidate countries,
2) Central Asia and Caucasus,
3) remaining countries of the former Soviet Union (Belarus, Moldova, Russia, Ukraine),
4) Southeastern Europe (Albania, Croatia, Macedonia).

Regional averages for Figure 2 were taken from the WHO HFA database. In all countries of the ECA region, life expectancy is lower than the EU average. Figure 3 shows the results of recalculations of life tables according to different estimates of infant and child mortality. If World Bank data reflect actual infant and child mortality rates in Central Asia and the Caucasus, life expectancies would be considerably lower. The difference is most dramatic for Tajikistan, where life expectancy would be reduced by 13.4 years.

Scenario 1: Achieving MDG Targets for Infant, Child, and Maternal Mortality

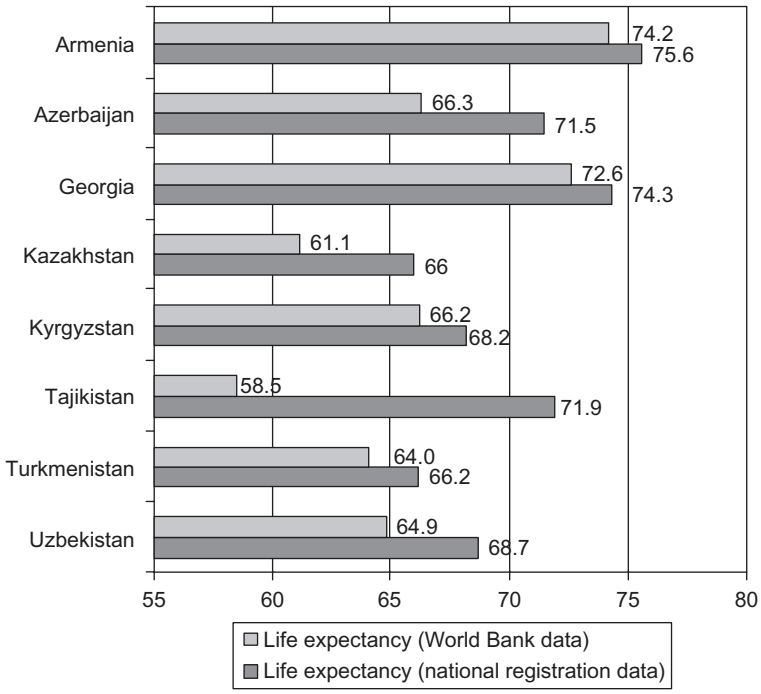
In this scenario, life tables were recalculated on the basis of achieving the MDG targets for infant, child, and maternal mortality. As a first step, the MDG targets were established on the basis of 1990 levels, taken from the WHO HFA Database, and, in the case of Central Asia and the Caucasus, from World Bank estimates. Tables 3 and 4 show current levels for infant mortality, the levels as they were in 1990 and the resulting MDG targets. Tables 5 and 6 show the related levels for 1–4 mortality and Tables 7 and 8 show the levels for maternal mortality.

Figure 2. Life Expectancies in the ECA Region (except Central Asia and Caucasus)



Note: Data refer to latest available years.

FIGURE 3. LIFE EXPECTANCIES IN CENTRAL ASIA AND THE CAUCASUS



Note: Data refer to latest available years.

Tables 8 and *9* show the changes in life expectancies after the recalculation of Scenario 1. The largest gains were generally achieved by reducing infant mortality, followed by gains in reducing child mortality. The reduction of maternal mortality resulted in only slight gains in life expectancy.

The average gain in life expectancy in the ECA region was between 0.68 and 1.24 years. According to national registration data, on a subregional level, Central Asia and the Caucasus showed maximum gains (0.98 years), followed by the remaining countries of the former Soviet Union (0.75 years), the Eastern European EU candidate countries (0.39 years) and Southeastern Europe (0.26 years). According to World Bank estimates of infant and child mortality, gains in Central Asia and the Caucasus would be considerably higher, reaching 4.04 years for the subregion and almost 8 years for Tajikistan.

Scenario 2: Reducing Infant, Child, and Maternal Mortality to EU Levels

In this scenario, life tables were recalculated on the basis of achieving the most recent EU levels for infant, child, and maternal mortality. The used EU levels were:

- Infant mortality: 4.89/1,000 live births (1999)
- Child (1–4) mortality: 1.02/1,000 live births (1999)
- Maternal mortality: 5.54/100,000 live births (2000)

Gains in life expectancy are shown in Tables 10 and 11. The overall average gain in life expectancy in the ECA region would be between 0.85 and 1.57 years, thus slightly higher than

TABLE 3. MILLENNIUM DEVELOPMENT GOALS FOR INFANT MORTALITY

	Infant mortality per 1,000 live births (Source: WHO 2003)		
	1990	**most recent year**	**MDG target (one third of 1990 level)**
Eastern European EU candidate countries			
Slovenia	8.27	4.25	2.76
Lithuania	10.22	7.92	3.41
Czech Republic	10.8	3.97	3.60
Slovakia	11.99	8.58	4.00
Estonia	12.37	8.79	4.12
Latvia	13.74	10.37	4.58
Bulgaria	14.77	14.4	4.92
Hungary	14.82	8.13	4.94
Poland	15.95	8.11	5.32
Romania	26.91	18.41	8.97
Southeastern Europe			
Serbia and Montenegro		13.25	
Croatia	10.67	7.68	3.56
Bosnia and Herzegovina	14.85	15	4.94
Macedonia FYR	31.60	11.81	10.53
Albania	33.81	11.62	11.27
Turkey	58	40	19.33
Remaining countries of the former Soviet Union			
Belarus	12.08	9.15	4.03
Ukraine	12.97	11.96	4.32
Russian Federation	17.64	14.57	5.88
Moldova	19.23	16.38	6.41
EU	**7.6**	**4.89**	

Note: Data are incomplete for Serbia and Montenegro.

TABLE 4. MILLENNIUM DEVELOPMENT GOALS FOR INFANT MORTALITY (CENTRAL ASIA AND CAUCASUS)

	National registration data, Source: [6]			World Bank data, Source: [2]		
	Infant mortality per 1,000 live births			Infant mortality per 1,000 live births		
	1990	**most recent year**	**MDG target (one third of 1990 level)**	**1990**	**most recent year**	**MDG target (one third of 1990 level)**
Georgia	15.83	10.43	5.28	24	24	8
Armenia	18.34	15.75	6.11	50	33.5	16.7
Azerbaijan	22.91	12.52	7.64	84	74	28
Kazakhstan	26.69	20.72	8.90	42	81	14
Kyrgyzstan	30.19	22.68	10.06	68	53.7	22.7
Uzbekistan	34.28	18.38	11.43	53	53.8	17.7
Tajikistan	40.41	27.9	13.47	98	91	32.7
Turkmenistan	45.15	32.78	15.05	80	69	26.7

Note: Data are incomplete for Serbia and Montenegro.

TABLE 5. MILLENNIUM DEVELOPMENT GOALS FOR 1–4 MORTALITY

	1–4 mortality per 1,000 live births (Source: WHO 2003)		
	1990	**most recent year**	**MDG target (one third of 1990 level)**
Eastern European EU candidate countries			
Czech Republic	1.62	1.01	0.54
Slovenia	1.63	0.44	0.54
Slovakia	1.95	1.54	0.65
Hungary	1.97	1.24	0.66
Poland	2.33	1.24	0.78
Lithuania	3.08	2.53	1.03
Bulgaria	3.5	2.78	1.17
Latvia	3.89	1.99	1.3
Estonia	4.4	2.19	1.47
Romania	7.4	3.27	2.47
Southeastern Europe			
Serbia and Montenegro		2.51	
Macedonia, FYR	0.15	1.84	0.05
Bosnia and Herzegovina	1.62		0.54
Croatia	1.71	1.27	0.57
Albania	8.25	5.18	2.75
Remaining countries of the former Soviet Union			
Belarus	3.19	2.46	1.06
Ukraine	3.74	3.53	1.25
Russian Federation	3.86	3.82	1.29
Moldova	5.13	3.53	1.71
EU	**1.55**	**1.02**	

Note: No data were available for Turkey. Data are incomplete for Bosnia and Herzegovina and Serbia and Montenegro.

TABLE 6. MILLENNIUM DEVELOPMENT GOALS FOR 1–4 MORTALITY (CENTRAL ASIA AND CAUCASUS)

	National registration data, Source: [6]			World Bank data, Source: [2]		
	1–4 mortality per 1,000 live births			1–4 mortality per 1,000 live births		
	1990	**most recent year**	**MDG target (one third of 1990 level)**	**1990**	**most recent year**	**MDG target (one third of 1990 level)**
Georgia	4.08	1.52	1.36	5	5	1.7
Armenia	5.81	3.47	1.94	8	4	2.7
Kazakhstan	7.56	6.04	2.52	10	18	3.3
Kyrgyzstan	12.03	11.59	3.86	13	9	4.3
Uzbekistán	13.49	8.05	4.5	12	16	4
Azerbaijan	18.2	11.08	6.07	22	19	7.3
Turkmenistan	20.4	19.67	6.56	18	18	6
Tajikistan	21.76	1.16	7.25	29	25	9.7

TABLE 7. MILLENNIUM DEVELOPMENT GOALS FOR MATERNAL MORTALITY

	Maternal mortality per 100,000 live births (Source: WHO 2003)		
	1990	most recent year	MDG target (one fourth of 1990 level)
Eastern European EU candidate countries			
Slovakia	6.25	15.64	1.56
Czech Republic	8.42	3.31	2.11
Slovenia	8.84	17.22	2.21
Poland	12.78	7.93	3.20
Hungary	20.69	5.15	5.17
Bulgaria	20.92	19.07	5.23
Lithuania	22.86	12.68	5.72
Latvia	23.74	24.69	5.94
Estonia	31.38	7.92	7.85
Romania	83.56	34.03	20.89
Southeastern Europe			
Bosnia and Herzegovina	10.46		2.62
Croatia	10.83	2.44	2.71
Serbia and Montenegro	10.97	5.56	2.74
Macedonia, FYR	11.48	14.81	2.87
Albania	37.75	22.69	9.44
Turkey	180	130	45
Central Asia and Caucasus			
Azerbaijan	9.29	25.37	2.32
Georgia	20.47	58.69	5.12
Uzbekistan	34.12	34.12	8.53
Armenia	40.06	21.83	10.02
Turkmenistan	42.28	44.03	10.57
Kazakhstan	54.77	46.74	13.69
Kyrgyzstan	62.88	46.12	15.72
Tajikistan	97.2	44.6	24.3
Remaining countries of the former Soviet Union			
Belarus	21.81	14.17	5.45
Ukraine	32.41	23.91	8.10
Moldova	44.11	43.9	11.03
Russian Federation	47.41	36.52	11.85
EU	**7.83**	**5.54**	

Note: No recent data were available for Bosnia and Herzegovina.

for reaching the Millennium Development Goals for infant, child, and maternal mortality. The subregion of Central Asia and the Caucasus would achieve maximum gains (between 1.58 and 5.60 years), followed by the remaining countries of the former Soviet Union (0.81 years), Southeastern Europe (0.47 years), and the Eastern European EU candidate countries (0.46 years). On the basis of World Bank estimates for Central Asia and the Caucasus, maximum gains would be achieved in Tajikistan (12.29 years), Kazakhstan (5.74 years), and Azerbaijan (5.71 years).

TABLE 8. SCENARIO 1: IMPACT ON LIFE EXPECTANCY OF REACHING MILLENNIUM DEVELOPMENT GOALS 4 AND 5

	Overall gain in life expectancy	Change due to reducing		
		Infant mortality	1–4 mortality	Maternal mortality
Eastern European EU candidate countries				
Czech Republic	0.07	0.03	0.04	0.0006
Slovenia	0.12	0.12	0	0.0026
Poland	0.24	0.20	0.03	0.0013
Hungary	0.27	0.23	0.04	0
Estonia	0.39	0.33	0.06	0.0001
Slovakia	0.40	0.33	0.06	0.0006
Lithuania	0.45	0.34	0.11	0.0014
Latvia	0.49	0.44	0.05	0.0047
Romania	0.73	0.67	0.06	0.0034
Bulgaria	0.76	0.65	0.11	0.0033
Subregional average	**0.39**	**0.34**	**0.05**	**0.0018**
Southeastern Europe				
Albania	0.20	0.02	0.18	0.0046
Macedonia, FYR	0.24	0.11	0.13	0.0047
Croatia	0.31	0.27	0.04	0
Subregional average	**0.26**	**0.15**	**0.10**	**0.0025**
Remaining countries of the former Soviet Union				
Belarus	0.48	0.36	0.11	0.0010
Ukraine	0.67	0.52	0.15	0.0013
Russian Federation	0.79	0.62	0.17	0.0058
Moldova	0.90	0.76	0.14	0.0053
Subregional average	**0.75**	**0.59**	**0.16**	**0.0045**
Overall ECA average	**0.68**	**0.52**	**0.16**	**0.0037**
Overall ECA average (1)	**1.24**	**0.89**	**0.35**	

Note: (1) based on World Bank data on infant and child mortality in Central Asia and Caucasus; data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro, and Turkey.

Scenario 3: Reducing Infant, Child and Maternal Mortality to the Lowest Subregional Levels

The analyzes were repeated using the lowest subregional levels of infant, child, and maternal mortality as targets. For all countries, national registration data were used to establish lowest subregional levels of infant, child, and maternal mortality. In the additional analysis for the countries of Central Asia and the Caucasus, based on World Bank data on infant and child mortality, the subregional targets were established on the basis of World Bank estimates. The lowest levels in the four subregions are shown in Table 12.

Tables 13 and 14 show the gains in life expectancy that would be achieved in this scenario. The average gain in the ECA region would be between 0.58 and 1.09 years. On a subregional level and on the basis of national registration data, the maximum gains would be reached in Central Asia and the Caucasus (1.18 years), followed by the Eastern European EU candidate countries (0.55 years), the remaining countries of the former Soviet Union (0.41 years) and Southeastern Europe (0.27 years). On the basis of World Bank data on infant and child mortality in Central Asia and the

Table 9. Scenario 1: Impact on Life Expectancy of Reaching Millennium Development Goals 4 and 5 (Central Asia and Caucasus)

	National registration data				World Bank data		
		Change due to reducing				Change due to reducing	
	Overall gain in life expectancy	Infant mortality	1–4 mortality	Maternal mortality	Overall gain in life expectancy	Infant mortality	1–4 mortality
Tajikistan	0.48	0.48	0	0.0003	7.97	1.57	6.4
Georgia	0.57	0.55	0.01	0.0026	1.92	1.68	0.24
Azerbaijan	0.73	0.36	0.37	0.0039	3.98	3.17	0.81
Armenia	0.86	0.74	0.11	0.0050	1.38	1.28	0.1
Uzbekistan	0.97	0.56	0.40	0.0011	3.72	2.41	1.31
Kazakhstan	1.02	0.78	0.23	0.0109	5.05	4.15	0.9
Kyrgyzstan	1.44	0.88	0.56	0.0055	2.41	2.1	0.31
Turkmenistan	2.05	1.11	0.93	0.0031	3.37	2.59	0.78
Subregional average	**0.98**	**0.64**	**0.33**	**0.33**	**4.04**	**2.68**	**1.37**

Note: Data refer to latest available years

Table 10. Scenario 2: Impact on Life Expectancy of Reducing Infant, Child and Maternal Mortality to EU Levels

	Overall gain in life expectancy	Change due to reducing Infant mortality	1–4 mortality	Maternal mortality
Eastern European EU candidate countries				
Czech Republic	0	0	0	0
Slovenia	0	0	0	0.0020
Poland	0.25	0.24	0.02	0.0007
Hungary	0.26	0.24	0.02	0
Slovakia	0.31	0.27	0.04	0.0004
Lithuania	0.34	0.23	0.11	0.0014
Estonia	0.37	0.28	0.09	0.0033
Latvia	0.48	0.41	0.07	0.0048
Bulgaria	0.77	0.65	0.12	0.0032
Romania	1.12	0.95	0.16	0.0074
Subregional average	**0.46**	**0.40**	**0.06**	**0.0024**
Southeastern Europe				
Croatia	0.19	0.18	0.01	0
Macedonia, FYR	0.65	0.59	0.06	0.0036
Albania	0.76	0.45	0.31	0.0059
Subregional average	**0.47**	**0.36**	**0.12**	**0.0027**
Remaining countries of the former Soviet Union				
Belarus	0.42	0.30	0.12	0.0010
Ukraine	0.65	0.48	0.17	0.0015
Russian Federation	0.88	0.69	0.18	0.0072
Moldova	1.07	0.87	0.19	0.0062
Subregional average	**0.81**	**0.62**	**0.17**	**0.0055**
Overall ECA average	**0.85**	**0.63**	**0.22**	**0.0045**
Overall ECA average (1)	**1.57**	**1.12**	**0.45**	

Note: (1) based on World Bank data on infant and child mortality in Central Asia and Caucasus; data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro and Turkey.

Caucasus, gains in this subregion would be 4.02 years, while gains on the country level would be maximal in Tajikistan (10.55 years), Azerbaijan (4.48 years), and Kazakhstan (4.41 years).

Scenario 4: Reducing Deaths from Cardiovascular Disease and External Causes of Death to EU Levels

In this scenario, infant, child, and maternal mortality were kept constant and mortality rates from cardiovascular disease and external causes of death (injuries, violence, and poisoning) reduced to EU averages. The most recent EU mortality rates were 258/100,000 (1999) for cardiovascular disease and 40/100,000 (1999) for external causes of death.

Table 15 shows the implications for life expectancy. The overall gain in life expectancy in the ECA region in this scenario would be 7.75 years. At a subregional level, maximum gains would be achieved in the remaining countries of the former Soviet Union (9.58 years), followed by Central Asia and the Caucasus (7.37 years), the Eastern European EU candidate countries (4.75 years), and Southeastern Europe (3.67 years). On a country level, gains in life expectancy were highest in the countries of the former Soviet Union. Maximum gains would be achieved in the Russian

Table 11. Scenario 2: Impact on Life Expectancy of Reducing Infant, Child and Maternal Mortality to EU Levels (Central Asia and Caucasus)

	National registration data				World Bank data		
		Change due to reducing				Change due to reducing	
	Overall gain in life expectancy	Infant mortality	1–4 mortality	Maternal mortality	Overall gain in life expectancy	Infant mortality	1–4 mortality
Georgia	0.63	0.59	0.04	0.0026	2.29	2	0.29
Tajikistan	0.82	0.76	0.07	0.0005	12.29	2.31	9.98
Armenia	1.02	0.83	0.18	0.0068	2.38	2.16	0.22
Azerbaijan	1.31	0.56	0.74	0.0034	5.71	4.72	0.99
Kazakhstan	1.39	1.05	0.33	0.0136	5.74	4.7	1.04
Uzbekistan	1.89	1.09	0.80	0.0013	5.39	3.76	1.63
Kyrgyzstan	1.99	1.23	0.75	0.0074	3.82	3.29	0.53
Turkmenistan	3.05	1.74	1.30	0.0036	5	3.89	1.11
Subregional average	**1.58**	**1.00**	**0.58**	**0.0050**	**5.60**	**3.72**	**1.88**

Note: Data refer to latest available years.

TABLE 12. LOWEST SUBREGIONAL LEVELS OF INFANT, CHILD, AND MATERNAL MORTALITY

Subregion	Infant mortality (per 1,000 live births)	Child (1–4) mortality (per 1,000 live births)	Maternal mortality (per 100,000 live births)
Central Asia and Caucasus (national registration data)	10.43 (Georgia 2001)	1.16 (Tajikistan 1999)	21.83 (Armenia 2001)
Central Asia and Caucasus (World Bank data)	24 (Georgia 2001)	4 (Armenia 2001)	
Eastern European EU candidate countries	3.97 (Czech Republic 2001)	0.44 (Slovenia 2001)	3.31 (Czech Republic 2001)
Remaining countries of the former Soviet Union (Belarus, Moldova, Russia, Ukraine)	9.15 (Belarus 2001)	2.46 (Belarus 2001)	14.17 (Belarus 2001)
Southeastern Europe (Albania, Croatia, Macedonia)	7.68 (Croatia 2001)	1.27 (Croatia 2001)	2.44 (Croatia 2001)

TABLE 13. SCENARIO 3: IMPACT ON LIFE EXPECTANCY OF REDUCING INFANT, CHILD, AND MATERNAL MORTALITY TO THE LOWEST LEVELS ACHIEVED IN THE SUBREGION

		Change due to reducing		
	Overall gain in life expectancy	Infant mortality	1–4 mortality	Maternal mortality
Eastern European EU candidate countries				
Slovenia	0.02	0.02	0	0.0024
Czech Republic	0.05	0	0.04	0
Latvia	0.09	0.09	0	0.0026
Hungary	0.36	0.31	0.06	0
Poland	0.36	0.30	0.06	0.0013
Slovakia	0.42	0.34	0.08	0.0005
Lithuania	0.45	0.30	0.15	0.0019
Estonia	0.48	0.34	0.13	0.0063
Bulgaria	0.88	0.72	0.16	0.0038
Romania	1.22	1.02	0.20	0.0079
Subregional average	**0.55**	**0.45**	**0.10**	**0.0028**
Southeastern Europe				
Croatia	0	0	0	0
Macedonia, FYR	0.40	0.35	0.04	0.0049
Albania	0.55	0.26	0.29	0.0070
Subregional average	**0.27**	**0.16**	**0.10**	**0.0033**
Remaining countries of the former Soviet Union				
Belarus	0	0	0	0
Ukraine	0.26	0.19	0.07	0.0008
Russian Federation	0.48	0.38	0.09	0.0052
Moldova	0.64	0.55	0.08	0.0048
Subregional average	**0.41**	**0.32**	**0.08**	**0.0039**
Overall ECA average	**0.58**	**0.40**	**0.17**	**0.0033**
Overall ECA average (1)	**1.09**	**0.73**	**0.36**	

Note: (1) based on World Bank data on infant and child mortality in Central Asia and Caucasus; data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro and Turkey.

Table 14. Scenario 3: Impact on Life Expectancy of Reducing Infant, Child, and Maternal Mortality to the Lowest Levels Achieved in the Subregion (Central Asia and Caucasus)

	National registration data				World Bank data		
		Change due to reducing				Change due to reducing	
	Overall gain in life expectancy	Infant mortality	1–4 mortality	Maternal mortality	Overall gain in life expectancy	Infant mortality	1–4 mortality
Georgia	0.03	0	0.03	0	0.07	0	0.07
Armenia	0.58	0.41	0.17	0	0.72	0.72	0
Tajikistan	0.68	0.58	0.10	0.0003	10.55	1.8	8.75
Azerbaijan	0.89	0.15	0.73	0.0006	4.48	3.44	1.04
Kazakhstan	1.01	0.68	0.32	0.0082	4.41	3.55	0.86
Uzbekistan	1.43	0.65	0.78	0.0005	3.62	2.31	1.31
Kyrgyzstan	1.59	0.85	0.74	0.0044	2.35	2.02	0.33
Turkmenistan	2.69	1.40	1.29	0.0021	3.67	2.75	0.92
Subregional average	**1.18**	**0.60**	**0.57**	**0.0024**	**4.02**	**2.44**	**1.58**

Note: Data refer to latest available years.

Table 15. Scenario 4: Impact on Life Expectancy of Reducing Adult Mortality from Injuries and Violence and Cardiovascular Disease to EU Levels

	Overall gain in life expectancy	Change due to reducing deaths from	
		Injuries and violence	Cardiovascular disease
Eastern European EU candidate countries			
Slovenia	1.36	0.73	0.63
Poland	3.30	0.56	2.74
Czech Republic	3.50	0.47	3.03
Hungary	4.29	0.73	3.56
Slovakia	4.65	0.39	4.26
Bulgaria	6.57	0.22	6.36
Estonia	6.72	2.28	4.44
Romania	6.85	0.51	6.34
Latvia	7.20	2.33	4.87
Lithuania	7.47	2.35	5.13
Subregional average	**4.75**	**0.65**	**4.10**
Southeastern Europe			
Albania	3.10	0.40	2.70
Croatia	3.54	0.40	3.14
Macedonia, FYR	4.84	0	4.84
Subregional average	**3.67**	**0.31**	**3.36**
Central Asia and Caucasus			
Armenia	4.36	0	4.36
Tajikistan	5.19	0	5.19
Kyrgyzstan	5.67	1.15	4.52
Georgia	6.39	0	6.39
Azerbaijan	6.47	0	6.47
Uzbekistan	7.98	0.23	7.75
Kazakhstan	8.63	1.83	6.81
Turkmenistan	9.70	0.34	9.36
Subregional average	**7.37**	**0.56**	**6.81**
Remaining countries of the former Soviet Union			
Moldova	7.36	1.20	6.16
Belarus	7.52	2.39	5.13
Ukraine	8.67	1.71	6.96
Russian Federation	10.09	3.40	6.70
Subregional average	**9.58**	**2.91**	**6.68**
Overall ECA average	**7.75**	**1.82**	**5.93**

Note: Data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro and Turkey.

Federation (10.09 years), Turkmenistan (9.70 years), and the Ukraine (8.67 years). Among the Eastern European EU candidate countries, Lithuania (7.47 years), and Latvia (7.20 years) stand out as the countries with the highest gains in life expectancy in this scenario.

Most of these gains in life expectancy in the ECA region would be achieved from reducing mortality from cardiovascular disease (5.93 years), although in some countries gains from reducing adult mortality from external causes of death would be significant, as in the Russian Federation, reaching 3.40 years.

Comparisons of Age-specific Deaths from Cardiovascular Disease and External Causes to Sweden

In order to make the reductions of mortality in Scenario 4 more transparent, in a complementary analysis, age-specific mortality patterns of cardiovascular disease and external causes of death in selected countries of the ECA region were compared to levels in Sweden. From each subregion mortality patterns from one country were compared to mortality patterns in Sweden.

As can be seen in Table 16, age-specific rates from cardiovascular disease are many times higher in the four countries of the ECA region than in Sweden. The difference is largest in younger age groups. The results of the comparisons for cardiovascular disease are graphically illustrated in the following four figures, which show the ratio of age-specific death rates in each country to that in Sweden.

The comparisons for external causes of death are shown in Table 17. The differences of the four countries of the ECA region to Sweden are largest in the youngest age groups, illustrating the need for reducing childhood injuries in these countries. Figures 8 to 11 make the results of the comparisons more visible, showing the ratio of age-specific death rates from external causes of death in each country to that in Sweden.

Overview of Scenarios

The results of the four scenarios are summarized in the following tables and figures. Tables 18 and 19 and Figure 12 show the overall impact on life expectancy. In the whole of the ECA region, as well as in all four subregions and in most individual countries, the gain in life expectancy was by far greatest in Scenario 4. Reducing mortality levels from cardiovascular disease and external causes of death to EU levels would result in an average gain of 7.75 years. The reductions in infant, child, and maternal mortality in Scenarios 1–3, on the other hand, would result in lower gains in life expectancy. Scenario 1 (reaching the Millennium Development Goals for infant, child, and maternal mortality) resulted in an average ECA gain of between 0.68 and 1.24 years. Scenario 2 (reaching EU levels for infant, child, and maternal mortality) would result in an average gain of 0.85–1.57 years, while Scenario 3 (reaching the lowest subregional levels of infant, child, and maternal mortality) would result in an average gain of 0.58–1.09 years.

Table 16. Age-specific Death Rates from Cardiovascular Disease per 100,000 Population in Sweden and Selected ECA Countries (latest available years)

Age group	Sweden	Russia	Kazakhstan	Macedonia	Bulgaria
20–24	2	18	18	11	12
25–29	3	32	33	8	16
30–34	5	59	55	7	33
35–39	11	110	103	24	56
40–44	32	206	188	55	121
45–49	49	360	323	121	219
50–54	84	599	546	264	389
55–59	158	949	928	417	666
60–64	297	1476	1491	841	1105
65–69	552	2362	2417	1482	1830
70–74	1072	3694	3666	2898	3270
75–79	2060	5651	5684	5383	5823
80–84	3979	9083	8989	9388	10054
85+	9332	16107	15380	13213	19169

Figure 4. Age-specific CVD Death Rates in Russia as Compared to Sweden

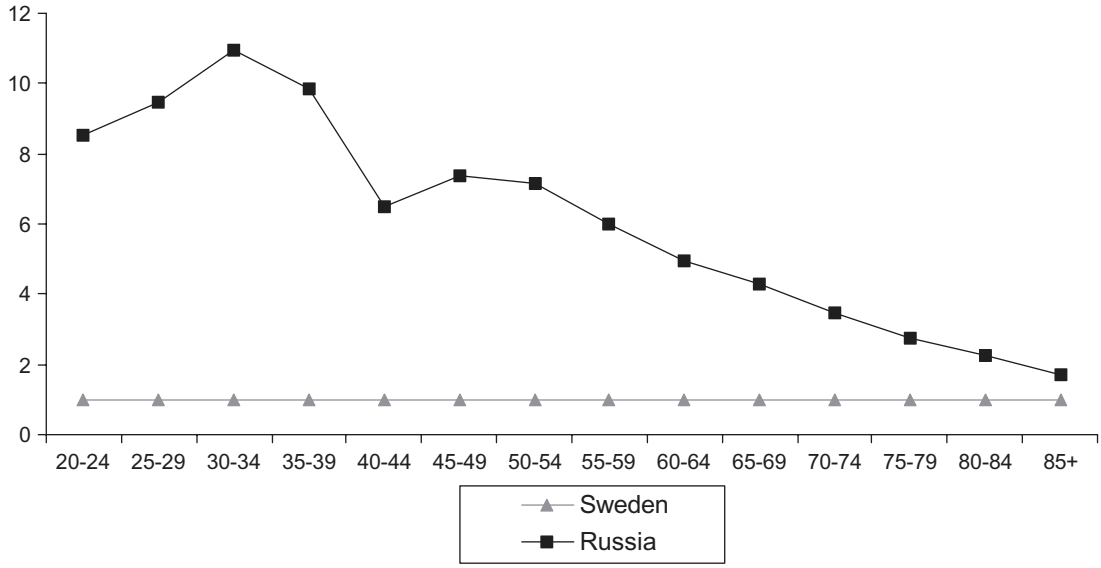


Figure 5. Age-specific CVD Death Rates in Kazakhstan as Compared to Sweden

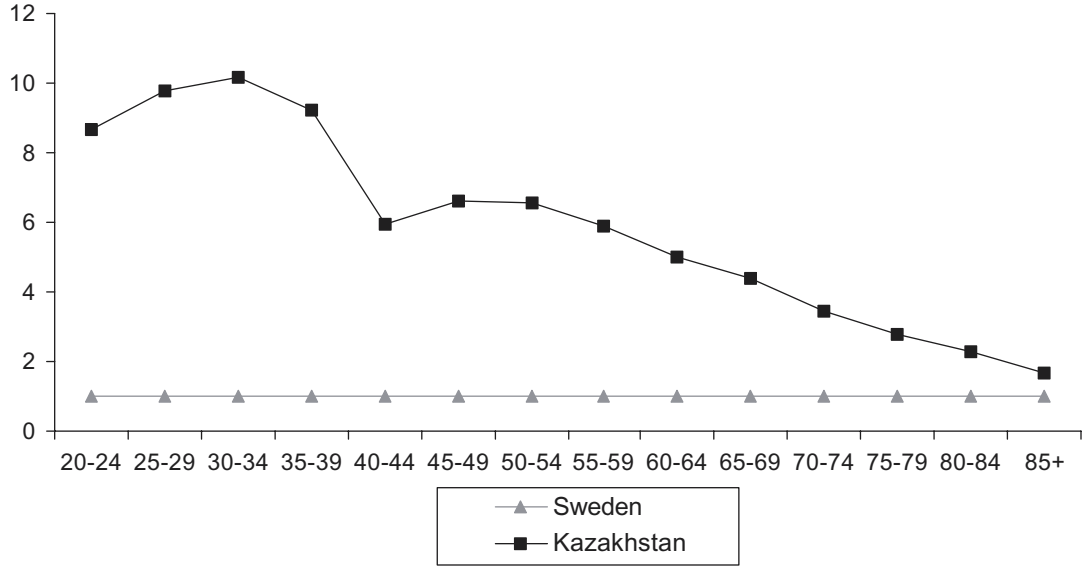


Figure 6. Age-specific CVD Death Rates in Bulgaria as Compared to Sweden

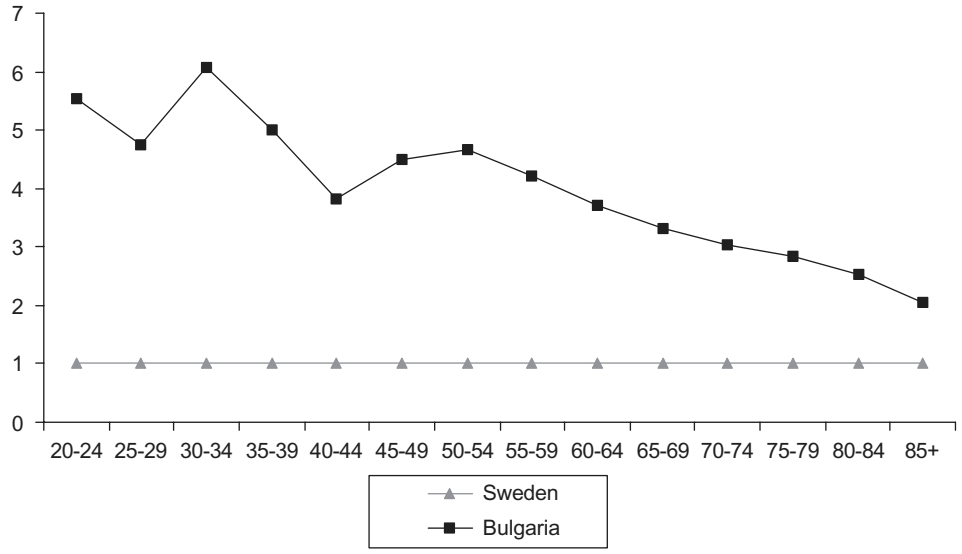


Figure 7. Age-specific CVD Death Rates in Macedonia, FYR as Compared to Sweden

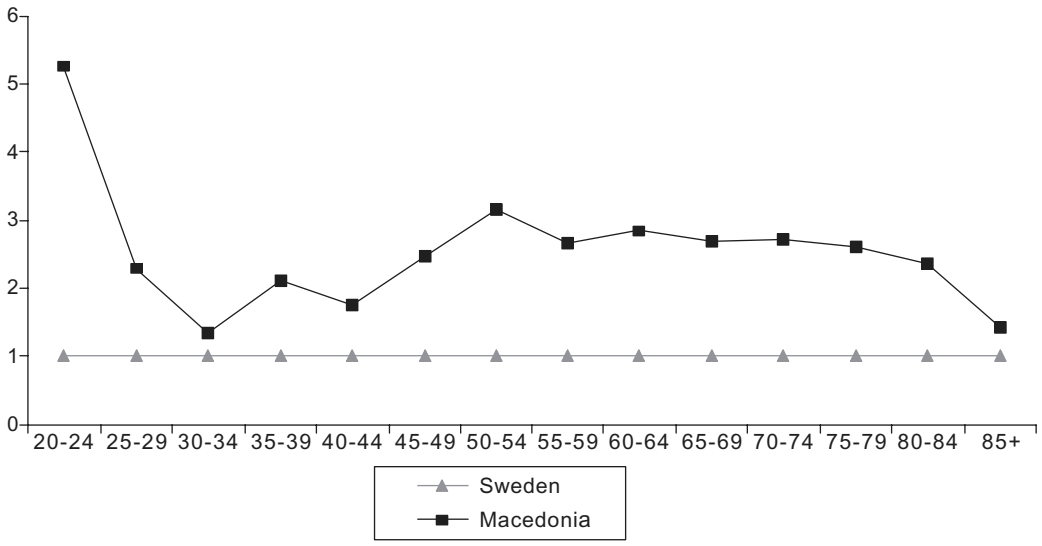


Table 17. Age-specific Death Rates from External Causes of Death per 100,000 Population in Sweden and Selected ECA Countries (latest available years)

Age group	Sweden	Lithuania	Kazakhstan	Croatia	Russia
<1	5	58	95	15	100
01–04	2	33	44	20	37
05–09	4	14	20	10	26
10–14	6	13	25	38	28
15–19	19	69	69	58	112
20–24	32	113	126	49	226
25–29	28	113	152	44	245
30–34	28	149	163	50	254
35–39	32	152	171	53	277
40–44	40	188	176	81	310
45–49	40	250	180	71	339
50–54	46	250	196	56	347
55–59	47	218	192	69	333
60–64	50	214	182	86	278
65–69	56	202	175	112	232
70–74	64	166	155	197	193
75–79	106	149	129	131	164
80–84	193	164	186	386	192
85+	449	191	357	21	213

Figure 8. Age-specific Death Rates from External Causes of Death in Russia as Compared to Sweden

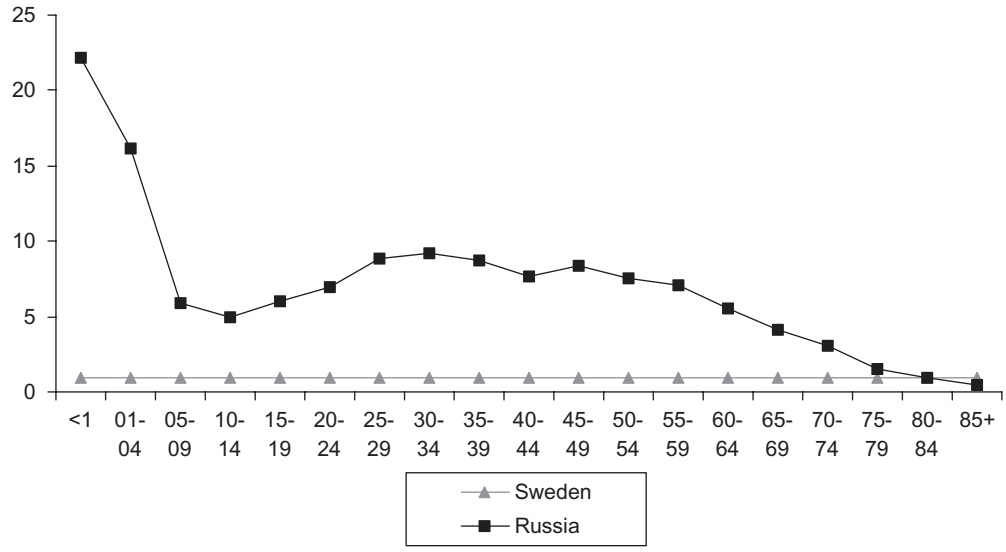


Figure 9. Age-specific Death Rates from External Causes of Death in Kazakhstan as Compared to Sweden

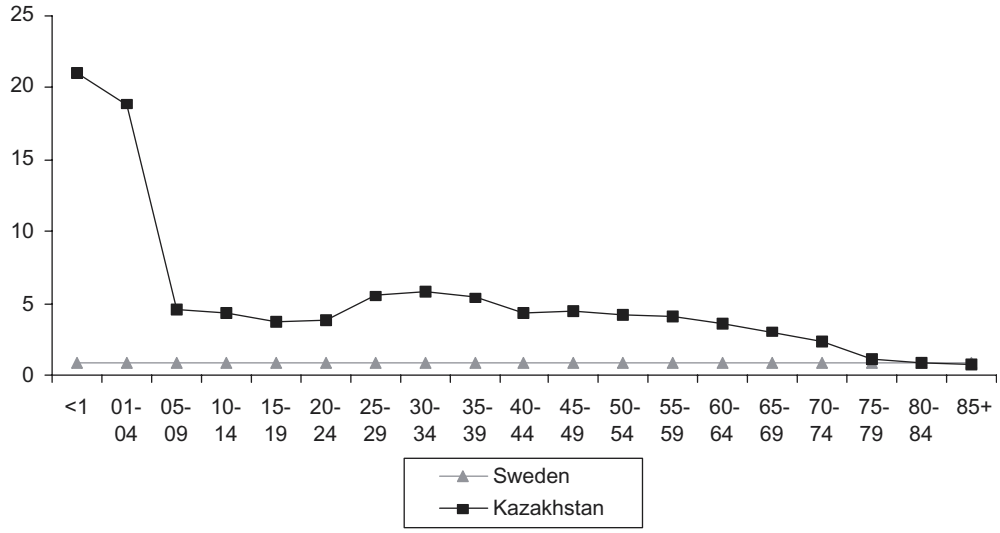


Figure 10. Age-specific Death Rates from External Causes of Death in Lithuania as Compared to Sweden

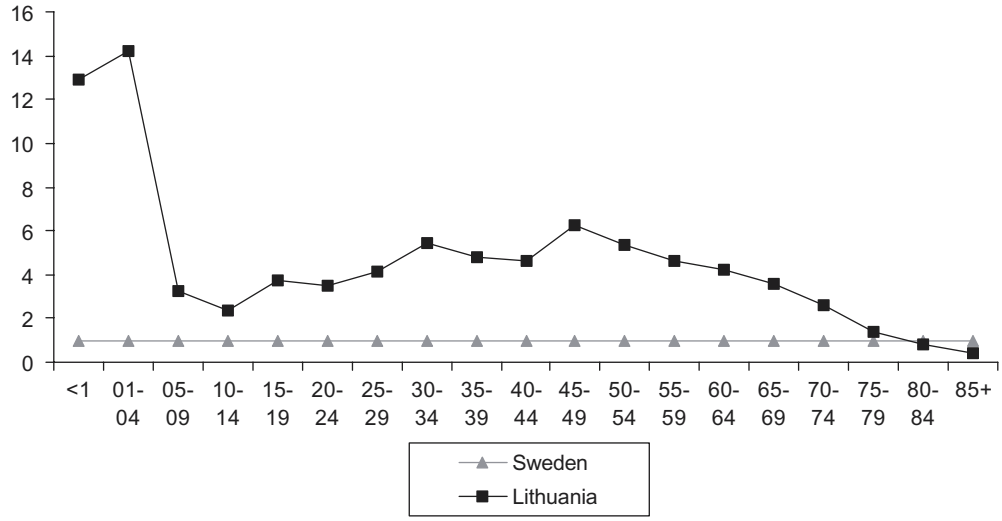
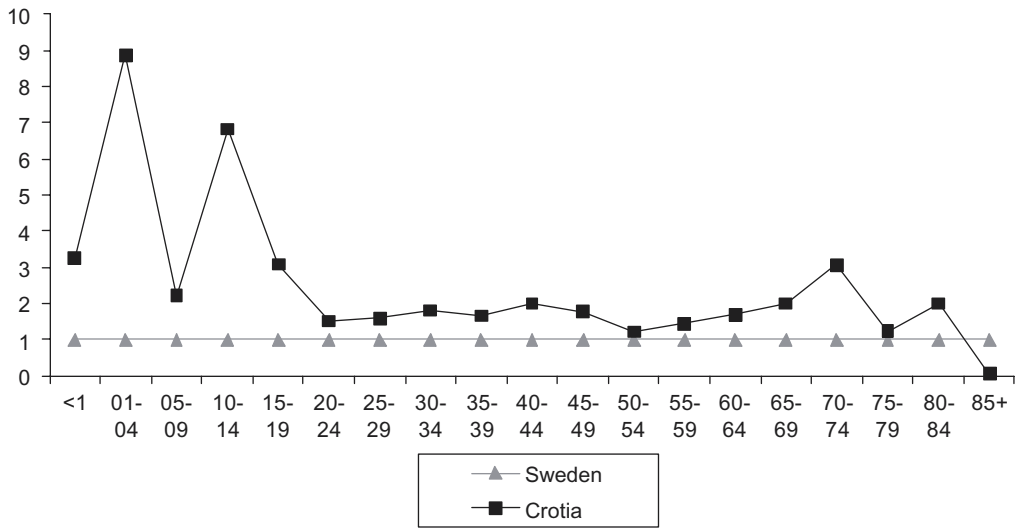


FIGURE 11. AGE-SPECIFIC DEATH RATES FROM EXTERNAL CAUSES OF DEATH IN CROATIA AS COMPARED TO SWEDEN



In Central Asia and the Caucasus, gains in the first three scenarios were considerably higher, when the calculations were based on World Bank estimates of infant and child mortality. In this case, average subregional gains would be 4.04 years in Scenario 1, 5.60 years in Scenario 2 and 4.02 years in Scenario 3. On a country level, Tajikistan would gain most (12.29 years) in Scenario 2.

Countries of the former Soviet Union also stand out with maximum gains from Scenario 4 (based on national registration data). These countries are the Russian Federation (10.09 years), Turkmenistan (9.70 years), Ukraine (8.67 years), Kazakhstan (8.63 years), Lithuania (7.47 years), and Latvia (7.20 years).

Table 18. Overall Impact on Life Expectancy According to the Different Scenarios

	Scenario 1: Reaching MDGs 4 and 5	Scenario 2: Reaching EU levels	Scenario 3: Reaching best subregional levels	Scenario 4: Reaching EU levels for CVD and external causes
Eastern European EU candidate countries				
Bulgaria	0.76	0.77	0.88	6.57
Czech Republic	0.07	0	0.05	3.50
Estonia	0.39	0.37	0.48	6.72
Hungary	0.27	0.26	0.36	4.29
Latvia	0.49	0.48	0.09	7.20
Lithuania	0.45	0.34	0.45	7.47
Poland	0.24	0.25	0.36	3.30
Romania	0.73	1.12	1.22	6.85
Slovakia	0.40	0.31	0.42	4.65
Slovenia	0.12	0	0.02	1.36
Subregional average	**0.39**	**0.46**	**0.55**	**4.75**
Southeastern Europe				
Albania	0.20	0.76	0.55	3.10
Croatia	0.31	0.19	0	3.54
Macedonia, FYR	0.24	0.65	0.40	4.84
Subregional average	**0.26**	**0.47**	**0.27**	**3.67**
Remaining countries of the former Soviet Union				
Belarus	0.48	0.42	0	7.52
Moldova	0.90	1.07	0.64	7.36
Russian Federation	0.79	0.88	0.48	10.09
Ukraine	0.67	0.65	0.26	8.67
Subregional average	**0.75**	**0.81**	**0.41**	**9.58**
Overall ECA average	**0.68**	**0.85**	**0.58**	**7.75**
Overall ECA average (1)	**1.24**	**1.57**	**1.09**	

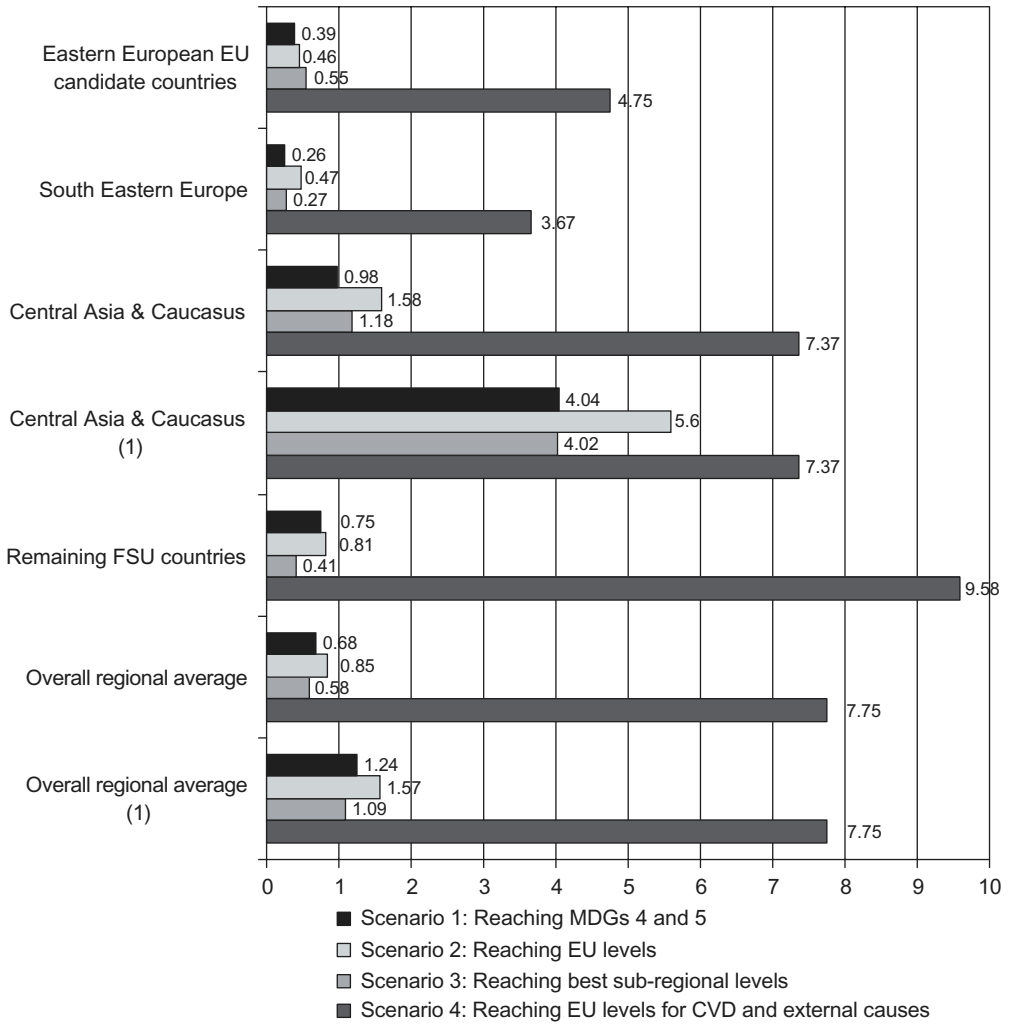
Note: (1) based on World Bank data on infant and child mortality in Central Asia and Caucasus; data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro and Turkey.

Table 19. Overall Impact on Life Expectancy According to the Different Scenarios (Central Asia and Caucasus)

	National registration data				World Bank data		
	Scenario 1: Reaching MDGs 4 and 5	**Scenario 2: Reaching EU levels**	**Scenario 3: Reaching best subregional levels**	**Scenario 4: Reaching EU levels for CVD and external causes**	**Scenario 1: Reaching MDGs 4 and 5**	**Scenario 2: Reaching EU levels**	**Scenario 3: Reaching best subregional levels**
Armenia	0.86	1.02	0.58	4.36	1.38	2.38	0.72
Azerbaijan	0.73	1.31	0.89	6.47	3.98	5.71	4.48
Georgia	0.57	0.63	0.03	6.39	1.92	2.29	0.07
Kazakhstan	1.02	1.39	1.01	8.63	5.05	5.74	4.41
Kyrgyzstan	1.44	1.99	1.59	5.67	2.41	3.82	2.35
Tajikistan	0.48	0.82	0.68	5.19	7.97	12.29	10.55
Turkmenistan	2.05	3.05	2.69	9.70	3.37	5	3.67
Uzbekistan	0.97	1.89	1.43	7.98	3.72	5.39	3.62
Subregional average	**0.98**	**1.58**	**1.18**	**7.37**	**4.04**	**5.60**	**4.02**

Note: Data refer to latest available years.

FIGURE 12. OVERALL IMPACT ON LIFE EXPECTANCY ACCORDING TO THE DIFFERENT SCENARIOS: REGIONAL AND SUBREGIONAL AVERAGES



Note: (1) based on World Bank data on infant and child mortality in Central Asia and Caucasus.

CHAPTER 6

DISCUSSION

Maximal gains in life expectancy at birth in the ECA region were observed when reducing mortality levels from cardiovascular disease and external causes of death to EU levels (Scenario 4). In contrast, the impact of the first three scenarios on life expectancy at birth was much more limited, when using national registration data. Gains in life expectancy in the first three scenarios would be considerably higher for the countries of Central Asia and the Caucasus, if more survey-based data on infant and child mortality were used. However, even in this case, adult mortality would still account for most premature mortality in the ECA region.

HIV/AIDS

As has already been noted, the impact of HIV/AIDS on mortality patterns, although still relatively small, may increase dramatically in the near future. In addition to the number of HIV positive individuals who will die if they do not receive antiretroviral treatment, the number of infections is still growing. The HIV epidemic in the most affected countries, Russia and Ukraine, shows no signs of declining and there is considerable potential for a continued rapid increase of the number of HIV positive individuals in the future.

A recent World Bank study on the economic impact of HIV in Russia modelled the future development of HIV infections, using cautious projections of the key parameters (Ruehl, Pokrovksy, and Vinogradov, 2002). The model assumed that no prevention or retroviral treatment would take place, using an "optimistic" and a "pessimistic" scenario. In the "optimistic" case, the cumulative number of HIV infected individuals would increase from 1.2 million in 2005 to 2.3 million in 2010 and 5.4 million in 2020. Mortality rates would increase from 500 per month in 2005 to 21,000 per month in 2020 (Ruehl, Pokrovksy, and Vinogradov, 2002).

Obviously, the predicted rise in the number of HIV infected individuals and mortality rates will have a devastating impact on life expectancy. According to the scenario of Ruehl et al. on Russia and based on current WHO mortality data, the number of deaths from HIV/AIDS per year would increase 1,212 times between 2001 and 2020. On the basis of the 2001 life table, this increase in

mortality would result in a decrease in the already low life expectancy at birth by 3.19 years, reaching 62.16 years.

This striking scenario illustrates the importance of Millennium Development Goal 6 (combating HIV/AIDS, malaria, and other diseases) to the countries of the ECA region. The case of HIV/AIDS, however, also points to some problems with the HIV related indicators used to measure progress towards this Millennium Development Goal.

These indicators are the HIV prevalence among 15- to 24-year-old pregnant women, the contraceptive prevalence rate, and the number of children orphaned by HIV/AIDS. Once again, it is apparent that the choice of indicator is driven by the availability of data, in particular the widespread availability of seroprevalence surveys among women attending prenatal clinics in many developing countries. However, while this not only provides no information about rates of infection among men in the population, it is also increasingly clear that it provides a biased measure of infection in the female population in the area concerned (Zaba, Boerma, and White, 2000; Crampin et al., 2003; Fylkesnes et al., 1998). Furthermore, unlike in many developing countries, sentinel surveillance at prenatal clinics remains uncommon in the ECA region and there is considerable uncertainty about the applicability of a method designed for countries where the predominant mode of transmission is heterosexual in others where it is still primarily through intravenous drug use.

Other possible approaches involve tracking numbers of newly diagnosed cases of AIDS but this is also highly problematic as the pattern of service delivery will, to a considerable extent, determine who is diagnosed and at what stage of the disease. In particular, it provides no information on whether cases are representative of the general population, of high risk groups, or of a bridge population linking the two, or any combination thereof. A change in the pattern of service delivery might affect reported rates without having any impact on the underlying dynamics of the disease.

Instead, a more useful set of measures would involve tracking HIV prevalence among specified subgroups of high-risk core transmitters, bridge populations, and the general population, but obtaining such data would require substantial investment in epidemiological resources in this region, where they are at present extremely scarce.

Moving Forward

A policy aimed at reducing mortality levels from cardiovascular disease and external causes of death to EU levels emerges as having the greatest potential to impact on life expectancy at birth, outweighing potential gains that might be achieved when reducing infant and child mortality. In summary, it can therefore be concluded that the study made the case for complementing the Millennium Development Goals in the ECA region with another set of goals or indicators that take into account adult mortality, while at the same time showing the benefits of reducing infant and child mortality in Central Asia and the Caucasus.

Millennium Development Goal 6 is to reverse the spread of HIV/AIDS and to reverse the incidence of malaria and "other major diseases." However, the only other disease specified in the related indicators in addition to HIV/AIDS and malaria is tuberculosis. Nevertheless, the use of the term "other major diseases" in the Goal makes it possible to include other major diseases that are more relevant in a specific country or regional context. This might leave countries room within the framework of the Millennium Development Goals to identify and tackle the diseases that cause the most damage to their populations and this offers an opportunity for dialogue between governments and international agencies to operationalise appropriate targets.

Perhaps as importantly, this study demonstrated the great variety among the countries of the ECA region. As the potential gains in life expectancy indicate, levels of infant, child, and maternal mortality, as well as of mortality from cardiovascular diseases and external causes, vary widely among the different countries of the region. At one end of the extreme is Slovenia, which would achieve almost no gain in life expectancy in the first three scenarios and only 1.36 years in Scenario 4. At the other end are Tajikistan, gaining 12.29 years in Scenario 2, and Turkmenistan, gaining 9.70 years in Scenario 4. Obviously, these countries need to adopt different strategies to improve the health of

their populations. This illustrates that appropriate policy interventions need to be developed at a country level and should not slavishly follow global development goals. It would clearly be mistaken to establish common goals for all countries of the ECA region.

A similar lesson can be drawn for the level of external assistance in the health sector that the countries of the ECA region require. The level of development assistance in the health sector needs to be informed by an understanding of the burden of disease and premature mortality. It seems reasonable to argue that countries with high levels of under-5 and adult mortality, and consequently with larger potential for improvement, should be allocated substantially more resources than countries with already low levels of mortality. However, such advocacy must include considerations of the costs and effectiveness of various interventions for controlling the causes of under-5 and adult mortality. The incremental resource requirements and economic benefits of various interventions for controlling the causes of under-5 and adult mortality in ECA Region are beyond the scope of this study, but they need to be examined in each subregional and/or country context.

Going beyond the ECA region, the study allows two more general conclusions. The first concerns adult mortality. The importance of non-communicable diseases and injuries is more obvious in the countries of the ECA region because vital registration systems, while imperfect, are much better than in other countries at comparable levels of development, but their importance is not confined to this region. It is often forgotten that non-communicable diseases and injuries account for more than half of all lost years of healthy life in developing countries (UNDP, 2003). Mortality from these causes of death could be used as additional indicators of progress towards the Millennium Development Goals, where data are available. This view has now been endorsed by senior WHO experts, calling for the inclusion of adult mortality and morbidity in the Millennium Development Goals (Kowal and Lopez, 2003).

The second conclusion concerns life expectancy. Life expectancy is not only the most general summary measure of mortality in a population, but also a measure of social development. Living a long and healthy life is a basic condition of human and social development. An increase in life expectancy should therefore be a global development goal in itself. The United Nations Development Program (UNDP) recognizes the importance of life expectancy as a measure of social development by including it as one of three indicators in the calculation of the Human Development Index (HDI). Improvements in life expectancy have been previously used as UN development goals. A United Nations General Assembly resolution in 1980 called for raising life expectancy in all countries to 60 years by 2000. In 124 of the 173 countries that fell below that level this goal has been achieved (UNDP, 2003).

Chapter 7

Recommendations

As was noted previously, this study has been limited to the analysis of the potential impact of reaching Goals 4 and 5 in the health-related Millennium Development Goals. Although mortality rates from HIV/AIDS are still comparatively low, this is likely to change in the near future unless ECA countries implement effective interventions to control the epidemic (World Bank, 2003). Studies modeling the future impact of HIV in this region exist but they are limited by the lack of contextually valid data on, for example, exposure to risk in the countries involved. Countries and international agencies should continue their efforts to improve HIV surveillance and to develop models of the future impact of HIV and tuberculosis in the region, exploring various scenarios and policy responses, and linking this information to Goal 6 so as to contribute to the discussion of the appropriateness of the MDGs to the ECA region.

A main theme of this study was the problem with existing data on which to judge progress towards identified targets in many countries. This requires action on several fronts. Governments and international agencies should place a high priority on strengthening systems for vital registration, in particular in the countries of Central Asia and the Caucasus. It will be necessary to address the main factors that contribute to the discrepancies between official and survey data in these countries. First, it is important that all countries adopt and implement fully the WHO definition of a live birth rather than the Soviet one. Although this process has now started, it is crucial to accelerate it. International agencies can play an important role in encouraging this shift and supporting it with training programs for relevant staff. Second, training for health care staff is also required to reduce misreporting of infant deaths. This will need to be accompanied by the abolition of incentives that lead staff to underreport infant mortality, such as the systems of control and sanctions that inhibit open discussion of adverse events. Instead, incentives are needed that increase the accuracy of reporting. Third, to ensure the reporting of births and deaths by parents, registration fees should be abolished where they still exist, as in Georgia. There are also many examples of how registration can be linked to access to benefits (financial and otherwise) to create positive incentives to improve vital registration. However it should also be recognized that some countries in Central Asia or the Caucasus may be reluctant to improve the accuracy of their data, as high official infant

mortality rates would portray their countries in a negative light. The authors have been made aware of at least one country where this is the case. This will again be an area in which international agencies can play a crucial role.

While national registration is still incomplete, it is possible to improve the quality of survey data. One way is by increasing the sample sizes that will consequently narrow the confidence intervals and provide more accurate estimates, as well as by increasing the number of surveys. This is most acute in the countries of Central Asia and the Caucasus, but also concerns other countries in the ECA region, where concerns about the quality of data have been raised, but where hardly any surveys have been undertaken so far.

This study demonstrates that there is currently no consensus on the true scale of infant and child mortality rates in Central Asia and the Caucasus. Estimates differ not only between national governments and international organizations, but also differ among international organizations. This ultimately threatens the credibility of the estimates. It is important to have in the public domain the sources and methods used for derivation of estimates for key health indicators being used by international agencies, with a view to achieving consensus on the best estimates for each country.

On a national level, vital registration data remain in general the official baseline against which countries are tracking their progress. It is therefore necessary to involve national governments in the dialogue on what should be considered to be the most accurate estimates, thus securing national ownership of estimates generated by international organizations and strengthening the case for improvements in national vital registration. As this study has shown, life expectancies in Central Asia and the Caucasus are likely to be dramatically lower than official data suggest. It is essential that the governments of these countries recognize this problem. This would be a first step of addressing the serious matter of improving the health of their populations. Improving the registration of infant and child mortality is not a goal in itself but it will help to increase national recognition of the main problems these countries face and to direct policy responses, both by national governments and international agencies, to where they are needed most.

Obviously, health targets and policy interventions need to be adapted to the individual country context. Perhaps the most important message of this study is that simply following global development targets will not be the best way to enhance the health of the populations in the ECA region. The reason for this is that the burden of disease and mortality varies widely between countries and generally differs markedly from the patterns observed in developing countries.

The eight countries of Central Asia and the Caucasus exhibit very high under-5 and maternal mortality rates. It is those countries that would benefit most from achieving the MDGs. In those countries where infant, under-5, and maternal mortality remain high there is a continuing need to direct resources to policies that will reduce them. This is likely to include strengthening basic social services and primary health care although, given the need to reflect local context, it will also be important not simply to transfer uncritically policies from other parts of the world. Instead, international agencies, bilateral donors, and global foundations should support primary research into the causes of adverse health outcomes among these populations.

In addition to high rates of childhood mortality, some of the countries of Central Asia and the Caucasus are at the same time struggling with staggering rates of adult mortality. One of the main findings that emerged from this study is that the health-related MDGs need to be adapted to the ECA region, so that they include adult mortality. This is particularly true of the countries of the former Soviet Union, but also of other countries of the ECA region. A potential average gain of 7.75 years in life expectancy at birth, when reducing mortality from cardiovascular diseases and external causes of death to EU levels, simply cannot be ignored.

There are various ways in which adult mortality could be included in the MDGs. One way of doing so would be to include additional health indicators under Target 8 of Goal 6. At the most general level, life expectancy at birth could be used as an additional indicator. More specifically, major causes of adult mortality could be used as indicators of development. Although there are

problems with the accuracy of mortality data in some countries of the region, these inaccuracies are unlikely to be any greater than those for traditional MDG indicators, and may even be less. Two additional indicators important for the ECA region are those used in this study, namely mortality rates from cardiovascular disease and external causes of death.

However, it is not necessary to wait for mortality levels to change. Instead, it is possible to intervene to address the main risk factors for cardiovascular disease, tracking changes that will appear before mortality declines. Cardiovascular disease is associated with complex risk factors, including poverty, smoking, alcohol, and poor nutrition, and although the precise contribution of different factors in this region differs from that in western populations (for example, the very low levels of dietary anti-oxidants and the consequences of episodic heavy drinking), changes in the prevalence of key risk factors could be used as additional indicators under Target 8 of MDG 6. So far, however, available data on the prevalence of relevant risk factors is very limited. Again, the gathering of more accurate data would help to direct policy responses to where they are most needed.

Appropriate policy interventions to reduce the high levels of adult mortality must include the strengthening of public health services, with more emphasis on health promotion and disease prevention. Concerted public health efforts are in particular required to counteract the tobacco epidemic which is spreading in the ECA region. The spread of tuberculosis and HIV/AIDS are other strong reminders of the need for such improvements in public health programs, including health promotion activities. The high rates of external causes of death, in particular among infants and children, call for concerted efforts to prevent injuries, especially during childhood.

International assistance to the health sector could play an important role in improving health in the region. In general, international assistance should be focused on the countries in the ECA region with the largest burden of disease and premature mortality. As this study has shown, this concerns not only infant, child, and maternal mortality, but also adult mortality. In this sense, the current study highlights where the need for development assistance in the health sector is greatest. A stronger emphasis on countries with the highest burden of mortality and disease could also be an incentive to improve vital registration systems.

Appendix

Impact on Years of Potential Life Lost

In an additional calculation, for each of the four scenarios and based on national registration data, Years of Potential Life Lost (YPLL) were calculated for each of the specified causes of death. YPLL were calculated as the number of premature life years lost up to the age of 64 per 10,000 persons. This measure offers a basis for considering the costs of different causes of mortality, when combined with economic measures of human capital. The disadvantage of the measure of YPLL is that it will not consider competing causes of death, which may lead to an overestimation of the impact and thus cost of specific causes of death.

Table 20 shows the results of Scenario 1 for Years of Potential Life Lost on the age group 0–64 per 10,000 persons. As in the case of life expectancy, YPLL gains were maximized when reducing infant mortality, followed by the gains in reducing child mortality. Gains in YPLL from reducing maternal mortality, on the other hand, were minimal.

The average gain in YPLL taking ECA as a whole was 5,364 years. Maximum gains were achieved in Central Asia and the Caucasus (6,876), followed by the remaining countries of the former Soviet Union (6,126), the Eastern European EU candidate countries (3,172), and Southeastern Europe (1,595). As in the case of life expectancy, maximum gains on a country level were achieved in the Central Asian countries Turkmenistan (13,096), Kyrgyzstan (9,611), and Kazakhstan (8,271).

The results for Scenario 2 are shown in Table 21. The overall average gain for the ECA region would be 6,500 years. The subregion of Central Asia and the Caucasus would achieve maximum gains (10,824), followed by the remaining countries of the former Soviet Union (6,557), the Eastern European EU candidate countries (3,741), and Southeastern Europe (3,379). As in the case of life expectancy, on a country level, maximum gains would be achieved in the Central Asian countries Turkmenistan (20,205), Kyrgyzstan (13,469), and Uzbekistan (12,165).

Gains in YPLL for Scenario 3 are shown in Table 22. The average gain for the ECA region would be 4,241 YPLL (age 0–64) per 10,000. Maximum gains were achieved for Central Asia and the Caucasus (7,059), followed by the Eastern European EU candidate countries (4,272), the

TABLE 20. IMPACT ON YPLL (AGE 0–64 PER 10,000) OF REACHING THE MILLENNIUM DEVELOPMENT GOALS 4 AND 5

	Overall gain in YPLL after reaching MDGs	Gain due to reducing		
		Infant mortality	1–4 mortality	Maternal mortality
Eastern European EU Candidate Countries				
Czech Republic	331.40	251.20	79.28	0.92
Slovenia	1033.53	1029.63	0	3.90
Poland	1870.00	1794.59	73.33	2.07
Hungary	2185.03	2093.23	91.80	0
Slovakia	3101.72	2960.25	140.52	0.95
Estonia	3159.10	3032.38	126.55	0.17
Lithuania	3261.75	3012.24	247.20	2.30
Latvia	4123.32	4005.39	110.10	7.83
Bulgaria	6140.32	5893.32	241.59	5.42
Romania	6177.58	6044.02	128.04	5.52
Subregional average	**3172.13**	**3058.91**	**110.37**	**2.85**
Southeastern Europe				
Albania	593.82	202.01	384.84	6.98
Macedonia, FYR	1255.43	964.06	283.80	7.56
Croatia	2463.16	2376.95	86.21	0
Subregional average	**1594.77**	**1364.95**	**225.93**	**3.89**
Central Asia and Caucasus				
Azerbaijan	4079.49	3239.72	833.49	6.29
Tajikistan	4282.69	4282.32	0	0.37
Georgia	4836.24	4806.23	25.97	4.04
Uzbekistan	6253.33	5304.44	946.94	1.95
Armenia	6594.79	6344.47	242.83	7.48
Kazakhstan	8270.72	7687.57	562.81	20.34
Kyrgyzstan	9610.91	8288.96	1312.16	9.80
Turkmenistan	13095.78	10831.57	2258.51	5.70
Subregional average	**6876.34**	**6080.58**	**788.36**	**7.40**
Remaining countries of the former Soviet Union				
Belarus	3687.47	3422.28	263.33	1.86
Ukraine	5346.82	4982.57	361.86	2.38
Russian Federation	6523.56	6097.52	415.08	10.96
Moldova	7570.38	7231.99	328.68	9.70
Subregional average	**6125.69**	**5723.62**	**393.61**	**8.46**
Overall ECA average	**5364.24**	**4972.25**	**385.32**	**6.66**

Note: Analysis based on national registration data; data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro and Turkey.

remaining countries of the former Soviet Union (3,383), and Southeastern Europe (1,631). Maximum gains on a country level would be achieved in Turkmenistan (16,795), Kyrgyzstan (9,802), and Romania (9,708).

The results of Scenario 4 are shown in Table 23. On average, ECA countries would gain 4,873 YPLL (age 0–64) per 10,000. Gains would be maximal in the remaining countries of the former Soviet Union (7,328), followed by Central Asia and the Caucasus (2,790), the Eastern

Table 21. Impact on YPLL (age 0–64 per 10,000) of Reducing Infant, Child, and Maternal Mortality to EU Levels

	Overall gain in YPLL after reaching EU levels	Gain due to reducing		
		Infant mortality	1–4 mortality	Maternal mortality
Eastern European EU candidate countries				
Czech Republic	0	0	0	0
Slovenia	3.04	0	0	3.04
Poland	2104.18	2068.31	34.81	1.05
Hungary	2160.33	2125.71	34.62	0
Lithuania	2272.74	2022.10	248.28	2.36
Slovakia	2465.84	2383.06	82.10	0.68
Estonia	2744.13	2533.98	204.65	5.50
Latvia	3952.64	3790.64	154.00	8.00
Bulgaria	6182.57	5913.74	263.54	5.29
Romania	9025.92	8655.45	358.50	11.97
Subregional average	**3741.20**	**3604.46**	**132.93**	**3.80**
Southeastern Europe				
Croatia	1638.99	1608.20	30.79	0
Albania	4539.70	3871.94	658.74	9.03
Macedonia, FYR	5357.15	5221.27	130.01	5.87
Subregional average	**3378.99**	**3117.52**	**257.27**	**4.20**
Central Asia and Caucasus				
Georgia	5251.42	5166.32	81.09	4.01
Azerbaijan	6738.86	5061.13	1672.32	5.41
Tajikistan	6978.99	6827.93	150.35	0.71
Armenia	7547.70	7149.42	387.96	10.32
Kazakhstan	11119.89	10291.95	802.59	25.36
Uzbekistan	12164.72	10289.34	1873.20	2.18
Kyrgyzstan	13468.82	11686.82	1768.92	13.08
Turkmenistan	20205.26	17037.04	3161.66	6.55
Subregional average	**10824.28**	**9452.27**	**1363.12**	**8.90**
Remaining Countries of the Former Soviet Union				
Belarus	3118.69	2845.37	271.48	1.84
Ukraine	5013.12	4612.59	397.76	2.77
Russian Federation	7264.23	6791.71	458.75	13.77
Moldova	8798.60	8334.03	453.25	11.32
Subregional average	**6556.63**	**6110.96**	**435.14**	**10.54**
Overall ECA average	**6499.66**	**5973.57**	**517.80**	**8.29**

Note: Analysis based on national registration data; data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro and Turkey.

European EU candidate countries (1,753), and Southeastern Europe (1,135). On a country level, gains would be maximal in the Russian Federation (8,417), Kazakhstan (5,785), and Belarus (5,542).

Comparing the impact of the four scenarios on YPLL (Table 24 and Figure 13), it can be seen that average overall gains in the ECA region were maximized when reducing infant, child, and maternal mortality to EU levels, reaching 6,500 YPLL per 10,000 (age 0–64). The regional average would

Table 22. Impact on YPLL (age 0–64 per 10,000) of Reaching the Lowest Infant, Child, and Maternal Mortality in the Subregion

	Overall gain in YPLL	Gain due to reducing		
		Infant mortality	1–4 mortality	Maternal mortality
Eastern European EU candidate countries				
Czech Republic	96.13	0	96.13	0
Slovenia	196.64	193.02	0	3.62
Latvia	848.29	843.90	0	4.39
Poland	2787.88	2659.26	126.60	2.02
Hungary	2856.00	2856.00	125.89	0.80
Lithuania	2982.82	2636.07	343.65	3.10
Slovakia	3151.71	2977.21	173.67	0.83
Estonia	3448.50	3131.74	306.10	10.66
Bulgaria	6842.39	6485.84	350.38	6.17
Romania	9708.25	9244.43	450.91	12.91
Subregional average	**4272.17**	**4062.22**	**217.77**	**4.54**
Southeastern Europe				
Croatia	0	0	0	0
Albania	2896.59	2266.78	619.15	10.66
Macedonia, FYR	3214.37	3116.17	90.37	7.84
Subregional average	**1631.42**	**1404.55**	**221.72**	**5.15**
Central Asia and Caucasus				
Georgia	61.17	0	58.39	2.78
Azerbaijan	3036.35	1386.34	1649.05	0.97
Armenia	3868.08	3502.30	365.79	0
Tajikistan	5412.52	5184.01	228.10	0.41
Kazakhstan	7485.63	6690.09	780.20	15.33
Uzbekistan	7900.60	6063.77	1835.90	0.94
Kyrgyzstan	9801.68	8047.42	1746.43	7.83
Turkmenistan	16795.45	13652.85	3138.82	3.78
Subregional average	**7058.65**	**5709.89**	**1344.12**	**4.66**
Remaining countries of the former Soviet Union				
Belarus	0	0	0	0
Ukraine	2004.33	1833.29	169.56	1.47
Russian Federation	4035.55	3802.80	222.82	9.93
Moldova	5446.12	5244.13	193.22	8.78
Subregional average	**3383.30**	**3176.97**	**198.90**	**7.42**
Overall ECA average	**4241.01**	**3827.00**	**411.20**	**6.10**

Note: Analysis based on national registration data; data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro and Turkey.

be 5,364 years for reaching the Millennium Development Goals for infant, child, and maternal mortality, and 4,873 when reducing mortality from cardiovascular disease and external causes of deaths to EU levels. The overall average would be lowest with 4,241 years when reaching the lowest subregional levels of infant, child, and maternal mortality in Scenario 3.

On a subregional and country level, the situation is more complex. The Eastern European EU candidate countries would gain maximum YPLL in Scenario 3, Southeastern Europe and

Table 23. Impact on YPLL (age 0–64 per 10,000) of Reducing Adult Mortality from Injuries and Violence and Cardiovascular Disease to EU Levels

		Decrease due to reducing deaths from	
	Overall gain in YPLL	**Injuries and violence**	**Cardiovascular disease**
Eastern European EU candidate countries			
Slovenia	870.78	764.91	105.87
Czech Republic	1009.11	541.95	467.15
Slovakia	1256.70	504.89	751.81
Poland	1314.46	710.70	603.76
Hungary	1692.41	867.98	824.43
Romania	2061.53	859.46	1202.07
Bulgaria	2174.38	330.84	1843.54
Lithuania	4026.32	3164.83	861.48
Latvia	4626.80	3344.41	1282.39
Estonia	4734.24	3596.13	1138.11
Subregional average	**1753.27**	**886.43**	**866.83**
Southeastern Europe			
Macedonia, FYR	817.28	0	817.28
Croatia	1134.50	547.24	587.25
Albania	1342.45	594.88	747.57
Subregional average	**1134.99**	**446.35**	**688.64**
Central Asia and Caucasus			
Armenia	544.25	0	544.25
Tajikistan	1044.22	0	1044.22
Georgia	1127.78	0	1127.78
Azerbaijan	1375.01	0	1375.01
Uzbekistan	2090.00	387.98	1702.02
Kyrgyzstan	3576.28	2006.33	1569.95
Turkmenistan	4108.88	593.36	3515.52
Kazakhstan	5784.99	3296.56	2488.43
Subregional average	**2790.46**	**1002.89**	**1787.57**
Remaining countries of the former Soviet Union			
Moldova	3918.24	2332.19	1586.05
Ukraine	4747.57	2689.20	2058.37
Belarus	5541.68	3785.56	1756.12
Russian Federation	8417.07	5903.28	2513.79
Subregional average	**7328.05**	**4975.24**	**2352.81**
Overall ECA average	**4873.31**	**3058.85**	**1814.46**

Note: Analysis based on national registration data; data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro and Turkey.

the countries of Central Asia and the Caucasus would achieve the highest gains in Scenario 2, while the remaining countries of the former Soviet Union would achieve maximum gains in Scenario 4.

On a country level, the subregion with the highest consistency is Central Asia and the Caucasus. All countries of this subregion would achieve maximum gains in YPLL in Scenario 2. The average gain in YPLL in Central Asia and the Caucasus in this scenario is 10,824, the highest subregional gain in YPLL in any scenario. In the other subregions, the results are more varied. Slovenia, Croatia,

Table 24. Impact on YPLL (age 0–64 per 10,000) in the Four Scenarios

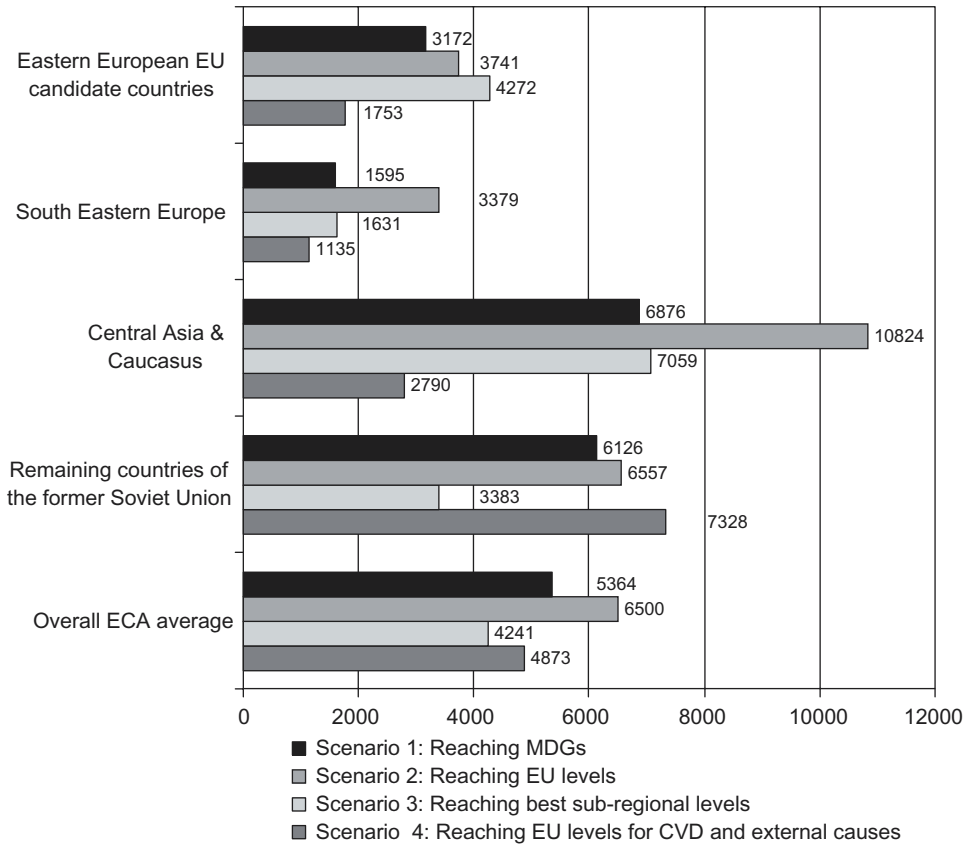
	Scenario 1: Reaching MDGs 4 and 5	Scenario 2: Reaching EU levels	Scenario 3: Reaching best subregional levels	Scenario 4: Reaching EU levels for CVD and external causes
Eastern European EU candidate countries				
Bulgaria	6140.32	6182.57	6842.39	2174.38
Czech Republic	331.40	0	96.13	1009.11
Estonia	3159.10	2744.13	3448.50	4734.24
Hungary	2185.03	2160.16	2856.00	1692.41
Latvia	4123.32	3952.64	848.29	4626.80
Lithuania	3261.75	2272.74	2982.82	4026.32
Poland	1870.00	2104.18	2787.88	1314.46
Romania	6177.58	9025.92	9708.25	2061.53
Slovakia	3101.72	2465.84	3151.71	1256.70
Slovenia	1033.53	3.04	196.64	870.78
Subregional average	**3172.13**	**3741.20**	**4272.17**	**1753.27**
Southeastern Europe				
Albania	593.82	4539.70	2896.59	1342.45
Croatia	2462.85	1638.99	0	1134.50
Macedonia, FYR	1255.43	5357.15	3214.37	817.28
Subregional average	**1594.77**	**3378.99**	**1631.42**	**1134.99**
Central Asia and Caucasus				
Armenia	6594.79	7547.70	3868.08	544.25
Azerbaijan	4079.49	6738.86	3036.35	1375.01
Georgia	4836.24	5251.42	61.17	1127.78
Kazakhstan	8270.72	11119.89	7485.63	5784.99
Kyrgyzstan	9610.91	13468.82	9801.68	3576.28
Tajikistan	4282.69	6978.99	5412.52	1044.22
Turkmenistan	13095.78	20205.26	16795.45	4108.88
Uzbekistan	6253.33	12164.72	7900.60	2090.00
Subregional average	**6876.34**	**10824.28**	**7058.65**	**2790.46**
Remaining countries of the former Soviet Union				
Belarus	3687.47	3118.69	0	5541.68
Moldova	7570.38	8798.60	5446.12	3918.24
Russian Federation	6523.56	7264.23	4035.55	8417.07
Ukraine	5346.82	5013.12	2004.33	4747.57
Subregional average	**6125.69**	**6556.63**	**3383.30**	**7328.05**
Overall ECA average	**5364.24**	**6499.66**	**4241.01**	**4873.31**

Note: Analysis based on national registration data; data refer to latest available years; no recent data available for Bosnia and Herzegovina, Serbia and Montenegro and Turkey.

and Ukraine would achieve the highest gains in Scenario 1, while Bulgaria, Hungary, Poland, Romania, and Slovakia would achieve maximum gains in Scenario 3.

Surprisingly, in several countries of the former Soviet Union (Estonia, Latvia, Lithuania, and the Russian Federation), as well as in the Czech Republic, gains in YPLL were largest in Scenario 4 (reducing mortality rates from cardiovascular disease and external causes of death to EU levels), in spite of the emphasis on deaths at early ages and under the age of 65 that the measure of YPLL implies.

FIGURE 13. OVERALL IMPACT ON YPLL ACCORDING TO THE DIFFERENT SCENARIOS (AGE 0–64 PER 10,000): REGIONAL AND SUBREGIONAL AVERAGES



Note: Analysis based on national registration data; data refer to latest available years.

The results of the calculation of YPLL illustrate how the method of assessing population health influences the perceived importance of challenges to population health. Invariably, value judgments are implied in the choice of method. With the notable exception of several countries of the former Soviet Union, including the Russian Federation, the average ECA gain in YPLL was largest in Scenario 2 (reaching EU levels on infant, child, and maternal mortality). This is perhaps not surprising, because the use of YPLL gives emphasis to death at young ages. With the limit of 65 years, reducing mortality after the age of 64 does not yield any benefits in YPLL. This obviously implies a judgment on the value of life at certain ages. Although societies usually hold the prevention and treatment of death in young ages as a higher priority than the prevention of death in older ages, there is hardly any society that would not value health gains over the age of 64. While thus not unproblematic, the measure of YPLL acknowledges that deaths at young ages represent a greater social and economic loss to a country.

In assessing the appropriateness of the Millennium Development Goals to the countries of the ECA region, the gains in YPLL clearly demonstrate the benefits of reducing infant and child mortality. This is particularly the case for the countries of Central Asia and the Caucasus, which have the highest infant mortality rates in the region. As is the case for life expectancy at birth, gains in

YPLL in these countries would be much higher, if World Bank data on infant mortality were used instead of the official data reported to WHO. Given the implicit priority YPLL gives to deaths at young ages, it is especially striking that in some countries Scenario 4 emerges as yielding the most gains.

Although outside the scope of this project, it should be noted that the method of YPLL has been applied, using different age limits or weighting factors to change the emphasis given to deaths at different ages. There is not, however, a consensus as to whether and how this should be done. To illustrate the effect of weighting factors on YPLL, we have recalculated the YPLL for ages 0–64 attributable to achieving the Millennium Development Goal for infant mortality for two countries with different patterns of mortality, Russia and Azerbaijan. We used the weightings developed in the Global Burden of Disease, in which the weight applied to years lost at different ages is Cxe^{-bx}, where x is age and C and b are constants with values 0.01658 and 0,04 respectively. This weighting reduced the YPLL for achieving the MDG for infant mortality for Russia from 6,098 to 495 and for Azerbaijan from 3,240 to 263. When using the same weighting for the reduction of mortality from cardiovascular disease, the YPLL increased from 2,514 to 2,820 for Russia and from 1,375 to 1,504 for Azerbaijan. These results indicate that gains in YPLL resulting from reductions of adult mortality would have been even greater if the Global Burden of Disease weighting was used.

The use of YPLL, or as in the main part of this study, life expectancy at birth, for judging the appropriateness of the health-related Millennium Development Goals for the countries of the ECA region requires another qualification. The case of maternal mortality clearly reveals the limitations of both measures. Reducing maternal mortality in Scenarios 1, 2, and 3 did result in very minimal, sometimes hardly detectable, gains in life expectancy at birth or in YPLL. This shows the degree of interpretation the results require. Obviously, the study does not intend to make the case that maternal mortality does not matter. Instead of directly guiding policy responses, the results of the analysis need to be read with caution.

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This study aims to contribute to the debate about the appropriateness of health-related Millennium Development Goals (MDGs) for the countries of the Europe and Central Asia (ECA) region.

The study has important implications for policy choices at the regional, subregional, and country levels. Despite the fact that averages mask variations that exist within countries, certain conclusions stand out:

- For the ECA region as a whole, proportionately more gains in life expectancy would accrue from the control of non-communicable diseases (NCDs) than from achieving the targets in the classic MDGs. This pattern holds in all subregions.
- There are proportionately more gains to be had from achieving the classic MDGs in Central Asia and the Caucasus subregions.

For priority setting, policy formulations, programs, and development assistance, the key messages from this study are:

- the importance of reducing morbidity and premature mortality from NCDs and external causes across the entire region;
- the need for particular attention to the classis MDG indicators (infant mortality rates, under-5 mortality rates, and maternal mortality ratios) in the countries of Central Asia and the Caucasus;
- the importance of establishing effective and sustainable surveillance, vital registration, and health information systems to provide valid data for local decisions and international comparisons, and
- the continued need for interagency collaboration in support of all these objectives.

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