The Burden of Disease and Injury in Serbia

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FOREWORD

This report presents the National Burden of Disease Study for Serbia, based on methods developed for the Global Burden of Disease Study and funded by the European Agency for Reconstruction (EAR), between October 2002 and September 2003.

Given the obvious incongruence between available resources and technological as well as human potential in health care, the setting of priorities for investment in health is mandatory in all societies. This seems to be especially true for Serbia at the beginning of the new millennium, and after a devastating last decade. Therefore priorities for Research and Development in Serbia have to be set based on evidence wherever possible. The purpose of the Burden of Disease concept used in this study is to provide comprehensive assessment of health challenges to help information based public debate on the priorities for health action and to provide the decision makers with essential information on:

- What diseases to prioritise,
- which population groups are disadvantaged,
- where medical services are deficient,
- what are the most cost-effective health interventions, and
- which trends can be expected for the immediate future?

The most common approach to answer these questions traditionally is based on mortality. However, in the ageing societies of Europe and especially in Serbia more than half of the population has a life-expectancy of more than 70 years, therefore years of life lived with disease or disability become increasingly important and need to be considered for meaningful estimates of disease burden. The Burden of Disease concept applied in *Serbian Burden of Disease Study* offers a comprehensive health outcome measure of mortality and morbidity experience in a defined population: a Disability Adjusted Life Year being a year lived with less than optimum health. This approach allows for adding up years lost due to premature death as well as years lived with diminished health, and thereby gives a realistic estimate (impression) of the total burden of disease.

The results coming from the *Serbian Burden of Disease Study* are not only of relevance for the decision makers in the government but also in all key institutions related to health care, especially for the Health Insurance Fund, which should reconsider the present allocation of scarce funds to health care services in the light of the results of this study. Furthermore *Serbian Burden of Disease Study* increases the awareness of the relevance of valid epidemiological data on which the precision of the estimates of disease burden depends to a large degree.

To achieve the objective of the Burden of Disease approach, it should become a routine tool in health surveillance in our country. The *Serbian Burden of Disease Study* is the starting point to achieve this objective. As a routine tool for present and future policy makers in Serbia, the *Serbian Burden of Disease Study* will be judged by its impact in making a difference in terms of health policy and the pattern of health service delivery.

Belgrade, August 2003

Prof. Tomica Milosavljević, MD, PhD
Minister of Health of Republic of Serbia

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DISCLAIMER

Opinions expressed in this report are those of the author and should not be construed as representing the view of the Ministry of Health or any other institution.

ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AIHF	Australian Institute of Health and Welfare
AMI	Acute myocardial infarction
CBA	Cost-benefit analysis
CEA	Cost-effectiveness analysis
COPD	Chronic obstructive pulmonary disease
CPS-II	Cancer Prevention Study
CRA	Comparative risk assessment
CUA	Cost-utility analysis
CVD	Cardiovascular disease
DALE	Disability-adjusted life expectancy
DALY	Disability-adjusted life year
DFLE	Disability-free life expectancy
DHS	Department of Human Services
DISMOD	Disease modeling software package
DM	Diabetes mellitus
DW	Disability weight
EAR	European Agency for Reconstruction
ECCCS	Emergency Center of Clinical Center of Serbia
EME	Established Market Economy
FR	Federal Republic
ESRF	End Stage Renal Failure
FSE	Formerly Socialist Economies of Europe
GP	General Practitioner
GBD	Global burden of disease
HALE	Health-adjusted life expectancy
HDL	High-density lipoprotein
HE	Health expectancy
HG	Health gap
HIF	Health insurance fund
HIV	Human Immunodeficiency Virus
ICD-10	International Classification of Diseases, 10th revision
IDDM	Insulin-dependent diabetes mellitus
IDP	Internally displaced person
IHD	Ischaemic heart disease
IOM	International Organization for Migration
IPH	Institute of Public Health
ISAAC	International Study of Asthma and Allergies in Childhood
LBW	Low birth weight
LDL	Low density lipoprotein
LE	Life expectancy
NBD	National burden of disease
NIDDM	Non-insulin dependent diabetes mellitus
NSGDM	National Serbian Guideline on the Management of Diabetes
PAR	Population attributable risk
QALY	Quality-adjusted life year
RR	Relative Risk
RTA	Road traffic accident
SBDS	Serbian Burden of Disease Study
SEYLL	Standards expected years of life lost
SF-36	Medical Outcomes Study 36 Item Short-Form Health Survey
SMN	Serbia and Monte Negro

SMPH	Summary measure of population health
STI	Sexually transmitted infection
TB	Tuberculosis
UN	United Nations
UNMIC	United Nations Mission in Kosovo
WHO	World Health Organization
YLD	Years lost due to disability
YLL	Years of life lost (due to mortality)

AUTHORS FOREWORD

To achieve its objectives in the area of health policy, the Government needs reliable and valid information on population health outcomes, how equitably these outcomes are distributed across population subgroups and the causes of these outcomes. These information are required to monitor current trends, forecast future needs for Government intervention, and evaluate the effectiveness and efficiency of Government policies and programmes in meeting its objectives.

The *Serbian Burden of Disease Study* provides more details about the health gap measures, than could be produced from the present health statistical framework. It is intended to serve as a resource for a wide range of users, including health planners and policy analysts, health service funders and providers, community groups, and others with interest in summary measures of population health in general and health gap measures in particular.

The main aim of doing a National Burden of Disease study is to inform and influence policy and planning and to involve the community in thinking about health problems. The study produces a large amount of results. Some of our stakeholders will be interested in a few summary findings, while others will want to scrutinise and make use of very detailed descriptions of the methods and results. That is the reason why a number of dissemination strategies, that will satisfy the information demands of our audience, were planned.

The results of *Serbian Burden of Disease Study* are presented in two printed publications, as a full report (in english) and as brief summary report (in serbian). Also, in order to achieve the most possible transparency and availability of information, the SBDS team made the results of the study available on the internet: http://www.sbds.sr.gov.yu. The results of the study, information about the project team, current activities and other relevant information are available on the site.

Belgrade, September 2003. Authors

SUMMARY

The *Serbian Burden of Disease Study* (SBDS) is an European Union funded project undertaken between October 2002 and September 2003 by European Agency for Reconstruction (EAR). This report provides an overview of results from the SBDS.

Traditionally, the only "health outcome" that could be monitored at the population level was mortality. In a "mild low mortality society" (measured by child mortality under five years of age and adult, 15-59 years, mortality for World Health Organization's Member States), such as Serbia, deaths have become increasingly concentrated into old age. This made mortality data less informative about health at earlier stages of the life cycle. Also, with the majority of the population living into old age and so increasingly at risk of chronic disease and disability, the need for information on quality as well as quantity of life has become more pressing.

During the last decade of the 20th century, the health status of the population of Serbia was harmfully influenced by numerous factors, but especially by the general situation in the country (the long lasting economic crisis, the consequences of war in the surrounding countries and Serbia itself, wide range of economic and diplomatic sanctions). Years of life under severe stress and trauma-ridden environment have brought depression and hopelessness, followed by general negligence towards health and increased risk behavior. Precise information about diseases and injuries, their incidences, their consequence, their causation and their trend is more than ever necessary to inform health policy-making in Serbia.

The main purpose of the SBDS was provision of the first detailed and internally consistent estimates for Serbia of the incidence, prevalence, duration, mortality and disease burden for an exhaustive and mutually exclusive set of disease and injury categories. The most important advantage from a policy perspective of the approach taken in this Study is that estimates are expressed in terms of a summary health-outcome measure which combines both mortality and morbidity. These estimates should guide future health strategies and interventions and would enable to monitor the improvements in health and the performance of the health care system.

The overall goals of the *Serbian Burden of Disease Study* are:

- to review the Global Burden of Disease (GBD) methodology and its applicability for Serbian analysis;
- to provide a comprehensive assessment of premature mortality and disability attributable to disease, injuries and various risk factors in year 2000, and
- to develop a framework for cost-effectiveness analysis, i.e. economic appraisal of current and potential new health intervention options that will aid in the effective allocation of health resources.

To achieve these goals, the study has several objectives:

- to develop internally consistent estimates of mortality for 135 causes of disease and injury (including over 500 stages or sequelae);
- to develop internally consistent estimates of incidence, duration and severity for the 18 major non-fatal health outcomes associated with the more than 100 causes of disease and injury;
- to calculate the burden of premature mortality and disability in terms of Disability-Adjusted Life Years;
- to estimate attributable and avoidable burden of disease due to 7 different risk factors: tobacco, alcohol, physical inactivity, low vegetable and fruit intake, high blood pressure, obesity and high blood cholesterol; and
- to establish a cost-effectiveness analysis on a selected health intervention for diabetes mellitus.

The SBDS Team has conducted this research in collaboration with the Ministry of Health of the Republic of Serbia, the School of Medicine at the Belgrade University, and the Institute of Public Health of the Republic of Serbia. It is largely based on the methods developed for the Global Burden of Disease Study. The method allows the quantification of all states of ill health into a universal indicator, the Disability Adjusted Life Years (DALY). The DALY combines a measurement of premature mortality and disability. This indicator is the aggregation of Years of Life Lost and Years Lived with Disability at the population level and thus reflect the "burden of disease" in population. Life expectancy determines the stream of life lost, or Years of Life Lost (YLL), for each premature death. Likewise, the disability arising from disease or injury is measured as the duration spent in state of ill health weighted for severity. This is referred to as the Years Lived with Disability (YLDs). The DALY expresses years of life lost to premature death together with years lived with disability of specified severity and duration. One DALY is thus one lost year of healthy life.

All summary measures of population health involve explicit or implicit social value choices. In particular, the DALY measures the gap between a population's actual health status and some 'ideal' or reference status. In the absence of Serbia specific values (social preferences for health states), SBDS 2000 project adopted GBD 1990 and 2000 health state valuation results expressed in the form of disability weights. As in the Global Burden of Disease Study and other national studies, both undiscounted and discounted (3 percent per year) DALYs were calculated. Only discounted data are presented in this report. The 3 percent discount rate was chosen to allow international comparisons and because this rate is recommended by the International Panel on Cost Effectiveness in Health and Medicine. The Global Burden of Disease Study weighted a year of healthy life lived at young ages and older ages lower than for other ages. This choice was based on a number of studies that have indicated there is a broad social preference to value a year lived by a young adult more highly than a year lived by a young child or at older ages. Not all such studies agree that young ages as well as older ages should be given less weight or on the relative magnitude of the differences. Because the influence of age weighting on the ranking of conditions is not very great and the latter are controversial in literature, in SBDS 2000 we have decided to use them for comparability with other studies. Recommended values of $C = 0.1658$ and $\beta = 0.04$ were applied.

For measuring the burden of disease due to premature mortality, the Standard Expected Years of Life Lost (SEYLL) method has been adopted. This uses the expectation of life at each age x based in some ideal standard to estimate the loss of years of life associated with death. To define the standard, the highest life expectancy observed at that time for any nation (i.e. the 82.5 years life expectancy of women in Japan) was chosen. The standard expectations are therefore based on a model life table, namely Coale and Demeny West level 26, which has a life expectancy at birth for females of 82.5 years. The male-female "biological" difference in survival potential was chosen as 2.5 years. The standard life expectancy at birth for males was

80 years. YLD are calculated by estimating the incidence (or prevalence where the former was not possible) of each condition in Serbia in 2000, or earlier, the average duration of each incident case (or, more precisely, of the associated disability until death or recovery) and the average severity of the associated disability (the average disability weight). For most conditions this involves calculating a weighted average, across all stages, sequelae or complications of the condition, for both duration and disability severity. Furthermore, both duration and disability distribution need to be adjusted for the effectiveness and coverage (access) of currently available interventions.

In Serbia, Burden of Disease Study level of analysis is national (Republic of Serbia without Kosovo and Metohia) and regional (City of Belgrade). Reference year for the analysis is 2000. Age groups are more detailed than those used in GBD 1990 or GBD 2000 (0, 1-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-59, 80-84, 85-89, 90-94, 95+). For the sake of comparison most of the results are expressed as GBD 1990 or GBD 2000 age groups.

Diseases' categories are based on the list used for the GBD 2000 but reviewed to amalgamate disease categories not relevant to the country. For the SBD Study some of the causes in the GBD list were not relevant. Selection process has been based on analysis of the local pattern of cause of death and compilation of the number of death coded to one letter and two numbers ICD-10 code, as well as on pattern of hospitalization's causes. Initially all diseases and injuries responsible for more than 100 deaths or 200 hospitalizations (that is approximately 0.1 percent of each) in 2000 were identified from the Serbian mortality database, which led to 60 causes and Belgrade hospital episodes database which led to 88 causes. These were then compared with the conditions selected for other studies (especially those highly ranked in disability), Serbian health priorities cited in Strategy document and by the SBDS Steering Committee. A final selection of 18 causes was made for which SBDS disease model metrics has been acquired.

The population attributable risks (PARs) were applied to the YLL, YLD and DALY data, so allowing an estimate to be made of the burden attributable to major risk factors. The methods assume independence of risks and so overestimate the attributable burden; on the other hand, conservative estimates of relative risks were used when calculating PARs. A set of seven risk factors: tobacco (smoking cigarettes), alcohol, physical inactivity, low vegetable and fruit intake, high blood pressure, obesity and high blood cholesterol were selected for analysis in this phase of the study. The selection was based on the proportion of diseases related to these risk factors in the mortality and morbidity rates, public health importance of the diseases and the health priorities defined in the documents related to the process of health care system reforms. The choice was also balanced against the availability of population data on risk factor exposure and on the relative risk associated with the exposure.

In planning the SBD study, we have also considered the feasibility and policy relevance of other analyses such as cost-effectiveness analyses (CEA), which is developed as an example for Diabetes mellitus type 2. In order to develop CEA for Diabetes mellitus Type 2, curative and preventive components were analysed separately for costs and outcomes, while a simplified disease model was developed.

In the time available to this study no new data were collected, but rather use was made of existing resources. While every effort has been made to identify and use the best available information relating to each disease and injury category, and wide consultation in the relevant field has been undertaken, the estimates made in this study should be regarded as in progress and capable of further refinement.

Deaths and estimates of YLL have been obtained for over 100 conditions (precisely 135, including over 500 stages or sequelae), and estimates of YLD, YLD/DALY ratio and DALY for smaller portion of conditions (precisely 18, including over 100 stages or sequelae) in different age groups, from 5 to 19 age groups, for both genders and for selected areas.

Sex and age-specific death rates and age-standardized death rates are also represented (per 1 000 population). YLLs, YLDs and DALYs rates (per 1 000 population per year) are age-standardized by direct method with Segi's world population, European standard population, WHO world population and Serbia 2000 population when Belgrade's rates are in question. Rates are calculated without rounding but output is rounded to the hundreds.

Calculations and final presentation were realized using STATISTICA, MORTPAK-LITE, NCSS, DISMOD II, Excel and @Risk.

Key findings out of the SBDS are:

Life expectancy at birth in 2000 was 69.00 years for Serbian males and 74.46 years for Serbian females. Male life expectancy at birth is 5.46 years shorter than female life expectancy. Serbia ranks around 60th in the world in terms of total life expectancy at birth in 2000.

The biggest improvement in life expectancy at birth in 2000 would occur with the elimination of ischemic heart disease mortality in males (2.40 years) and elimination of cerebrovascular disease in females (2.10 years).

Between 1950 and 2001 the change in average life expectancy at birth for males in Serbia is 0.35 years increase annually (CI: 0.17-0.53) and for females 0.40 years (CI: 0.25-0.55).

Premature mortality (all causes of deaths) was responsible for 814 022 years of life lost or 107.8 YLLs lost per year per 1 000 population (discounted at 3% per annum) in Serbia in 2000. Males lost 31.3% more years of life than females. Of these years 161 452 have been lost in Belgrade, 91 835 years in males and 69 617 in females.

Cardiovascular diseases, cancers and injuries were responsible for 80% of the total mortality burden in both males and females.

In people aged 65 years and over, cardiovascular diseases account for more than half of the years of life lost, whereas cancers are more important cause than cardiovascular diseases for all ages below 45. Injuries are the main cause of lost years of life in young adults and children aged 5-14, and neonatal conditions are the main cause in children aged under five.

In general, the total burden of 18 selected diseases and injuries in Serbia without Kosovo and Metohia in 2000 was estimated to be 621 993 DALYs or 82 DALYs lost per year per 1 000 population, while the estimate for Belgrade of 130 587 DALYs resulted in the same rate – 82 DALYs lost per 1 000 population in the year 2000. The burden in Serbia for males was 32% higher than for females (in Belgrade: 34%).

Ischaemic heart disease, cerebrovascular diseases, lung cancer, unipolar depressive disorders, and diabetes mellitus were responsible for almost two thirds of the total burden (70%). Rankings based on DALYs differ substantially from rankings based on the number of deaths only. In terms of specific conditions, the ranking of the total burden in Serbia was highest for ischemic heart disease, followed by cerebrovascular disease, lung cancer and unipolar depressive disorders at the fourth place for both territories. However, diabetes mellitus took the fifth place in Serbia without Kosovo and Metohia, while in Belgrade breast cancer was at the same position. The importance of unipolar depressive disorders, even if it doesn't generate deaths in Serbia, was one of the key findings of this study.

With the exception of non-fatal health outcomes (unipolar depressive disorders, hearing and vision loss, low birth weight and asthma), YLL had a more significant contribution than YLD to the total burden of selected conditions (78% : 22% in Serbia without Kosovo and Metohia, and 75% : 25% in Belgrade).

For the selected group of conditions in the Serbian Burden of Disease Study mortality was the main contributor to the burden of smoking, physical inactivity, inadequate intake of fruits and vegetables, hypertension and high blood cholesterol, because the diseases connected to those risk factors are characterized by high mortality. The greater proportion of disability in our study was recognized in the burden due to alcohol and obesity. The disability associated with alcohol dependence and abuse is responsible for the YLDs of alcohol harm, while negative values of YLDs for low regular alcohol intake produced the final alcohol benefit.

Cost-effectiveness analysis for diabetes mellitus has shown that the rigid implementation of the national guideline for Diabetes mellitus in clinical practice bears an enormous potential to save lives respectively to reduce years lived with reduced quality of life and it may reduce clinical costs by as much as a quarter. In addition this analysis has shown that a preventive programme with a relatively small budget may achieve risk factor reductions resulting in about the same amount of quality adjusted life years saved, not only through the prevention of diabetes but also of other diseases.

One of the important by-products of the extensive epidemiological modeling carried out as part of this study has been the identification of a number of gaps and deficiencies in Serbian population health data. The key issues arising from these gaps and deficiencies are discussed.

Prevalence and incidence data for some diseases is relatively complete (for example, cancer and some infectious diseases) but data for many others are unavailable or have severe limitations. This can lead to inconsistencies between commonly quoted prevalence, incidence and mortality estimates - particularly relevant with regard to some important diseases:

Other gaps in our knowledge of the epidemiology of disease and injury in Serbia relate to information on the distribution of disease severity and case fatality rates, which are not available for the vast majority of conditions. Improvements in record linkage and retention of identifiers in population surveys should allow these issues to be addressed at relatively low cost.

Plausible fractions of disease burden attributable to risk factors (“Attributable Risk”) are difficult to calculate for a variety of reasons. There is a lack of complete and valid information on the prevalence of risk factors. Evidence of the relative risk of death or disease in the presence of a risk factor is limited and often reported by different categories of exposure from those used in population surveys.

In the course of undertaking this study, a number of methodological issues have emerged, which require further development and refinement in order to improve the validity and applicability of the DALY metric. Efforts are already under way internationally in some of these areas. We mention the major areas where methods need improvement: taking co-morbidity into account in estimating the total burden of disease; discounting specifically for diseases with long-term sequelae; numerical valuation of health states with an aim to develop Serbian-specific disability weights; population disability data seen as a development of standard validated summary health state measures for inclusion in population surveys; micro-simulation methods that allow for a more flexible approach in dealing with multiple disease and population categories, the interactions between them and a number of still unresolved issues in using DALYs as health outcome measures in cost-effectiveness analyses.

This study has provided an assessment of the health status of the Serbian population through estimates of contribution of fatal and non-fatal health outcomes to the total burden of disease and injury in Serbia in 2000. Mortality, morbidity and disability arising from different diseases, injuries and risk factors were measured using a common metric, the disability-adjusted life year.

This study also presents an example of cost-effectiveness analysis using DALYs as a health outcome measure. The treatment of Diabetes mellitus Type 2 has been chosen to demonstrate the potential of cost-effectiveness analysis, because it is a mass disease affecting large numbers especially of the older population in Serbia. In addition a National Serbian Guideline on the management of Diabetes has recently been developed. The analysis of cost and effectiveness of the management of Diabetes mellitus Type 2 should clarify, whether the nationwide application of the guideline would save a relevant amount of Disability Adjusted Life Years and reduce the medical cost of diabetic patients' treatment as compared to the present situation in Serbia.

The results coming from the SBDS analysis are not only of relevance for the decision makers in the government but also in all key institutions related to health.

The analyses presented in this report provide a framework for completition of DALY estimates for all conditions that are not covered in this report; for more detailed analysis of particular conditions; for burden of disease estimates for sub-populations and for analysis of the impact of risk factors and health determinants to inform health policy making and priority setting.

1. INTRODUCTION

VESNA BJEGOVIĆ, JELENA MARINKOVIĆ, ULRICH LAASER

Traditionally, the only "health outcome" that could be monitored at the population level was mortality. In a "mild low mortality society" (measured by child mortality under five years of age and adult, 15-59 years, mortality for World Health Organization's Member States), such as Serbia, deaths have become increasingly concentrated into old age. This made mortality data less informative about health at earlier stages of the life cycle. Also, with the majority of the population living into old age and so increasingly at risk of chronic disease and disability, the need for information on quality as well as quantity of life has become more pressing, (Tobias et al. 2001). In addition, given the obvious incongruence between available resources and technological as well as human potential in health care, the setting of priorities for investment in health is mandatory in all societies. The simple question is: "How do we set our priorities?" However, the answer to this seemingly easy question is a rather difficult one (WHO 1998). This seems to be especially true for Serbia at the beginning of the new millennium and after a devastating decade.

Population of Serbia experienced many social and economic threats during 1990s. Years of life under severe stress and trauma-ridden environment have brought depression and hopelessness, followed by general negligence towards health and increased risk behavior. During the last decade of the 20th century, the health status of the population of Serbia was harmfully influenced by numerous factors, but especially by the general situation in the country (the long lasting economic crisis, the consequences of war in the surrounding countries and in Serbia as well, wide range of economic and diplomatic sanctions), (Simić at al. 2001, Garfield 2001).

The total population of Serbia, including Central Serbia and Vojvodina, is to be 7 875 380 according to Census 2002 (Federal Statistical Office 2002). The population of Central Serbia declined by more than 25 000 over decade, while the population of Vojvodina increased for more than 77 000. Serbia entered the crisis of the 1990s with the population profile overall of a developed country. The economic crisis led to a smaller number of births, increased emigration of young people and increased immigration of the elderly (among refugees and internally displaced persons). Today the major trend is a rapid ageing of the population. Consequently, the population of Serbia can be classified among very old populations. According to the data from 2000, somewhat over 12% of residents are aged 65 years or more. The life expectancy at birth for males born in 1997/98 is 67.69 in Vojvodina and 69.96 in Central Serbia, while for females is higher: 73.24 and 75.00 respectively.

National death registries for Serbia show that mortality among infants and children under five years declined by about half during 1990s. Infant mortality, which is a good indicator of general health status of the population, is decreasing over the recent years (from 17.2 – Central Serbia and 14.1 - Vojvodina in 1990 to 10.7 and 10.5 respectively in 2000). Mortality rate of children under 5 years in the Republic of Serbia during the last decade has also significantly decreased. Maternal deaths per 100 000 live births are relatively rare events; their number thus randomly varies year by year in Serbia. Nevertheless, the maternal mortality did not change significantly during the last 10 years and in 1999 it was 9.7 per 100 000 live births. A three-year moving average also shows that the maternal mortality rate was low and essentially stable throughout the 1990s (Garfield 2001). However, mortality has risen among most adult age groups, during most years, since 1995. The rise was small among those under 65 years and therefore increased with age. The chronic non-communicable diseases are dominating within the structure of death causes. At the first place are cardiovascular diseases with the share of 56.7% in Central Serbia and 58.4% in Vojvodina, followed by malignant neoplasm with the share of 17.1% and 17.5% respectively. According to the data of the mortality statistics (death certificates), there were no significant changes in the structure of causes of death during the last ten years.

The survey of the health status, health needs and the utilization of health services of the population of Serbia conducted during the year 2000 by the Institute of Public Health, showed that even 60.4% of the adult population are smokers and that the one-third of all women and nearly the half of men are daily smokers (Institute of Public Health of Serbia 2000). Smoking is the highest among those 19 – 34 years of age. The nutrition of the population is mostly improper, 37% of the population can be classified as moderate, while 17% of the population is over-weight. As much as 63% of individuals are spending their spare time sedentary. Of those individuals with sedentary type job, three quarters are spending their spare time likewise. Hypertension is diagnosed in 41% of adult population of Serbia, while 27% is anemic. Although alcohol is consumed regularly only by 3.3% of the population, according to the weekly alcohol consumption, expressed by alcohol units and the estimated health risk, 82.7% of adult population of Serbia are at lower risk, 11.6% at high risk, and 5.6% at the highest risk. Females are most common in the lower risk category, and males in the high and highest risk category. Approximately 10.0% of adults are taking different kinds of psychoactive drugs (diazepam, valium, amphetamines), while 3.2% intake marijuana. Risky sexual behavior (not using condoms) exists in 56.2% of the population. The survey showed that approximately 18% of the population of Serbia have some sort of physical impairment, which in more than half of them is causing certain difficulties.

Yet separate analyses of the “length of life” and “quality of life” dimensions of health are insufficient for evidence-based policy in Serbia. Increasingly, when setting policy, a trade-off between gains in quantity and gains in quality of life must be made, creating the need for a composite unit of health that integrates both dimensions.

Precise information about diseases and injuries, their incidences, their consequence, their causation and their trend is more than ever necessary to inform policy-making, (Mathers et al. 2001a). While the public has growing expectations of health services and the repertoire of health services to respond to these demands is expanding, governments are under pressure to allocate and justify their health resource allocation. Decision-makers at all levels are increasingly required to evaluate the impact of health policies, to justify the adoption of new ones and to ensure that information is available for inter-programme comparisons.

In the previous context evidence-based evaluation of policies to improve health and reduce inequalities, and the prioritising and resourcing these policies, require four basic types of information, (Murray and Lopez 1996b; Mathers et al. 1999):

- a detailed assessment of the magnitude and impact of health problems in the population, including information on the causes of loss of health in the population (both in terms of disease and injury, and risk factors or broader determinants), in order to address the questions of what can be done to improve health and what are the best buys for the health dinar;

- information on health expenditure and health infrastructure (a national system of health accounts) detailing the availability of resources for health improvement and what the resources are currently used for;
- information on the cost-effectiveness of available technologies and strategies for improving health; and
- information on inequalities in health status, health determinants, and access to and use of health services (including both prevention and treatment services).

This Report addresses the first of these information needs by providing the first detailed and internally consistent estimates for Serbia of the incidence, prevalence, duration, mortality and disease burden for an exhaustive and mutually exclusive set of disease and injury categories. The most important advantage from a policy perspective of the approach taken in this Study over previous health status research is that estimates are expressed in terms of a summary health-outcome measure which combines both mortality and morbidity. This measure can be used for cost-effectiveness analysis, allowing the linkage of information on burden of disease, costs and health outcomes, (Michaud et al. 2001).

1.1. BACKGROUND

In the last decade of 20th century, a considerable effort has been put into the development of summary measures of population health that combine information on mortality and non-fatal health outcomes. In 1993 the Harvard School of Public Health in collaboration with The World Bank and World Health Organization (WHO) assessed the global burden of disease (GBD). Aside from generating the most comprehensive and consistent set of estimates of mortality and morbidity by age, sex and region ever produced, GBD also introduced a new metric – disability adjusted life year (DALY) – to quantify the burden of disease. The use of DALY allows researchers to combine in a single indicator years of life lost from premature death and years of life lived with disabilities.

With the publication of the original GBD Study in 1993-1996, there was immediate interest in applying the methods in countries. Since 1993, when the study in Andhra Pradesh in India started, 35 national burden of disease (NBD) studies have been undertaken, (Mahapatra 2002). National Burden of Disease Studies have been completed or are underway in all regions of the world for example, Brazil, Chile, Colombia and Mexico in Latin America; in Algeria, Tunisia and Morocco in North Africa; in Ghana, Uganda, Mozambique, Tanzania and South Africa in Sub-Saharan Africa; in the state of Andhra Pradesh (India), Nepal and Indonesia, in China and Mauritius; and in Australia, the United States, the Netherlands, Sweden and the United Kingdom, (Department of Human Services 1999a, 1999b; Aragon et al. 1998; Bevan et al. 1998; Bradshaw et al. 2002; Le et al. 2000; Magnus et al. 2000; Hyder and Morrow 2000). Some have been completed and others are still in progress.

Although the majority have followed the essential principles and methodology initially proposed by Murray and Lopez (1996a), they are not totally comparable to each other, because some have important modifications to the original procedures. For example, taking into account the valuation of health states as a criterion for classification of the studies, the first generation of NBD studies can be defined as those which used the map of disabilities published in the original version (Lozano et al. 1994, 1995; Fundacion Mexicana Para La Salud 1995; Republica de Colombia Ministerio de Salud 1994; Concha et al. 1996; Vos et al. 1995). Another group of countries have validated the procedures followed at the international level by undertaking local valuations of health states. Yet another group of studies have developed their own procedures for health valuations (Ruwaard and Kramers 1998; Mathers et al. 1999). In year 2000 WHO realized the new GBD study (Murray et al. 2001, Mather et al. 2002).

The Burden of disease study in FR Yugoslavia has been taken already in 1996 based on 1995 mortality and morbidity data, (Pejin-Stokić Lj 1996). The authors considered serious data problems concerning disability dimension and came up with the ratio of 1: 9 between years of life lost and years of life with disability. They also stressed a possible future cost-effective dimension of their study.

1.2. SERBIAN BURDEN OF DISEASE STUDY 2000

The Serbian Burden of Disease Study (SBDS) was carried out by the European Agency for Reconstruction's Project Team using methods largely based on those developed for the Global Burden of Disease study. The project commenced in October 2002 and finished in September 2003.

The overall goals of Serbian Burden of Disease Study, SBDS 2000, are:

- to review the Global Burden of Disease (GBD) methodology and its applicability for Serbian analysis;
- to provide a comprehensive assessment of premature mortality and disability attributable to disease, injuries and various risk factors in year 2000, and
- to develop a framework for cost-effectiveness analysis, i.e. economic appraisal of current and potential new health intervention options that will aid in the effective allocation of health resources.

To achieve this goal, the study has several objectives:

- to develop internally consistent estimates of mortality for 135 causes of disease and injury (including over 500 stages or sequelae);
- to develop internally consistent estimates of incidence, duration and severity for the 18 major non-fatal health outcomes associated with the more than 100 causes of disease and injury;
- to calculate the burden of premature mortality and disability in terms of Disability-Adjusted Life Years;
- to estimate attributable and avoidable burden of disease due to 7 different risk factors: tobacco, alcohol, physical inactivity, low vegetable and fruit intake, high blood pressure, obesity and high blood cholesterol; and
- to establish a cost-effectiveness analysis on a selected health intervention for diabetes mellitus.

1.3. SUMMARY MEASURES OF POPULATION HEALTH

Summary measures of population health are measures that combine information on mortality and non-fatal health outcomes to represent the health of a particular population as a single number (Field and Gold 1998; Murray et al. 2002). Efforts to develop summary measures of population health have a long history and in the past decade, there has been a markedly increased interest in the development, calculation and use of summary measures. Their range of potential applications includes:

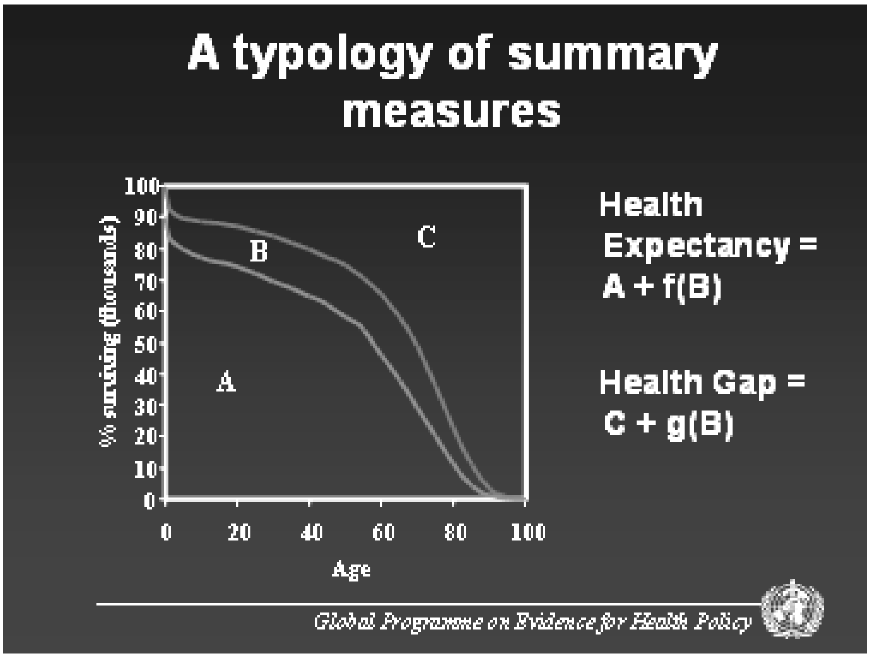
- comparison of health conditions or overall health status between two populations or the same population over time;
- quantification of health inequalities;
- inclusion of non-fatal health outcomes to ensure these receive appropriate policy attention;
- measurement of the magnitude of different health problems using a common currency;
- analysis of the benefits of health interventions for use in cost-effectiveness studies (Gold et al. 1996); and
- provision of information to assist in setting priorities for health planning, public health programs, research and development, and professional training (Murray, Salomon and Mathers 2000).

Comparative judgments are essential to evaluations of the performance of different health systems. Comparisons may allow decision-makers to focus their attention on those health systems with the worst performance. In addition, comparative judgments provide the possibility of analyzing the key contributors to differences in health between populations. Monitoring changes in health status over time is essential for the evaluation of health system performance and progress towards stated goals for a given society. Secondly, in the absence of summary measures, conditions that cause decrements in function but not mortality tend to be neglected relative to conditions that primarily cause mortality. Lastly, the relative contributions of different diseases, injuries and risk factors to the total summary measure are also a major input to debate on priorities for research and development investment (World Health Organization 1996). The change in some summary measures of population health offers a natural unit for quantifying intervention benefits in these analyses.

Broad interest and use of summary measures in the policy demonstrate the recognition of their value at the practical level for many of the purposes identified above (Brundtland 1998, World Bank 1993, Bobadilla 1996). In examining the properties of various summary measures, it is important to bear in mind the ultimate goal of influencing the policy process (Field and Gold 1998). Because of their potential influence on international and national resource allocation decisions, summary measures must be considered as normative measures. As stated by the IOM panel, "all measures of population health involve choices and value judgments in both their construction and their application." Great care must be taken in the construction of summary measures precisely because they may have far-reaching effects.

Two classes of summary measure have been developed: health expectancies and health gaps. Both classes of summary measure use time (lived in health states or lost through premature death) as an appropriate common metric for measuring the impact of mortality and non-fatal health outcomes. These two classes of measures are complementary (see Figure 1.1.).

Figure 1.1. A Typology of Summary Measures., of population Health



Source: Mathers et al. (2001a). National Burden of Disease Studies: A Practical Guide. Edition 2.0. Global Program on Evidence for Health Policy. Geneva, WHO.

In the Figure, there are two lines (upper and lower) and three areas (A, B and C). The upper line is the survivorship curve from a hypothetical life table population. The lower curve is a hypothetical curve of survivors to each age x in optimal health. Area A represents time lived in optimal health, area B time lived in suboptimal health, and area C represents time lost due to mortality. Total life expectancy at birth (LE) is given by the area under the upper curve:

$$LE = A + B$$

Health expectancies are population indicators that estimate the average time (in years) that a person could expect to live in a defined state of health. In terms of Figure 1.1., health expectancy (HE) is given by:

$$HE = A + f(B)$$

where f(.) is some function that assigns weights to years lived in suboptimal health (optimal health has a weight of 1).

A wide range of health expectancies have been proposed since the original notion was developed (Sanders 1964), including active life expectancy, ALE, (Katz et al. 1983), disability-free life expectancy, DFLE, (Robine et al. 1993, Mathers et al.1994), disability-adjusted life expectancy, DALE, (Murray and Lopez 1997), years of healthy life, YHL, (Erickson et al. 1995), quality-adjusted life expectancy, QALE, (Fanshel and Bush 1970, Wilkins and Adams 1992) and dementia-free life expectancy (Ritchie et al. 1993). Although not proposed as a summary measure, Cutler and Richardson (1997, 1998) developed a type of health expectancy called health capital. Health expectancies can be categorized into two main classes: those that use dichotomous health state weights and those that use health state valuations for an exhaustive set of health states.

During the 1990s, Disability-Free Life Expectancy (DFLE) and related measures were calculated for many countries (Mathers 2001, Robine et al. 1999). However, these measures incorporate a dichotomous weighting scheme in which time spent in any health state categorized as disabled is assigned arbitrarily a weight of zero (equivalent to death). Thus, DFLE is not sensitive to differences in the severity distribution of disability in populations. In contrast, DALE adds up expectation of life for different health states with adjustment for severity weights. DALE has been calculated in the GBD for eight regions of the world and for 191 WHO Member States (WHO 2000, Mathers et al. 2001b). HALE, which is a synonym for DALE, was calculated for 191 WHO Member States for the year 2000 (WHO 2001), for Canada based on population prevalence data for health states together with measured utility weights (Wolfson 1996) and for Australia using prevalence data from the Australian Burden of Disease Study and preference weights based on the GBD valuation methods (Mathers, Vos and Stevenson 1999).

Health gaps (HG) measure the difference between actual population health and some specified norm or goal

$$HG = C + g(B)$$

where g(.) is some function that assigns weights to health states lived during time B, but where a weight of 1 equates to time lived in a health state equivalent to death.

Following the pioneering work of Dempsey (1947), various measures of years of life lost due to premature mortality have been proposed. All are examples of “mortality gaps”, or the area labeled C in Figure 1.1. Health gaps extend the notion of mortality gaps to include time lived in states of suboptimal health (i.e. part of area B in Figure 1.1.). The principle characteristic defining a health gap measure is the population norm (age) chosen to define the period before which death or disability is considered premature. For some types of health gap measures, the implied target age may change as the mortality level changes, a highly undesirable property for comparisons.

Methods for defining health states and for eliciting health state valuations, as well as the incorporation of other social values also affect the calculation and interpretation of health gaps, as for health expectancies (Mathers 2002). One of the best known of the health gaps measures is the disability-adjusted life year (DALY), developed for use in burden of disease studies by Murray and Lopez (1996a).

2. METHODS

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The Serbian Burden of Disease Study is largely based on the methods developed for the Global Burden of Disease (GBD) Study (Murray and Lopez 1996a). The method allows the quantification of all states of ill health into a universal indicator, the Disability Adjusted Life Years (DALY). The DALY combines a measurement of premature mortality and disability (Murray and Acharya 1997; Anand and Hanson 1997; Williams 1999; Murray and Lopez 2000). Life expectancy determines the stream of life lost, or Years of Life Lost (YLL), for each premature death. Likewise, the disability arising from disease or injury is measured as the duration spent in state of ill health weighted for severity. This is referred to as the Years Lived with Disability (YLDs). DALYs are the aggregation of YLLs and YLDs at the population level and thus reflect the "burden of disease" in population:

$$\text{DALY} = \text{YLL} + \text{YLD}$$

The DALY expresses years of life lost to premature death together with years lived with disability of specified severity and duration. One DALY is thus one lost year of healthy life.

2.1. TIME AS THE COMMON METRIC FOR DEATH AND DISABILITY

The DALY is based on the premise that the best approach for measuring the burden of disease is to use units of time. Having chosen units of time as the unit of measure, the burden of disease can still be calculated using incidence or prevalence measures. Time lost due to premature mortality is a function of the death rate and the duration of life lost due to death at each age. Because death rates are incidence rates, there is no obvious alternative for mortality using an incidence perspective.

By contrast for non-fatal health outcomes both incidence and prevalence measures have been routinely used. There are at least two ways of measuring the aggregate time lived with a disability. One method is to take point prevalence measures of disability, adjusting for seasonal variation if present, and estimate the total time lived with the disability as prevalence *times* one year. The alternative is to measure the incidence of disabilities and the average duration of each disability. Incidence *times* duration will then provide an estimate of the total time lived with disability. For burden of disease analysis using the DALY, an incidence perspective has been chosen for three reasons. First, the method of calculating time lived with disability is consistent with the method for calculating time lost due to premature mortality. Second, an incidence perspective is sensitive to current epidemiological trends. Third, measuring incidence or deriving it from prevalence data and information on case-fatality and remission rates imposes a level of internal consistency and discipline that would be missing if prevalence data were used uncritically.

For some conditions, incidence estimates were directly available from disease registers or epidemiological studies. For others, incidence was modeled from data on prevalence, recovery and mortality, using multi-state life table methods. Where insufficient Serbian data were available to run the model, the incidence estimates developed in other studies were used.

2.2. SOCIAL VALUE CHOICES

All summary measures of population health involve explicit or implicit social value choices. In particular, the DALY measures the gap between a population's actual health status and some 'ideal' or reference status. In developing the DALY indicator, Murray and Lopez (1996a) identified five value choices that should be explicitly made:

- How long 'should' people in good health expect to live?
- Is a year of healthy life gained now worth more to society than a year of healthy life gained sometime in the future, for instance in 20 years' time?
- How should we compare years of life lost through death with years lived with poor health or disability of various levels of severity?
- Are lost years of healthy life valued more at some ages than others?
- Are all people equal? Do all people lose the same amount of health through death at a given age, even if there are variations in current life expectancies between population groups?

The Global Burden of Disease Study uses the same values for all regions of the world. In particular, it uses the same life expectancy "ideal" standard for all population subgroups, whether or not their current life expectancy is lower than that of other groups, it uses the same "disability weight" for everyone living a year in a specified health state, but it does not give equal value to a year of healthy life lost at different age intervals (nonequal "age weights").

The standard social value choices for Serbian Burden of Disease Study are described below.

2.2.1. Disability Weights – Making Time Lived Comparable to Time Lost

In order to use time as a common currency for non-fatal health states and for years of life lost due to mortality, we must define, measure and numerically value time lived in non-fatal health states. The valuation of time lived in non-fatal health states formalises and quantifies social preferences for different states of health as health state *weights*. Depending on how these weights are derived, they are variously referred to as disability weights, quality-adjusted life year (QALY) weights, health state valuations, health state preferences or health state utilities. Most such weights are measured as a number on a scale of 0 to 1, where 0 is assigned to a state comparable to death and 1 is assigned to a state of optimal health. Because the DALY measures loss of health, the weights are inverted for DALY calculation with 0 representing a state of optimal health (no loss) and 1 representing a state equivalent to death.

While death is not difficult to define, non-fatal health states are. Non-fatal outcomes of disease are different from each other in their impact on the individual, and the impact on the individual is mediated by contextual factors including personal characteristics and the physical and social environment. Non-fatal outcomes of disease involve multiple domains of health. Disability weights provide the means to weight and then aggregate various aspects of an individual's health such as mobility, anxiety and pain. Methods for measuring preferences for health states are numerous.

One common approach is to describe health as a profile of levels on a series of domains. The SF-36 is an example of such an instrument, with eight domains covering self-perceived health, vitality, bodily pain, mental health, physical functioning, social functioning, and role limitations (Ware and Sherbourne 1992). SF-36 domains are scored on continuous scales from 0 to 100, resulting in a large number of potential health states. Health state profiles intended for use with health state valuations tend to use a more limited number of levels in each domain.

Ideally, any weighting exercise for use in burden of disease analysis or economic evaluation should measure preferences for clearly defined health states. The Global Burden of Disease Study 1990 asked participants in weighting exercises to make a composite judgement on the severity distribution of the condition and the preference for time spent in each severity level. This was to a large extent necessitated by the lack of population information on the severity distribution of most conditions at the global and regional level.

The Netherlands has also carried out a project to measure weights for 52 most common conditions using a methodology consistent with the GBD study (Stouthard et al 1997). This study used more specific disease stages or severity levels so that judgements were not required on the distribution of disease stages or severity levels in the population. In addition, the Dutch defined each disease stage in terms of the associated average levels of disability, handicap, mental wellbeing, pain and cognitive impairment using a modified version of the EuroQol health status instrument. They derived a set of weights for 196 disabling outcomes.

The Global Burden of Disease 2000 project is adopting a similar approach to health state valuation, using a standard health state description based on 7 core domains of health.

In the absence of Serbia specific values (social preferences for health states), SBDS 2000 project adopted GBD 1990/2000 health state valuation results expressed in the form of disability weights.

2.2.2. Discounting

The DALY measures the future stream of healthy years of life lost due to each incident case of disease or injury. It is thus an incidence-based measure rather than a prevalence-based measure. The GBD applied a 3% time discount rate to years of life lost in the future to estimate the net present value of years of life lost. With this discount rate, a year of healthy life gained in 10 years' time is worth 24% less than one gained now.

Discounting of future benefits is standard practice in economic analysis and there are some specific arguments for applying discounting to the DALY in measuring population health (Murray and Acharya 1997):

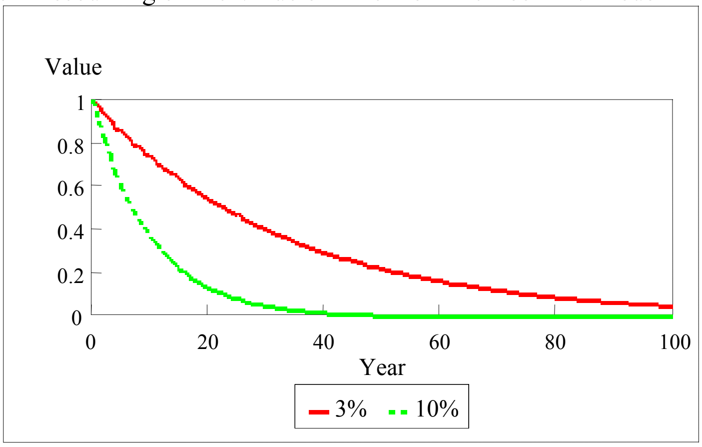
- to be consistent with measurement of health outcomes in cost-effectiveness analyses;
- to prevent giving excessive weight to deaths at younger ages (without age weighting and discounting, a male death at age zero results in 44% more YLL than a death at age 25 and 97% more than a death at age 40; with discounting at 3% an infant death results in only 12% and 29% more YLL than a death at age 25 and age 40, respectively); and
- the disease eradication/research paradox: assuming that investment in research or disease eradication has a non-zero chance of succeeding, then without discounting, all current expenditure should be shifted to such investment because the future stream of benefits is infinite. This is a particular case of the excessive sacrifice argument.

A number of people have argued that discounting should not be applied to future health gains or losses and discounting is rarely used by epidemiologists and demographers for summary health measures. Murray and Acharya (1997) concluded that the strongest argument for discounting is the disease eradication/research paradox and that the social discount rate should be smaller than average individual discount rates. They noted, however, that the choice of a discount rate for health benefits, even if technically desirable, may result in morally unacceptable allocations between generations. Because the discount rate issue is not easily resolved, the GBD published discounted and undiscounted estimates of the global burden.

The World Bank Disease Control Priorities Study and the Global Burden of Disease project both used a 3% discount rate. The US Panel on Cost-Effectiveness in Health and Medicine has recently recommended that a 3% real discount rate be used in health economic analyses to adjust both costs and health outcomes (Gold et al. 1996), but that the sensitivity of the results to the discount rate should be examined.

Discounting has a profound effect on the estimated size of benefits. As shown in Figure 2.1., discounting alters the value attached to death at different ages.

Figure 2.1. Effect of Discounting on the Value of a Year of Life Lost at Various Times in the Future.



Source: Mathers et al (2001a). National Burden of Disease Studies: A Practical Guide. Edition 2.0. Global Program on Evidence for Health Policy. Geneva, WHO.

For ease of calculation, the DALY formulae use a continuous discounting function of the form e^{-rt} where r is the discount rate and t is time. The rate (3% in SBD Study) is not precisely the same as the annual discount rate used in the discrete form of the discount function $(1+r)^{-t}$. With a continuous discount rate of 3%, the corresponding annual discount rate is 2.96%. In order to make the discrete and continuous forms give the same result, the discount rate in the continuous form must be set equal to ln(1+r).

As in the Global Burden of Disease Study and other national studies, both undiscounted and discounted (3 percent per year) DALYs were calculated. Only discounted data are presented in this report. The 3 percent discount rate was chosen to allow international comparisons and because this rate is recommended by the International Panel on Cost Effectiveness in Health and Medicine (Gold et al 1996).

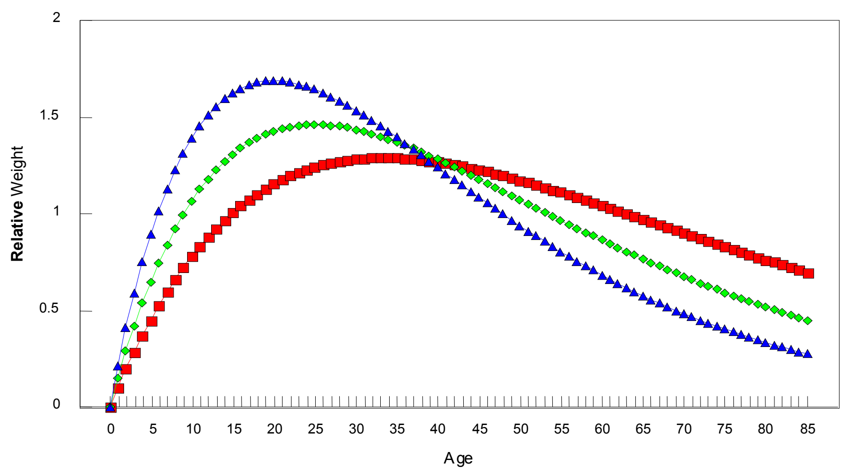
2.2.3. Age Weighting

The Global Burden of Disease Study weighted a year of healthy life lived at young ages and older ages lower than for other ages. This choice was based on a number of studies that have indicated there is a broad social preference to value a year lived by a young adult more highly than a year lived by a young child or at older ages (Murray and Lopez 1996a).

Not all such studies agree that young ages as well as older ages should be given less weight or on the relative magnitude of the differences.

An exponential function $Cxe^{-\beta x}$ can express this age-weighting:

Figure 2.2. Values of a Year of Life Lived at Different Ages for Various Values of Beta



Source: Mathers et al (2001a). National Burden of Disease Studies: A Practical Guide. Edition 2.0. Global Program on Evidence for Health Policy. Geneva, WHO.

Such an exponential function captures the rising and then falling value of individual years of life lived at different ages. In the above equation, β determines the importance of age-weights and is chosen arbitrarily; *C* is an adjustment constant, chosen so that the introduction of age-weights does not alter the total number of years of life lost. Figure 2.2. shows the shape of the exponential age weight function that gives higher weight to time lost due to premature mortality or disability at ages between nine and 55. Similarly, age weighting gives more emphasis to long-term chronic disabling outcomes of disease or injury at younger ages. However, the shorter the episode of disability is, the more the effect of age weighting resembles the curve in Figure 2.2.

Because the influence of age weighting on the ranking of conditions is not very great and the latter are controversial in literature, in SBDS 2000 we have decided to use them for comparability with other studies. Recommended values of C = 0.1658 and β = 0.04 were applied.

2.2.4. Estimating Years of Life Lost Due to Premature Mortality

For measuring the burden of disease due to premature mortality, the Standard Expected Years of Life Lost (SEYLL) method has been adopted. This uses the expectation of life at each age x based in some ideal standard to estimate the loss of years of life associated with death.

To define the standard, the highest life expectancy observed at that time for any nation (i.e. the 82.5 years life expectancy of women in Japan) was chosen. The standard expectations are therefore based on a model life table, namely Coale and Demeny West level 26, which has a life expectancy at birth for females of 82.5 years (Coale et al 1983, Coale and Demeny 1966). The male-female "biological" difference in survival potential was chosen as 2.5 years. As there is no male schedule with a life expectancy of 80 years, the standard life expectancy at birth for males of 80 years was based on the female schedule for Coale and Demeny model life table West level 25.

2.2.5. Estimating Years Lived with Disability

YLD are calculated by estimating the incidence (or prevalence where the former was not possible) of each condition in Serbia in 2000, or earlier, the average duration of each incident case (or, more precisely, of the associated disability until death or recovery) and the average severity of the associated disability (the average disability weight):

$$\text{YLD} = \text{number of incident cases} \times \text{average duration} \times \text{average disability weight}$$

For most conditions this involves calculating a weighted average, across all stages, sequelae or complications of the condition, for both duration and disability severity. Furthermore, both duration and disability distribution need to be adjusted for the effectiveness and coverage (access) of currently available interventions.

2.3. Levels of Burden of Disease Analysis Choices

2.3.1. Key components

Key components to identify are the level of analysis (regional or national); the year of reference and the age groups to be included in the study. Other key decisions include the set of disease and injury categories to be used, and the risk factors for which burden analyses will be conducted (Mathers et al 2001a).

In Serbia, Burden of Disease Study level of analysis is national (Republic of Serbia excluding Kosovo&Metohia) and regional (City of Belgrade).

Reference year for the analysis is 2000.

Age groups are more detailed than those used in GBD 1990 or GBD 2000 (0, 1-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-59, 80-84, 85-89, 90-94, 95+). For the sake of comparison most of the results are expressed as GBD 1990 or GBD 2000 age groups.

2.3.2. Disease and injury categories

These categories are based on the list used for the GBD 2000 (see Appendices, Annex Table 1a and full definitions given in Murray et al. 2001) but reviewed to amalgamate disease categories not relevant to the country.

For the Global Burden of Disease 1990 study (GBD 1990), Murray and Lopez (1996a) proposed a tree structure of causes of death. This GBD list has four levels of disaggregation and includes 108 specific diseases and injuries. At the first level, overall mortality is divided into three broad groups of causes:

- Group I, consisting of communicable diseases, maternal causes, conditions arising in the perinatal period and nutritional deficiencies,
- Group II encompassing the non-communicable diseases; and
- Group III, comprising intentional and unintentional injuries.

Each group has been divided into several sub-categories of disease and injury that are mutually exclusive and exhaustive. Specifically, Group I has been divided into 5 sub-categories (infectious and parasitic diseases, respiratory infections, maternal causes, conditions arising in the perinatal period and nutritional causes). Non-communicable diseases (Group II) have been divided in 14 sub-categories and Injuries (Group III) have been divided into unintentional and intentional injuries.

A third level of disaggregation is used to identify more specific causes of death within each of the 21 sub-categories. For example, within the category of respiratory infections, specific causes such as, upper respiratory infections, lower respiratory infections and otitis media have been identified. Finally, for some diseases, such as sexually transmitted disease, a fourth level of disaggregation is provided, in this case syphilis, chlamydia, and gonorrhoea.

The 108 diseases and injuries studied in the GBD 1990 were selected on the basis of three criteria: a) the probable magnitude of the cause of death; b) level of health services provided for the cause; and, c) the attention attracted by the cause in current health policy debate. For the Global Burden of Disease 2000 Study being carried out by WHO, the cause list has been expanded to include additional causes (see Annex Table 1a), 135 at all.

For the SBD Study some of the causes in the GBD list were not relevant. Selection process has been based on analysis of the local pattern of cause of death and compilation of the number of death coded to one letter and two number ICD-10 code, (WHO 1992), as well on analysis of local patterns of hospitalization's causes. Initially all diseases and injuries responsible for more than 100 deaths or 200 hospitalizations (that is approximately 0.1 percent of each) in 2000 were identified from the Serbian mortality database, which led to 60 causes (Appendices, Annex Table 3a) and Belgrade hospital episodes database which led to 88 causes (Appendices, Annex Table 3b). These were then compared with the conditions selected for other studies (especially those highly ranked in disability), Serbian health priorities cited in Strategy document and the SBDS Steering Committee, (Simić et al. 2003). A final selection of 18 causes was made for which SBDS disease model metrics should be acquired (Table 2.1.), (selected diseases with chosen disability weights are in Appendices Annex Table 1b).

Table 2.1. SBDS disease models

Disease	Code	ICD-10	Proportional Mortality Rate* (%)	Proportional Hospital Morbidity Rate* (%)
Tuberculosis	U003	A15-19, B90	0.27	0.37
HIV/AIDS	U009	B20-24	0.04	0.08
Conditions arising during perinatal period Low birth weight Birth asphyxia and trauma	 U050 U051	P00-96	0.52	0.91
Stomach cancer	U063	C16	1.67	0.31
Colon and rectum cancers	U064	C18-21	2.72	0.84
Trachea, bronchus and lung cancers	U067	C33-34	5.28	1.09
Breast cancer	U069	C50	3.86 (female)	0.71
Cervix uteri cancer	U070	C53	1.20 (female)	0.39
Diabetes mellitus	U079	E10-14	2.62	2.31
Unipolar depressive disorders	U082	F32-33	0.00	0.61
Sense organ diseases Vision disorders, age-related	U101	H54-59, H524	0.00	0.00

	Hearing loss, adult onset	U102	H90-91	0.00	0.08
Ischaemic heart disease		U107	I20-25	17.86	4.82
Cerebrovascular disease (Stroke)		U108	I60-69	18.06	4.69
Asthma		U113	J45-46	0.68	0.74
Nephritis and nephrosis		U121	N18	1.47	1.36
Road-traffic accidents		U150	V01-04, V06, V09-80, V87, V89, V99,W00-W19	0.81	0.50
Self-inflicted injuries		U157	X60-X84	1.83	0.03

* 2000

2.3.3. Risk factors

The population attributable risks (PARs) were applied to the YLL, YLD and DALY data, so allowing an estimate to be made of the burden attributable to major risk factors. The methods assume independence of risks and so overestimate the attributable burden; on the other hand, conservative estimates of relative risks were used when calculating PARs. A set of seven risk factors: tobacco (smoking cigarettes), alcohol, physical inactivity, low vegetable and fruit intake, high blood pressure, obesity and high blood cholesterol were selected for analysis in this phase of the study. The selection was based on the proportion of diseases related to these risk factors in the mortality and morbidity rates, public health importance of the diseases and the health priorities defined in the documents related to the process of health care system reforms (Simić et al, 2003). The choice was also balanced against the availability of population data on risk factor exposure and on the relative risk associated with the exposure, Table 2.2. The main source of data on risk prevalence was the study 2000 Population Health Survey (Institute of Public Health of Serbia 2000).

Table 2.2. SBDS risk factors

Risk Factors in GBD 2000 study	Available Serbian data (Y/N)	Health Priority (Y/N)	Selected (Y/N)
Alcohol	Y	Y	Y
High blood pressure	Y	Y	Y
Obesity and overweight	Y	Y	Y
Non-breastfeeding	Y	Y	N
Childhood abuse	N	Y	N
Cholesterol	N	Y	Y
Global climate changes	N	N	N
Food safety risks	Y	Y	Y
Illicit drugs	N	Y	N
Indoor smoke	N	Y	N
Malnutrition	Y	N	N
Lead	N	N	N
Occupational risks	N	Y	N
Ambient and pollution	Y	N	N
Physical activity	Y	Y	Y
Road traffic risks	Y	Y	N
Tobacco	Y	Y	Y
Unsafe medical injections	N	N	N
Unsafe sex	N	Y	N
Unsafe water and sanitation	N	Y	N
Distribution by poverty	Y	Y	N

2.3.4. Other analysis

In planning the SBD study, we have also considered the feasibility and policy relevance of other analyses such as cost-effectiveness analyses.

2.4. DATA SOURCES

In the time available to this study no new data were collected, but rather use was made of existing resources. While every effort has been made to identify and use the best available information relating to each disease and injury category, and wide consultation in the relevant field has been undertaken, the estimates made in this study should be regarded as in progress and capable of further refinement. It was not always possible to find Serbian data for the wide range of diseases. The following table summarises the broad data sources used and illustrates the numerous and wide ranging sources used for the calculation of the disability estimates compared to the mortality burden, which relied primarily on one source. The complete list of sources for estimation of disability metrics is included in Appendices Annex Table 4.

Table 2.3. Serbian Burden of Disease Study Data Sources

Population	Years of Life Lost	Years Lived with Disability
Serbian Office of Statistics Census database	Serbian Office of Statistics Mortality Database 1999-2001	Disease registers, surveillance systems and notification systems
Serbian Office of Statistics estimated population		Population health surveys
		Specific epidemiological studies
		Health service utilisation data
		Expert opinions

2.5. MORTALITY ANALYSIS

2.5.1. Population

The Federal Statistical Office regularly calculates yearly population estimates of republics and provinces by age and sex. These estimates fall into the group of, so called, postcensal estimates, because they follow the results of the latest conducted population census (population distribution by age and sex). The estimates are calculated by adding the natural increase (births by sex and deaths by age and sex). Therefore, the component method was used, but without including the migration component. The latest published estimates for the FR Yugoslavia (Serbia) are for 1999.

The regular population census for Serbia was supposed to be conducted in 2001. However, it was delayed for a year, mostly due to reasons of political nature (armed rebellion in south Serbia), so that the first census in Serbia in the 21st century was taken in April 2002.

This census is important for a number of reasons:

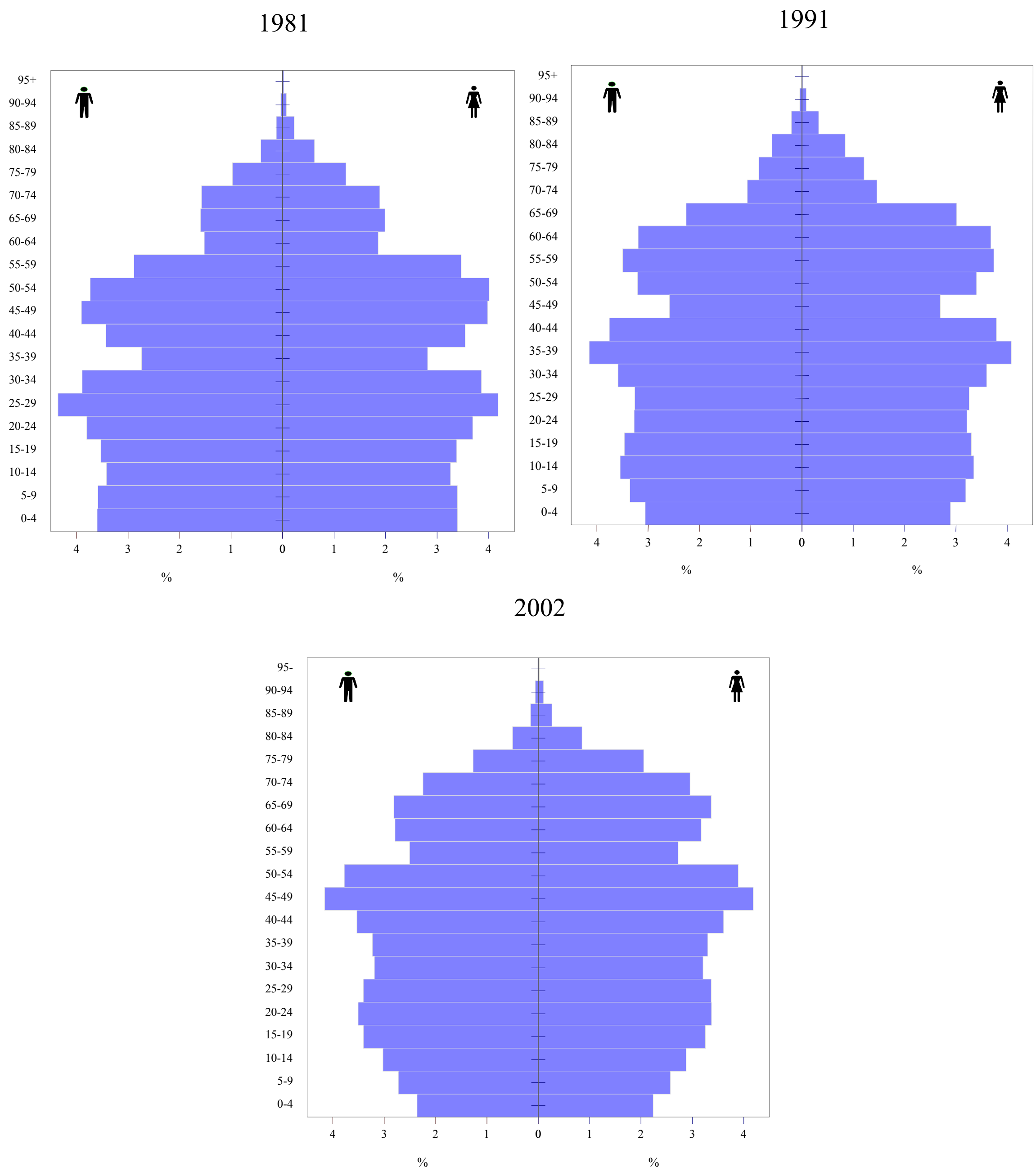
- It is the first population census of Serbia since the falling apart of former Yugoslavia, it is the first census since the establishing of the UN Mission in Kosovo (UNMIK) and the first census since the radical political changes in country. The most drastic consequence of the events of the last decade of the 20th century is the mass migration, both internal and international. Several hundred thousand (over 600 thousand) of refugees came to Serbia from the former Yugoslav republics (mostly Bosnia-Herzegovina and Croatia). But, in the same period, several hundred thousand left Serbia (mostly to west European countries, USA, Canada, Australia, New Zealand, and, but in a considerably lower number, other former Yugoslav republics). In the summer of 1999, after the international military forces entered Kosovo-Metohia, 200 thousand so called IDPs came to Central Serbia, mostly ethnical Serbs and Romanies.

- According to the international recommendations of the Census of 2002, a new total population concept was accepted. Namely, all the total population censuses taken in the second half of the 20th century are based on 'de jure' concept (usual resident), while in 2002 new concept is applied which contains the elements of de jure and de facto concepts and which can be conditionally named de facto concept (physically present). What is the main difference between these two concepts? According to the 1991 census, the total population of Serbia included the population in country and population on 'temporary' work/stay abroad. According to the 2002 census, total population includes the population in country and population abroad that has been out of the country for less than a year. The total population also includes all refugees but not the IDPs from Kosovo-Metohija.

Considering the importance of migration component on the total population dynamics of Serbia (Central Serbia and Vojvodina) in the intercensal period 1991-2002, it was normal to expect that the number of the total population according to the population census would be significantly different from the total population estimates for the same year. Results of the estimates calculated in the Demographic Research Center (regarding that the Federal Statistical Office has not published the population estimates for 2000 and 2001, in the Demographic Research Center were calculated the population estimates by age and sex for 2000, 2001 and 2002, using the same methodology) showed that the difference between the estimated total population on 1. 1. 2002. and the enumerated total population on 1. 4. 2002. was significant, especially in Vojvodina. According to the results of the estimates calculated according to the census of 1991 and the natural population movement in the intercensal period 1999-2002 (concept "de jure"), the total population in Central Serbia was estimated on 1st January 2002 to 5 725 223 persons, and in Vojvodina to 1 934 250. According to the population census on 1st April 2002 in Central Serbia, 5 466 009 persons were registered, and 2 031 992 persons in Vojvodina. The difference between the total population according to the census and according to the estimates, accounted –259 thousand for Central Serbia, and 98 thousand for Vojvodina. It was caused, primarily, by two factors. First, it is the difference in the definition of the total population (de jure for estimates, and de facto for census). Second, net migration balance was not included in the calculating of total population estimates. Naturally, the quality of the statistical data must be taken into consideration (census data of 1991 and 2002, as well as the data of the demographical statistics in the intercensal period), but their influence is significantly less important. It should also be noted that, for the same reasons, the estimated number of the young and middle-aged population is higher than the census enumerated persons, and the situation is reverse with persons older than 60 (the census enumerated number is higher than the estimated population number). Age Pyramids for Serbia, according to Census 2002, are presented in the Figure 2.3.

Considering the significant differences in the total population and its age structure according to the census 2002 and the estimates for 2002, it is evident that the values of the demographic indicators (and especially the mortality and morbidity indicators), calculated according to the available postcensal estimates, were significantly different from their real values. Therefore, it was needed to calculate intercensal estimates, or at least the census adjustments. It should be considered that, so far, the Yugoslav statistics has not calculated intercensal estimates, and that the population estimations where censal adjustments were applied are very rare (only for 1969, 1970 and 1980).

Figure 2.3. Age Pyramids for Serbia (excluding Kosovo and Metohia) – 1981, 1991 and 2002.



It should also be stated that there were certain constraints in preparing the methodologically correct intercensal estimates/censal adjustments of the Serbian population (Central Serbia and Vojvodina) for 1999, 2000 and 2001, caused by unavailability of necessary statistical data. With that in mind, it was necessary to make certain approximations. The most important limitations (the most important missing data) and used assumptions are as following:

1)
Constraint :The population distribution by single years age is still unavailable (so far, only census data on age structure by five-year groups has been tabulated and published)

Solution : It is assumed that the internal age structure by five-year age-sex groups in the Census Day (1st April 2002) was identical to the internal age structure of the same five-year age group according to the postcensal estimates for 1st January 2002.

2)
Constraint : Available statistical data about the number of live births by sex and number of deaths by age and sex for the intercensal period of 1991-2002 were given according to the 'de jure' concept (births and deaths of refugees were not included, but births and deaths of residents 'temporary' outside of the country were included).

Solution : It was assumed that there was no difference in the vital events according to the 'de jure' and 'de facto' concept.

3)
Constraint : There are no data on the vital events for the first quarter of 2002.

Solution : It was assumed that the number of live births and deaths in the period of 1st January – 31st March 2002 was identical to the quarter of the number of live births and deaths in 2001.

4)
Constraint : The data on the total population enumerated on Census Day 1991 according to the 'de facto' concept are unavailable.

Solution : It was assumed that in 1991, the total population of the country most closely resembled the total population according to the 'de facto' concept (note: in 1991, there were no refugees, and only about 5% of the population outside of the country were out of the country for less than a year)

5)
Constraint : There are no data on the yearly net migration balance by age and sex for the intercensal period 1991-2002.

Solution : Calculated net migration balance by age and sex (using the vital statistical methods) for the intercensal period 1991-2002 was divided into 11 equal yearly parts (note: the most missive migration was between 1992 and 1996)

Along with the used assumptions for the needs of the SBDS project, two versions of the population estimates for 1999, 2000 and 2001 were made.

- First version: the results of the intercensal estimates calculated for the period 1991-2002 for years 1999, 2000 and 2001.
- Second version: the population estimates were done according to the census adjustments for 1999, 2000 and 2001 (not including the migration component)

The second version of the estimates was chosen for the calculation of values of needed demographic indicators, for two main reasons :

- the net migration balance for the period of 1999-2001 was significantly below the yearly average for the intercensal period of 1991-2002;
- all official population estimates of Serbia (and former Yugoslavia) so far, calculated by the Federal Statistical Office did not consider the net migration balance.

2.5.2. Deaths

Regional Offices of Statistics compile information on death certificates. The Serbian Office of Statistics receives these data from each region and provides a unit record file of deaths with diagnosis, date of death, age, sex and place of residence as the most important variables. For the burden of disease estimates, we considered all deaths of people with their usual place in Republic of Serbia that occurred anywhere in and outside of Serbia and were registrated in 2000.

The death files provide one letter and two number ICD-10 code corresponding to the main cause of death registered. From ICD-10 codes, deaths were classified into a comprehensive list of three major disease groups, 21 categories of disease and injury and 135 specific conditions following the structure of the GBD list of conditions. Full details of the conditions considered in this study along with their "U codes" and their corresponding ICD-10 codes are presented in Annex Table 1a.

In year 2000 there was a total of 104 042 deaths. Of these, 53 751 (51.7%), occurred among males and 50 291 (48.3%) among females.

Irrespective of the source, under-reporting of deaths is unfortunately very common, particularly in developing countries. Concerning Serbian Statistical Office completeness of 2000 mortality database is 98%.

There are likely to be several more problems, called miscertification, with the validity and reliability of cause of death data, even those certified by medical practitioners. The three major problems are:

- not assigning a specific code, but using senility or some other ill-defined code;
- assigning the wrong code due to diagnostic fashions, carelessness, etc. or
- having missing data.

Table 2.4. Miscertification Analysis.

Group	Cause*	f	% of Group	% of Total number of deaths**
Group I Communicable, maternal, perinatal and nutritional conditions	U037 Other infectious disease	285	12.66	0.27
	U048 Other maternal conditions	2	0.19	0.00
	U052 Other perinatal conditions	95	9.09	0.09
	U058 Other nutritional disorders	8	0.76	0.01
Group II Noncommunicable diseases	U077 Other malignant neoplasms	3 581	4.04	3.44
	U097 Other neuropsychiatric disorders	296	0.33	0.03
	U110 Other cardiovascular diseases	11 153	12.58	10.72
	U114 Other respiratory diseases	895	1.01	0.86
	U119 Other digestive diseases	1 541	1.74	1.48
	U123 Other genitourinanry system diseases	35	0.04	0.00
	U130 Other musculoskeletal disorders	86	0.00	0.00
	U142 Other congenital anomalies	75	0.00	0.00
	U147 Other oral diseases	2	0.00	0.00
Group III Injuries	U155 Other unintentional injuries	513	12.44	0.49
	U160 Other intentional injuries	2	0.05	0.00
Total		18 569		17.85
Ill-defined codes	U161	9 015		8.67

	U162	763		0.73
Missing ages		93		0.09
Grand Total		28 440		26.79

* U codes for Other diseases not mentioned in the table are equal 0.
** Bold ones are redistributed

The 0.73% of deaths assigned to ill-defined injury deaths (U162) was redistributed proportionally by age and sex across all unintentional injuries. The 8.67% of deaths assigned to ill-defined and senility codes (U161) were redistributed by sex for age group less than 5 proportionally across group I and for ages more than 5 proportionally across group II.

Cancers of unspecified sites (U077), 3.44% of all deaths, were redistributed proportionally by age and sex across all specified sites. Cardiovascular garbage codes (U110), 10.72% of all deaths, were redistributed using GBD regression formula (high ill-defined coding) to ischemic heart disease, (Lozano et al 2001).

The 0.09% of deaths with missing ages was redistributed proportionally by sex and cause.

Redistributed deaths by age, sex and cause in Serbia 2000 and in Belgrade 2000 are in Appendices: Annex Table 5 and Annex Table 6. Due to these various redistributions, the distribution of deaths by age, sex and cause used to estimate the mortality burden in Serbia in 2000 differ slightly from cause of death data in Serbian mortality database. These adjusted numbers of deaths by cause form the basis for the YLL estimates described in the following sections. For the sake of analysis we also calculated death rates (age, sex and cause specific) and adjusted them to three standard populations: Segi's World, European and WHO World Population and in the case of Belgrade to Serbian 2000 Population, too (Table 2.5.).

Table 2.5. Standard Populations Distributions and Serbia 2000 age distribution (percent)

Age group	**Segi ("world") standard**	**Scandinavian ("European") standard**	**WHO World Standard**	**Serbia 2000**
0-4	12.00	8.00	8.86	4.77
5-9	10.00	7.00	8.69	5.46
10-14	9.00	7.00	8.60	6.08
15-19	9.00	7.00	8.47	6.74
20-24	8.00	7.00	8.22	6.89
25-29	8.00	7.00	7.93	6.59
30-34	6.00	7.00	7.61	6.37
35-39	6.00	7.00	7.15	6.70
40-44	6.00	7.00	6.59	7.41
45-49	6.00	7.00	6.04	8.35
50-54	5.00	7.00	5.37	6.95
55-59	4.00	6.00	4.55	5.38
60-64	4.00	5.00	3.72	6.26
65-69	3.00	4.00	2.96	6.28
70-74	2.00	3.00	2.21	5.02
75-79	1.00	2.00	1.52	3.04
80-84	0.50	1.00	0.91	0.96
85+	0.50	1.00	0.63	0.74
Total	100.00	100.00	100.00	100.00

Source: Ahmad et al (2000). Age Standardization of Rates: A New WHO Standard. Geneva, WHO.

2.5.3. Life expectancy

The life expectancy at age *x* is one of the basic life table functions. For the Serbian Burden of Disease Study, abridged life tables were prepared for Serbia (excluding Kosovo and Metohia), its great areas: Central Serbia, Vojvodina, also for City of Belgrade, as well as for any of 161 municipalities in this part of the country. These tables are based on the registered deaths for 1999, 2000 and 2001 and on population estimates (Census 2002 adjustments) by age and sex.

The life tables are constructed on a set of age-sex specific death rates. These rates are in the following age detail: 0, 1-4, 5-9, 10-14 ... 75-79, 80-84.

For large areas (Central Serbia, Vojvodina and Belgrade) annual tables (for 1999, 2000 and 2001) are calculated. For the municipalities the tables are for the period 1999-2001. The second set of tables is based on average age-specific mortality rates for 1999-2001 (3-year death data and average estimated population for the same period).

The life tables have been computed with MORTPAK-LITE (version 3.0/CP, an UN software package for mortality measurement developed at the UN Population Division).

2.5.4. Years of Life Lost

YLLs are the mortality component of DALYs. They are determined by the average life expectancy at age of death while discounting future years by three percent. For twenty-one age categories YLL conversion figures were calculated.

YLLs were calculated using the life expectancy at that age in standard life tables (Coale and Demeny West Model Level 26) with the life expectancy at birth fixed at 82.5 years for females and 80.0 years for males. This method has been chosen for consistency with that used in the Global Burden of Disease Study (Murray and Lopez 1996a).

YLL for deaths lost in each age-sex category can be estimated from the observed mean age at death in the age interval and the standard life expectancy figures at the exact ages defining the age interval. These standard life expectancies are then used to interpolate the standard life expectancy L for the observed mean age at death in the interval. Total YLL for a given cause, age and sex from the corresponding number of deaths N, is then calculated as follows:

Without discounting or age weights: $YLL = N \, x \, L$

With 3% discounting and uniform age weights: $YLL = \frac{N}{0.03}\left(1 - e^{-0.03L}\right)$

The full formula for non-zero discounting and age weighting is given by Murray and Lopez (1996) as follows:

$$YLL = N\,Ce^{(ra)} / (\beta+r)^2 \,[e^{-(\beta+r)(L+a)}\,[-(\beta+r)(L+a)-1] - e^{-(\beta+r)a}\,[-(\beta+r)a-1]]$$

where r is the discount rate (GBD standard value is 0.03), C is the age-weighting correction constant (GBD standard value is 0.1658), β is the parameter from the age-weighting function (GBD standard value is 0.04), *a* is the age of onset, and L is the duration of disability or time lost due to premature mortality.

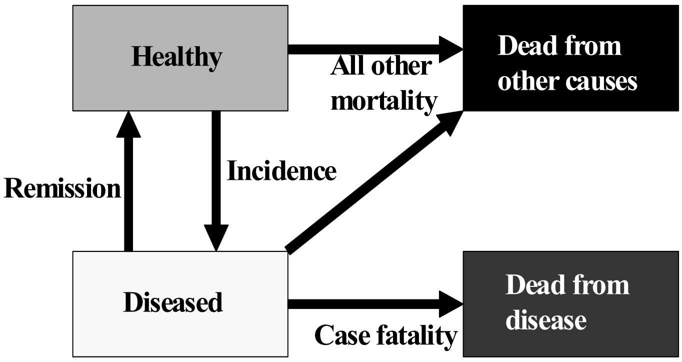
For comparisons between populations and over time, YLL rates per 1 000 population were calculated and age standardised to the three standard populations, as well as 2000 Serbia population for the Belgrade YLL rates, Appendices: Annex Table 7 and Annex Table 8.

2.6. MORBIDITY ANALYSIS

2.6.1. Disability Models

The starting point for YLD calculation is to determine the number of new cases for a particular condition in the year of interest and to model disease progression of the relevant disabling sequelae, some of which, we expect to manifest as many as thirty or forty years in the future. While for some conditions, we derive numbers of incident cases directly from disease registers, routine databases or epidemiological studies, for most prevalence data are available. For these conditions, we rely on software DISMOD II. We use this software iteratively to find a set of incidence that matches observed prevalence, given estimates of remission rates and specific mortality risk derived from population data. The underlying model used by DISMOD II is summarised in Figure 2.4.

Figure 2.4. DISMOD Model of Incidence, Prevalence and Duration of Disease



Source: Mathers et al (2001). National Burden of Disease Studies: A Practical Guide. Edition 2.0. Global Program on Evidence for Health Policy. Geneva, WHO.

Locating or modelling information on the incidence, average duration, and in some cases severity distribution in the Serbian population requires considerable work and creativity. Due to the relatively large number of categories analysed, and the paucity of even basic epidemiological information for many of them, many of the disease models are necessarily simple and approximate. Many different sources of information were used to calculate YLD. Where no data are available and estimates could not be found in Serbian or international epidemiological and medical literature, expert judgement was relied on.

2.6.2. Years Lived with Disability

YLD is the disability component of DALYs. The basic formula for calculating YLD is:

$$YLD = I \times DW \times L$$

where I is the number of incident cases in the reference period, DW is the disability weight (in the range 0-1) and L is the average duration of disability (measured in years). With discounting at a rate of 3 per cent, the formula becomes:

$$YLD = \frac{I \times DW \times (1 - e^{-0.03L})}{0.03}$$

The full formulae for YLD with non-uniform age weights are given by:

$$YLD= I\ DW\ Ce^{(ra)} / (\beta+r)^2\ [e^{-(\beta+r)(L+a)}\ [-(\beta+ r)(L+a)-1] - e^{-(\beta+ r)a}\ [-(\beta+r)a-1]]$$

where DW is the disability weight, r is the discount rate (GBD standard value is 0.03), C is the age-weighting correction constant (GBD standard value is 0.1658), β is the parameter from the age-weighting function (GBD standard value is 0.04), *a* is the age of onset, and L is the duration of disability.

Using a parameter K that specifies whether age-weighting is applied (K=1) or not (K=0), we can combine the previous two formulas into a single general formula for YLD:

$$YLD= I\ DW\ \{ K\ Ce^{(ra)} / (\beta+r)^2\ [e^{(\beta+r)(L+a)}\ [-(\beta+ r)(L+a)-1] - e^{(\beta + r)a}\ [-(\beta+r)a-1]] +$$
$$+ (1-K)\ (L/r)\ (1- e^{rL}\ )\}$$

For comparisons between populations and over time, YLD rates per 1 000 population were calculated and age standardised to the three standard populations, as well as 2000 Serbia population for the Belgrade YLD rates (for chosen disease categories and disability weights see Annex Table 1b in Appendices for YLD see Annex Tables 9. and 10.).

2.7. DISABILITY ADJUSTED LIFE YEARS - DALY

The estimates of YLL and YLD can be combined to yield estimates of the total burden of disease and injury in Serbia in 2000, reflecting both fatal and non-fatal outcomes (that is, integrating both “quantity of life” and “quality of life” dimensions of health). This is possible because preference weighting of YLDs makes the burden of non-fatal outcomes commensurate with that of fatal outcomes, measured in YLLs. Given these additive properties, disability adjusted life years (the integrated unit of health loss) are simply the sum of two components.

DALY is accumulated for each sex, age and cause group, and also for two different areas (Annex Tables 9. and 10.).

For comparisons between populations and over time, DALY rates per 1 000 population were calculated and age standardised to the three standard populations, as well as 2000 Serbia population for the Belgrade DALY rates (Anexx Tables 11. and 12. in Appendices).

2.8. RISK FACTORS

The prevalence of a risk factor in a population and the relative risk of dying or falling ill for those exposed to the risk factor, determine the attributable fraction, which is the disease burden that occurs due to the current and past presence of the risk factor. As defined in Foundation of Epidemiology by Lilienfild and Stolley, the attributable factor is a measure of association that is influenced by the frequency of a characteristic, such as smoking, in a population.

Attributable fractions were calculated from available information on the prevalence of a risk factor in our population and the relative risk (RR) of dying if exposed to the risk factor using formula:

$$\text{Attributable fraction} = \frac{P\ (RR - 1)}{P\ (RR - 1) + 1}$$

P – prevalence of risk factor
RR – relative risk of death comparing exposed to non-exposed

For risk factors with different categories of exposure we used the formula suggested by English and Holman (1995):

$$\text{Attributable fraction} = \frac{p_i\,(RR_i - 1)}{\sum_{i=0}^{k} P_i\,(RR_i - 1) + 1}$$

i – baseline category of risk
P_i – prevalence of the risk factor level
RR_i – corresponding relative risk

For the attribution of the disability burden to risk factors, we assumed that relative risks equally apply to mortality and morbidity. In this report, we provide calculations of the burden attributable to tobacco, alcohol, physical inactivity, low vegetable and fruit intake, high blood pressure, obesity and high blood cholesterol.

The population attributable risk (PAR) has been applied to the: YLL, YLD and DALY estimates, allowing the proportion of the burden attributable to each risk factor to be calculated. These results should be regarded as approximate only, for the following reasons:

- associations between the causes considered and the diseases included in the SBDS have not been fully investigated in all cases;
- the relative risks used to calculate the PARs have mostly been extracted from the international literature and may differ from those pertaining in Serbia;
- the relative risks used here relate mainly to mortality rather than to incidence; for the conditions with both fatal and non-fatal outcomes, it is assumed that the relative risk for YLL is the same as that for YLD. This assumption may not be warranted in all cases;
- the relative risks are not fully adjusted to important covariates (confounders) in all cases; and
- the univariate PARs calculated do not allow for clustering and interaction of risk factors.

The prevalence data for the most selected risk factors were derived from the 2000 Population Health Survey in Serbia (Institute of Public Health of Serbia 2001). A brief overview of the adopted methodology follows to highlight the rates applied, data sources and diseases attributed to each selected risk factor.

2.8.1. Tobacco

There is a discussion about whether the attributable burden should be estimated from the current prevalence of smoking, because there is a long time between exposure to tobacco smoke and the occurrence of cancers and chronic obstructive pulmonary disease Therefore Peto and Lopez (1993) suggested the method that proposes an artificial compound prevalence measure of the relevant past exposure to tobacco. This measure is derived from a comparison of lung cancer mortality rates in the population of interest and lung cancer mortality rates among non-smokers observed in a large long-term follow-up study in the USA. We used this method in the first step of our work on attributable fractions, about the obtained results but they were not valid. The reasons for that are not still completely clear, but it could be the great difference between age specific mortality rates for analyzed diseases, obtained from our statistics and the rates used for mixed-population calculations in the Peto and Lopez study. So we decided to use our prevalence rates.

The prevalence of smoking in Serbia was derived from the 2000 Population Health Survey in Serbia (Institute of Public Health of Serbia, 2001). The study collected the data of current smokers and former smokers. The selected diseases attributable to smoking were: oral cavity cancer, lung cancer, esophagus cancer, pancreas cancer, cervical cancer, urinary bladder cancer, ishaemic heart disease (IHD), cardiovascular disease (stroke) and chronic obstructive pulmonary disease (COPD). To estimate the burden attributable to tobacco, we have used the age-adjusted relative risks estimates for persons 35 years and over from the second wave of the American Cancer Society Cancer Prevention Study (CPS-II) (National Center for Chronic Disease Prevention and Health Promotion (Florida Department of Health, Bureau of Epidemiolgy, 2001) and our prevalence rates for current smokers (Table 2.6).

Table 2.6. Relative risks for smoking related causes of death (current smokers)

Cause of death	**Males**	**Females**
Oral cavity cancer	10.89	10.89
Lung cancer	23.26	12.69
Esophagus cancer	6.76	7.75
Pancreas cancer	2.31	2.25
Cervix uteri cancer		1.59
Urinary bladder cancer	3.27	2.22
Ischaemic Heart disease		
Age 35-64	2.80	3.08
Age 65+	1.51	1.60
Cerebrovascular disease		
Age 35-64	3.27	4.00
Age 65+	1.63	1.49
COPD	17.1	12.04

Source: Florida Department of Health, Bureau of Epidemiology (2001). 1999 Smoking-Attributable Mortality Report.

2.8.2. Alcohol

In the 2000 Population Health Survey in Serbia (IPH of Serbia, 2001) data were collected on the type of alcohol drinks consumed and the number of drinks. We converted the data to standard drinks per day (10 ml alcohol = 7.9 g alcohol) and used the classification proposed by English et al. (1995) (Table 2.7.).

Table 2.7. Classification of reported daily intake of alcohol in number of standard drinks

Classes	**Men**	**Women**
Abstinence	0-0.24	0-0.24
Low risk	0.25-3.9	0.25-1.99
Moderate risk	4-6	2-4
High risk	>6	>4

Source: English et al. (1995). ABS National Health Survey 1995.

The prevalence of each level of alcohol intake was estimated by age groups and sex. For the purpose of analysis of attributable burden due to alcohol, the harm and benefit from regular intake of alcohol were separated (Baffeta and Garfinkel, 1990; Poikolainen, 1995; Doll et al. 1996). Regular low intake of alcohol protects against cardiovascular diseases (Jackson et al., 1991; Holman and English, 1996), but alcohol consumption at all levels above abstinence increases the risk of injuries and various other diseases. Diseases attributable to alcohol harm were four cancers, haemorrhagic stroke, cirrhosis, suicide, road traffic accidents, falls, fires, drowning and violence. Alcohol benefit was estimated for ischaemic heart disease and ischaemic stroke. The same relative risks were used as in the Victorian Burden of Disease Study (Department of Human Services, 1999a) (Table 2.8.).

Table 2.8. Relative risks for diseases associated with alcohol

Disease	Males			Females		
	Low	Hazardous	Harmful	Low	Hazardous	Harmful
Alcohol harm Oral cavity cancer	1.45	1.85	5.39	1.45	1.85	5.39
Esophagus cancer	1.80	2.37	4.26	1.80	2.37	4.26
Liver cancer	1.45	3.03	3.60	1.45	3.03	3.60
Breast cancer	1.00	1.00	1.00	1.14	1.41	1.59
Haemorhagic stroke	1.27	2.19	2.38	0.59	0.65	7.98
Cirrhosis	1.26	9.54	9.54	1.26	9.54	9.54
Suicide	1.00	1.66	1.80	1.00	1.66	1.80
Road traffic accidents	1.40	5.01	6.61	1.34	2.48	9.14
Falls	2.12	12.22	16.71	2.64	8.14	40.29
Fires	2.03	11.34	15.48	2.51	7.58	37.21
Drowning	2.27	13.67	18.74	2.85	9.06	45.34
Violence	1.11	2.08	2.51	1.16	1.68	4.76
Alcohol benefit Ishaemic heart disease	0.82	0.84	0.88	0.82	0.84	0.88
Ishaemic stroke	0.94	1.33	1.65	0.52	0.64	1.06

Source: Department of Human Services (DHS) (1999a). The Victorian Burden of Disease Study: Morbidity. Melbourne: Public health and Development Division, Department of Human Services

2.8.3. Physical Inactivity

The prevalence data for physical inactivity were also derived from the 2000 Population Health Survey in Serbia (IPH of Serbia, 2001). The study collected the data about the type, frequency, duration and regularity of different physical activities. Levels of physical activity were defined as: sedentary, irregular, regular and vigorously active based on the reported frequency and duration of physical activity. For calculation of attributable part of mortality we used the relative risks from The Victorian Burden of Disease Study (DHS 1999a). The attributable mortality burden was calculated for ischaemic heart disease, stroke, diabetes and colon cancer (Table 2.9.).

Table 2.9. Relative risks for diseases associated with physical inactivity

Disease	<65 years		65+ years	
	Sedentary	Low	Sedentary	Low
Colorectal cancer	1.70	1.70	1.70	1.70
Breast cancer	1.40	1.40	1.40	1.40
Ischaemic heart disease	1.90	1.50	1.45	1.25
Stroke	2.00	2.00	1.50	1.50
Type 2 Diabetes mellitus	1.30	1.30	1.15	1.15
Falls	2.50	2.50	2.50	2.50

Source: Department of Human Services (DHS) (1999a). The Victorian Burden of Disease Study: Morbidity. Melbourne: Public health and Development Division, Department of Human Services.

2.8.4. Insufficient Intake of Fruits and Vegetables

Data for estimating prevalence for insufficient intake of fruits and vegetables were derived from the 2000 Population Health Survey in Serbia (IPH of Serbia, 2001). Inadequate consumption was defined as less than everyday consumption of fruits and vegetables. The definition was based on the analysis of the structure of the available data. According to the results of relevant epidemiological studies, we have chosen all cancers, ischaemic heart disease and stroke for calculating the attributable mortality burden. The same relative risks were used as in the Southern Metropolitan Burden of Disease Study (DHS 2000) (Table 2.10.).

Table 2.10. Relative risks for diseases associated with inadequate intake of fruit and vegetables

Diseases	<45 years	45-64 years	65-74 years	75+ years
All cancers	1.40	1.30	1.20	1.10
Ischaemic heart disease	1.18	1.18	1.10	1.00
Stroke	1.18	1.18	1.10	1.00

Source: Department of Human Services (DHS) (2000). Southern Metropolitan Burden of Disease Study: Mortality and Morbidity. Department of Human Services. Southern Health Care Network.

2.8.5. High Blood Pressure

High blood pressure was defined in people with known hypertension and those with a systolic blood pressure over 160 mm Hg and/or a diastolic blood pressure higher than 95 mm Hg. The prevalence of high blood pressure was calculated using data from the 2000 Population Health Survey in Serbia (Institute of Public Health of Serbia 2001). For calculation of attributable part of mortality we used the relative risks from The Victorian Burden of Disease Study (DHS 1999a). Ischaemic heart disease, stroke diseases and renal failure have been chosen as the main diseases attributed to hypertension (Table 2.11.).

Table 2.11. Relative risks for diseases associated with hypertension

Disease	<65 years		65-74 years		75+years	
	male	female	male	female	male	female
Ischaemic heart disease	2.0	2.2	1.8	2.0	1.6	1.8
Stroke	3.8	2.6	3.4	2.3	3.0	2.1
Renal failure	6	6	6	6	6	6

Source: Department of Human Services (DHS) (1999a). The Victorian Burden of Disease Study: Morbidity. Melbourne: Public health and Development Division, Department of Human Services.

2.8.6. Obesity

The prevalence data for obesity were derived on body weight and height of the population sample measured during the 2000 Population Health Survey in Serbia (IPH of Serbia, 2001). The differentiation was made between obesity (body mass index or BMI equal or more than 30 kg per m^2) and overweight (BMI between 25 and 30 kg per m^2). Attributable burden was calculated for ischaemic heart disease, stroke, adult-onset diabetes, bowel cancer, endometrial cancer, using the same values for relative risks as in the The Victorian Burden of Disease Study (DHS 1999a) (Table 2.12.). The choice of diseases attributed to obesity was based on the results of international studies of the relationship between obesity and specific diseases and the availability of prevalence data in Serbia.

Table 2.12. Relative risks for diseases associated with obesity

Disease	BMI 25-29				BMI >=30			
	Males		Females		Males		Females	
	<65 years	65+ years	<65 years	65+ years	<65 years	65+ years	<65 years	65+ years
Ischaemic heart disease	1.35	1.00	1.40	1.00	1.80	1.20	2.00	1.25
Stroke	1.35	1.00	1.35	1.00	1.50	1.15	1.60	1.20
Adult-onset diabetes	1.80	1.80	1.80	1.80	3.20	3.20	3.20	3.20
Bowel cancer	1.20	1.20	1.20	1.20	1.40	1.40	1.40	1.40
Endometrium cancer			1.00	1.00			1.75	1.75
Post-menopausal breast cancer			1.00	1.00			1.30	1.30

Source: Department of Human Services (DHS) (1999a). The Victorian Burden of disease Study: Mortality. Melbourne: Public health and Development Division, Department of Human Services.

2.8.7. High Blood Cholesterol

The recent prevalence data on high blood cholesterol for the population of Serbia were not available. So we decided to use the data from "Public Health and Disease Control Project" in the Republic of Srpska (Ministry of Health and Social Welfare of the Republic of Srpska, Bosnia and Herzegovina 2002). The decision was based on the assumption that there were many similarities in the population structure, health status, life styles and social conditions in our countries. Attributable mortality burden was calculated for ischaemic heart disease and peripheral vascular diseases, using the relative risk calculations from the The Victorian Burden of Disease Study (DHS 1999a) (Table 2.13.).

Table 2.13. Relative risks for diseases associated with high blood cholesterol

Disease	**Males**		**Females**	
	5.5-6.49 mg/dl	**6.5+ mg/dl**	**5.5-6.49 mg/dl**	**6.5+ mg/dl**
IHD	1.31	1.72	1.155	1.36
Peripheral vascular diseases	1.31	1.72	1.155	1.36

Source: Department of Human Services (DHS) (1999a). The Victorian Burden of Disease Study: Mortality. Melbourne: Public health and Development Division, Department of Human Services.

2.9. COST-EFFECTIVENESS ANALYSIS

Demands for health care are always greater than available resources, particularly in low-income countries where the burden of disease is high and income is low. However, scarcity in income implies that everyone will not be able to have access to every possible intervention that could improve their health. Priority should be established between which interventions should be chosen and/or which people should have priority access to certain interventions. Policy-makers have long been concerned with improving the procedure of making priorities in health care system, because reforms have targeted financing, provision, stewardship and resource development.

The impact of these reforms is increasingly being studied (Evans et al 2001). Numerous studies have confirmed that knowing the prevalence and causes of a health problem does not always tell us the most effective way to reduce it (Laaser et al. 1999, Macintyre 2003). Knowing the links between smoking and lung cancer, obesity and diabetes, HIV and AIDS may help provide goals such as reducing smoking, obesity, or risk sex, but does not necessarily tell us how to achieve these goals. Thus anyone wanting to reduce inequalities in health is faced with a lack of evidence about what action would be most successful and efficient. One of the ways to improve evidence-based policy making is application of cost-effectiveness analysis (CEA).

CEA is a type of analysis that compares interventions or programmes having a common health outcome (e.g., reduction of blood pressure, life-years maximise the health benefits conferred to the population of concern), (World Bank, 2001). The most vivid examples are on the expenditure of 100 000 $ on chemotherapy for tuberculosis that could save about 500 patients. It could also prevent them from infecting others, for a total gain about 35 000 DALYs.

The results obtained by comparing different health interventions confirmed the value of the primary health interventions, since many of the most cost-effective health interventions are preventive in character.

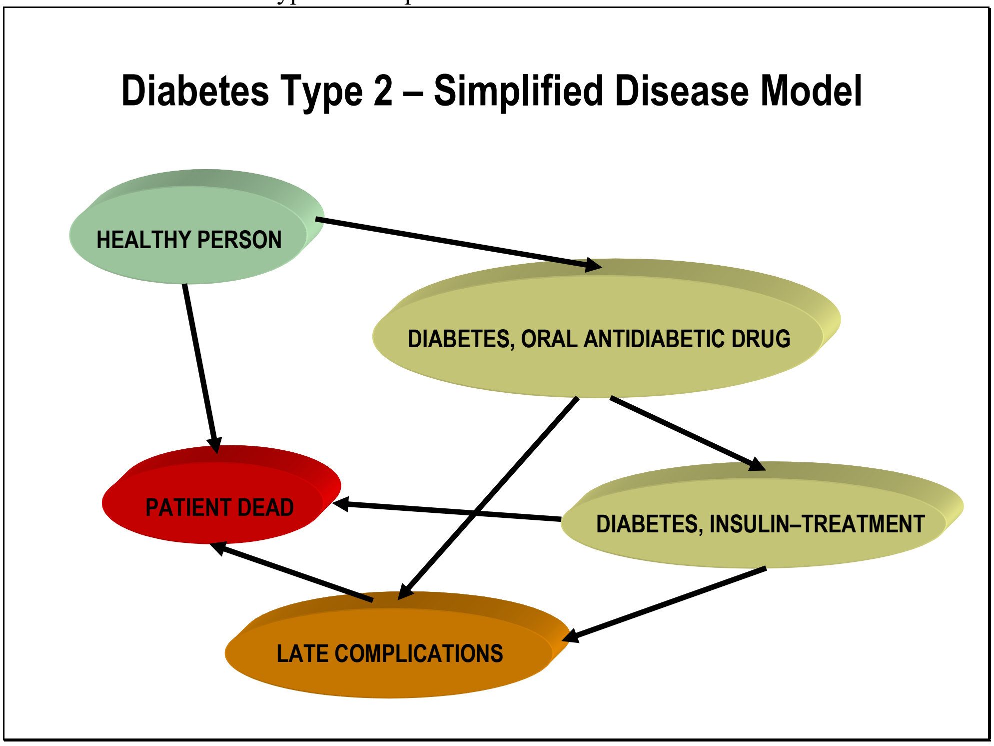
Since it is obvious that current health care interventions in Serbia is bellow the required quantity for the existing scope of health care infrastructure and that principles of equity and solidarity have been abandoned it is necessary to improve and revise existing resources use.

Within SBDS the objective was to present a model of the CEA applied to the selected condition – Diabetes mellitus Type 2.

Type 2 of diabetes is the most common form of this disease, while many international studies suggest that health system costs attributable to Diabetes Type 2 are the huge ones (Marks et al. 2001). In addition, complications of diabetes such as heart disease, stroke, blindness, kidney problems, and lower limb amputations, contribute significantly to the overall morbidity and mortality. For the purpose of the CEA, the definition of Diabetes Type II used in the National Serbian Guideline for Diabetes Mellitus was taken (EAR 2002). According to this definition, Diabetes Type II is the condition in which "fasting glucose level is greater or equal 7.0 mmol/l and or glucose in any random sample is greater or equal 11.1 mmol/l and or OGTT 2 hour plasma glucose greater or equal 11.1 mmol/l" (see Appendix D).

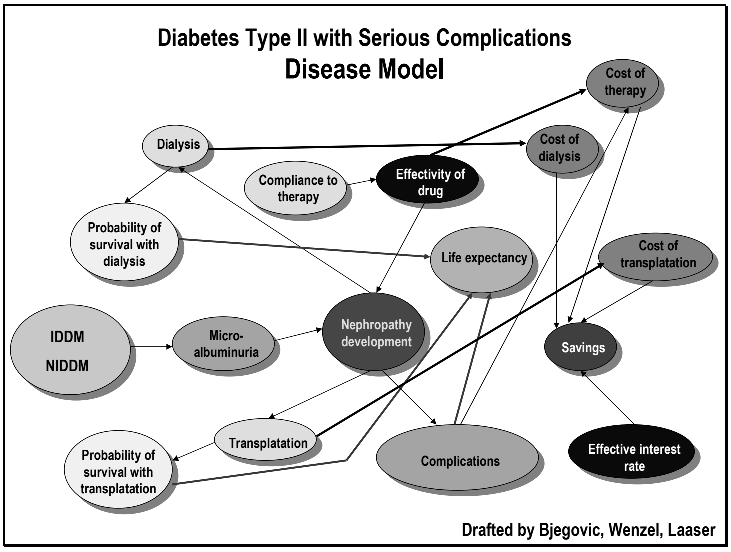
In order to develop CEA for Diabetes mellitus Type 2, curative and preventive components were analysed separately for costs and outcomes, while a simplified disease model was developed (Figure 2.5).

Figure 2.5. Diabetes Mellitus Type 2 – Simplified Disease Model



It was decided that Diabetes Type 2 without serious complications would be the subject of the CEA within the SBDS, while the CEA of Diabetes Type II with serious complications would be proposed for the future priority projects in Serbia. The main reason for such decision was the complexity of each disease model when certain complications are the subject of CEA, whose task requires the framework of the completely new project. An example is a disease model with nephropathy as late complication of Diabetes Type 2 (Figure 2.6).

Figure 2.6. Diabetes Mellitus Type 2 – Disease Model with Serious Complications



Following the simplified disease model of Diabetes Type 2 (Figure 2.5) the next steps were planned for the curative component of the CEA:

1. Developing the ideal 1st year flow of the patients within health care services according to the National Serbian Guideline for Diabetes Mellitus.
2. Outlining the definition of ideal outcome as share of those who normalised diabetes according to guideline and experts' opinion (blood glucose level, normalised HBA1c, reduced complications). Instead of Delphi technique, average experts' opinion will be developed by examination of 5 outstanding experts in the field of diabetes. The instrument for examination will be the questionnaire based on the ideal 1st year flow of patients within health care services.
3. Gathering experts' estimates of share of desired outcome for patients within average Serbian health care services and making the average estimate of outcome. The instrument will be the same questionnaire applied in the step 2.
4. Preparing the 2000 demographic distribution by sex and 5 age groups separately for Vojvodina and Central Serbia. Distribution will be made according to the backward projection of the Census 2002 population number.
5. Preparing the 2000 incidence and prevalence of Diabetes Type II by sex and 5 age groups. The source of data for the incidence and prevalence will be the Belgrade register of Diabetes Mellitus.
6. Estimating the unit costs of an ideal and an average diagnostic and therapeutic procedure according to the official List of HIF Prices (HIF – Health Insurance Fund). The unit costs will include the official prices for history and physical examination, base line laboratory (glucose level, HbA1c, OGTT – 3 times, Total Cholesterol, HDL, LDL and TGL), dietary and health education, drugs, insulin, self-monitoring and follow-up controls. Besides official prices of HIF, the prices in private practice will be considered in order to make comparison. The prices in private practices are based on examination of 5 private services.
7. Calculating the final costs per ideal and average outcome in Serbia. For this purpose the unit costs of the diagnostic and therapeutic procedures will be multiplied by prevalence / incidence in the population, separately for Vojvodina and Serbia. The outcome will be also presented as DALY (YLLs and YLDs) by using the results of SBDS for Diabetes Mellitus and by applying adjustments necessary for Diabetes Type II.

In addition to this curative component of CEA, the attempts will be made to estimate the preventive component by using similar procedure. The basis for the preventive component of the CEA will be the estimates of the reduction of prevalence / incidence in healthy population by application of preventive measures. In such a way the cost-effectiveness of prevention will be assessed by making cost of the preventive programmes in healthy population.

In general, this CEA analysis will give an example how to make an evidence-based decision about priority in providing treatment to people who would benefit most. The ethical issues of the CEA application will be discussed, because sometimes providing treatment to people who benefit most is not the same as giving priority to people who need it most – e.g. those at higher risk of death. The main ethical issues in CEA using DALYs are the following (Burden of Disease Unit – Harvard University, WHO 2002):

- "All lives do not count equally". Saving the life of a 60-year old does not count the same as saving the life of a 25-year old. Saving the life of a 60-year old who is blind does not give as many DALYs as saving the life of a 60-year old who is healthy.
- Where there is age weighting and discounting, all years of life do not count equally. One year of life at the age of 25 counts more than one year of life at the age 70. One year saved today counts more than one year saved in 20 years.
- 25 additional discounted years of healthy life to one person counts the same as one discounted year to 25 people.

2.10. DATA PRESENTATION

Deaths and estimates of YLL have been obtained for over 100 conditions (precisely 135, including over 500 stages or sequelae), and estimates of YLD, YLD/DALY ratio and DALY for smaller portion of conditions (precisely 18, including over 100 stages or sequelae) in different age groups, from 5 to 19 age groups, for both genders and for selected areas.

Sex and age-specific death rates and age-standardized death rates are also represented (per 1 000 population). YLLs, YLDs and DALYs rates (per 1 000 population per year) are age-standardized by direct method with Segi's world population, European standard population, WHO world population and Serbia 2000 population when Belgrade's rates are in question. Rates are calculated without rounding but output is rounded to the hundreds.

Calculations and final presentation were realized using STATISTICA, MORTPAK-LITE, NCSS, DISMOD II, Excel and @Risk, (see Software packages in Refence section).

3. LIFE EXPECTANCY

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The measurement of life expectancy begins with life expectancy at birth (point life expectancy), a summary measure of mortality that enables comparisons of health status to be made. It allows us to analyse how many years, on average, a child born today would be expected to live, compared to a child born at another time or place.

By calculating life expectancy, inequalities in health status can be scrutinised including the differences associated with gender and geography (place), Table 3.1.

Table 3.1. Life expectancies by sex, Serbia 2000, Central Serbia 2000, Vojvodina 2000 and Belgrade 2000

Exact age in years	Males				Females			
	Serbia	Central Serbia	Vojvodina	Belgrade	Serbia	Central Serbia	Vojvodina	Belgrade
0	69.00	69.57	67.64	69.44	74.46	74.79	73.75	75.12
1	68.95	69.50	67.48	69.36	74.18	74.47	73.45	74.83
5	65.09	65.60	63.68	65.48	70.34	70.63	69.61	70.91
10	60.17	60.69	58.76	60.51	65.39	65.70	64.63	65.95
15	55.27	55.77	53.88	55.61	60.47	60.78	59.69	61.05
20	50.47	50.98	49.07	50.81	55.56	55.87	54.78	56.13
25	45.76	46.30	44.28	46.11	50.68	50.98	49.92	51.23
30	41.02	41.57	39.52	41.41	45.79	46.10	45.02	46.34
35	36.33	36.88	34.79	36.71	40.97	41.28	40.20	41.54
40	31.72	32.27	30.19	32.12	36.20	36.51	35.43	36.79
45	27.31	27.82	25.86	27.68	31.50	31.80	30.75	32.05
50	23.15	23.62	21.80	23.53	26.99	27.28	26.27	27.55
55	19.34	19.74	18.17	19.76	22.62	22.90	21.92	23.21
60	15.85	16.17	14.89	16.25	18.51	18.77	17.90	19.06
65	12.67	12.92	11.88	13.09	14.65	14.85	14.20	15.20
70	9.98	10.17	9.42	10.39	11.20	11.39	10.83	11.75
75	7.69	7.82	7.33	8.28	8.25	8.43	7.97	8.90
80	6.03	6.07	5.90	6.51	6.00	6.17	5.77	6.60
85	4.68	4.68	4.69	5.14	4.32	4.47	4.14	4.87

For our situation, year 2000, Vojvodina males have the lowest average life expectancy at birth, 67.6 years, and Belgrade females the highest, over 75 years. Life expectancy at 60 years of age shows that Vojvodina males expected yet almost 15 years of life and Belgrade females more than 19 years of life. The life expectancy at birth for males in Serbia is 5.46 years less than that of females, in Central Serbia 5 years, in Vojvodina almost 6 years and in Belgrade 5.5 years less than that of females. A similar difference in life expectancy between males and females is found in all industrialised countries. This can be largely attributed to the greater health risks men take, resulting in more premature deaths from cardiovascular diseases and injuries. There may also be a smaller "true" biological difference between men and women, attributed to the protective effect conferred by female hormones on cardiovascular disease.

Comparison with life expectancy by sex and total for the world, WHO regions and subregions, is based on results in Table 3.2.

Table 3.2. Life expectancy (LE) at birth and at age 60, by sex and total, WHO regions, selected subregions and world, Version 2 results, 2000

WHO region*	Both sexes	Males	Females
At birth			
AFRO	48.0	46.7	49.3
AMRO	73.7	70.4	77.0
EMRO	62.4	61.1	63.7
EURO	72.2	68.1	76.3
EURO A	78.0	74.8	81.1
EURO B1	70.3	66.9	73.7
EURO B2	64.7	61.6	67.8
EURO C	66.2	60.3	72.1
SEARO	61.8	60.7	62.8
WPRO	72.0	69.9	74.1
World	65.0	62.7	67.2
At age 60			
AFRO	15.1	14.1	16.2
AMRO	21.3	19.4	23.1
EMRO	16.4	15.6	17.2
EURO	19.3	17.2	21.4
EURO A	21.6	19.4	23.8
EURO B1	18.1	16.3	19.9
EURO B2	16.6	15.2	18.0
EURO C	16.1	13.7	18.6
SEARO	16.3	15.5	17.2
WPRO	19.6	18.1	21.1
World	18.4	16.7	20.2

Source: Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N, Bernard C, Lopez A, Murray C (2002). Global Burden of Disease 2000: Version 2 methods and results. GPE Disccussion Paper No. 50. Geneva, WHO. Available on the worlwide web at www.who.int./evidence.
* For list of abbreviations see Annex Table 2. in Appendices.

Table 3.2. summarizes life expectancies at birth and at age 60 for the 6 WHO regions, for 4 subregions and for the globe (GBD regions and 17 subregions in Appendices: Annex Table 2). Overall, global life expectancy at birth in 2000 for males and females combined is 65.0 years, an increase of 6 years over the last two decades. Global average life expectancy at birth is 4.5 years higher for females than for males. Across the GBD epidemiological regions, average life expectancies at birth in 2000 ranged from 48 years for males and females in AFRO to as high as 74 years or over for females in the low mortality countries of AMRO, EURO A and WPRO region. Regional life expectancies at age 60 in 2000 ranged from as low as around 14 years for males in AFRO region to as high as 20 years or over for females in AMRO, EURO A and WPRO region.

Our results for life expectancy at birth are almost identical to those of WPRO and slightly shorter than those in EURO A. When life expectancy at age of 60 is in question, our values are slightly better than those for EURO B2 subregion.

3.1. LIFE EXPECTANCY IN THE ABSENCE OF SELECTED CAUSES OF DEATH

Life expectancy in the absence of selected causes of death, although hypothetical, answers the question: if a specific disease or injury could be eliminated as a cause of death, how long would life expectancy at birth be extended? For the overall 10 leading causes of deaths in Serbia 2000, Table 3.3. shows the expected gain in life expectancy at birth that would occur for each sex and territory if each cause alone were to be eliminated completely.

Table 3.3. Improvement in Life expectancy at birth and at age 60 (years) in the theoretical absence of each leading cause of death, by sex, Serbia 2000

Selected causes of deaths	Improvement in life expectancy at birth Serbia 2000	Improvement in life expectancy at 60 years of age Serbia 2000
Males	69.00	15.85
Ischaemic heart disease	2.40	1.85
Cerebrovascular disease	1.70	1.60
Inflammatory heart disease	1.50	1.70
Trachea, bronchus, lung cancers	1.00	0.60
Colon and rectum cancers	0.40	0.26
COPD	0.30	0.29
Self-inflicted injuries	0.50	0.14
Diabetes mellitus	0.25	0.20
Stomach cancer	0.27	0.17
Cirrhosis of the liver	0.22	0.10
Females	74.46	18.51
Cerebrovascular disease	2.10	1.90
Inflammatory heart disease	1.80	1.90
Ischaemic heart disease	1.40	1.30
Breast cancer	0.60	0.30
Diabetes mellitus	0.30	0.27
Colon and rectum cancers	0.26	0.20
Trachea, bronchus, lung cancers	0.30	0.17
Hyperthensive heart disease	0.16	0.15
COPD	0.14	0.13
Nephritis and necrosis	0.17	0.12

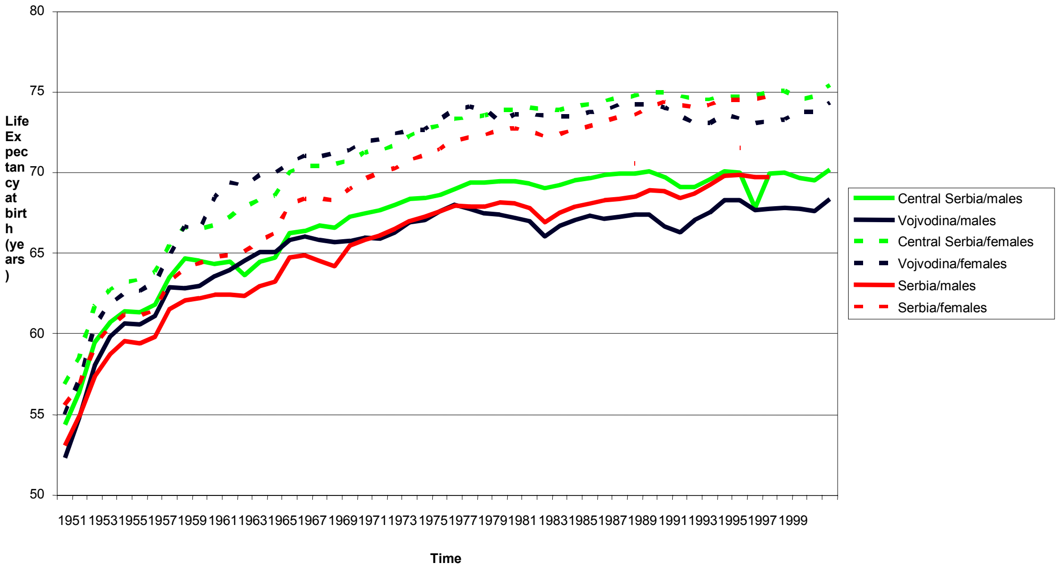
For example, for Serbian males the biggest improvement in life expectancy at birth would occur with the elimination of ischaemic heart disease mortality. In contrast, for all females, cerebrovascular disease has the biggest impact on life expectancy at birth. When life expectancy at 60 years of age is in question, the former situation still holds. Inflammatory heart disease has biggest impact in life expectancy at age 60 as compared with the one at birth in both genders. Cardiovascular diseases together make improvement of 5.60 years in males and 5.46 years in females when life expectancy at birth is concerned, i.e. 8.1% and 7.3% more years of life. In the case of life expectancy at age 60 cardiovascular diseases together make improvement of 5.15 years in males and 5.25 years in females, i.e. 32.5% and 28.4% more years of life.

3.2. TRENDS IN LIFE EXPECTANCY

Between 1950 and 2001 life expectancy at birth in Serbia steadily increased for almost 40 years, then declined and fluctuated, and after the year 2000 increased again. The average rate of changes during this period for males is 0.30 years annually (CI: 0.08 – 0.52) and for females 0.36 years annually (0.19 – 0.52) in Central Serbia, 0.31 years annually (CI: 0.11 – 0.51) for males and 0.37 (0.17 – 0.58) for females in Vojvodina, and 0.35 (0.17 – 0.53) for males and 0.40 (0.25 – 0.55) for females in Serbia, Figure 3.1.

The smaller annual increase in life expectancy at birth for males may be an indication that either men are living more dangerously than women or that women in Serbia, as other females in the world, are still far from the potential limit of the human life span (Tobias et al 2001). However, the mortality from smoking-related illness alone is large enough to explain the slower gains in life expectancy for males.

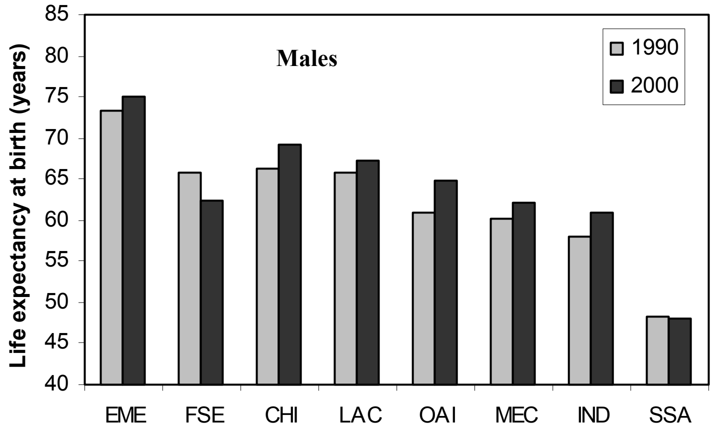
Figure 3.1. Trends in life expectancy at birth by sex and territories, 1950 - 2001

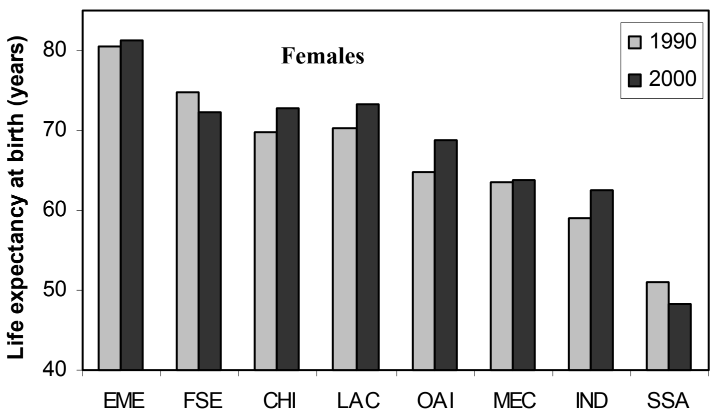


GBD 2000 results are compared in Figure 3.2. with GBD 1990 results. As shown in Figure 3.2., life expectancy increased during the 1990s for most regions of the world, with the notable exception of Africa and the former Soviet countries of Eastern Europe. In the former situation on average, HIV/AIDS reduced life expectancy for sub-Saharan Africans by 6 years in 2000**.** The largest impact was in Zimbabwe, Botswana and Namibia, where male and female life expectancies would be around 20 years higher if there were no deaths due to HIV/AIDS. In the latter case, life expectancies at birth for males and females declined by 3.2 years and 2.7 years respectively, over the 10 year period between 1990 and 2000.

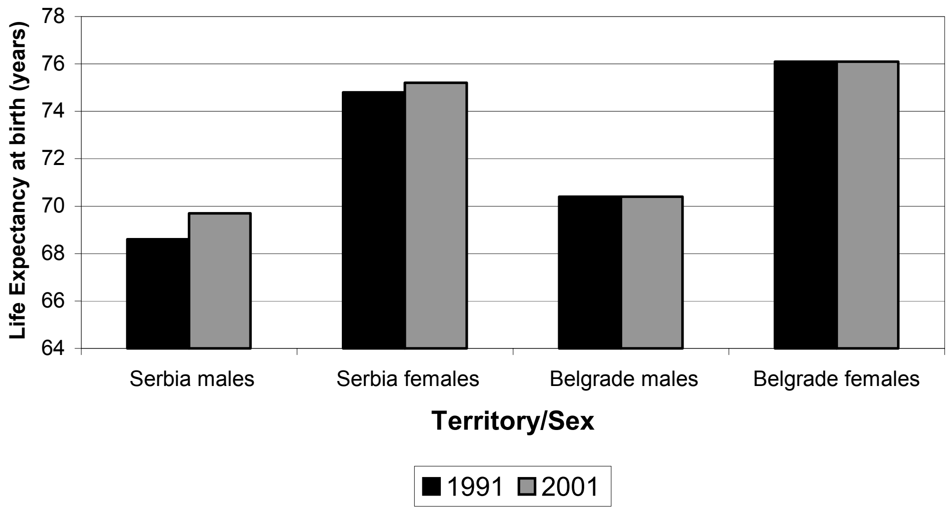
In our country, life expectancy at birth is almost identical over the ten year period for females and slightly increased for males (75.8 years in 1991 and 75.2 years in 2001 for females; 68.6 years in 1991 and 69.7 years in 2001 for males). The situation in Belgrade is identical over the ten-year period for both sexes (76.1 years in 1991 and 76.1 years in 2001 for females; 70.4 years in 1991 and 70.4 years in 2001 for males), (Figure 3.2 also).

Figure 3.2. Gains in life expectancy at birth, World population from 1990 to 2000, Serbia population from 1991 to 2001, by sex and region





Source:Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N, Bernard C, Lopez A, Murray C (2002). Global Burden of Disease 2000: Version 2 methods and results. GPE Disccussion Paper No. 50. Geneva, WHO. Available on the worlwide web at www.who.int./evidence.
List of abbreviations in Annex Table 2. in Appendices.

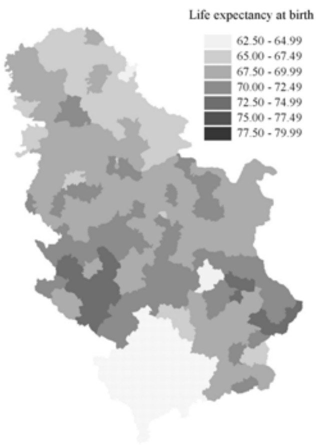


3.3. Regional Aspect of Life Expectancy

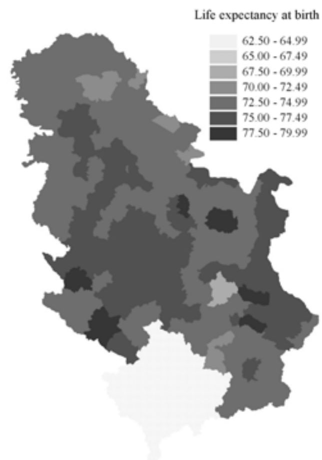
In Serbia, from a regional aspect, the differences in life expectancy at birth are not highly visible. In the three-year period 1999-2001, life expectancy by municipalities (Serbia, excluding Kosovo, has a total of 161 municipalities, 116 in Central Serbia and 45 in Vojvodina), is in the interval of 64.7 to 74.7 years for males and 69.3 to 79.0 years for females. However, in over 75% of municipalities, life expectancy for males is between 67.5 and 72.5 years (in the same three-year period, average for Serbia is 69.3 years), and for females in 91.3% municipalities it is in the interval of 72.5 to 77.5 years (average for Serbia is 74.7 years).

The distribution of municipalities according to life expectancy at 60 years of age is also quite even. In most municipalities (73.9%) life expectancy at age 60 is in the interval of 15-18 years for males, and 18-21 years for females (77.6% of all municipalities).

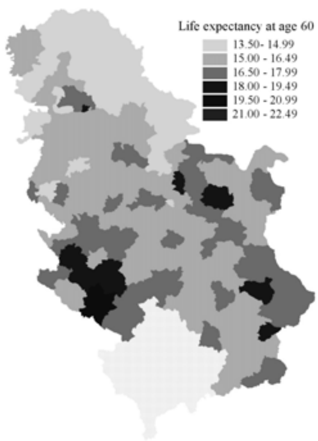
Map 3.1. Life expectancy at birth for males



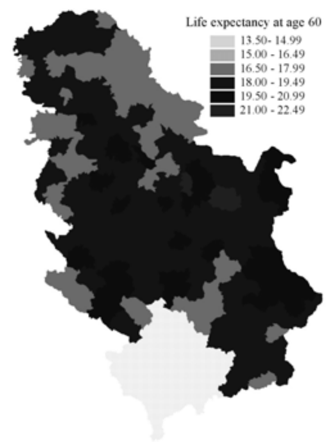
Map 3.2. Life expectancy at birth for females



Map 3.3. Life expectancy at age 60 for males



Map 3.4. Life expectancy at age 60 for females



Spatially, municipalities with the highest life expectancy at birth (Maps 3.1. and 3.2.) and at age 60 (Maps 3.3. and 3.4.) are in the southeast and southwest of Central Serbia. These are mostly less economically developed municipalities, with an above average part of rural population, and they are in the mountain regions of the country. It should also be noted that in these municipalities, the correlations of fertility levels with life expectancy at birth are not significant. In fact, in the group of 10 municipalities with the highest expectancy at birth, there are municipalities with very low total fertility rate (southeast), but also municipalities with relatively high fertility (southwest).

Viewed by large areas, in Vojvodina, compared to Central Serbia, life expectancy at birth for males is two years lower (67.9 opposed to 69.8) and nearly one year lower for females (74.0 opposed to 74.9). Viewed by municipalities, life expectancy at birth is usually the lowest in Vojvodina (Maps 3.1. and 3.2.). Out of 10 municipalities with the lowest expectancy at birth for males, 8 municipalities are in Vojvodina, and 6 for females. In the group of 10 municipalities with the lowest life expectancy at 60 years of age for males, all are in Vojvodina, and for females, 5 are in Vojvodina. Out of the 10 municipalities with the highest life expectancy at 60 years of age for males, only one is in Vojvodina, and for females, none is in Vojvodina.

Since municipalities in Vojvodina are in the group of developed municipalities, low values of life expectancy at birth, and especially life expectancy at 60 years of age, can usually be explained by lifestyle, nutrition and living environment which do not favor the decrease in mortality, especially for males.

4. THE BURDEN OF FATAL DISEASES AND INJURIES

JELENA MARINKOVIĆ, NIKOLA KOCEV

Serbia has an almost complete registration of deaths and relatively good information on causes of deaths. This chapter describes the burden of premature mortality in Serbia in 2000 using years of life lost (YLL). The calculation of YLL is based on numbers of deaths attributed to each cause at each age.

4.1. DEATHS IN SERBIA 2000

Deaths by broad cause groups and sex for Serbia in 2000 are presented in Table 4.1. Males had 6.9 percent more deaths by all causes than females in year 2000. When measurement by death rates is in question male excess is 13%.

Table 4.1. Deaths by broad cause groups and sex, Serbia 2000

Causes	Measures	Both sexes	Males	Females
Group I:	N	2 350	1 376	974
Communicable,	Vertical %	2.26	2.56	1.94
maternal, perinatal and	Horizontal %	100.00	58.55	41.45
nutritional conditions	Rate*	0.31	0.37	0.25
	Rate Ratio**	-	1.48	1.00
Group II:	N	97 570	49 365	48 205
Noncommunicable	Vertical %	93.78	91.84	95.85
diseases	Horizontal %	100.00	50.59	49.41
	Rate	12.92	13.44	12.43
	Rate Ratio	-	1.08	1.00
Group III:	N	4 122	3 010	1 112
Injuries	Vertical %	3.96	5.60	2.21
	Horizontal %	100.00	73.02	26.98
	Rate	0.55	0.82	0.29
	Rate Ratio	-	2.83	1.00
	N	104 042	53 751	50 291
All causes	Vertical %	100.00	100.00	100.00
	Horizontal %	100.00	51.66	48.34
	Rate	13.78	14.63	12.97
	Rate Ratio	-	1.13	1.00

* Death rate per 1 000 population; ** Male to female death rate

Age and distribution of deaths for Serbia 2000 according to broad groups of diseases are presented in Table 4.2.

Table 4.2. Deaths by broad cause group and age, Serbia 2000

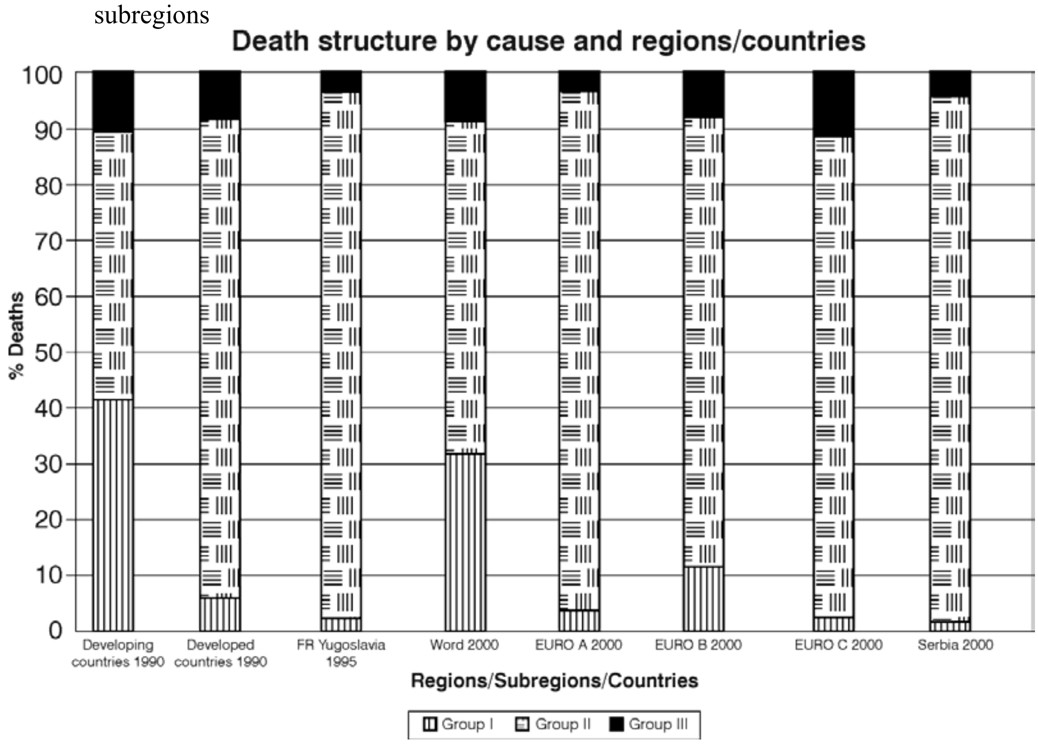
Cause	Age groups (%)				
	0-14	15-24	25-44	45-64	65+
Group I: Communicable, maternal, perinatal and nutritional conditions	655 (56.5)	36 (5.0)	117 (3.3)	395 (1.8)	1 147 (1.5)
Group II: Noncommunicable diseases	384 (33.1)	294 (41.1)	2 512 (71.9)	20 149 (92.4)	74 231 (96.6)
Group III: Injuries	121 (10.4)	385 (53.8)	866 (24.8)	1 256 (5.8)	1 494 (1.9)
All causes	1 160 (100)	715 (100)	3 495 (100)	21 800 (100)	76 872 (100)
Rates	0.94	0.69	1.71	10.71	63.44

Children die mostly by Group I diseases, adolescents of injuries and some of Group II diseases. Young adults besides Group II diseases die frequently because of injuries, too. Adults and older people die of causes from Group II diseases.

4.1.1. Causes of deaths

Deaths by broad cause groups for Serbia in 2000 are compared with those for GBD subregions in the same year in Figure 4.1. Group I conditions (infectious, maternal, perinatal and nutritional conditions) are responsible for fewer deaths in Serbia 2000 than in other developed countries, as are Group III conditions (injuries). The noncommunicable diseases (Group II) thus account for a larger proportion of deaths in Serbia than in other world regions.

Figure 4.1. Deaths by broad cause groups, Serbia 2000, compared with chosen world regions and subregions



Source: Murray C, Lopez A(1997). Mortality by cause for eight regions of the world: Global Burden of Disease Study. Lancet, 349: 1269-1276.
Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N, Bernard C, Lopez A, Murray C (2002). Global Burden of Disease 2000: Version 2 methods and results. GPE Disccussion Paper No. 50. Geneva, WHO. Available on the worlwide web at www.who.int./evidence.

Deaths by disease categories and sex are presented in Table 4.3. Cardiovascular and malignant diseases represent the cause with majority of deaths in Serbia for both sexes, around 80%. Diabetes mellitus is the third for females (3.12%) and seventh for males (2.16%). Unintentional injuries are the sixth cause for males (2.78%) and even tenth for females (0.94%). Genitourinary diseases are at the sixth place for females and eighth for males. All other causes are almost at identical places for males and females. Causes such as skin diseases, nutritional deficiencies, maternal conditions, oral conditions and sense organ disorders are not present at all or are represented by marginal numbers.

Table 4.3. Deaths by disease categories and sex, Serbia 2000

Disease categories	**Both sexes**		**Male**		**Female**	
	%	**Rank**	**%**	**Rank**	**%**	**Rank**
Cardiovascular disease	61.53	1	56.24	1	67.19	1
Malignant neoplasms	18.84	2	20.94	2	16.61	2
Respiratory diseases	3.91	3	4.69	3	3.07	4
Digestive diseases	3.18	4	3.82	4	2.50	5
Diabetes mellitus	2.63	5	2.16	7	3.12	3
Intentional injuries	2.07	6	2.82	5	1.27	7
Unintentional injuries	1.89	7	2.78	6	0.94	10
Genitourinary diseases	1.65	8	1.74	8	1.57	6
Neuropsychiatric conditions	1.30	9	1.58	9	1.00	8
Respiratory infections	1.02	10	1.07	10	0.97	9
Infectious and parasitic diseases	0.67	11	0.84	11	0.49	11
Perinatal conditions	0.52	12	0.62	12	0.42	12
Congenital anomalies	0.24	13	0.24	13	0.24	13
Other neoplasms	0.22	14	0.23	14	0.20	14
Endocrine disorders	0.11	15	0.09	15	0.14	16
Musculoskeletal diseases	0.11	16	0.05	17	0.18	15
Skin diseases	0.05	17	0.06	16	0.04	18
Nutritional deficiencies	0.04	18	0.03	18	0.05	17
Maternal conditions	0.01	19	-	-	0.01	19
Oral conditions	0.00	-	0.00	-	0.00	-
Sense organ disorders	0.00	-	0.00	-	0.00	-

At the same time, death rates (per 1 000 population) for cardiovascular diseases are slightly higher in females (8.71 vs 8.23 in males), death rates for malignant disease are higher in males (3.06 vs 2.15 in females) as are death rates for respiratory diseases (0.69 vs 0.40 in females), for digestive diseases (0.56 vs 0.32), intentional (0.41 vs 0.16) and unintentional injuries (0.41 vs 0.12), neuropsychiatric conditions (0.23 vs 0.13) and infectious and parasitic diseases (0.12 vs 0.06). Females prevail in diabetes mellitus (0.40 vs 0.32 in males) and musculoskeletal diseases (0.02 vs 0.001).

Deaths by the top twenty causes of death and sex are presented in Table 4.4. The top twenty causes of death are almost identical for both sexes except breast cancer (4th), cervical cancer (12th), corpus uteri cancer (17th) and ovarian cancer (18th) which are limited to females and prostate cancer (12th) that is limited to males. Also causes such as cirrhosis of the liver (10th), road traffic accidents (14th), mouth and oropharynx cancers (18th), bladder cancer (19th) are found in twenty leading causes only in males. Leukaemia settled as the nineteenth cause for females and is not listed for males.

Table 4.4. Top twenty leading causes of death, Serbia 2000

Rank	Both sexes		Male		Female	
	Causes	**% of total deaths**	**Causes**	**% of total males deaths**	**Causes**	**% of total females deaths**
1	Cerebrovascular disease	18.05	Ischaemic heart disease	20.25	Cerebrovascular disease	20.78
2	Ischaemic heart disease	17.86	Cerebrovascular disease	15.51	Inflammatory heart disease	20.57
3	Inflammatory heart disease	17.54	Inflammatory heart disease	14.71	Ischaemic heart disease	15.31
4	Trachea, bronchus, lung cancers	5.28	Trachea, bronchus, lung cancers	8.07	Breast cancer	3.86
5	Colon and rectum cancers	2.72	Colon and rectum cancers	3.06	Diabetes mellitus	3.12
6	Diabetes mellitus	2.63	COPD	2.90	Colon and rectum cancers	2.37
7	COPD	2.29	Self-inflicted injuries	2.48	Trachea, bronchus, lung cancers	2.30
8	Breast cancer	1.90	Diabetes mellitus	2.16	Hyperthensive heart disease	1.93
9	Self-inflicted injuries	1.83	Stomach cancer	2.05	COPD	1.63
10	Stomach cancer	1.67	Cirrhosis of the liver	1.50	Nephritis and nephrosis	1.55
11	Hyperthensive heart disease	1.58	Nephritis and nephrosis	1.40	Stomach cancer	1.26
12	Nephritis and nephrosis	1.47	Prostate cancer	1.38	Cervix uteri cancer	1.20
13	Liver cancer	1.08	Hyperthensive heart disease	1.25	Self-inflicted injuries	1.14
14	Lower respiratory infections	1.02	Road traffic accidents	1.24	Lower respiratory infections	0.97
15	Cirrhosis of the liver	1.01	Liver cancer	1.23	Pancreas cancer	0.94
16	Pancreas cancer	0.98	Lower respiratory infections	1.07	Liver cancer	0.91
17	Road traffic accidents	0.82	Pancreas cancer	1.03	Corpus uteri cancer	0.84
18	Prostate cancer	0.71	Mouth and oropharynx cancers	0.95	Ovary cancer	0.81
19	Asthma	0.68	Bladder cancer	0.85	Leukaemia	0.53
20	Leukaemia	0.63	Asthma	0.82	Asthma	0.52

Among cardiovascular diseases the cerebrovascular ones are the leading cause of deaths for females and second for males, ischaemic heart disease is the leading cause of death for males and third for females, inflammatory heart disease is the third for males and second for females and hyperthensive heart disease is the eighth for females and thirteenth for males. Rates are only higher for males in the case of ischaemic heart disease (2.96 vs 1.98 for females), otherwise they are higher for females (almost 20% higher).

Cancers listed in the top twenty leading causes of death bring about 15% of deaths. Trachea, bronchus, lung cancers are first listed for males with death rate four times higher for males in comparison with females (1.18 vs 0.30), than colon and rectum cancers (0.45 vs 0.31 in females), stomach cancer (0.30 vs 0.16 in females), liver cancer (0.18 vs 0.12 in females) and pancreas cancer (0.15 vs 0.12 in females). All others are typical for one sex only, i.e. breast cancer (death rate 0.50), cervical cancer (0.16), corpus uteri cancer (0.11) and ovarian cancer (0.105) for females and prostate cancer (0.20) for males.

Diabetes mellitus is more frequent in females than in males (0.40 vs 0.32 in males), as well as chronic obstructive pulmonary disease - COPD (0.42 vs 0.21 in females), lower respiratory infections (0.16 vs 0.125 in females) and asthma (0.12 vs 0.07 in females). Cirrhosis of the liver is typical for males (0.22 vs 0.06). Nephritis and nephrosis are almost identical in both sexes (0.204 vs 0.201 in females).

Self-inflicted injuries (0.36 vs 0.15 in females) and road-traffic accidents (0.18 vs 0.046 in females) are typical for males.

In the world population, leading causes of death in males and females are presented in Table 4.5.

Table 4.5. Leading causes of death in males and females, Version 1 global estimates for 2000

	Males	**% total deaths**		**Females**	**% total deaths**
1	Ischaemic heart disease	12.6%	1	Ischaemic heart disease	12.7%
2	Cerebrovascular disease	8.4%	2	Cerebrovascular disease	10.9%
3	Lower respiratory infections	6.9%	3	Lower respiratory infections	6.9%
4	Perinatal conditions	4.8%	4	Chronic obstructive pulmonary disease	4.9%
5	HIV/AIDS	4.7%	5	HIV/AIDS	4.5%
6	Chronic obstructive pulmonary disease	4.5%	6	Perinatal conditions	4.2%
7	Diarrhoeal diseases	3.6%	7	Diarrhoeal diseases	3.7%
8	Tuberculosis	3.5%	8	Malaria	2.2%
9	Trachea, bronchus, lung cancers	3.0%	9	Hypertensive heart disease	2.1%
10	Road traffic accidents	2.9%	10	Tuberculosis	2.1%
11	Malaria	1.8%	11	Diabetes mellitus	1.8%
12	Self-inflicted injuries	1.8%	12	Breast cancer	1.6%
13	Stomach cancer	1.8%	13	Measles	1.5%
14	Cirrhosis of the liver	1.7%	14	Upper respiratory infections	1.3%
15	Liver cancer	1.4%	15	Road traffic accidents	1.3%
16	Measles	1.3%	16	Self-inflicted injuries	1.2%
17	Diabetes mellitus	1.3%	17	Stomach cancer	1.2%
18	Hypertensive heart disease	1.3%	18	Trachea, bronchus, lung cancers	1.2%
19	Violence	1.3%	19	Nephritis and nephrosis	1.1%
20	Nephritis and nephrosis	1.1%	20	Cirrhosis of the liver	1.1%

Source: Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N, Bernard C, Lopez A, Murray C (2002). Global Burden of Disease 2000: Version 2 methods and results. GPE Disccussion Paper No. 50. Geneva, WHO. Available on the worlwide web at www.who.int./evidence.

The differences between Serbia and World population are important in the group of communicable diseases, while other groups are similar.

In Table 4.6. the comparison between the ten leading causes of death for Serbia (total population) and selected subregions in the World in 2000 is presented. Comparison with various world regions point out the similarities with developed countries as far as the causes of death are in question. In Serbia like in developed and developing countries ischaemic heart disease and cerebrovascular disease (mainly stroke) are together responsible for the biggest part of mortality (36% in Serbia, 36.7% in developed countries and 17.6% in developing countries). This proportion has decreased slightly from 38% in 1990 (developed countries). The increase in cardiovascular mortality in Eastern European countries has been offset by continuing declines in many other developed countries. Lung cancer is the next leading cause of death in developed countries (4.4% and 5.3% in Serbia). Another, largely tobacco-related cause, chronic obstructive pulmonary disease (COPD) leads to 3.2% of all deaths in developed countries and 2.3% in Serbia. Suicide accounts for nearly 2% of deaths in developed countries and 1.8% in Serbia. Road traffic accidents are no longer in the top 10 causes of mortality, as there has been a decline in death rates due to road traffic accidents of nearly 30% in developed countries since 1990.

Table 4.6. Ten leading causes of death, Serbia 2000, compared to developed and developing regions in the world, 2000

Serbia, 2000	**% total deaths**	**World, 2000**	**% total deaths**	**Developed countries (EURO, AMRO A, WPRO A)**	**% total deaths**	**Developing countries (All other regions)**	**% total deaths**
Cerebro-vascular-disease	18.1	Ischaemic heart disease	12.6	Ischaemic heart disease	23.3	Ischaemic heart disease	9.2
Ischaemic heart disease	17.9	Lower respiratory infections	11.1	Cerebrovascular disease	13.4	Cerebrovascular disease	8.4
Inflammatory heart disease	17.5	Cerebrovascular disease	9.6	Trachea, bronchus, lung cancers	4.4	Lower respiratory infections	7.9
Trachea, bronchus, lung cancers	5.3	COPD	4.7	Lower respiratory infections	3.6	Perinatal conditions	6.0
Colon and rectum cancers	2.7	HIV/AIDS	4.6	COPD	3.2	HIV/AIDS	6.0
Diabetes mellitus	2.6	Perinatal conditions	4.5	Colon and rectum cancers	2.3	COPD	5.2
COPD	2.3	Diarrhoeal diseases	3.6	Self-inflicted injuries	1.8	Diarrhoeal diseases	4.6
Breast cancer	1.9	Tuberculosis	2.9	Diabetes mellitus	1.7	Tuberculosis	3.6
Self-inflicted injuries	1.8	Road traffic accidents	2.2	Stomach cancer	1.7	Malaria	2.7
Stomach cancer	1.7	Trachea, bronchus, lung cancers	2.1	Hypertensive heart disease	1.7	Road traffic accidents	2.4

Source: Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N, Bernard C, Lopez A, Murray C (2002). Global Burden of Disease 2000: Version 2 methods and results. GPE Disccussion Paper No. 50. Geneva, WHO. Available on the worlwide web at www.who.int./evidence.

The leading causes of death are very different in developing countries. Six of the top ten causes are infectious/parasitic and perinatal causes. Acute lower respiratory infections (primarily pneumonia) are the third leading cause of death. Still, cardiovascular diseases, mainly ischaemic heart disease and cerebrovascular disease, are leading causes of death in developing countries as is the case in developed countries and Serbia, too. Chronic obstructive pulmonary disease is ranked at 6th place and road-traffic accidents at 10th in developing countries. Among ten leading causes of death in these countries there are no cancers, as is the case in developed countries (lung, colorectal and stomach cancers) or Serbia (lung, colorectal, breast and stomach cancers).

Age-adjusted cause specific death rates are given in Table 4.7. Due to the “old” Serbian population, death rates are considerably higher than the ones which would be expected even in European age distribution’s circumstances.

Table 4.7. Serbia death rates and Age adjusted death rates to the European, WHO and Segi standard population

Causes	Death rate* Serbia 2000	European standard population	WHO World population standard	Segi’s world population standard
All causes	13.7788	11.6833	8.9018	7.5706
Group I	0.3112	0.3376	0.3105	0.3428
Group II	12.9217	10.8551	8.1518	6.8208
Group III	0.5459	0.4906	0.4396	0.4070
Cerebrovascular disease	2.4878	2.0133	1.5076	1.2265
Ischaemic heart disease	2.4610	2.0076	1.4964	1.2702
Inflammatory heart disease	2.4169	2.1889	1.5767	1.2252
Trachea, bronchus, lung cancers	0.7273	0.5773	0.4475	0.4121
Colon and rectum cancers	0.3754	0.2923	0.2244	0.1963
Diabetes mellitus	0.3617	0.2773	0.2118	0.1796
COPD	0.3150	0.2487	0.1853	0.1535
Breast cancer	0.2619	0.2212	0.1729	0.1538
Self-inflicted injuries	0.2526	0.2186	0.1877	0.1687
Stomach cancer	0.2297	0.1789	0.1393	0.1228
Hyperthensive heart disease	0.2175	0.1833	0.1367	0.1098
Nephritis and nephrosis	0.2027	0.1610	0.1241	0.1067
Liver cancer	0.1482	0.1135	0.0870	0.0777
Lower respiratory infections	0.1405	0.1281	0.1009	0.0881
Cirrhosis of the liver	0.1393	0.1146	0.0897	0.0830
Pancreas cancer	0.1354	0.1067	0.0814	0.0726
Road traffic accidents	0.1124	0.1046	0.0999	0.0957
Prostate cancer	0.0981	0.0757	0.0566	0.0469
Asthma	0.0931	0.0774	0.0583	0.0483
Leukaemia	0.0862	0.0731	0.0635	0.0593

* rate per 1 000 population

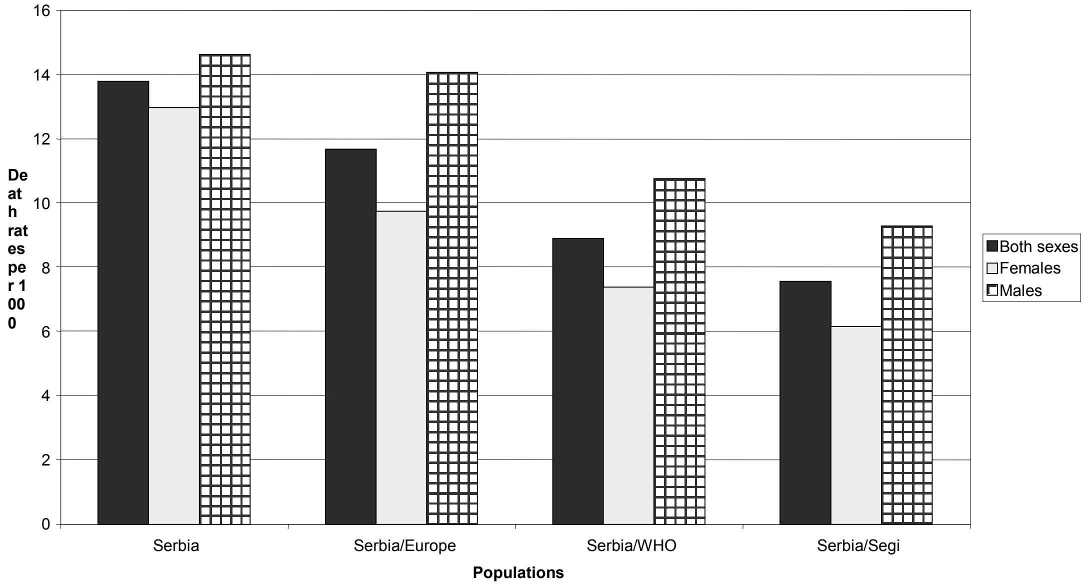
When analysing sex specific adjusted mortality rates, Table 4.8. and Figure 4.2., males and females show this pattern, too.

Table 4.8. Sex specific Serbian death rates, age-standardized

Sex	Serbian death rates*	Adjusted death rates		
		European standard	WHO world population	Segi’s world population
Males	14.63	14.06	10.74	9.26
Females	12.97	9.74	7.37	6.14
Both sexes	13.78	11.68	8.90	7.57

* rate per 1 000 population

Figure 4.2. Death rates and age-adjusted death rates (per 1 000), by sex, Serbia 2000



4.1.2. Deaths in Belgrade

Deaths by broad cause groups and sex for Belgrade in 2000 are in the Table 4.9. Males had 8.5 percent more deaths by all causes than females in year 2000. When measurement by death rates is in question male excess is 19.8%. Both death rates and death structure are slightly different than those in Serbia.

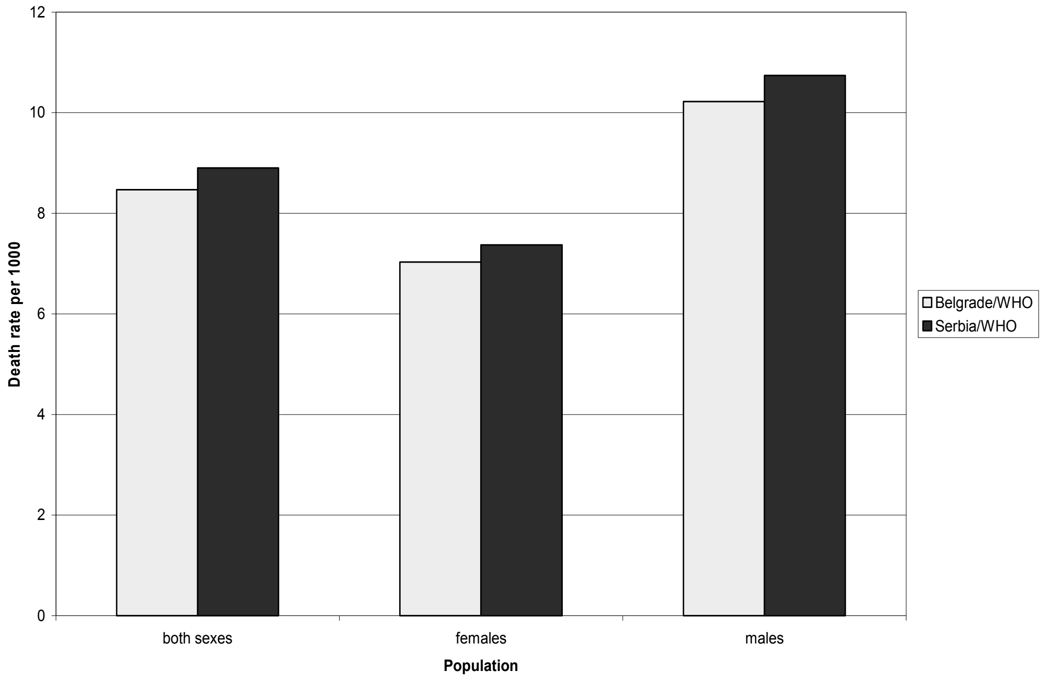
Table 4.9. Deaths by broad cause groups and sex, Belgrade 2000

Causes	Both sexes (%)	Male (%)	Female (%)
Group I: Communicable, maternal, perinatal and nutritional conditions	596 (3.02)	362 (3.52)	234 (2.47)
Group II: Noncommunicable diseases	18 340 (92.82)	9 362 (91.03)	8 978 (94.76)
Group III: Injuries	822 (4.16)	560 (5.44)	262 (2.76)
All causes	19 758 (100.00)	10 284 (100.00)	9 474 (100.00)
Rate*	12.46	13.65	11.39
Rate ratio	-	1.20	1.00
Rate Serbia**	13.15	14.02	12.39
Rate ratio	-	1.13	1.00

* rate per 1 000
** rate age standardized to 1 000 Serbian population

Death rates in Belgrade are lower than ones in Serbia (difference is approximately half a death per 1 000 population for males, females and both sexes), and percentage of deaths for noncommunicable diseases is lower, too (Table 4.9. and Figure 4.3). Naturally, percentages for Group I and Group III are somewhat higher.

Figure 4.3. Age-adjusted death rates, Belgrade 2000 and Serbia 2000 to WHO world population



Age and broad groups of diseases distribution of deaths for Belgrade 2000 are presented in Table 4.10.

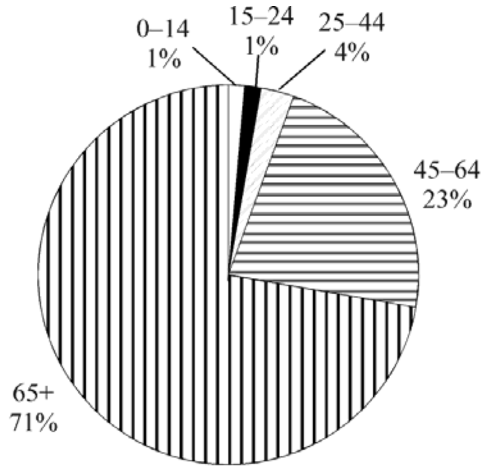
Table 4.10. Deaths by broad cause group and age, Belgrade 2000

Cause	Age groups				
	0-14	15-24	25-44	45-64	65+
Group I: Communicable, maternal, perinatal and nutritional conditions	132 (62.3)	5 (3.4)	31 (4.3)	102 (2.2)	326 (2.3)
Group II: Noncommunicable diseases	58 (27.4)	62 (42.5)	520 (71.8)	4 252 (92.6)	13 448 (95.5)
Group III: Injuries	22 (10.4)	79 (54.1)	173 (23.9)	237 (5.2)	311 (2.2)
All causes	212 (100.00)	146 (100.00)	724 (100.00)	4 591 (100.00)	14 085 (100.00)
Rate*	0.88	0.66	1.64	10.30	59.41
Rate Serbia**	0.82	0.63	1.62	10.44	69.38

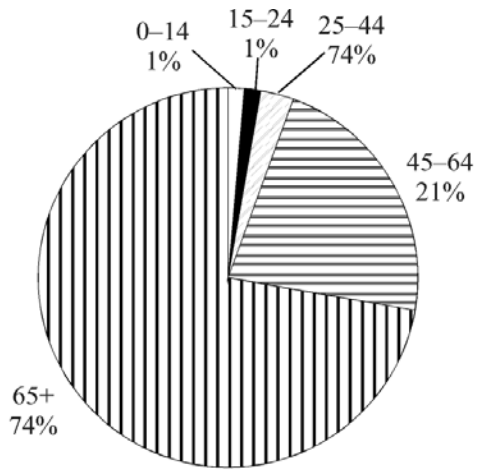
* rate per 1 000
** rate age standardized to 1 000 Serbian population

Children die mostly by Group I diseases, adolescents of injuries and some of Group II diseases. Young adults besides Group II diseases die frequently because of injuries, too. Adults and older people die of causes from Group II diseases. The majority of deaths are in old ages (71.3 percent / death rate of 69.38) and middle ages (23.2 percent / death rate 10.44). Together they are the same as the ones in Serbia (old and middle ages are represented as 94.9 percent of all deaths, death rates are 63.44 and 10.71 respectively), Figure 4.4.

Figure 4.4. Death structure by age groups, Belgrade and Serbia 2000



Death structure by age groups, Belgrade 2000



Death structure by age groups, Serbia2000

Deaths by disease categories and sex are presented in Table 4.11. Cardiovascular and malignant diseases represent the causes for the majority of deaths in Belgrade for both sexes, around 80%. Digestive diseases are at the third place accounting for approximately 3% of total deaths. Intentional injuries prevail in males (3.15 percent vs 1.49 percent in females). Respiratory diseases are the fifth cause both for males and females. Diabetes mellitus is the fourth for females (2.07 percent) and eighth for males (1.63 percent). All other causes are almost at identical places in males and females. Causes such as skin diseases, nutritional deficiencies, maternal conditions, oral conditions and sense organ disorders are not present at all or are represented by marginal numbers.

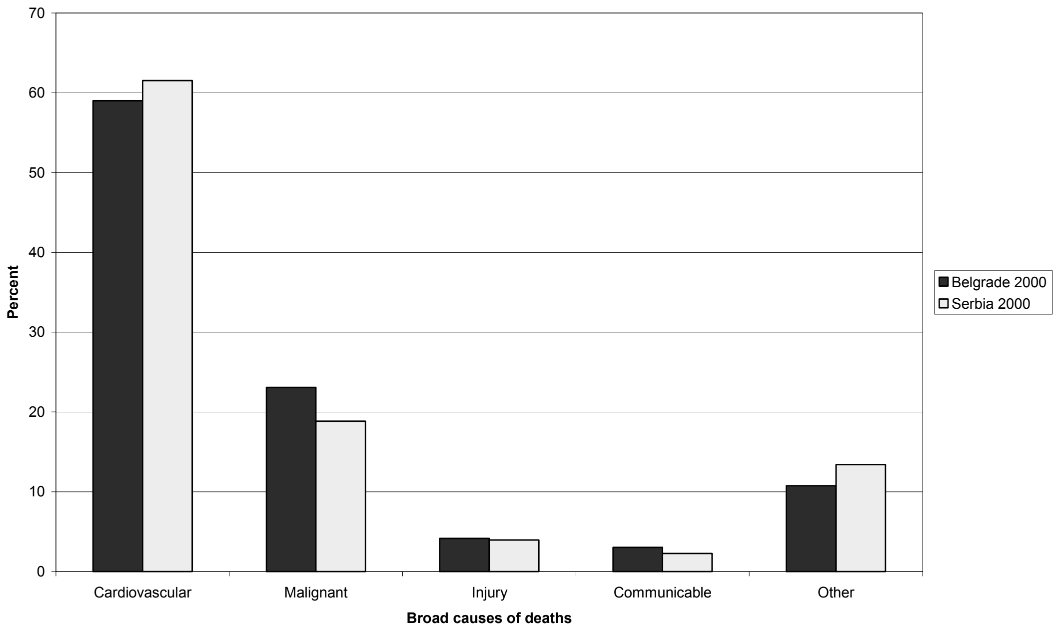
Table 4.11. Deaths by disease categories and sex, Belgrade 2000

Disease categories	Both sexes		Male		Female	
	%	Rank	%	Rank	%	Rank
Cardiovascular diseases	59.01	1	54.99	1	63.41	1
Malignant neoplasms	23.06	2	24.30	2	21.71	2
Digestive diseases	3.32	3	3.88	3	2.72	3
Intentional injuries	2.36	4	3.15	4	1.49	7
Respiratory diseases	2.29	5	2.84	5	1.71	5
Diabetes mellitus	1.84	6	1.63	7	2.07	4
Unintentional injuries	1.80	7	2.29	6	1.27	8
Genitourinary diseases	1.51	8	1.38	10	1.65	6
Respiratory infections	1.47	9	1.68	8	1.24	9
Neuropsychiatric conditions	1.29	10	1.57	9	0.98	10
Infectious and parasitic diseases	0.92	11	1.17	11	0.65	11
Perinatal conditions	0.58	12	0.63	12	0.52	12
Congenital anomalies	0.18	13	0.22	13	0.13	14
Endocrine disorders	0.10	14	0.05	16	0.16	13
Musculoskeletal diseases	0.09	15	0.06	15	0.12	15
Other neoplasms	0.08	16	0.10	14	0.07	16
Nutritional deficiencies	0.04	17	0.03	17	0.05	17
Skin diseases	0.01	18	0.01	18	0.01	18
Maternal conditions	-		-		-	
Sense organ diseases	-		-		-	
Total	100.00		100.00		100.00	

At the same time, death rates (per 1 000 population) for cardiovascular diseases are slightly higher in males (7.51 vs 7.22 in females). Death rates for malignant disease are also higher in males (3.32 vs 2.47 in females) as are death rates for respiratory diseases (0.39 vs 0.19 in females), for digestive diseases (0.53 vs 0.31), intentional (0.43 vs 0.17) and unintentional injuries (0.31 vs 0.15), neuropsychiatric conditions (0.22 vs 0.11) and infectious and parasitic diseases (0.16 vs 0.07). Females prevail in diabetes mellitus (0.24 vs .022 in males) and musculoskeletal diseases (0.01 vs 0.001).

In comparison to Serbia, the death structure led to minor differences in causes ranked from the third place on, but because the small percentages (numbers) are in question the reason could be either random variations or slightly different patterns of defining causes of deaths in death certificates, Figure 4.5.

Figure 4.5. Deaths (in percent) by broad disease categories, Belgrade 2000 and Serbia 2000



Deaths by the top twenty causes of death and sex are presented in Table 4.12. The top twenty causes of death are almost identical for both sexes except breast cancer (4th), cervical cancer (10th), corpus uteri cancer (17th) and ovarian cancer (16th) which are limited to females and prostate cancer (9th) that is limited to males. Also, the causes such as cirrhosis of the liver (13th), road-traffic accidents (16th), bladder cancer (18th), leukaemia (19th) and mouth and oropharynx (20th) are found in twenty leading causes only in males. Lymphomas and multiple myeloma, and falls, settled as the 19th and 20th causes for females, are not listed for males.

Table 4.12. Top twenty leading causes of death, Belgrade 2000

Rank	Both sexes		Males		Females	
	Causes	**% of total deaths**	**Causes**	**% of total males deaths**	**Causes**	**% of total females deaths**
1	Cerebrovascular disease	17.66	Ischaemic heart disease	19.12	Inflammatory heart disease	19.46
2	Inflammatory heart disease	16.42	Cerebrovascular disease	16.08	Cerebrovascular disease	19.39
3	Ischaemic heart disease	16.39	Inflammatory heart disease	13.62	Ischaemic heart disease	13.42
4	Trachea, bronchus, lung cancers	7.12	Trachea, bronchus, lung cancers	10.11	Breast cancer	5.61
5	Colon and rectum cancers	3.34	Colon and rectum cancers	3.64	Trachea, bronchus, lung cancers	3.88
6	Breast cancer	2.71	Self-inflicted injuries	2.44	Colon and rectum cancers	3.02
7	Hyperthensive heart disease	1.94	Stomach cancer	2.24	Hyperthensive heart disease	2.24
8	Self-inflicted injuries	1.90	COPD	1.84	Diabetes mellitus	2.07
9	Diabetes mellitus	1.84	Prostate cancer	1.77	Nephritis and nephrosis	1.64
10	Stomach cancer	1.75	Lower respiratory	1.68	Cervix uteri	1.38

			infections		cancer	
11	Nephritis and nephrosis	1.49	Hyperthensive heart disease	1.66	Self-inflicted injuries	1.32
12	Lower respiratory infections	1.47	Diabetes mellitus	1.63	Lower respiratory infections	1.24
13	COPD	1.43	Cirrhosis of the liver	1.56	Stomach cancer	1.21
14	Pancreas cancer	1.15	Nephritis and nephrosis	1.35	Pancreas cancer	1.20
15	Cirrhosis of the liver	1.06	Pancreas cancer	1.10	COPD	0.98
16	Prostate cancer	0.92	Road traffic accidents	1.02	Ovary cancer	0.95
17	Liver cancer	0.92	Liver cancer	0.94	Corpus uteri cancer	0.93
18	Leukaemia	0.76	Bladder cancer	0.92	Liver cancer	0.90
19	Bladder cancer	0.73	Leukaemia	0.89	Lymphomas, multiple myeloma	0.66
20	Road traffic accidents	0.68	Mouth and oropharynx c.	0.88	Falls	0.65

Among cardiovascular diseases, the cerebrovascular ones are the leading cause for total population and second both for females and males, ishaemic heart disease is the leading cause of death for males and third for females, inflammatory heart disease is the third for males and first for females and hyperthensive heart disease is the eleventh for males and seventh for females. Rates are only higher for males in the cases of ischaemic heart disease (2.61 vs 1.53 for females), otherwise they are slightly higher for females.

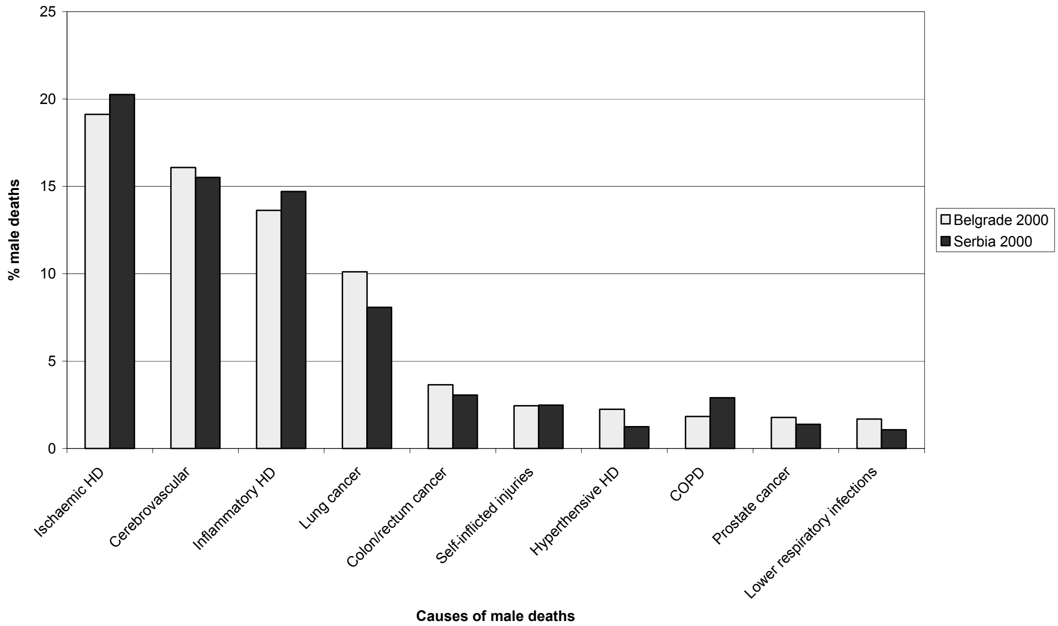
Cancers listed in the top twenty leading causes of death bring almost 20% of total deaths. Trachea, bronchus, lung cancers are first listed for males with death rate three time higher for males in comparison with females (1.38 vs 0.44), then colon and rectum cancers (0.50 vs 0.34 in females), stomach cancer (0.31 vs 0.14 in females), pancreas cancer (0.15 vs 0.14 in females) and liver cancer (0.13 vs 0.10 in females). All others are typical for one sex only, i.e. breast cancer (death rate 0.64), cervical cancer (0.16), corpus uteri cancer (0.11) and ovarian cancer (0.108) for females and prostate cancer (0.24) for males.

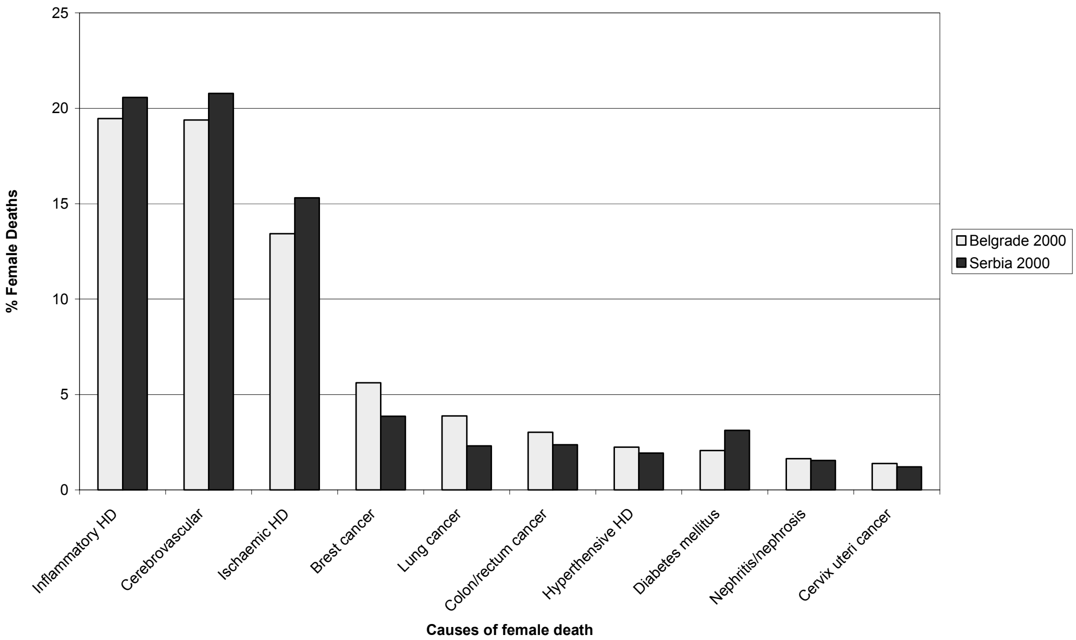
Diabetes mellitus is more frequent in females than males (0.24 vs 0.22 in males), but COPD (0.25 vs 0.11 in females), lower respiratory infections (0.23 vs 0.14 in females) and cirrhosis of the liver (0.21 vs 0.06 in females) are more frequent in males. Nephritis and nephrosis are almost identical in both sexes (0.18 in males vs 0.19 in females).

Self-inflicted injuries (0.33 in males vs 0.15 in females) and road-traffic accidents (0.14 vs 0.036 in females) are typical for males.

Comparison to Serbia 2000 leads to minor differences either in ranking the top twenty causes of death or in selected causes but those which attribute little to the total deaths, Figure 4.6. These causes represent 82 percent of total deaths both in Belgrade and Serbia, and 72 percent of total deaths both in Belgrade and Serbia when the 10 top causes of deaths are in question. Percentages realted to cancers are steadily higher in Belgrade than in Serbia, while percentages for cardiovascular diseases are smaller (an exception is hypertensive heart disease).

Figure 4.6. Ten leading causes of deaths, by sex, Belgrade 2000 and Serbia 2000





4.2. MORTALITY BURDEN IN SERBIA IN 2000

In 2000, premature mortality was responsible for 814 022 years of life lost discounted at 3% per annum and with age-weighting, and 1 206 945 years of life lost when discounted at 3% per annum without age-weighting. Males lost 462 050 and females 351 972 years. Males lost 31.3 % more years of life than females, Table 4.13.

Table 4.13. Years of Life Lost (YLL) discounted at 3% per annum and with age-weightning, by sex, Serbia 2000

YLL	Male	Female	Total Population
Number (%)	462 050 (56.8)	351 972 (43.2)	814 022 (100.0)
Rate*	125.78	90.78	107.81
Rate ratio	1.39	1.00	-
Rate (WHO)**	97.89	60.66	78.76
Rate ratio (WHO)	1.61	1.00	-
Rate (European)**	115.70	72.67	93.46
Rate ratio (European)	1.59	1.00	-
Rate (Segi)**	93.74	57.35	75.05
Rate ratio (Segi)	1.63	1.00	-

* rate per 1 000 population
** standard population on which rates were age adjusted

This loss, 108 years of life lost per 1 000 person years, corresponds to an age standardized rate of 79 years of life lost per 1 000 person years, using WHO world population as a standard, or 93 years of life lost per 1 000 person years using European standard population or 75 years using Segi's world population as a standard. Age standardization is necessary to allow different subgroups of the population to be fairly compared with one another. Table 4.13. shows that males bear a higher burden of premature mortality than females: 98 years per 1 000 compared with 61 years per 1 000 respectively, a male excess of 61 percent in the case of adjustment to WHO world population.

It is typical that males lose more life years than females, i.e. in 1990 GBD study in Established Market Economies (EME) males lost 60% of all years of life lost and in Formerly Socialist Economics of Europe (FSE) 62.1%; in 2000 GBD study in the EURO region they lost 61.5%, in WPRO 56.4% and in whole World 53.9%; in the Australia BD Study 55.8% and in Victoria 54.7%.

Table 4.14. shows that, for the population as a whole in 2000, approximately 8 percent of the premature mortality burden was sustained in childhood and adolescence (0-24 years), somewhat higher percentage in the young adults (25-44 years), approximately one third in the middle age (45-64 years) and just under one half in old ages (65 years and over). However, the age distribution of the burden was different among males and females. Females in old ages realized 55 percent of their premature mortality burden while the highest percent in males is in middle ages, 40 percent.

Table 4.14. Years of Life Lost (YLL) by age groups, Serbia 2000

Age years	Total Population			Male			Female		
	N	%	YLL rate*	N	%	YLL rate*	N	%	YLL rate*
0-14	39 696	4.9	32.22	23 288	5.0	36.84	16 407	4.7	27.36
15-24	24 837	3.1	24.14	18 027	3.9	34.41	6 810	1.9	13.48
25-44	86 839	10.7	42.49	58 619	12.7	57.63	28 221	8.0	27.49
45-64	291 353	35.8	143.19	185 674	40.2	187.77	105 679	30.0	101.05
65+	371 297	45.6	306.44	176 442	38.2	344.92	194 855	55.4	278.33
Total	814 022	100.0	107.80	462 050	100.0	125.78	351 972	100.0	90.78

*rate per 1 000 population

The distribution of years of life lost along age groups in Serbia is similar to that of the EURO region and almost identical to the one in New Zealand, Australia or Victoria, 1996. The age distribution of years of life lost in New Zealand in 1996, for example, was 6 percent in childhood, 4.7 percent in adolescence, 10.2 in young adults, 25.2 percent in adults and 53.9 percent in older ages.

4.2.1. Causes of fatal disease and injury burden

For the entire Serbian population in 2000, cardiovascular diseases (including ischaemic heart disease, stroke, and other cardiovascular diseases) (48 percent) and cancers (24 percent) dominated the burden of premature mortality. The third ranked cause were injuries: unintentional injuries accounted for over 4 percent of the mortality burden, and intentional injuries (mainly suicide) for a further 4 percent. Together, these three cause groups made up over three-quarters of the total burden, Table 4.15.

Table 4.15. Years of Life Lost (YLL), by cause group, Serbia 2000

Cause	**Years of Life Lost**			
	Number	**Percentage**	**Rate**	**Adjusted rate***
Group I	36 721	4.51	4.86	6.84
Group II	710 403	87.28	94.08	63.21
Group III	66 899	8.22	8.86	8.70
Cardiovascular diseases	393 579	48.35	52.12	32.67
Malignant neoplasms	193 977	23.83	25.68	18.01
Unintentional injuries	34 757	4.27	4.60	4.78
Intentional injuries	32 141	3.95	4.25	3.92
Digestive diseases	30 724	3.77	4.06	2.85
Respiratory diseases	27 911	3.43	3.69	2.37
Diabetes mellitus	20 723	2.55	2.74	1.72
Perinatal conditions	18 000	2.21	2.38	4.42
Neuropsychiatric conditions	16 162	1.99	2.14	1.87
Genitourinary diseases	13 733	1.69	1.81	1.24
Infectious and parasitic diseases	9 433	1.16	1.24	1.24
Respiratory infections	8 729	1.07	1.15	1.10
Congenital anomalies	7 860	0.97	1.04	1.83
Other neoplasms	2 031	0.25	0.26	0.19
Endocrine disorders	1 923	0.24	0.25	0.27
Musculoskeletal diseases	1 154	0.14	0.15	0.12
Skin diseases	576	0.07	0.07	0.07
Nutritional deficiencies	357	0.04	0.04	0.05
Maternal conditions	201	0.02	0.02	0.03
Oral conditions	50	0.01	0.01	0.01
Sense organ diseases	-	-	-	
Total	814 022	100.00	107.80	78.76

* rate per 1000 age standardized to WHO world population

Years of life lost by broad cause groups in Serbia are compared with those for other regions or countries, Table 4.16. Group I conditions (communicable, maternal, perinatal and nutritional) are responsible for fewer years of life lost in Serbia in 2000 than in other developed countries, as are Group III conditions (injuries). The last, noncommunicable diseases, thus account for a larger proportion of years of life lost than in other regions or countries. The situation in Serbia is the closest to the one in Australia or Victoria in 1996.

Table 4.16. Years of life lost (in percents) by broad cause groups, Serbia 2000, compared with chosen world regions / countries

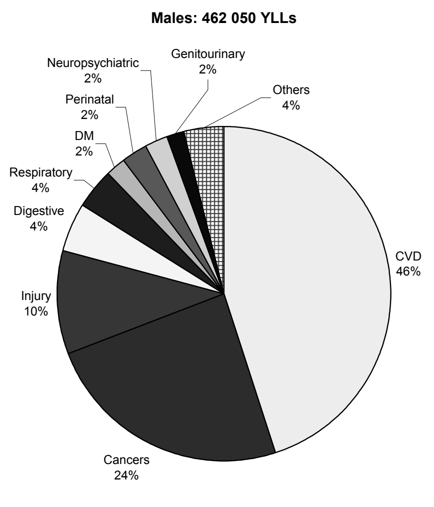
Regions, countries	Cause groups			
	Communicable, maternal, perinatal and nutritional conditions	Noncommunicable diseases	Injuries	Total
GBD1990 / EME	8.8	75.3	15.9	100.0
GBD1990 / FSE	9.4	67.6	23.0	100.0
GBD2000 / World	54.2	33.0	12.8	100.0
GBD2000 / AFRO	81.8	10.9	7.3	100.0
GBD2000 / AMRO	26.8	53.9	19.3	100.0
GBD2000 / EMRO	61.6	26.9	11.5	100.0
GBD2000 / EURO	11.9	70.5	17.6	100.0
GBD2000 / SEARO	56.9	30.2	12.8	100.0
GBD2000 / WPRO	27.3	53.9	18.8	100.0
Australia 1996	4.9	83.8	11.3	100.0
Victoria 1996	5.5	82.2	12.3	100.0
Serbia 2000	4.5	87.3	8.2	100.0

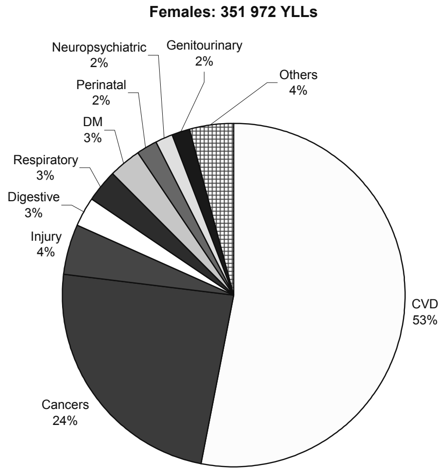
Source: Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N, Bernard C, Lopez A, Murray C (2002). Global Burden of Disease 2000: Version 2 methods and results. GPE Disccussion Paper No. 50. Geneva, WHO. Available on the worlwide web at www.who.int./evidence.
Mathers C, Vos T, Stevenson C (1999). The burden of disease and injury in Australia. Australian Institute of Health and Welfare, Canberra: AIHW. Also available on the worldwide web at www.aihw.gov.au.
Department of Human Services (DHS) (1999a). The Victorian Burden of Disease Study: Mortality. Melbourne: Public Health and Development Division, Department of Human Services.

In the case of main disease categories, 21 of them, main differences between Serbia and World population concern infectious/parasitic diseases (1.2 % in Serbia and 32.7% in World population), respiratory infections (1.1% vs 9.5%), maternal conditions (0% vs 1.6%), perinatal conditions (2.2% vs 9%) and nutritional conditions (0% vs 1.3%), as well as congenital anomalies (1% vs 1.8%) and unintentional injuries (4.3% vs 8.8%). Naturally, the category of noncommunicable disease as a cause for years of life lost is significantly bigger in Serbia.

The population analysis entails significant variations according to sex, Figure 4.7. and Table 4.17.

Figure 4.7. The mortality burden in years of life lost by sex and broad disease groups, Serbia 2000





Cardiovascular diseases are relatively more important in Serbia for females than for males (accounting for 53 percent compared with 45 percent of YLL respectively), although the sex specific YLL rates are statistically significantly different when standardized for age (27 per 1 000 and 39 per 1 000 respectively, adjusted to WHO world population). However, reduction in cardiovascular disease mortality burden is equally important for both sexes even the impact is different when measured in absolute and relative figures. Cancer remains with the same percent of YLL both for females and males, 24 percent, although the sex specific YLL rates are significantly higher for males (22 per 1 000 in males and 15 per 1 000 in females). In contrast, injury impacts less on females than on males (in absolute and relative figures), accounting for only 4.5 percent of YLL among females compared with 11 percent among males (and also in terms of sex specific YLL rates 4 per 1 000 in females and almost 14 per 1 000 in males). This suggests that especially injury prevention strategies for males are needed to achieve further reduction in the mortality burden.

Table 4.17. Years of life lost, by sex and broad disease groups, Serbia 2000

Cause groups	**Male YLL**			**Female YLL**		
	%	**Rate**	**Adjusted rate***	**%**	**Rate**	**Adjusted rate***
Cardiovascular diseases	44.67	56.18	38.98	53.18	48.27	26.65
Malignant neoplasms	23.77	29.90	21.48	23.90	21.69	14.95
Unintentional injuries	5.95	7.48	7.56	2.06	1.86	2.02
Intentional injuries	5.12	6.44	5.98	2.41	2.18	1.90
Digestive diseases	4.43	5.56	4.13	2.92	2.64	1.66
Respiratory diseases	3.83	4.81	3.28	2.91	2.63	1.61
Diabetes mellitus	2.04	2.56	1.76	3.21	2.91	1.65
Perinatal conditions	2.37	2.98	5.25	2.00	1.81	3.56
Neuropsychiatric conditions	2.34	2.94	2.58	1.52	1.37	1.21
Genitourinary diseases	1.59	1.99	1.48	1.82	1.65	1.04
Infectious and parasitic diseases	1.31	1.64	1.55	0.97	0.87	0.95
Respiratory infections	1.05	1.32	1.26	1.10	0.99	0.96
Congenital anomalies	0.88	1.11	1.87	1.08	0.97	1.79
Other neoplasms	0.27	0.34	0.27	0.22	0.19	0.12
Endocrine disorders	0.19	0.24	0.28	0.30	0.27	0.26
Musculoskeletal diseases	0.05	0.07	0.05	0.26	0.23	0.17
Skin diseases	0.07	0.08	0.08	0.08	0.07	0.07

Nutritional deficiencies	0.04	0.05	0.06	0.05	0.04	0.04
Maternal conditions	-	-	-	0.06	0.05	0.06
Oral conditions	0.01	-	0.01	-	0.01	-
Sense organ diseases	-	-	-	-	-	-
Total	100.00	125.78	97.89	100.00	90.78	60.66

* rate per 1000 age standardized to WHO world population

The causes of premature mortality vary markedly with age, Table 4.18. and Figure 4.8. In childhood, infant conditions (including birth asphyxia, birth trauma and congenital anomalies) and unintentional injury together account for almost three quarters of the loss sustained during this stage of the life cycle. Cancers (5.8 percent), infectious and parasitic diseases (4.7 percent) and lower respiratory infections (4.7 percent) also exceed the 4 percent threshold in this age group.

Among young people (15-24 years), more than half of the mortality burden can be attributed to external causes – unintentional injury (32.2 percent), mainly road traffic accidents (19.8 percent) and intentional injury (21.6 percent), mainly self-inflicted injuries (16.3 percent).

Among young adults (25-44 years), cancers (28.1 percent) are joined by unintentional and intentional injury (26 percent combined) as major contributors. Cardiovascular diseases (mainly ischaemic heart disease) also emerge in this age group and account for 25.6 percent of the burden.

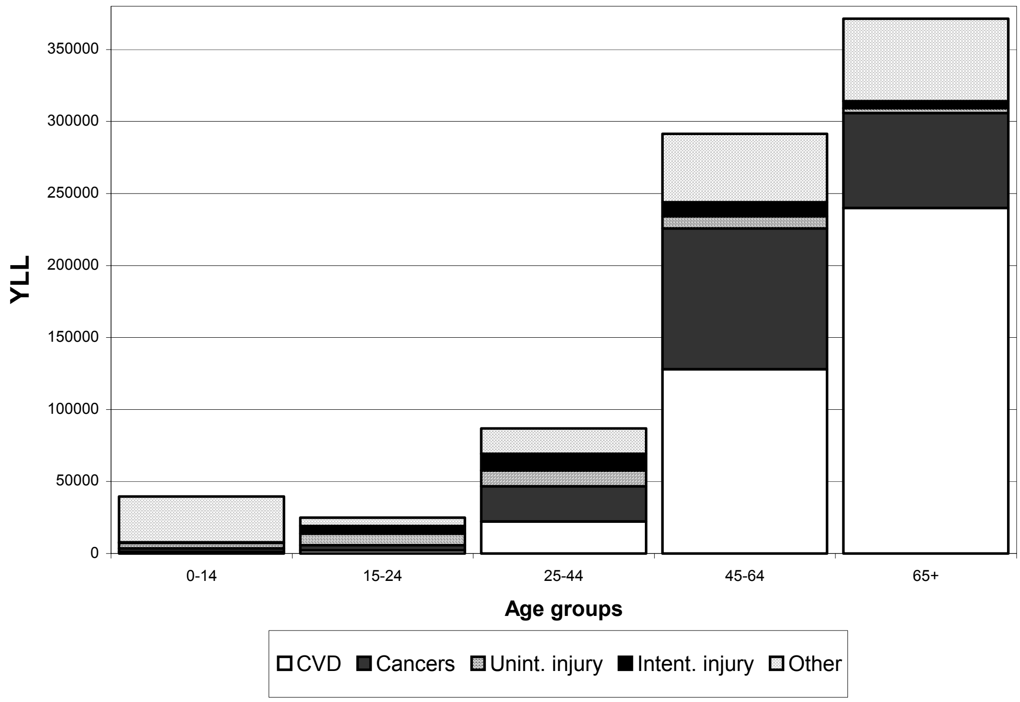
Table 4.18. Years of life lost in percents, by age and broad disease grouping, Serbia 2000

Cause groups	**Age groups**				
	0-14	**15-24**	**25-44**	**45-64**	**65+**
Group I	55.1	5.1	3.4	1.8	1.4
Group II	33.9	41.1	70.6	91.9	96.3
Group III	11.1	53.9	26.1	6.3	2.2
Total	100.00	100.0	100.00	100.00	100.00
Cardiovascular diseases	2.84	9.06	25.62	43.92	64.63
Malignant neoplasms	5.85	14.45	28.14	33.57	17.73
Unintentional injuries	9.91	32.23	12.64	2.90	0.92
Intentional injuries	1.16	21.63	13.42	3.37	1.31
Digestive diseases	0.82	1.68	5.37	4.68	3.14
Respiratory diseases	1.41	2.94	1.70	3.03	4.40
Diabetes mellitus	0.00	1.37	1.86	2.45	3.13
Perinatal conditions	45.35	0.00	0.00	0.00	0.00
Neuropsychiatric conditions	2.82	7.35	4.40	1.84	1.09
Genitourinary diseases	0.59	1.19	2.04	1.66	1.78
Infectious and parasitic diseases	4.73	2.09	2.36	1.10	0.48
Respiratory infections	4.70	2.69	0.83	0.68	0.94
Congenital anomalies	17.89	1.15	0.24	0.07	0.02
Other neoplasms	0.09	0.44	0.25	0.31	0.21
Endocrine disorders	1.13	1.24	0.51	0.15	0.08
Musculoskeletal diseases	0.00	0.22	0.26	0.18	0.09
Skin diseases	0.42	0.00	0.15	0.04	0.04
Nutritional deficiencies	0.29	0.00	0.03	0.04	0.03
Maternal conditions	0.00	0.27	0.15	0.00	0.00
Oral conditions	0.00	0.00	0.04	0.01	0.00
Sense organ diseases	0.00	0.00	0.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00

In the middle age (45-64 years), injuries decline in relative and absolute importance (to 6 percent), and the chronic diseases become dominant: cancer (33.6 percent) and cardiovascular diseases (43.9 percent) together account for over three-quarters of the burden.

Among older people (65 years and over), the relative ranking of cancers and cardiovascular diseases remain the same, with cardiovascular diseases accounting for almost two thirds (64.6 percent) of the total burden, and cancer a little under one fifth (17.7 percent).

Figure 4.8. Years of Life Lost by age and broad disease groups, Serbia 2000



The top twenty leading specific diseases and injuries contributing to YLL by sex are shown in Table 4.19.

Table 4.19. Top 20 causes of YLL, by gender, Serbia 2000

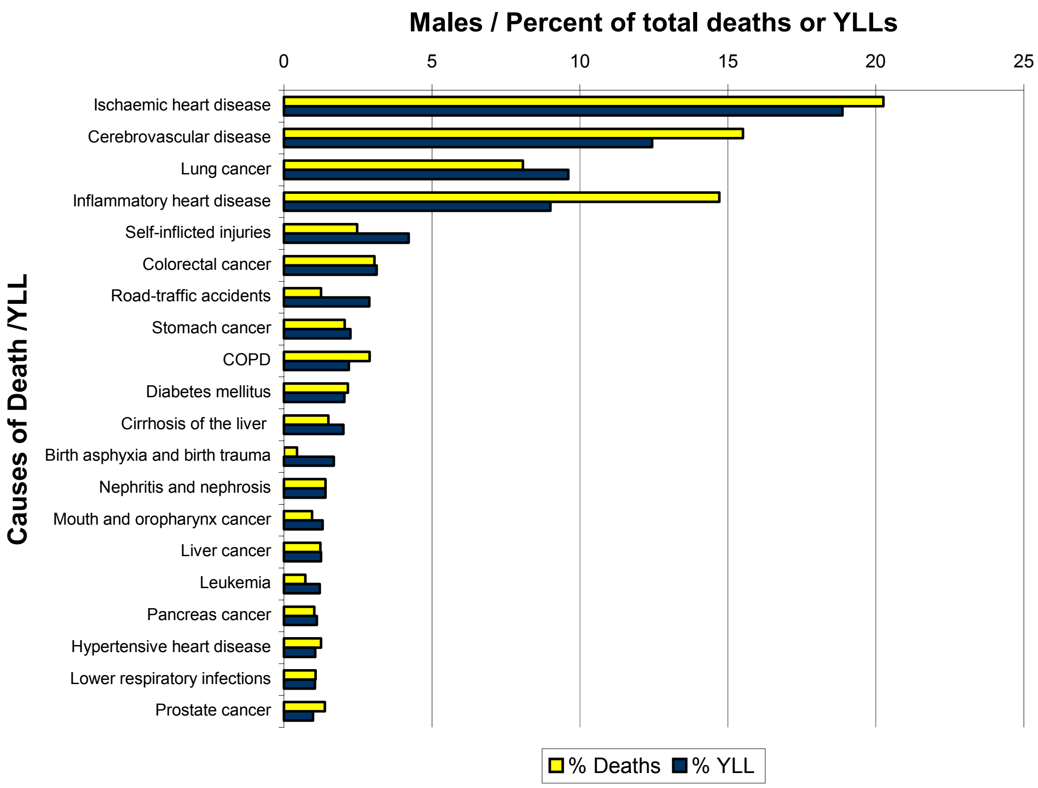
Rank	Male		Female	
	Cause	YLLs	Cause	YLLs
1	Ischaemic heart disease	87 191	Cerebrovascular disease	64 691
2	Cerebrovascular disease	57 478	Ischaemic heart disease	48 965
3	Lung cancer	44 407	Inflammatory heart disease	46 539
4	Inflammatory heart disease	41 576	Breast cancer	21 463
5	Self-inflicted injuries	19 517	Lung cancer	12 027
6	Colon and rectum cancers	14 542	Diabetes mellitus	11 284
7	Road-traffic accidents	13 340	Colon and rectum cancers	9 680
8	Stomach cancers	10 415	Cervix uteri cancer	7 702
9	COPD	10 111	Self-inflicted injuries	7 319
10	Diabetes mellitus	9 438	Nephritis and nephrosis	6 349
11	Cirrhosis of the liver	9 310	Hypertensive heart disease	5 638
12	Birth asphyxia and birth trauma	7 787	Stomach cancers	5 487
13	Nephritis and nephrosis	6 487	Birth asphyxia and birth trauma	5 133
14	Mouth and oropharynx cancer	6 059	COPD	5 061
15	Liver cancer	5 793	Ovary cancer	4 765
16	Leukaemia	5 610	Corpus uteri cancer	4 011
17	Pancreas cancer	5 146	Pancreas cancer	3 954
18	Hypertensive heart disease	4 885	Road-traffic accidents	3 893

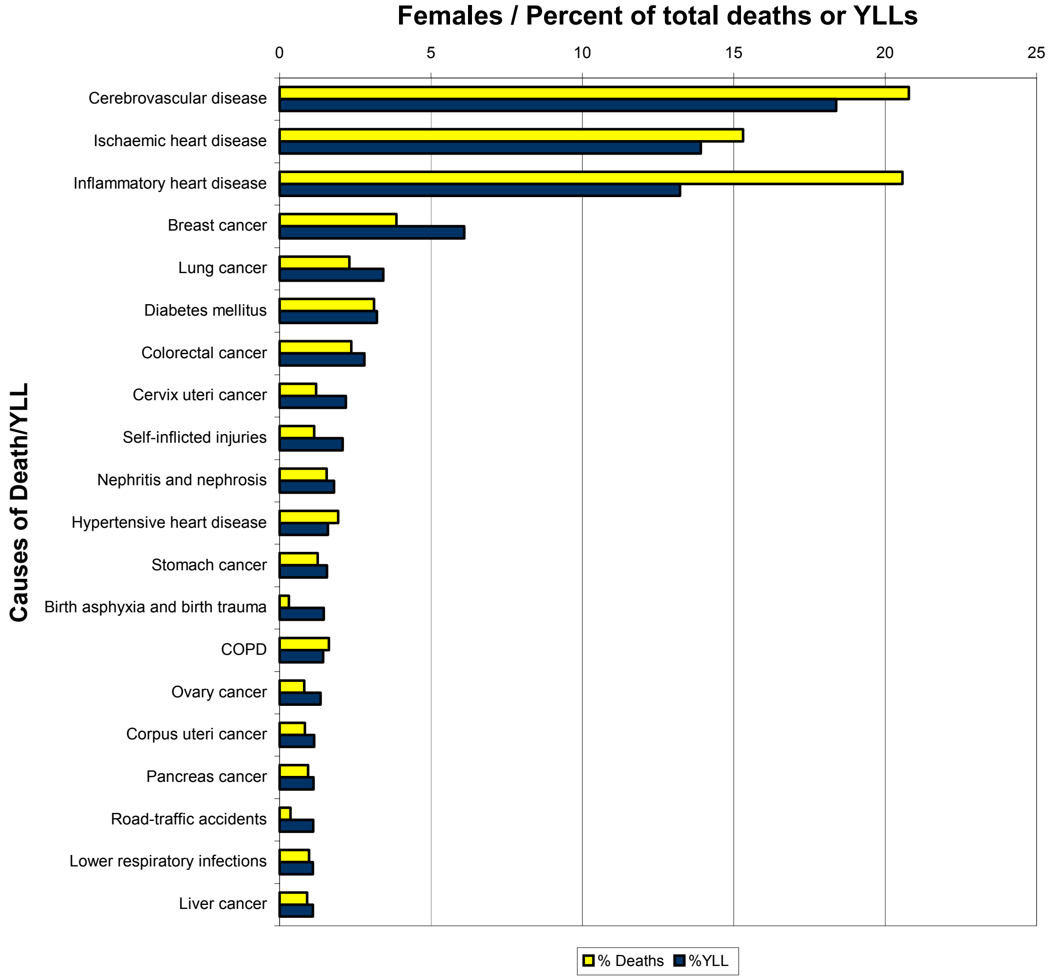
19	Lower respiratory infections	4 861	Lower respiratory infections	3 860
20	Prostate cancer	4 511	Liver cancer	3 856
Top 20		368 464		281 407
Total		462 050		351 972
Top 20 as % of Total		79.74		79.95

Ischaemic heart disease is the leading single cause of premature years of life lost for males. It is followed by stroke and lung cancer. Above an YLL threshold of 10 000 YLL are also: inflammatory heart disease, self-inflicted injuries, road-traffic accidents, colon, rectum and stomach cancers, as well as chronic obstructive pulmonary disease. These specific conditions account for 65 percent of total YLL among males. For females, cerebrovascular disease is the leading cause of years of life lost followed by ischaemic heart disease, breast and lung cancers, and diabetes mellitus. These conditions account for 58 percent of total YLL among females.

A comparison with the twenty leading causes of deaths in Serbia 2000 points out the differences in birth asphyxia and birth trauma, that is not cited in top 20 leading causes of deaths and holds rank 12 for males and rank 13 for females in the case of years of life lost. Because these conditions affect newborn children it is obvious that they become dominant regarding life expectancies. Some other causes also hold different ranks regarding mortality and YLL approach. Road-traffic accidents are ranked 14th in the causes of death and 7th in YLL causes in males, they are not among top 20 leading causes of death in females but are 18th in YLL structure. Prostate cancer in males is ranked 12th in mortality and 20th in YLLs. Cancer of cervix uteri and ovary cancer are ranked higher in YLLs compared to mortality in females. Self-inflicted injuries are ranked much higher in YLLs than in deaths. All these different ranking show that causes that affect young people become more prominent if YLLs are used, Figure 4.9.

Figure 4.9. – Leading causes of mortality burden (YLL and deaths), by sex, Serbia 2000





The National health priority areas, concerning the burden of fatal diseases and injuries, should therefore cover cardiovascular diseases, cancers, diabetes mellitus, injuries (road-traffic accidents and self-inflicted injuries that mostly cover broad topics of mental health), pulmonary (chronic obstructive disease), genitourinary (nephritis and nephrosis) and digestive diseases (cirrhosis of the liver) as well as selected perinatal conditions and lower respiratory infections.

The comparison with different world regions, subregions or countries leads to similarities with developed countries as far as the causes of years of life lost are in question, Table 4.20. In Serbia, like in developed countries, ischaemic heart disease and cerebrovascular disease are the main causes of YLL for the total population as well as for both sexes. For the world population, the first three causes come from the group of communicable, maternal, perinatal and nutritional conditions. Cancers are highly rated in developed countries, as well as in Serbia. COPD and cirrhosis of the liver are a problem of similar importance both in developed countries and in the world population. Injuries, particularly self-inflicted injuries and road-traffic accidents, are among the first ten causes of years of life lost in developed countries and among the first twenty in the world population.

Table 4.20. Top 20 causes of Years of Life Lost (ranks), by sex, World, EURO region and Serbia 2000

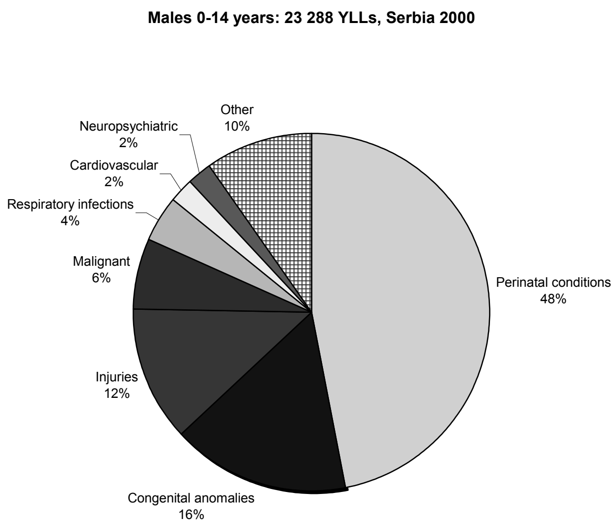
Diseases	World 2000			EURO 2000			Serbia 2000		
	Both	Males	Females	Both	Males	Females	Both	Males	Females
Tuberculosis	9	8.5	9	12	9.5	18.5			
STD	23	22.5	24						
HIV/AIDS	2	2	2	22.5	16	23			
Diarrhoeal disease	3	4	3						
Childhood cluster diseases	5	6	4						
Malaria	7	10	7						
Lower respiratory infections	1	1	1	4	6	4	19	19	19
Low birth weight	6	5	6	17.5	18	15			
Birth asphyxia and birth trauma	11	11	10	20.5	20.5	17	12	12	13
Protein malnutrition	21	20.5	19.5						
Stomach cancer	19	18	22	14	12.5	10.5	10	8	12
Colorectal cancer				9	12.5	5	6	6	7
Lung cancer	17	15.5	22	4	4	7.5	4	3	5
Breast cancer	24		14	12		3	7		4
Liver cancer							16	15	20
Pancreas cancer							17	17	17
Leukaemia							18	16	
Lymphoma, melanoma							20		
Diabetes mellitus	22	20.5	17	16	20.5	12.5	8	10	6
Hypertensive heart disease				15	18	10.5	15	18	11
Ischaemic heart disease	4	3	5	1	1	1	1	1	2
Cerebrovascular disease	8	8.5	8	2	2	2	2	2	1
Inflammatory heart disease				17.5	15	20	3	4	3
COPD	13	14	11.5	10	11	12.5	11	9	14
Cirrhosis of the liver	16	17	17	7.5	8	6	14	11	
Nephritis, nephrosis				22.5	22	18.5	13	13	10
Cong. heart anomal.	18	19	17						
Road-traffic accidents	10	7	11.5	6	5	7.5	9	7	18
Poisonings				7.5	7	14			
Falls				20.5	18	21			
Fires	20	22.5	15						
Drownings	15	15.5	19.5	19	14	22			
Self-inflicted injury	12	12	13	4	3	9	5	5	9
Violence	14	13	22	12	9.5	16			

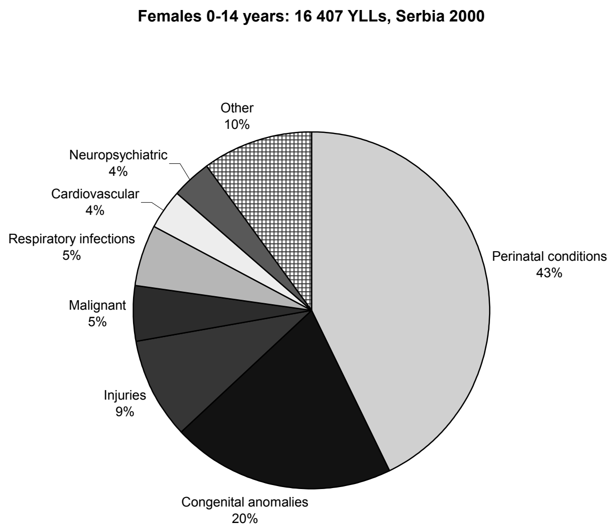
4.2.2. Sex and age patterns of mortality burden in Serbia 2000

Age and sex patterns of overall disease burden could be very useful in setting up national priority areas. That is a reason why we analyzed sex and age patterns of mortality burden in Serbia in year 2000.

The size of the mortality burden of disease and injury for boys in 2000 is almost one and a half times the burden for girls due to their higher disease mortality. The overall proportion attributable to selected main causes, however, is similar for both sexes with roughly equal proportions attributable to perinatal conditions, congenital anomalies and injuries, Figure 4.10.

Figure 4.10. Main causes of mortality burden in YLLs in Males and Females aged 0-14 years, Serbia 2000





Birth asphyxia and birth trauma are the leading cause of mortality burden in children in 2000, accounting for about a third of the total mortality burden in both boys and girls, Table 4.21.

This is followed by congenital heart disease and lower respiratory infections in both sexes, leukaemia, low birth weight and road-traffic accidents in boys and low birth weight and road-traffic accidents in girls.

Table 4.21. Leading causes of YLLs in children 0-14 years by sex, Serbia 2000

	Males	YLLs	%		Females	YLLs	%
1	Birth asphyxia&trauma	7 787	33.44	1	Birth asphyxia&trauma	5 133	31.28
2	Congenital heart disease	2 158	9.27	2	Congenital heart disease	1 717	10.46
3	Leukaemia	1 008	4.33	3	Lower respiratory inf.	890	5.42
4	Lower respiratory inf.	978	1.20	4	Low birth weight	595	3.63
5	Low birth weight	882	3.79	5	Road-traffic accidents	570	3.47
6	Road-traffic accidents	832	3.57	6	Leukaemia	504	3.07
7	Drownings	669	2.87	7	Down syndrome	428	2.61
8	Meningitis	338	1.45	8	Epilepsy	329	2.01
9	Down syndrome	333	1.43	9	Lymphomas	303	1.85
10	Endocrine disorders	293	1.26	10	Cerebrovascular disease	279	1.69

Top 10	15 278		Top 10	10 748	
Total	23 288		Total	16 407	
Top 10 as percent of Total	65.6		Top 10 as percent of Total	65.5	
YLL Rate*	36.17		YLL rate	27.04	
Abs. YLL Ratio	1.42		Abs. YLL ratio	1.00	

* rate per 1 000

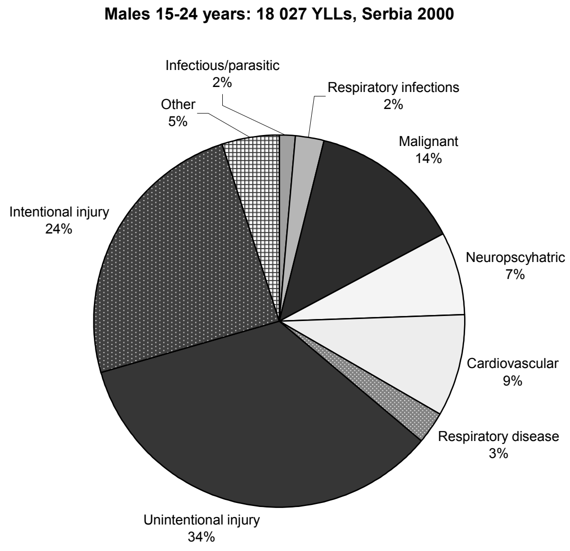
Majority of years of life lost settled in infants, 15 659 (67.2 percent) for males and 10 364 (63.2 percent) for females aged less than 1. Children under 5 years of age realized 5 424 YLLs (2 637 in boys and 2 787 in girls), the rest, 21.8 percent, included children between 5 and 15 years of age. The mortality burden structure is completely different among those three age groups, but in final (children 0-14 years) prevails the impact of infant's mortality burden, Table 4.22.

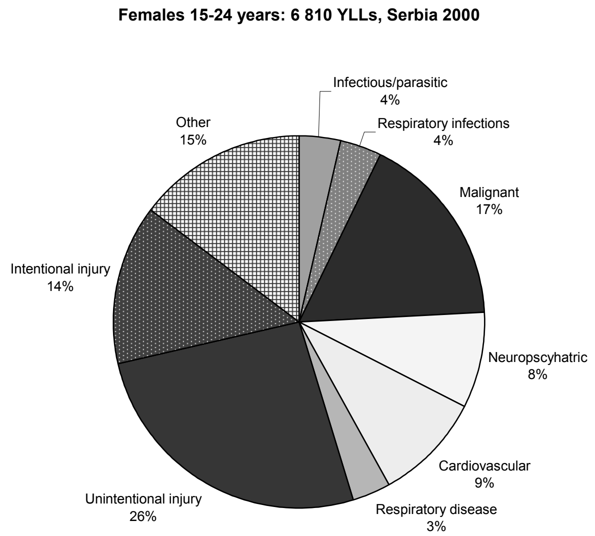
Table 4.22. Leading causes of YLLs (ranks) for children by sex and age groups, Serbia 2000

Males	0	1-4	5-14	Females	0	1-4	5-14
Birth asphyxia&trauma	1	-	-	Birth asphyxia&trauma	1	-	-
Congenital heart disease	2	2	6	Congenital heart disease	2	2	-
Low birth weight	3	-	-	Low birth weight	3	-	-
Lower respiratory infections	4	1	9	Lower respiratory infections	4	1	10
Down syndrome	5	9	-	Down syndrome	5	4.5	8
Spina bifida	6	-	-	Endocrine disorders	6	-	9
Endocrine disorders	7	5	11	Leukaemia	-	3	4
Fires	8	7	12	Road-traffic accidents	-	4.5	1
Cerebrovascular dis.	9	-	8	Fires	-	6.5	-
Leukaemia	-	3	1	Cerebrovascular dis.	-	6.5	5
Road-traffic accidents	0	4	2	Drowning	-	9	6
Drowning	-	6	3	Falls	-	9	11
Epilepsy	-	9	10	Epilepsy	-	9	3
Lymphomas	-	-	4	Lymphomas	-	-	2
Self-inflicted injury	-	-	5	Self-inflicted injury	-	-	7
Asthma	-	9	7				

The size of mortality burden in adolescence in 2000 is considerably higher in males than in females (male excess of 165%), while the proportion attributable to selected main causes also is different, Figure 4.11. The sex difference in mortality burden attributable to injuries is evident, with males having almost two times both the unintentional and intentional injury burden than that of females largely due to their greater propensity for risk taking and suicide.

Figure 4.11. Main causes of mortality burden in YLLs in Males and Females aged 15-24 years, Serbia 2000





Road-traffic accidents are the leading single cause of mortality burden for both sexes followed by self-inflicted injuries. The third and fourth for males are drownings and violence, for females lymphomas and epilepsy, Table 4.23.

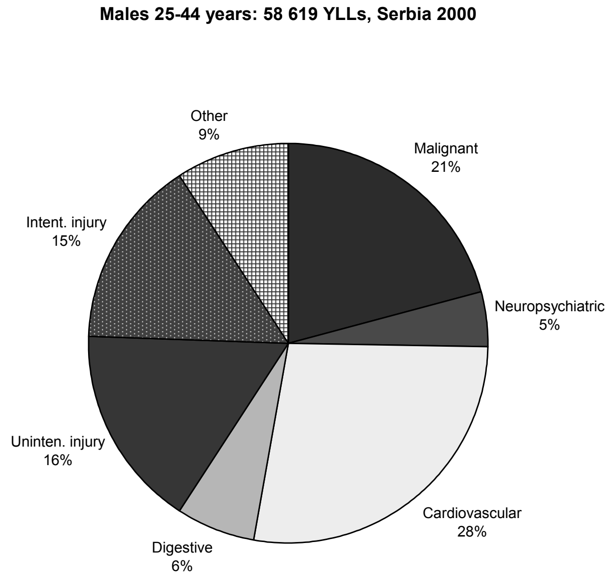
Table 4.23. Leading causes of YLLs in people 15-24 years by sex, Serbia 2000

Males		YLLs	%	Females		YLLs	%
1	Road-traffic accidents	3 503	19.43	1	Road-traffic accidents	1 401	20.58
2	Self-inflicted injuries	3 359	18.63	2	Self-inflicted injuries	702	10.31
3	Drownings	1 138	6.31	3	Lymphomas	466	6.84
4	Violence	1 057	5.87	4	Epilepsy	416	6.11
5	Leukaemia	1 044	5.79	5	Violence	253	3.71
6	Neuropsychiatric diseases	1 042	5.78	6	Lower respiratory infections	251	3.69
7	Lymphomas	696	3.86	7	Leukaemia	249	3.66
8	Cerebrovascular disease	444	2.46	8	Diabetes mellitus	229	3.35
9	Lower respiratory infections	417	2.31	9	Nephritis/nephrosis	184	2.69
10	Asthma	112	2.14	10	Asthma	184	2.69
Top 10		12 812		Top 10		4 335	
Total		18 027		Total		6 810	
Top 10 as % of Total		71.1		Top 10 as % of Total		63.7	
YLL rate*		34.41		YLL rate		13.48	
Abs. YLL ratio		2.65		Abs. YLL ratio		1.00	

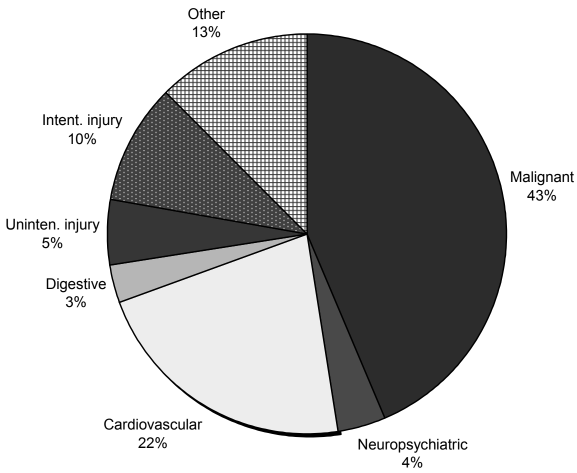
* rate per 1 000 person years

The overall size of the mortality burden in adults aged 25-44 years in 2000 in males is 2.08 times that of females, Figure 4.12. The proportion attributable to selected main causes is also very different. Males have about twice the burden attributable to intentional injuries and digestive diseases, up to four times the burden attributable to unintentional injuries, but only half the burden attributable to cancers than females. Two thirds of the total mortality burden in females in this age group is attributable to cancers and cardiovascular diseases. For males, this proportion is slightly under half.

Figure 4.12. Main causes of mortality burden in YLLs in Males and Females aged 25-44 years, Serbia 2000



Females 25-44 years: 28 221 YLLs, Serbia 2000



Ischaemic heart disease and self-inflicted injuries are the leading causes of mortality burden in males aged 25-44 years, followed by road-traffic accidents, cerebrovascular diseases and lung cancer. In females, the top four causes are breast cancer, self-inflicted injuries, cancer of corpus uteri and cerebrovascular disease, Table 4.24.

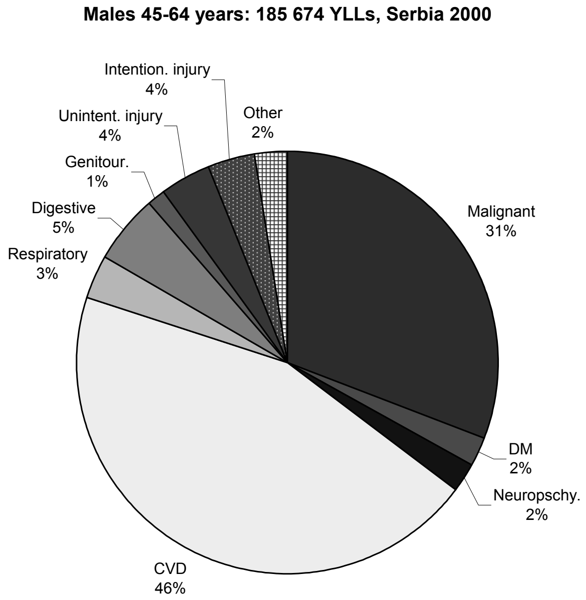
Table 4.24. Leading causes of YLLs in people 25-44 years by sex, Serbia 2000

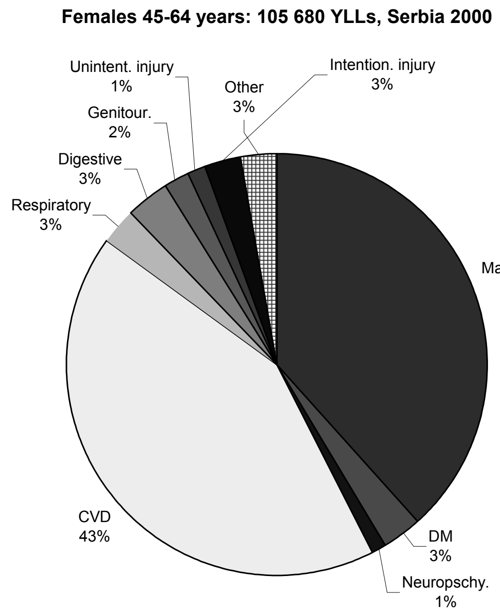
Males		YLLs	%	Females		YLLs	%
1	Ischaemic heart disease	6 646	11.39	1	Breast cancer	2 268	11.93
2	Self-inflicted injury	6 670	11.38	2	Self-inflicted injury	2 335	8.28
3	Road-traffic accidents	4 940	8.43	3	Corpus uteri cancer	2 287	8.10
4	Cerebrovascular disease	4 261	7.27	4	Cerebrovascular disease	2 252	7.98
5	Lung cancer	4 171	7.12	5	Lung cancer	1 585	5.62
6	Violence	2 209	3.77	6	Ischaemic heart disease	1 427	5.06
7	Cirrhosis of the liver	1 591	2.72	7	Road-traffic accidents	882	3.12
				8	Nephritis/nephrosis	584	2.07
				9	Violence	439	1.55
				10	Cirrhosis of the liver	390	1.38
Top 7		30 488		Top 10		14 449	
Total		58 619		Total		28 221	
Top 7 as % of Total		52.00		Top 10 as % of Total		51.20	
YLL rate*		57.64		YLL rate		27.49	
Abs. YLL ratio		2.08				1.00	

* rate per 1 000 person years

The overall size of the mortality burden in middle ages in 2000 is in males 1.76 times that of females, Figure 4.13. The proportion attributable to selected main causes is not very different. Males have smaller burden attributable to cancers, diabetes mellitus and genitourinary diseases than females, otherwise bigger or equal.

Figure 4.13. Main causes of mortality burden in YLLs in Males and Females aged 45-64 years, Serbia 2000





Ischaemic heart disease, lung cancer, cerebrovascular disease, inflammatory heart disease and colon and rectum cancers are the leading causes of the mortality burden in males aged 45-64 years. In females the top five causes are cerebrovascular disease, ischaemic heart disease, breast cancer, inflammatory heart disease and lung cancer, Table 4.25.

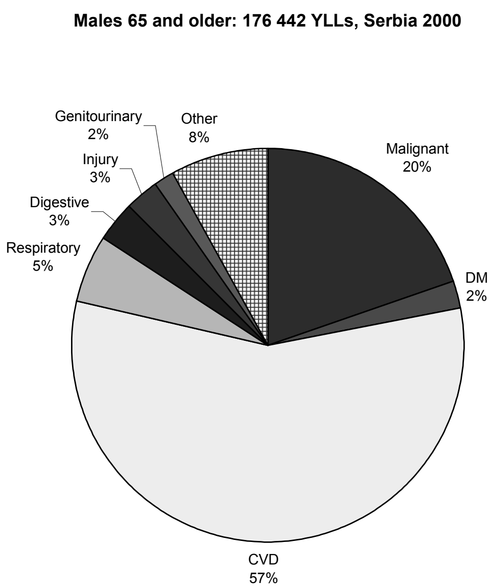
Table 4.25. Leading causes of YLLs in people 45-64 years by sex, Serbia 2000

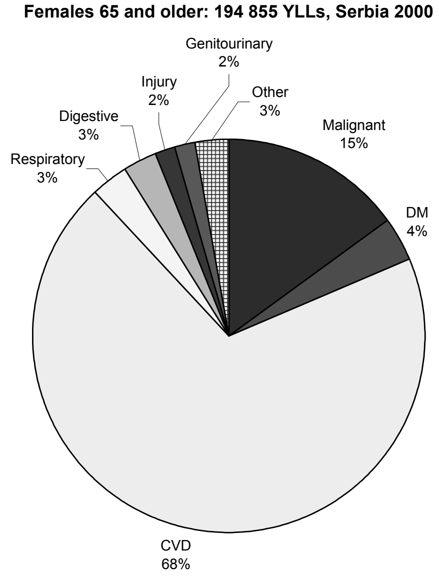
Males		YLLs	%	Females		YLLs	%
1	Ischaemic heart disease	42 917	23.11	1	Cerebrovascular disease	16 982	16.10
2	Lung cancer	26 978	14.53	2	Ischaemic heart disease	15 084	14.27
3	Cerebrovascular disease	21 423	11.57	3	Breast cancer	12 584	11.91
4	Inflammatory heart disease	11 256	6.06	4	Inflammatory heart disease	6 845	6.48
5	Colon and rectum cancers	6 929	3.73	5	Lung cancer	6 280	5.94
6	Self-inflicted injury	6 375	3.43	6	Colon and rectum cancers	3 878	3.67
7	Cirrhosis of the liver	5 663	3.05	7	Diabetes mellitus	3 149	2.98
8	Stomach cancer	5 065	2.73	8	Self-inflicted injury	2 450	2.32
9	Diabetes mellitus	3 999	2.15	9	Stomach cancer	2 349	2.23
10	Road-traffic accidents	3 294	1.78	10	Nephritis/nephrosis	2 082	1.97
Top 10		133 899		Top 10		71 683	
Total		185 674		Total		105 680	
Top 10 as % of Total		72.12		Top 10 as % of Total		67.83	
YLL rate*		187.78		YLL rate		101.05	
Abs. YLL ratio		1.76				1.00	

* rate per 1 000 person years

The overall mortality burden in older Serbians in 2000 is 1.09 times higher in females than in males while the proportion attributable to selected main causes is roughly similar in both sexes, Figure 4.14. Two thirds of the burden are attributable to cardiovascular diseases and one fifth to cancers.

Figure 4.14. Main causes of mortality burden in YLLs in Males and Females 65 years and over, Serbia 2000





Ischaemic heart disease, cerebrovascular and inflammatory heart disease are the leading causes of years of life lost in older Serbians. Lung cancer and chronic obstructive pulmonary diseases in males, and diabetes mellitus and breast cancer in females, are fourth and fifth causes of YLL (Table 4.26).

Table 4.26. Leading causes of YLLs in people 65 years and older by sex, Serbia 2000

Males		YLLs	%	Females		YLLs	%
1	Ischaemic heart disease	37 354	21.17	1	Cerebrovascular disease	45 044	23.12
2	Cerebrovascular disease	31 096	17.62	2	Inflammatory heart disease	39 151	20.09
3	Inflammatory heart disease	28 172	15.96	3	Ischaemic heart disease	32 454	16.65
4	Lung cancer	13 257	7.51	4	Diabetes mellitus	7 190	3.69
5	COPD	6 534	3.70	5	Breast cancer	5 512	2.83
6	Colon and rectum cancers	5 871	3.33	6	Colon and rectum cancers	4 939	2.53
7	Diabetes mellitus	4 425	2.51	7	Lung cancer	4 099	2.10
8	Prostate cancer	3 077	1.74	8	COPD	3 411	1.75
9	Self-inflicted injury	2 903	1.64	9	Self-inflicted injury	1 661	0.85
Top 9		132 689		Top 9		143 461	
Total		176 442		Total		194 855	
Top 9 as % of Total		75.20		Top 9 as % of Total		73.62	
YLL rate*		344.92		YLL rate		278.33	
Abs. YLL ratio		0.91				1.00	

* rate per 1 000 person years

4.2.3. Mortality Burden in Belgrade

In 2000, premature mortality was responsible for 161 452 years of life lost discounted at 3% per annum and with age-weighting. Males lost 91 835 and females 69 617 years. Males lost 31.9 % more years of life than females, Table 4.27.

Table 4.27. Years of Life Lost (YLL), by gender, Belgrade 2000

YLL	Male	Female	Total Population
Number (%)	91 835 (56.9)	69 617 (43.1)	161 452 (100.0)
Rate*	121.94	83.67	101.85
Rate ratio	1.46	1.00	-
Rate (Serbia)**	122.63	86.92	103.66
Rate ratio (Serbia)	1.41	1.00	

* Rate per 1 000 population
** Rate adjusted to Serbia 2000 population

This loss, 102 years of life lost per 1 000 person years, corresponds to an age standardized rate of 104 years of life lost per 1 000 person years, using the Serbian population as a standard. Males bear a higher burden of premature mortality than females: 123 years per 1 000 compared with 87 years per 1 000 respectively, a male excess of 41 percent in the case of adjustment to Serbian population.

The males and females percentage of total years of life lost is identical to the one in Serbia 2000. Rates in Belgrade are significantly lower than those in Serbia, on average by 4 years of life lost per 1 000 person years, (107.8 in Serbia and 103.7 in Belgrade adjusted to Serbia).

Table 4.28. shows that, for the population as a whole in 2000, approximately 8 percent of the premature mortality burden was sustained in childhood and adolescence (0-24 years), somewhat higher percentage in the young adults (25-44 years), approximately one third in the middle age (45-64 years) and just under one half in old age (65 years and over). However, the age distribution of the burden was different among males and females. Females in adolescence and young ages (15-44) lost only 10 percent of total mortality burden, while males lost 17 percent. Also, females in old ages realized 52 percent of their premature mortality burden while the highest percentage in males is in the middle ages, 42 percent.

Table 4.28. Years of Life Lost (YLL) by age groups, Belgrade 2000

Age years	Total Population			Male			Female		
	N	%	YLL rate*	N	%	YLL rate*	N	%	YLL rate*
0-14	7 232	4.5	30.05	4 216	4.6	34.11	3 016	4.3	25.77
15-24	5 069	3.1	22.95	3 810	4.1	34.34	1 259	1.8	11.45
25-44	18 173	11.2	41.23	11 991	13.1	57.08	6 182	8.9	26.80
45-64	61 790	38.3	138.60	38 679	42.1	185.68	23 111	33.2	97.31
65+	69 188	42.9	291.84	33 139	36.1	330.84	36 049	51.8	263.31
Total	161 452	100.0	101.85	91 835	100.0	121.94	69 617	100.0	83.67

* rate per 1 000 population

The distribution of years of life lost along age groups in Belgrade is similar to the one in Serbia 2000. A small exception is the percentage of YLL in the middle and old ages: in Belgrade the percentage of YLL is bigger than Serbia (38.3 percent vs 35.8 percent in Serbia) and consequently a smaller percentage is found in old ages (42.9 percent in Belgrade and 45.6 percent in Serbia).

For the Belgrade population in 2000, cardiovascular diseases (including ischaemic heart disease, stroke, and other cardiovascular diseases) (46 percent) and cancers (28 percent) dominated the burden of premature mortality. The cause group ranked third were injuries:

unintentional injuries accounted for over 3 percent of the mortality burden, and intentional injuries (mainly suicide) for a further 5 percent. Together, these three cause groups made up over three-quarters of the total burden, Table 4.29.

Table 4.29. Years of Life Lost (YLL), by cause group, Belgrade 2000

Cause	Years of Life Lost			
	Number	Percentage	Rate	Adjusted rate*
Group I	8 261	5.12	5.2114	5.3903
Group II	139 993	86.71	88.3160	90.0596
Group III	13 198	8.17	8.3259	8.2155
Cardiovascular diseases	74 299	46.02	46.8723	48.4155
Malignant neoplasm	45 634	28.26	28.7887	28.8263
Intentional injuries	7 811	4.84	4.9279	4.8349
Digestive diseases	6 094	3.78	3.8447	3.8610
Unintentional injuries	5 386	3.34	3.3980	3.3807
Perinatal conditions*	3 818	2.37	2.4084	2.5382
Respiratory diseases	3 388	2.10	2.1377	2.1979
Neuropsychiatric conditions	3 173	1.97	2.0018	1.9805
Diabetes mellitus	2 770	1.72	1.7476	1.7909
Genitourinary diseases	2 629	1.63	1.6585	1.6806
Infectious and parasitic diseases	2 405	1.49	1.5169	1.5204
Respiratory infections	1 993	1.23	1.2572	1.3004
Congenital anomalies	1 154	0.72	0.7281	0.7647
Endocrine disorders	434	0.27	0.2738	0.2813
Musculoskeletal diseases	251	0.16	0.1586	0.1570
Other neoplasms	151	0.09	0.0953	0.0945
Nutritional deficiencies	46	0.03	0.0289	0.0312
Skin diseases	15	0.01	0.0092	0.0094
Maternal conditions	0	-	0.0000	-
Sense organ diseases	0	-	0.0000	-
Oral conditions	0	-	0.0000	-
Total	161 452	100.00	101.8500	103.6654

* Rate per 1000 age standardized to Serbia 2000 population

Years of life lost by broad cause groups in Belgrade are compared with those for Serbia. Group I conditions (communicable, maternal, perinatal and nutritional) are responsible for fewer years of life lost in Serbia in 2000 than in Belgrade. The noncommunicable diseases, thus account for a larger proportion of years of life lost in Serbia than in Belgrade. Group III conditions (injuries) account for the same percentage both in Belgrade and in Serbia.

In the case of main disease categories, 21 of them, the main differences between Belgrade and Serbia are in malignant diseases (28.3 percent in Belgrade and 23.8 percent in Serbia), intentional injuries (4.8 percent in Belgrade and 3.9 in Serbia) as well as unintentional injuries (3.3 percent vs 4.3 percent in Serbia).

The whole population analysis comprises significant sex variations, Table 4.30. Cardiovascular diseases are relatively more important in Belgrade for females than for males (accounting for 49 percent compared with 44 percent of YLL respectively), although the sex specific YLL rates are statistically significantly different when standardized for age (43 per 1 000 and 54 per 1 000 respectively, adjusted to Serbian population). However, reduction in cardiovascular disease mortality burden is equally important for both sexes. Cancer remains similarly relevant in the terms of YLL, both for females and males, 27 percent for males and 30 percent for females, although the sex-specific YLL rates are significantly higher for males

(33 per 1 000 in males and 25 per 1 000 in females). In contrast, injury impacts less on females than on males (in absolute and relative terms), accounting for only 5.2 percent of YLL among females compared with 10.5 percent among males (and also in terms of sex-specific YLL rates: 4 per 1 000 in females and almost 13 per 1 000 in males). This suggests that especially injury prevention strategies for males in Belgrade are needed to achieve further reduction in the mortality burden.

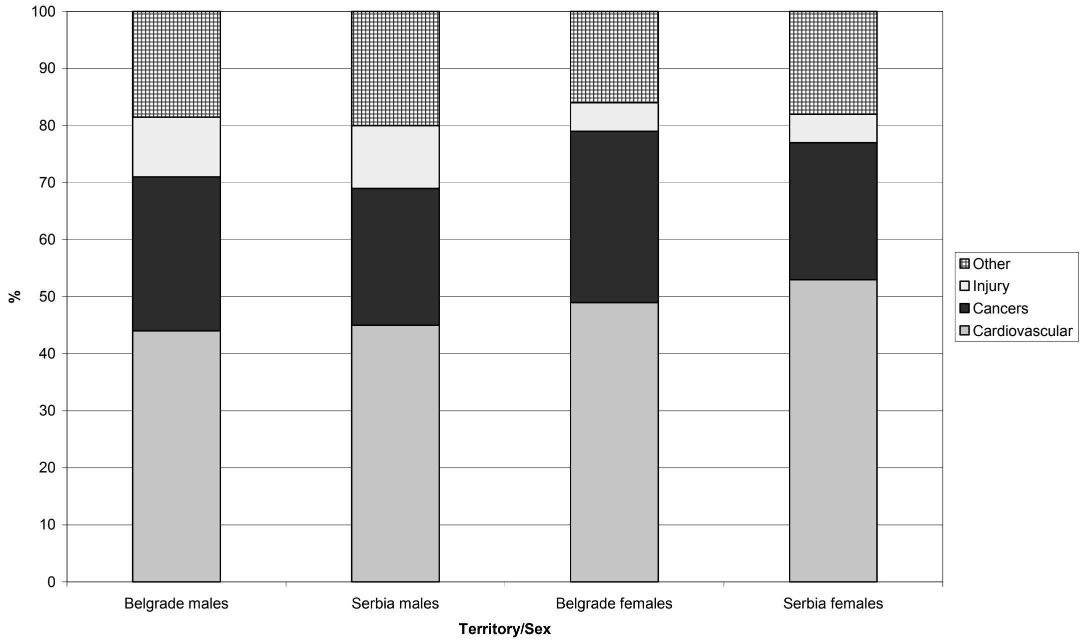
Table 4.30. Years of life lost, by sex and broad disease grouping, Belgrade 2000

Cause groups	**Male YLL**			**Female YLL**		
	%	**Rate**	**Adjusted rate***	**%**	**Rate**	**Adjusted rate***
Cardiovascular diseases	43.92	53.5520	54.2101	48.79	40.8261	43.4968
Malignant neoplasms	27.11	33.0596	33.0891	29.79	24.9228	24.9763
Intentional injuries	6.10	7.4431	7.3399	3.17	2.6513	2.6220
Digestive diseases	4.36	5.3152	5.2992	3.00	2.5136	2.5855
Unintentional injuries	4.33	5.2829	5.2233	2.02	1.6918	1.7237
Neuropsychiatric conditions	2.54	3.0922	3.0536	1.21	1.0148	1.0230
Perinatal conditions*	2.36	1.9859	2.9434	2.37	1.9858	2.1516
Respiratory diseases	2.34	2.8483	2.9013	1.79	1.4944	1.5396
Infectious and parasitic diseases	1.70	2.0772	2.0804	1.21	1.0098	1.0241
Diabetes mellitus	1.43	1.7442	1.7666	2.09	1.7505	1.8268
Genitourinary diseases	1.39	1.6978	1.7121	1.94	1.6297	1.6588
Respiratory infections	1.28	1.5596	1.5861	1.18	0.9838	1.0354
Congenital anomalies	0.82	0.9971	1.0295	0.58	0.4845	0.5158
Endocrine disorders	0.13	0.1597	0.1613	0.45	0.3771	0.3969
Other neoplasms	0.09	0.1145	0.1137	0.09	0.0778	0.0775
Musculoskeletal diseases	0.08	0.0966	0.0971	0.26	0.2147	0.2114
Nutritional deficiencies	0.02	0.0224	0.0234	0.04	0.0347	0.0386
Skin diseases	0.00	0.0038	0.0044	0.02	0.0141	0.0143
Maternal conditions	0.00	-	-	-	-	-
Sense organ diseases	0.00	-	-	-	-	-
Oral conditions	0.00	-	-	-	-	-
Total	100.00	121.9411	122.6306	100.00	83.6710	86.9177

* Rate per 1000 age standardized to Serbia 2000 population

Comparison to Serbia 2000 leads to differences between rates for cardiovascular diseases for males and females, 48 per 1 000 for females in Serbia and 44 per 1 000 in Belgrade, i.e. almost a 10 percent difference in Serbia compared to a five percent difference between sexes in Belgrade. As far as malignant diseases are in question, YLL rates and percentages are higher in Belgrade both for males and females compared to Serbia, Figure 4.15.

Figure 4.15. Years of Life Lost, by sex and broad disease grouping, Belgrade and Serbia 2000



The causes of premature mortality vary markedly with age, Table 4.31. and Figure 4.16. In childhood, infant conditions (including birth asphyxia, birth trauma and congenital anomalies) and unintentional injury together account for more than three quarters of the loss sustained during this stage of the life cycle. Cancers (6.8 percent), infectious and parasitic diseases (4.9 percent) also exceed the 4 percent threshold in this age group.

Table 4.31. Years of Life Lost in percent, by age and broad disease grouping, Belgrade 2000

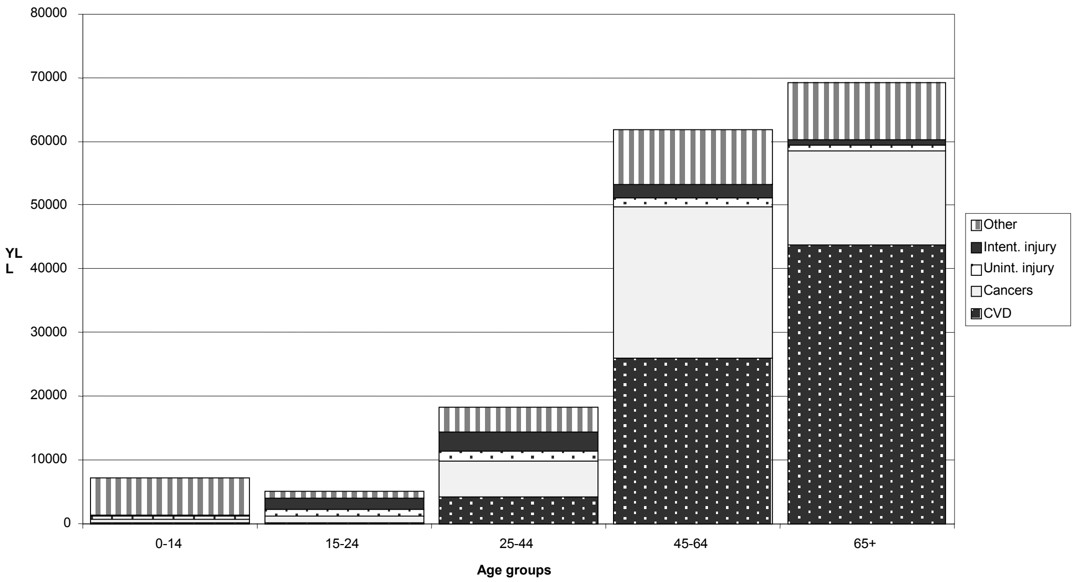
Cause groups	Age groups				
	0-14	15-24	25-44	45-64	65+
Group I	60.84	3.43	4.27	2.27	2.18
Group II	28.06	42.42	70.51	92.21	95.43
Group III	11.09	57.15	25.22	5.53	2.39
Total	100.00	100.0	100.00	100.00	100.00
Cardiovascular diseases	1.38	3.85	23.08	42.1	63.32
Malignant neoplasms	6.79	19.21	31.17	38.46	21.31
Unintentional injuries	8.38	22.26	8.60	2.15	1.10
Intentional injuries	2.71	31.89	16.62	3.37	1.29
Digestive diseases	-	1.94	4.85	4.65	3.24
Respiratory diseases	0.86	2.95	1.71	1.79	2.55
Diabetes mellitus	-	-	1.33	1.60	2.22
Perinatal conditions	52.79	-	-	-	-
Neuropsychiatric conditions	1.35	13.41	3.94	1.63	0.98
Genitourinary diseases	-	1.06	2.57	1.60	1.62
Infectious and parasitic diseases	4.92	0.67	3.56	1.44	0.67
Respiratory infections	3.12	2.76	0.71	0.83	1.43
Congenital anomalies	14.46	-	0.60	-	-

Other neoplasms	-	-	-	0.15	0.08
Endocrine disorders	3.22	-	0.67	0.07	0.05
Musculoskeletal diseases	-	-	0.61	0.16	0.06
Skin diseases	-	-	-	0.02	-
Nutritional deficiencies	-	-	-	-	0.07
Maternal conditions	-	-	-	-	-
Oral conditions	-	-	-	-	-
Sense organ diseases	-	-	-	-	-
Total	100.00	100.00	100.00	100.00	100.00

Among young people (15-24 years), more than half of the mortality burden can be attributed to external causes – unintentional injuries (22.3 percent), mainly road traffic accidents (13.3 percent) and intentional injuries (31.9 percent), mainly self-inflicted injuries (19.4 percent) and violence (12.5 percent).

Among young adults (25-44 years), cancers (31.2 percent) are joined by unintentional and intentional injuries (25.2 percent combined) as major contributors. Cardiovascular diseases (mainly ischaemic heart disease) also emerge in this age group and account for 23.1 percent of the burden. Digestive diseases are close to the 5 percent threshold, 4.8 percent (mainly cirrhosis of the liver, 2.0 percent).

Figure 4.16. Years of Life Lost by age and broad disease groupings, Belgrade 2000



In the middle age (45-64 years), injuries decline in relative and absolute importance (to under 6 percent), and the chronic diseases become dominant: cancer (38.5 percent) and cardiovascular diseases (42.1 percent) together account for over three-quarters of the burden. Digestive diseases are close to the 5 percent threshold, 4.6 percent (mainly cirrhosis of the liver, 2.5 percent).

Among older people (65 years and over), the relative ranking of cancers and cardiovascular diseases remains the same, with cardiovascular diseases accounting for almost two thirds (63.3 percent) of the total burden, and cancer only a little over one fifth (21.3 percent).

Comparison of children in Belgrade and Serbia leads to higher percentage of Group I causes in Belgrade and consequently a lower percentage of Group II causes for years of life lost. In the adolescence percentages of unintentional and intentional injuries are reversed, in Belgrade 22.3 percent and 31.9 percent, in Serbia, 32.2 and 21.6 percent respectively. In young adults this reversed order between injuries remains, and also the percentage of cardiovascular diseases is lower in Belgrade as compared to Serbia, whereby the percentage of malignant diseases is higher in Belgrade compared to Serbia. This pattern holds for middle and old ages, too.

The top twenty leading specific diseases and injuries contributing to YLL by sex are shown in Table 4.32.

Table 4.32. Top 20 causes of YLL, by gender, Belgrade 2000

Rank	Male		Female	
	Cause	**YLLs**	**Cause**	**YLLs**
1	Ischaemic heart disease	16 517	Cerebrovascular disease	11 622
2	Cerebrovascular disease	11 432	Ischaemic heart disease	8 501
3	Trachea, bronchus, lung cancers	10 601	Inflammatory heart diseases	8 105
4	Inflammatory heart diseases	7 813	Breast cancer	5 956
5	Self-inflicted injuries	3 835	Trachea, bronchus, lung cancers	3 748
6	Colon and rectum cancers	3 264	Colon and rectum cancers	2 140
7	Stomach cancer	2 269	Self-inflicted injuries	1 782
8	Cirrhosis of the liver	2 020	Cervix uteri cancer	1 638
9	Road traffic accidents	1 990	Diabetes mellitus	1 457
10	Violence	1 734	Birth asphyxia and birth trauma	1 352
11	Leukaemia	1 679	Nephritis and nephrosis	1 343
12	Birth asphyxia and birth trauma	1 444	Hypertensive heart disease	1 317
13	Hypertensive heart disease	1 419	Ovary cancer	1 060
14	Diabetes mellitus	1 314	Stomach cancer	976
15	Nephritis and nephrosis	1 267	Pancreas cancer	891
16	Mouth and oropharynx cancers	1 216	Corpus uteri cancer	880
17	Chronic obstructive pulmonary disease	1 215	Lower respiratory infections	819
18	Lower respiratory infections	1 174	Lymphomas, multiple myeloma	802
19	Melanoma and other skin cancers	1 146	Leukaemia	758
20	Pancreas cancer	945	Liver cancer	733
Top 20		77 563		55 880
Total		91 835		69 617
Top 20 as % of Total		84.46		80.27

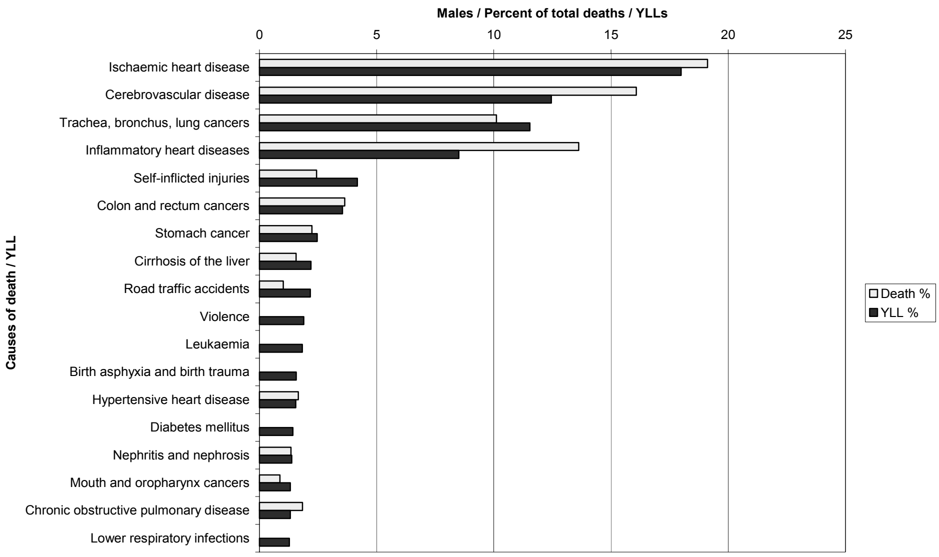
Ischaemic heart disease is the leading single cause of premature years of life lost for males. It is followed by stroke and lung cancer. Above, a YLL threshold of 2 000 YLL, includes also: inflammatory heart disease, self-inflicted injuries, colon and rectum cancers, stomach cancer as well as cirrhosis of the liver. These specific conditions account for almost 50 percent of total YLL among males. For females, cerebrovascular disease is the leading cause of years of life lost followed by ischaemic heart disease, inflammatory heart disease, breast and lung cancer, colon and rectum cancers, self-inflicted injuries and cervical cancer. These conditions account for 60 percent of total YLL among females.

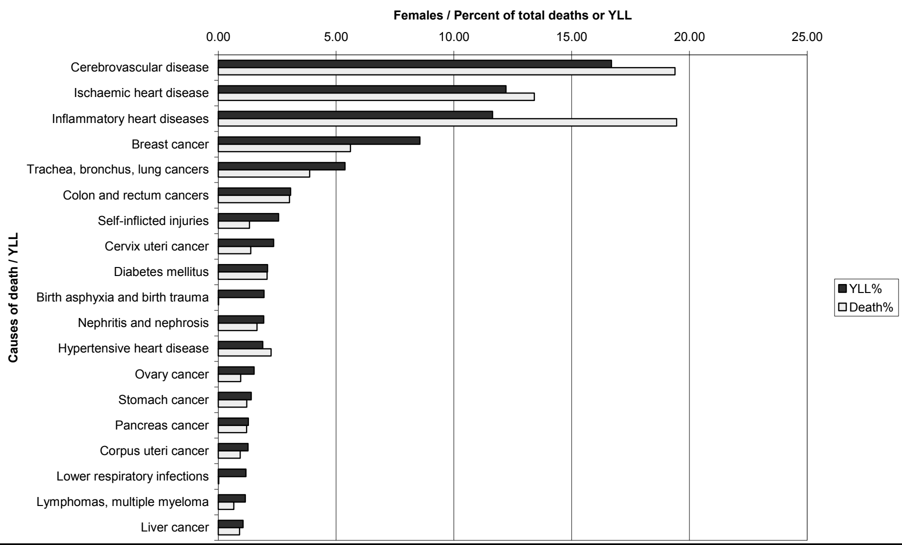
The first five causes of years of life lost are identical for males and females in Belgrade and Serbia. Minor differences exist from the sixth place on. Males in Belgrade lost years of life

frequently because of cirrhosis of the liver and violence. In Serbia cirrhosis is at the eleventh place, and violence is not cited among the first twenty causes.
Comparison of the top twenty causes of years of life lost with the twenty leading causes of deaths in Belgrade 2000 shows differences in birth asphyxia and birth trauma that are not cited in the top 20 leading causes of deaths and hold rank 12 for males and rank 10 for females regarding years of life lost. Because these conditions affect newborn children, it is natural that they dominate a life year approach. A few other causes also hold different ranks in death and YLL approach. Road-traffic accidents are ranked 20th in death causes and 9th in YLL causes in males; they are not among top 20 leading causes of death/YLL for females. Violence in males is not among the top twenty causes of death but is ranked 10th in YLL causes. Prostate cancer in males is ranked 16th in deaths with no YLLs among the first twenty causes. Cervical cancer is ranked higher in YLLs compared to deaths in females. Self-inflicted injuries are ranked much higher in YLLs than in deaths for both sexes, Figure 4.17.

The health priority areas for Belgrade, based on the mortality burden of diseases and injuries, should therefore cover cardiovascular diseases, cancers, injuries and mental health, digestive diseases (cirrhosis of the liver), pulmonary (chronic obstructive disease), genitourinary (nephritis and nephrosis) and diabetes mellitus as well as selected perinatal conditions and lower respiratory infections. These areas are practically the same as those for Serbia.

Figure 4.17. Leading causes of mortality burden (YLL and deaths), by sex, Belgrade 2000





5. THE TOTAL BURDEN OF SELECTED DISEASES AND INJURIES

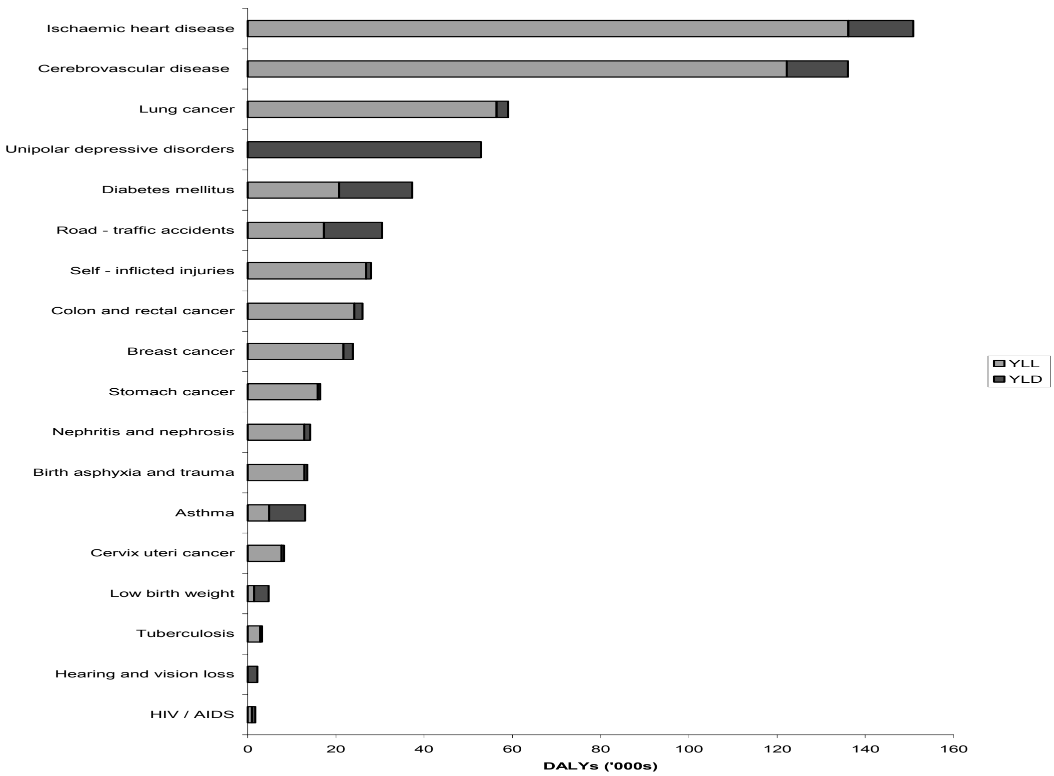
5.1. OVERVIEW

HRISTINA VLAJINAC

In this chapter the results of the Serbian Burden of Disease and Injury Study for selected diseases burden measured in DALYs by age and sex for the year 2000 are presented.

Figure 5.1. shows the YLL and YLD contributions to total DALYs for 18 selected conditions in Serbia without Kosovo and Metohia. There were more relevant YLLs lost for observed disorders than YLDs (78% : 22%) with the exception of non-fatal health outcomes (unipolar depressive disorders, and hearing and vision loss), and low birth weight and asthma, the burden of which was mainly caused by lengthy period of disability. For HIV/AIDS contribution of YLL and YLD in DALYs was almost the same. These 18 selected conditions caused 484 995 YLLs or nearly 60% of the total mortality burden in Serbia.

Figure 5.1. Burden of selected diseases (YLL, YLD and total DALYs), Serbia without Kosovo and Metohia, 2000



The total burden of selected diseases and injuries in Serbia without Kosovo and Metohia in 2000 was estimated at 621 993 DALYs or 82 DALYs lost per 1 000 population. Ischaemic heart disease, cerebrovascular diseases, lung cancer, unipolar depressive disorders, and diabetes mellitus were responsible for over two thirds of the total burden (70%).

The burden of the majority of selected conditions was higher for males (Figure 5.2). The burden of breast cancer, depressive disorders and diabetes mellitus was higher for females, and the burden cerebrovascular diseases, low birth weight and of hearing and vision loss was almost the same for both sexes. The total male burden was 32% higher than the total female burden (94 per 1 000 males and 71.4 per 1 000 females). Non-fatal outcomes (YLD) were responsible for 20% of the male burden and for 25% of the female burden.

Figure 5.2. Burden of selected diseases, by sex (DALYs per 1 000 population), Serbia without Kosovo and Metohia, 2000

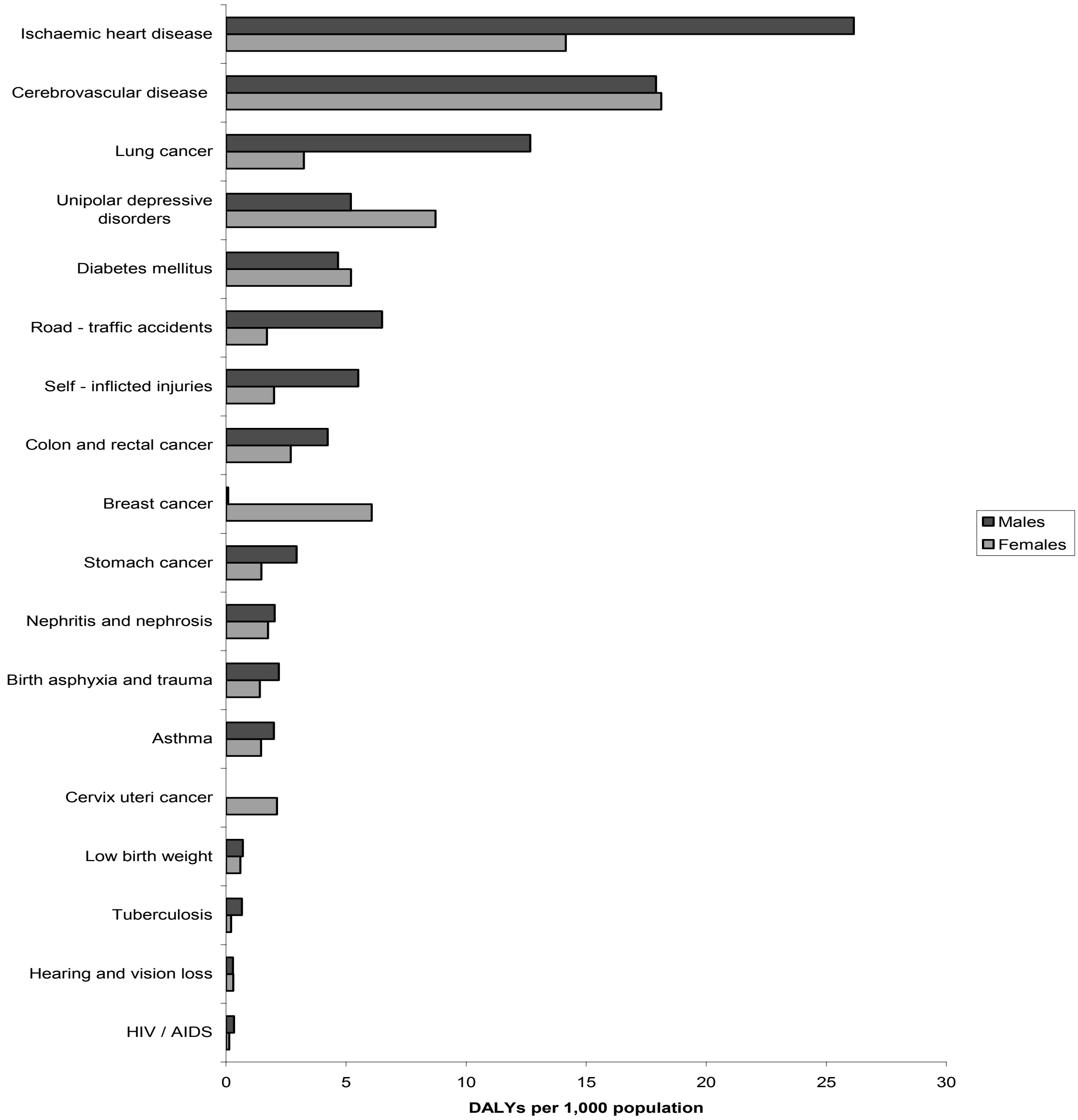
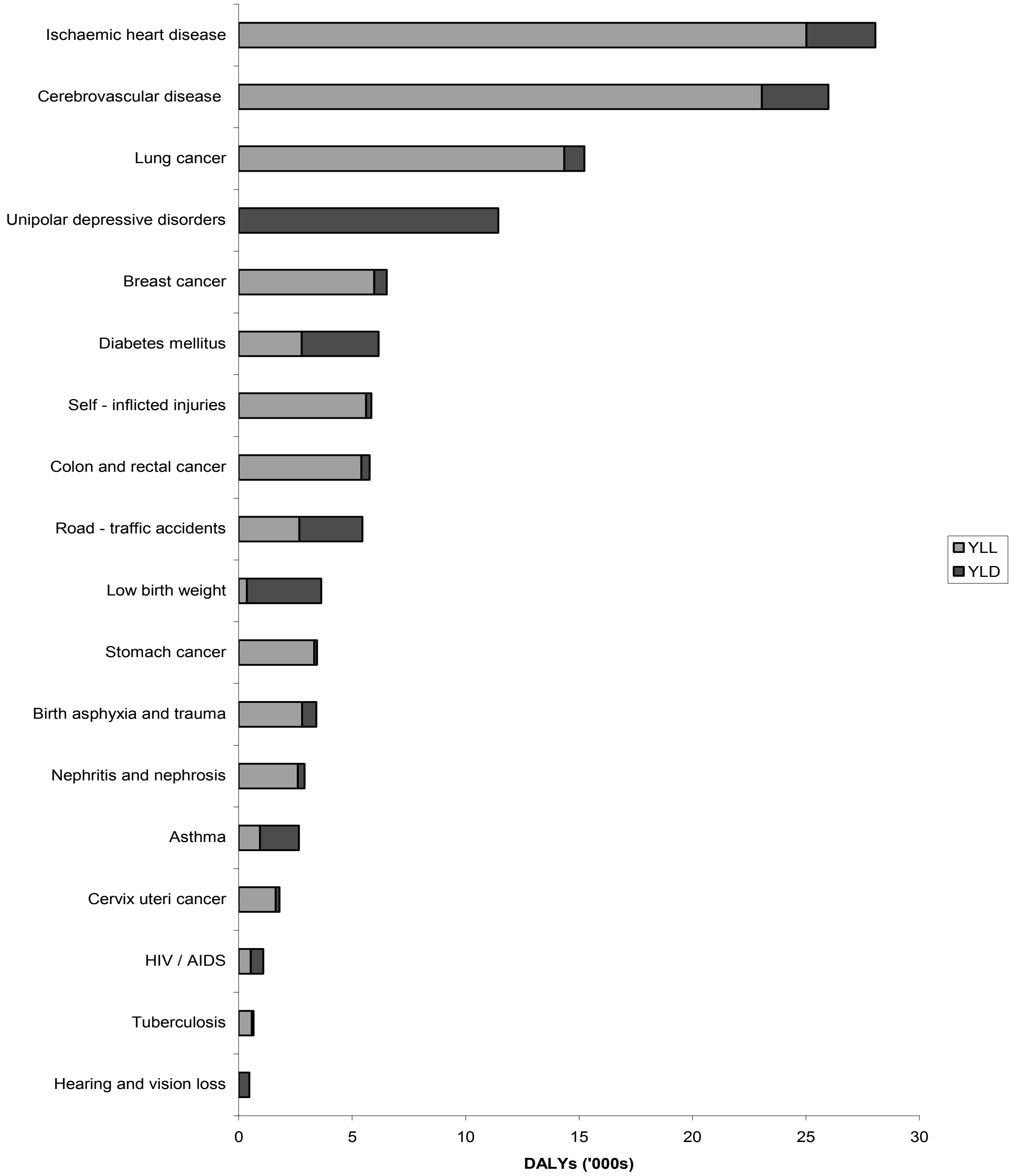


Figure 5.3 presents the YLL and YLD contribution to total DALYs for the same 18 conditions in Belgrade in 2000. The burden of the majority of the observed disorders was dominated by mortality rather than lengthy period of disability (the total YLL and YLD contributions being 75% and 25%). The exceptions were non-fatal health outcomes (depressive disorders and

hearing and vision loss), and low birth weight, asthma and diabetes for which YLD was higher than YLL. For HIV/AIDS and for road traffic accidents contribution of YLL and YLD in DALYs was almost the same. The selected diseases and injuries were responsible for 60.5% (97 679 YLLs) of the total mortality burden in Belgrade.

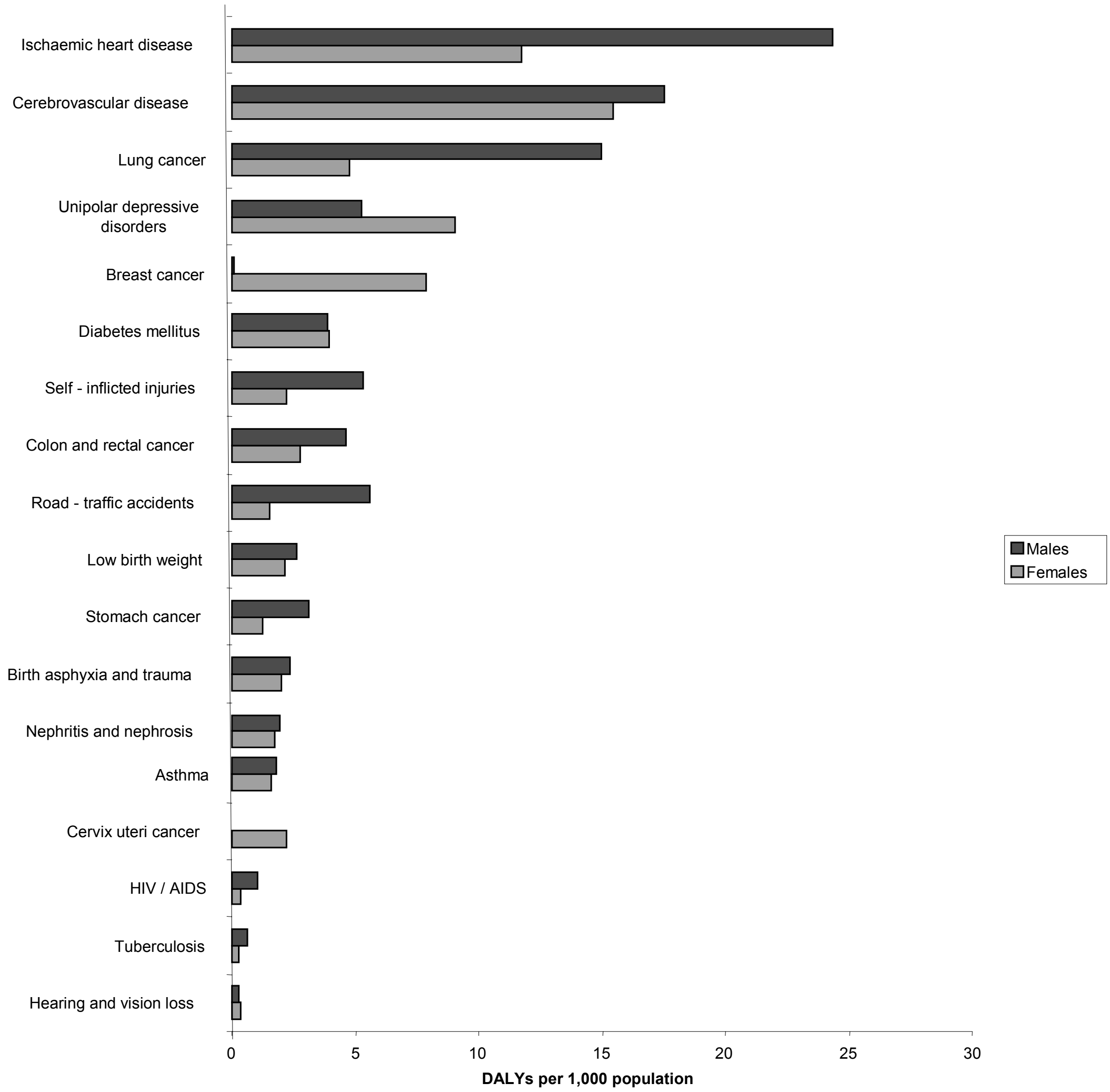
Figure 5.3. Burden of selected diseases (YLL, YLD and total DALYs), Belgrade, 2000



The total burden of selected diseases and injuries in Belgrade in 2000 was estimated at 130 587 DALYs or 82 DALYs lost per 1 000 population. The burden of ischaemic heart disease, cerebrovascular diseases, lung cancer and unipolar depressive disorders made up 62% of the total burden. The burden of breast cancer, diabetes, self-inflicted injuries, colorectal cancer and road traffic accidents was similar and these five conditions made up 23% of the total burden.

The burden of the majority of selected conditions was higher for males (Figure 5.4). The burden of breast cancer and depressive disorders was higher for females, and the burden of hearing and vision loss and diabetes was almost the same for both sexes. The total male burden was 34% higher than the total female burden (95 per 1 000 males and 71 per 1 000 females). Non-fatal outcomes (YLD) were responsible for 22% of the male burden and 29% of the female burden.

Figure 5.4. Burden of selected diseases, by sex (DALYs per 1 000 population), Belgrade, 2000



5.2. Communicable, Maternal, Perinatal and Nutritional Conditions

5.2.1. Tuberculosis

Hristina Vlajinac

Among infectious and parasitic diseases, tuberculosis occupies the first place as a single cause of death in the population of Serbia without Kosovo and Metohia. In the year 2000, out of all deaths caused by infectious and parasitic diseases, 41% was due to tuberculosis (45% in males and 32% in females). During the last decade, the incidence rate was stable ranging from 31.4 to 36.0 per 100 000 inhabitants (Pešut 2002).

Data and method

Incidence data were used for calculation of YLD.

Incidence estimates were based on data from the Serbian Central TB Registry (Institute of Lung Diseases and Tuberculosis 2000). Incidence comprised active new or relapsed cases of tuberculosis. We have assumed that these data are a good approximation of all active cases in Serbia without Kosovo and Metohia. The vast majority of cases had pulmonary tuberculosis. During the year 2000, extra-pulmonary tuberculosis was present in 3.3% of female and in 13% of male TB cases (Institute of Lung Diseases and Tuberculosis 2000).

The decision was made to use the GBD disability weights (Murray and Lopez 1996b) that provided varying disability weights by age group, without accounting for the clinical picture.

The average duration for TB in the region of the former socialist economies (FSE) was assumed to be 6 months in GBD study (Murray and Lopez 1996a), and we used 6-month duration of TB disability for YLD calculation. Average duration of treatment was 6 months. More than 80% of cases were successfully cured (Pesut 2002). In Central Serbia, during the period 1992-2000, initial and acquired resistance to izoniazid (H), izoniazid and rifampicin (H+R) and other drugs was 6.3% (range 2.6% - 11.5%) and 5.3% (range 2.7 - 8.3%) respectively (Pešut et al. 2002).

DALY for Serbia without Kosovo and Metohia

The burden of tuberculosis was three times bigger for males than that for females (Figure 5.5, Table 5.1).

Figure 5.5. The burden of tuberculosis by sex, Serbia without Kosovo and Metohia, 2000

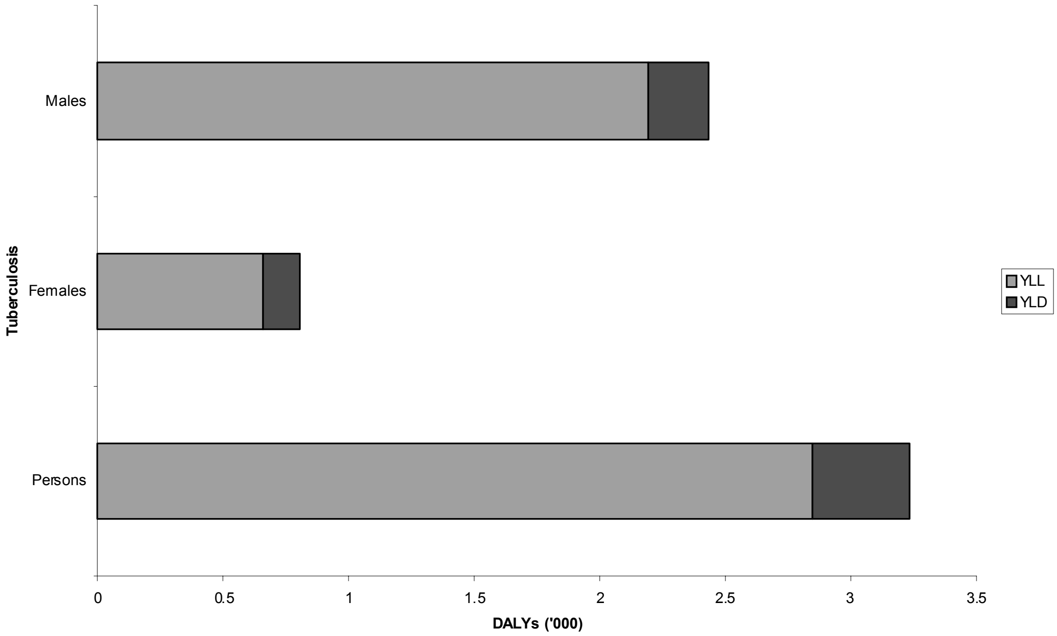
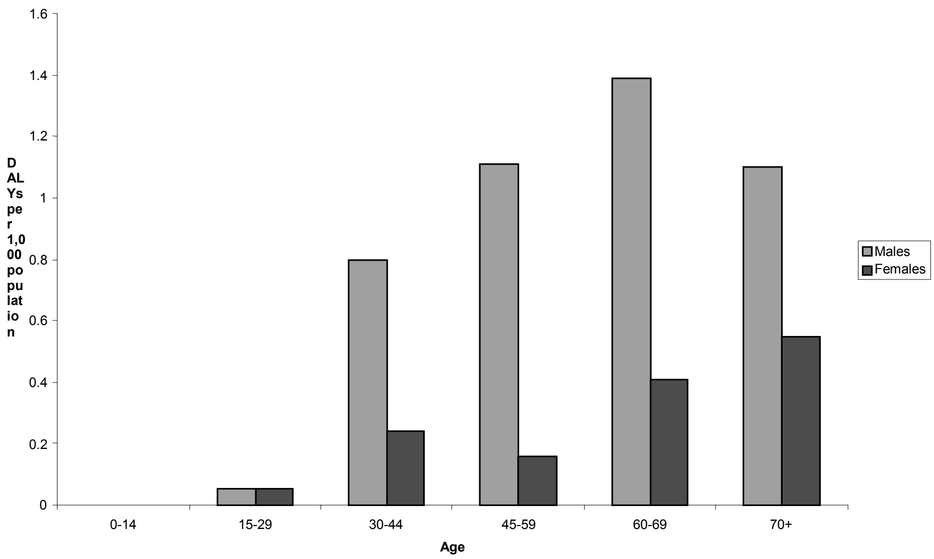


Table 5.1. YLD, YLL and DALY per 1 000 population from tuberculosis, by sex, Serbia without Kosovo and Metohia, 2000

	YLD per 1 000	YLL per 1 000	DALY per 1 000
Males	0.07	0.60	0.67
Females	0.04	0.17	0.21

DALY rates per 1 000 population increased with aging. In males, the highest rate was in the age group 60 - 69. In females the rate was the highest in those 70 years of age and older (Figure 5.6).

Figure 5.6. The burden of tuberculosis by age and sex, Serbia without Kosovo and Metohia, 2000



DALY FOR BELGRADE

In population of Belgrade, the burden of tuberculosis by sex and age had the similar pattern as the one seen in the population of Serbia without Kosovo and Metohia (Table 5.2, Figures 5.7 and 5.8).

Figure 5.7. The burden of tuberculosis, by sex, Belgrade 2000

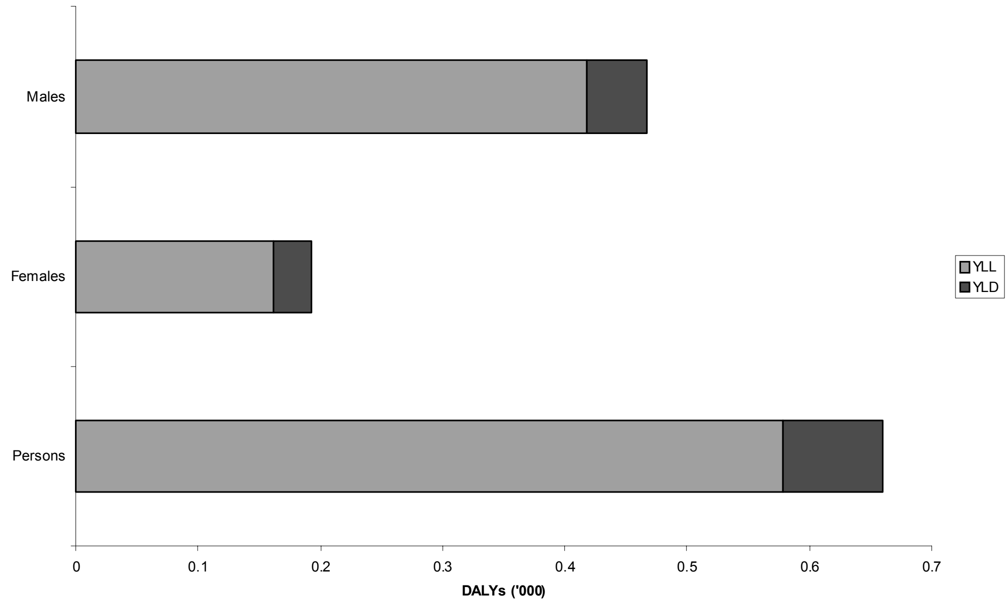
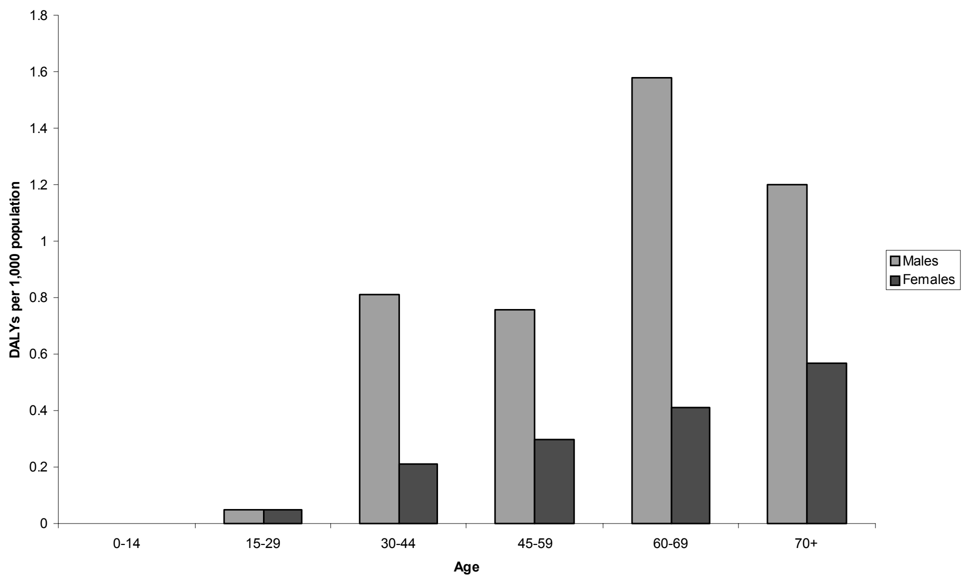


Table 5.2. YLD, YLL and DALY per 1 000 population from tuberculosis, by sex, Belgrade 2000

	YLD PER 1 000	YLL per 1 000	DALY per 1 000
Males	0.07	0.55	0.62
Females	0.04	0.19	0.23

Figure 5.8. The burden of tuberculosis by age and sex, Belgrade 2000



The proportion of YLD in DALY for tuberculosis is the same as that estimated for EURO C region (Murray et al. 2000) (Table 5.3).

Table 5.3. Incidence, YLD, DALY and YLD/DALY ratio for tuberculosis in Serbia without Kosovo and Metohia, Belgrade and EURO region

Region	Incidence per 1 000	YLD per 1 000	DALY per 1 000	YLD/DALY (%)
Serbia	0.36	0.05	0.43	12%
Belgrade	0.36	0.05	0.42	12%
EURO	0.56	0.21	1.83	11%
EURO A	0.17	0.05	0.15	33%
EURO B	0.62	0.31	2.03	15%
EURO C	1.16	0.55	4.51	12%

5.2.2. HIV/AIDS

SLAVENKA JANKOVIĆ

Anual rates of new HIV and AIDS diagnosed cases in central Europe have remined below ten per milion population per year (8.1 and 5.4 in FRY in 1996 and 2001, respectively) (Hamers and Downs 2003). The cumulative number of AIDS cases reported by the Republic Institute of Public Health from 1985 to 2002 in Serbia is 1083, and 671 of those have died (62 %) (IPH of Serbia 2002).

DATA AND METHODS

The IPH of Serbia is responsible under the law for the surveillance of all reportable infectious diseases, including HIV/AIDS/STI. The surveillance data flow is complex, different for HIV and AIDS, and not standardized across all districts. While AIDS cases are reported for all of Serbia, HIV positive persons are reported only by Belgrade IPH and Novi Sad IPH (Vojvodina). Consequently no official HIV data exist at the Republic level. HIV/AIDS reporting is separate from that of other diseases (e.g. hepatitis B and C, STI) and so co-infection rates are unavalable.

The number of positive HIV test reports captures only those who came forward for testing, were diagnosed with HIV infection and were reported. However, it does not capture the total number of individuals infected with HIV since many infected individuals are unaware of their positive HIV status (have not been tested for HIV). The fact that over 70% of reported HIV cases from Belgrade have already reached the AIDS stage raises concerns that individuals wait till they develop advanced HIV before coming for testing. The HIV reporting system in Serbia underestimates the size of the HIV-infected population (Wong 2002).

The disease model used to produce the estimation of HIV/AIDS burden in Serbia and Belgrade separately, included HIV cases and cases of clinical AIDS. The standard 1993 Revised European AIDS case definition, adopted by other European countries, was used (Ancelle-Park 1993; European Center for Epidemiological Monitoring of AIDS 1996).

YLD was calculated on the basis of incidence data.

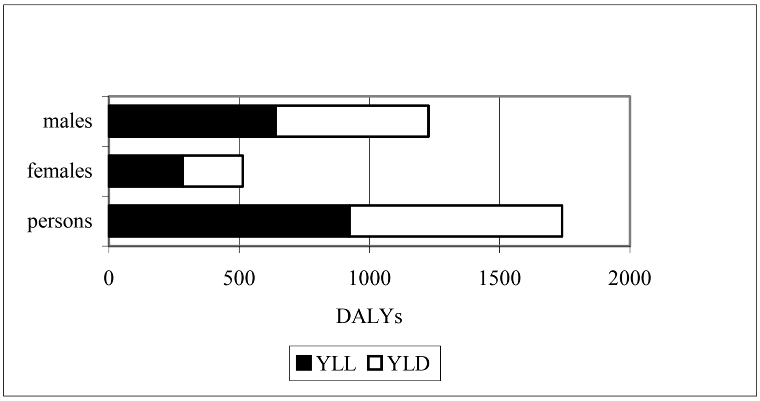
We derive incidence estimates from notifications to the Institute of Public Health of Serbia (IPH of Serbia 2001) and from Institute of Public Health of Belgrade (IPH of Belgrade 2001), in 2000. We also used data from HIV/AIDS Centre of the Institute for Infectious and Tropical Diseases in Belgrade.

Current notifications do not represent the true incidence of HIV/AIDS (incident cases are a mix of incident and prevalent cases but, on the other hand, we have underreporting of HIV infection). To account for this, we increased the number of notified HIV/AIDS by 10 percent. Experts (the clinicians) contacted about the disease were unable to predict the effect of current treatment on survival rates or disease prognosis. Therefore we used provisional estimates of the five-year average duration for the first three phases and a half-year average duration for the last phase, like in the Australian study of burden of disease. The Dutch weights for HIV/AIDS in all its stages were used (0.200 for asymptomatic HIV infection, 0.310 for symptomatic HIV infection, 0.560 for AIDS prior to terminal phase, and 0.950 for AIDS terminal phase) (Salomon, 2003).

DALY FOR SERBIA WITHOUT KOSOVO AND METOHIA

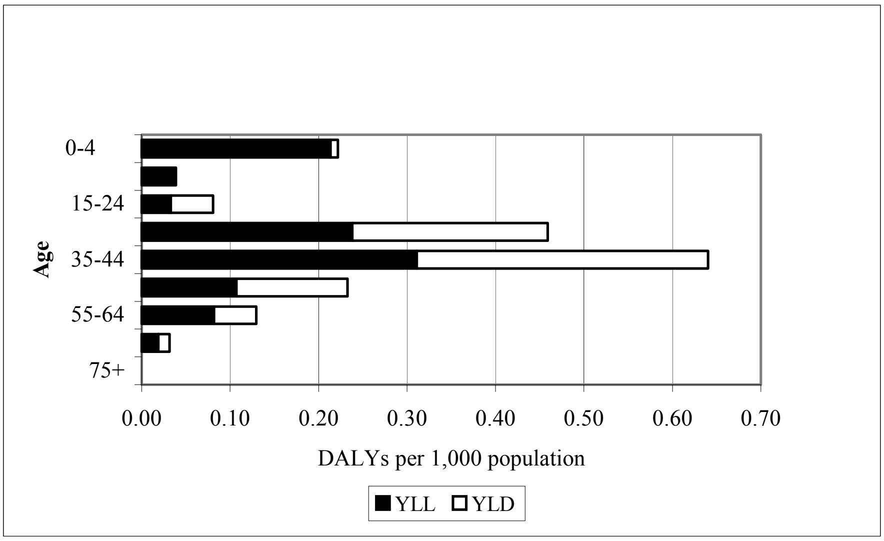
HIV/AIDS was responsible for 1 227 DALYs in men and 515 DALYs in women. Over 50 per cent of this burden is due to mortality. There is a marked sex difference. The male burden from HIV/AIDS is more than twice as high, compared to females (Figure 5.9).

Figure 5.9. The burden of HIV/AIDS (YLL, YLD and DALYs) by sex, Serbia 2000



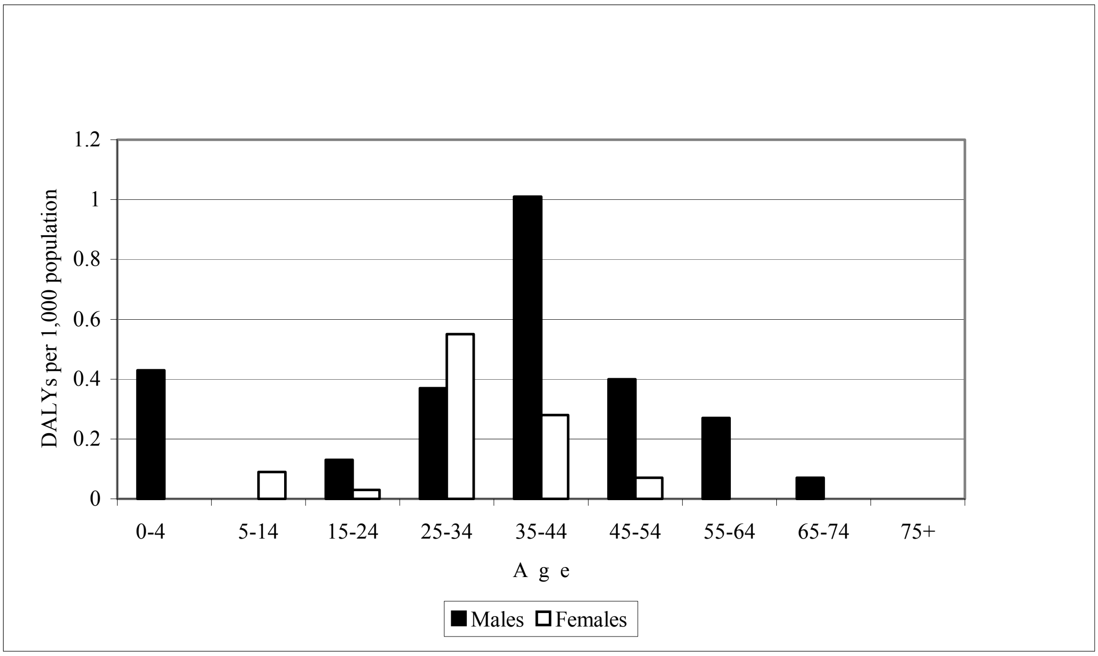
The burden of HIV/AIDS was dominated in persons aged 35-44 years (Figure 5.10).

Figure 5.10. The burden of HIV/AIDS in DALY rates by age, Serbia 2000



DALYs rates are the highest in males aged 35-44, and females aged 25-34. They are higher for males in all age groups, except in 5-14 and 25-34 age groups (Figure 5.11).

Figure 5.11. The burden of HIV/AIDS in DALY rates by age and sex, Serbia 2000



DALY FOR BELGRADE

Age and sex patterns of HIV/AIDS burden in the population of Belgrade were similar to the patterns seen in the population of Serbia. It was expected, because over 70 per cent of all AIDS cases notified in Serbia reside in Belgrade (figures 5.12a, 5.12b, and 5.13).

Figure 5.12a. The burden of HIV/AIDS (YLL, YLD and DALYs) by sex, Belgrade 2000

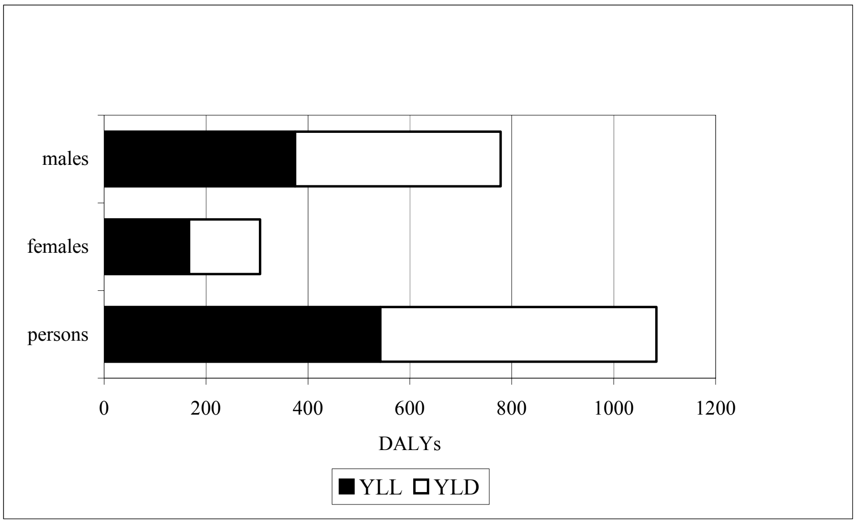


Figure 5.12b. The burden of HIV/AIDS in DALY rates by age, Belgrade 2000

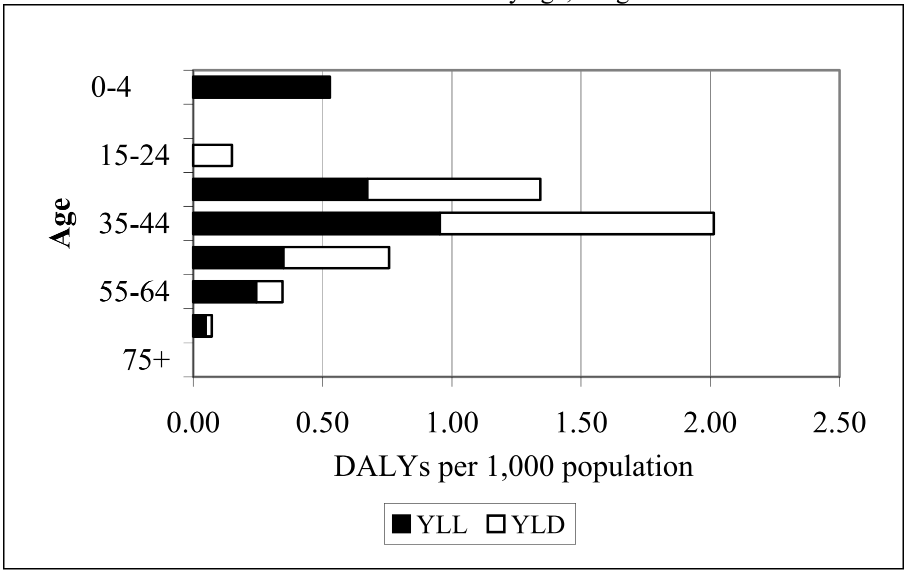
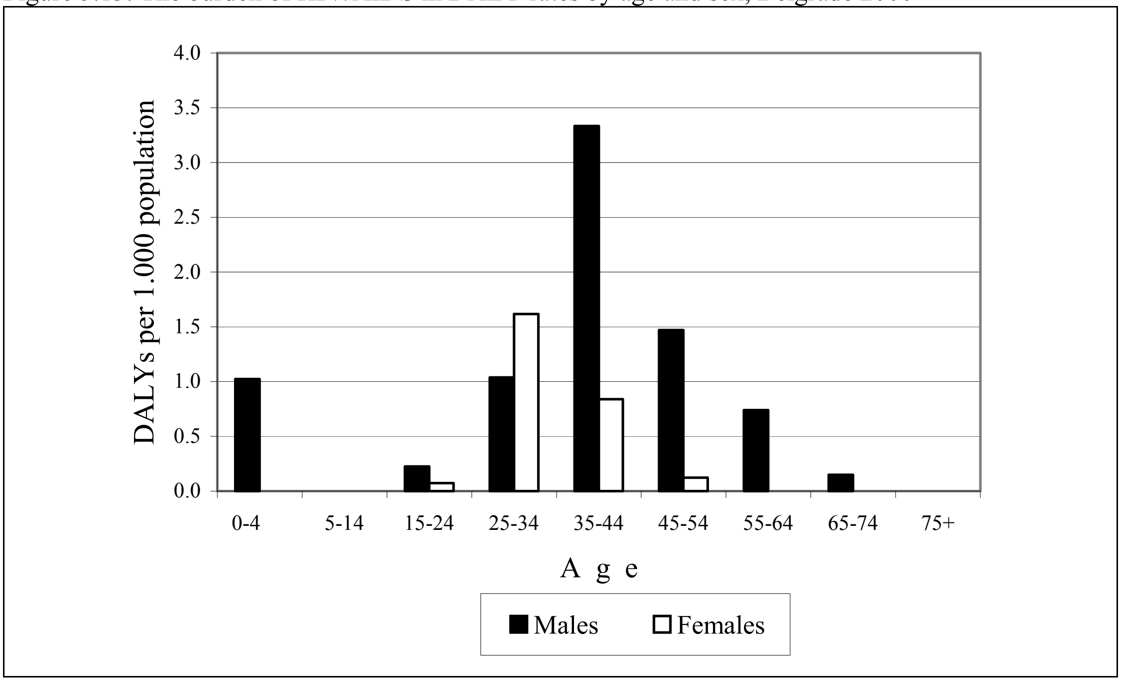


Figure 5.13. The burden of HIV/AIDS in DALY rates by age and sex, Belgrade 2000



The burden of HIV/AIDS in terms of incidence, YLDs, YLLs and DALYs rates, as well as YLD/DALY ratio (%) in Serbia without Kosovo and Metohia, Belgrade, and EURO region, is presented in tables 5.4. and 5.5.

Table 5.4. HIV/AIDS incidence,YLDs and YLLs rates by sex in Serbia, Belgrade and EURO region

Region	**Incidence per 100 000**		**YLD per 100 000**		**YLL per 100 000**	
	Males	**Females**	**Males**	**Females**	**Males**	**Females**
Serbia	2.4	0.8	16.0	5.9	17.4	7.3
Belgrade	8.0	2.3	53.6	16.7	49.8	20.1
EURO A [a)]	11.0	3.6	23.5	6.8	97.5	23.6
EURO B1 [a)]	3.5	0.6	5.3	0.9	17.2	9.7
EURO B2 [a)]	1.3	0.3	1.6	0.4	24.8	6.3
EURO C [a)]	80.7	30.8	112.3	37.1	169.8	35.8

a) Data from Global Burden of Disease study (Murray and Lopez 1996a)

Table 5.5. HIV/AIDS DALYs rates and YLD/DALY (%) in Serbia, Belgrade and EURO region

Region	DALY per 100 000 Persons	YLD/DALY %
Serbia	23.1	45%
Belgrade	68.4	50%
EURO A[a)]	52.9	20%
EURO B[a)]	19.7	17%
EUROC[a)]	222.9	43%

a) Data from Global Burden of Disease study (Murray and Lopez 1996a; Salomon 2003)

The burden of HIV/AIDS for Belgrade in 2000 is about three times the burden for whole Serbia (without Kosovo and Metohia).

The HIV/AIDS burden in males in all EURO regions, including Serbia and Belgrade, is at least twice as high as the HIV/AIDS burden in females. Serbia belongs to the EURO B region (precisely to the EURO B1), region with the lowest burden of HIV/AIDS in Europe. High values of DALYs in EURO C region are the result of high HIV prevalence levels in the former Soviet Union countries.

CONCLUSION

HIV/AIDS was the 4th leading cause of death and the 3rd leading cause of disability-adjusted life years (DALYs) globaly in 2000 as reported by the World Health Report (WHO 2001). In view of the current levels of HIV prevalence, eastern Europe will soon be confronted with a major AIDS epidemic (Hamers and Downs 2003). By contrast, rates of HIV in our country remain low at present, but behaviours that promote HIV transmission are present. There is a danger that the label of low prevalence may translate into low priority for HIV prevention. Improved measures to prevent further HIV spread are urgently needed.

5.2.3. Perinatal Conditions

LJILJANA MARKOVIĆ DENIĆ

Perinatal conditions are the major cause of death among children under five. Perinatal conditions include birth trauma and asphyxia and low birth weight (Hoyert at al. 2001).

Low birth weight (LBW) is defined as the birth weight of less than 2500 g, consisting of both infants who are small for their gestational age and of preterm (premature) birth infants. Improved survival rates and earlier discharges of premature infants have increased the number of infants weighting less than 2500 g (American Academy of Pediatrics 1996). All developmental sequelae due to low birth weight have been clustered into one outcome which includes mental retardation, cerebral palsy, epilepsy, hearing loss and vision loss.

Among perinatal insults, asphyxia at birth is the major cause of mortality and morbidity in neonates. Signs of asphyxia of the fetus are not uncommon and can be detected during labour, delivery, or the early neonatal period. All the developmental sequelae due to birth asphyxia and birth trauma have been clustered into one outcome which includes cerebral palsy, mental retardation, epilepsy, hearing loss and visual loss.

DATA AND METHODS

Incidence data were used for calculation of YLD.

Incidence data were obtained from unpublished hospitalization data of the Data Collection Unit of the City Institute of Public Health, Belgrade for the year 2000.

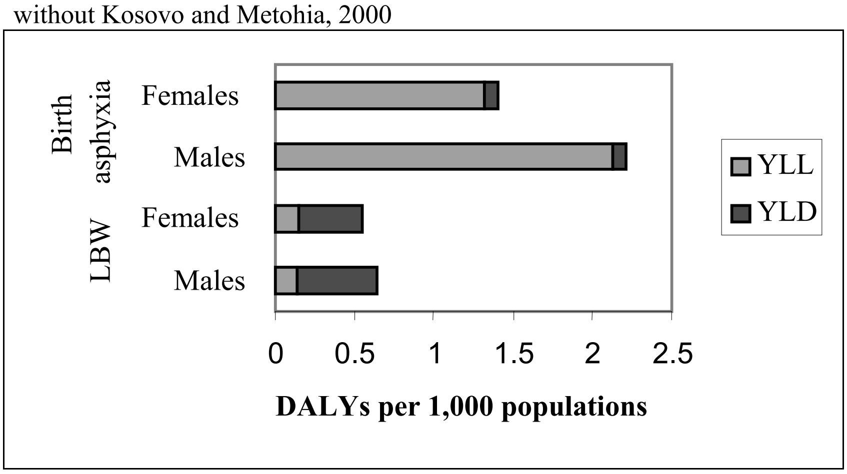
The attributable risk of LBW and birth asphyxia and birth trauma is not well established and the YLD estimates here are based on estimates for direct sequelae only. Due to the absence of data for Serbia without Kosovo and Metohia, the estimation of incidence for this region was based on data for Belgrade.

GBD disability weights were used (Mathers et al. 2002). The GBD provided varying disability weights for untreated and treated person. According to GBD estimate, in the Former Socialist economies of Europe (FSE) 60% of LBW infants were treated.

RESULTS

Low birth weight DALYs dominated by YLD (65% in male and 73% in female babies) – reflecting the fact that LBW is the major cause of chronic disability rather than death. Contrary to these findings, the proportion of YLL in DALY was higher in relation to YLD for birth asphyxia and trauma, which could be explained by the fact that birth asphyxia and trauma burden were the result of mortality rather than a long period of disability (Figure 5.14).

Figure 5.14. The burden of low birth weight (LBW) and birth asphyxia and birth trauma, by sex, Serbia without Kosovo and Metohia, 2000



DALY FOR BELGRADE

In the Belgrade population, the burden of birth asphyxia and birth trauma by sex had the similar pattern as seen in the population of Serbia. However, LBW DALY was higher in Belgrade in relation to reported data for Serbia. It may be explained by better perinatal care of pregnant women - Belgrade residents - and a larger number of newborns with low birth weight (Figure 5.15).

Figure 5.15. The burden of low birth weight (LBW) and birth asphyxia and birth trauma, by sex, Belgrade, 2000

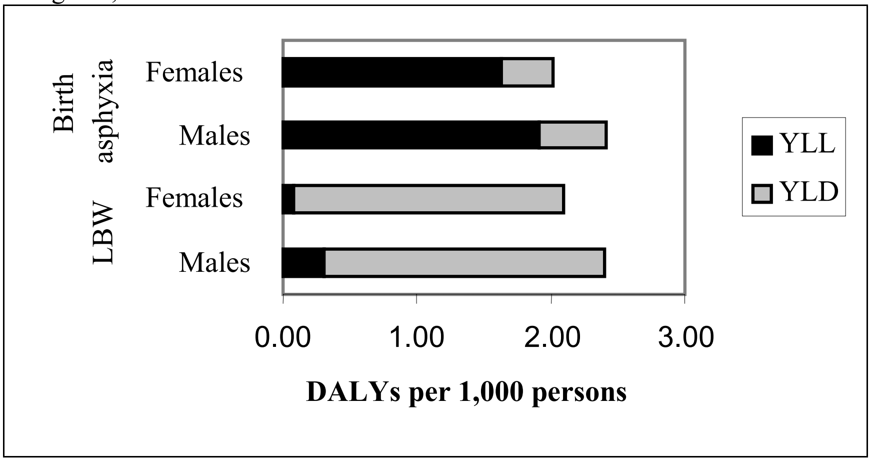


Table 5.6. presents LBW and birth asphyxia and trauma YLD, DALY and YLD/DALY ratio (%) per 1 000 populations in Serbia without Kosovo and Metohia, Belgrade, and EURO regions.

Table 5.6. The burden of perinatal conditions in Serbia, Belgrade and EURO region

Perinatal conditions	Low birth weight			Birth asphyxia and trauma		
	YLD per 1 000	DALY per 1 000	YLD/DALY (%)	YLD per 1 000	DALY per 1 000	YLD/DALY (%)
Serbia	0.43	0.60	71.7	0.16	1.80	8.9
Belgrade	2.07	2.30	90.0	0.08	2.20	3.6
EURO A	0.18	0.47	38.3	0.21	0.50	42.0
EURO B	0.33	3.07	10.7	0.92	3.32	27.7
EURO C	0.12	1.92	13.0	0.32	0.95	33.7

The LBW DALY rate for Serbia is similar to EURO A region, but in Belgrade it is similar to EURO C region, while the proportions of YLD in DALY in Serbia and Belgrade were higher. The proportion of YLD in DALY for birth asphyxia and trauma is smaller than estimated in EURO region. We have these differences because mortality for birth asphyxia and trauma is higher than in other European countries (Murray and Lopez 1996b, Murray et al. 2002).

5.3. NONCOMMUNICABLE DISEASES

5.3.1. Cancers

HRISTINA VLAJINAC, SLAVENKA JANKOVIĆ, SANDRA ŠIPETIĆ-GRUJIČIĆ

In population of Serbia without Kosovo and Metohia, malignant neoplasms occupy the second place as a cause of death. In the year 2000 they were responsible for 19% of all causes of deaths (21% in males, 17% in females).

Out of all cancers, for YLDs calculations were chosen lung cancer, colorectal cancer, stomach cancer, breast cancer and cervical cancer. These cancers were responsible for 65% of deaths caused by all malignant neoplasms (63% in males, 66% in females). Lung cancer, colorectal cancer and stomach cancer were among ten leading causes of death in males. Breast cancer, colorectal cancer, lung cancer, stomach cancer and cervical cancer were among twelve leading causes of death in females.

DATA AND METHODS

YLD was calculated on the basis of incidence data.

Incidence data were obtained from Cancer Registry of Central Serbia (for the year 1999) (Institute of Public Health of Serbia 2002), and from Cancer Registry of Vojvodina (for the year 1998) (Institut of Oncology Sremska Kamenica 2001). Out of the data for Central Serbia, only those for the Belgrade population were used as being more reliable in comparison with the data for the rest of the region. On the basis of comparison with cancer incidence in Slovenia (Institute of Oncology, Ljubljana 2002), we assumed that these data were a good approximation of all new cancer cases in Serbia without Kosovo and Metohia.

For all cancers, the GBD disease model and provisional disability weights for cancer stages were used (Mathers and Boschi-Pinto 2003).

Cancer is modeled in terms of the incidence and survival. Three pathways are modeled for an incidence case:

A. Those who do not die from the cancer (% survive) will undergo a period of disability for primary diagnosis and therapy, and a period of disability for the state after intentionally curative primary therapy (control period) before the person is considered "cured".
B. Those who die from cancer (% treated - % survive) will undergo a period of disability for primary diagnosis and therapy, a period of disability for the control period, a preterminal phase, with dissemination of the disease (metastasis), and a general 1 month terminal phase.
C. Those who are untreated (100 - % treated) will experience a period of disability for the dissemination and terminal stage only.

According to the GBD estimate, in the region of the former socialist economies of Europe 20% of cancers are untreated (Murray and Lopez 1996).

For all cancers observed, including breast cancer, we assumed patients surviving five years to be in remission and took the five-year survival rate as the cure rate. Those who were cured we assumed to be without disability.

For those who die, average time to death was assumed to follow an exponential distribution so that the mean survival time was estimated by fitting this distribution to available survival data (after 1, 3 and 5 years), by the use of Kaplan - Meier product limit method.

The duration of primary diagnosis and therapy, control / weighting phase and preterminal phase of each cancer was discussed with experts.

Because of lack of own survival of cancer patients data, we used 5-year survival data for Slovenia for the period 1985-1989 (IARC 1999). Although these data are more than one decade old we used them for two reasons:

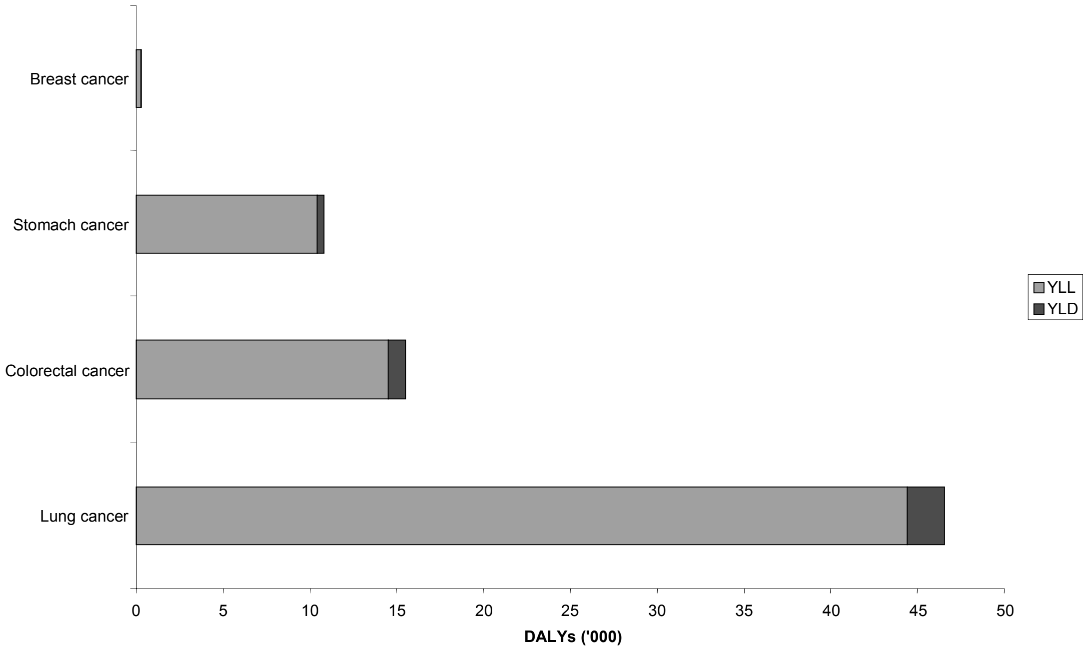
a) Even for cancers showing the improvement of survival probability in some countries, in Serbia we could not expect positive changes in survival during the preceding ten years (1991-2000). The civil strife in 1991, which led to the war and the break-up of the former Yugoslavia, the UN economic sanctions imposed on Serbia and Montenegro and the ensuing economic crisis had a highly adverse effect on the population health and on the quality of health care (Vlajinac et al. 1997).

b) It is more appropriate to use data for Slovenia rather than data for some other neighbouring country or from Europe as a whole, because Slovenia was a part of the former Yugoslavia and its health service was more closely related to that in Serbia. Cancer Registry in Slovenia is also one of the oldest services of this type in Europe.

DALY for Serbia without Kosovo and Metohia

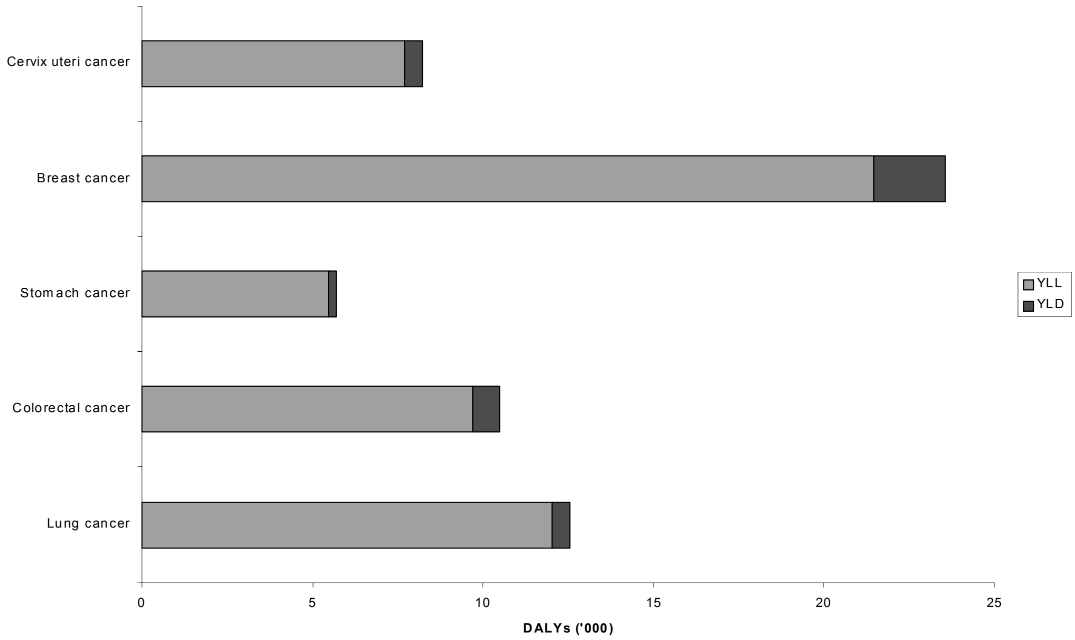
The cancer burden for males was dominated by lung cancer. Colorectal and stomach cancers were on the second and the third place respectively. The burden of breast cancer was negligible (Figure 5.16).

Figure 5.16. The burden of cancer by site for males, Serbia without Kosovo and Metohia, 2000



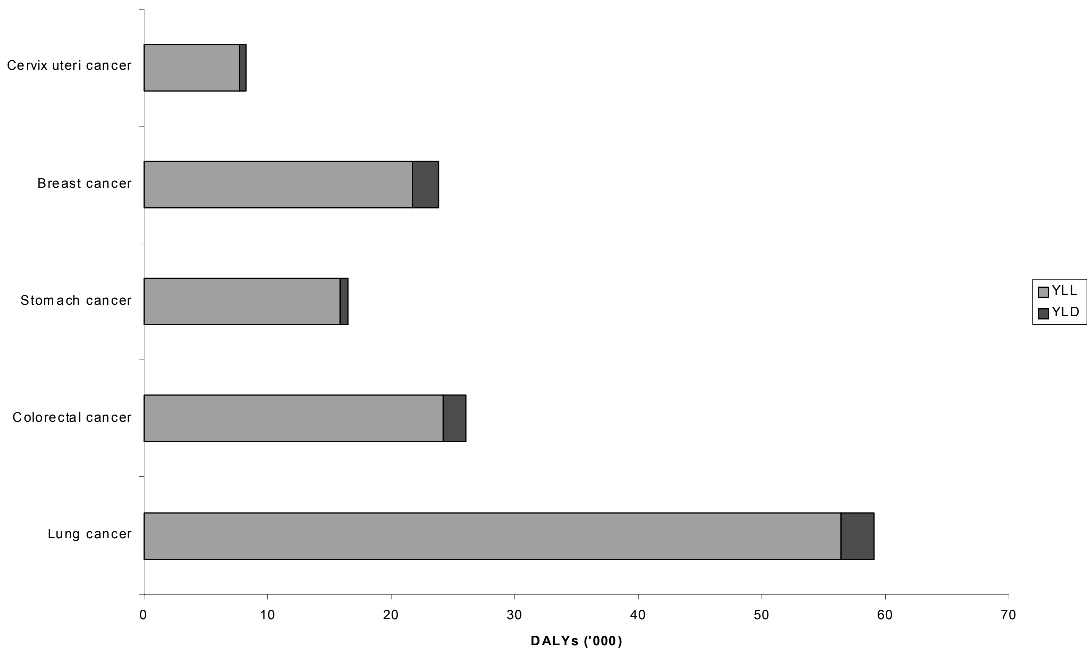
The cancer burden for females was dominated by breast cancer. The breast cancer was followed by lung cancer, colorectal cancer, cervical cancer and stomach cancer (Figure 5.17)

Figure 5.17. The burden of cancer by site for females, Serbia without Kosovo and Metohia, 2000



There were more considerably YLLs lost for all cancers than YLDs, reflecting the fact that the burden of cancer is dominated by mortality rather than lengthy period of disability (Figure 5.18).

Figure 5.18. The burden of cancer by site, all persons, Serbia without Kosovo and Metohia, 2000



The DALY rates per 1 000 population were very low before the age 35. They peaked in the age group 55 - 74 for both males and females, with the exception of cervical and colorectal cancer rates in females, and breast cancer rate in males. DALY rate for cervical cancer was the highest in the age group 35 - 54. For colorectal cancer in females, and breast cancer in males, DALY rates were the highest in those 75 years of age and older. For lung, colorectal and stomach cancers, DALY rates for females were in all age groups lower in comparison with rates for males (Figure 5.19 and 5.20).

Figure 5.19. The burden of cancer by site and age, for males, Serbia without Kosovo and Metohia, 2000

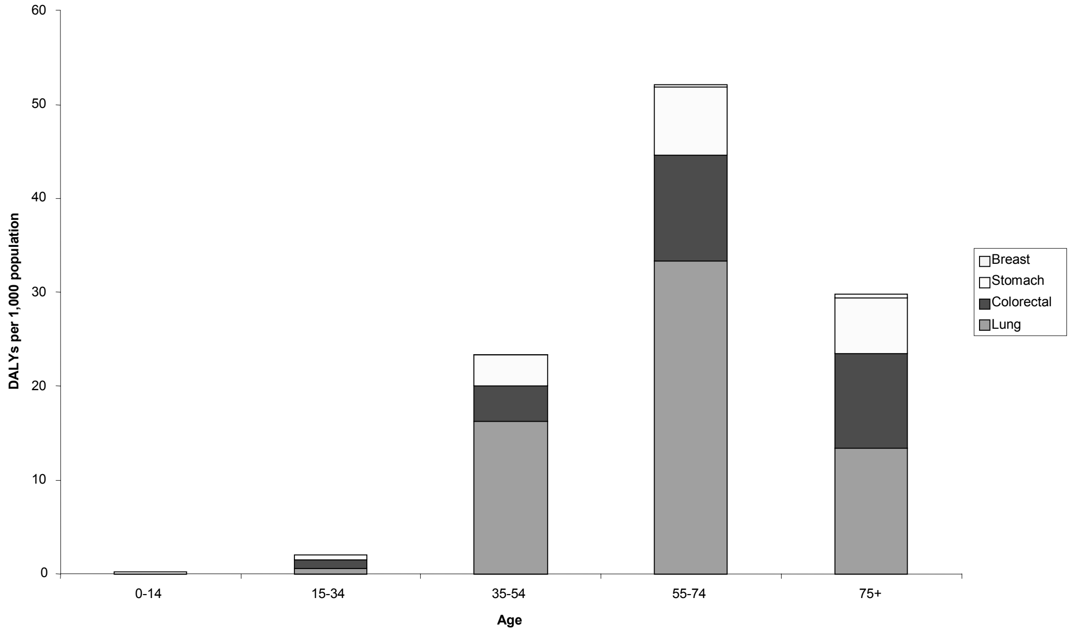
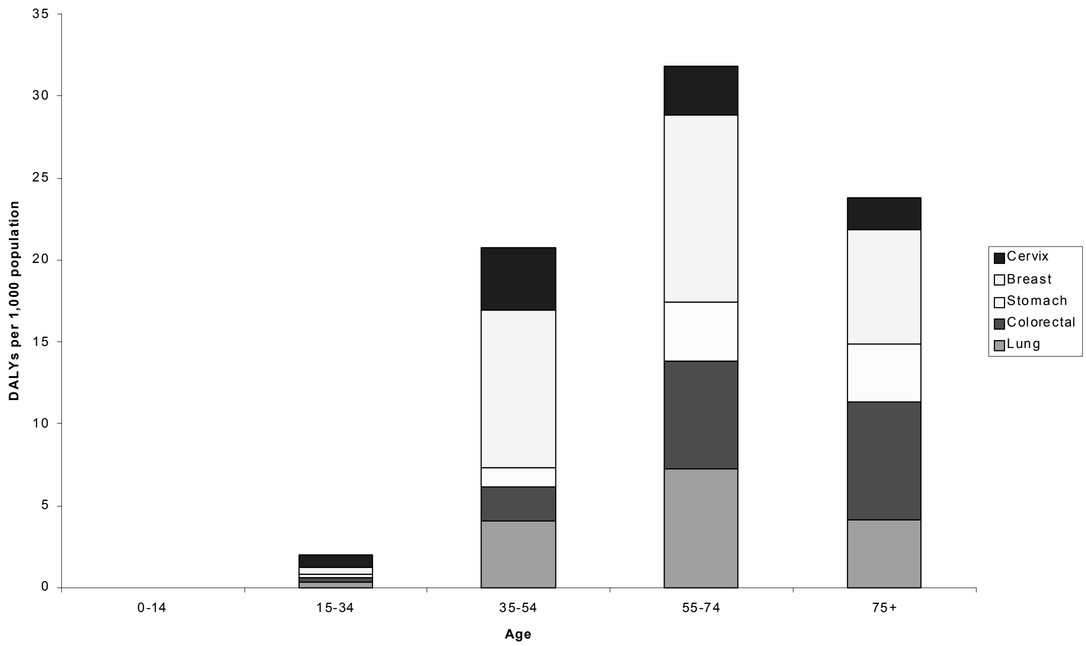


Figure 5.20. The burden of cancer by site and age, for females, Serbia without Kosovo and Metohia, 2000



DALY FOR BELGRADE

In the population of Belgrade, the burden of cancer by site, sex and age (Figures 5.21 – 5.25), had the same pattern as the one seen in the population of Serbia without Kosovo and Metohia.

Figure 5.21. The burden of cancer by site for males, Belgrade, 2000

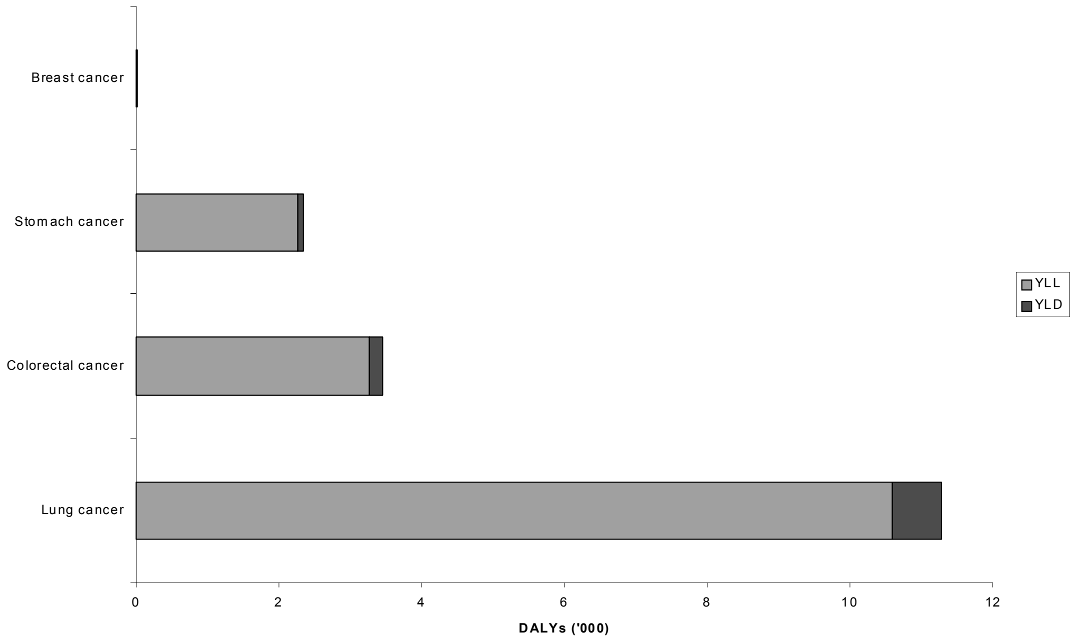


Figure 5.22. The burden of cancer by site for females, Belgrade, 2000

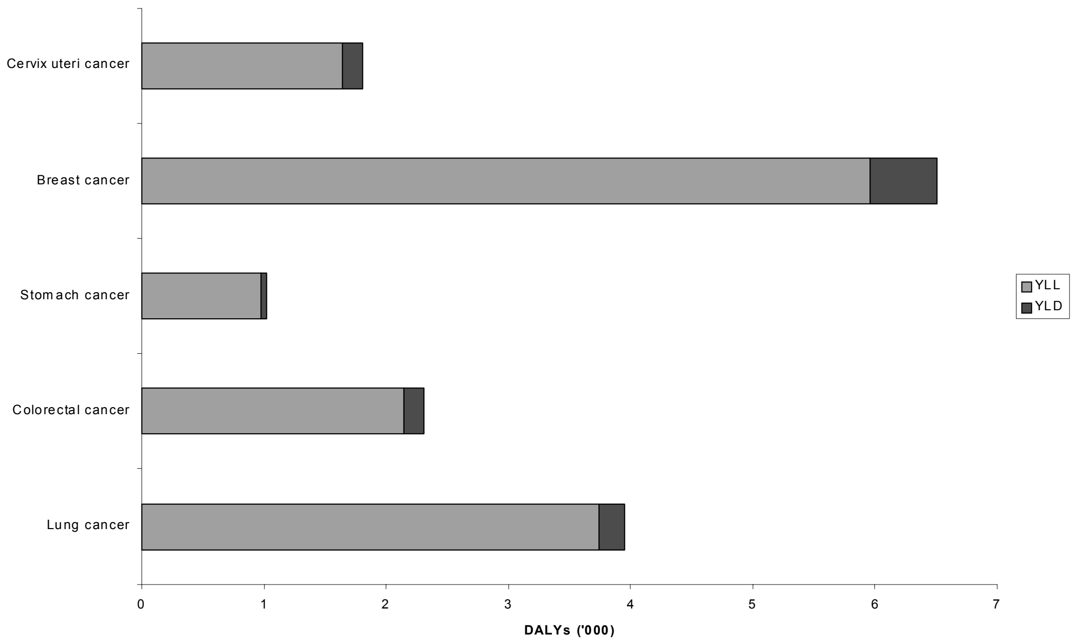


Figure 5.23. The burden of cancer by site, all persons, Belgrade, 2000

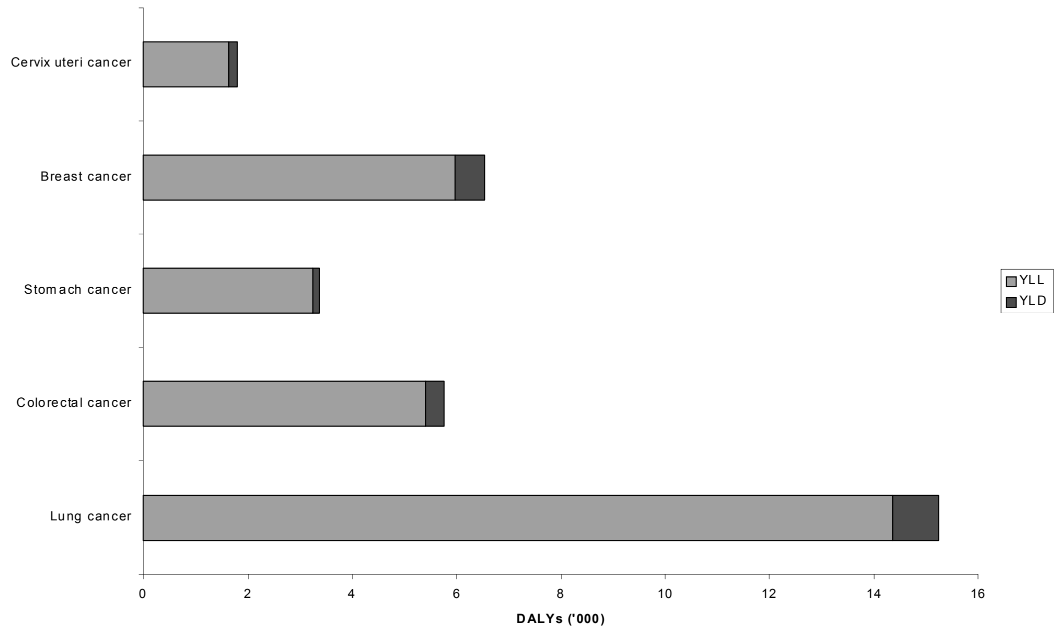


Figure 5.24. The burden of cancer by site and age, for males, Belgrade 2000

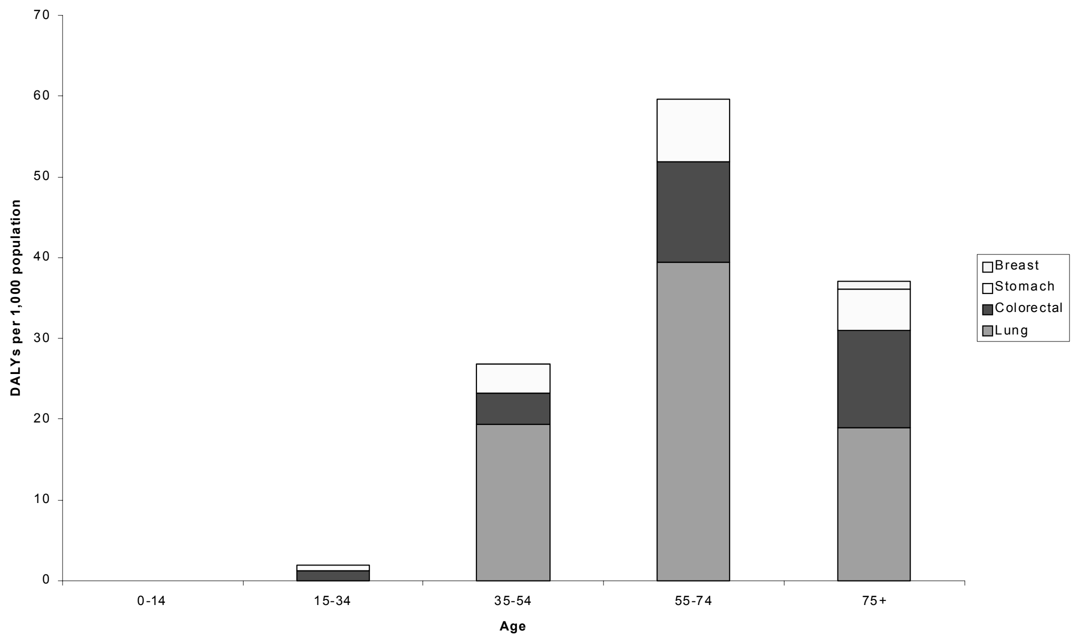
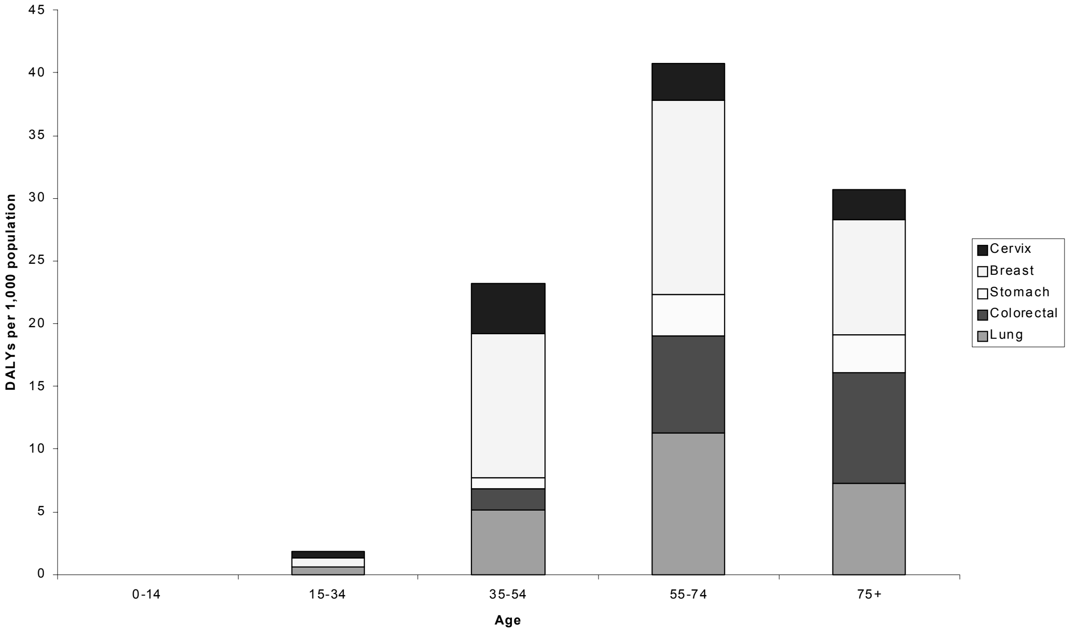


Figure 5.25. The burden of cancer by site and age, for females, Belgrade, 2000



In Tables 5.7. and 5.8. are presented cancer incidence, YLD and DALY per 1 000 population, as well as YLD/DALY ratio (%) in Serbia without Kosovo and Metohia, Belgrade and EURO region (Mathers and Boschi-Pinto 2003). The proportion of YLD in DALY for lung cancer and stomach cancer in Serbia is similar to that estimated for EURO region. For colorectal, breast and cervical cancer, the proportion of YLD in DALY is lower even in comparison with EURO B and EURO C. The majority of cancers are not easily recognized in their early phase without special medical attention. As early diagnosis and early and adequate therapy of colorectal, breast and cervical cancer have a considerable influence on their prognosis, the health authorities in Serbia should make an effort aimed at:

- organizing better health education of the population
- organizing screening for cervical and breast cancer, and probably for colorectal cancer in a selected group of the population, and
- improving cancer therapy.

Table 5.7. Cancer incidence, YLD and DALY per 1 000 population in Serbia, Belgrade and EURO region

Cancer Site	Lung cancer			Colorectal cancer			Stomach cancer		
	Inciden. per 1 000	**YLD per 1 000**	**DALY per 1 000**	**Inciden. per 1 000**	**YLD per 1 000**	**DALY per 1 000**	**Inciden. per 1 000**	**YLD per 1 000**	**DALY per 1 000**
Region									
Serbia	0.76	0.35	7.82	0.49	0.24	3.44	0.21	0.08	2.19
Belgrade	0.81	0.56	9.61	0.49	0.23	3.64	0.21	0.08	2.18
EURO	0.46	0.12	3.75	0.43	0.27	2.14	0.25	0.06	1.83
EURO A		0.14	4.04		0.50	2.63		0.06	1.15
EURO B		0.08	2.76		0.12	1.30		0.04	1.48
EURO C		0.11	4.49		0.20	2.49		0.09	3.29

Cancer Site	Breast cancer			Cervical cancer		
	Inciden. per 1 000	YLD per 1 000	DALY per 1 000	Inciden. per 1 000	YLD per 1 000	DALY per 1 000
Region						
Serbia	0.53	0.28	3.16	0.17	0.07	1.09
Belgrade	0.66	0.35	4.12	0.24	0.10	1.14
EURO	0.42	0.36	2.14	0.06	0.05	0.46
EURO A		0.50	2.46		0.03	0.26
EURO B		0.18	1.36		0.05	0.67
EURO C		0.27	2.29		0.06	0.69

Table 5.8. YLD/DALY (%) for cancers, by site, all persons - Serbia, Belgrade and EURO region

Cancer Site	Lung	Colo-rectal	Stomach	Breast	Cervix
Region					
Serbia	4%	7%	4%	9%	6%
Belgrade	6%	6%	4%	8%	9%
EURO	3%	13%	3%	17%	11%
EURO A	3%	19%	5%	20%	12%
EURO B	3%	9%	3%	13%	7%
EURO C	2%	8%	3%	12%	9%

5.3.2. DIABETES MELLITUS

SANDRA ŠIPETIĆ-GRUJIČIĆ

Diabetes mellitus (DM) is a chronic disease in which there is a deficiency of the insulin action. It may result from quantitative deficiency of the insulin, abnormal insulin, resistance to its action or a combination of deficits.

Two major forms of the disease are recognized: insulin-dependent diabetes mellitus (IDDM), which accounts for about 10% of all cases, and non-insulin dependent diabetes mellitus (NIDDM), accounting for about 90% of the time. Both IDDM and NIDDM patients are at risk of long-term complications. Different complications are caused by diabetes and they are divided into two groups:

a) microvascular - retinopathy, nephropathy, neuropathy, and
b) macrovascular - ischemic heart disease, stroke, peripheral vascular diseases.

The complications appear to be similar for both types of diabetes, although the prevalence may be slightly higher in IDDM, especially in renal diseases.

DM was estimated to be the 29th leading cause of burden of disease in the world in 1990, accounting for 1.1% of total YLDs, which was close to percentage of respiratory infections or malignant neoplasms (Murray and Lopez, 1996a). In version 1 estimates for GBD 2000 study (WHO, 2001), DM is the 20th leading cause of YLDs at the global level, accounting for 1.4% of the total global YLDs.

In Serbia without Kosovo and Metohia, diabetes mellitus was in the fifth place as a cause of death for decades. In the year 2000, DM was responsible for 2.16% of all causes of death (2.16% in males and 3.12% in females).

DATA AND METHODS

YLD was calculated on the basis of prevalence data. Prevalence data for the Belgrade population was obtained from Diabetes Registry of Belgrade for the year 2000 (unpublished data of Institute of Public Health of Belgrade). Because of the lack of data for Serbia without Kosovo and Metohia, the estimation of prevalence for this region was based on the data for Belgrade. Raw registry data referring to NIDDM were first corrected for 47% because it was assessed, by comparison of registry data with records on death causes, that the registry covered only 53% of the diagnosed diabetic cases. Afterwords, the obtained NIDDM prevalence was corrected for 50%, since it has been estimated that the ratio of diagnosed and undiagnosed diabetes in subjects 20 years and over was approximately 1 : 0.5.

The prevalence of diabetics with different complications (blindness due to retinopathy, neuropathy, diabetic foot and amputation) was calculated on the basis of estimates for former socialist economics of Europe performed by Sarah and associates (Table 5.9) (Wild et al. 2000).

Table 5.9. Percentages of people with diabetes mellitus with each complication in 2000 for FSE

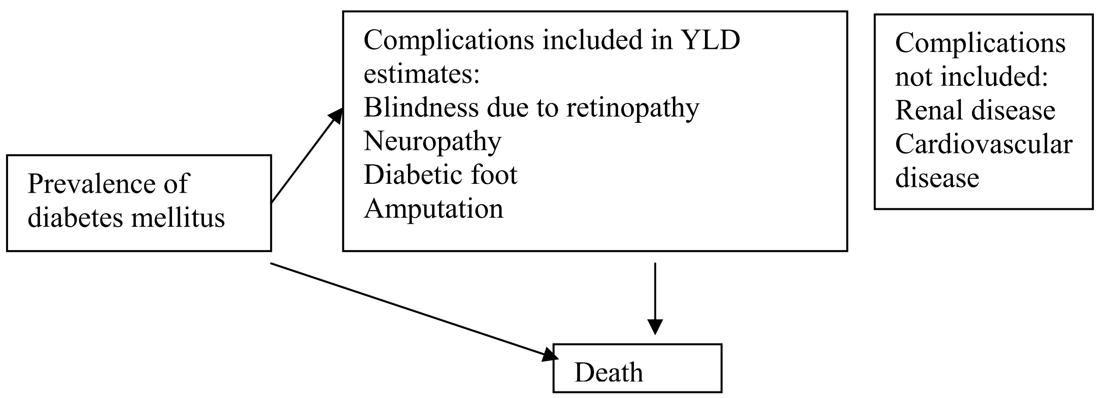
Complications	% of people with DM
Blindness due to retinopathy	0.5
Neuropathy	27.9
Diabetic foot	6.2
Amputation	0.18*

*EURO B1 region

GBD disability weights (DWs) were also used to measure YLD (Murray and Lopez 1996a). DW for uncomplicated cases and cases with complications was assessed on the basis of estimation of proportion of treated and untreated persons. Since, DW of diabetic cases was 0.012 for untreated and 0.033 for treated cases with the assumption that 20% were treated and 80% untreated, an average GBD disability weight was 0.20x0.033+0.80x0.012=0.016.

With a view to estimate YLDs in diabetes, the GBD disease model was used (Figure 5.26) (Wild et al. 2000). Total YLD was obtained by gathering of YLD for diabetic patients without complications and YLD for patients with complications (blindness due to retinopathy, neuropathy, diabetic foot and amputation). Renal and cardiovascular diseases were the complications not included in YLD estimates.

Figure 5.26. Disease model for diabetes mellitus



DALY FOR SERBIA WITHOUT KOSOVO AND METOHIA

Figure 5.27. illustrates that the diabetes burden in females was slightly higher in relation to males. In both sexes, the proportion of YLL in DALY was higher in relation to YLD. However, the proportion of YLD in DALY among males (45.6%) was higher than in females (38.4%).

Figure 5.27. The burden of diabetes mellitus by sex, Serbia without Kosovo and Metohia, 2000

DALY rates per 1 000 population were very low under the age of 45 years in both sexes (Figure 5.28a. and 5.29a.). They increase with aging, and they are the highest in the age group of 75 and more years, in both sexes.

In both sexes of all age groups (except in the age group of 75 years and more for both sexes, and age group of 45 - 54 years in females), the diabetes burden due to mortality burden was considerably higher than due to disability (Figure 5.28b. and 5.29b.).

Figure 5.28a. The burden of diabetes mellitus (DALY) by age for males, Serbia without Kosovo and Metohia, 2000

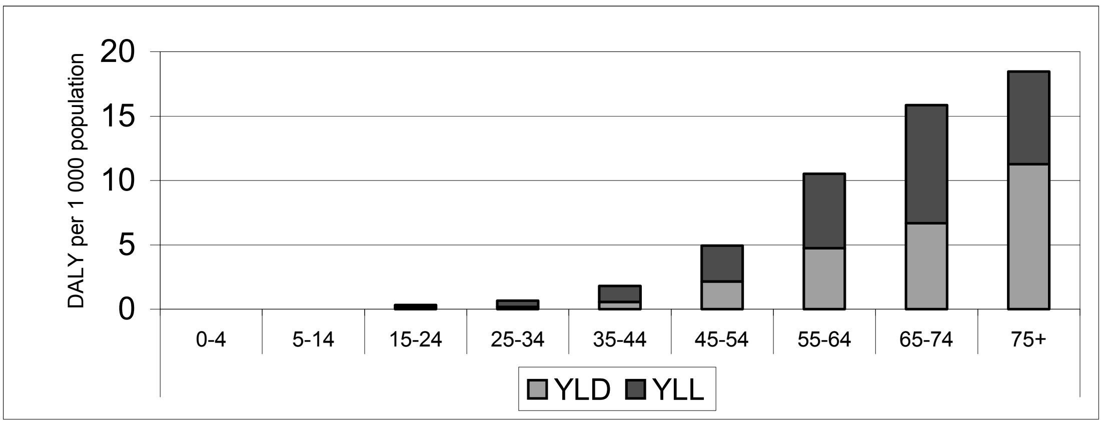


Figure 5.28b. The burden of diabetes mellitus by age for males (YLD and YLL), Serbia without Kosovo and Metohia, 2000

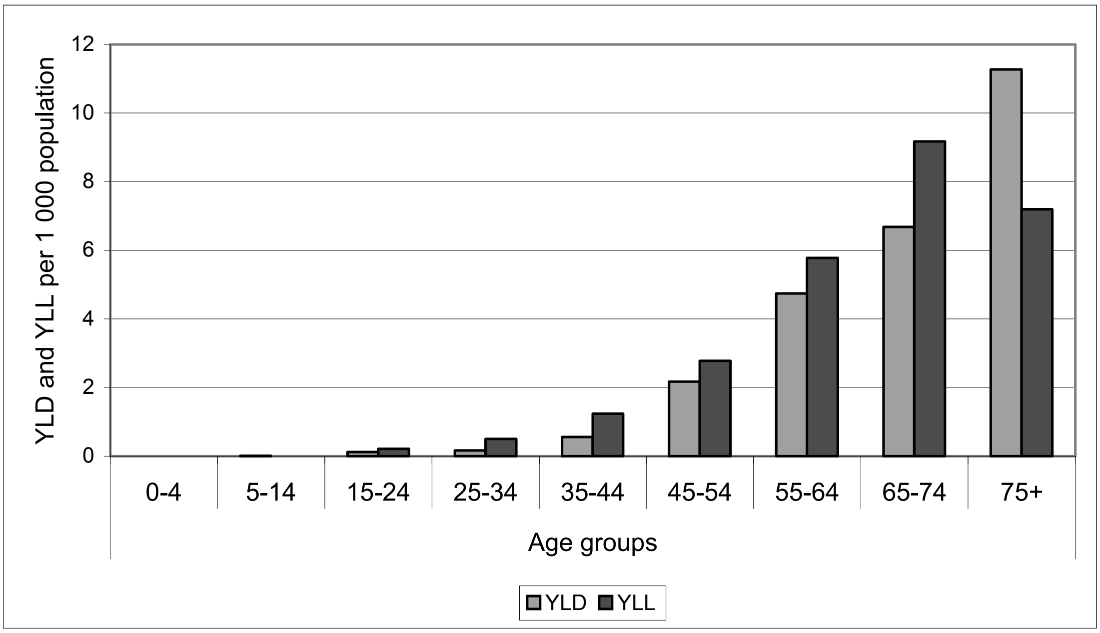


Figure 5.29a. The burden of diabetes mellitus (DALY) by age for females, Serbia without Kosovo and Metohia, 2000

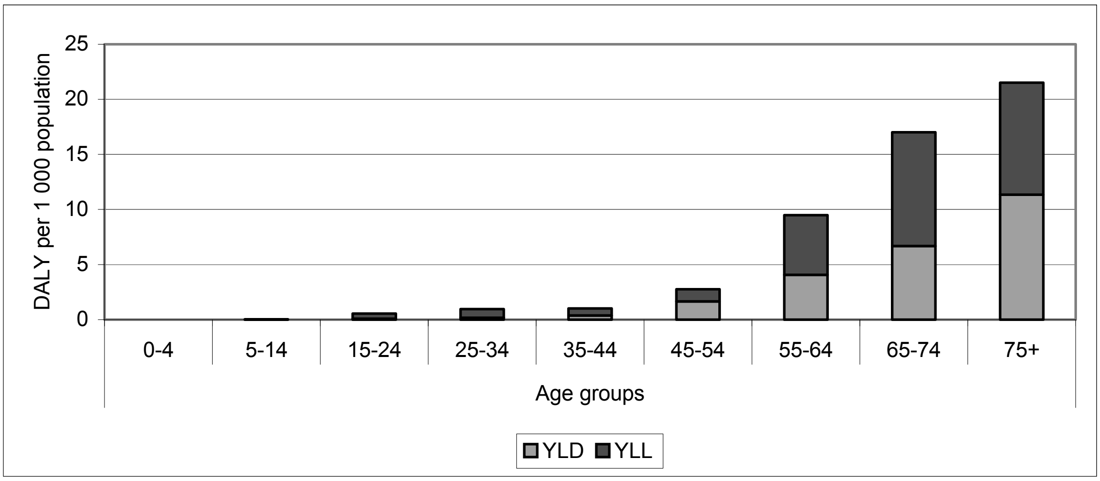
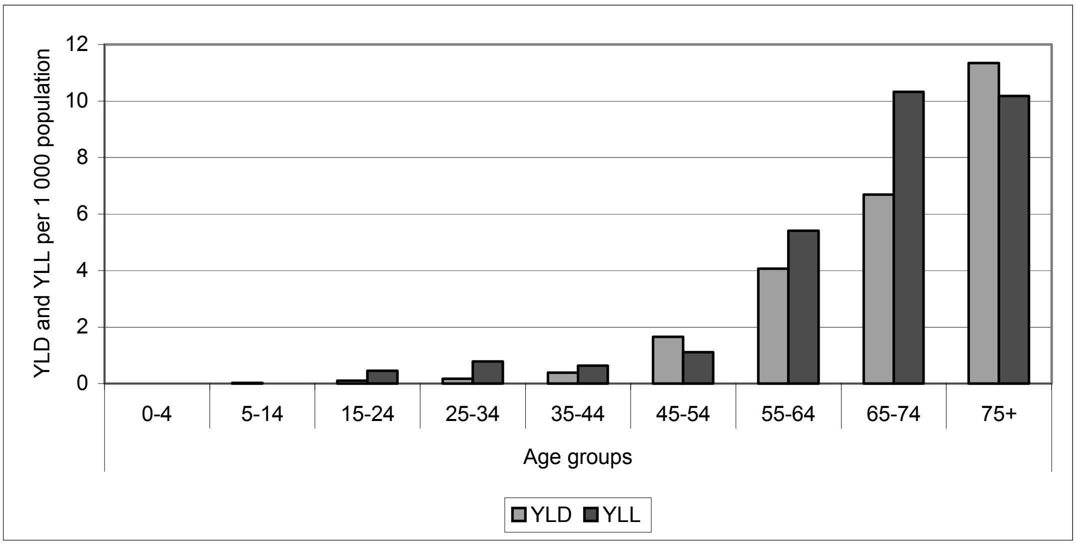


Figure 5.29b. The burden of diabetes mellitus (YLD and YLL) by age for females, Serbia without Kosovo and Metohia, 2000

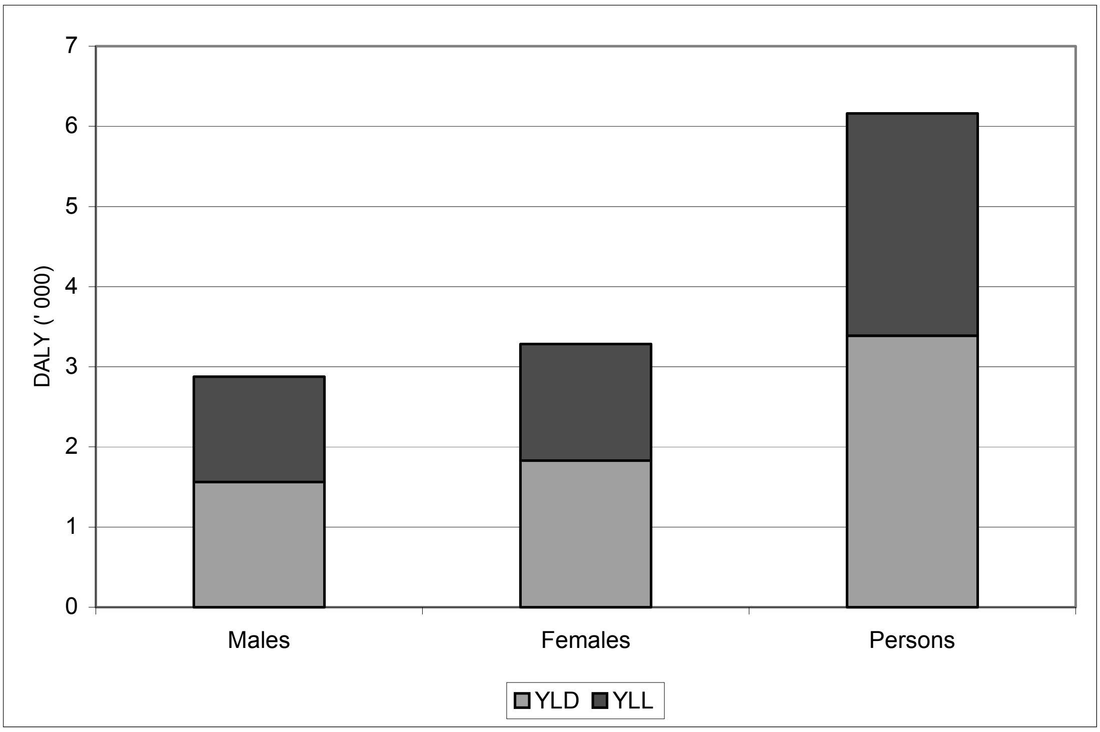


DALY FOR BELGRADE

In the population of Belgrade, the burden of DM by sex and age had a different pattern as the one seen in the population of Serbia without Kosovo and Metohia.

Figure 5.30. illustrates that in both sexes, the proportion of YLL in DALY was smaller in relation to YLD.

Figure 5.30. The burden of diabetes mellitus by sex, Belgrade, 2000



DALY rates per 1 000 population were very low under the age of 35 years in both sexes (Figure 5.31a. and 5.32a.). They increase with aging, and they are the highest in the age group of 75 and more years, in both sexes.

In both sexes of all age groups (except in the age group of 45-54 and 65-74 years for males, and 25 - 34 years in females), the diabetes burden due to mortality burden was considerably less than due to disability (Figure 5.31b. and 5.32b.).

Figure 5.31a. The burden of diabetes mellitus (DALY) by age for males, Belgrade, 2000

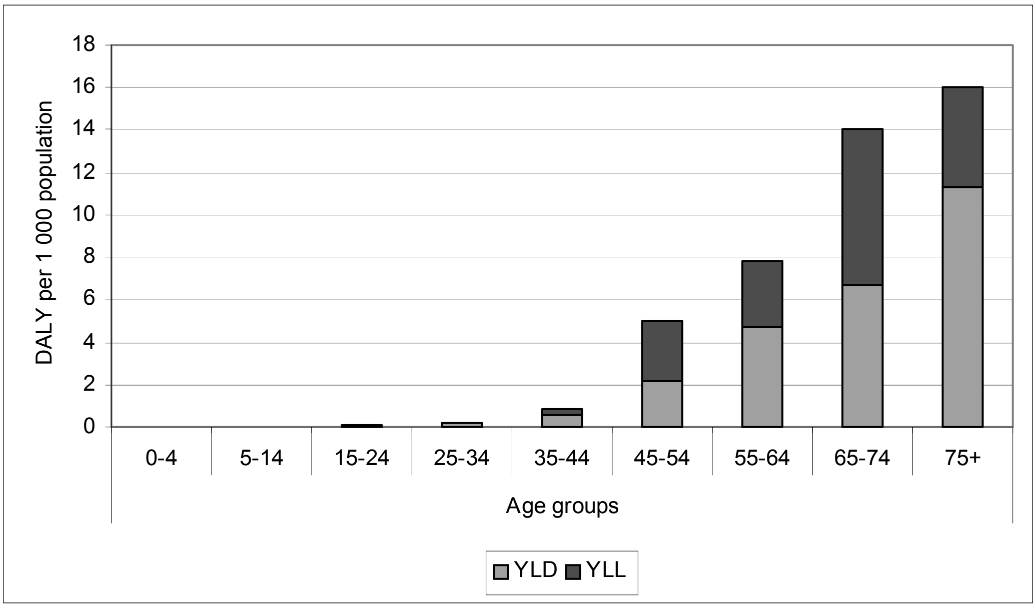


Figure 5.31b. The burden of diabetes mellitus (YLD and YLL) by age for males, Belgrade, 2000

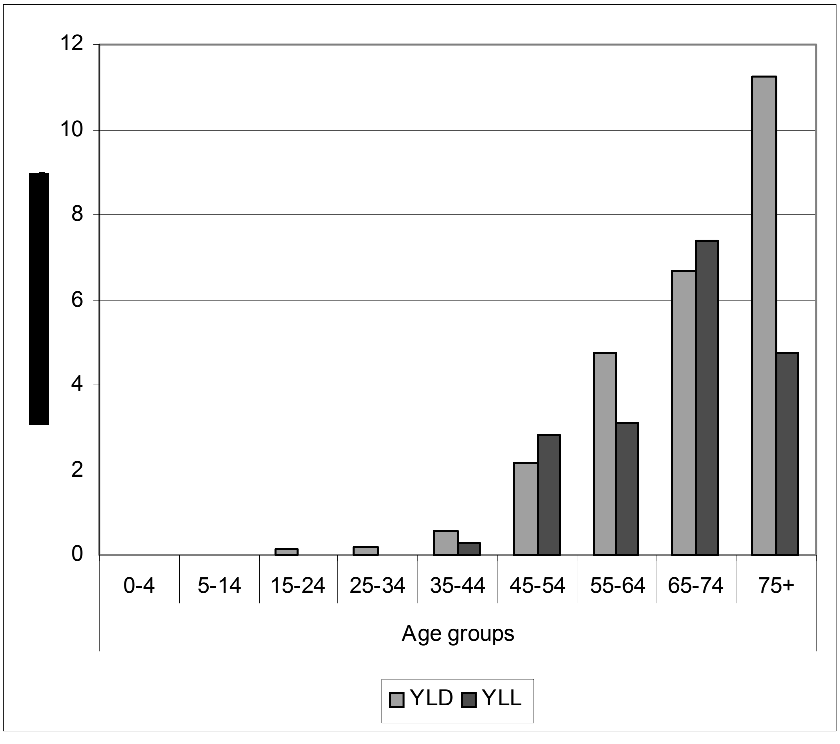


Figure 5.32a. The burden of diabetes mellitus (DALY) by age for females, Belgrade, 2000

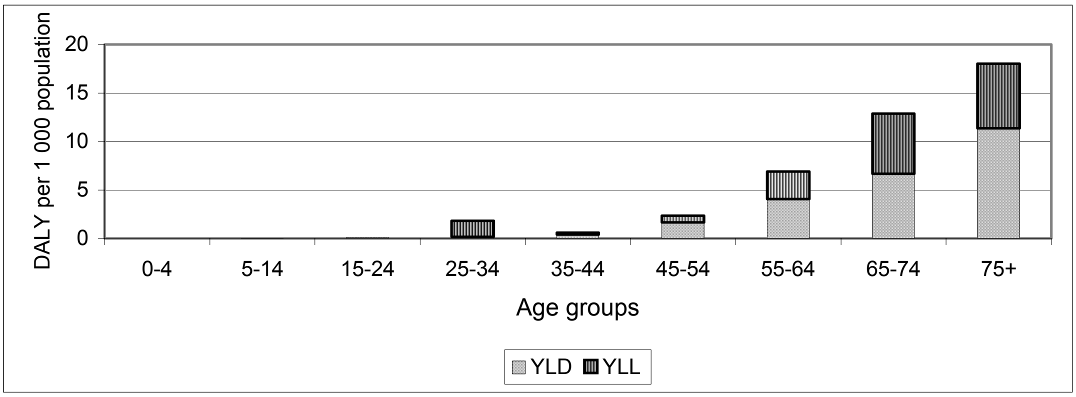
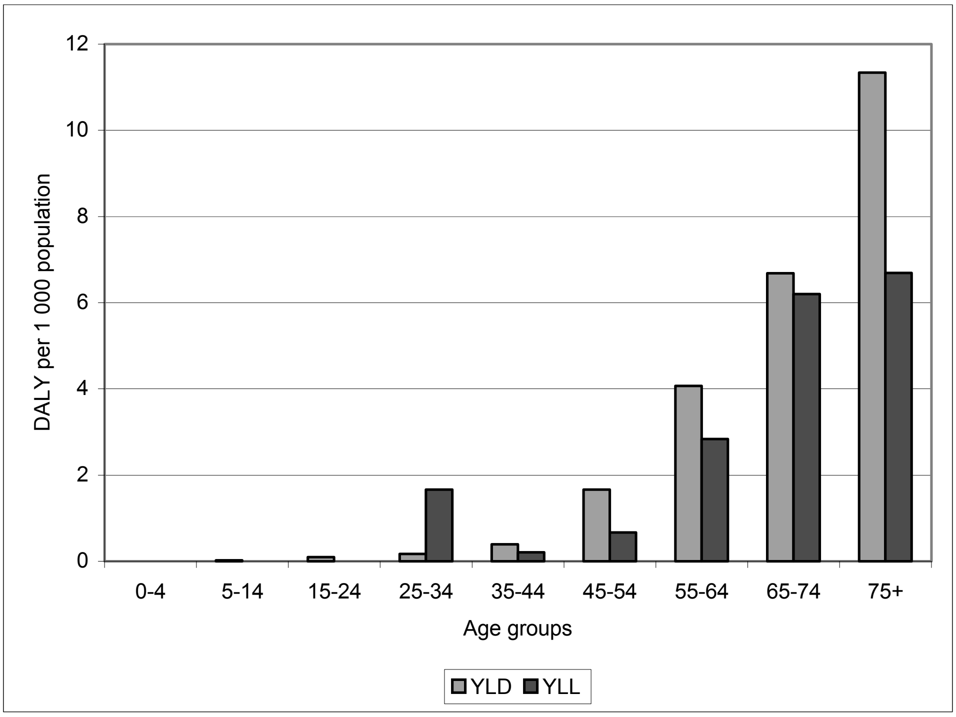


Figure 5.32b. The burden of diabetes mellitus (YLD and YLL) by age for females, Belgrade, 2000



In Table 5.10 are presented DM prevalence, YLD, YLL and DALY per 1 000 population, as well as YLD/DALY ratio (%) in Serbia without Kosovo and Metohia, Belgrade and EURO region (Murray and Lopez 1996; Mathers et al. 2002). The proportion of YLD in DALY for DM in Serbia without Kosovo and Metohia is similar to the one estimated for EURO B region (Mathers et al. 2002), but in Belgrade it is similar to EURO A region (Mathers et al. 2002). We have got these differences because in the Belgrade population, the mortality burden caused by DM is less than in Serbia without Kosovo and Metohia. The data discrepancy can be explained by the fact that in the Belgrade population, the diagnosis of DM is made earlier and the cases with DM are better followed-up in time.

Table 5.10. Diabetes mellitus: Prevalence, YLD, YLL and DALY per 1 000 population in Serbia without Kosovo and Metohia, Belgrade and EURO region

Regions	**Prevalence per 1 000**	**YLD per 1 000**	**YLL per 1 000**	**DALY per 1 000**	**YLD/DALY (%)**	**Source of data**
Serbia without K&M	47.73	2.20	2.74	4.94	44.50	
Belgrade	46.39	2.14	1.75	3.89	55.00	
EURO	41.47	1.51	1.10	2.61	57.80	GBD 2000
EURO A	43.35	1.52	1.10	2.62	58.00	GBD 2000
EURO B	29.94	1.14	1.23	2.37	48.10	GBD 2000
EURO C	48.62	1.83	0.97	2.80	65.40	GBD 2000
EURO	40.60	1.81	1.07	2.88	62.85	GBD 1990
EURO A	32.89	1.40	1.05	2.45	57.14	GBD 1990
EURO B	30.31	1.90	1.15	3.05	62.30	GBD 1990
EURO C	62.91	2.43	0.97	3.40	71.47	GBD 1990

The obtained results suggest that only an early diagnosis of the disease, adequate treatment and continuous follow-up of diabetic patients may reduce early death from this condition and multiple undesired complications contributing to burden of society with this disease.

DATA AND METHODS

Both hearing and vision losses were modeled as progressive conditions, but only in case of severe stages, i.e.:

- Severe hearing loss: hearing threshold in case of better ear is 61 dBHTL or higher (great difficulty to follow or participate in conversation with another person).

- Severe vision loss: complete blindness or loss of both eyes; complete loss of vision of one eye, while another eye can barely catch glimpses of objects (less than 1/20), loss of one eye or complete loss of sight of one eye, paralysis of ocular muscles of both eyes; paralysis of one eyelid.

YLD was calculated on the basis of prevalence data. Prevalence data of Serbia were obtained from prevalence study "The Disabled and the Environment" (Cucić et al. 2001). The study included 1727 subjects up to 75 years of age, from 12 communities obtained from multiphase-geographical stratified sample of the Serbian communities. All subjects were interviewed (face-to-face), and if an interview was not possible, data were collected from persons in their immediate neighborhood. Based on prevalence for the observed communities, the estimated prevalence of hearing and visual loss was calculated for the overall Serbian population by age and sex. The prevalence of the age group of 60-69 years was used for persons over 75 years, who were not covered by above-mentioned study (Cucić et al. 2001).

The decision was made to use mean values of severe vision loss and severe hearing loss Dutch weights. Therefore, an average Dutch disability weight was (0.43+0.37)/2=0.40.

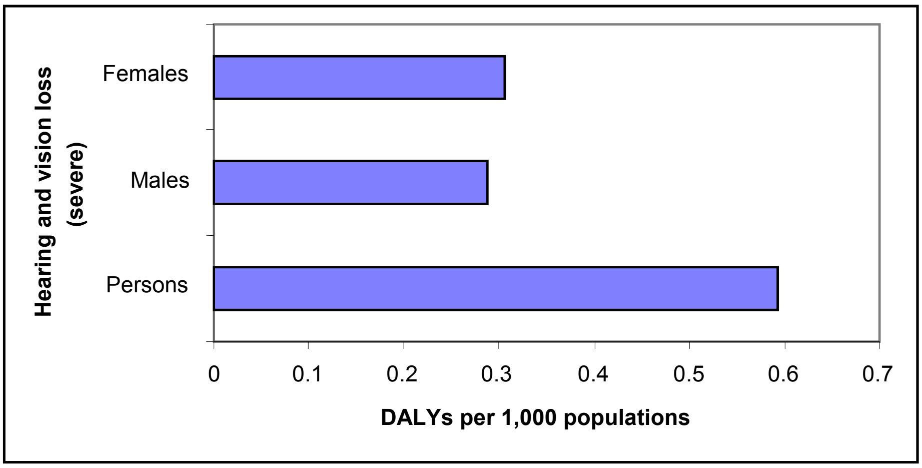
As YLL for sense organ disorders was 0, YLD was equal to DALY.

RESULTS

DALY FOR SERBIA WITHOUT KOSOVO AND METOHIA

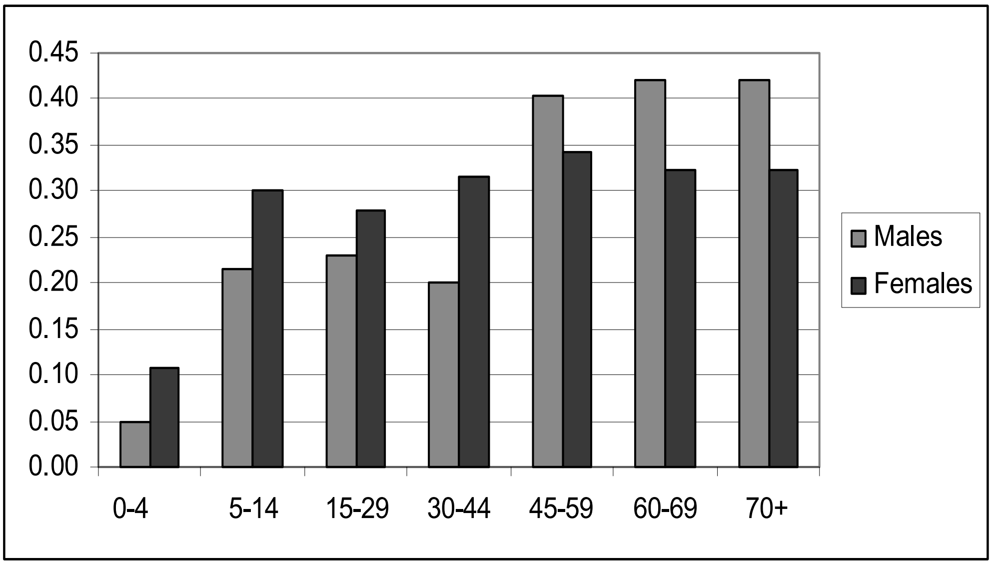
The burden of hearing and vision loss was similar for males and females (Figure 5.39)

Figure 5.39. The burden of hearing and vision loss by sex, Serbia without Kosovo and Metohia



DALYs rates per 1 000 increased with aging. In males the rate was the highest among those of 60 or more years old. In females the highest rate was in the age group 45 - 59 (Figure 5.40).

Figure 5.40. The burden of hearing and vision loss by age and sex, Serbia without Kosovo and Metohia, 2000



DALY FOR BELGRADE

In population of Belgrade, the burden of hearing and vision loss (severe) had the similar pattern as the one seen in the population of Serbia without Kosovo and Metohia (Figures 5.41 and 5.42).

Figure 5.41. The burden of hearing and vision loss, by sex, Belgrade 2000

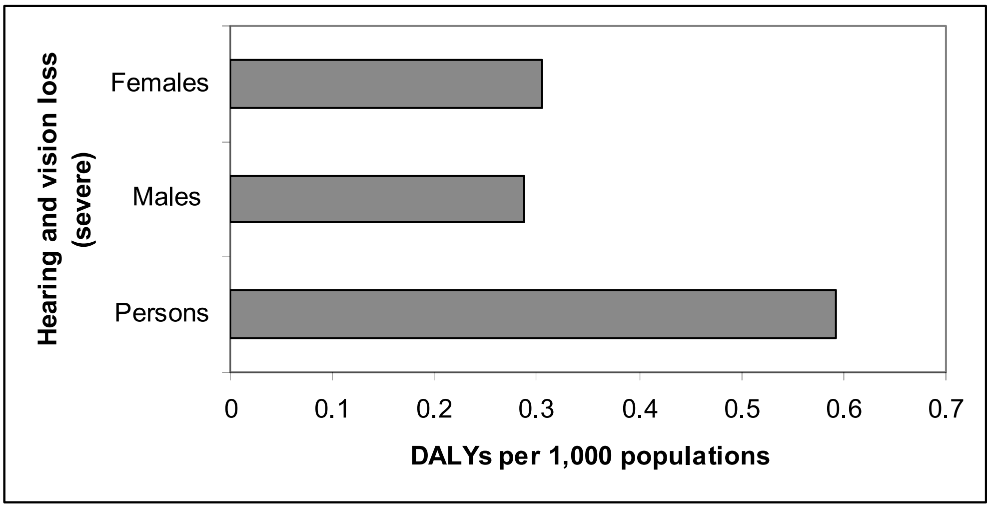
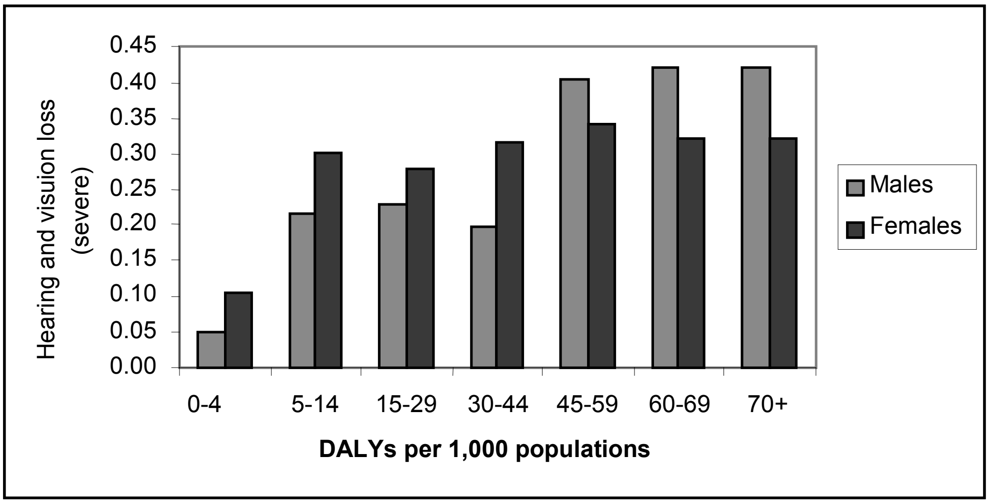


Figure 5.42. The burden of hearing and vision loss by age and sex, Belgrade, 2000



The obtained results were hard to compare with those of other studies, because of different methodological approaches. Explicitly, we used prevalence study data, which included both persons with hearing and visual losses, and only the severe forms of the condition. Moreover, as some other authors reported (Mathers et al. 1999), the severe stage of the overall hearing loss accounted for about 8.9%, and the severe stage of the overall visual loss accounted for about 71.3%, and therefore it was impossible to estimate the total number of persons from Serbia and Belgrade who had these sense organ disorders.

The burden of depression in Serbia is about two thirds of that in EURO B and EURO C regions, but higher than the burden in Australia.

CONCLUSION

Depression is a common mental disorder, causing a very high level of disease burden, and is expected to show a rising trend during the coming 20 years. Worldwide projections undertaken by the WHO for the main contributors to the burden of disease in the year 2020 identify unipolar major depression as the second greatest cause of burden after ischemic heart disease. In developing countries, major depression is projected to be the leading cause of disease burden (Murray and Lopez 1996a).

In Serbia, like in many developing countries, there is a paucity of information on prevalence and the burden of major mental and behavioral disorders, including depressive disorders. The mental health of communities should be monitored including mental health indicators in health information and reporting systems. There is a notable lack of scientific research on mental health epidemiology, services, treatment, prevention and policy. The main objectives of the future studies include the evaluation of the prevalence, severity, and disabilities of depressive disorders, and assessment of the resultant use of services and medications. Building research capacity in Serbia is an urgent need.

5.3.4. Sense Organ Disorders

LJILJANA MARKOVIĆ DENIĆ

The loss of eyesight is one of the most serious misfortunes that can befall a person. Due to the lack of epidemiological data, especially from the developed countries, the exact number of blind persons in the world is not known. Thus, the global burden of serious visual impairment is estimated at 148 million people (Thylefors et al. 1995). Blindness and low vision are defined as in the International Classification of Diseases 10th edition (ICD10):

- Blindness is visual acuity of less than 3/60 (0.05) or corresponding visual field loss in the better eye with the best possible correction. This corresponds to loss of walk-about vision.
- Low vision corresponds to visual acuity of less than 6/18 (0.3), but equal or better than 3/60 in the better eye with the best possible correction (visual impairment categories 1 and 2 in ICD-10).

Hearing loss is a common problem in modern society due to the combined effects of noise, aging, disease, and heredity. WHO's most recent estimate is that 250 million people in the world have disabling hearing impairment (moderate or worse hearing impairment in the better ear) (WHO, 2001). Two thirds of these people live in developing countries.

Hearing is a complex sense involving both the sensitivity of the ear as well as the ability to understand speech. Determining the prevalence of hearing loss depends on the type and degree of the loss, the area(s) of abnormality in the auditory system (e.g., middle ear, inner ear, brain), noise exposure, and age. Hearing loss may be defined by self-report, by report of friends and family, and by hearing testing.

DATA AND METHODS

Both hearing and vision losses were modeled as progressive conditions, but only in case of severe stages, i.e.:

- Severe hearing loss: hearing threshold in case of better ear is 61 dBHTL or higher (great difficulty to follow or participate in conversation with another person).

- Severe vision loss: complete blindness or loss of both eyes; complete loss of vision of one eye, while another eye can barely catch glimpses of objects (less than 1/20), loss of one eye or complete loss of sight of one eye, paralysis of ocular muscles of both eyes; paralysis of one eyelid.

YLD was calculated on the basis of prevalence data. Prevalence data of Serbia were obtained from prevalence study "The Disabled and the Environment" (Cucić et al. 2001). The study included 1727 subjects up to 75 years of age, from 12 communities obtained from multiphase-geographical stratified sample of the Serbian communities. All subjects were interviewed (face-to-face), and if an interview was not possible, data were collected from persons in their immediate neighborhood. Based on prevalence for the observed communities, the estimated prevalence of hearing and visual loss was calculated for the overall Serbian population by age and sex. The prevalence of the age group of 60-69 years was used for persons over 75 years, who were not covered by above-mentioned study (Cucić et al. 2001).

The decision was made to use mean values of severe vision loss and severe hearing loss Dutch weights. Therefore, an average Dutch disability weight was (0.43+0.37)/2=0.40.

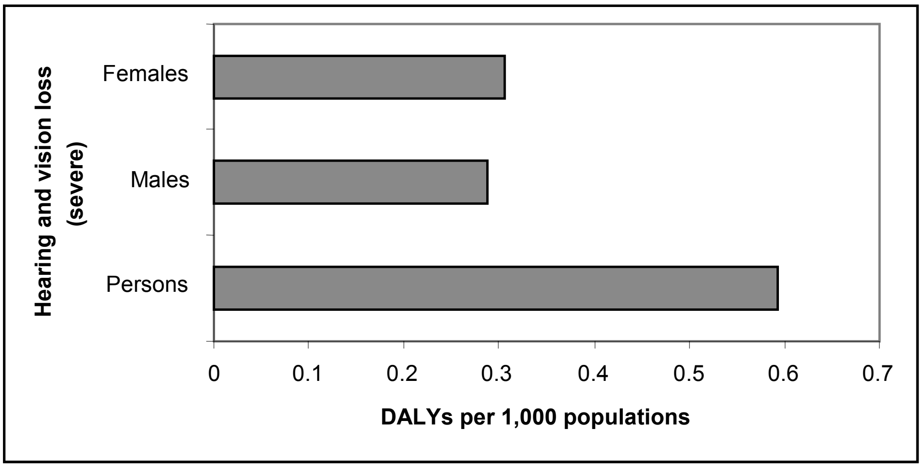
As YLL for sense organ disorders was 0, YLD was equal to DALY.

RESULTS

DALY FOR SERBIA WITHOUT KOSOVO AND METOHIA

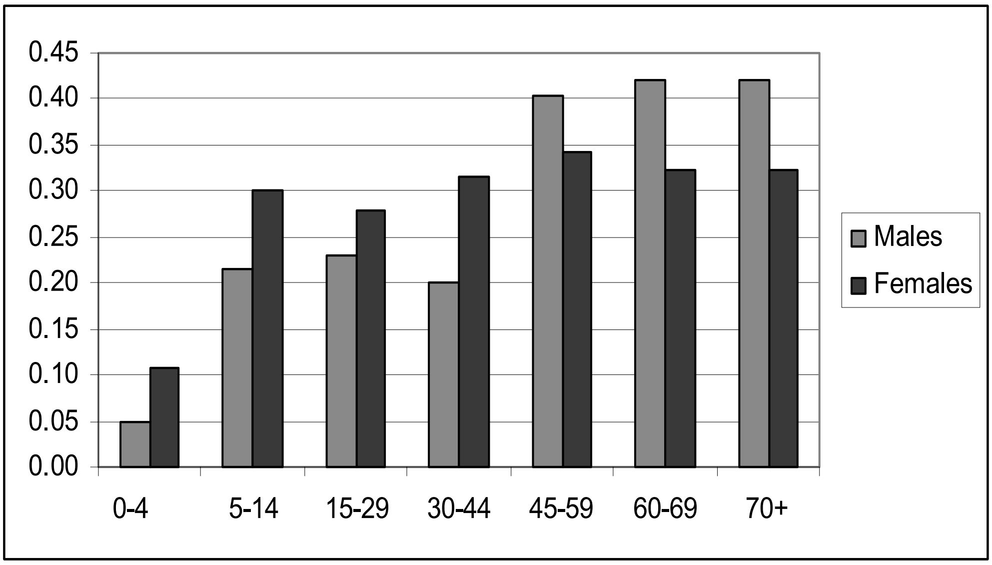
The burden of hearing and vision loss was similar for males and females (Figure 5.39)

Figure 5.39. The burden of hearing and vision loss by sex, Serbia without Kosovo and Metohia



DALYs rates per 1 000 increased with aging. In males the rate was the highest among those of 60 or more years old. In females the highest rate was in the age group 45 - 59 (Figure 5.40).

Figure 5.40. The burden of hearing and vision loss by age and sex, Serbia without Kosovo and Metohia, 2000



DALY FOR BELGRADE

In population of Belgrade, the burden of hearing and vision loss (severe) had the similar pattern as the one seen in the population of Serbia without Kosovo and Metohia (Figures 5.41 and 5.42).

Figure 5.41. The burden of hearing and vision loss, by sex, Belgrade 2000

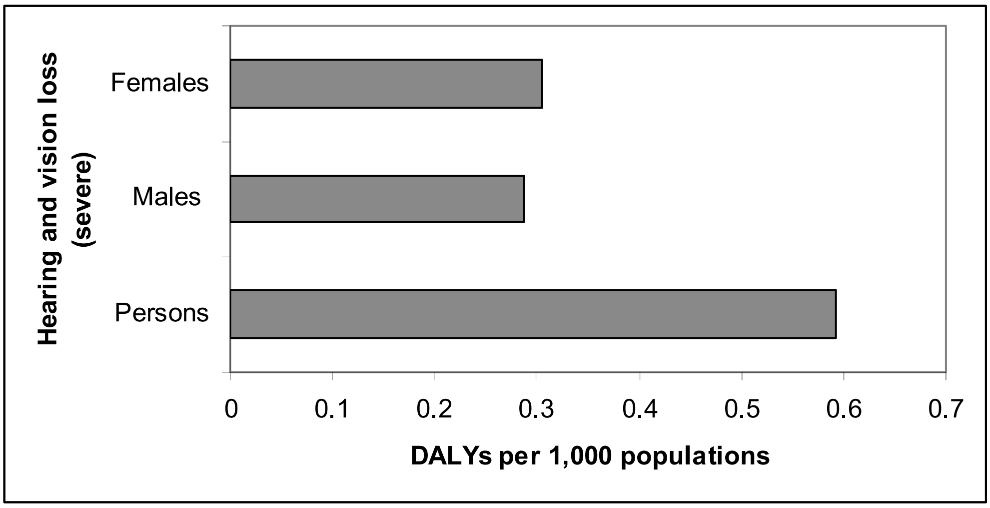
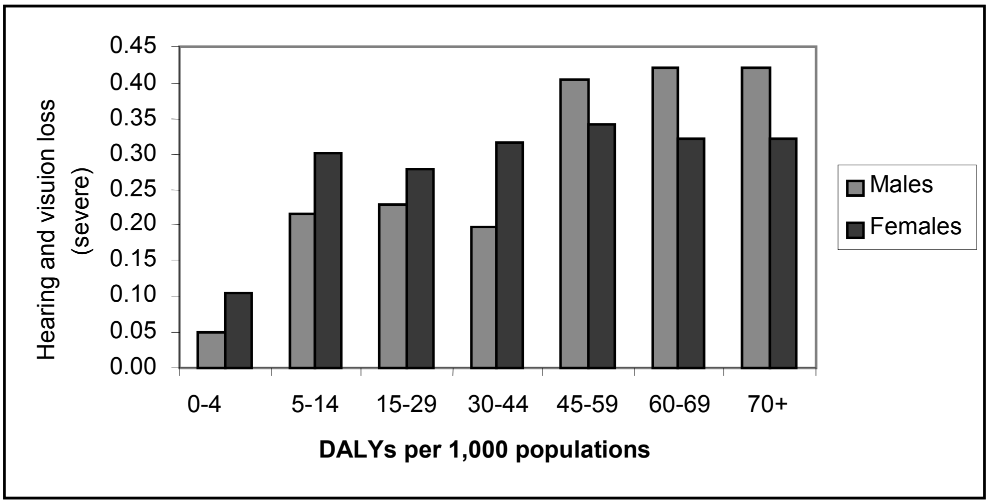


Figure 5.42. The burden of hearing and vision loss by age and sex, Belgrade, 2000



The obtained results were hard to compare with those of other studies, because of different methodological approaches. Explicitly, we used prevalence study data, which included both persons with hearing and visual losses, and only the severe forms of the condition. Moreover, as some other authors reported (Mathers et al. 1999), the severe stage of the overall hearing loss accounted for about 8.9%, and the severe stage of the overall visual loss accounted for about 71.3%, and therefore it was impossible to estimate the total number of persons from Serbia and Belgrade who had these sense organ disorders.

5.3.5. Cardiovascular Diseases

HRISTINA VLAJINAC, SANDRA ŠIPETIĆ-GRUJIČIĆ

In Serbia without Kosovo and Metohia, cardiovascular diseases have occupied the first place as a cause of death for decades. In the year 2000, they were responsible for 62% of all causes of death (56% in males and 67% in females).

Out of all cardiovascular diseases, for YLD calculation were chosen ischaemic heart disease (IHD) and cerebrovascular diseases. In the year 2000, these diseases were responsible for 58% of deaths caused by all cardiovascular diseases (64% in males and 54% in females). In both males and females, ischaemic heart disease and cerebrovascular diseases ranked the first and second as a cause of death. In Australian Burden of Disease study (Mathers et al. 1999), these diseases accounted for almost 82% of the cardiovascular DALYs.

DATA AND METHOD

YLD was calculated on the basis of incidence data.

The ischaemic heart disease (ICD10 codes I20-I25) model assumed that the disease might start as either angina pectoris (AP) or an acute myocardial infarction (AMI). In this study, the general term 'stroke' is used synonymously with the group of cerebrovascular diseases (ICD10 codes I60-I69).

All data on AMI and stroke were derived from Registry of Myocardial Infarction and Stroke - Cindy and Monica Collaborative Center, Novi Sad, for 1998 (unpublished data). Incidence comprised cases which, in the course of the year, experienced AMI / stroke for the first time.

In the absence of appropriate data on AP, AP incidence was estimated to be 1.8 times higher than the one for AMI. This estimate was based on data from hospitals in Belgrade (for the year 2000) showing that out of all hospitalized IHD cases 64% were with AP and 36% with AMI. With such an approach AP incidence was most probably underestimated.

The disability duration for AMI 28-day non-survivors was assessed on the basis of data from Register. The disability duration for AMI 28-day survivors was taken from GBD study - estimate for FSE (Murray and Lopez 1996b). For AP, disability duration was taken from Victorian Burden of Disease Study (1999). Duration of disability in stroke cases was assessed in the manner applied in The South and West DALYs project (Bevan et al.1998). An average of three-week disability was assumed for incidence cases who died within the first 28 days. Those who survived the first 28 days were expected to live out their full life expectancy if under 65, live another 5 years if aged 65-74, and live another 3 years if over 74 years.

Disability weights used for IHD and stroke were slightly modified GBD weights (Murray and Lopez 1996a). It was assumed that each one of non-survivors (AMI or stroke) suffered disability of the most severe category, similar to terminal cancer (Bevan et al. 1998, Mathers and Bosch-Pino 2003). For the rest, disability weights were calculated from GBD weights assuming that, according to GBD estimate for the former socialist economies of Europe (FSE), 20% of IHD and stroke incidence cases were untreated (Murray and Lopez 1996a).

DALY FOR SERBIA WITHOUT KOSOVO AND METOHIA

The burden of ischaemic heart disease was much higher for males than females, while the burden of stroke was slightly higher for females than for males (Figure 5.43 and Table 5.12).

Figure 5.43. The burden of ischaemic heart disease (IHD) and stroke, by sex, Serbia without Kosovo and Metohia, 2000

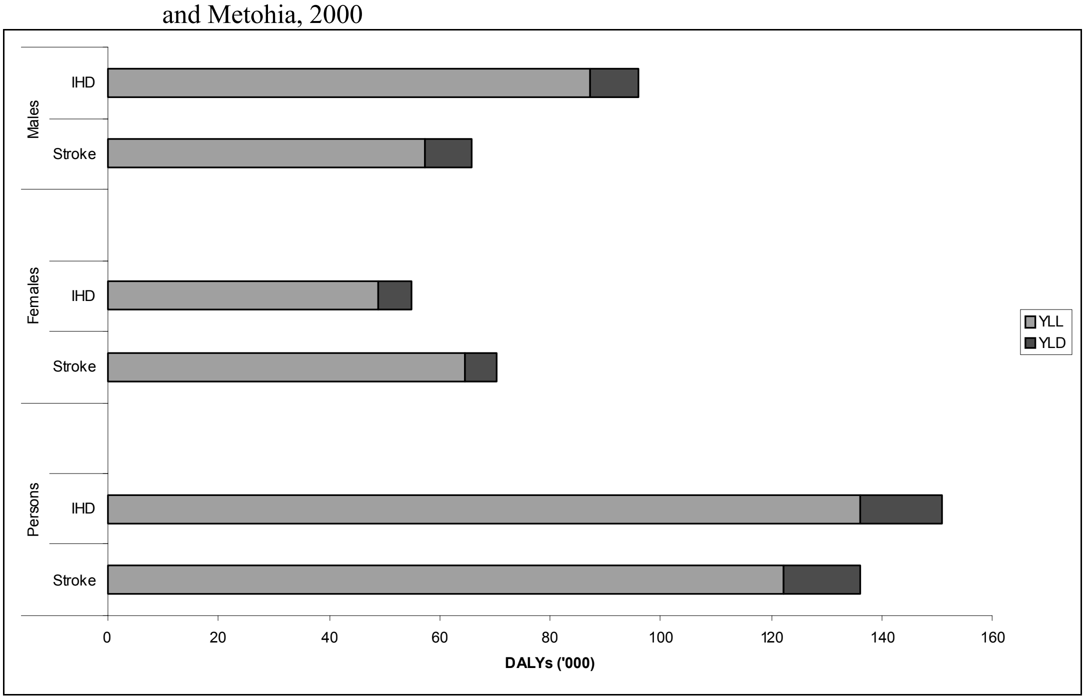


Table 5.12. YLD, YLL and DALY per 1 000 population for ischaemic heart disease (IHD) and stroke, by sex, Serbia without Kosovo and Metohia, 2000

Disease	**YLD per 1 000**		**YLL per 1 000**		**DALY per 1 000**	
	Males	**Females**	**Males**	**Females**	**Males**	**Females**
IHD	2.40	1.52	23.73	12.63	26.14	14.15
Stroke	2.26	1.45	15.65	16.68	17.91	18.13

For IHD and stroke, the DALY rates per 1 000 population increased with aging in both men and women, and peaked in the oldest - 75 years of age and older (Figure 5.44 and Figure 5.45).

Figure 5.44. The burden of ischaemic heart disease (IHD) and stroke by age, for males, Serbia without Kosovo and Metohia, 2000

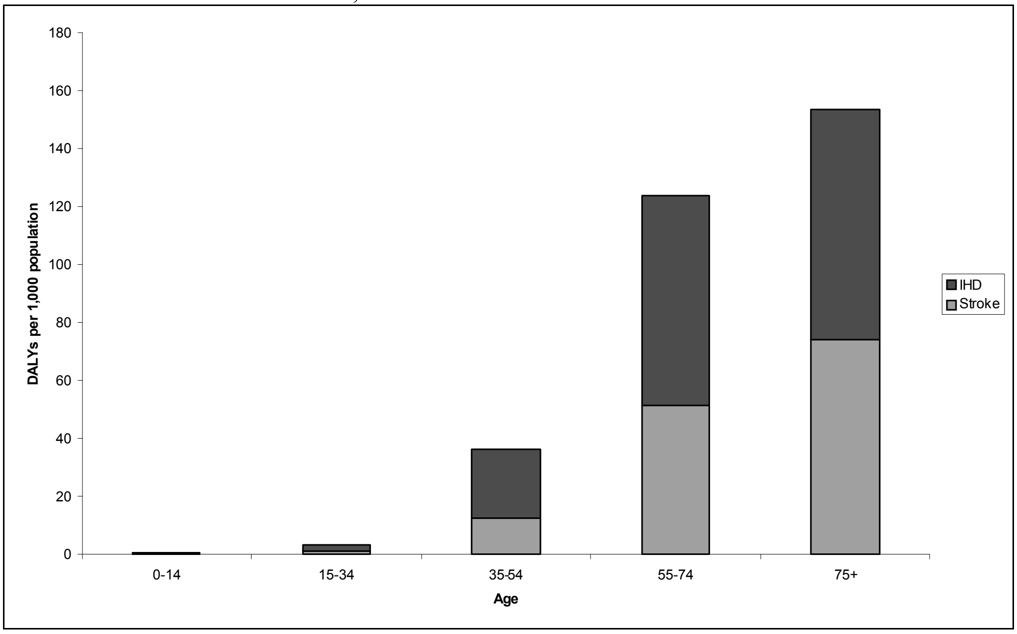
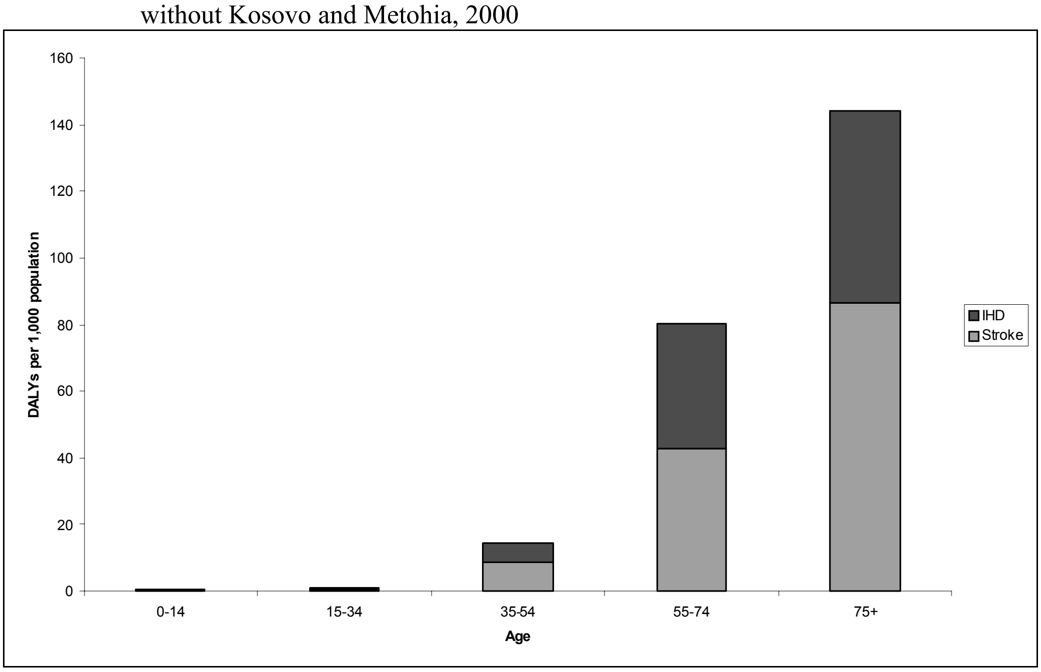


Figure 5.45. The burden of ischaemic heart disease (IHD) and stroke by age, for females, Serbia without Kosovo and Metohia, 2000



DALY FOR BELGRADE

In the population of Belgrade, the burden of both IHD and stroke was higher for males than for females, the sex differences being more pronounced for IHD (Figure 5.46, Table 5.13).

Figure 5.46. The burden of ischaemic heart disease (IHD) and stroke, by sex, Belgrade 2000

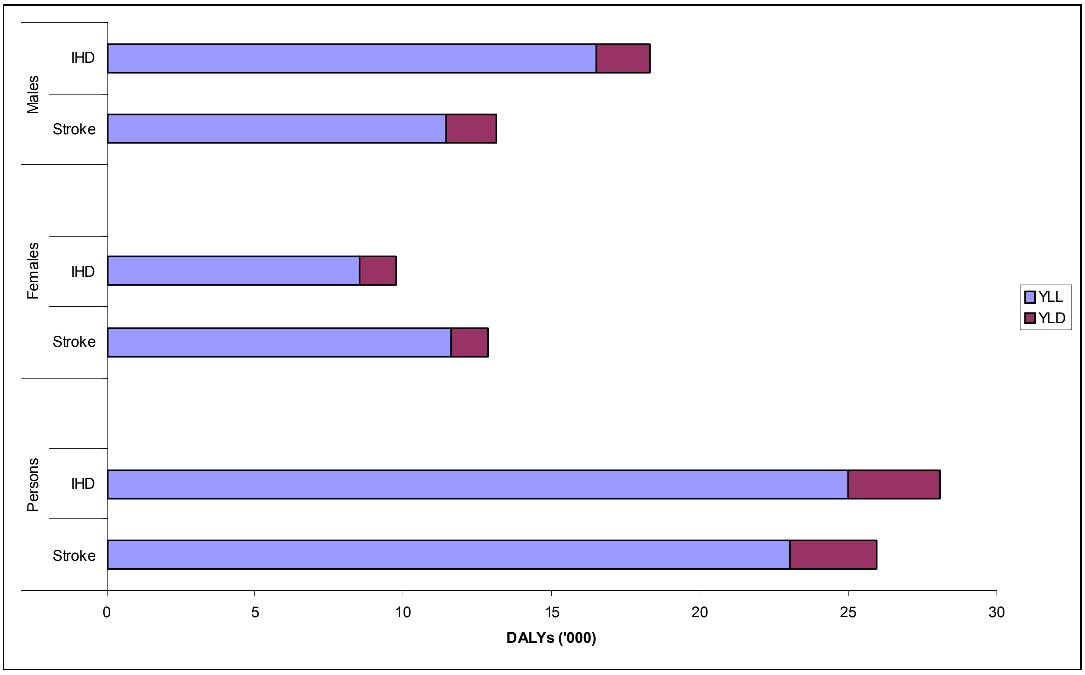


Table 5.13. YLD, YLL and DALY per 1 000 population for ischaemic heart disease (IHD) and stroke, by sex, Belgrade 2000

Disease	YLD per 1 000		YLL per 1 000		DALY per 1 000	
	Males	Females	Males	Females	Males	Females
IHD	2.40	1.49	21.93	10.22	24.33	11.71
Stroke	2.29	1.45	15.18	13.97	17.46	15.42

The burden of ishaemic heart disease and stroke, by sex and age, had the similar pattern as the one seen in the population of Serbia without Kosovo and Metohia. The DALY rate per 1 000 population increased with aging and peaked in the oldest - 75 years of age and older, in both males and females. The only exception was DALY for IHD in males. The DALY rates for IHD in males were the same in age groups 55 - 74 and 75+ (Figure 5.47 and Figure 5.48).

Figure 5.47. The burden of ischaemic heart disease (IHD) and stroke by age, for males, Belgrade 2000

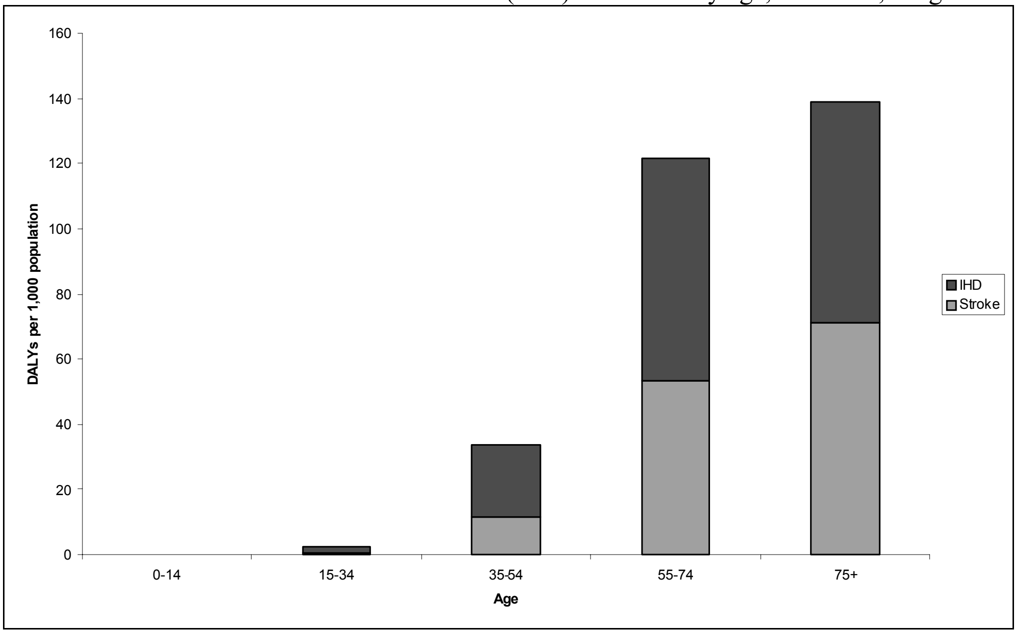
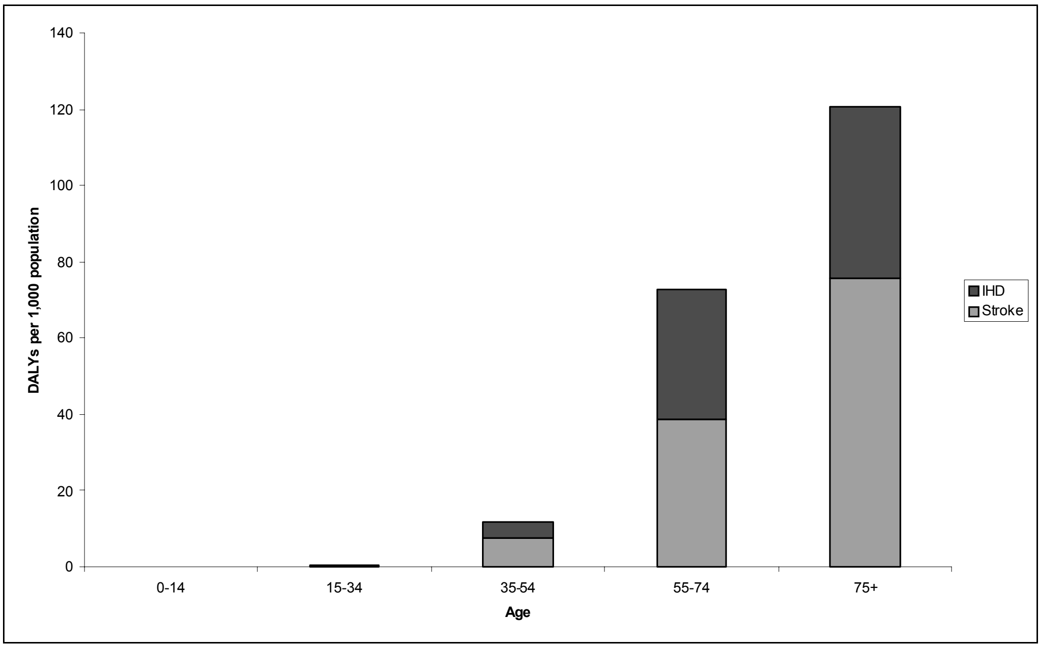


Figure 5.48. The burden of ischaemic heart disease (IHD) and stroke, by age, for females Belgrade 2000



In Table 5.14. are presented YLD and DALY per 1 000 population, as well as YLD/DALY ratio (%) for IHD and stroke in Serbia without Kosovo and Metohia, Belgrade and EURO region (Murray et al. 2001). The proportion of YLD in DALY for stroke in Serbia is half of that in EURO B. It is lower even when compared with EURO C. This could be probably explained by the fact that in Serbia high proportion of stroke cases die within first 28 days. The results call for efforts to be made to improve stroke therapy.

Table 5.14. YLD and DALY per 1 000 population and YLD/DALY ratio (%) for ischaemic heart disease and stroke in Serbia without Kosovo and Metohia, Belgrade and EURO region

Region	ISCHAEMIC HEART DISEASE			STROKE		
	YLD per 1 000	DALY per 1 000	YLD/DALY (%)	YLD per 1 000	DALY per 1 000	YLD/DALY (%)
Serbia	1.95	19.98	10	1.84	18.02	10
Belgrade	1.92	17.70	11	1.85	16.39	11
EURO	1.10	17.73	6	2.55	11.94	21
EURO A	0.70	16.70	4	2.03	6.63	31
EURO B	1.10	16.20	7	2.48	11.05	22
EURO C	1.80	32.40	6	3.49	21.73	16

5.3.6. Asthma

SLAVENKA JANKOVIĆ

Respiratory diseases in general were the second most common cause of death in the world in the year 2001 (WHO 2002). If tuberculosis and lung cancer are excluded and reclassified into other categories, respiratory diseases (mainly lower respiratory infections and COPD) would rank third after cardiovascular diseases, infections, and parasitic diseases (Lam and Hedley 2002).

Out of all chronic respiratory diseases, only asthma was chosen for YLD calculation.

Asthma prevalence and incidence are of greater concern generally, and represent a greater population burden of disease than asthma mortality (Pearce et al. 2002). According to the WHO, 100-150 million of persons worldwide suffer from asthma, where the economical costs are higher than those for tuberculosis and HIV/AIDS combined. Asthma deaths are rare, although mortality of this disease has increased in the last few decades (Viegi et al. 2003).

DATA AND METHODS

As asthma belongs to the group of diseases for which there are no disease registers or a notification system, the prevalence estimates from population health surveys (the most reliable sources upon which to base incidence estimates) would be used.

Unfortunately, the only epidemiological survey conducted in Serbia was the International Study of Asthma and Allergies in Childhood (ISAAC) (Živković 2002). However, there are no reliable data for asthma prevalence in Serbian adult population. That is why we used the incidence estimation and average duration from the Global health statistics (Murray and Lopez 1996b). As our Republic belongs to the Formerly Socialist Economies of Europe (FSE) region we applied incidence rates of asthma, by age and sex, from that region to the Serbian population and calculated the expected incidence of asthma cases in Serbia. The disability duration for asthma (in years) for all age groups was derived from the same source as well (Murray and Lopez 1996b). An average of 4.4 years disability for males and 4.3 for females was assumed.

Disability weight used for asthma was GBD weight. The GBD uses a DW of 0.059 for treated and 0.099 for untreated asthma, encompassing 95% of cases receiving treatment. The overall DW for asthma in GBD was thus: 0.059x0.95 + 0.099x0.05 = 0.06 (Murray and Lopez 1996a).

DALY FOR SERBIA WITHOUT KOSOVO AND METOHIA

Asthma was responsible for 7 317 DALYs in males and 5 672 in females in Serbia. The asthma DALYs are dominated by YLD (58% in males and 68% in females) – reflecting the fact that asthma is a major cause of chronic disability rather than death (Figure 5.49).

Figure 5.49. The burden of asthma (YLL, YLD and DALYs) by sex, Serbia 2000

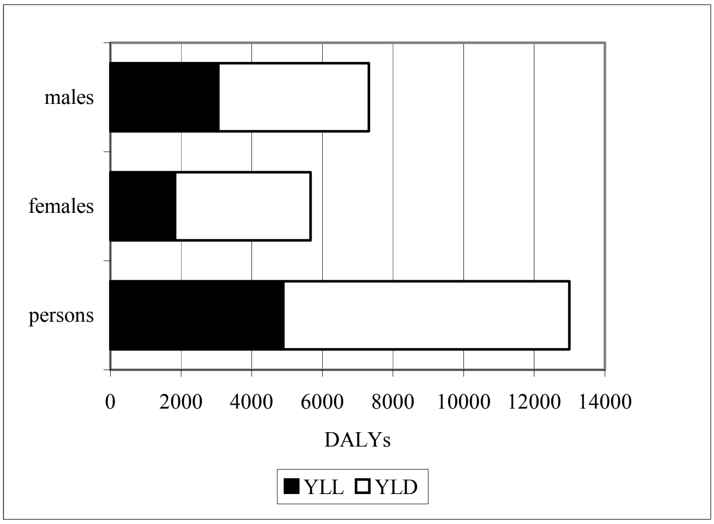
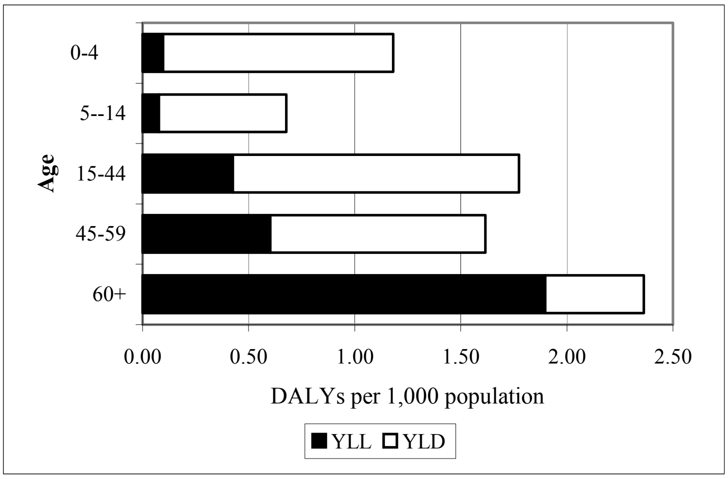


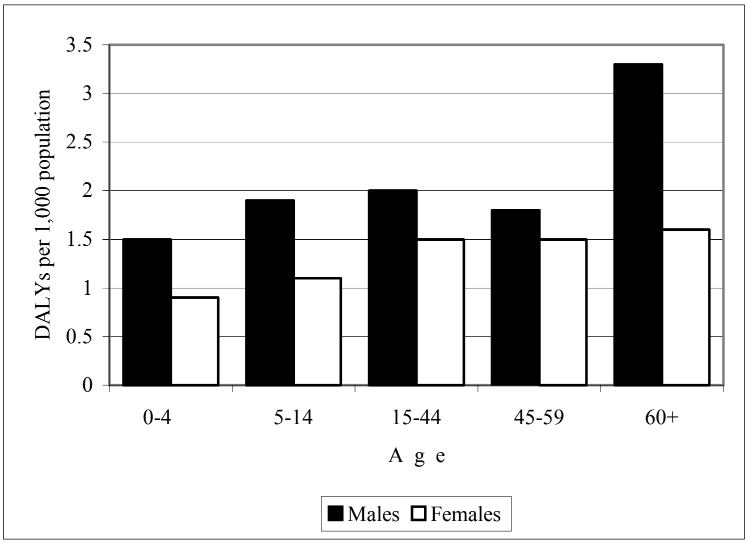
Figure 5.50. shows the distribution by age of YLL, YLD, and DALYs due to asthma. The burden of asthma in all age groups, except in the oldest one, is a consequence of morbidity rather than that of mortality. Only among people of 60 years and older the burden for asthma has a larger mortality component - YLLs account for 76 % of total DALYs.

Figure 5.50. The burden of asthma in DALY rates by age, Serbia 2000



The DALY rates increase with aging, except among 45-59 year olds. The rates are the highest in the oldest age group (Figure 5.51).

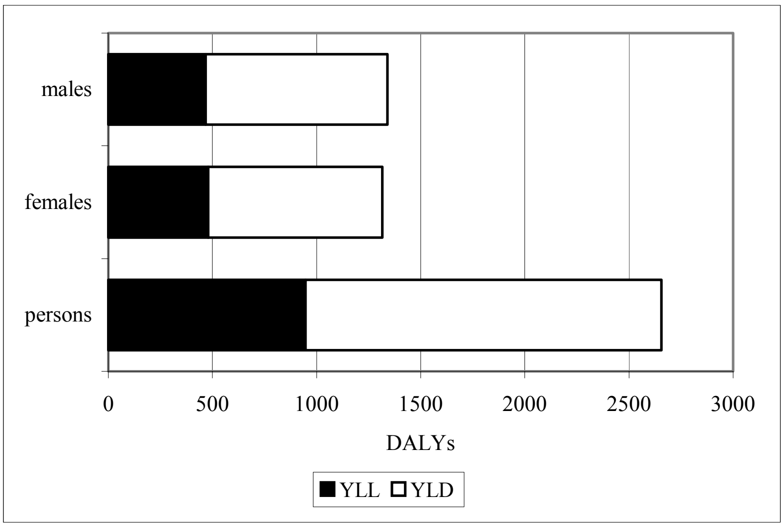
Figure 5.51. The burden of asthma in DALY rates by age and sex, Serbia 2000



DALY FOR BELGRADE

In the population of Belgrade asthma was responsible for 1 340 DALYs in males and 1 315 in females. Almost two thirds of this attributable burden, in both sexes, are due to morbidity (Figure 5.52.).

Figure 5.52. The burden of asthma (YLL, YLD and DALYs) by sex, Belgrade 2000



The age and sex distribution of YLL, YLD, and DALYs due to asthma in the population of Belgrade has the similar pattern like that in Serbia. (Figure 5.53. and 5.54).

Figure 5.53. The burden of asthma in DALY rates by age, Belgrade 2000

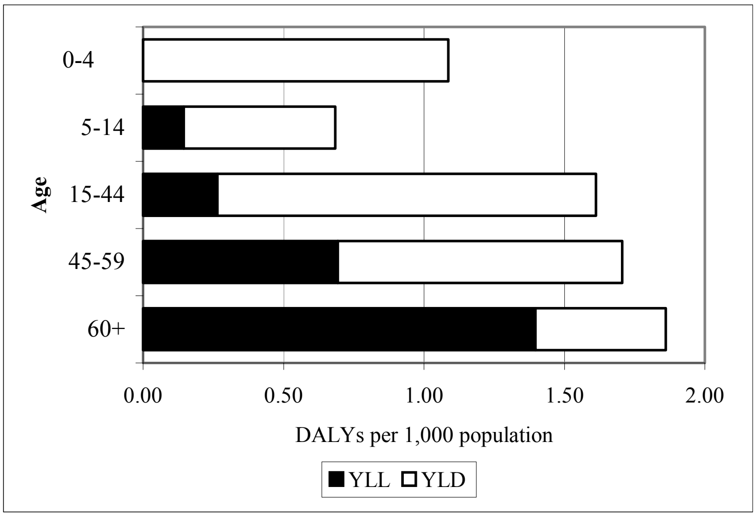
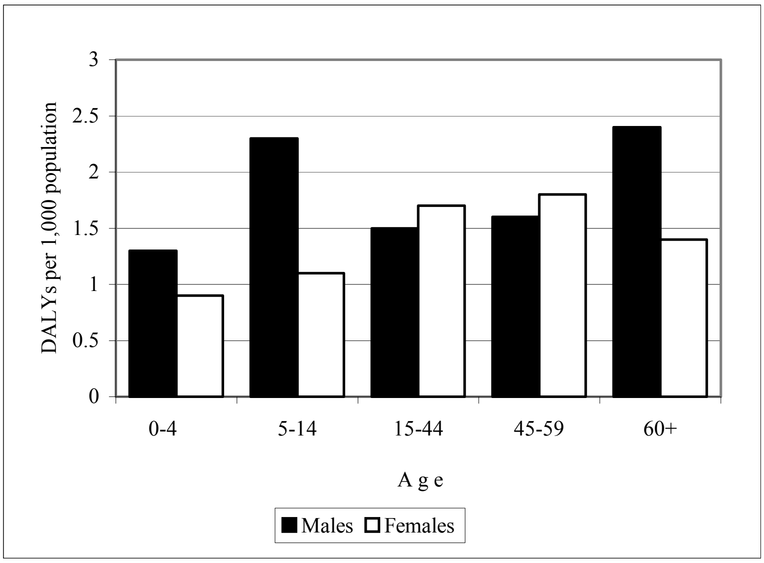


Figure 5.54. The burden of asthma in DALY rates by age and sex, Belgrade 2000



The burden of asthma in terms of DALYs rates shows two peaks in males (the first one among 5-14 year olds, and the second one among persons 60 years old and over). In females rates increase slowly with aging, and the highest rate is among 45 - 59 year olds.

The burden of asthma in terms of YLDs and DALYs rates, and YLD/DALY ratio, is presented in Table 5.15.

Table 5.15. The burden of asthma in Serbia, Belgrade, EURO region and Australia

Region	YLD per 1 000			DALY per 1 000			YLD/DALY %
	Males	Females	Persons	Males	Females	Persons	
Serbia	1.16	0.99	1.08	1.99	1.46	1.72	62%
Belgrade	1.16	1.00	1.08	1.78	1.58	1.67	64%
EURO A[a)]	NA	NA	1.51	NA	NA	1.73	86%
EURO B[a)]	NA	NA	1.20	NA	NA	1.67	75%
EUROC[a)]	NA	NA	0.56	NA	NA	1.18	59%
Australia[b)]	2.71	3.40	3.05	3.95	3.11	3.53	86%

a) Data from Global Burden of Disease study (Murray and Lopez 1996a)
b) Data from Australian Burden of Disease Study (Mathers et al. 1999)
NA – Not available

The greatest burden of asthma was in Australia, while the lowest one was in EURO C region. The DALY rates for Serbia and Belgrade were similar with the rates in EURO A and EURO B regions, while the proportions of YLD in DALY for asthma in Serbia and Belgrade were lower.

CONCLUSION

Although largely avoidable, asthma tends to occur as epidemic and hits young people both in developed and developing countries. A non-negligible proportion of patients is not diagnosed early and they do not use medicines appropriately. As a consequence, social and economic burden of asthma is heavy (Viegi 2003).

In order to monitor the epidemiological situation of asthma in Serbia, the quality of routine statistical data on mortality and hospital admissions has to be higher. However, for a more thorough comprehension of the natural history of asthma, the performance of longitudinal epidemiological surveys in population-based samples in Serbia is needed.

5.3.7. Nephritis and nephrosis

SLAVENKA JANKOVIĆ

The only representative of the genitourinary disoders in SBDS was nephritis and nephrosis group.

DATA AND METHODS

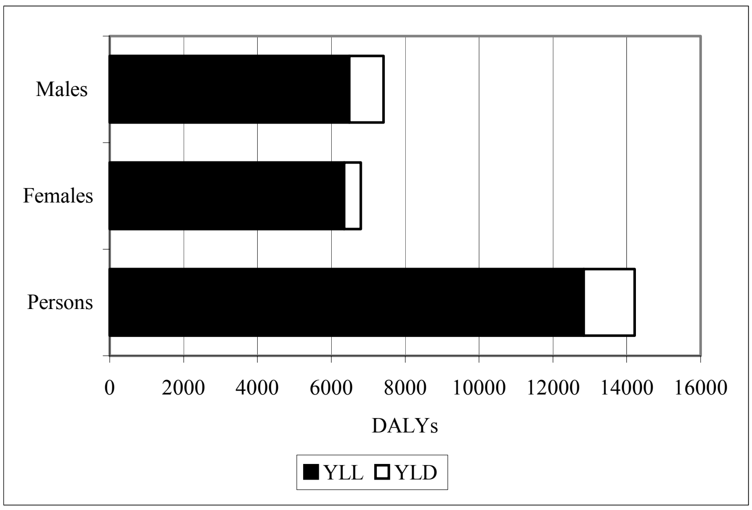
YLD for nephritis and nephrosis group was calculated on the basis of incidence of patients whose End Stage Renal Failure (ESRF) was sequel to primary acquired renal disease, i.e. patients suffering from diabetic nephropathy, nephropathy due to cancers, congenital conditions and injury were excluded from this calculation.

Incidence, prevalence and mortality data for dialysis and transplant patients were obtained from nine dialysis and three kidney transplantation centers in Belgrade. Data for patients from the Dialysis Center in Barajevo (Belgrade municipality) were obtained from Belgrade Registry of Dialysis Patients (unpublished data). The source for other necessary data was the Annual Report on Regular Dialysis and Transplantation in Yugoslavia, 2000 (Đukanović and Radović 2002). DISMOD was used to model duration of dialysis and transplant cases. For dialysis patients, we used incidence, prevalence and case fatality rates, while for transplant cases we used incidence, remission rates (graft failure – 5% annually), and case fatality rates. For dialysis patients we applied the Dutch weight (0.290) for diabetic nephropathy (there are no Dutch DWs for nephritis and renal failure per se) like in the Australian burden of disease study. For transplants, in the first six months, we also assumed DW of 0.290, while for the remaining period with the transplant, we used a weight of 0.110. We derived untreated end stage renal failure from the difference between dialysis or transplant deaths and total renal deaths, to which we applied an average duration of one year prior to death at the GBD weight for untreated renal failure (0.104) (Mathers et al. 1999).

DALY FOR SERBIA WITHOUT KOSOVO AND METOHIA

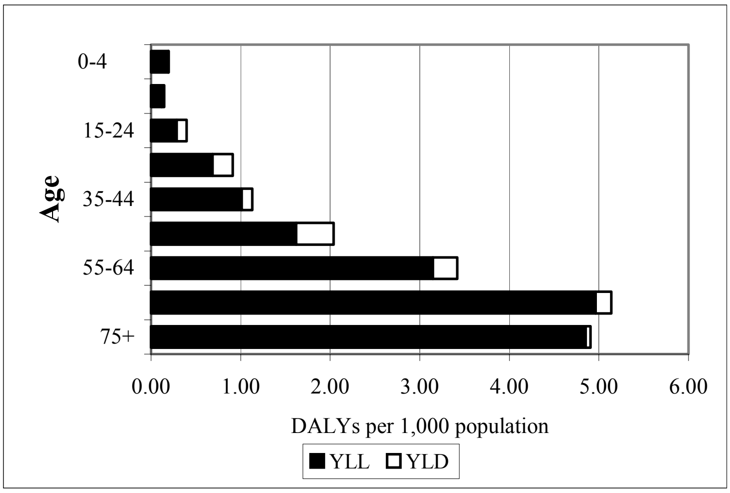
Nephritis and nephrosis were responsible for 7 417 DALYs in males and 6 798 in females in Serbia in 2000. About 90 per cent (87% in males and 93% in females) of this attributable burden is due to mortality (Figure 5.55.).

Figure 5.55. The burden of nephritis and nephrosis (YLL, YLD, and DALYs) by sex, Serbia 2000



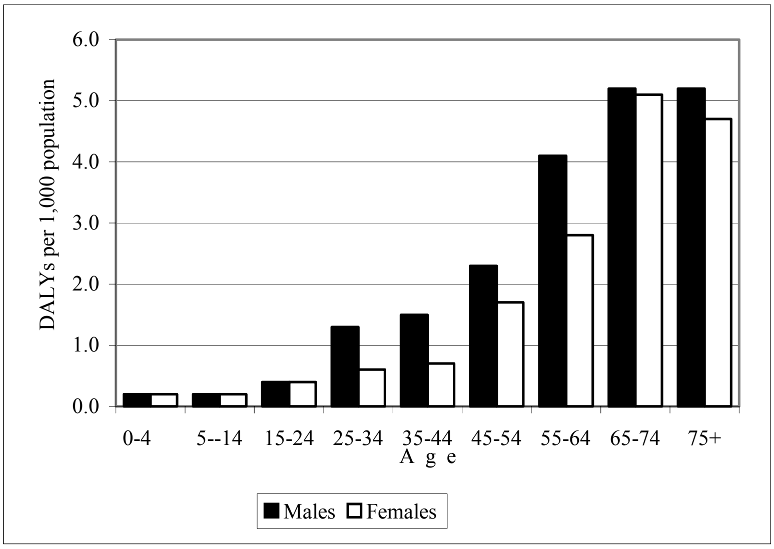
DALY rates increase with ages, except in the oldest age group, in both sexes (Figure 5.56 and 5.57).

Figure 5.56. The burden of nephritis and nephrosis in DALY rates by age, Serbia 2000



The DALY rates for nephritis and nephrosis are higher for males, except in children aged 0 - 14 and young adults of 15 - 24 years, where the rates are the same for males and females (Figure 5.57).

Figure 5.57. The burden of nephritis and nehrosis in DALY rates by age and sex, Serbia 2000



DALY FOR BELGRADE

The burden of nephritis and nephrosis in Belgrade had the similar pattern as the one seen in Serbia without Kosovo and Metohia (Figure 5.58, 5.59, and 5.60).

Figure 5.58. The burden of nephritis and nephrosis (YLL, YLD, and DALYs) by sex, Belgrade 2000

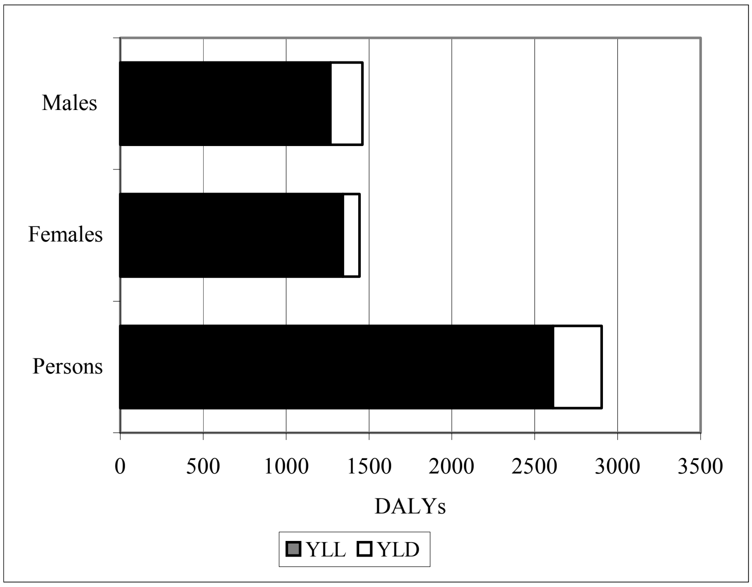
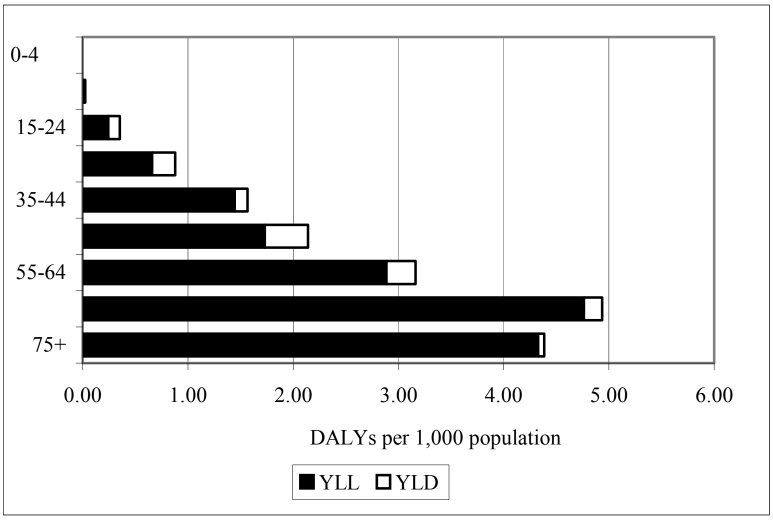
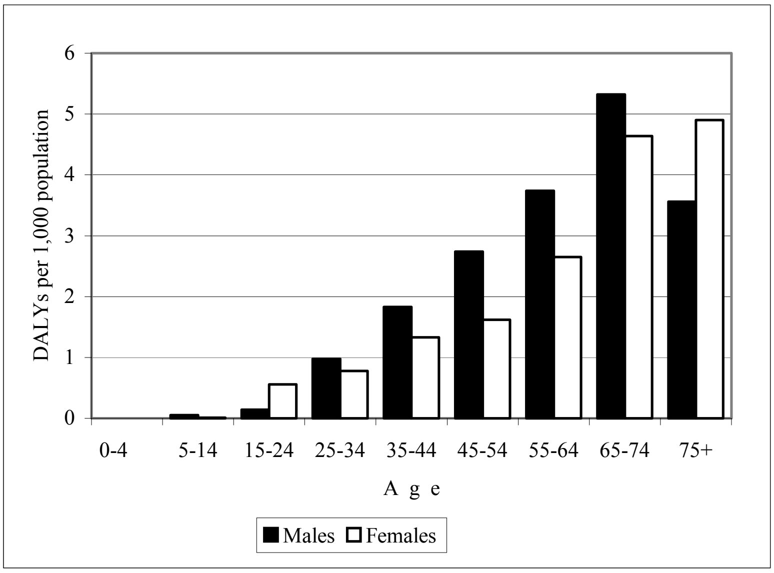


Figure 5.59. The burden of nephritis and nephrosis in DALY rates by age, Belgrade 2000



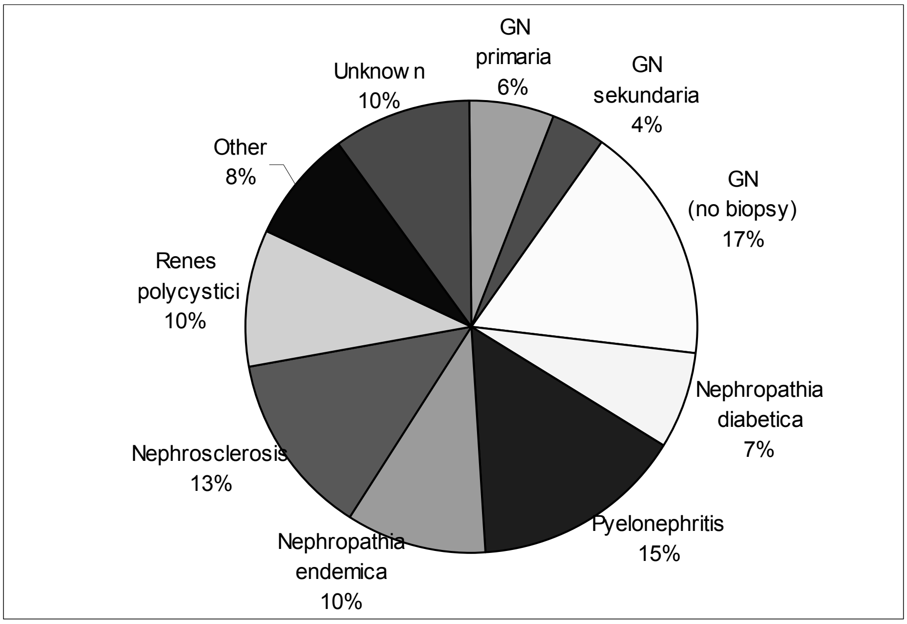
The DALY rates for nephritis and nephrosis are higher for males, except in the two age groups (15 - 24 and 75 and over) where the rates are higher for females (Figure 5.60).

Figure 5.60. The burden of nephritis and nehrosis in DALY rates by age and sex, Belgrade 2000



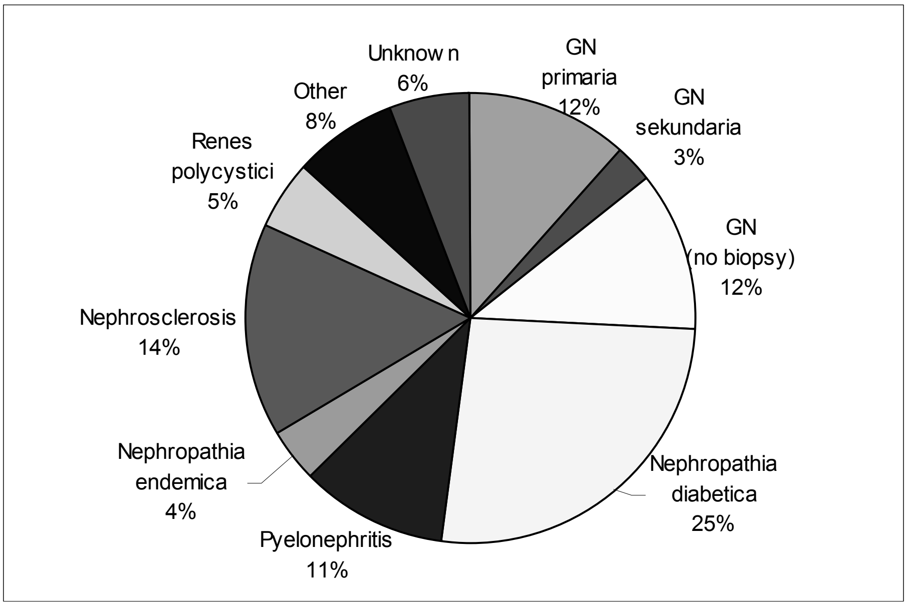
The underlying renal disease distribution in end stage renal failure patients in Serbia in 2000 year is presented in figures 5.61, 5.62 and 5.63.

Figure 5.61. Underlying renal disease distribution for hemodialysis patients, Serbia 2000*



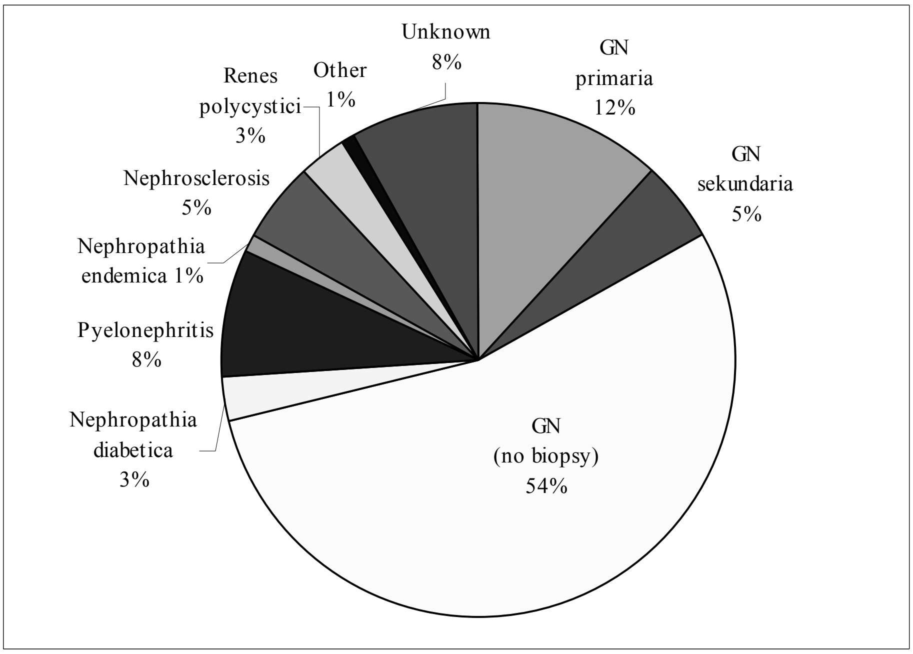
*Source: Đukanović and Radović, 2002. Annual report on regular dialysis and transplantation in Yugoslavia, 2000.

Figure 5.62. Underlying renal disease distribution for peritoneal dialysis patients, Serbia 2000*



*Source: Đukanović and Radović, 2002. Annual report on regular dialysis and transplantation in Yugoslavia, 2000.

Figure 5.63. Underlying renal disease distribution for kidney transplant patients, Serbia 2000*



*Source: Đukanović and Radović, 2002. Annual report on regular dialysis and transplantation in Yugoslavia, 2000.

Glomerulonephritis was the most frequent cause of the end stage renal failure, especially in transplants. In dialysis patients who are, in comparison to kidney transplant patients, about 20 years older on the average, nephrosclerosis, nephropathia diabetica and endemic nephropathy are more frequently diagnosed as underlying renal diseases (Đukanović and Radović 2002).

In Table 5.16 YLD, and DALY rates are presented per 1,000 population as well as YLD/DALY ratio (%) in Serbia without Kosovo and Metohia, Belgrade and EURO region.

Table 5.16. Nephritis and nephrosis, YLD and DALY rates by sex, per 1 000 population in Serbia, Belgrade and EURO region

Region	YLD per 1 000			DALY per 1 000			YLD/DALY %
	Males	Females	Persons	Males	Females	Persons	
Serbia	0.25	0.12	0.18	2.02	1.75	1.88	10%
Belgrade	0.26	0.12	0.19	1.94	1.73	1.83	10%
EURO A[a)]	NA	NA	0.03	NA	NA	0.48	5%
EURO B[a)]	NA	NA	0.09	NA	NA	1.24	6%
EURO C[a)]	NA	NA	0.07	NA	NA	0.90	4%

a Data from Global Burden of Disease study (Murray and Lopez 1996a)
NA – Not available

The burden due to nephritis and nephrosis in terms of YLD and DALY rates is higher in Serbia than in EURO region.

CONCLUSION

In conclusion, one of the reasons for a high burden of nephritis and nephrosis in Serbia (calculated on the basis of ESRF patients incidence) could be the late referral of our patients with ESRF to the nephrologist. High incidence of nephrosclerosis, and Balkan endemic nephropathy, as a primary reasons for ESRF, is in concordance with this. Another reason is that the percentage of ESRF patients treated by renal transplantation in Serbia is very low with consequence of higher percentage of ESRF patients on dialysis. In 2000 only 39 patients underwent a transplantation, out of whom 5 were pre-emptive.

The establishment and widespread dissemination of adequate guidelines for general practitioners and non-nephrological specialists on when and how to refer a patient to the nephrologist, information on the importance of close nephrological follow-up, and development of educational programs for chronic renal failure patients are urgently needed (Lameire and Biesen 1996).

Renal transplantation, especially pre-emptive transplantation, as a method for treating ESRF patients, should be used more widely.

5.4. INJURIES

SLAVENKA JANKOVIĆ, MILENA ŠANTRIĆ-MILIĆEVIĆ, VESNA BJEGOVIĆ

Injury categories within BoD Group III comprise intentional and unintentional injuries. The case definition of an incident episode for an injury is one that leads immediately to death or that is non-fatal but severe enough to warrant hospital treatment, or which requires emergency room care (if such care is available), irrespective of whether or not an appropriate medical facility is available (Murray and Lopez 1996). Considering the relevant epidemiological research studies and the Serbian health priorities cited in Strategy document, two causes of injuries represent the major burden of unintentional and intentional categories of injuries in the last decade of 20th century: road traffic accidents (RTA) and self-inflicted injuries (Simić et al. 2003; Šantrić-Milićević 2002). Road traffic accidents include crashes and pedestrian injuries due to motor vehicles, and self-inflicted injuries include suicide attempts, whether or not resulting in death (Murray et al. 2001). The total burden associated with injuries is based on capturing the impact of both premature deaths and disability and expressing it in time-based currency: years of life lost (YLL) for premature mortality due to injuries and years lived with disability (YLD) for time lived with disability as non-fatal events of injuries.

DATA AND METHODS

The injury-related YLD reported here are based on methods developed for the GBD 1990 and assumptions that all severe disabilities from injury were the subject of treatment (Mathers et al. 2001).

The incidence rates of selected injuries in the Belgrade and Serbia populations have been estimated from hospitals utilization data of the electronic facility database of Public Health Center of Belgrade. For estimation of road traffic injuries incidence rate in the year of 2000, the data from Emergency Center of Clinical Center of Serbia (ECCCS) were retrieved as all severely injured in the accidents are mainly transferred there. Selection of multiple data sources for estimation of the self-inflicted injury incidence cases is based on the assumption that all attempts of suicide resulted in severe disability are usually admitted at emergency department of a nearest hospital.

The number of RTA and the number of self-inflicted injuries in Belgrade and in Serbia could be find in the police department. Number of deaths at the site of the accident are registered in the vital registration of Belgrade, also they could be found in the police department documentation. Number of people with mild injuries or without injuries, could be estimated from the police documentation in Belgrade. Number of persons with mild injuries might or might not seek for state health care service, were not considered since there is no need for hospitalisation. This method assumes that injuries treated outside the hospital system do not result in significant disability. This assumption was not included in the analysis in our study but is supported by an analysis of data from the Victorian national study of general practice activity known as "Bettering the evaluation and care of health" (Department of Human Services 1999). In addition, number of dead in the ambulance is the number of persons having received some intervention but not admitted to hospitals for treatment. Hospital data we have are the number of admissons and the number of the treated as well as the number of deaths in hospital. The length of hospitalization is connected with dissability. If the duration of sequelae is life long dissability, the best way is using the standard life expectancy or period life expectancy. Those data could be used to calculate case fatality.

In ECCCS, there were 1 899 admissions (male 1 277 and female 622) for hospital treatmant of injuries. From total admissions, the number of ill-defined accidents was 169 (8.9%) and all of them resulted in death. Only 25.5% (485) of all admitted injuries were road traffic accident cases and 48 of them died (9.9% RTA). The diagnosis were checked in 63% cases postmortem, and 86 were replaced to another department or hospital for continuing the treatmant. Also, in total, there were 56 admissions in all 15 public hospitals for attempts in suicides: 18 of them were released home, 4 were replaced and 4 died. From the electronic facility database of Institute of Public Health of Belgrade, we found that about 50 % of all admissions of injured in road traffic accidents in Belgrade in the year 2000 were in the ECCCS. In other hospitals, there were less than 6.2% per hospital and for those admissions, we assume, there were replaced patients for continuous care or readmissions. With the purpose to estimate the incidence cases we evaluated the completeness of nature-cause classifications for morbidity and lethality data, and co-morbidity per injured person, as well as the question of validity and reliability. The big problem was how to deal with S-T type codes which were coded sometimes with 3-digit and sometimes with 4-digit. The tendencies in resolving the problem were to follow the GBD classification and excluding those S-T codes, which are excluded in GBD as well, as those nature of injuries do not cause severe disabilities.

The problem that occurred when we were checking the other hospitals admissions cases was for e.g. what to do with cases as amputations? Also, we could not be sure that those cases were not previously present to treatment in the ECCCS: there were no inputs of personal identification of patients in the electronic database that will make our decision of considering the ECCCS admissions only, as a big mistake. In the other way, including all hospitals data of admissions might be resulting in doubling the burden figures, if we have in mind that only 50 % of admissions were in ECCCS.

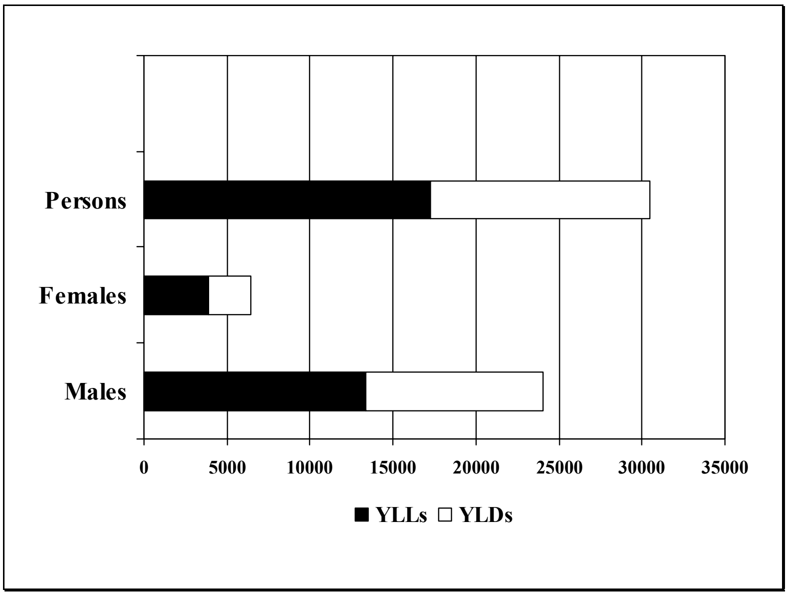
After careful analysis of validity and reliability of existing routine and research data in Serbia, several decisions were made. The first was to take over GBD estimates of incidence for both selected conditions (RTA and self-inflicted injuries) (Murray and Lopez 1996). The second decision was made to use GBD 1990 disability weights, followed by the same decision regarding average duration of disability by sex and age. Expert opinion provided to the GBD 1990 study was that some nature of injury categories would comprise cases with short-term disability only (e.g. open wounds, fractured arm), while others would be made up of cases all of which would experience permanent disability (e.g. amputations, spinal cord lesions). A few categories, however, would contain both short- and long-term cases (e.g. fractured skull). Life long durations by age, sex and country, have been estimated from standard life-tables on the basis of New WHO standard population and mortality estimates (Murray et al. 2001).

Certain nature of injury categories in the GBD 1990 study were assumed to have different durations and disability weights depending on whether or not treatment was received. In the absence of more recent evidence regarding this aspect of injury epidemiology at a global level, assumptions that in FSE region 80% of fractured scull cases and 95% of fractured femur cases are receiving treatment, have been adopted without modification (Murray et al. 2001).

RESULTS

The burden of road traffic accidents (RTA) in Serbia in 2000 was responsible for 30 468 DALYs out of which 17 233 years belong to YLLs and 13 235 years to YLDs. The difference between DALYs for females and males was threefold (6 430 and 24 038 respectively) (Figure 5.64). The proportion of YLDs in DALYs for RTA was 43%.

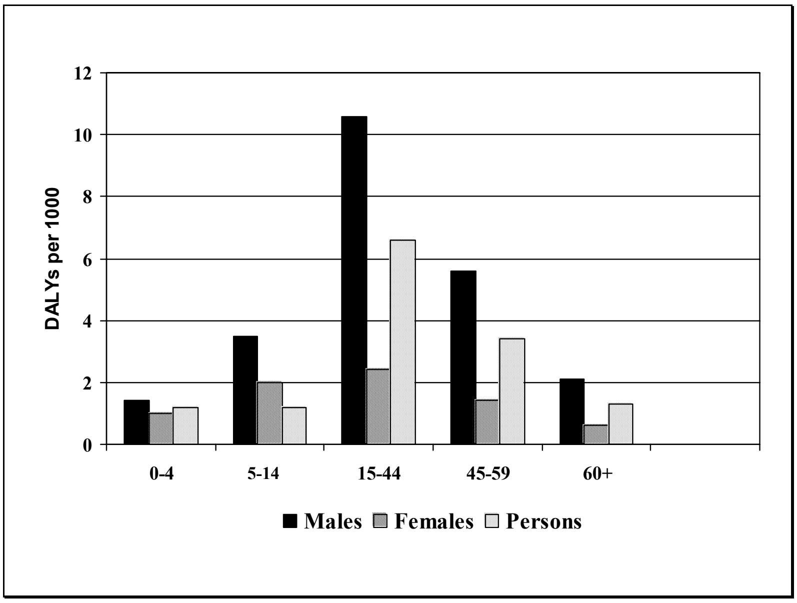
Figure 5.64. The burden of road traffic accidents (DALYs with YLLs and YLDs) by sex in Serbia 2000



Looking at age distribution the highest burden was found in the most active population groups: from 15 to 44 years of age (DALY rate was 6.6), followed by the group from 45 to 59 years age (DALY rate was 3.4). For other population groups DALYs rates were much less

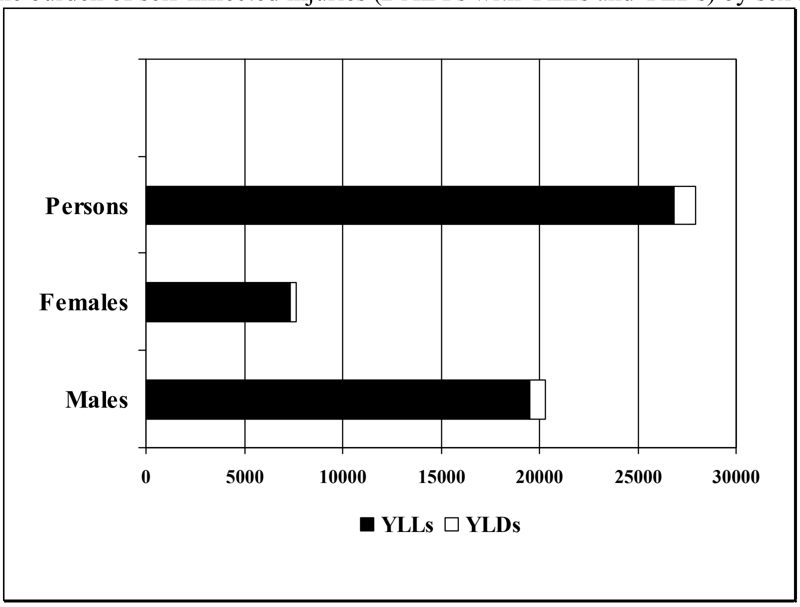
(Figure 5.65). The similar pattern could be observed in analysis of RTA DALYs rates by age and sex.

Figure 5.65. The burden of road traffic accidents in DALYs rates by age and sex, Serbia 2000



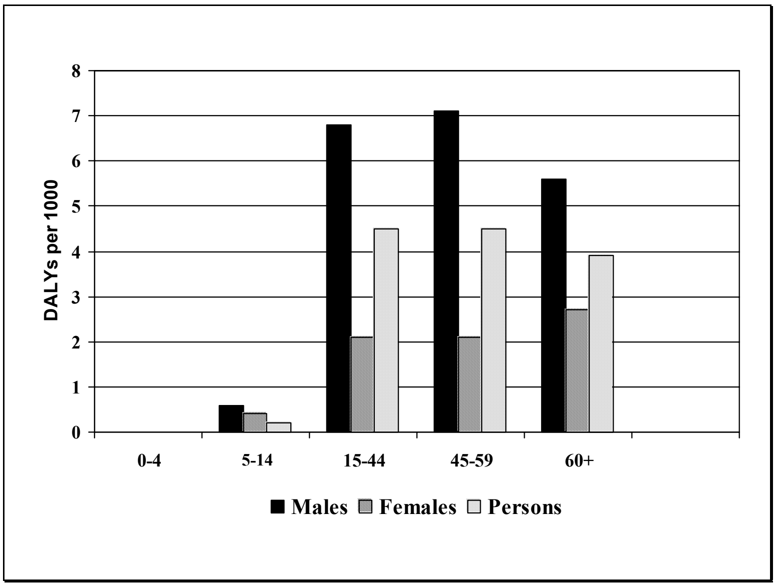
At the same the burden of self-inflected injuries were presented with 27 938 DALYs where even 26 836 years belong to YLLs, while YLDs were much less – 1 103. The similar difference between females and males DALYs, which was found for RTA, could be observed during consideration of this condition (7 630 and 20 308 respectively). (Figure 5.66). The proportion of YLDs in DALYs for self-inlicted injuries was 4%.

Figure 5.66. The burden of self-inflected injuries (DALYs with YLLs and YLDs) by sex in Serbia 2000



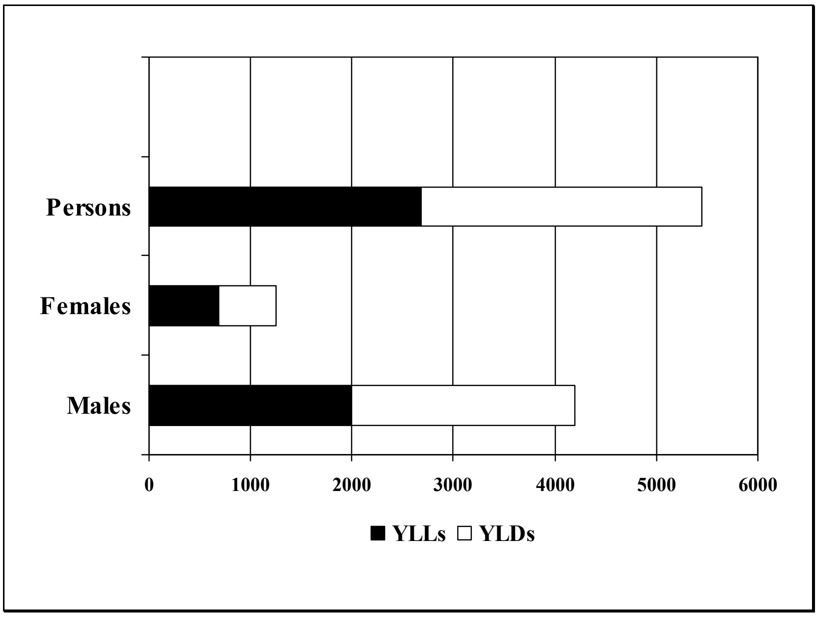
Looking at age and sex distribution of DALYs in Serbia without Kosovo and Metohia, the burden of self-inflected injuries was the highest and same in population groups from 15 to 44 years and from 45 to 49 years (DALY rate in both group was 4.5) (Figure 5.67). Considering self-inflected DALY rates, presented in Figure 5.67, the difference between females and males was also obvious in all age groups except in those who ware 5 to 14 years old. Male population of Serbia without Kosovo and Metohia had much higher burden.

Figure 5.67. The burden of self-inflicted injuries in DALYs rates by age and sex, Serbia 2000



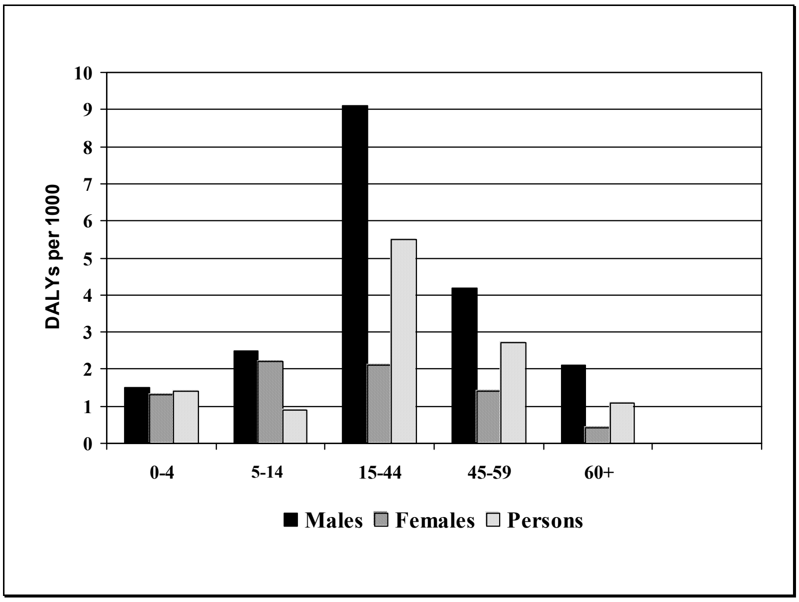
The burden of RTA in Belgrade for the same year - 2000 had almost the similar pattern as in Serbia without Kosovo and Metohia. Total burden of RTA was 5 452 years and it was also higher for males (Figure 5.68). The morbidity component of DALYs contains 2 771 years of YLDs, while mortality component is slightly less – 2 681 YLLs. The proportion of YLDs in RTA DALYs was 51%, which is higher for 8% in comparison to results for Serbia where this proportion was 43%.

Figure 5.68. The burden of road traffic accidents (DALYs with YLLs and YLDs) by sex in Belgrade 2000



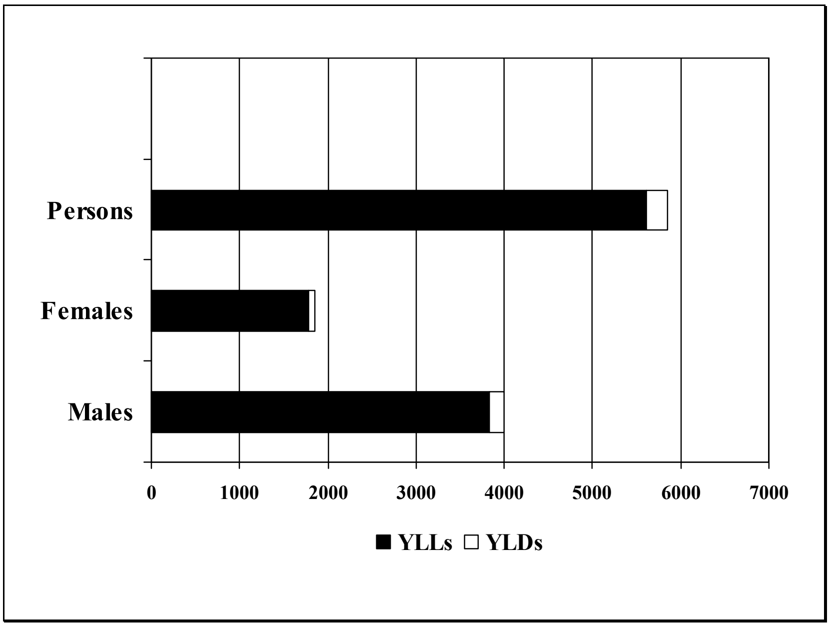
In Figure 5.69 the burden of road traffic accidents in Belgrade is presented by age and sex. It was similar in childhood and early adolescence. However in young adulthood males burden is threefold higher than females burden presented by DALYs rates.

Figure 5.69. The burden of road traffic accidents in DALYs rates by age and sex, Belgrade 2000



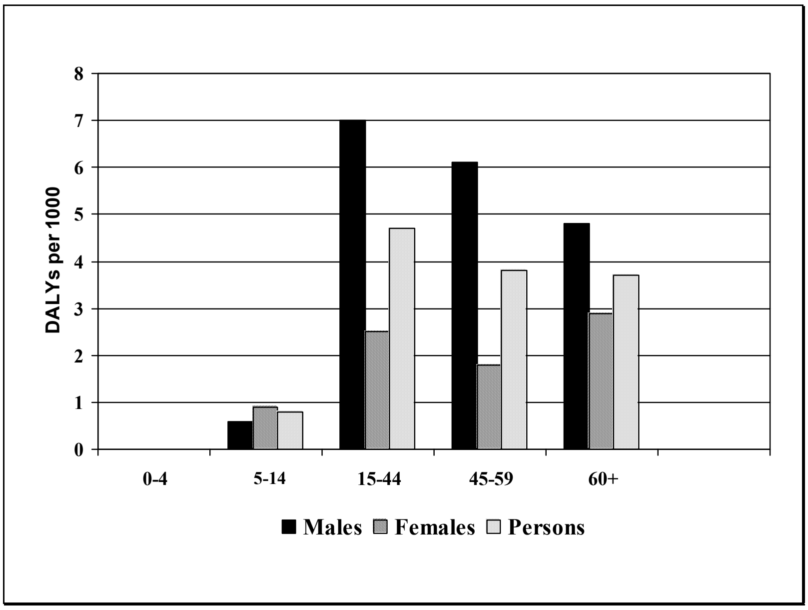
In Figure 5.70 the results are presented for self-inflicted injuries in Belgrade in 2000. It is obvious that the total burden came mostly from YLLs – in total DALYs (5 848 years), YLLs presented 5 616 years, while YLDs were only 232 years. The proportion of YLDs in total DALYs in Belgrade was 4% (the same as in Serbia).

Figure 5.70. The burden of self-inflected injuries (DALYs with YLLs and YLDs) by sex in Belgrade 2000



Again the male burden is much higher in comparison to females (3 998 DALYs and 1 850 DALYs, respectively), the same as in Serbia without Kosovo and Metohia. However, in Belgrade DALY rate has only one pick for males – in age group 15 – 44 (Figure 5.71).

Figure 5.71. The burden of self-inflicted injuries in DALYs rates by age and sex, Belgrade 2000



After the comparison with international data it was noticed that obstacles of Serbian RTA data are related not only to morbidity but also to mortality. This conclusion was derived by considering the proportion of YLDs in total RTA DALYs in Serbia and Belgrade, which is higher than in other BOD studies (Mathers et al. 1999, Murray and Lopez 1996b). The SBDS results considering the burden of self-inflected injuries are similar to the burden in other studies regarding both mortality and morbidity parts.

CONCLUSION

By 2020, RTAs are expected to be the second leading cause of death world-wide. Interventions to reduce RTA are increasingly commonplace in industrialized countries, but little evidence is available from developing countries, including Serbia. WHO has recently critically examined the economic impact of interventions (mandatory use of motorcycle helmets, head lamps in daytime and seat belts, speed and alcohol use limits, etc.) to prevent RTA and their potential applicability to different countries. The limited number of economic evaluations of interventions have used cost-benefit analysis where the outcome has been the assumed economic value of extending life and preventing accidents, and only one of the studies reviewed focused on the developing world, where the rates of RTA are highest (WHO 2002). This underlines the urgent need for cost-effectiveness analysis of RTA as the basis on which to develop strategy to reduce road traffic injuries.

It is known that suicide attempts and suicidal ideation are consistently found in the depressed population and also found in patients diagnosed with anxiety disorders. When anxiety disorders are comorbid with depression the suicide attempt rate is increased, adding further burden to families of sufferers (Lepine 2001). Any attempt to address the public health challenge posed by depression in Serbia should be based on reliable epidemiological data which will enable us to better understand depression disorders and assist us in allocating resources for intervention.

The SBDS results related to injuries pointed out again the great importance of preventive measures and health promotion interventions. Two selected conditions, road traffic accidents and self-inflected injuries, In Serbia are presented with almost 10% in total burden of selected conditions expressed in DALYs. Proper and comprehensive health promotion interventions related to injuries (legislative measures to limit driving speed, to increase seat belt using and to eliminate driving under alcohol) could lead to enormous savings of DALYs (both YLLs and YLDs). At the same time the burden caused by self-inflicted injuries could be efficiently decrease with preventive interventions oriented to stress management and adequate treatment of depression.

6. BURDEN ATTRIBUTABLE TO MAJOR RISK FACTORS

ANKA ŠAULIĆ, ZORICA ATANASKOVIĆ-MARKOVIĆ

Balanced and comprehensive assessment of the causes of ill health in population is the basis for creating successful health policy. Many of diseases and injuries are caused by a single defined cause, infection, some pathogen or isolated event. However, a prior or current exposure to some sort of hazard can cause or contribute to the occurrence of a disease or injury (Murray and Lopez 1997). It is important to identify and quantify such exposures, because for prevention or treatment of each disease or injury measures could be taken not only for the disease or injury itself, but also for prevention or reduction of the exposures as possible underlying causes for disease or injury.

The model we used in our study is based on the traditional definition of the epidemiological concept of an attributable fraction: “When an exposure is believed to be a cause of a given disease, the attributable is the proportion of the disease in the specific population that would be eliminated in the absence of the exposure” (Beaglehole et al. 1993). The burden of disease and injuries attributable to various health risks can be estimated if the prevalence of exposure to the risk factor in the population is known and the relative risk of each causally associated disease or injury for those exposed to the risk factor.

The application of this concept is straightforward only when exposure is a simple dichotomous variable, with no variations in intensity, duration or time lag of exposure, which is not so in the reality. Relative risks are dependent on dose, duration and other quantitative and qualitative parameters. For many exposures, such as smoking cigarettes or alcohol consumption, relative risk is a function of duration, intensity and type of exposure. Survey or consumption data are available only for current exposure status, such as proportion of the population who are current smokers, or drank a number of drinks in a certain past period of time. Current exposure status measures are than used as proxies for cumulative past exposure (Murray and Lopez eds.1996a) .

The sum of attributable burden in the model we used is unbounded, because each of these risk factors has been associated with disease or injury independently of other risk factors. In reality two or more risk factors often occur together and may interact to produce higher or lower risks. The sum of attributable fractions can even exceed one hundred per cent for a given cause or for mortality from all causes. For this reason the estimations of attributable burden must be interpreted with caution.

Risk factor estimates in our study, as in most other studies, are based on reviews of our data and exposure and international data of relative risks. It is assumed that the relative risks are general i.e. studies in one population can be applied to other populations. However, the results of different studies have shown that the major determinant of variations in the attributable burden due to a particular risk factor is not usually differences in relative risk, but in the population distribution of exposure levels. The reason for this is the fact that the risks are also embedded within a social, cultural and environmental context.

All of those complexities and interactions between risk factors are not captured in this method, but the fact remains that public health policies aimed to modify lifestyle risk factors can expect large health gains from effective health interventions regarding those risk factors.

6.1. THE MORTALITY BURDEN ATTRIBUTABLE TO RISK FACTORS

In this section the mortality burden attributable to tobacco, alcohol, physical inactivity, insufficient intake of fruits and vegetables, high blood pressure, high blood cholesterol and obesity is presented (Figure 6.1.). The next section will include DALY calculations for the selected risk factors. The calculations were made for the territory of Serbia without Kosovo and Metohia and for Belgrade.

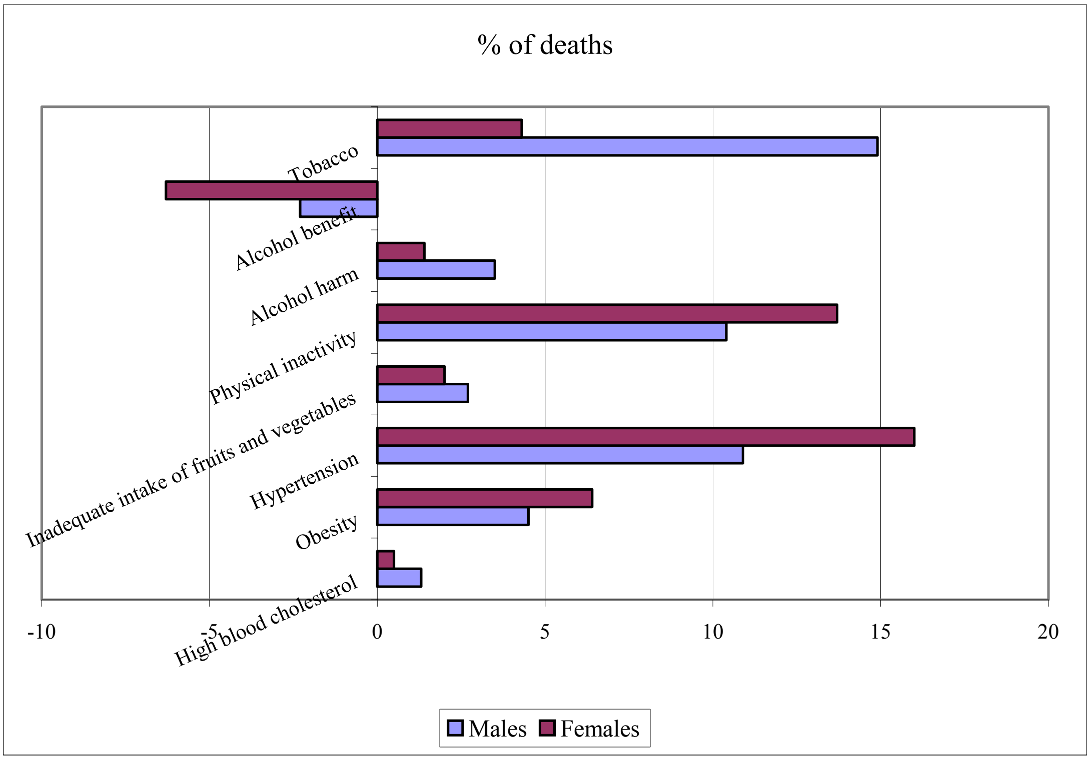
The estimated attributable fractions are interpreted as the proportion of current burden attributable to exposure to the selected risk factors. The model we used produces relatively simplistic estimates, because each of these risk factors has been associated with disease or injury independently of other risk factors.

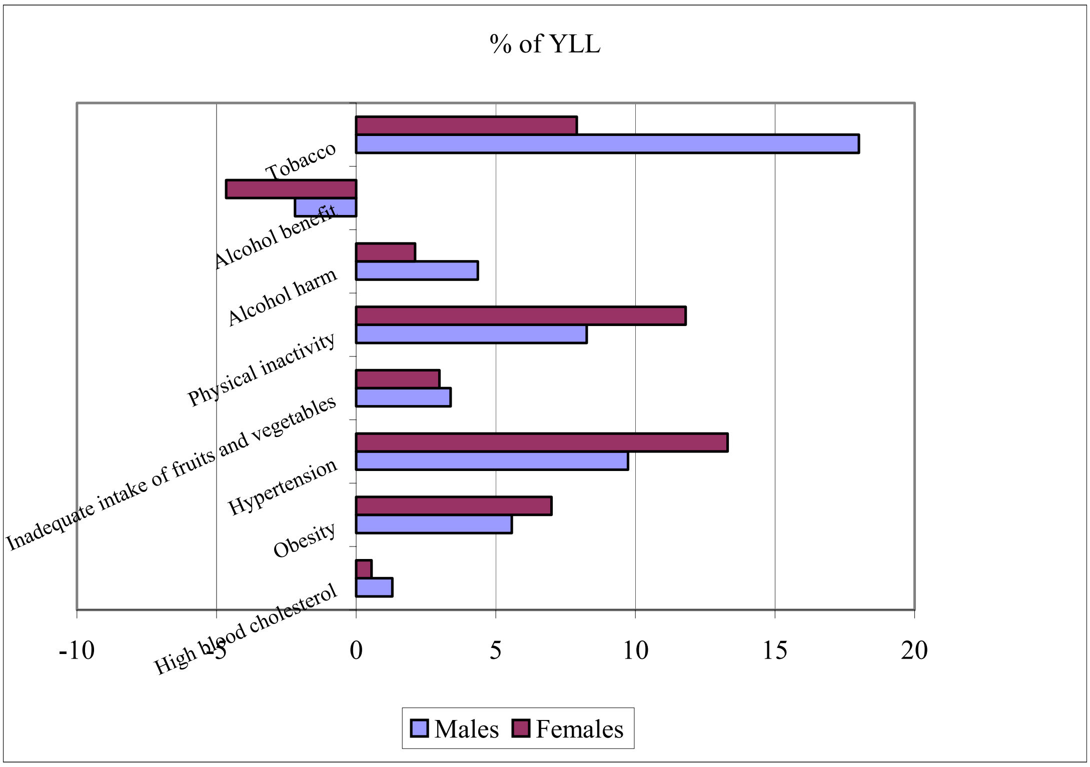
In the process of selection of the main risk factors, we used several criteria:

- a good evidence that the risk factor is causally associated with at least one mayor category of disease or injury;
- availability of the relative risk estimates from recent high-quality epidemiological studies;
- significant proportion of diseases or injuries related to the risk factor in the mortality and morbidity rates in Serbia;
- availability of the nationally representative estimates of prevalence of the risk factor for Serbia;
- public health importance of the diseases and health priorities defined in the documents related to the process of health care system reforms.

The prevalence data for the most selected risk factors were derived from the 2000 Population Health Survey in Serbia (Institute of Public Health of Serbia 2001). There were several studies in Serbia connected to the risk factors for groups of diseases and conditions: cardiovascular risk factors (Vlajinac et al. 1992; Vlajinac et al. 1994), thyroid cancer (Sokić et al. 1994), obesity (Vasiljević et al. 1994), laringeal cancer (Sokić et al. 1995), pancreatic cancer (Kokić et al. 1996), prostate cancer (Ilić et al. 1996; Vlajinac et al. 1997), environmental factors (Backović et al. 1998), breast cancer (Vasiljević et al. 1998; Kocić et al. 1999), but this is the first comprehensive study wich was aimed to estimate the comparable measures of the influences of seven chosen risk factors.

Figure 6.1. Proportion of mortality burden attributed to selected risk factors, by sex, Serbia, 2000

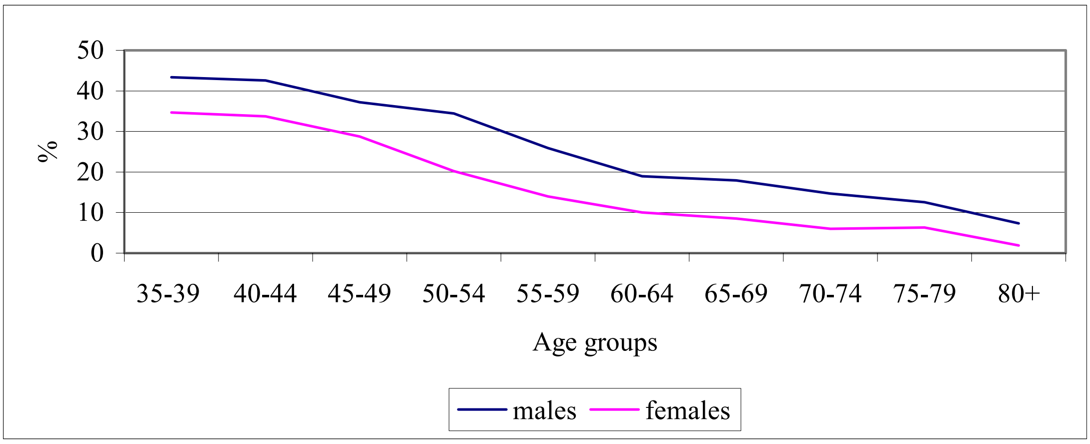




6.1.1. Tobacco

The hazards of tobacco have been documented by many studies (Peto and Lopez 1993; Doll et al. 1994; Murray and Lopez 1997), and some of them were very large prospective studies (Lin et al. 1998). To estimate the burden attributed to tobacco, we have used the age-adjusted relative risks estimated for persons 35 years and over from the second wave of the American Cancer Society's Cancer Prevention Study (CPS-II) (National Center for Chronic Diseases Prevention and Health Promotion. Florida Department of Health 2001) and our prevalence rates of current smokers (Figure 6.2.). Separate relative risk data are used for smokers aged 35-65 and 65 years and over for ishaemic heart disease and cerebrovascular disease. The relative risk of death from smoking drops dramatically after the age of 65 for these two conditions.

Figure 6.2. Rates of smoking by age and sex, Serbia 2000



The attributable mortality burden of tobacco was calculated for cancers of oral cavity, lung, oesophagus, pancreas, bladder and cervix, ishaemic heart disease, cerebrovascular diseases (stroke) and chronic obstructive pulmonary disease, too.

It is recognized that current prevalence is not a good proxy for cumulative exposure. Peto and Lopez suggested a method (Peto and Lopez 1993), which can be used to correct for potential confounding of the estimated relative risks for smokers. A smoking impact ratio, calculated from the data on the observed lung cancer rate in a given age group of a population under study and smoker and no-smoker lung cancer rates observed in the USA Cancer Prevention Study population was used as a surrogate for the prevalence of cumulative exposure in the attributable fraction formula. In fact, this method describes an artificial compound prevalence measure of tobacco exposure derived from a comparison between lung cancer rates in the country of interest and lung cancer rates among non-smokers observed in the long-term follow-up USA Cancer prevention Study. Using this formula on our lung cancer mortality rates produced overestimated results. The reason for this is not clear, but we concluded that the probable cause might be the great differences in our lung cancer mortality age rates and age rates in the Peto and Lopez method. In Serbian Burden of Disease Study we decided to use the relative risks from the CPS-II and our prevalence of current smokers in the traditional attributable fraction method.

The prevalence of 47.5% of males and 33.1% of female's current smokers is one of the highest in Europe. In our study, the highest rates are in the younger population (35 to 44 years of age) and declining with age. Other studies of smoking related habits have shown that there is also a great percentage of smokers among people younger than 35 years: 49.1% of students population of Serbia are regular smokers (Institute of Social Medicine. Medical Faculty, University of Belgrade 2000) and 27% of 15 years old school children (Bjegović et al. 1999).

Table 6.1. lists the conditions associated with tobacco smoking, associated deaths and YLL and Table 6.2. lists the total attributable deaths and YLL, as a proportion of the total disease burden.

Table 6.1. The mortality burden attributable to tobacco by condition in Serbia and Belgrade 2000

Condition	Serbia		Belgrade	
	Attributable deaths	Attributable YLL	Attributable deaths	Attributable YLL
Oral cavity Ca	363	4 276	67	861
Ca lung	4 101	47 781	1 031	12 228
Ca oesophagus	173	1 851	35	402
Ca pancreas	158	1 708	30	280
Ca bladder	61	1 149	30	257
Ca cervix	45	725	10	157
Ischaemic heart disease	2 082	24 127	384	4 482
Stroke	1 816	19 891	364	3 983
COPD	1 390	9 676	167	1 194

Tobacco is the risk factor associated with the greatest health problems and is responsible for 13.7 per cent of the total YLLs in Serbia, 18 per cent in males and 7.9 per cent in females, which is lower than the results of GBD results for the groups of countries - EME (Established Market Economies): 16 per cent of total YLLs, and FSE (Formerly Socialistic Economies of Europe): 16.3 of total YLLs (Global burden of disease Study, 1990). The results of the The burden of disease and injury in Australia (Mathers et al. 1999) were similar to ours: 13.1 per cent of the total YLLs for whole population, 17.1 for males and 8.6 for females.

The greater burden is in the younger ages and declining for the older. Most of the tobacco burden is due to lung cancer, ishaemic heart disease, stroke and COPD. The detailed results are presented in the Appendix C and Annex Tables 13 and 14. Smoking cigarettes is responsible for 62% (age group of 80 and over) to 90.6% (age group of 35 to 39) YLLs for males and 18.1% (age group of 80 and over) to 80.2% (age group of 35 to 39) YLLs for females who died from lung cancer. COPD YLLs attributable to tobacco for males are in the range from 54.2% (age group of 80 and over) to 87.4% (age group of 35 to 39) and from 17.2% (age group of 80 and over) to 79.2% (age group of 35 to 39) for females.

We do not have the information about the relevant trends in consumption patterns by age groups and sex, so we have to rely on self-report, which is not always accurate. There are some tobacco control measures in progress, but their impact on the occurrence on smoking related diseases will only become apparent in years or decades. The impact on morbidity and cardiovascular mortality and reduced demands for health services can be expected in a relatively shorter time, than the impact on cancer morbidity and mortality.

Table 6.2. The mortality burden attributable to tobacco, Serbia and Belgrade 2000

	Males		Females		Total	
	Number	Percent	Number	Percent	Number	Percent
Serbia						
Deaths	8 012	14.9	2 175	4.3	10 187	9.8
YLL	83 380	18.0	27 805	7.9	111 196	13.7
Belgrade						
Deaths	1 656	16.1	462	4.9	2 118	10.7
YLL	17 482	19.0	6 361	9.1	23 843	14.8

6.1.2. Alcohol

For the purposes of analysis of attributable burden due to alcohol, the harm and benefit from regular intake of alcohol were separated (Baffeta and Garfinkel 1990; Poikolainen 1995; Doll et al. 1996). Regular low intake of alcohol protects against cardiovascular diseases (Jackson et al. 1991; Holman and English 1996), but alcohol consumption at all levels above apstinence increases the risk of injuries and various other diseases. The GBD study have estimated that the burden of disease and injury currently averted by alcohol consumption is 2.1 per cent of the total YLLs (Murray and Lopez 1996a).

For the estimation of the attributable burden of alcohol consumption, we have used the prevalence data from the 2000 Population Health Survey in Serbia (Institute of Public Health of Serbia 2001) and the relative risks estimated by English et al (1995). We used the same method as in Victorian Burden of Disease Study (Department of Human Services 1999b), which was run in parallel with the national analisys of the Australian national burden of disease (Mathers and al. 1999), to made the estimations for 11 chosen conditions for alcohol harm and two conditions for alcohol benefit (ishaemic heart disease and ishaemic stroke). The mortality risk of abstinence was the stratum of comparison.

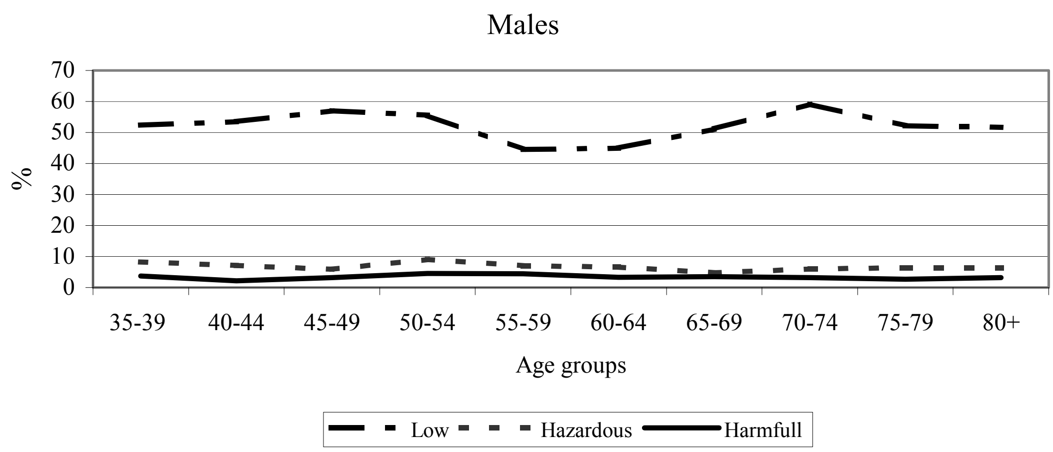
Table 6.3. Classification of reported daily intake of alcohol in number of standard drinks

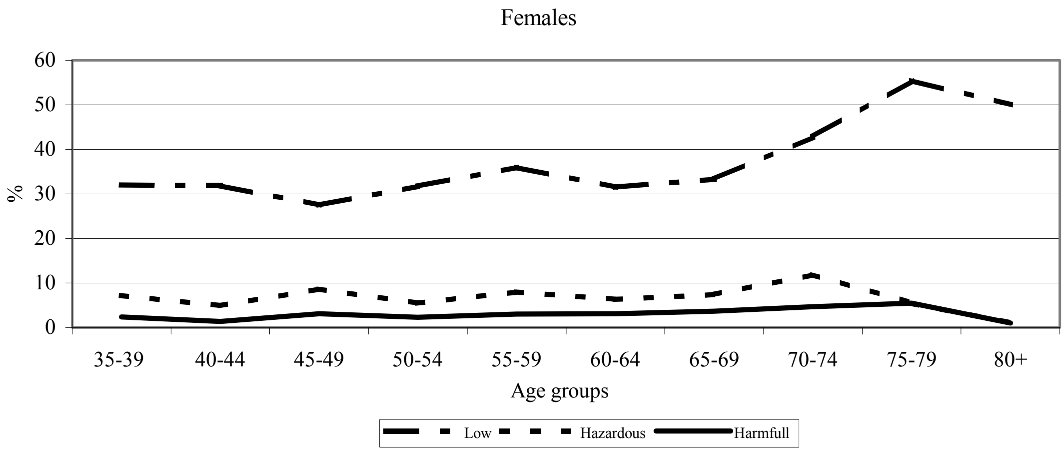
	Number of standard drinks		**Prevalence (%)**	
Classes	**Male**	**Female**	**Male**	**Female**
Abstinence	0-0.25	0-0.25	37.3	57.3
Low risk	0.26-4.00	0.26-2.00	52.4	33.0
Hazardous	4.01-6.00	2.01-4.00	6.9	6.9
Harmfull	>6	>4	3.4	2.7

Source: English et al (1995), 2000 Population Health Survey Study in Serbia (2001).

The prevalence of alcohol consumption was taken from the 2000 Population Health Survey Study in Serbia (Institute of Public Health of Serbia, 2001) and categorised into four levels of daily reported alcohol intake (Table 6.3, Figure 6.3).

Figure 6.3. Rates of alcohol consumption by age and sex, Serbia 2000





The health survey collected information for the last seven days on wich alcohol was consumed. The proportion of interviewed people who were abstinent was 57.3 % for females and 37.3% for males. These results are based on the self reported data.

The estimations were made separetely for alcohol harm and alcohol benefit since the distribution of harm and benefit is different by age groups. The harmfull efects of alcohol are distributed relatively evenly across the age groups for both genders, whereas almost all benefits from alcohol are found in ages over 45 and particulary over 65. This leads to a conclusion that alcohol use can be beneficial at middle and older ages, while excesive use of alcohol is harmfull at all ages. Tables 6.4. and 6.5. list the conditions causally assotiated with alcohol use with attributable deaths and YLLs.

Table 6.4. The mortality burden attributable to alcohol harm by condition, Serbia and Belgrade 2000

Condition	Serbia		Belgrade	
	Attributable deaths	Attributable YLL	Attributable deaths	Attributable YLL
Ca mouth/pharynx	182	1 962	43	395
Ca oesophagus	129	1 251	25	266
Ca liver	339	2 857	54	447
Ca breast	174	1 820	47	501
Haemorrhagic stroke	690	7 489	142	1 505
Cirrhosis	511	5 667	103	1 170
Suicide	108	1 230	21	244
RTA	217	2 970	36	472
Falls	109	819	64	353
Fires	49	495	8	99
Drowing	53	641	6	74
Violence	34	361	8	132

Table 6.5. The mortality burden attributable to alcohol benefit by condition, Serbia and Belgrade 2000

Condition	Serbia		Belgrade	
	Attributable deaths	Attributable YLL	Attributable deaths	Attributable YLL
Ishaemic heart disease	-2 110	-15 077	-370	-2 984
Ischaemic stroke	-2 350	-11 437	-404	-1 984

In our available mortality data haemorhagic and ischaemic stroke were not separated, but regarded as one condition. For the purpose of this calculation we have used the proportion of those two conditions by age groups and gender from the Victorian Burden of disease study.

We have applied their proportions of haemorhagic and ishaemic stroke on our aggregated data for stroke. The detailed results are presented in the Appendix C.

The most of the mortality burden attributable to alcohol harm for Serbia and Belgrade is due to haemorhagic stroke, cirrhosis and liver carcinoma. The attributable benefit is more important for ishaemic heart disease. Although the estimated number of prevented deaths caused by this condition is smaller than the number of prevented deaths from ishaemic stroke, the number of prevented YLLs is bigger, because of the younger age groups of deceased.

The final results of mortality burden attributable to alcohol harm for Serbia and Belgrade are presented in the Table 6.6. 2.4% of total deaths and 3.3% of total YLLs due to the selected conditions are attributed to alcohol consumption in Serbia. The results for Belgrade are very much the same. Our results for total attributable deaths and YLLs were higher than the estimation in the Global Burden of Disease Study (world average: 1.5% of deaths and 2.1% of YLLs; Murray and Lopez 1996a). Our results for total atrribútable YLLs are closer to the estimates for developed countries. The values of our estimations are lower than the results of Australian Burden of disease and injury study (4.7% of deaths and 6.4% of YLLs for males; 2.1% of deaths and 3.1% of YLLs for females (Mathers et al. 1999).

Table 6.6. The mortality burden attributable to alcohol harm, Serbia and Belgrade 2000

	Males		**Females**		**Total**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Serbia						
Deaths	1 884	3.51	703	1.40	2 587	2.49
YLL	20 145	4.36	7 413	2.11	27 558	3.39
Belgrade						
Deaths	367	3.56	180	1.90	547	2.77
YLL	3 890	4.24	1 766	2.54	5 657	3.50

Alcohol benefit to mortality burden is presented in Table 6.7. and the net attributable burden in the Table 6.8. The estimations of total benefit to mortality burden in our study indicate that the deaths averted by alcohol consumption outweight the deaths due to alcohol harm, while the YLLs are almost equaly balanced. The reason for this is the attributable benefit for females, which is very high, while for males the burden of disease and injury averted by alcohol is lower than that caused by alcohol consumption. Also, the number of deaths from cardiovascular diseases for females is very high in our study and that influences the values of estimations for attributable beneficial effects of alcohol.

Table 6.7. Alcohol benefit to mortality burden, Serbia and Belgrade 2000

	Males		**Females**		**Total**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Serbia						
Deaths	-1 269	-2.36	-3 191	-6.34	-4 460	-4.29
YLL	-10 111	-2.19	-16 403	-4.66	-26 514	-3.26
Belgrade						
Deaths	-229	-2.22	-545	-5.75	-774	-3.92
YLL	-2 105	-2.29	-2 863	-4.11	-4 968	-3.08

Table 6.8. Net attributable burden of alcohol, Serbia and Belgrade 2000

	Males		Females		Total	
	Number	Percent	Number	Percent	Number	Percent
Serbia						
Deaths	615	1.14	-2 488	-4.95	-1 873	-1.80
YLL	10 034	2.17	-8 990	-2.55	1 044	0.13
Belgrade						
Deaths	138	1.35	-365	-3.85	-227	-1.15
YLL	1 785	1.94	-1 096	-1.57	688	0.43

The results of our study are very similar to the results of the Australian study for males, but their benefit estimations for females were even higher. The net attributable burden in their study was –4.3 for total male and female deaths and 0.6 for total YLLs.

The estimations of attributable burden of alcohol must be taken with caution and should be revised in the next phases of our study. The estimations of proportion between mortality rates for ischaemic and haemorrhagic stroke were not based on our original data, but on the prevalences from the Victorian Burden of Disease Study (Department of Human Services 1999b). The prevalence data may be underestimated, because they were based on self-reported data. The benefit from regular low intake of alcohol against cardiovascular disease has been proven, but we must always consider the fact that alcohol consumption at all levels above apstinence increases the risk of significant number of other diseases, especially injuries.

6.1.3. Physical Inactivity

Physical inactivity increases risks of mortality and incidence for a number of diseases and injury (Berlin and Colditz 1990; Leons et al. 1997; Blair et al. 1998). The evidence also suggests that physical inactivity often occur with other risk factors for cardiovascular diseases, like obesity, high blood pressure and high blood cholesterol, while physical activity plays an important protective role for coronary heart disease and stroke. Prat and Coplan (1996) have analyzed the burden of disease attributable to physical inactivity using standard risk approach. The results of this study were used for estimation of age and sex specific relative risks for ishaemic heart disease, colon cancer and diabetes in the GBD study for different regions. Bauman et al. (1999) have reviewed and analyzed population attributable risk of disease and injury due to physical inactivity to estimate relative risks for coronary heart disease, stroke, Type 2 diabetes, hypertension, colorectal cancer, breast cancer, depression and falls. Those relative risks were used in the Australian Burden of disease study (Mathers et al.1999) and Victoria Burden of Disease Study (Department of Human Services 1999b), which were the resources for our relative risk estimations. We used the relative risks from the Australian study, together with prevalence data on levels of physical inactivity obtained from 2000 population Health Survey Study in Serbia (Institute of Public Health of Serbia 2001), and based on self reported data. To avoid overestimating the impact of physical inactivity, in the Australian study the excess relative risk for cardiovascular conditions and diabetes in people aged 65 years and over were halved. The reason for this is that cardiovascular relative risks are lower for older people.

Figure 6.4. Rates of physical inactivity by age and sex, Serbia 2000.

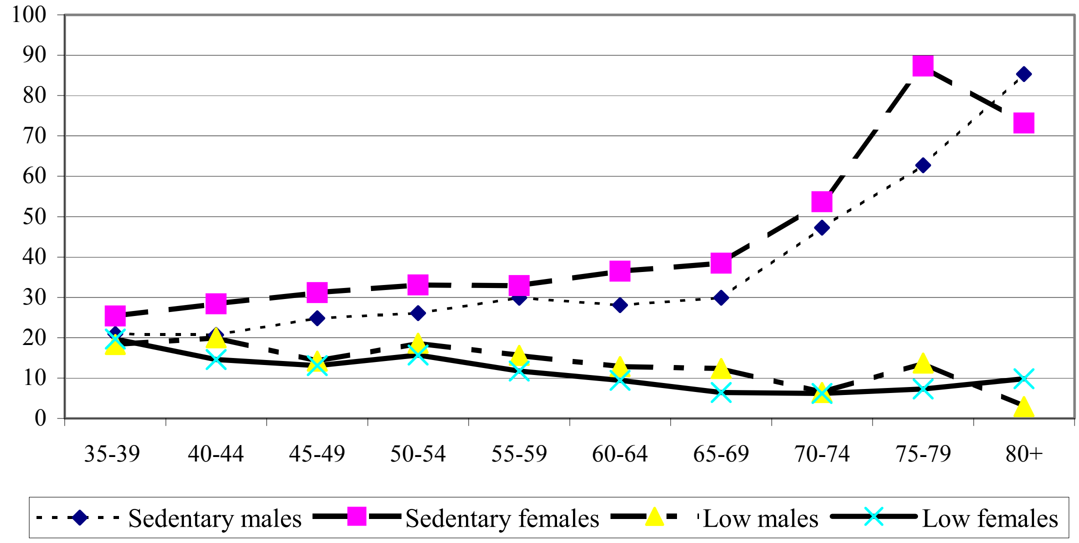


Figure 6.4. shows the prevalence of physical inactivity among Serbian adult population. The analyzed levels of inactivity were sedentary and low level. These levels were defined by an estimation based on the frequency and duration of self-reported physical activity during previous seven days.

The prevalence of physical inactivity in our population was very high: 41.9% for males and 53.5% for females. Table 6.9. lists the conditions associated with physical inactivity, total deaths and YLLs for Serbia and Belgrade. The most of the burden is due to ishaemic heart disease and stroke. The greatest burden is in the older age groups, because the prevalence of those diseases is also higher in older age groups.

Table 6.9. The mortality burden attributable to physical inactivity by condition, Serbia and Belgrade 2000

Condition	Serbia		Belgrade	
	Attributable deaths	**Attributable YLL**	**Attributable deaths**	**Attributable YLL**
Colorectal cancer	935	6 299	223	1 446
Breast cancer	361	3 246	97	886
Ischaemic heart disease	4 947	33 164	830	5 994
Stroke	5 873	34 608	1 284	6 578
Type 2 diabetes mellitus	244	1 692	32	219
Falls	142	755	98	404

The final results for mortality burden attributable to physical inactivity are listed in the Table 6. 10. 12% of deaths due to listed conditions and 9.8% of YLLs are attributed to physical inactivity in Serbia. The results for Belgrade population are not significantly different from those for whole Serbia.

These results are in accordance with the results in GBD 1990 study (Murray and Lopez 1996a) for developed regions: 10.1% of total deaths and 6.2% of total YLLs. The results of the Australian study were the same for attributable deaths (10.1%) and a little higher for attributable YLLs (9.0%).

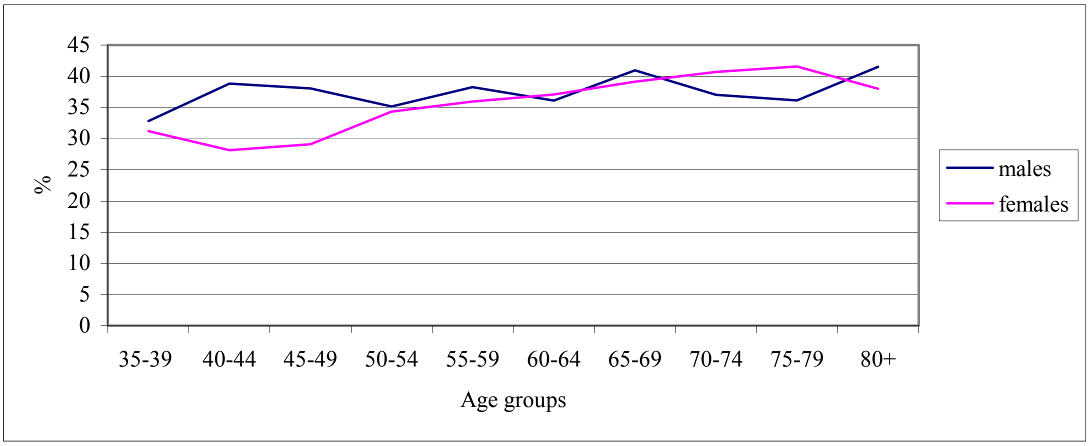
Table 6.10. The mortality burden attributable to physical inactivity, Serbia and Belgrade 2000.

	Males		Females		Total	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Serbia						
Deaths	5 625	10.46	6 876	13.67	12 501	12.01
YLL	38 148	8.26	41 616	11.82	79 764	9.80
Belgrade						
Deaths	1 087	10.57	1 278	13.49	2 366	11.97
YLL	7 552	8.22	7 974	11.45	15 527	9.62

6.1.4. Inadequate intake of Fruits and Vegetables

Inadequate intake of fruits and vegetables have been recognized as a risk factor for cardiovascular diseases and cancers (Witteman et al. 1989; Rimm et al. 1996). In order to estimate the burden attributed to inadequate intake of fruits and vegetables, we have reviewed several relevant epidemiological studies and compared their sources and results with our prevalence data obtained from the 2000 Health Population Survey in Serbia (Institute of Public Health of Serbia 2001). Based on the structure data obtained from the study and consultations with our clinical experts, adequate consumption was defined as more than one serving of fruits and vegetables per day. The prevalence of inadequate intake of fruits and vegetables in Serbia is 34.3% for males and 30.9% for females. In younger age groups women take more fruits and vegetables than men, but in the older ages, the differences between genders are very small (Figure 6.5).

Figure 6.5. Rates of inadequate intake of fruits and vegetables by age and sex, Serbia 2000



The diseases associated with inadequate intake of fruits and vegetables are: all cancers, ishaemic heart disease and stroke. Table 6.11. lists the deaths and YLLs associated with inadequate intake of fruits and vegetables in Serbia and Belgrade for those chosen conditions. Both distributions are very much alike. The greatest burden is in the younger ages and declining for the older. Most of the burden is due to cancers.

Table 6.11. The mortality burden attributable to inadequate intake of fruits and vegetables by condition, Serbia and Belgrade 2000

Condition	Serbia		Belgrade	
	Attributable deaths	**Attributable YLL**	**Attributable deaths**	**Attributable YLL**
All cancers	1 469	15 851	342	3 733
Iscahemic heart disease	551	5 767	105	1 085
Stroke	456	5 467	90	884

Inadequate intake of fruits and vegetables is responsible for 2.3% of total deaths in Serbia and 3.2% of total YLLs, (Table 6.12.). The Burden of Disease and Injury in New Zealand study estimated that low fruits and vegetables intake cause around 2% of the total burden, although their definition of adequate consumption was more severe and specified than ours.

Table 6.12. The mortality burden attributable to inadequate intake of fruits and vegetables, Serbia and Belgrade 2000

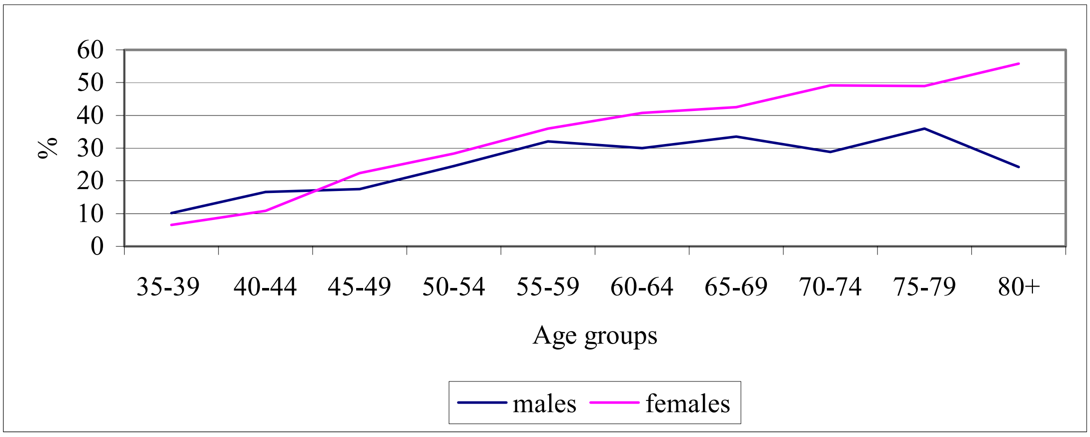
	Males		Females		Total	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Serbia						
Deaths	1 472	2.74	1 004	2.00	2 476	2.38
YLL	15 609	3.38	10 475	2.98	26 084	3.20
Belgrade						
Deaths	312	3.04	224	2.37	537	2.72
YLL	3 342	3.64	2 360	3.39	5 702	3.53

6.1.5. Hypertension

High blood pressure is defined as systolic blood pressure higher or equal to 160 mmHg and/or diastolic blood pressure higher or equal to 95 mm Hg. “Hypertension” is used as a term referred to those people with high blood pressure and/or receiving treatment for high blood pressure. Hypertension is a major risk factor for coronary heart disease, cerebrovascular diseases, peripheral vascular diseases and renal failure (Nichols and Elliot 1996d; Witeman et al. 1998). In our study, we have analyzed the attributable burden of hypertension for three conditions: ischaemic heart disease, stroke and renal failure, because the mortality and morbidity data for those conditions were available and of acceptable quality. Our source of relative risk data for conditions associated with hypertension was the Burden of disease and injury in Australia (Mathers et al. 1999) and Victorian Burden of Disease Study (Department of Human services 1999). Their list of conditions and risk ratios estimation were based on the Framingham Study data (Kannel 1995).

For the purpose of this study we decided to use the prevalence of hypertension obtained from the 2000 Population Health Survey in Serbia (Institute of public Health of Serbia 2001). The total prevalence was 15.5% for males and 19.4% for females. The distribution by age and gender is shown on the Figure 6.6.

Figure 6.6. Rates of hypertension by age and sex, Serbia 2000



The prevalence rates of hypertension in our study confirmed the results from the other similar studies that the prevalence is higher for males in younger age groups (35 to 44 years of age) and for females in older age groups. Hypertension related illnesses are most common in old age and that is the reason why the attributable deaths are higher for females. Table 6.13. lists the conditions associated with hypertension, attributable deaths and YLLs for Serbia and Belgrade. The highest attributable burden is due to stroke and than iscahemic heart disease. The attributable rates for Belgrade are not significantly different from the rates for whole Serbia for stroke and renal failure, and for ishaemic heart disease the Belgrade rates are lower.

Table 6.13. The mortality burden attributable to hypertension by condition, Serbia and Belgrade 2000

Condition	Serbia		Belgrade	
	Attributable deaths	**Attributable YLL**	**Attributable deaths**	**Attributable YLL**
Ischaemic heart disease	4 280	31 927	792	5 948
Stroke	8 633	58 548	1 708	11 104
Renal failure	968	6 448	187	1 464

Table 6.14. lists the total attributable deaths and YLLs as a proportion of the total disease burden. Hypertension is a very important risk factor in our population, which is associated with great health problems. It is responsible for 13.3 per cent of the total YLLs in Serbia, more in females than in males, as we discussed before. Our results are very similar to the estimations of total deaths attributable to hypertension in developed regions of the GBD (12.9%), while the per cent of total YLLs is higher in our study (8.1% in GBD study), which means that deaths attributable to hypertension occur in younger age (Murray and Lopez 1996a). In Australian study, per cent of total deaths attributable to hypertension was 11.2 and of YLLs 8.2.

Table 6.14. The mortality burden attributable to hypertension, Serbia and Belgrade 2000

	Males		**Females**		**Total**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Serbia						
Deaths	5 855	10.8	8 026	15.9	13 882	13.3
YLL	43 423	9.7	54 353	13.3	97 776	12.0
Belgrade						
Deaths	1 132	11.0	1 555	16.4	2 688	13.6
YLL	8 615	9.3	9 901	14.2	18 516	11.4

6.1.6.Obesity

Obesity produces a higher risk of ill health for a number of diseases, including coronary heart disease, stroke, congestive heart failure, Type 2 diabetes and some of the cancers (Manson et al. 1995; Bender et al.1998) . It is also associated with hypertension and high blood cholesterol. The Body Mass Index (BMI) was used to access the number of people that are overweight and/obese. BMI is calculated as weight (kg) divided by height squared (m^2). BMI 25-29.9 was defined as overweight and BMI >30 as obesity.

For estimation of overweight/obesity prevalence we have used the data from the 2000 Population Health Survey in Serbia (Institute of Public Health of Serbia 2001). The proportion of overweight in Serbia was 36.3% for males and 26.5% for females and for obesity 12.2% for males and 16.7% for women (total of 48.5% for men and 43.2% for females, Figure 6.7.).

Figure 6.7. Rates of obesity by age and sex, Serbia 2000

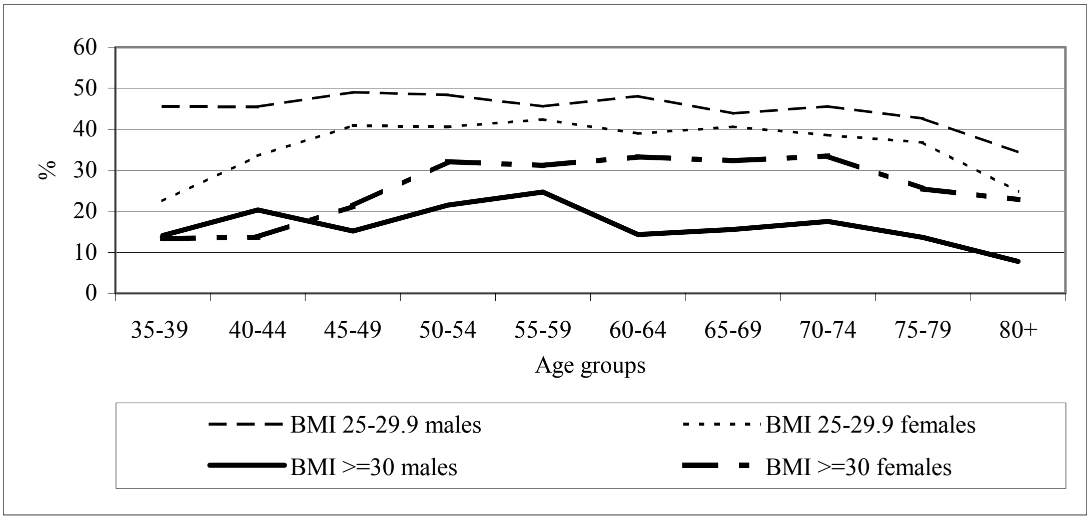


Table 6.15. lists the selected conditions associated with obesity for our study, attributable deaths and YLLs for Serbia and Belgrade. The most mortality attributable burden is due to adult onset diabetes, ishaemic heart disease and stroke. The attributable YLLs are highest for ishaemic heart disease, because the burden for this disease is highest in younger age groups.

Table 6.15. The mortality burden attributable to obesity by condition, Serbia and Belgrade 2000

Condition	Serbia		Belgrade	
	Attributable deaths	Attributable YLL	Attributable deaths	Attributable YLL
Ischaemic heart disease	1 851	20 013	335	3 687
Stroke	1 425	14 048	278	3 802
Adult-onset diabetes	1 894	12 836	223	1 596
Colo-rectal cancer	310	3 484	98	634
Endometrium cancer	84	738	17	161
Post-menopausal brest cancer	136	1 427	37	397

5.4% of all deaths caused by selected conditions and 6.1% of all YLLs in Serbia are attributed to obesity (Table 6.16.). The figures for Belgrade are very similar to those for whole Serbia. Our results are a little higher, but very similar to the results of the study Burden of Disease and Injury in Australia (4.5% of all deaths and 4.6% of all YLLs, Mathers et al. 1999).

Table 16. The mortality burden attributable to obesity, Serbia and Belgrade 2000

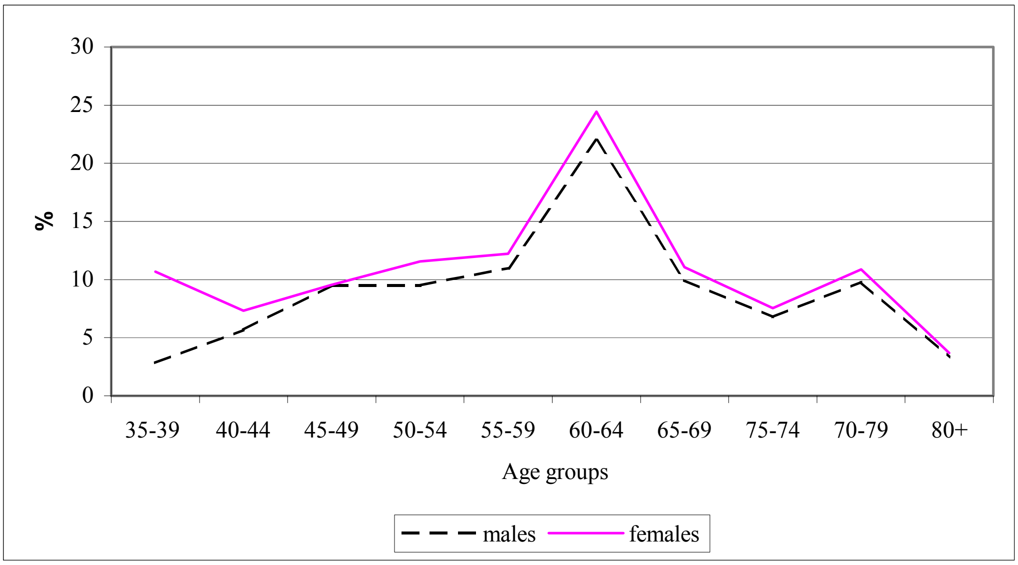
	Males		Females		Total	
	Number	Percent	Number	Percent	Number	Percent
Serbia						
Deaths	2 396	4.5	3 232	6.4	5 701	5.4
YLL	25 751	5.5	26 796	7.0	50 382	6.1
Belgrade						
Deaths	450	4.3	485	5.7	935	4.7
YLL	4 876	5.3	4 617	6.6	8 718	5.4

6.1.7. High Blood Cholesterol

High blood cholesterol is a major risk for ischaemic heart disease and peripheral vascular disease. It causes the process by which the blood vesels become clogged and endangers the blood supply for heart and other vital organs. The estimates of high blood cholesterol as a risk factor for stroke are not still completely clear, so stroke is not included in this analysis (Mathers et al. 1999). The mortality and morbidity data of adequate quality for peripheral vascular disease were not available in this phase of our study, so we decided to estimate the mortality burden of high blood cholesterol only for ischaemic heart disease.

The blood cholesterol levels above 5.5 mmol/l are suggested as a risk of developing coronary heart disease (The Burden of Disease and Injury in Australia. Mathers et al. 1999). There were no recent studies of blood cholesterol levels for Serbian population, so we decided to use the data from the population health survey study in Republic of Srpska (Ministry of Health and Social Welfare of the Republic of Srpska 2002) for estimation of prevalences of high blood cholesterol by age and gender in Serbian population. The life stiles and social environment is much the same in both countries, and we can expect that these estimates are valid. The rates of high blood cholesterol by age and gender in our study are presented in Figure 6.8.

Figure 6.8. Rates of high blood cholesterol by age and sex, Serbia 2000



The total prevalence of high blood cholesterol is lover for males (22.7%), than for females (25.3%). The estimates of high blood cholesterol as a risk factor for stroke are not still completely clear, so stroke is not included in this analysis (Bucher et al. 1998). In our study the prevalence of high blood cholesterol was low in younger age groups (2.8% for males and 10.6% for females in the age group of 35 to 39 years, 5.6% for males and 7.3% for females in the age group of 40 to 44 years of age). The highest prevalence was in the age group of 60 to

64 years: 21.9% for males and 25.3% for females and declining again in older age groups: 3.3% for males and 3.6% for females in the age of 80 and older. In our study we used the relative risks from the Australian study. The results are listed in Tables 6.17. and 6.18.

Table 6.17. The mortality burden attributable to high blood cholesterol by conditions, Serbia and Belgrade 2000

Condition	**Serbia**		**Belgrade**	
	Attributable deaths	**Attributable YLL**	**Attributable deaths**	**Attributable YLL**
Ischaemic heart disease	956	8 044	175	1 506

The results of our estimations have shown that 0.92% of all deaths and 0.99% of all YLLs from ishaemic heart disease in Serbia are attributable to high blood cholesterol. The obtained results must be interpreted with caution. Estimations of mortality burden of high blood cholesterol in our study is much lower than the estimated burden in the Australian study (5.1% of all deaths and 4.1% of all YLLs). There may be several possible reasons for these differences. The total prevalence of high blood cholesterol was much higher in Australian study: 47% for men and 39% for women. There was also the difference in distribution of rate values for age groups. In our study the prevalence of high blood cholesterol was low in younger age groups (35 to 44 years of age) and the highest prevalence was in the age group of 60 to 64 years, declining again in older age groups. In Australian study the prevalence rates for younger age groups were higher. The highest prevalence in their study for males was in the age group of 45 to 54 years and declining, but for females in the oldest age group the rate was over 90%. It was stated in the discussion of their results that the estimation of high blood cholesterol rates for these age groups must be treated with caution, because it was based on a small sample size. The mortality rates for ishaemic heart disease were also much higher in Australian study than the rates for Serbia.

Table 6.18. The mortality burden attributable to high blood cholesterol, Serbia and Belgrade 2000

	Males		**Females**		**Total**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Serbia						
Deaths	704	1.31	251	0.50	956	0.92
YLL	6 122	1.32	1 922	0.55	8 044	0.99
Belgrade						
Deaths	132	1.28	43	0.46	175	0.89
YLL	1 168	1.27	338	0.49	1 506	0.93

6.2. Total Burden Attributable to Risk Factors for Selected Diseases and Injuries

In this Chapter DALY calculations for tobacco, alcohol, physical inactivity, insufficient intake of fruits and vegetables, high blood pressure, obesity and high blood cholesterol are presented. The attributable risk factors burden was calculated only for the selected list of 18 diseases and injuries. The prevalence data for the most selected risk factors were derived from the 2000 Population Health Survey in Serbia (Institute of Public Health of Serbia 2001).

Selection process was based on analysis of the local pattern of causes of death and compilation of the number of deaths coded to one letter and two numbers ICD-10 code (WHO 1992). Proportional mortality rates and hospital morbidity rates were analyzed and compared with the conditions selected for other studies, Serbian health priorities cited in the Health Strategy Document (Simić et al, 2003) and the SBDS Steering Committee decision. The final selection included 18 causes, for which the SBDS disease model metric was acquired.

The population attributable risks were applied to the YLL, YLD and DALY data on selected conditions, in order to produce estimates of the total burden attributable to major risk factors. The estimates for YLL and YLD were combined to yield the estimates for the total burden of disease and injuries, reflecting both fatal and non-fatal outcomes. These calculations are based on the preference weighting of YLDs, which makes the burden on non-fatal outcomes commensurate with that of the fatal outcomes, measured in YLLs, and the integrated unit of health loss – DALYs, can be calculated as the sum of two components. DALY is accumulated for each sex, age group and disease or injury related to the selected risk factors, for the whole Serbia and Belgrade.

As we explained in the previous section, the estimated attributable fractions are interpreted as the proportion of current burden attributable to exposure to certain risk factors. Risk factor estimates were based on reviews of our data on exposure and international data on relative risks. The calculations of total burden attributable to the risk factors selected in this report were based on the assumption that relative risks apply equally to mortality and morbidity. For the calculations of total burden attributable to selected major risk factors, we used the same values for relative risks as in the previous section, where the mortality burden attributable to those risk factors was calculated. The model we used produces relatively simplistic estimates, because each of these risk factors was associated with disease or injury independently of other risk factors.

For the selected group of conditions in the SBD study mortality was the main contributor to the burden of smoking, physical inactivity, inadequate intake of fruits and vegetables, hypertension and high blood cholesterol, because the diseases connected to those risk factors are characterized by high mortality. The greater proportion of disability in our study was recognized in the burden due to alcohol and obesity. The disability associated with alcohol dependence and abuse is responsible for the YLDs of alcohol harm, while negative values of YLDs for low regular alcohol intake produced the final alcohol benefit.

6.2.1. Tobacco

The disease burden attributable to smoking was the greatest of all calculated attributable burden for related risk factors. To estimate the total burden attributed to smoking, we used the age-adjusted relative risk estimated for persons 35 years and over from the second wave of the American Cancer Society's Cancer Prevention Study (CPS-II) and our prevalence of current smokers in the traditional attributable fraction method (The National Center for Chronic Diseases Prevention and Health Promotion, Florida Department of Health

2001). The calculations were made for whole Serbia and for Belgrade (Tables 6.19. and 6.20.). Percentage of total DALYs was calculated as a proportion of total DALYs attributable to selected disease or injury, for Serbia and Belgrade (see Chapter 2).

Table 6.19. The disease burden attributable to tobacco by conditions, Serbia 2000.

Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ca lung	3 502	36 775	1 768	38 543	82.81
Ishaemic heart disease	1 612	19 064	2 570	21 635	22.53
Stroke	1 173	12 348	2 915	15 263	23.19
Females					
Ca lung	599	11 006	309	11 315	90.20
Ca cervix	45	725	57	782	9.58
Ishaemic heart disease	470	5 063	1 144	6 208	11.31
Stroke	643	7 543	1 617	9 160	13.03

Table 6.20. The disease burden attributable to tobacco by conditions, Belgrade 2000.

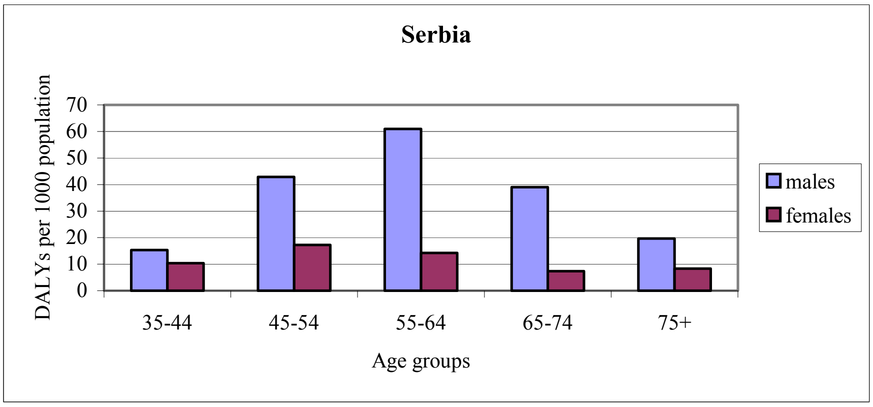
Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ca lung	843	8 885	1 768	9 450	83.26
Ishaemic heart disease	304	3 632	2 570	4 160	20.70
Stroke	243	2 542	2 915	3 146	23.91
Females					
Ca lung	188	3 343	308	3 462	91.16
Ca cervix	10	157	57	175	10.12
Ishaemic heart disease	80	850	1 144	1 097	11.27
Stroke	121	1 441	1 617	1 796	14.00

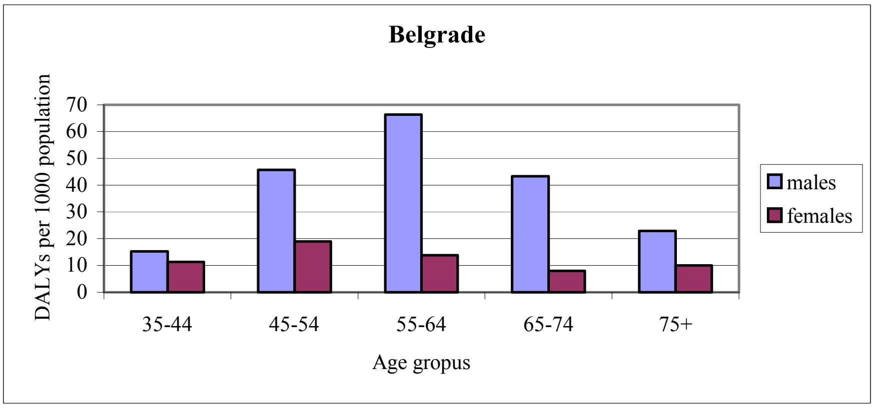
The prevalence of smoking in Serbia is presented in the previous section. Our prevalence is one of the highest in Europe: 47.5% of males and 33.1% of females are currently smokers. The highest rates are in the younger population (35 to 44 years of age) and declining with age. There is also a great percentage of regular smokers among people younger than 35 years: 49.1% of student's population of Serbia and 27% of 15 years old school children (Bjegović et al., 1999).

Most of the burden is due to mortality from the selected conditions. The greatest proportion of tobacco burden is associated with lung cancer: more than 80% of total DALYs attributable to lung cancer for males, and 90% for females. The greater percentage for females is related to differences in age distribution of attributable YLLs for males and females. The values for younger age groups for females were greater than those for males. For other two selected conditions, ishaemic heart disease and stroke, the attributed burden due to tobacco for males was two times higher than that for females. The number of YLLs for those conditions was much higher for males, than for females and also connected to younger age groups than for females, especially for ishaemic heart disease.

Calculated rates of total DALYs attributable to tobacco per 1 000 population, for all selected conditions, by age and gender for whole Serbia and for Belgrade are presented in the Figure 6.9. There were no significant differences in age and gender distributions for Serbia and Belgrade. The detailed data are presented in Appendix C and Annex Tables 13 and 14.

Figure 6.9. The disease burden attributable to tobacco in DALY rates per 1 000 population





The disease burden attributable to tobacco in our study was calculated only for a selected list of conditions, so the results cannot be fully compared to the results of other studies, where DALYs were calculated for all conditions connected to smoking hazard. It is interesting, however, that the distribution by age groups in our study showed that the greatest burden is present in the age groups of 45 to 65 years, while in the Victoria Burden of Disease Study (The Department of Human Services 1999a) and the Australian study (Mathers et al. 1999) the greatest burden was connected to the oldest age groups. The disease burden attributable to tobacco is much greater for males then for females, which is similar to the results of other studies mentioned above.

6.2.2. Alcohol

The data source on prevalence of alcohol consumption was the 2000 Population Health Survey in Serbia (Institute of Public Health of Serbia 2001). For the purpose of this study, the information about alcohol consumption was collected in relation to the last week in which alcohol was consumed. The prevalence of each level of alcohol intake was estimated from weekly consumption by age groups and gender, after conversion to standard drinks per day (10ml alcohol equals 7.9g alcohol). The proportion of abstinent people was 57.3% for females and 37.3% for males. The relative risks estimated by English et al. (1995) were used (see Chapter 2).

The estimations were made separately for alcohol harm for four selected conditions (breast cancer, haemorhagic stroke, suicide and road traffic accidents) and alcohol benefit for two selected conditions (ishaemic heart disease and ishaemic stroke). The net attributable burden related to alcohol is presented in Table 6.21. for whole Serbia and Table 6.22. for Belgrade. Percentage of total DALYs was calculated as a proportion of total DALYs attributable to selected disease or injury, for Serbia and Belgrade (Chapter 2).

Table 6.21. The disease burden attributable to alcohol by conditions, Serbia 2000

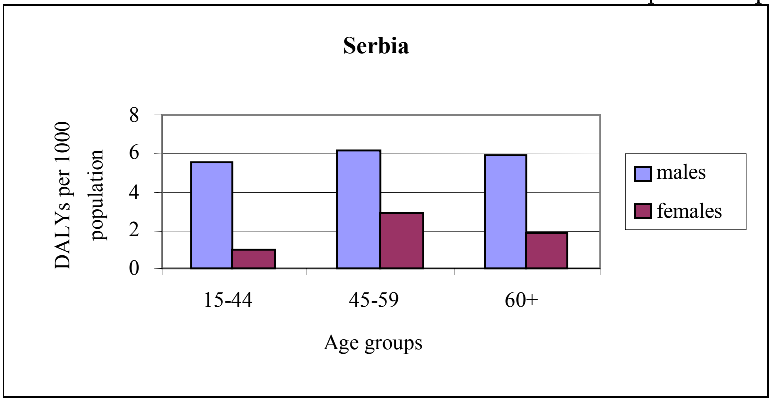
Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	-1 315	-10 359	-1 050	-11 409	-10.61
Stroke	679	6 384	838	7 222	10.97
Self inflicted injuries	74	1 340	52	1 392	6.85
RTA	183	5 227	4 093	9 321	38.79
Females					
Ca breast	174	1 820	175	1 995	8.47
Ishaemic heart disease	-802	-4 732	-524	-5 256	-8.74
Stroke	-3 233	-16 256	-689	-16 945	-19.42
Self inflicted injuries	34	428	18	446	5.84
RTA	34	972	608	1 580	24.57

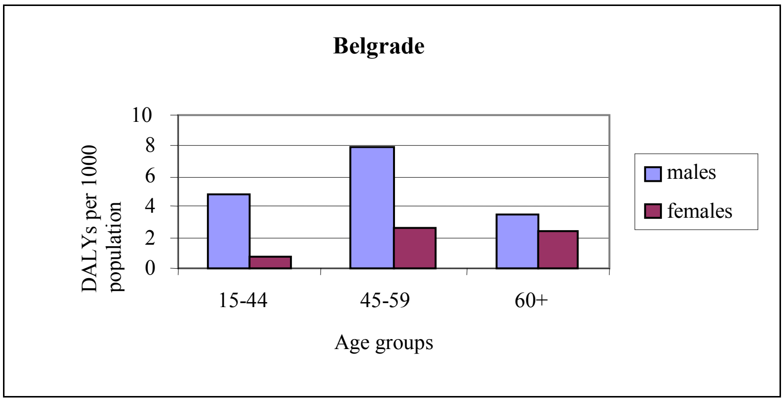
Table 6.22. The disease burden attributable to alcohol by conditions, Belgrade 2000

Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	-238	-2 156	-214	-2 370	-11.45
Stroke	139	1 310	186	1 496	11.37
Self inflicted injuries	14	263	11	274	6.85
RTA	30	791	854	1 645	39.15
Females					
Ca breast	47	501	46	548	9.15
Ishaemic heart disease	-133	-929	-109	-1 038	-9.63
Stroke	-507	-2 959	-261	-3 220	-20.06
Self inflicted injuries	7	101	4	105	5.67
RTA	6	166	136	302	25.06

The most harmful effect of alcohol consumption was on road traffic accidents: 38.79% of total DALYs for males and 24.57% for females in Serbia and 39.15% for males and 25.06% for females in Belgrade. Compared to 0.5% of attributable DALYs for road traffic accidents due to alcohol consumption in the Victorian Burden of Disease Study (Department of Human Services 1999b), alcohol consumption is a very important problem for injury prevention in our country. Most of the burden from road traffic accidents is due to mortality. The disease burden attributable to alcohol harm by age groups and gender is presented in Figure 6.10. The major burden was in the age group of 45 to 59: 6.14 attributable DALYs per 1 000 male population in Serbia and 7.87 in Belgrade; 2.91 attributable DALYs per 1 000 female population in Serbia and 2.61 in Belgrade.

Figure 6.10. The disease burden attributable to alcohol harm in DALY rates per 1 000 population



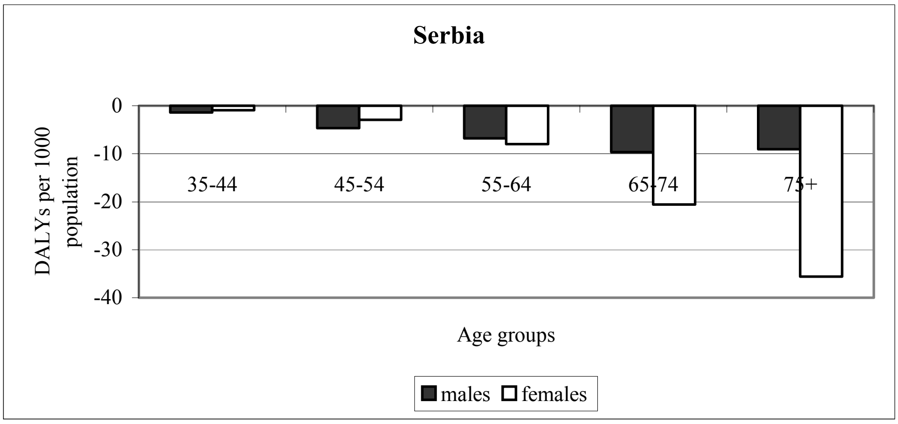


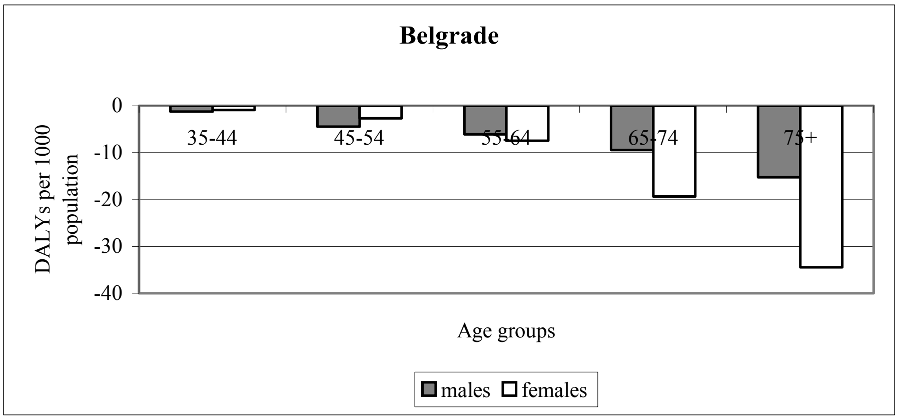
Regular moderate intake of alcohol protects against cardiovascular diseases. To estimate the alcohol benefit, like it was done in other studies, we compared the attributable burden of disease averted by current levels of alcohol consumption with a situation were all people were abstainers. In our study, alcohol prevented more deaths than it caused. In terms of YLL, there was a net harm from alcohol, as it was presented in the previous section. The estimated burden of alcohol benefit for ishaemic heart disease was higher for males (-10.6% in Serbia and -11.4% in Belgrade) than for females (-8.7% in Serbia and -9.6% in Belgrade). Net attributable burden of alcohol intake for stroke was different for males and for females. Alcohol intake had a harmful effect on stroke for males (10.9% of total DALYs in Serbia and 11.3% in Belgrade) and beneficial affect for females (-19.4% of total DALYs in Serbia and -20% in Belgrade).

Those estimations must be taken with caution. The estimation for the proportion between mortality rates of ischaemic and haemorhagic stroke was not based on our original data, but on the prevalence from the Victorian Burden of Disease Study (Department of Human Services 1999b). Also, in our mortality data, there was a difference in age distribution of deaths from stroke between males and females. The greater prevalence of deaths caused by stroke was in the younger age groups among males, and in the old ages among females. The harmful effect of alcohol intake for stroke is connected to younger age, while all benefits are found in ages over 45 and mostly in the elderly ages. That is probably the main reason for gender differences of disease burden attributable to alcohol in our study. The disease burden attributable to alcohol benefit by age groups and gender is presented in Figure 6.11.

The results of the study showed that alcohol intake is an important factor in total burden of disease estimation for selected conditions.

Figure 6.11. The disease burden attributable to alcohol benefit in DALY rates per 1 000 population





6.2.3. Physical Inactivity

The prevalence of physical inactivity in our population is very high: 41.9% for males and 53.5% for females, according to the results of the 2000 Population Health Survey in Serbia (IPH of Serbia 2001). There is strong evidence that physical inactivity causes the higher risk of dying and falling ill from a number of diseases and injuries. It also occurs together with other risk factors for cardiovascular diseases, like obesity, high blood pressure and high blood cholesterol. Total deaths, YLLs, YLDs and DALYs for selected conditions by gender are presented in Table 6.23. for the whole Serbia and Table 6.24. for Belgrade. Percentage of total DALYs was calculated as a proportion of total DALYs attributable to a selected disease or injury, for Serbia and Belgrade.

Table 6.23. The disease burden attributable to physical inactivity by conditions, Serbia 2000

Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Colorectal cancer	475	3 265	243	3 508	20.60
Ishaemic heart disease	2 647	19 332	1 994	21 326	22.21
Stroke	2 342	14 109	2 126	16 235	24.67
Type 2 diabetes mellitus	92	685	598	1 283	7.49
Females					
Colorectal cancer	460	3 006	241	3 246	30.97
Breast cancer	361	3 247	316	3 563	15.13
Ishaemic heart disease	2 300	13 576	1 607	15 183	27.67
Stroke	3 531	20 035	1 722	21 757	30.95
Type 2 diabetes mellitus	152	981	850	1 831	9.07

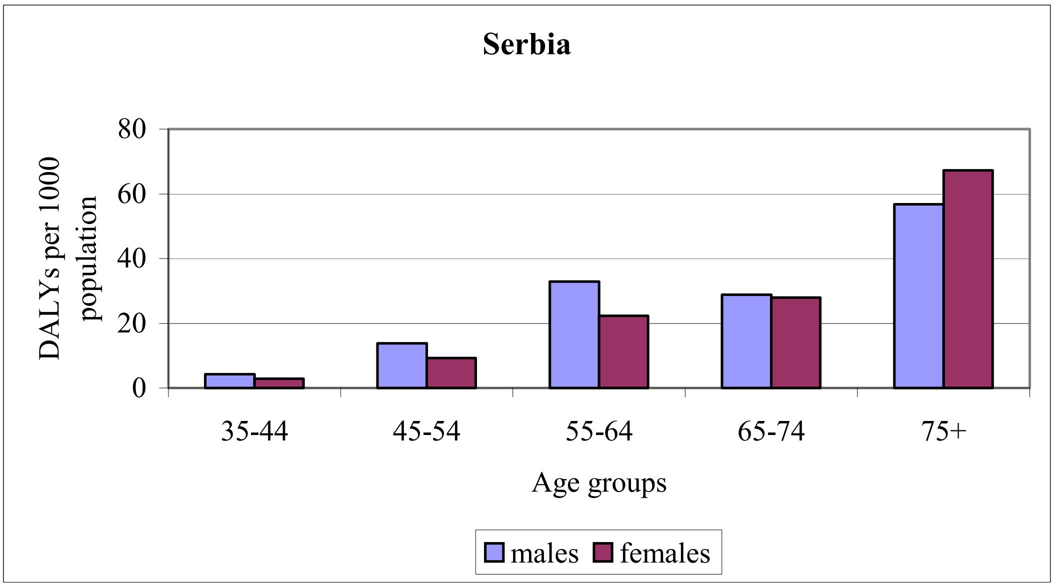
Table 6.24. The disease burden attributable to physical inactivity by conditions, Belgrade 2000

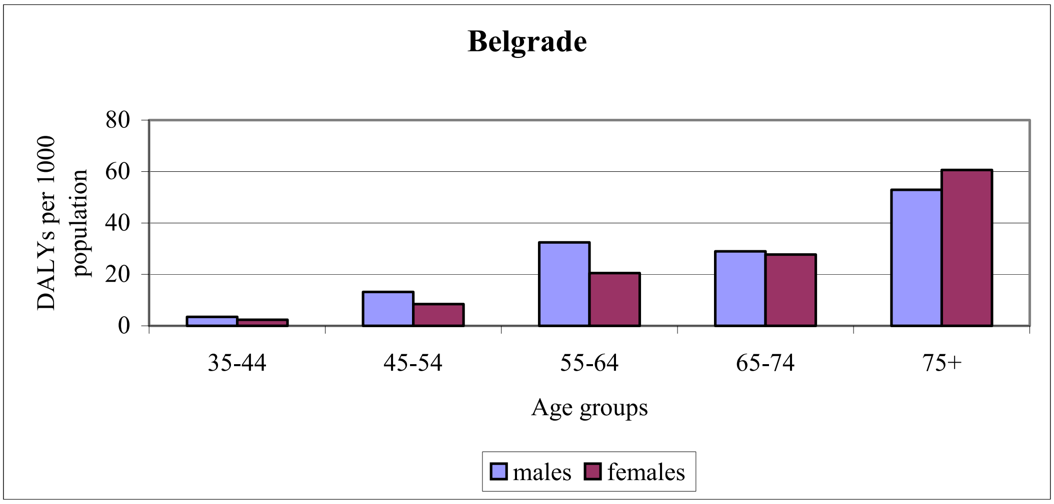
Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Colorectal cancers	110	729	49	778	22.47
Ishaemic heart disease	462	3 627	409	4 037	22.03
Stroke	466	2 877	441	3 318	25.22
Type 2 diabetes mellitus	13	98	121	219	7.63
Females					
Colorectal cancers	113	701	50	751	32.51
Breast cancer	97	888	84	972	16.24
Ishaemic heart disease	370	2 304	339	2 643	27.14
Stroke	618	3 604	370	3 974	30.98
Type 2 diabetes mellitus	19	118	174	292	8.88

For the purpose of the Serbian Burden of Disease Study we have used the relative risks from the Australian Burden of Disease Study (Mathers et al. 1999) and the Victoria Burden of Disease Study (Department of Human Services 1999a) together with the prevalence data on levels of physical inactivity obtained from the 2000 Population Health Survey of Serbia (IPH of Serbia 2001).

Most of the burden is due to the increased risk of cardiovascular disease in inactive people and colorectal cancers. Physical inactivity is particularly the risk that affects older people. The disease burden attributable to physical inactivity in DALY rates per 1 000 population, by age and gender, for Serbia and Belgrade is presented in Figure 6.12. The greatest burden is connected to older age groups for males and for females. Our results for attributable deaths and YLLs were in accordance with the results in the GBD 1990 study (Murray and Lopez 1996a) for developed regions. The main differences between our results for DALY estimations and the results of those studies is in connection to the age distribution of prevalence of physical inactivity. Our estimated prevalence for younger age groups is very high. For example, our prevalence of sedentary level of physical inactivity in the age group of 35 to 39 years of age was nearly two times higher than in the Australian study.

Figure 6.12. The disease burden attributable to physical inactivity in DALY rates per 1 000 population





6.2.4. Inadequate Intake of Fruits and Vegetables

Adequate consumption of fruits and vegetables in our study was defined as more than one serving of fruits and vegetables per day. The definition was based on structure of the data obtained from the 2000 Population Health Survey in Serbia (IPH of Serbia 2001) and the consultations with our clinical experts. The prevalence of inadequate intake of fruits and vegetables in Serbia was 34.3% for males and 30.9% for females. In younger ages the prevalence is higher for males, and in older age groups the differences between genders are very small (Figure 6.5.). Fresh fruit and vegetable consumption offers protection against cancers and cardiovascular disease. The New Zealand Ministry of Health has reviewed relevant epidemiological studies and estimated relative risks associated with inadequate fruit and vegetable consumption for all cancers, ishaemic heart disease and stroke (NZMOH 1999) and those were the relative risks values used in our study. The disease burden attributable to inadequate intake of fruits and vegetables was calculated only for cardiovascular diseases, because the data for all cancers were not available at this stage. Total deaths, YLLs, YLDs and DALYs attributable to inadequate intake of fruits and vegetables are listed in Table 6.25. for the whole Serbia and Table 6.26. for Belgrade. Percentage of total DALYs was calculated as a proportion of total DALYs attributable to a selected disease or injury, for Serbia and Belgrade.

Table 6.25. The disease burden attributable to inadequate intake of fruits and vegetables by conditions, Serbia 2000

Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	371	4 026	436	4 461	4.65
Stroke	236	2 362	453	2 814	4.27
Females					
Ishaemic heart disease	180	1 741	251	1 993	3.63
Stroke	220	2 105	256	2 361	3.35

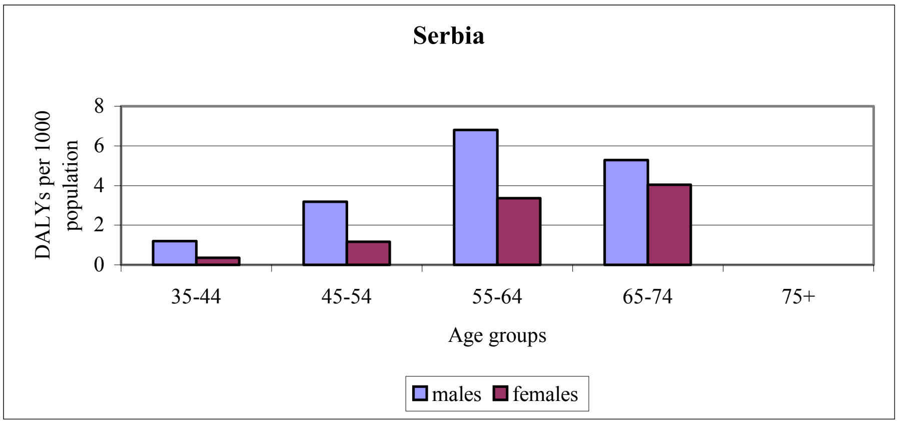
Table 6.26. The disease burden attributable to inadequate intake of fruits and vegetables by conditions, Belgrade 2000

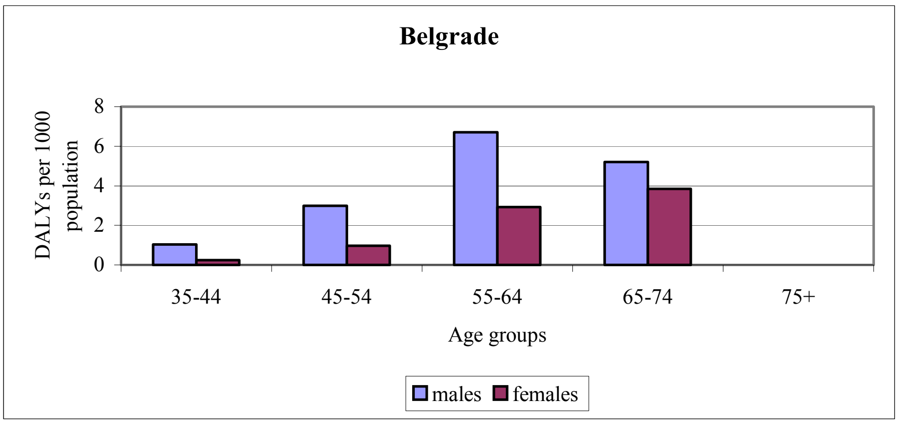
Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	71	770	90	859	4.69
Stroke	49	490	94	584	4.44
Females					
Ishaemic heart disease	34	315	54	369	3.79
Stroke	41	394	56	450	3.50

The disease burden attributable to inadequate intake of fruits and vegetables in DALY rates per 1 000 population, by age and gender, for Serbia and Belgrade is presented in Figure 6.13. The proportion of attributable DALYs is the highest for males at the age of 55 to 64 years and for females in the older age group: 65 to 74 years of age. The proportion for males is higher in all age groups. Attributable burden of inadequate intake of fruits and vegetables is mostly due to YLLs.

Because of the differences in the definition of inadequate intake of fruits and vegetables, our results are not completely comparable, although similar to the results of New Zealand study (NZMOH 1999) and the Australian Burden of Disease Study (Mathers et al. 1999). Their definition of adequate consumption was much more stricter and more specified than ours, but because of the form of data collected for our study, we could not make a more specific estimates. Although, regarding the living habits of our population, we assume that the inadequate consumption of fruits and vegetables is an important risk factor that should be further examined.

Figure 6.13. The disease burden attributable to inadequate intake of fruits and vegetables in DALY rates per 1 000 population





6.2.5. Hypertension

For analysing the disease burden due to hypertension, we used the same source of data on prevalence of high blood pressure and relative risks as for the analysis of mortality burden: the 2000 Population Health Survey of Serbia (IPH of Serbia 2001) and the Australian Burden of Disease Study (Mathers et al. 1999).

High blood pressure is defined as systolic blood pressure higher or equal to 160 mmHg and/or systolic blood pressure higher or equal to 95 mmHg. The term ”hypertension” refers to people with high blood pressure and/or those who receive treatment for high blood pressure. The total prevalence in our study was 15.5% for males and 19.4% for females. The prevalence was higher for males in younger age groups (35-44 years of age) and for females in older age groups (Figure 6.6.). The attributable burden related to hypertension is presented in Table 6.27. for the whole Serbia and in Table 6.28. for Belgrade. Percentage of total DALYs was calculated as the proportion of total DALYs attributed to a selected disease or injury.

Table 6.27. The disease burden attributable to hypertension by conditions, Serbia 2000

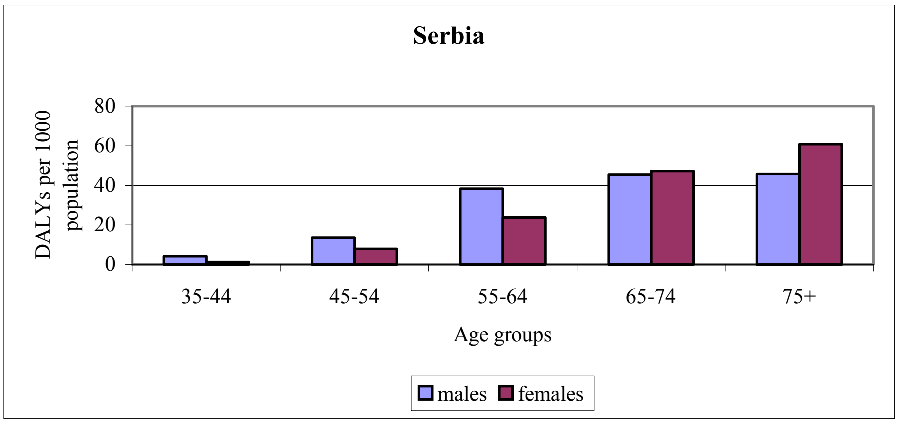
Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	2 057	16 702	1 727	18 429	19.19
Stroke	3 367	23 244	3 412	26 656	40.51
Renal failure	431	3 316	768	4 084	49.56
Females					
Ishaemic heart disease	2 223	12 232	1 321	13 554	24.70
Stroke	5 266	31 700	2 504	34 204	48.65
Renal failure	537	3 779	394	4 174	58.90

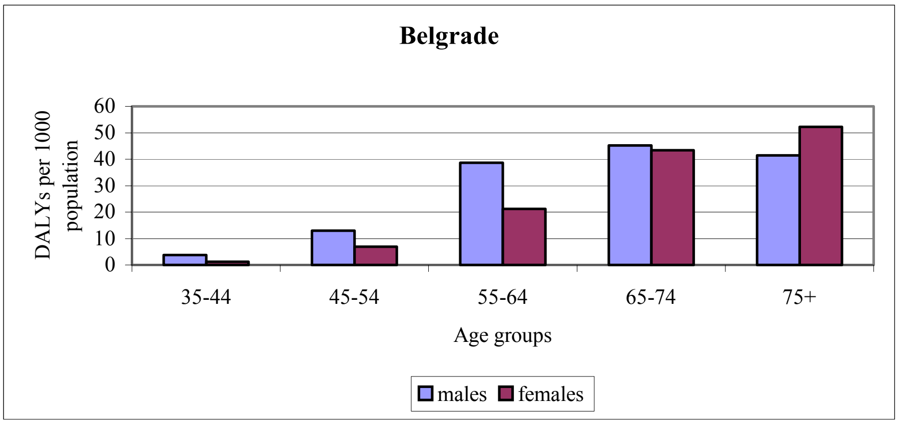
Table 6.28. The disease burden attributable to hypertension by conditions, Belgrade 2000

Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	378	3 159	354	3 513	19.17
Stroke	674	4 752	706	5 459	41.50
Renal failure	80	671	160	831	50.92
Females					
Ishaemic heart disease	414	2 161	303	2 464	25.30
Stroke	1 034	5 716	533	6 249	48.71
Renal failure	107	754	88	841	55.83

Ishaemic heart disease, stroke and renal failure, as adverse health outcomes of high blood pressure were analyzed in our study. The proportion of total DALYs calculated for those diseases due to hypertension is very high and is higher for females than for males. 49.5% of disease burden attributable to renal failure among males and 58.8% among females in Serbia are due to hypertension. The attributable percentage for stroke is also very high: 40.5% for males and 48.6% for females in Serbia.

Figure 6.14. The disease burden attributable to hypertension in DALY rates per 1 000 population





The hypertension burden grows with age and most of the burden is due to mortality. It is higher for males in younger age groups and for females in older age groups (Figure 6.14.). Those results are in accordance with the results of other relevant studies (Murray and Lopez 1996a; Mathers et al. 1999).

6.2.6. Obesity

Overweight and obesity is nowadays one of the important health problems. Obese people have a higher risk of cardiovascular disease, peripheral vascular disease, cancers, adult-onset diabetes and some other diseases. For the estimation of overweight/obesity prevalence we used the data from the 2000 Population Health Survey in Serbia (Institute of Public Health of Serbia 2001). The total proportion of overweight/obesity was 48.5% in males and 43.2% in females (Figure 6.7.).

Type 2 diabetes is the main condition contributing to the disease burden due to obesity (Tables 6.29. and 6.30.). Our results indicate that the risk of disability has the most important part in total burden of disease due to diabetes, IHD and stroke, while the risk of dying is still higher for cancers. The main contributors to obesity burden in the proportion of total burden for the selected conditions in our study were IHD and colorectal cancers.

Table 6.29. The disease burden attributable to obesity by conditions, Serbia 2000

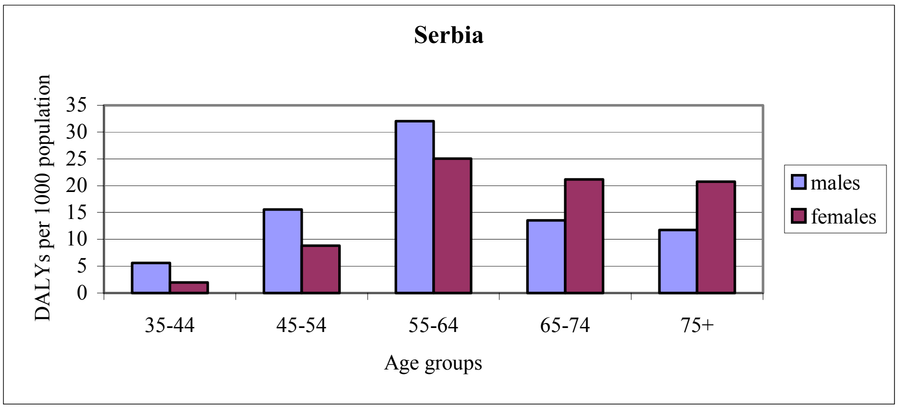
Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	1 042	12 690	1 411	14 101	14.69
Stroke	542	6 248	1 356	7 605	11.55
Type 2 diabetes mellitus	773	4 916	3 195	8 111	47.33
Colorectal cancers	111	1 896	133	2 029	13.07
Females					
Ishaemic heart disease	809	7 323	1 091	8 414	15.34
Stroke	883	7 800	937	8 737	12.42
Type 2 diabetes mellitus	1 121	7 920	4 244	12 164	60.22
Colorectal cancers	199	1 588	125	1 713	16.34
Post menopausal breast cancer	136	1 427	75	1 501	6.38

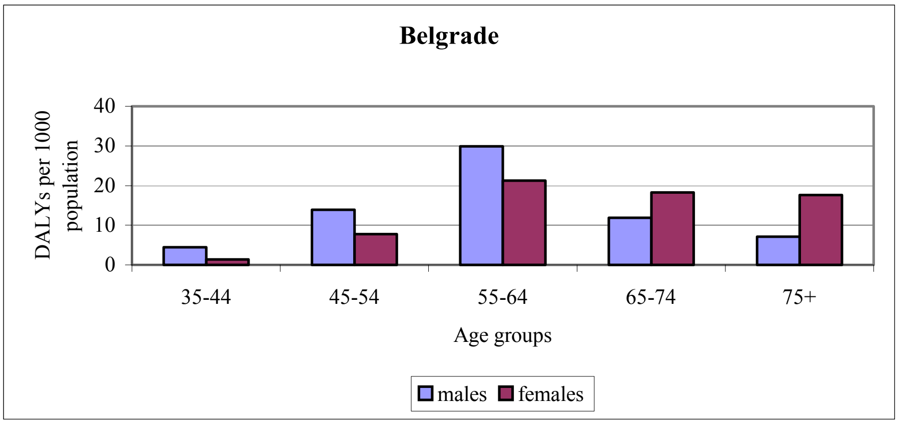
Table 6.30. The disease burden attributable to obesity by conditions, Belgrade 2000

Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	198	2 426	295	2 720	14.85
Stroke	116	1 328	284	1 612	12.25
Type 2 diabetes mellitus	86	646	648	1 294	45.02
Colorectal cancers	49	259	27	286	8.27
Females					
Ishaemic heart disease	137	1 261	238	1 499	15.39
Stroke	162	1 474	207	1 680	13.09
Type 2 diabetes mellitus	137	950	870	1 820	55.39
Colorectal cancers	49	374	25	399	17.29
Post menopausal breast cancer	37	397	40	437	7.30

The disease burden in our study increases with age and the highest rates are at the age of 55 to 64 years in both males and females. This is somewhat different from the results of the Australian Burden of Disease Study (Mathers et al. 1999), where the highest rates are in the oldest age groups. Between 35 and 64 years of age the DALY rates due to obesity are higher in males than in females, because of the higher prevalence of obesity in males for those age groups and due to the highest mortality incidence for selected conditions (Figure 6.15.), which is in accordance with the results of other studies.

Figure 6.15. The disease burden attributable to obesity in DALY rates per 1 000 population





6.2.7. High Blood Cholesterol

In the previous section we explained that high blood cholesterol is a major risk factor for ishaemic heart disease (IHD) and for peripheral vascular disease. As we had no relevant mortality and morbidity data for the peripheral vascular disease, the burden was calculated only for ishaemic heart disease. High blood cholesterol may also be a risk factor for stroke, but the evidence is less clear and stroke was not included in this analysis. Total cholesterol levels above 5.5 mmol/l are recognized as an increased risk of developing coronary heart disease, while levels above 6.5 mmol/l indicate very high risk.

There were no recent studies of blood cholesterol levels in our population, so we used the data from the Population Health Survey Study in Republic of Srpska (The Ministry of Health and Social Welfare of the Republic of Srpska, 2002) for our population estimates. The prevalence is lower among males (22.7 %) than among females (25.3%). The highest prevalence was in the age group of 60 to 64 years of age (Figure 6.8.). The source for the values of relative risks was the Australian Burden of Disease Study (Mathers et al. 1999) and the same relative risks were used in both parts of our study.

Total deaths, YLLs, YLDs and DALYs for IHD by gender are presented in Table 6.31. for the whole Serbia and Table 6..32. for Belgrade. Percentage of total DALYs was calculated as a proportion of total DALYs attributable to IHD, for Serbia and Belgrade.

Table 6.31. The disease burden attributable to high blood cholesterol by conditions, Serbia 2000

Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	704	6 122	631	6 753	7.03
Females					
Ishaemic heart disease	251	1 922	1 064	2 986	5.44

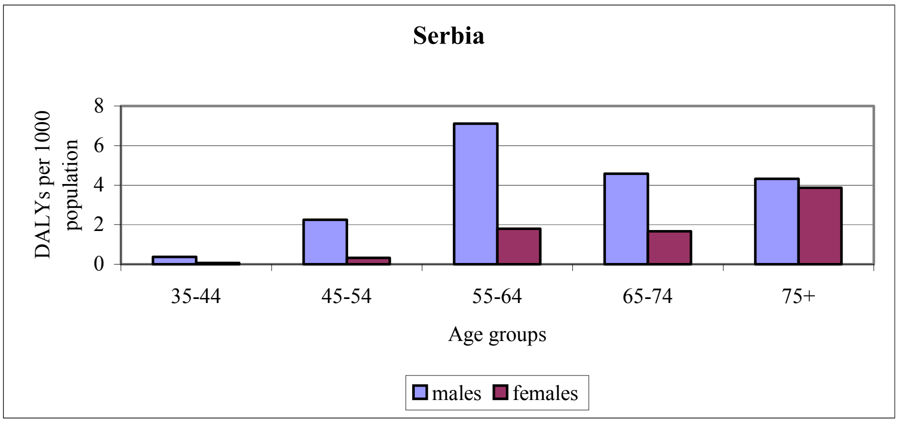
Table 6.32. The disease burden attributable to high blood cholesterol by conditions, Belgrade 2000

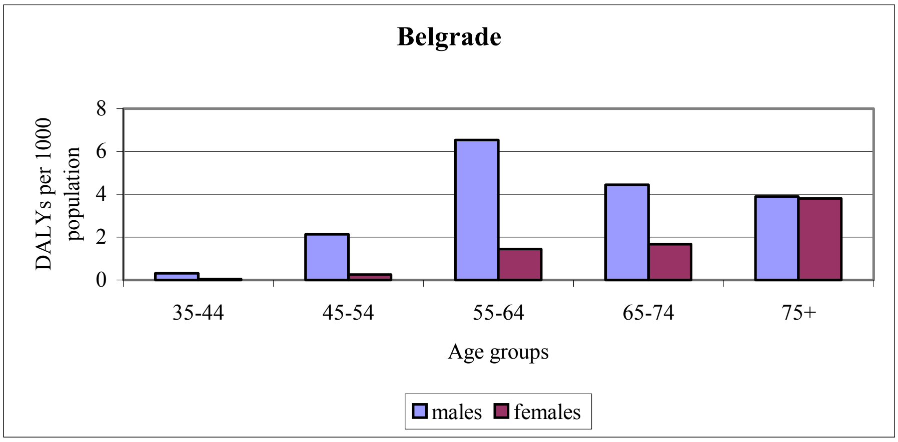
Condition	Deaths	YLL	YLD	DALY	% of total DALYs
Males					
Ishaemic heart disease	132	1 168	130	1 299	7.09
Females					
Ishaemic heart disease	43	338	62	400	4.10

Almost complete disease burden of high blood cholesterol is due to to the increased risk of dying, rather than having disability. The disease burden is much higher for males than for females, because IHD is a more common disease with males. It is also suggested in the literature that high blood cholesterol is a stronger risk factor for IHD in males. 7% of all disease burden attributable to IHD is due to high blood cholesterol in males and 5.4% in females of Serbia. In Belgrade population the percentage among females is lower: 4.1% of total DALYs attributable to IHD.

The highest estimated burden for males in our study was for the age group of 55 to 64 years of age and then declining for the older age groups. The highest burden for females was in the oldest age group (Figure 6.16.). These results are different from the results of other relevant studies (Mathers et al. 1999; Department of Human Services, Victoria 1999), where the highest burden for both genders was in the oldest age groups. Also, the differences in the attributable disease burden for males and females were much higher in their studies.

Figure 6.16. The disease burden attributable to high blood cholesterol in DALY rates per 1 000 population





6.3. Discussion and Conclusions

The Serbian Burden of Disease Study provided estimates for the seven selected risk factors: tobacco, alcohol, physical inactivity, insufficient intake of fruits and vegetables, high blood pressure, obesity and high blood cholesterol. In the process of selecting the main risk factors several criteria were used: a good evidence of the risk factor assotiation with at least one mayor category of disease or injury; availability of the relative risk estimates from recent epidemiological studies; proportion of the related diseases or injuries in the mortality and morbidity rates in Serbia; availability of nationally representative estimates of prevalence of the risk factor for Serbia, public health importance of the related diseases and health priorities defined by the Ministry of Health in the health care reform process.

The model that was used in our study produced relatively simplistic estimations. It allows the estimations of the burden of diseases and injuries attributable to various health risks if the prevalence of exposure to the risk factor in the population is known as well as the relative risk of each causally associated disease or injury for those exposed to the risk factor. The relative risks are dependent on dose, duration and other quantitative and qualitative parameters. Data on risk prevalence were available only for current exposure status and may not reflect the level of the true exposure over a period of time.

Most of our prevalence data were based on self-reported health status, alcohol consumption, smoking behavior, dietary habits and physical activity. Self reported data may not always be completely valid.

The attribution of disease burden to the single risk factor is also a simplification, because several risk factors often occur simultaneusly for the same individual. The overall risk may be greater or smaller than the addition of risks for each risk factor.

The mortality burden due to the selected risk factors was estimated for all diseases and injuries, whose occurences can be connected to the exposure to the selected risk factors and calculated as a proportion of total mortality burden in Serbia. The total disease burden was estimated only for conditions which were included in the group of diseases and injuries selected for the analysis in the morbidity part of our study. The combination of seven selected risk factors is responsible for about 45% of the mortality burden in Serbia. The percentage of total disease burden may be similar, because most of the burden attributed to risk factors for conditions selected for analysis of total burden, was due to mortality.

The results of our study are mostly in accordance with the results of other relevant studies. Tobacco smoking is the risk factor responsible for the greatest burden: 18% of total YLLs in males and 7.9% in females. Hypertension is also a major risk factor in our population: 9.7% of total YLLs in males and 13.3% in females are attributed to this risk factor. Next to hypertension, physical inactivity is responsible for 8.2% of total YLLs in males and 11.8% in females. Obesity was connected to somewhat lower proportion of 5.5% of total YLLs in males and 7% in females. Inadequate intake of fruits and vegetables can be considered as an important risk factor in our population, because it is responsible for 3.3% of total YLLs in males and 2.9% in females. The burden due to high blood cholesterol was 1.3% of total YLLs in males and 0.5% in females. Estimations of mortality burden of high blood cholesterol in our study are lower than in other studies. The possible reasons are the relatively low total prevalence of high blood cholesterol in our study and the distribution of rate values for age groups. In our study the highest prevalences were in the older age groups.

The net harm associated with alcohol consumption was estimated at 0.13% of total YLLs. The injury and chronic diseases burden associated with harmful and hazardous levels of alcohol consumption is minimized by the burden of cardiovascular diseases prevented by alcohol consumption. This protective effect was much higher in females and in the older age groups, while the harmful effects of alcohol were apparent in all ages and in both males and females.

Total burden of risk factors calculated for selected conditions is mostly due to mortality burden, except for obesity. Our results indicate that the risk of disability attributed to obesity has the most important part in total burden of disease due to diabetes, IHD and stroke.

7. Cost and Effectiveness of the Management of Diabetes Mellitus Type 2

Vesna Bjegović, Ulrich Laaser, Ljiljana Stokić-Pejin, Zorica Terzić-Šupić, Sandra Šipetić-Grujičić

It is evident that the health sector in Serbia is facing numerous problems which result in inaccurate provision of services. At present, health care resources cannot be increased substantially, but it is a great challenge to try to improve the efficiency of the care or at least contain the costs. The main health services financial provider is the Health Insurance Fund (HIF), which functions upon principles that have not changed in the last twenty years. Cost-effectiveness has never been analyzed for several reasons:

- The existing salary system for the health care providers does not make provision for any attempt to improve effectiveness. The health care personnel receive their salaries regardless of the outcomes;
- Lack of standardized disease management protocols;
- Lack of reliable data on health status and absence of health information technology;
- Opposition of the health care system employees to adopt methods for measuring the efficiency;
- Lack of proper methodology and insufficient manpower in applying cost-effectiveness instruments;
- Absence of the National Health Accounts.

Taking these problems into account, an analysis of cost and effectiveness - in the framework of the Serbian Burden of Disease Study (SBDS) - can only be performed to a very limited degree in terms of scope, validity, and disease spectrum. The treatment of Diabetes mellitus (DM) in Serbia was chosen as an example demonstrating the potential of Cost –Effectiveness Analysis (CEA), because it is a mass disease affecting large numbers especially among older people (DM type 2). The fact that the National Serbian Guideline on the Management of Diabetes (NSGDM) is available since 2002/03 is of no lesser relevance.

The analysis of cost and effectiveness of the management of Diabetes mellitus type 2 in Serbia *outlined below should clarify whether the nationwide rigid application of the Guideline would save relevant amount of Disability Adjusted Life Years and/or reduce the medical cost of treating diabetic patients in Serbia, as compared to the present situation***.** Nevertheless, the CEA described below is to be considered strictly as a preliminary one, since the key data have to be confirmed in a more thorough analysis, including a systematic evaluation of clinical opinion (e.g., in a DELPHI approach, or in specific surveys). Also, a lifetime or cohort approach has to be employed in the final analysis instead of the cross-sectional concept for one-year period used here as a first step (Laaser 1994).

Figure 2.5, presented in Chapter 2.9, sets the stage for describing in a simplified manner the various stages of a patient with DM considered here. The two types of Diabetes mellitus, type 1 and type 2 – formerly also named Insulin Dependent Diabetes mellitus (IDDM) and Non Insulin Dependent Diabetes mellitus (NIDDM) – have distinct pathogeneses and age spectra. The CEA in this project is restricted to DM type 2, as it accounts for more than 98% of the total prevalence in the Serbian population (the Belgrade Diabetes Registry).

7.1. COSTING

As the first step an attempt was made to extract standard procedures for diagnosis, monitoring, and control from the NSGDM and to apply appropriate costing. In Table 7.1. a simplified scheme suitable for cost analysis of patient monitoring is provided. Costs are calculated from the health insurance perspective. This means that only those cost items which are reimbursed were taken into account. In addition to the prices of the Health Insurance Fund (HIF), prices in private practice for the same items are given for comparison in the following tables. The schemes refer to a “Standard Patient”, without considering differences in individual needs. Whereas a more intense monitoring may be necessary for some patients, e.g. with weekly controls of a number of parameters, others may require much smaller check-ups only once every three months, thus compensating each other to some degree in terms of rising costs (Appendix D). For our purposes, we assumed that all patients should be controlled at least annually, including a dietary consultation; those with a well-adjusted therapeutic regimen need only 3 additional interim controls, i.e., quarterly. More frequent controls every 2 months may be required for patients with higher blood sugar levels.

Table 7.1. Monitoring of patients with DM 2 (according to NSGDM)

Parameter	Interim controls	Entrance examination resp. annual controls
Physical examination and history		x
Dietary analysis and counselling		x
Glycemia	x	x
OGTT* or diurnal profile	x	x
HbA1c	x	x
Proteinuria/ Albuminuria		x
Glycosuria		x
Creatinine level		x
Total Cholesterol		x
LDL		x
HDL		x
TGL		x

* OGGT with 3 determinations of blood sugar level

Table 7.2. indicates costs for the monitoring procedures according to the Health Insurance Book of Prices, Belgrade 2001, and, for comparison, to the private practice (the latter is based on a telephone survey in 5 Belgrade facilities in July 2003). For HbA1c the prices of the HIF in 1999 had to be assumed as still valid in 2003, as more recent prices were not available. For dietary counselling with private practice physicians prices were not known, therefore the higher HIF prices for a small group work in Table 7.2. were applied.

Table 7.2. Estimated cost (Dinar SMN) of diagnostic procedures in patients with DM 2 (acc. to Health Insurance Book of Prices, Belgrade 2001 and private practice)

Parameter	2001-03 (still valid in 2003)	Private Practice (Belgrade)
History & physical exam at entrance (GP)	33.39	1500.00
Dietary & health education, respectively small group work	60.13 286.69	
History & physical exam at (annual) follow up (GP)	21.75	1500.00
Glycemia (pre-/postprandial)	35.44	50.00
OGTT/diurnal profile	211.86	700.00
HbA1c	102.59	460.00
Proteinuria/albuminuria	51.77	100.00
Glycosuria (qualitative) (quantitative)	10.33 51.77	50.00
Urine analysis (total)	43.78	
Creatinine	49.48	70.00
Total Cholesterol	35.44	70.00
HDL	44.80	70.00
LDL	44.80	70.00
TGL	35.44	70.00

Applied to the monitoring of patients presented in the Table 7.1., resulting prices for entrance examination, bimonthly or quarterly controls throughout one year, and the annual control examination are given in Table 7.3.

Table 7.3. Estimated cost of monitoring patients with DM 2 (Dinar)

Monitoring	HIF 2001-03	Private practice 2003
Entrance examination	715.47	3496.69
Bimonthly follow-ups	1749.45	6050.00
Quarterly follow-ups	1049.67	3630.00
Annual check-up	703.83	3496.69

Table 7.4. assembles the relevant information on treatment schemes presently most common in Serbia (acc. to Prof. Lalić, personal communication). Again, this relates to the “Standard Patient”. In order to consider more specific variations, a regular survey had to be executed instead of asking for expert opinion only.

Table 7.4. Estimated costs of standard therapies of patients with DM 2

Scheme	Drugs	Prices of Drugs (Dinar)	Composition	Daily Price by Scheme (2003)
Diet		/	/	/
Antidiabetics	Sulfonylurea	10.66/tbl.	Scheme 1	17.37
	Metformine	2.31/tbl.	Scheme 2	26.14
Insulin	Insulin	13.48/IU	40 IU/day	53.90

In Table 7.4. it is important to acknowledge that diet is assumed to be part of any treatment, but without costs other than those paid by the patient for dietary food. All prices in Table 7.4. were calculated by using average values only of drugs registered on the domestic market. The prices of Sulfonylurea and Metformine were calculated for 1 tablet of drug as an average of those which are presented at the registered drug market in Serbia. In order to calculate daily prices of Sulfonylurea and Metformine, two therapeutic options were considered: Scheme 1 and Scheme 2:

- Scheme 1 – according to NSGDM: 1.0 Sulfonylurea + 1.5 Metformin + 0.5 others
- Scheme 2 – presently common: 2.2 Sulfonylurea + 0.6 Metformin + 0.2 others

The daily price of drugs under the term “others” was considered as the average of Sulfonylurea and Metformin taken (i.e. 6.48/tbl Dinar). Prices for insulin were estimated by a market average of the 10 most common insulin products registered on the domestic market. It is assumed that usual dose of insulin is 40 IU per day.

Crucial information on the distribution of patients had to be obtained according to the above present treatment schemes, and in an ideal situation when NSGDM is applied. In the present situation it is estimated, according to expert opinion, that: 30% of diabetic patients are treated and normalized and 70% are either not treated or insufficiently treated; 40% of diabetic patients are being on diet alone, 25% on diet and drugs, 15% on diet, drugs, and insulin, and 20% on diet and insulin. In an ideal situation defined by the NSGDM: 65% should be treated and normalized and 35% treated without complete normalization of blood sugar levels; 50% should be on a diet alone, 25% on diet and drugs, 15% on diet, drugs and insulin, and 10% on diet and insulin.

These estimates are based on the “Target values of low cardiovascular risk” in the NSGDM, which are <5,5 mmol/L for fasting glucose, <7,5 mmol/L for postprandial, and <6,5 mmol/L for HbA1c.

7.2. DALYs LOST IN SERBIA DUE TO DIABETES MELLITUS

Table 7.5. indicates some basic epidemiological data of Diabetes mellitus from the Registry in Belgrade, which also allow for an estimate of the proportion of DM 2 in all diabetic cases (98%).

Table 7.5. Prevalence and incidence data for diabetes mellitus from the Registry of Belgrade

	Males	**Females**
Population of Belgrade	752 107	832 028
Incidence (%)	0.180	0.180
Prevalent cases of DM 1	704	652
Prevalence of DM 1 (%)	0.094	0.078
Prevalent cases of DM 2	15 086	17 745
Corrected prevalent cases of DM 2 [1]	22 126	26 026
Adjusted prevalent cases of DM 2 [2]	33 166	39 019
Prevalence of DM 2 (%)	4.404	4.690
Total prevalent cases of Diabetes	33 870	39 671
Total prevalence of Diabetes (%)	4.497	4.768
Proportion DM 2 of total diabetic cases	4.404 / 4.497 = **0.98**	4.690 / 4.768 = **0.98**

[1] According to Dr. Lj. Marčetić of the City Institute of Public Health, the Belgrade Registry covers only 53.34% of DM II, i.e. the prevalence of DM 2 has to be multiplied by 1.4666 (corrected number of cases).

[2] In addition, it is estimated that the ratio of diagnosed to undiagnosed diabetes is approximately 1: 0.5, i.e., the corrected prevalence of DM 2 has to be multiplied by 1.5 (adjusted number of cases).

Tables 7.6a. and 7.6b. summarize the information on YLDs, YLLs and DALYs due to Diabetes Mellitus in Serbia (year of reference: 2000). 37 336 DALYs altogether are lost (Table 7.6b.) per year in a population of 7.551 million inhabitants, or 4.94 DALYs per 1 000. This is an underestimation, as only the 4 most important complications are considered: diabetic blindness, neuropathy, diabetic foot, and amputation. Especially the secondary effects due to arteriosclerosis of the coronary and the renal arteries do not enter the analysis, as the contribution of diabetes mellitus to these states is difficult to determine without additional data. The total prevalence for Serbia - used in this calculation - differs slightly from the total prevalence for Belgrade because of different population sizes per age class. The age-specific prevalences are taken from the Belgrade registry and therefore identical.

Table 7.6a. DALYs due to Diabetes mellitus (type 1 and type 2), Serbia 2000

Diabetic status	Sex	Population	Prevalence (%)	Number of cases	Disability weight	YLD	YLD/1000 population
Diabetic cases	Males	3 673 529	4.548	167 070	0.016	2 707	0.737
	Females	3 877 326	4.987	193 363	0.016	3 132	0.808
Complications							
Diabetic blindness	Males	3 673 529	0.023	827	0.528	436	0.119
	Females	3 877 326	0.025	963	0.530	508	0.131
Neuropathy	Males	3 673 529	1.271	46 673	0.068	3 174	0.864
	Females	3 877 326	1.393	54 027	0.068	3 674	0.948
Diabetic foot	Males	3 673 529	0.281	10 333	0.131	1 354	0.368
	Females	3 877 326	0.308	11 958	0.131	1 567	0.404
Amputation	Males	3 673 529	0.008	294	0.098	29	0.008
	Females	3 877 326	0.009	347	0.098	34	0.009
All	Males	3 673 529		58 127		4 939	
	Females	3 877 326		67 295		5 783	

Note: Slightly incongruent numbers are due to rounded factors.

Disability weights are GBD: 0.016 is the weighted average of treated and untreated cases, having a lower weight for untreated or ineffectively treated cases under the assumption that those patients have less discomfort due to therapy (e.g. side-effects). However, they have more DALYs stemming from complications.

Table 7.6b. YLD and YLL from Diabetes mellitus in Serbia and resulting DALYs

Total	Population	YLD	YLD /1 000	YLL	YLL /1 000	DALYs	DALYs /1 000
Males	3 673 529	7 700	2.10	9 438	2.57	17 137	4.66
Females	3 877 326	8 915	2.30	11 283	2.91	20 199	5.21
Total	7 550 855					3 7336	

7.3. Cost and Effectiveness of the Present Management of DM 2 in Serbia, Comparison with an Ideal Management Scheme According to NSGDM.

In order to analyse cost-effectiveness of the clinical management of Diabetes in Serbia a number of assumptions has to be made:

1. The analysis is restricted to the estimated number of patients with DM 2.
2. The fully controlled diabetic patient (DM 2) has a slightly diminished quality of life (disability weight 0.016), but the same life expectancy as a healthy person (i.e., no DALYs from YLL).
3. However, fully controlled patients also develop micro- and macro-angiopathies. The reduction of the rate of complications in controlled vs. uncontrolled DM 2 patients according to expert opinion (Prof. Lalić, School of Medicine, Belgrade University) may be as much as 1/3 for (nephritic, retinal) micro- and 1/5 for (arteriosclerotic) macro-angiopathies, or on the average 25% assumed for this analysis.
4. DM 1 and 2 do not differ with regard to the rates of DALYs originating from these disease entities, i.e., their course is sufficiently similar, which allows the use

of a proportional factor (0.98; see Table 7.5.) to estimate the number of DALYs due to DM 2 from the total DALYs caused by Diabetes in Serbia.

5. The prevalence of diabetes used in the SBDS is the period prevalence of 1 year and therefore includes fully the one-year incidence (the annual incidence of DM 2 in the population is 0.18% according to the Belgrade Diabetes Registry).
6. All prevalent cases have the disease throughout the entire year; all incident cases have the disease on the average for ½ year (i.e., no annual follow-up examination yet).
7. Treatment effectiveness is equal for prevalent and incident cases.
8. The evaluation of the clinical management of Diabetes in Serbia provided by expert opinion (Prof. Lalić, School of Medicine, Belgrade University), is a reasonably good estimate of the situation in Serbia and of the prospects of patient management based on the NSGDM.
9. Hospitalisation costs are not considered because they are difficult to determine, and only a small number of diabetic patients requires hospitalisation at all (most should be managed in out-patient care). Likewise, the cost for associated treatment, e.g., of hyperlipidemia, is not accounted for. With regard to the present situation, monitoring costs have been calculated as if the NSGDM Scheme was followed everywhere, which is not likely or realistic. Therefore, monitoring costs for the present situation are somewhat overestimated.
10. The clinical determinants do not differ to a greater extent according to sex and age; therefore the calculation of cost-effectiveness can be done on the basis of the total population.
11. Only the "Standard Patient" is considered in this analysis, neither individual differences nor different stages in a diabetic "career" could be accounted for in this first cross-sectional one-year period analysis.

Based on the foregoing assumptions, cost effectiveness will be analysed in 8 population groups (Population group I – Population group VIII) in Serbia under ideal and under present conditions; prevalent and incident cases each split up for patients with well controlled, i.e., normalized blood glucose levels, and those uncontrolled, i.e., with elevated levels of blood glucose.

IDEAL SITUATION

Diabetic cases	**Clinical status**	
	Controlled	**Uncontrolled**
Prevalent cases	Population group I Table 7.7a.	Population group III Table 7.8a.
Incident cases	Population group II Table 7.7b.	Population group IV Table 7.8b.

PRESENT SITUATION

Epidemiological status	**Clinical status**	
	Controlled	**Uncontrolled**
Prevalent cases	Population group V Table 7.9a.	Population group VII Table 7.10a.
Incident cases	Population group VI Table 7.9b.	Population group VIII Table 7.10b.

In the following tables (Table 7.7a. and Table 7.7b.) the analysis is performed for the ideal situation when DM 2 is controlled. For this situation it is assumed (see above) that no YLL due to DM 2 occurs, and that YLD can be reduced to 75% of the present situation. As regards the monitoring, the quarterly controls are considered to be sufficient, including an annual follow-up examination with a broader spectrum of laboratory investigations for the prevalent cases and an entrance examination for the incident cases. With regards to therapy, the pharmaceuticals are weighted according to Scheme 1 (ideal treatment according to the NSGDM).

Table 7.7a. and Table 7.7b. Ideal situation, controlled Recalculation of DALYs (YLD from cases + 75% complications + 0% YLL for DM 1 and 2):

	Total DALYs from DM 1 and 2##	**Total DALYs of DM 2 only***	**Prevalence corrected for 1-year incidence included**	**DALYs from prevalent cases**	**DALYS from controlled prevalent cases (x 0.65)**	**Factor for incidence**	**DALYs from incident cases**	**DALYs from controlled incident cases (x 0.65)**
Males	6 452	6 323	0.9604**	6 073		0.0396**	250	
Females	7 469	7 320	0.9639#	7 056		0.0361#	264	
Total	13 921	13 643		13 129	8 534		514	334

Calculation of population denominator:

	Population of Serbia 2000	**1-year prevalence DM 2 (%)**	**Population prevalence**	**Prevalence corrected for incidence**	**Controlled prevalence (x 0.65)**	**1-year incidence (%)**	**Population incidence**	**Controlled incidence (x 0.65)**
Males	3 673 529	4.548	167 070	160 458**		0.18	6 612	
Females	3 877 326	4.987	193 363	186 384#		0.18	6 979	
Total	7 550 855		360 433	346 842	225 447		13 591	8 834

* For the proportion of DM 2 from total DM equal to 0.98 see Table 7.5.
** males: 0.18 x 100 : 4.548 = 3.96 i.e. 1.00 – 0.0396 = 0.9604
# females: 0.18 x 100 : 4.987 = 3.61 i.e. 1.00 – 0.0361 = 0.9639
From Table 7.6. calculate for males 2 707 + [(7 700-2 707) x 0.75] + 0.0 x 9 438 = 6 452
From Table 7.6. calculate for females 3 132 + [(8 915-3 132) x 0.75] + 0.0 x 11 283 = 7 469
For the incidence of 0.18 see Table 7.5.; for the total prevalence of 4.548 responds 4.987 in Serbia see Table 7.6.

SUMMARY (Tables 7.7a. and 7.7b.)	**Controlled prevalence**	**Controlled incidence**
Controlled diabetic population	225 447	8 834
DALYs* from controlled diabetics	8 534	334
Monitoring costs (2001): Entrance examination Bi-monthly controls Quarterly controls Annual control Sum:	 None 1049.67 703.83 1753.50	 715.47 1049.67 : 2 = 524.84* None 1240.31
Monitoring costs (private): Entrance examination Bi-monthly controls Quarterly controls Annual control Sum:	 None 3630.00 3496.69 7126.69	 3496.69 3630.00 : 2 = 1815.00* None 5311.69
Treatment cost/day: Diet (50%) Diet & drugs-scheme 1 (25%) Diet, drugs & insulin (15%) Diet& insulin (10%) Weighted average	 0.00 17.37 x 0.25 = 4.34 (17.37+53,90) x 0.15 = 10.69 53,90 x 0.10 = 5.39 4.34+10.69+5.39=20.42	 20.42
Calculation of population costs: Monitoring (2001-3): Monitoring (private):	 1753.50 x 225 447 = 395 321 314.50 7126.69 x 225 447 = 1 606 690 880.00	 1240.31 x 8 834 = 10 956 898.54 5311.69 x 8 834 = 46 923 469.46

Therapy (2003): Total (2001-3): Total (private):	365 x 20.42 x 225 447 = 1 680 570 989.57 2 075 892 304.07 3 287 261 870.00	(365:2) x 20.42 x 8 834= 32 926 062.72 43 882 917.09 79 849 532.18

* An average duration of 6 months was assumed for incident cases in the first year

In summary:

IDEAL SITUATION, CONTROLLED

	Population group I Prevalent cases	**Population group II Incident cases**
DALYs	8 534	334
Costs 2001-3 (million of Dinars):	2 076	44
Costs private (million of Dinars):	3 287	80

In the foregoing analysis separate calculations were done for those diabetic patients who are well controlled under ideal management according to the NSGDM. However, even under ideal conditions, for some reasons the glucose metabolism may not be fully controlled. According to expert opinion this could happen in about 35%.

In the following tables (Table 7.8a. and Table 7.8b.) the same procedure as before was followed for the ideal situation when DM is not fully under control. For this situation it is assumed (see above) that YLL and YLD due to DM 2 cannot be reduced, i.e., occurrence is 100%. With regards to monitoring, the bimonthly controls are considered to be necessary, including an annual follow-up examination with a broader spectrum of laboratory investigations for the prevalent cases and an entrance examination for the incident cases. With regards to therapy, the pharmaceuticals are weighted according to Scheme 1 (ideal treatment according to the NSGDM).

Table 7.8a. and Table 7.8b. Ideal situation, uncontrolled:
Recalculation of DALYs (YLD from cases + 100% complications + 100% YLL for DM 1 and 2):

	Total DALYs from DM 1 and 2	**Total DALYs of DM 2 only***	**Prevalence corrected for 1-year incidence included**	**DALYs from prevalent cases**	**DALYS from un-controlled prevalent cases (x 0,35)**	**Factor for incidence**	**DALYs from incident cases**	**DALYs from un-controlled incident cases (x 0.35)**
Males	17 137	16 794	0.9604**	16 129	5 645	0.0396**	665	233
Females	20 199	19 795	0.9639#	19 080	6 678	0.0361#	715	250
Total	37 336	36 589			12 323			483

Calculation of population denominator:

	Population of Serbia 2000	**1-year prevalence DM 2 (%)**	**Population prevalence**	**Prevalence corrected for incidence**	**Uncontrolled prevalence (x 0.35)**	**1-year incidence (%)**	**Population incidence**	**Uncontrolled incidence (x 0.35)**
Males	3 673 529	4.548	167 070	160 458		0.18	6 612	
Females	3 877 326	4.987	193 363	186 384		0.18	6 979	
Total	7 550 855		360 433	346 842	121 395		13 591	4 757

* For the proportion of DM 2 from total DM equal to 0.98 see Table 7.5
** males: 0.18 x 100 : 4.548 = 3.96 i.e. 1.00 – 0.0396 = 0.9604
\# females: 0.18 x 100 : 4.987 = 3.61 i.e. 1.00 – 0.0361 = 0.9639
For the incidence of 0.18 see Table 7.5; for the total prevalence of 4.548 resp. 4,.87 in Serbia see Table 7.6.

SUMMARY (Tables 7.8a. and 7.8b.)	Uncontrolled prevalence	Uncontrolled incidence
Uncontrolled diabetic population	121 395	4 757
DALYs* from uncontrolled diabetics	12 323	483
Monitoring costs (2001): Entrance examination Bi-monthly controls Quarterly controls Annual control Sum:	 None 1749.45 703.83 2453.28	 715.47 1749.45 : 2 = 874.73* None 1590.20
Monitoring costs (private): Entrance examination Bi-monthly controls Quarterly controls Annual control Sum:	 None 6050.00 3496.69 9546.69	 3496.69 6050.00 : 2 = 3025.00* None 6521.69
Treatment cost/day: Diet (50%) Diet & drugs-Scheme 1 (25%) Diet, drugs & insulin (15%) Diet& insulin (10%) Weighted average	 0.00 17.37 x 0.25 = 4.34 (17.37+53,9) x 0.15 = 10.69 53,9 x 0.10 = 5.39 4.34+10.69+5.39=20.42	 20.42
Calculation of population costs: Monitoring (2001-3): Monitoring (private): Therapy (2003): Total (2001-3): Total (private):	 2453.28 x 121 395 = 297 815 925.60 9546.69 x 121 395 = 1 158 920 433.00 365 x 20.42 x 121 395 = 904 926 281.03 1 202 742 206.63 2 063 846 713.58	 1590.20 x 4 757 = 7 564 581.40 6521.69 x 4 757 = 31 023 679.33 (365 : 2) x 20.42 x 4 757 = 17 730 278.51 25 294 836.12 48 753 957.84

* An average duration of 6 months is assumed for incident cases in the first year

In summary:

IDEAL SITUATION, UNCONTROLLED

	Population Group III Prevalent cases	Population Group IV Incident cases
DALYs	12 323	483
Costs 2001-3 (million of Dinars):	1 203	25
Costs private (million of Dinars):	2 064	49

In the following tables (Table 7.9a. and Table 7.9b.) the analysis is performed for the present situation in Serbia and the most common therapy of DM is considered (see therapeutic Scheme 2). It is supposed, according to expert opinion, that under these circumstances only 30% of diabetic cases are under full metabolic control. For this situation it is further assumed (see above) that no YLL due to DM 2 occurs and YLD can be reduced to 75% of the present situation. With regards to monitoring, quarterly resp. bimonthly controls are considered to be sufficient, including an annual follow-up examination with a broader spectrum of laboratory investigations for the prevalent cases and an entrance examination for the incident cases. With regards to therapy, the pharmaceuticals are weighted according to Scheme 2 (treatment as presently common).

Table 7.9a. and Table 7.9b. Present situation, controlled:
Recalculation of DALYs (YLD from cases + 75% complications + 0% YLL for DM 1 and 2):

	Total DALYs from DM 1 and 2##	Total DALYs of DM 2 only*	Prevalence corrected for 1-year incidence included	DALYs from prevalent cases	DALYS from controlled prevalent cases (x 0.30)	Factor for incidence	DALYs from incident cases	DALYs from controlled incident cases (x 0.30)
Males	6 452	6 323	0.9604**	6 073		0.0396**	250	
Females	7 469	7 320	0.9639#	7 056		0.0361#	264	
Total	13 921	13 643		13 129	3 939		514	154

Calculation of population denominator:

	Population of Serbia 2000	1-year prevalence DM 2 (%)	Population prevalence	Prevalence corrected for incidence	Controlled prevalence (x 0.30)	1-year incidence (%)	Population incidence	Controlled incidence (x 0.30)
Males	3 673 529	4.548	167 070	160 458		0.18	6 612	
Females	3 877 326	4.987	193 363	186 384		0.18	6 979	
Total	7 550 855		360 433	346 842	104 053		13 591	4 077

* For the proportion of DM 2 from total DM equal to 0.98 see Table 7.5.
** males: 0.18 x 100 : 4.548 = 3.96 i.e. 1.00 - 0.0396 = 0.9604
\# females: 0.18 x 100 : 4.987 = 3.61 i.e. 1.00 - 0.0361 = 0.9639
\## From Table 7.6. calculate for males 2 707 + [(7 700-2 707) x 0.75] + 0.0 x 17 137 = 6 452
\## From Table 7.6. calculate for females 3 132 + [(8 915-3 132) x 0.75] + 0.0 x 17 137 = 7 469
For the incidence of 0.18 see Table 7.5.; for the total prevalence of 4.548 resp. 4.987 in Serbia see Table 7.6.

SUMMARY (Tables 7.9a. and 7.9b.)	Controlled prevalence	Controlled incidence
Controlled diabetic population	104 053	4 077
DALYs* from controlled diabetics	3 939	154
Monitoring costs (2001): Entrance examination Bi-monthly controls Quarterly controls Annual control Sum:	 None 1049.67 703.83 1753.50	 715.47 1049.67 : 2 = 524.84* None 1240.31
Monitoring costs (private): Entrance examination Bi-monthly controls Quarterly controls Annual control Sum:	 None 3630.00 3496.69 7126.69	 3496.69 3630.00 : 2 = 1815.00* None 5311.69
Treatment costs/day: Diet (40%) Diet & drugs-scheme 2 (25%) Diet, drugs & insulin (15%) Diet& insulin (20%) Weighted average	 0.00 26.14 x 0.25 = 6.54 (26.14+53,9) x 0.15 = 12.01 53,9 x 0.20 = 10.78 6.54+12.01+10.78=29.32	 29.32
Calculation of population costs: Monitoring (2001-3): Monitoring (private): Therapy (2003): Total (2001-3): Total (private):	 1753.50 x 104 053 = 182 456 935.50 7126.69 x 104 053 = 741 553 474.60 365 x 29.32 x 104 053 = 1 113 592 374.75 1 296 049 310.25 1 855 145 849.32	 1240.31 x 4 077 = 5 056 743.87 5311.69 x 4 077 = 21 655 760.13 (365 : 2) x 29.32 x 4 077 = 21 816 363.35 26 873 086.84 43 472 123.48

* An average duration of 6 months is assumed for incident cases in the first year

In summary:

PRESENT SITUATION, CONTROLLED

	Population group V Prevalent cases	Population group VI Incident cases
DALYs	3 939	154
Costs 2001-3 (million of Dinars):	1296	27
Costs private (million of Dinars):	1 855	43

When the most common therapy of DM (according to the present situation in Serbia) is applied, expert opinion suggests that 70% of diabetic cases will not be under control. For this situation it can be assumed (see above) that YLL and YLD due to DM 2 cannot be reduced, i.e., occurrence is 100%. With regards to monitoring, the bimonthly controls are considered to be necessary, including an annual follow-up examination with a broader spectrum of laboratory investigations for the prevalent cases and an entrance examination for the incident cases. With regards to therapy, the pharmaceuticals are weighted according to Scheme 2 (treatment as presently common). The following tables (Table 7.10a. and Table 7.10b.) present the analysis for such a situation.

Table 7.10a. and Table 7.10b. Present situation, uncontrolled:
Recalculation of DALYs (YLD from cases + 100% complications + 100% YLL for DM 1 and 2):

	Total DALYs from DM 1 and 2	Total DALYs of DM 2 only*	Prevalence corrected for 1-year incidence included	DALYs from prevalent cases	DALYS from uncontrolled prevalent cases (x 0.70)	Factor for incidence	DALYs from incident cases	DALYs from uncontrolled incident cases (x 0.70)
Males	17 137	16 794	0.9604**	16 129	11 290	0.0396**	665	466
Females	20 199	19 795	0.9639#	19 080	13 356	0.0361#	715	501
Total	37 336	36 589			24 646			966

Calculation of population denominator:

	Population of Serbia 2000	1-year prevalence DM 2 (%)	Population prevalence	Prevalence corrected for incidence	Uncontrolled prevalence (x 0.70)	1-year incidence (%)	Population incidence	Uncontrolled incidence (x 0.70)
Males	3 673 529	4.548	167 070	160 458		0.18	6 612	
Females	3 877 326	4.987	193 363	186 384		0.18	6 979	
Total	7 550 855		360 433	346 842	242 789		13 591	9 514

* For the proportion of DM 2 from total DM equal to 0.98 see Table 7.5.
** males: 0.18 x 100 : 4.548 = 3.96 i.e. 1.00 - 0.0396 = 0.9604
# females: 0.18 x 100 : 4.987 = 3.61 i.e. 1.00 - 0.0361 = 0.9639
For the incidence of 0.18 see Table 7.5; for the total prevalence of 4.548 and 4.987 respectively in Serbia see Table 7.6.

SUMMARY (Table 7.10a. and 7.10b.)	Uncontrolled prevalence	Uncontrolled incidence
Uncontrolled diabetic population	242 789	9 514
DALYs * from uncontrolled diabetics	24 646	966
Monitoring costs (2001): Entrance examination Bi-monthly controls Quarterly controls Annual control Sum:	 None 1749.45 703.83 2453.28	 715.47 1749.45 : 2 = 874.73* None 1590.20
Monitoring costs (private): Entrance examination Bi-monthly controls Quarterly controls Annual control Sum:	 None 6050.00 3496.69 9546.69	 3496.69 6050.00 : 2 = 3025.00* None 6521.69

Treatment cost/day:		
Diet (40%)	0.00	
Diet & drugs-scheme 2 (25%)	26.14 x 0.25 = 6.54	
Diet, drugs & insulin (15%)	(26.14+53,9) x 0.15 = 12.01	
Diet& insulin (20%)	53,9 x 0.20 = 10,78	
Weighted average	6.54+12.01+10.78=29.32	29.32
Calculation of population costs:		
Monitoring (2001-3):	2453.28 x 242 789 =	1590.20 x 9 514 =
	595 629 397.90	15 129 162.80
Monitoring (private):	9546.69 x 242 789 =	6521.69 x 9 514 =
	2 317 831 318.00	62 047 358.66
Therapy (2003):	365 x 199.12 x 242 789 =	(365 : 2) x 199.12 x 9 514
	2 598 367 938.19	=
Total (2001-3):	3 193 997 336.11	50 910 198.91
Total (private):	4 916 199 256.60	66 039 314.14
		112 957 557.57

* An average duration of 6 months is assumed for incident cases in the first year

In summary:

PRESENT SITUATION, UNCONTROLLED

	Population group VII Prevalent cases	**Population group VIII Incident cases**
DALYs	24 646	966
Costs 2001-3 (million of Dinars):	3 194	66
Costs private (million of Dinars):	4 916	113

Table 7.11. presents the Summary of all previous calculations which were done for the ideal and the present situation in Serbia, considering controlled as well as uncontrolled diabetes cases.

Table 7.11. Summary 2001-3 - all situations

Situation	**DALYs from**			**Costs (million of Dinars) for**		
	Prevalent cases	**Incident cases**	**Prev. and Inc. cases**	**Prevalent cases**	**Incident cases**	**Prev. and Inc. cases**
1) Ideal, controlled	8 534	334		2 076	44	
2) Ideal, uncontrolled	12 323	483		1 203	25	
1) & 2)	20 857	817	21 674	3 279	69	3 348
3) At present, controlled	3 939	154		1 296	27	
4) At present, uncontrolled	24 646	966		3 194	66	
3) & 4)	28 585	1 120	29 705	4 490	93	4 583
Difference			8 031			1 235

In order to allow for a comparison with the prices of private health services in Serbia, Table 7.12. presents the analogous results calculated for private practice.

Table 7.12. Summary “private” - all situations

Situation	DALYs from			Costs (million of Dinars) for		
	Prevalent cases	**Incident cases**	**Prev. and Inc. cases**	**Prevalent cases**	**Incident cases**	**Prev. and Inc. cases**
1) Ideal, controlled	8 534	334		3 287	80	
2) Ideal, uncontrolled	12 323	483		2 064	49	
1) & 2)	20 857	817	21 674	5 351	129	5 480
3) At present, controlled	3 939	154		1 855	43	
4) At present, uncontrolled	24 646	966		4 916	113	
3) & 4)	28 585	1 120	29 705	6 771	156	6 928
Difference			8 031			1 448

Table 7.13. presents the final results of the CEA and comparisons between official prices according to the HIF with average prices in private practice.

Table 7.13. Results of CEA on Diabetes mellitus type 2, Serbia 2000-03 (million of Dinars).

Situation	DALYs Lost	Costs, HIF prices 2001-3 (million of Dinars)	Costs, Private practice (million of Dinars)
Ideal situation (Table 7.7. and 7.8.)	21 674	3 348	5 480
Situation at present (Table 7.9. and 7.10.)	29 705	4 583	6 928
Difference	8 031	1 235	1 448

The overall direct costs for diabetes management in Serbia, summarized in Table 7.13., are likely to exceed 4.6 billion Dinars or 72 million EUROs per year indicated here for the HIF, if the Fund would cover all ambulatory diagnostic and therapeutic costs. In reality the costs may be considerably lower as the assumption of a complete coverage of the population is not very likely. If the entire management would be organised in private practice only, the costs (6.9 billion Dinars or 108 million EUROs) would be higher than those for the Fund. This is due to the fact that the more costly diagnostic procedures make up for a significant portion as compared to drug costs, which would be the same in both systems.

The ideal treatment scheme according to the NSGDM applied to the entire diabetic patient population could save 8 031 DALYs during one-year period from total of 29 705 or 27.04% at costs even reduced by 1 235 million Dinars (19 million EUROs) of a total of 4 583 or 27.0% on the basis of the HIF prices. Under the conditions of private practice 1 448 million Dinars (23 million EUROs) of 6 928 or 20.9% could be saved. One DALY saved would then at the same time save 0.15 million Dinars (2 403 EUROs), or 0.18 (2 817 EUROs) in private practice.

However, as (rare) hospitalisation costs, on the one hand, and additional costs for diagnostic procedures in false suspects (to confirm 100 cases of diabetes approximately 150 suspects have to be investigated according to experts’ opinion) as well as for associated therapies (e.g., for hyperlipidemias), on the other, were not considered, the real costs are underestimated to some degree. Nevertheless, the difference between the situation at present and an ideal situation according to the NSGDM may tend to remain more or less the same.

A sensitivity analysis should take different pricing schemes into account (here only HIF 2001-2003 and private practice without variation of the schemes themselves), and different epidemiological assumptions, especially in regard to the complication rates, different assumptions on treatment coverage and effectiveness. However, more differentiated estimates are needed to this aim, which require additional well-designed studies.

Furthermore, instead of the static approach for 1 year chosen in this analysis, a cohort or lifetime analysis would provide far more differentiated results and by usage of appropriate software (Accusim, Mellibase) would allow for a much broader variation of key parameters.

7.4. ANALYSIS OF THE IMPACT OF RISK FACTOR REDUCTION ON DIABETES MELLITUS IN SERBIA

Obesity and physical inactivity are described as key risk factors for the development of Diabetes mellitus type 2. As the effects of preventive programmes are not evident before adulthood, the analysis presented in Table 7.14 is restricted to the population older than 34 years. For both risk factors 1 169 and 2 339 diabetic DALYs can be saved respectively by a preventive programme which effectuates a prevalence reduction of either 5% or 10%. The main contribution stems from obesity reduction rather than from physical activation. These estimates constitute an optimistic maximum of what can be achieved as controlled low-cost community prevention programmes, like the North Karelia Project or the German Cardiovascular Prevention Study have shown during the seventies and eighties in Europe (Puska et al, 1985; Hoffmeister et al, 1996).

The effect of risk factor reduction does not remain limited to Diabetes mellitus, however, but also has a positive impact on other diseases, such as colorectal cancers, breast cancer, ischemic heart disease, and stroke. Therefore, in Table 7.15. the total effects are estimated as 7 617 and 15 232 DALYs saved respectively out of 152 309. If one assumes that a preventive programme with a budget of 4.3 million Dinars, i.e., 1 Dinar per adult per year, can produce effects in the order of a 5% or even 10% reduction of prevalence, this would mean average costs of 566 and 283 Dinars respectively per DALY. If this is considered too modest a budget, a tenfold increase to 43.1 million Dinars should certainly be sufficient (i.e., 10 Dinars per adult per year). A DALY saved would then cost 5 660 and 2 830 Dinars respectively in case of a 5 or 10% reduction.

Table 7.14. Effects on DM 2 of a prevention programme among adults for physical inactivity and obesity, Serbia 2000

			Physical inactivity				Overweight				Total
	Population Males 35-75+	**Population Females 35-75+**	**Prevalence Males**	**Prevalence Females**	**Attributable DALYs Males**	**Attributable DALYs Females**	**Prevalence Males**	**Prevalence Females**	**Attributable DALYs Males**	**Attributable DALYs Females**	**DALYs Males & Females**
BoD	2 028 623	2 282 736	41.91	53.50	1 283	1 831	48.60	43.20	8 111	12 164	23 389
Males & Females	4 311 359				3 114				20 275		
Prevalence reduction A) -5%			39.81	50.83	2 958		46.17	41.04	19 261		22 220
Difference DALYs					156				1 014		1 169
Prevalence reduction B) -10%			37.72	48.15	2 803		43.74	38.88	18 248		21 050
Difference DALYs					311				2 027		2 339

Table 7.15. Cost-Effectiveness of the potential overall effects of preventive programmes on physical inactivity and obesity.

	Burden of Disease, all causes*, attributable to physical inactivity		**Burden of Disease, all causes*, attributable to obesity**		**Total Burden of disease (DALYs)**	**Cost per DALY saved by programme I** (1 Dinar/adult) Programme II** (10 Dinars/adult)**	
	Males	Females	Males	Females	Both sexes	I	II
DALYs (total)	42 352	45 581	31 847	32 529	152 309		
Reduction of prevalence: -5%	-2 118	-2 279	-1 593	-1 627	-7 617	566.02	5660.18
Reduction of prevalence: -10%	-4 236	-4 558	-3 185	-3 253	-15 232	283.01	2830.09

Note: Calculations rounded where appropriate.

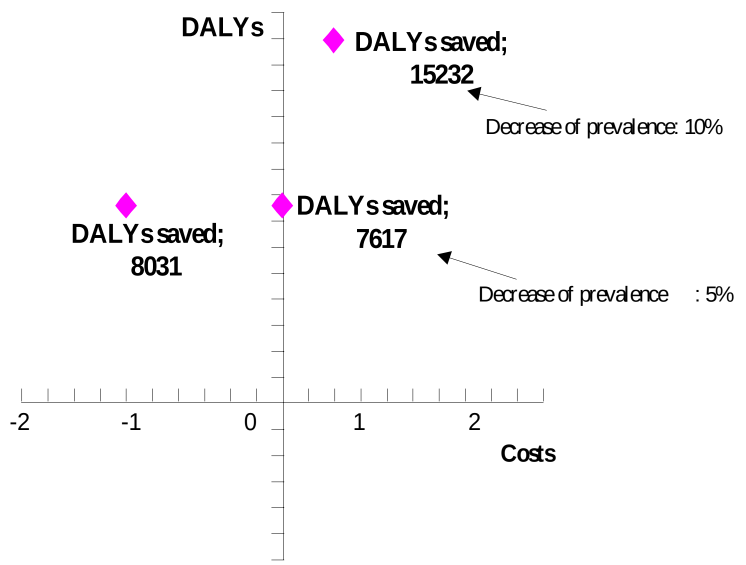
* All causes: Colorectal cancer, breast cancer, IHD, Stroke, DM 2

** The total adult Serbian population (35+ years) in 2000 is estimated at 4 311 359 (2 028 623 males and 2 282 736 females), giving 4.3 million Dinars for programme I and 43.1 millions for programme II.

7.5. Final Summary and Conclusion

Figure 7.1. shows the relative positioning of curative and preventive strategies. In the given situation of Serbia the clinical approach is likely to be cost saving as compared to the preventive one. However, different target groups are in question, diabetic patients, on the one hand, the general population, on the other. Also, a preventive approach has additional major effects on other diseases than Diabetes.

Figure 7.1. Clinical and preventive intervention



If medical care is considered under ideal conditions in Serbia – full application of Scheme 1 as stated in the NSGDM (Figure 7.1.) – 8 031 DALYs could be saved with a potential cost reduction at the same time of -1.2 billion Dinars (HIF prices). In the case of implementing the low cost preventive programme (with 5% reduction of physical inactivity and obesity) – 7 617 DALYs could be saved at an estimated cost of 4.3 million Dinars, however in the case of 10% reduction – 15 232 DALYs.

In conclusion, it seems that the rigid implementation of the NSGDM in clinical practice bears an enormous potential not only in saving lives and lowering the years lived with reduced quality of life, but in addition it may reduce clinical costs by as much as about a quarter.

A preventive programme with a relatively small budget may achieve risk factor reductions resulting in about the same amount of quality adjusted life years saved, not only through the prevention of diabetes, but also of malignant and degenerative cardiovascular diseases.

8. DISCUSSION, RECOMMENDATIONS AND CONCLUSIONS

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Initially promoted by the World Bank, national burden of disease studies are now being strongly encouraged and supported by World Health Organization. The usefulness of burden of disease assessments for policy makers and health planners still remains to be fully evaluated. Familiarisation with the concepts and methods underlying this measure of health gap will be needed before applications can be developed and judgments be made as to the added value of burden of disease analysis. The usefulness of this study along with this sort of data for both health policy and health service planning will be enhanced as a time series develops, and as the quality of the data used to generate the DALY improves.

8.1. METHODOLOGICAL ISSUES

8.1.1. Summary measures of population health

Interest in summary measures of population health relates to a range of potential applications of them. These applications range from comparison of the health of different populations; comparison of the health of the same population at different points in time; identification and quantification of overall health inequalities within populations; provision of a appropriate and balanced attention to the effects of non-fatal health outcomes on overall population health; informing debates on priorities for health service delivery and planning; informing debates on priorities for research and development in the health sector; improvement of professional training curricula in public health to analyse the benefits of health interventions for use in cost-effectiveness analysis (Murray et al, 2000). Despite the many uses of summary measures there is a criticism that summary measures of population health are not informative. According to Williams, 1999, only information on the incremental costs and benefits of interventions, and not information on the level of health in a population, should be considered relevant inputs to decision-making.

It is also very important to distinguish clearly between the nature and quality of various inputs to summary measures and the properties of summary measure themselves. Information on age-specific mortality and the non-fatal health outcomes provides a basic input to any type of summary measure where the latter usually is of somewhat limited validity. Another critical input is information on the values attached to various health states relative to ideal health or death. Also, the challenge of understanding and accounting for the difference between self-assessed and observed measures of health status is a critical challenge to the enterprise of measuring population health.

In examining the concept and properties of various summary measures, it is important to bear in mind the ultimate goal of influencing the policy process (Field and Gold, 1998). Because of their potential influence on international and national resource allocation decisions, summary measures must be considered as normative measures. As stated by the IOM panel (Murray, Salomon and Lopez, 2000), "all measures of population health involve choices and value judgments in both their construction and their application."

The DALY methodology itself has inherent limitations arising from its disease-by-disease base and consequential failure to utilize population level data from national health and disability surveys to their full extent. In addition, its negative orientation (as a measure of health loss rather than health gain) may make it less attractive to some potential users. For both these reasons, it will be necessary to supplement burden of disease assessment with positive measures of health expectancy or health adjusted life expectancy, derived from national health, disability or health-related quality of life surveys.

In principle, as stated by Tobias, (2001), these two families of summary measures of population health (health expectancy and health gap) could be measured in such a way as to make them not only conceptually but also quantitatively complementary (by using consistent health state descriptors and valuations for both indicators, if not actually deriving both measures from the same dataset). Health adjusted life expectancy (disability adjusted life expectancy) would provide a whole-of-population measure at the strategic level, allowing the health of the population to be monitored over time and compared with that of other countries, and enabling trends in equity of outcomes across socio-demographic groups to be monitored and priority groups to be identified for targeting of interventions. DALYs would elaborate this description of population health status, and identify the shares or contributions made by different causes (diseases and risk factors) to the level of health experienced by the population or socio-demographic group. Such assessments could then be linked to economic evaluations of specific health interventions to complete the priority setting and outcome evaluation framework, (Tobias et al, 2001). This concept, summarised in Table 8.1. is proposed by the World Health Organization (WHO 2000).

Table 8.1. A possible framework for application of summary measures of population health to policy analysis

Outcome measure	Level of application	Purpose	Example
HALE (DALE)	Macro	Strategic	Are we achieving our equity objectives?
DALY	Meso	Funding	Do we have the right balance between funding for mental health versus other services?
QALY	Micro	Service delivery	Should we subsidise immunisation of children against chickenpox?

Source of base data: compiled from multiple sources

Notes: HALE = health adjusted life expectancy; DALE = disability adjusted life expectancy; DALY = disability adjusted life year; QALY = quality adjusted life year.

8.1.2. Precision of estimates

The calculation of mortality burden is straightforward, and the precision of YLL estimates is almost entirely dependent on the quality of data on underlying cause of death. Death registration is almost complete in Serbia but as discussed in section 2.5.2., there are several ICD-10 categories ("garbage" codes and ill-defined or unknown categories) for which deaths have been redistributed to diseases and injury causes based on NBD manual. This redistribution involves, although tolerable, a considerable number of deaths and certainly has some effect on the precision of YLL estimates.

The calculation of non-fatal burden requires much more extensive epidemiological modeling based on a diverse range of data sources, research findings and expert opinion. Thus, the precision of YLD estimates is not really quantifiable in the usual statistical sense of deriving a confidence interval as it varies between diseases. Also it depends on the specific disease model being applied and the source and nature of the data underlying this model.

Furthermore, due to the timeframe of the Serbian Burden of Disease Study and limited financial resources, the total burden was analysed only for 18 selected diseases and injuries. It has not been possible to carry out YLD and DALY estimates for each disease and injury category. However 18 conditions were selected according to Serbian health priorities cited in the Health Care Strategy (Simić et al. 2003), experts' opinion of the SBDS Steering Committee, relevant international studies (Michaud et al. 2001; Mathers et al. 2002), as well as their highest rankings in the Serbian mortality and hospital morbidity structure. It's worthwhile to notice that precise estimates of the DALY burden for many of the conditions with lower rankings according to criteria mentioned, should be the subject of a subsequent SBDS in Serbia. The analyses carried out for selected diseases and injuries in this study will provide a framework for detailed analysis of other conditions in the near future.

An additional issue, which affects precision relates to the choice of disability weights. The weights used in this study have not been derived within a Serbian context and therefore may not completely reflect local community preferences for different health states. For these reasons, the YLD estimates (and hence the DALY estimates) should be regarded as provisional and developmental. We anticipate that further improvements over time in methods, models and data will result in incremental improvements in the accuracy and certainty of burden of disease estimates for Serbia.

8.1.3 Data gaps and deficiencies

One of the important by-products of the extensive epidemiological modeling carried out as part of this study has been the identification of a number of gaps and deficiencies in Serbian population health data. The key issues arising from these gaps and deficiencies are discussed.

Incidence and prevalence data for some diseases is relatively complete (for example, incidence data for cancers and TB) but data for many others are unavailable or have severe limitations. This can lead to inconsistencies between commonly quoted prevalence, incidence and mortality estimates, - particularly relevant with regard to some important diseases:

Tuberculosis – Incidence estimates were based on data from the Serbian Central TB Registry. It was assumed that these data are a good approximation of all active TB cases in Serbia without Kosovo and Metohia.

HIV/AIDS – The flow of surveillance data for HIV/AIDS in Serbia is complex and not standardised across all districts. Though all AIDS cases are reported, official data on the number of HIV positive persons do not exist at the republic level, while the co-infection rates are unavailable, due to separate reporting of HIV/AIDS from other diseases. Patients with active TB or STIs are not routinely tested for HIV and so the magnitude of HIV infection in these populations is unknown. In addition, the low presence of voluntary HIV testing behavior, even with doctor's referral, leads to underestimates of the size of the HIV-infected population. Most recently HIV testing is also available in the private system, where reporting is not consistent.

Perinatal conditions – The attributable risk of low birth weight, birth asphyxia and birth trauma, which were selected for analysis in this study, is not well established and the YLD estimates are based on estimates for direct sequelae only. In addition the estimation of incidence was based only on data for Belgrade, due to the absence of data for all of Serbia.

Cancers – Incidence data were obtained from Cancer Registry of Central Serbia, and from Cancer Registry of Vojvodina. Incidence data for Central Serbia were based only on the population of Belgrade, which was considered as being more reliable in comparison to the rest of data from the Cancer Registry of Central Serbia. However, in comparing to the cancer incidence in Slovenia, this was considered as a good approximation of cancer incidence in Serbia without Kosovo and Metohia. Because of the lack of Serbian data on survival of cancer patients, Slovenian survival data for the period 1985-1989 were used as most appropriate.

Diabetes mellitus – The estimation of prevalence for the republic level in this study was based on data for Belgrade, due to absence of data for the rest of Serbia. In addition data were corrected according to expert opinion for those cases, which are not covered by the Diabetes Registry of Belgrade, as well as for cases that are considered as undiagnosed diabetes.

Depression – Despite exsistance of the Belgrade Register of mental health disorders (the only existing Register of that kind in Serbia), after analysis, it was concluded it is not a reliable source of prevalence data. In addition there are no available published or unpublished data of meaningful population-based studies on depressive disorders in Serbia. Due to these reasons the incidence estimation for depression was used from the Global Health Statistics (Murray and Lopez 1996b) and then expected incidence for Serbian population was calculated. For depressive disorders in childhood, incidence of episodes was used from the Australian BOD study (Mathers et al. 1999).

Sense organ disorders – The prevalence of hearing and visual loss were considered together, due to luck of separate data and only severe forms of these conditions were included from the same reason. The prevalence of the disorders in the group 60-69 was used for persons over 75 years, who were not covered by Serbian prevalence study "The Disabled and the Environment" (Cucić et al. 2001).

Cardiovascular diseases – In the lack of appropriate data on angina pectoris which together with acute myocardial infarction represent a model of ischaemic heart disease (IHD), incidence for this condition was estimated by using hospital utilization data in Belgrade. According to hospital utilization data out of all hospitalized IHD cases 64% were with angina pectoris. With such an approach incidence of angina pectoris was the most probably underestimated.

Asthma – There is neither disease register nor notification for this condition in Serbia, while the only epidemiological survey was conducted in children. There are no reliable prevalence data for Serbian adult population. Consequently the incidence estimation and average duration was taken from Global Health Statistics (Murray and Lopez, 1996b).

Nephritis and nephrosis – The burden of these conditions was calculated on the basis of incidence of patients whose End Stage Renal Failure (ESRF) was sequel of primary acquired renal disease. As data for dialysis and transplant patients (incidence, prevalence and mortality, according to age and sex), were not available from the Annual Report on Regular Dialysis and Transplantation in Yugoslavia, 2000 we obtained necessary data from nine dialysis and kidney transplatation centers in Belgrade, and from Belgrade Registry of Dialysis Patients (unpublished data for Barajevo).

Injuries – Due to lack of valid and reliable data in this filed in Serbia GBD estimates were used. As an example of bad quality of data for injuries in Serbia: there were no inputs for the personal identification of patients in the electronic database, which would allow for the identification of each case. Another problem was also how to deal with S-T type codes, which were coded sometimes with 3 digits and sometimes with 4 digits. Under-registration is also possible because there were no reliable information on non-hospitalised injuries.

The accuracy of basic epidemiological data from which DALY is calculated will influence the final results. We can conclude that considerable effort has to be invested in improving the basic epidemiological data.

Other gaps in our knowledge of the epidemiology of disease and injury in Serbia relate to information on the distribution of disease severity and case fatality rates, which are not available for the vast majority of conditions. Improvements in record linkage and retention of identifiers in population surveys should allow these issues to be addressed at relatively low cost.

Plausible fractions of disease burden attributable to risk factors (“Attributable Risk”) are difficult to calculate for a variety of reasons. There is a lack of complete and valid information on the prevalence of risk factors. Evidence of the relative risk of death or disease in the presence of a risk factor is limited and often reported by different categories of exposure from those used in population surveys.

Most of prevalence data for risk factors in the Serbian Burden of Disease Study were based on self-reported health status, alcohol consumption, smoking behavior, dietary habits, and physical activity, which were predominantly obtained from the 2000 Population Health Survey in Serbia. Self reported data may not always be sufficiently valid. In addition they depend on the research instrument, which is applied in the procedure of data collection. In this study it was noticed that some questions were exclusively designed for the purpose of the 2000 Population Health Survey in Serbia and were not standardized (tested for validity and reliability). As an example: For the purpose of this survey, the information about alcohol consumption was collected in relation to the last week in which alcohol was consumed. The prevalence of each level of alcohol intake was estimated from weekly consumption by age groups and gender. Because of the differences in the definition of inadequate intake of fruit and vegetables, our results are not completely comparable with other similar studies. In addition the disease burden attributable to inadequate intake of fruit and vegetables was calculated only for cardiovascular diseases, because the data for cancers were not available at this stage. Also there were no recent studies of blood cholesterol levels in the Serbian population, therefore we used data from the Population Health Survey in the Republic of Srpska (Ministry of Health and Social Welfare of the Republic of Srpska, 2002) for our population estimates. As we had no relevant mortality and morbidity data for the peripheral vascular disease, the burden attributable to high blood cholesterol was calculated only for ischemic heart disease. High blood cholesterol may also be a risk factor for certain forms of stroke (hemorrhagic apoplexia), but the evidence is less clear and stroke was not included in this analysis.

Also, the attribution of disease burden to single risk factors is a simplification of reality. Several risk factors are often present in the same individual resulting in an overall risk that may be greater or smaller than the addition of risks for each risk factor. New models based on surveys that measure multiple risk factors in the same people are needed to do more justice to the interaction between risk factors and the effect on the calculation of the burden attributable to risk factors.

8.1.4. Methods development

In the course of undertaking this study, a number of methodological issues have emerged, which require further development and refinement in order to improve the validity and applicability of the DALY metric. Efforts are already under way internationally in some of these areas. We mention the major areas where methods need improvement: taking co-morbidity into account in estimating the total burden of disease; discounting specifically for diseases with long-term sequelae; numerical valuation of health states with an aim to develop Serbian-specific disability weights; population disability data seen as a development of standard validated summary health state measures for inclusion in population surveys; micro-simulation methods that allow for a more flexible approach in dealing with multiple disease and population categories, the interactions between them and a number of still unresolved issues in using DALYs as health outcome measures in cost-effectiveness analyses.

8.2. KEY FINDINGS

This study has provided an assessment of the health status of the Serbian population through estimates of contribution of fatal and non-fatal health outcomes to the total burden of disease and injury in Serbia in 2000. Mortality, morbidity and disability arising from different diseases, injuries and risk factors were measured using a common metric, the disability-adjusted life year.

This study also presents an example of cost-effectiveness analysis using DALYs as a health outcome measure. The treatment of Diabetes mellitus type 2 has been chosen to demonstrate the potential of cost-effectiveness analysis, because it is a disease affecting large numbers especially of the older population in Serbia. In addition a National Serbian Guideline on the management of Diabetes has recently been developed. The analysis of cost and effectiveness of the management of Diabetes mellitus type 2 should clarify, whether the nationwide application of the guideline would save a relevant amount of Disability Adjusted Life Years and reduce the medical cost of diabetic patients' treatment as compared to the present situation in Serbia.

8.2.1. Key findings - mortality

Life expectancy at birth in 2000 was 69.00 years for Serbian males and 74.46 years for Serbian females. Male life expectancy at birth is 5.46 years shorter than female life expectancy. Serbia ranks around 60th in the world in terms of total life expectancy at birth in 2000.

The biggest improvement in life expectancy at birth in 2000 would occur with the elimination of ischemic heart disease mortality in males (2.40 years) and elimination of cerebrovascular disease in females (2.10 years).

Between 1950 and 2001 the change in average life expectancy at birth for males in Serbia is 0.35 years annually (CI: 0.17-0.53) and for females 0.40 years (CI: 0.25-0.55).

Premature mortality was responsible for 814 022 years of life lost or 78.8 YLLs lost per year per 1 000 population (discounted at 3% per annum) in Serbia in 2000. Males lost 31.3% more years of life than females. Of these years 161 452 have been lost in Belgrade, 91 835 years in males and 69 617 in females.

Cardiovascular diseases, cancers and injuries were responsible for 80% of the total mortality burden in both males and females.

In people aged 65 years and over, cardiovascular diseases account for more than half of the years of life lost, whereas cancers are more important cause than CVD for all ages below 45. Injuries are the main cause of lost years of life in young adults and children aged 5-14, and neonatal conditions are the main cause in children aged under five.

8.2.2. Key findings – disability and burden of disease and injury

In general, the total burden of 18 selected diseases and injuries in Serbia without Kosovo and Metohia in 2000 was estimated to be 621 993 DALYs or 82 DALYs lost per year per 1 000 population, while the estimate for Belgrade of 130 587 DALYs resulted in the same rate – 82 DALYs lost per 1 000 population in the year 2000. The morbidity burden in total DALYs represents 22.3% in Serbia and 25.20% in Belgrade. The burden in Serbia for males was 32% higher than for females (in Belgrade 34%).

Rankings based on DALYs differ substantially from rankings based on the number of deaths only. In terms of specific conditions, the ranking of the total burden in Serbia was highest for ischemic heart disease, followed by cerebrovascular diseases, lung cancer and unipolar depressive disorders at the fourth place for both territories. However, diabetes mellitus took the fifth place in Serbia without Kosovo and Metohia, while in Belgrade breast cancer was at the same position. The importance of unipolar depressive disorders, even if it doesn't generate deaths in Serbia, was one of the key findings of this study, like to similar studies worldwide (Mathers et all, 2002).

With the exception of non-fatal health outcomes (unipolar depressive disorders, hearing and vision loss, low birth weight and asthma), YLL had a more significant contribution than YLD to the total burden of selected conditions (78% : 22% in Serbia without Kosovo and Metohia, and 75% : 25% in Belgrade).

The burden of tuberculosis was represented with 3 236 DALYs in Serbia, out of which 660 DALYs were for Belgrade. Burden presented by DALY rates per 1 000 population increased with aging, for both sexes, and it is three times bigger for Serbian males than that for Serbian females (0.67 per 1 000 vs. 0.21 per 1 000 respectively). In the population of Belgrade the burden of tuberculosis had the similar pattern. In the overall ranking of diseases and injuries based on DALYs tuberculosis takes the 16th position in Serbia and the 17th in Belgrade.

HIV/AIDS was responsible for 1 742 DALYs in Serbia (1 227 DALYs in males and 515 DALYs in females). Over 50 per cent of this burden is due to mortality. There is a marked sex difference. The male burden from HIV/AIDS is more than twice as high compared to females. It is higher for male than female in all age groups, except in 5 to 14 and 25 to 34, where the burden is higher for female. The HIV/AIDS burden has the same age and sex pattern in Belgrade. However, the burden per 1.000 population of HIV/AIDS in Belgrade in 2000 is about three times higher than the burden in Serbia without Kosovo and Metohia. In the overall rankings based on DALYs in Serbia, for 18 selected diseases and injuries, HIV/AIDS presents with the last rank, while in Belgrade with the 16th.

With regard to Low Birth Weight (LBW) 4 759 DALYs in Serbia, are dominated by YLD (65% in male and 73% in female babies) – reflecting the fact that LBW is the major cause of chronic disability rather than death in Serbia. Contrary to these findings, the proportion of YLL in 13 520 DALYs was higher in relation to YLD for asphyxia and trauma at birth. In the Belgrade population these states follow a similar pattern. However, DALYs due to LBW were relatively higher in Belgrade as compared to Serbia. In the overall ranking LBW is at the 15th place, birth asphyxia and birth trauma are at the 12th position, whereas in Belgrade rank 9 and 11 are taken respectively.

Among all cancers, which are selected for analysis, in Serbia without Kosovo and Metohia the burden of lung cancer was at the first place responsible for 59 088 DALYs, followed by colorectal cancer (26 007 DALYs), breast cancer (23 868 DALYs), stomach cancer (16 487 DALYs) and cervix uteri cancer (8230 DALYs). In overall rankings of diseases and injuries based on DALYs in Serbia in 2000, for 18 conditions, lung cancer had 3rd rank, colon and rectal cancer – 7th rank, breast cancer – 8th rank and stomach cancer – 10th rank. Except for breast cancer, which has the 5th rank in Belgrade, the situation in Belgrade was completely the same as for Serbia: lung cancer has 3rd rank, colon and rectal cancer – 7th rank and stomach cancer – 10th rank. The cancer burden for male was dominated by lung cancer. Colorectal and stomach cancers in the male population were on the second and the third place respectively. The cancer burden for female was dominated by breast cancer, followed by lung cancer, colorectal cancer, cervical cancer and stomach cancer. YLLs were significantly more important for all cancers than YLDs, reflecting the fact that the burden of cancer is dominated by mortality rather than lengthy periods of disability.

The burden of Diabetes Mellitus in Serbia without Kosovo and Metohia is presented with 37 336 DALYs, out of which 6 160 DALYs occur in Belgrade. Measured by DALYs the burden of Diabetes Mellitus in Serbia was slightly higher in the female population than in males. In both sexes, the contribution of YLL to the DALYs was higher than that of YLD. The proportion of YLD of total DALYs was higher in males than in females (45.6% and 38.4% respectively). In the population of Belgrade the burden of Diabetes Mellitus by sex showed a different pattern in comparison to Serbia without Kosovo and Metohia. In both sexes in Belgrade, the proportion of YLL of total DALYs was smaller in relation to YLD. DALY rates per 1 000 population increase with aging being highest in the age group of 75 years and more, for both sexes. In the overall ranking Diabetes Mellitus takes the 5th place in Serbia, while in Belgrade it has rank 6.

Depression was responsible for 52 901 DALYs (19 073 in males and 33 828 in females) in Serbia in 2000, while in Belgrade for 11 436 DALYs. All DALYs were due to the morbidity component, YLDs. The burden of depression is higher in adult females than in the adult male population both for Serbia and Belgrade. In the overall ranking, based on DALYs for selected diseases, depression has the 4th rank for both territories.

The burden of hearing and vision loss analysed in this study, which included only severe forms of these disorders, presents with 2 236 DALYs in Serbia without Kosovo and Metohia, out of which 471 DALYs occurred in Belgrade. The burden was similar for male and female, both in Serbia and Belgrade. YLDs make up all of the DALYs for hearing and vision loss. Measured by DALYs, hearing and vision loss take the 17th rank in Serbia and the 18th (last) rank in Belgrade.

The burden of Ischaemic Heart Disease (IHD) was responsible for 150 889 DALYs in Serbia without Kosovo and Metohia, and in Belgrade for 28 062 DALYs, which is much higher than for other selected conditions except stroke. At the same time stroke caused 136 090 DALYs and 25 980 respectively. Regarding sexes, DALYs for IHD was much higher in Serbia for male than for female, while the burden of stroke was slightly higher for female than for male. For IHD and stroke, the DALY rates per 1 000 increased with aging in both males and females. In the population of Belgrade, the burden of both, IHD and stroke, was higher for males than for females, the sex difference is more pronounced for IHD. In the overall ranking according to DALYs IHD takes the first place and cerebrovascular diseases the second, both for Serbia and Belgrade.

Asthma was responsible for 12 989 DALYs in Serbia and for 2 655 DALYs in Belgrade. In Serbia the burden is higher for the male population than for females (7 317 DALYs and 5 672 DALYs, respectively), dominated by YLD (58% in males and 68% in females). Only among people of 60 years and older the burden for asthma has a larger mortality component. In the population of Belgrade the difference between males and females is much less (1 340 DALYs and 1 315 DALYs, respectively). Almost two thirds of the attributable burden, in both sexes, are due to morbidity. In the overall ranking of the selected diseases astma takes the 13th position for Serbia and the 14th for Belgrade.

Nephritis and nephrosis were responsible for 14 215 DALYs (7 417 DALYs in male and

6 798 in female). About 90 per cent of this attributable burden is due to mortality. DALY rates increase with age, except in the oldest age group, in both sexes. The burden of nephritis and nephrosis in Belgrade had a similar pattern as in Serbia without Kosovo and Metohia. Nephritis and neprhrosis have the 11th rank in Serbia and the 12th in Belgrade.

Road traffic accidents were responsible for 30 468 DALYs out of which 17 233 years belong to YLLs and 13 235 years to YLDs. The difference between females and males DALYs was almost threefold (6 430 and 24 038 respectively). The proportion of YLDs in DALYs for RTA was 43%. At the same the burden of self-inflected injuries were presented with 27 938 DALYs where even 26 836 years belong to YLLs, while YLDs were much less – 1 103. The same difference between females and males DALYs, which was found for RTA, could be observed during consideration of this condition. The proportion of YLDs in DALYs for self-inlicted injuries was 4% in Serbia. In the overall ranking for 18 conditions selected, the road traffic accidents are on 6th place, while self-inflicted injuries take the 7th place. The situation is completely different in Belgrade: the road traffic accidents are on 9th place, and self-inflicted injuries on 7th place.

8.2.3. Key findings – attributable burden of risk factors

For the group of conditions selected in the Serbian Burden of Disease Study mortality was the main contributor to the burden due to smoking, physical inactivity, inadequate intake of fruits and vegetables, hypertension and high blood cholesterol, because the diseases connected to these risk factors are characterized by high mortality. The greater proportion of disability in our study has been found with regard to the burden due to alcohol and obesity. The disability associated with alcohol dependence and abuse is responsible for the YLDs of alcohol harm, while negative values of YLDs for low regular alcohol intake with its positive effects on cardiovascular diseases produced the final alcohol benefit.

The results of our study are mostly in accordance with the results of other relevant studies. Tobacco smoking is the risk factor responsible for the largest burden: 18% of total YLLs in male and 7.9% in female. Hypertension is also a major risk factor in our population: 9.7% of total YLLs in male and 13.3% in female are attributed to this risk factor. Next to hypertension, physical inactivity is responsible for 8.2% of total YLLs in male and 11.8% in female. Obesity was connected to somewhat lower proportion of 5.5% out of total YLLs in male and 7% in female. Inadequate intake of fruits and vegetables can also be considered as an important risk factor in our population, because it is responsible for 3.3% of total YLLs in male and 2.9% in female. The burden due to high blood cholesterol was 1.3% of total YLLs in male and 0.5% in female. The estimations of mortality burden of high blood cholesterol in our study are lower than in other studies.

Ishaemic heart disease, stroke and renal failure, as adverse health outcomes of high blood pressure were also analyzed in the SBDS study. The proportion of total DALYs calculated for diseases due to hypertension is very high and is higher for females than for males. Hypertension is responsible for 49.5% of the disease burden attributable to renal failure among males and for 58.8% among females in Serbia. The attributable percentage for stroke is also very high: 40.5% for males and 48.6% for females. The burden of hypertension increases with age, most of it being due to mortality. The main contributors to the burden of obesity were IHD and colorectal cancer.

Almost the complete disease burden of high blood cholesterol is due to the increased risk of dying, rather than having disability. The burden is much higher for males than for females, because IHD is a more frequent in males. High blood cholesterol in Serbia is a strong risk factor for IHD in males – 7% of all disease burden attributable to IHD is due to high blood cholesterol in male population and 5.4% in female population of Serbia. In the Belgrade population the percentage among females is lower: 4.1% of total DALYs attributable to IHD.

8.2.4. Key findings – cost-effectiveness analysis

As an example for Cost-Effectiveness-Analysis (CEA), treatment efficiency for Diabetes mellitus type 2 has been analysed in this study by comparison of the burden of disease and the direct costs of two treatment schemes: Scheme 1, which is stated in the National Serbian Guideline on Management of Diabetes Mellitus, and Scheme 2, which is used most commonly at present in the management of Diabetes mellitus in Serbia. Direct costs of public and private services were examined for both schemes. The impact of a potential preventive programme for the reduction of obesity and physical inactivity was also addressed.

Scheme 1 is cheaper by about one quarter and at the same time more effective (in terms of DALYs saved) by about one quarter than Scheme 2, given full coverage in monitoring and treatment (although we considered in a way non-treated diabetics by the percentage of diet alone (50 resp. 40%). Private practice is more expensive only with regard to monitoring costs. However, as treatment costs are the same, this does not make much of a difference, relatively speaking. These relations are likely to be stable and consistent even if the general levels of cost should be different and/or variation of compliance and coverage of population be included.

If medical care is considered under ideal conditions in Serbia - full application of Scheme 1 as stated in National Serbian Guideline - altogether -8 031 DALYs could be saved with a potential cost reduction at the same time of - 7.5 billion Dinar (according to official HIF prices). In the case of the implementation of a low cost preventive programme (with 5% reduction of physical inactivity and obesity) - 7 617 DALYs could be saved at an estimated cost of 4.3 million Dinar or 1 Dinar per adult, if the (major) effects on other diseases than Diabetes mellitus type 2 are included. No judgment should be made at the present stage whether this is achievable with a budget of this size.

In the given situation of Serbia the clinical approach is likely to be even cost saving as compared to the preventive one. However, different target groups are concerned, diabetic patients on the one hand, the general population on the other. Also a preventive approach has additional major effects on other diseases than Diabetes. In conclusion it seems that the rigid implementation of the national guideline for Diabetes mellitus in clinical practice bears an enormous potential to save lives respectively to reduce years lived with reduced quality of life and it may reduce clinical costs by as much as a quarter. In addition this analysis has shown that a preventive programme with a relatively small budget may achieve risk factor reductions resulting in about the same amount of quality adjusted life years saved, not only through the prevention of diabetes but also of other diseases.

8.3. Recommendations

The analyses presented in this report provide a framework for completition of DALY estimates for all conditions that are not covered in this report; for more detailed analysis of particular conditions; for burden of disease estimates for sub-populations and for analysis of the impact of risk factors and health determinants to inform health policy making and priority setting. Some of the potential priorities for future work are summarised below.

- Provide total burden of disease estimates for conditions not covered in this Report.
- A full analysis of the attributable burden of socio-economic disadvantage in Serbia to support public health planning and monitoring of inequality in health status.

- Provide burden of disease estimates for local areas by using multiple years of mortality data and synthetic estimates of disability.
- Assistance to other parties to build on the SBDS in order to carry out other national and regional studies using area-specific population and health data.
- Define regular framework for a number of diseases a population-based epidemiological studies, particularly longitudinal ones, which can provide a wealth of information on the incidence, average duration, levels of severity, remission and case fatality.
- Work on strengthening the quality of health statistical framework, where data flow should be simplified and uniform across Serbia.
- Estimation of Serbian social preferences for a comprehensive set of conditions and sequelae.
- Linkage of burden of disease analysis and marginal cost-effectiveness analysis of potential interventions that aim to inform priority setting processes for health policy and research.
- Supplement burden of disease assessment with positive measures of health expectancy or health adjusted life expectancy, derived from national health, disability or health-related quality of life surveys.
- Regular (for example, five yearly) iteration of burden of disease assessment could potentially develop into a major tool for policy analysis in health. Projections of future burden of disease and risk factors in Serbia are extremely useful for the decision-making process.

Prerequisite for all these recommendations is strengthening the quality of routine statistical data on morbidity and mortality in Serbia. All clinicians and all laboratories (not just public ones) should be required to report all notifiable diseases. Data flow should be simplified and uniform across Serbia. Disease registers are part of the surveillance system for several diseases, but they have been more important, and successful, for cancer due to serious nature of most cancers. The emphasis of a cancer registers should be on the quality of the data collected, rather than on the quantity. The improving cooperation of the medical profession and health care services is vital to the success of cancer registration. In the absence of information from disease registers or notification systems, population health surveys should provide useful self-reported information on disabilities, impairments and diseases and they are urgently needed. The mental health of communities should be monitored by including mental health indicators in health information and reporting system.

For a number of diseases a population-based epidemiological studies, particularly longitudinal ones, which can provide a wealth of information on the incidence, average duration, levels of severity, remission and case fatality, should be very useful.

8.4. CONCLUSIONS

This report provides the first detailed and internally consistent estimates for Serbia of the mortality and disease burden for a defined set of disease and injury categories. It has also taken first steps towards quantifying the burden associated with a range of risk factors and using burden unit (DALYs) as a measure in cost-effectiveness analysis.

This study introduces a summary measure that identifies the relative magnitude of different health problems, including diseases, injuries and risk factors.

This study also provides a coherent and integrated health-statistical framework, with a summary measure (DALYs) of population health status that is able to measure and monitor the health of Serbians.

The use of a common metric such as the DALY for burden of disease analysis, measurement of clinical outcomes, and cost-effectiveness analyses allows existing or prospective interventions to be judged both in terms of cost-effectiveness, and their relative impact in reducing the burden of disease and ill-health.

This study is a first step towards exploring the usefulness of these methods to provide information to assist in health planning and priority setting. It also gives an example of cost-effectiveness analysis as a tool for policy decision making about health care, which entails making trade-offs between the estimated benefits and the estimated harms and costs of the intervention.

Cardiovascular diseases, cancers and injuries were responsible for 80% of the total mortality burden in both males and females.

Ranking of total burden in Serbia based on DALYs differ substantially from ranking based on the number of deaths only. In terms of specific conditions, the ranking of the total burden was highest for ishaemic hearth disease, followed by cerebrovascular diseases, lung cancer and unipolar depressive disorders. Diabetes mellitus took the fifth place in Serbia without Kosovo and Metohia, while in Belgrade breast cancer was at the same position.

The final results of the study have shown that the national health priority areas should cover cardiovascular diseases, cancers, injuries, mental health, diabetes mellitus, pulmonary (chronic obstructive disease and asthma), genitourinary (nephritis and nephrosis) and digestive diseases (cirrhosis of the liver), as well as selected perinatal conditions and lower respiratory infections.

The combination of seven selected risk factors is responsible for about 45% of the mortality burden in Serbia. The percentage of total disease burden may be similar, because most of the burden attributed to risk factors for selected conditions, was due to mortality. Tobacco smoking is the risk factor responsible for the largest burden, followed by hypertension, physical inactivity and obesity.

Cost-effectiveness analyses of the management of diabetes mellitus type 2 pointed to the advantages of guidelines application in the clinical practice as well as preventive programmes for reduction of physical inactivity and obesity. The implementation of the National Serbian Guideline for Diabetes Mellitus in clinical practice bears an enormous potential not only in saving lives and lowering the years lived with reduced quality of life, but in addition it may reduce clinical costs by as much as about a quarter. A preventive programme with a relatively small budget may achieve risk factor reductions resulting in about the same amount of quality adjusted life years saved, not only through the prevention of diabetes, but also of malignant and degenerative cardiovascular diseases.

While every attempt has been made to identify the best available information in relation to each disease, injury and risk factor category, and to consult as widely as possible, it must be emphasized that the estimates published here should be seen as provisional and developmental. It is hoped that others will contribute to future improvements in data, disease models and disability weights.

9. Glossary of Terms

Accountability
The result of the process which ensures that decision-makers at all levels actually carry out what they are obliged to do and that they are made answerable for their actions. The process of setting explicit objectives and targets for health and defining the means of monitoring progress towards them has facilitated the attempt to achieve greater accountability through public disclosure or "transparency".

Age-adjusted death rate
Rate which accounts for differences in age distributions across populations. The composite rate for population resulting from applying its age-specific death rates to a population with the age distribution of a standard population (usually WHO World population or European population). Age-adjusted rates based on the same standard population can be compared. Also called age-adjusted mortality rate.

Age distribution
The percentage of any given population in each age group (i.e., the percent of the population ages 0 to 4, 5 to 24, etc.). The age distribution of populations is important to consider when using rates because disease and death rates differ widely by age group. Age-adjusted death rates and life expectancies allow summary comparison of the burden of mortality in population with different age distributions.

Age-specific rate
Rate for a specified age group (e.g., the age-specific rate for ages 25 to 44 is the number of deaths in a given time period of people ages 25 to 44, divided by the number of people ages 25 to 44 in the population in that time period, times 1 000 to get the rate per 1 000 population). Age-adjusted rates are weighted averages of age-specific rates; as such, they mask differences between populations in age-specific rates. Age-specific rates for the same age groups can be directly compared.

Age standardised rate, see Age Adjusted Rate
Rate that has been statistically adjusted to enable valid comparison despite differences in the age structures of the populations being compared. In this report, Segi's, European and WHO World Population (model populations) are used as the reference population for age standardisation by the direct method.

Allocative efficiency
Requires that an economy provide its members with the amounts and types of goods and services that they most prefer. In standard economic theory it occurs when resources are allocated in such a way that any change to the amounts or types of outputs currently being produced (which might make someone better off) would make someone worse off.

Appropriate health technology
Methods, procedures, techniques and equipment in the field of health that are scientifically valid, adapted to local needs and acceptable to those who use them and those for whom they are used, and which can be maintained and utilized by the community with resources it and the country can afford.

Attributable fraction
The maximum proportion by which the incidence or mortality of a specified disease or other health outcome in a specified population could theoretically be reduced if a given risk factor of the outcome of interest were eliminated.

Beneficiaries
The individuals covered within a health care plan. In a publicly funded system, the beneficiaries are residents of a jurisdiction or members of a social insurance system; in a private plan, they are enrollees of the insurance plan.

Burden of disease
A measure of the social impact of a disease (or injury) on a population, including both fatal and non-fatal outcomes of the disease (or injury).

Cause of death
General name for the category of the ICD-10 code listed as the "underlying cause of death" on the death certificate.

Co-morbidity (co-disability)
Co-existence of more than one disease (disability) in the same individual at a given time.

Cost-benefit analysis
A form of economic evaluation where all the costs and consequences are expresses in money terms. In principle, this form of analysis enables one to assess whether a particular objective is worth achieving. However, estimation difficulties often reduce cost-benefit analysis to a consideration of those costs and consequences that are easy to express in money terms.

Cost-effectiveness analysis
In the health field, a form of economic evaluation where the costs are expressed in money terms but where some of the consequences are expressed in physical units (e.g. life years gained, cases detected). It is usually used to compare different ways of achieving the same objective and assumes the objective is worth achieving.

Cost-utility analysis
A type of analysis that measures benefits in utility-weighted life-years (QALYs) and which computes a cost per utility-measure ratio for comparison between programmes.

Comparative risk assessment, CRA
A systematic counterfactual approach estimating health gaps (or changes in health expectancy) causally attributable to a risk factor or a group of risk factors.

Crude death rate
Death rate calculated for a population, without accounting for its age distribution. Crude death rates provide a measure of overall burden of mortality in a population, but are misleading to compare across populations with different age distributions.

Death rate or mortality rate
Rate expressing proportion of population dying from a specified cause or causes in a specified time period, usually expresses as deaths per 1 000 people in the population.

Demographics
Basic characteristics of populations, especially their distributions by age, sex.

Disability
Functional, activity or role limitation resulting from a health condition and lasting (or expected to last) for six months or more.

Disability adjusted life expectancy (DALE)
The average number of years an individual of a given age is expected to live, with the years of life weighted on a 0-1 scale according to the social preferences for the different states of disability into which the population is distributed, if current mortality and disability rates, and current disability state valuations, continue to apply. Synonym for HALE or healthy life expectancy.

Disability adjusted life year (DALY)
A health gap measure developed for the Global Burden of Disease derived by adding YLD to YLL. One DALY thus represents the loss of one year of healthy life.

Disability weight
Social preferences for a specified health (disability) state, measured on a 0-1 scale using person trade-off or similar valuation method.

Discounting
A mathematical method for reducing the value of future health losses so as to reflect their present value.

Efficiency
The capacity to produce the maximum output for a given input.

Effectiveness
A measure of the extent to which a specific intervention, procedure, regimen, or service, when deployed in the field in routine circumstances, does what it is intended to do for a specified population.

Equality
Principle by which all persons or things under consideration are treated in the same way.

"Equity in health"
Equity in health implies that everyone should have a fair opportunity to attain his or her full health potential and, more pragmatically, that no one should be disadvantaged from achieving this potential.

Evaluation
In the health field, the systematic assessment of the relevance, adequacy, progress, efficiency, effectiveness and impact of a health programme or other actions for health gain.

Global Burden of Disease, GBD
A project to estimate health gaps for a comprehensive set of disease and injury causes, and for major risk factors, in the population of the world using all available mortality and health data and methods to ensure internal consistency and comparability of estimates. The original Global Burden of Disease project estimated health gaps using DALYs for eight regions of the

world in 1990. The WHO Global Burden of Disease 2000 project is updating these estimates for 14 subregions of the world for the year 2000 and subsequent years.

Governance
The exercise of political, economic and administrative authority in the management of a country's affairs at all levels. It is a neutral concept comprising the complex mechanisms, processes, relationships and institutions through which citizens and groups articulate their interests, exercise their rights and obligations and mediate their differences.

Health advocacy
The actions of health professionals and others with perceived authority in health to influence the decisions and actions of communities and governments which have some control over the resources which influence health.

Health-adjusted life expectancy, HALE
Any of a number of summary measures which use explicit weights to combine health expectancies for a set of discrete health states into a single indicator estimating the expectation of equivalent years of good health. Also referred to as healthy life expectancy.

Health expectancy, HE
Generic term for summary measures of population health, which estimate the expectation of years of life lived in various health states.

Health gain
The result of a systematic process of approving, for a specific population, a range of measures that are based on the length of life and the quality of life, and then providing and planning health resources that increase the average length of improved life enjoyed by that population.

Health gap, HG
A generic term for summary measures of population health; estimates the gap between current population health and a normative goal for population health; the difference between the observed health status of a population and some standard or reference level of health.

Health outcome
A change in the current and future health status of a patient that can be attributed to antecedent health care or health policy measures. One of the achievements of the HFA approach is the shift from planning for inputs and outputs to planning based on the achievements of health outcome.

Health potential
The fullest degree of health that an individual can achieve, regardless of whether he or she suffers from mental, sensory or physical impairment to health. Health potential is determined by caring for oneself and others, by being able to make decisions and take control over one's life, and by ensuring that the society in which one lives creates conditions that allow the attainment of health by all its members.

Healthy public policy
An explicit concern for the promotion of health and equity in all areas of policy and accountability for health impact. Health public policy creates a supportive physical and social environment which enables people to lead healthy lives.

Health services research
A field on inquiry that examines the impact of the organization, financing and management of health care services on the delivery, quality, cost, access and outcomes of such services.

Health status
The state of health of a person or a population, assessed by reference to general morbidity, morbidity from particular diseases, impairments, anthropomorphic measurements and mortality, and indicators of functional status and quality of life.

Horizontal equity
The principle that says that those who are in identical or similar circumstances should pay similar amounts in taxes and should receive similar amounts in benefits.

ICD-10, International Statistical Classification of Diseases and Related Health Problems Tenth revision
Internationally used method for classifying and coding specific conditions and group of conditions. A classification of diseases and other causes of mortality that was entrusted to the World Health Organization in 1948, along with the constitutional mandate to have it periodically revised as necessary. The current tenth revision was issued in 1992 to come into effect on 1 January 1993. The ICD is a member of the WHO family of international classifications.

Impact
The total, direct and indirect, effects of a programme, service or institution on a health status and overall health and socio-economic development.

Input
In most organizations includes resources of money, materials and staff (with their skills, aspirations and attitudes).

Life expectancy, LE
Generic term for summary measures of population mortality that estimate the expectation of years of life lived. Average number of years an individual is expected to live if current age-specific mortality rates continue to apply. Often reported as life expectancy at birth, but can apply to life expectancy at any given age. An overall measure of a population's current total mortality burden.

Monitoring
The regular observation of changes in a condition (e.g. health status) or situation (e.g. levels of pollution) or changes in activities to ensure that they are proceeding according to plan. In the case of monitoring activities, this might include keeping track of achievements, staff movements and utilization, supplies and equipment, and the money spent in relation to the resources available. The information gained from monitoring is utilized for evaluation.

Model life table
A standard or reference life tables used to estimate life expectancy remaining at age of death (i.e. the health loss function) for calculation of years of life lost.

Morbidity
Any departure (subjective or objective) from a state of physiological or psychological wellbeing.

Mortality
Death.

Outcome
In the field of health, the result or impact of policy measures or health interventions in terms of a change in health status or health behavior.

Output
The result of an activity. In a factory the output is a product. In health work, the output is a service.

Performance
The level of attainment of a goal in comparison to a given effort.

Policy
An agreement or consensus among relevant partners on the issues to be addressed and on the approaches or strategies to deal with them.

Population attributable risk (PAR)
The difference between the incidence (or mortality) rate of a specified disease in the total population and in those not exposed to a given risk factor for the disease.

Population health status
The level of health experienced by a population at a given time.

Premature mortality
The social burden of fatal health outcomes, measured in terms of years of life lost.

Price
What must be given in exchange for something.

Process
A continuous and regular action or succession of actions, taking place or being carried out in a definite manner, and leading to the accomplishment of some results.

Quality of life
An individual's perception of their position in life in the context of the culture in which they live, and in relation to their goals, expectations and standards. The term incorporates concepts of physical and psychological wellbeing, levels of independence and autonomy, social relationships and support, and spirituality.

Quality-adjusted life year (QALY)
A common measure of health improvement used in cost-utility analysis; combines mortality and quality of life gains (outcome of treatment measured as the number of years of life saved, adjusted for quality).

Rate
Number of events of interest occurring in a defined population during specified time period, usually expressed per specified unit size of the population involved (e.g., death rate usually reported as numbers of deaths in a given population in a given year per 1 000 people in that population at midyear).

Rate ratio
Ratio of two rates.

Risk factor
An attribute or exposure associated with increased risk of death or morbidity.

Relative risk
The ratio of the risk (or rate, or odds) of a disease (or other health event or condition) among exposed to a given risk factor to that among those unexposed.

Resources
The basic inputs to production – the time and abilities of individuals, raw materials such as land and natural resources (air, water, minerals, etc), transformations and accumulations of these into capital (facilities, equipment, etc), and knowledge of production process (technologies).

Summary measure of population health (SMPH)
A population health indicator that integrates both quantity of life (mortality) and quality of life (morbidity or disability) dimensions of health into composite index. May be a healthy expectancy or a health gap measure.

Stakeholder
Any party to a transaction which has particular interests in its outcome.

Standard population
Population whose age distribution is used as a standard for calculating age-adjusted rates.

Standardization
Weighted average according to a standard distribution. Age standardization involves calculating rates based on a standard population's age distribution; rates so calculated are called age-adjusted rates.

Strategy
Broad lines of action to be taken to achieve the goals and objectives, incorporating the identification of suitable points for intervention, the ways of ensuring the involvement of other sectors, the range of political, social, economic, managerial and technical factors, as well as constraints and ways of dealing with them.

Sustainable development
Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

Technical efficiency
Requires that for any given amount of output the amount of inputs used to produce it is minimized.

Uncertainty
A situation in which an individual has incomplete information as to what is going to happen in the future. Economists sometimes distinguish between risk and uncertainty.

Vertical equity
The principle that says that those who are in different circumstances with respect to a characteristic of concern for equity should, correspondingly, be treated differently, e.g. those with greater economic capacity to pay should pay more; those with greater need should receive more.

Years of life lost (YLL)
An indicator of the social burden of fatal health outcomes, calculated by subtracting the age at death from the life expectancy remaining at that age (as determined from suitable standard or reference life tables).

Years of life with disability (YLD)
A measure of the burden of non-fatal health outcomes, used in the construction of the DALY. YLD represents the equivalent of years of life lost to severity adjusted disability.

10. REFERENCES

Ahmad OB, Boschi-Pinto C, Lopez A, Murray CJL, Lozano R, Inoue M (2000). Age Standardization of Rates: A New WHO Standard. GPE Discussion Paper Series No. 31. Geneva, WHO.

American Academy of Pediatrics (1996). Committee on Injury and Poison Prevention and Committee on Fetus and Newborn Safe Transportation of Premature and Low Birth Weight Infants. Pediatrics; 97(5):758-760.

Anand S, Hanson K (1997). Disability-Adjusted Life Years: A Critical Review. Journal of Health Economics 16(6): 685-702.

Ancelle-Park R (1993). Expanded European AIDS case definition. Lancet 341:441.

Aragon T, Reiter R, Katcher B (1998). San Francisco Burden of Disease and Injury: Mortality Analysis, 1990-1995. Division of Population Health & Prevention, San Francisco Department of Public Health. Also available on the worldwide web at www.dph.sf.ca.us

Backović D et al. (1999). Environmental factors, heath-related habits and serum selenium levels in cancer patients and healthy controls. Biological Trace Element Research. 67(1):55-62.

Bauman A, Stephenson J and Armstrong T (1999). The cost of illless attributed to physical inactivity in the Austarlian adult population: with particular reference to coronary heart disease, non-insulin dependent diabetes and colon cancer. Canberra: Australian Sports Commission and Commonwealth Department of Health and Aged.

Beaglehole R, Bonita R and Kjellstrom T (1993). Basic epidemiology. Geneva: World Health Organization.

Bender R et al. (1998). Assesment of excess mortality in obesity. American Journal of Epidemiology 147:42-48.

Berlin JA and Colditz GA (1990). A meta-analysis of physical activity in the prevention of coronary heart disease. American Journal of Epidemiology 132:612-628.

Bevan G, Hollinghurst S, Raftery J, Gold L, Stevens A, Smithies A, Spurgeon R, Bowie C (1998). The South and West DALYs Project: Developing a powerful tool for health care planning. Somerset Health Authority, Wellsprings Road, Taunton, Somerset.

Blair SN et al. (1995). Changes in physical fitness and the all cause mortality. Journal of American Medical Association 273:1093-1098.

Bjegović V, Terzić Z, Cucić V (2000). Komparativne studije zdravstvenog ponašanja školske dece – iskustva naše zemlje. Zbornik radova. Zdravstveno ponašanje studentske i srednjoškolske omladine. Stručno-naučni skup. Zlatibor: Zavod za zaštitu zdravlja studenata. pp.25-33.

Bobadilla JL (1996). Searching for essential health services in low- and middle-income countries: A Review of Recent Studies on Health Priorities. Human Development Department, World Bank.

Boffeta P and Garfinkel L (1990). Alcohol drinking and mortality among men enrolled in an American Cancer Society Prospective study. Epidemiology 1:342-348.

Bradshaw D, Schneider M, Laubscher R, Nojilana B (2002). Cause of Death Profile South Africa, 1996. Burden of Disease Research Unit Report. South African Medical Research Council. Also available at www.mrc.ac.za/bod/profile.pdf

Brundtland GH (1998). The global burden of disease. Speech delivered on December 15, 1998, Geneva.

Chiang CL (1984). The Life Table and Its Applications. Robert E Krieger Publishing Company, Florida.

Cindy and Monica Collaborative Center (unpublished data). Register of Myocardial Infarction and Stroke, 1983-1998. Novi Sad.

Coale AJ, Demeny P (1966). Regional Model Life Tables and Stable Population. Princeton: Princeton University Press.

Coale AJ, Demeny P, Vaughan B (1983). Models of mortality and age composition. In: Coale, et al.. eds. Regional model life tables and stable populations, 2nd ed. New York: Academic Press.

Concha M, Aguilera, X, Albala C, et al (1996). Estudio ecarga de enfermedad informe final. Estudio Prioridades de Inversio en salud Minsterio de Salud.

Cucić V, ed (2001). The disabled and the environment. Belgrade: Centar za proučavanje alternative.

Cutler DM, Richardson E (1997). Measuring the health of the U.S. population. Brookings Paper: Microeconomics, 217-271.

Cutler DM, Richardson E (1998). The value of health. American Economic Review, 88 (2): 97-100.

Department of Human Services (DHS) (1999a). The Victorian Burden of Disease Study: Mortality. Melbourne: Public Health and Development Division, Department of Human Services.

Department of Human Services (DHS) (1999b). The Victorian Burden of Disease Study: Morbidity. Melbourne: Public Health and Development Division, Department of Human Services.

Doll R et al. (1994). Mortality in relation to smoking: 40 years` observation on male British doctors. British Medical Journal 308:901-911.

Doll R et al. (1996). Mortality in relation to consumption of alcohol: 13 years` observation on male British doctors. British Medical Journal 309:911-918.

Đukanović Lj, Radović M, eds. (2002). Annual report on regular dialysis and transplantation in Yugoslavia, 2000. Belgrade, Clinical Center of Serbia.

English DR, Holman CDJ, Milne E (1995). The quantification of drug caused morbidity and mortality in Australia, 1995 edition. Canberra: Commonwealth Department of Human Services and Health.

Erickson P, Wilson R, Shannon E (1995). Years of healthy life. Hyattsville, Maryland: US National Center for Health Statistics.

European Center for the Epidemiological Monitoring of AIDS (1996). European case definition for AIDS surveillance in children-revision 1995. HIV/AIDS Surveillance in Europe. Quartely Report, No. 49:30-33.

Evans DB, Tandon A, Murray CJL, Lauer JE (2001). Comparative efficiency of national health systems: cross national econometric analysis. MBJ; 323: 307-310.

Fanshel S, Bush JW (1970). A health-status index and its application to health services outcomes. Operations research, 18(6):1021-1066.

Federal Statistical Office (2002). Statistical Yearbook of Yugoslavia 2002. 71-92.

Field MJ, Gold GM, eds. (1998). Summarizing population health: Directions for the development and application of population metrics. Institute of Medicine, Washington, D.C.: National Academy Press.

Florida Department of Health, Bureau of Epidemiology (2001). 1999 Smoking-Attributable Mortality Report.

Fundación Mexicana Para La Salud (1995). Health and the Economy: Proposals for Progress in the Mexican Health System. Mexico, Salud.

Garfield R (2001). Economic Sanctions, Health, and Welfare in the Federal Republic of Yugoslavia 1990 – 2000. Belgrade: OCHA and UNICEF Belgrade.

Gold MR, Siegel JE, Russell LB, Weinstein MC (1996). Cost-Effectiveness in Health and Medicine. Oxford University Press, New York.

Hamers FF, Downs A (2003). HIV in central and eastern Europe. Lancet htpp: /image.thelancet.com/extras/02art6024web.pdf

Hoffmeister H, et al (1996). Reduction of Coronary Heart Disease Risk Factors in the German Cardiovascular Prevention Study (GCP). Prev Med; 25: 135-145.

Holman CDJ and English DR (1996). Ought low alcohol intake be promoted for health reasons? Journal of the Royal Society of Medicine 89:123-129.

Hoyert D, et al (2001). Annual Summary of Vital Statistics: 2000. Pediatrics; 108(6): 1241-1255.

Hyder AA, Morrow RH (2000). Applying burden of disease methods in developing countries: a case study from Pakistan. American Journal of Public Health, 90(8): 1235-1240.

Ilić M, Vlajinac H and Marinković J (1996). Case control study of risk factors for prostate cancer. British Journal of Cancer 67:1682-1686.

International Agency for Research on Cancer (IARC) (1999). - European Commission. Survival of Cancer Patients in Europe: the EUROCARE-2 Study (editors Berrino F, Capocaccia R, Esteve J, Gatta G, Hakulinen T, Micheli A, Sant M and Verdecchia A), IARC Scientific Publication No. 151, Lyon, France: IARC.

Institute of Lung Diseases and Tuberculosis (2002). Annual Report. Belgrade: Clinical Center of Serbia.

Institute of Oncology Sremska Kamenica (2001). Cancer registry of Vojvodina - Cancer incidence and mortality in Vojvodina, 1998. Novi Sad: Institute of Oncology Sremska Kamenica.

Institute of Oncology Ljubljana (2002). Cancer register of Slovenia - Cancer incidence in Slovenia 1999. Report No. 41 Ljubljana: Institute of Oncology Ljubljana.

Institute of Public Health of Serbia (2001). 2000 Population Health Survey in Serbia. Institute of Public Health of Serbia.

Insitute of Public Health of Serbia (2001). Report on infectious disease in Serbia without Kosovo and Metohia, 2000. Belgrade, Institute of Public Health of Serbia.

Insitute of Public Health of Belgrade (2001). Report on HIV/AIDS in Belgrade, 2000. Belgrade: Institute of Public Health of Belgrade.

Institute of Public Health of Serbia (2002). Cancer registry of Central Serbia - Cancer incidence and mortality in Central Serbia, 1999. Report No. 1. Belgrade: Institute of Public Health of Serbia "Dr Milan Jovanović - Batut".

Institute of Social Medicine. Medical Faculty, University of Belgrade (2000). Health-related habits in high school children and students. Institute of Social Medicine. Medical Faculty, University of Belgrade.

Jackson R, Saragg R and Beaglehole R (1991). Alcohol consumption and risk of coronary heart disease. British Medical Journal 303:211-216.

Kannel W (1995). Framingham study insights into hypertensive risk of cardiovascular disease. Hypretension Research 18:181-196.

Kocić B et al. (1999). Case control study of breast cancer risk factors. Journal of BUON 4:399-403.

Laaser U, Wenzel H (1990). Antihypertensive treatment in Germany, subjected to a cost-effectiveness analysis. J Hum Hypertens; 4(4): 436-40.

Laaser U (1994). Benefits and costs of early detection and treatment of hypercholesterolemia. Z Kardiol; 83(Suppl 6): 163-7.

Laaser U, Breckenkamp J, Niermann U (1999). Kosten-Wirksamkeits-Analyse kurativer Interventionen bei Patienten mit Schlaganfall in Deutschland unter besonderer Berücksichtigung von Schlaganfallstationen. Cost-Effectiveness-Analysis of curative interventions for stroke patients in Germany with special consideration of Stroke Units. Gesundheitsökonomie & Qualitätsmanagement; 6: 176-183.

Lam TH, and Hedley AJ (2002). Respiratory disease. In: Detels R et al, eds. Oxford Textbook of Public health, 4th ed., Vol. 3. New York. Oxford University Press, pp.1227-54.

Lameire N, Biesen VW (1999). The pattern of referral of patients with end-stage renal disease to the nephrologist – a European survey. Nephrol Dial Transplant; 14:16-23.

Leon DA, Walt G, Gilson L (2001). International perspectives on health inequalities and policy. BMJ; 322: 591-594.

Leons AS, Myers MJ, Connett J (1997). Leisure time physical activity and the 16-years risk of mortality from coronary heart disease and all cancers in the Multiple Factor Intervention Trial (MRFFIT). International Journal of Sports Medicine 18:S208-S215.

Lepine JP (2001). Epidemiology, burden and disability in depression and anxiety. J Clin Psychiatry, 62 (suppl 13): 4-10.

Lin BQ et al. (1998). Emerging tobacco hazards in China: 1. Retrospective proportional mortality study of one million deaths. British Medical Journal 317:1411-1422.

Linh Cu LE, Anh Vu LE (2000). Evaluation of the Burden of Disease in the Chi Linh District, Hai Duong Province of Vietnam by Analyzing Mortality Data for the Year 1997-1998. Hanoi School of Public Health.

Lozano R, Frenk J, Gonzalez MA (1994). El peso de la enfermedad en adultos mayores, Mexico 1994. Salud Publica de Mexico, 38: 419-429.

Lozano R, Murray CJL, Frenk J, and Bobadilla J (1995). Burden of Disease Assessment and Health System Reform: Results of a study in Mexico. Journal for International Development, 7(3): 555-564.

Lozano R, Murray CJL, Lopez AD, Satoh T (2001). Miscoding and misclassification of ischaemic heart disease mortality. Geneva, World Health Organization (GPE Discussion Paper No. 12). Available on the worlwide web at www.who.int./evidence.

Macintyre S (2003). Evidence based policy making. BMJ; 326: 5-6.

Magnus A, Bensberg M (2000). Southern Metropolitan Burden of Disease Study: Mortality & Morbidity. Department of Human Services, Southern Health Care Network, Dandenong, Victoria. Also available at www. dhs.vic.gov.au/phd/ 9909073/index.htm

Mahapatra P (2002). Estimating National Burden of Disease: The Burden of Disease in Andra Pradesh, 1990's. Institute of Health Systems, Hyderabad.

Manson JE et al. (1995). Body weight and mortality among women. New England Journal of Medicine 333:677-685.

Marks GC, Coyne T, Pang G (2001). Type 2 Diabetes Costs in Australia – the potential impact of changes in diet, physical activity and levels of obesity. Sydney: Australian Food and Nutrition Monitoring Unit.

Mathers C, McCallum J, Robine J-M., eds. (1994). Advances in health expectancies: proceedings of the 7th meeting of the International Network on Health Expectancy (REVES), Canberra. Canberra, Australian Institute of Welfare: AGPS.

Mathers C, Vos T, Stevenson C (1999). The burden of disease and injury in Australia. Australian Institute of Health and Welfare, Canberra: AIHW. Also available on the worldwide web at www.aihw.gov.au.

Mathers CD, Vos T, Lopez AD, Salomon J, Ezzati M (ed.) (2001a). National Burden of Disease Studies: A Practical Guide. Edition 2.0. Global Program on Evidence for Health Policy. Geneva: World Health Organization.

Mathers CD, Sadana R, Salomon JA, Murray CJL, Lopez AD (2001b). Healthy life expectancy in 191 countries, 1999. Lancet, 357(9269): 1685-1691.

Mathers CD (2002). Health expectancies: an overview and critical appraisal. In: Murray CJL, Salomon J, Mathers CD, Lopez A, Lozano R (2002). Summary Measures of Population Health: concepts, ethics, measurement and applications. Geneva, World Health Organization.

Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N, Bernard C, Lopez A, Murray C (2002). Global Burden of Disease 2000: Version 2 methods and results. GPE Disccussion Paper No. 50. Geneva, WHO. Available on the worlwide web at www.who.int./evidence.

Mathers C and Boschi-Pinto C (2003). Global burden of cancer in the year 2000: Version 1 estimates. In Global Burden of Disease 2000. Geneva: WHO.

Michaud CM, Murray CJL, Bloom BR (2001). Burden of Disease – Implications for Future Research. JAMA. 2001; 285: 535-539.

Ministry of Health and Social Welfare of the Republic of Srpska, Bosnia and Herzegovina (2002). Public Health and Disease Control Project. Ministry of Health and Social Welfare of the Republic of Srpska, Bosnia and Herzegovina.

Murray CJL, Lopez, AD, eds. (1996a). The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020. Global Burden of Disease and Injury Series, Vol. 1. Cambridge: Harvard University Press; 1996.

Murray CJL, Lopez AD, Eds. (1996b). Global health statistics: A compendium of incidence, prevalence and mortality estimates for over 200 conditions. (Global Burden of Disease and Injury Series, Vol.2) Cambridge: Harvard School of Public Health, World Health Organization and World Bank.

Murray CJL, and Lopez A (1996c). Evidence-based health policy—lessons from the Global Burden of Disease Study. Science, 274:740-743.

Murray C and Lopez A (1996d). Tobacco. In: Murray C and Lopez A eds. Quantifying global health risks: the burden of disease attributable to selected risk factors. Cambridge, Harvared University Press.

Murray CJL, Acharya AK (1997). Understanding DALYs. J Health Economics 16: 703-730.

Murray CJL, and Lopez A (1997a). Mortality by cause for eight regions of the world: Global Burden of Disease Study. Lancet, 349: 1269-1276.

Murray CJL, and Lopez A (1997b). Regional patterns of disability-free life expectancy and disability-adjusted life expectancy: Global Burden of Disease Study. Lancet, 349: 1347-1352.

Murray CJL, Lopez AD (2000). Progress and directions in refining the global burden of disease approach: response to Williams. Health Economics 9: 69-82.

Murray CJL, Salomon JA, Mathers C (2000). A critical examination of summary measures of population health. Bulletin of the World Health Organisation 78(8): 981-994.

Murray CJL, Lopez AD, Mathers CD, Stein C (2001). The Global Burden of Disease 2000 project: aims, methods and data sources. Geneva,World Health Organization (GPE Discussion Paper No. 36). Available on the worlwide web at www.who.int./evidence.

Murray CJL, Salomon J, Mathers CD, Lopez A, Lozano R (2002). Summary Measures of Population Health: concepts, ethics, measurement and applications. Geneva, World Health Organization. Available on the worlwide web at www.who.int./evidence.

Nacionalni komitet za izradu Vodiča Kliničke prakse u Srbiji (2002). Diabetes Mellitus. Nacionalni vodič dobre prakse. Beograd: Evropska agencija za rekonstrukciju, EPOS Health Consultants.

Nichols SR and Elliot P (1996). Hypertension. In: Murray C and Lopez A eds. Quantifying global health risks: the burden of disease attributable to selected risk factors. Cambridge, Harvared University Press.

Pearce N, Douwes J, Beasley (2002). Asthma. In: Detels Ret al, eds Oxford Textbook of Public Health, 4th ed., Vol. 3. New York. Oxford University Press, pp.1255-77.

Pejin-Stokić LJ (1996). Improvement of Planning and Financing in Health. Economics Institute, Institute of Public Health, Belgrade.

Pešut DP (2002). Tuberculosis Epidemiology in Serbia - 10-year analysis (1991-2000) (in Serbian). 45th Serbian Pulmologists' Meeting in Belgrade. Proceedings: 63-70.

Pešut DP, Stefanović G, Tomić Lj, Danilović M, Bogdanović N and Vukičević M (2002). Anti-tuberculosis Drug Resistance in Serbia in the Last Decade of the 20th Century. 33rd World Conference on Lung Health of the IUATLD, Montreal, Canada, 2002. International Journal of Tuberculosis and Lung Disease - Abstract Book: S194.

Peto R, Lopez AD (1993). Mortality from smoking in developed countries. Lancet 339: 1268-78.

Poikolainen J (1995). Alcohol and mortality: a review. Journal of Clinical Epidemiology 48(4):455-465.

Pratt M and Coplan J (1996). Physical inactivity. In: Murray C and Lopez A eds. Quantifying global health risks: the burden of disease attributable to selected risk factors. Cambridge, Harvared University Press.

Preston SH (1984). Chapter 8: Use of direct and indirect techniques for estimating the completeness of death registration systems. In: United Nations, Data Bases for Mortality Measurement. New York: United Nations.

Puska P, et al (1985). The community-based strategy to prevent coronary heart disease. Conclusions from the Ten Years of the North Karelia Project. Ann Rev Public Health: 6: 147-193.

República de Colombia Ministerio de Salud (1994). La Carga de la Enfermedad en Columbia. Bogota, Ministerio de Salud, 1994.

Raikou M, et al (1998). Cost effectiveness analysis of improved blood pressure control in hypertensive patients with type 2 diabetes: UKPDS 40. BMJ; 317: 720-726.

Rimm EB et al. (1996). Vegetable, fruit and cereal fiber intake and coronary heart disease among men. JAMA 275(6):447-451.

Ritchie K, Jagger C, Brayne C, Letenneur L (1993). Dementia-free life expectancy: preliminary calculations for France and the United Kingdom. In Robine J-M, Mathers CD, Bone MR, Romieu I, eds. Calculation of health expectancies: harmonization, consensus achieved and future perspectives. London, John Libbey Eurotex.

Robine JM, et al., eds. (1993). Calculation of health expectancies: harmonization, consensus achieved and future perspectives. London, John Libbey Eurotex.

Robine JM, Romieu I, Cambois E (1999). Health expectancy indicators. Bulletin of the World Health Organisation 77(2):181-185.

Ruwaard D. and Kramers PGN (1998). Public health status and forecasts. The Hague: National Institute of Public Health and Environmental Protection.

Salomon JA. Global burden of HIV/AIDS in the year 2000 (2003). Version 1 estimates. In Global Burden of Disease 2000, WHO, Geneva.

Sanders BS (1964). Measuring community health levels. American Journal of Public Health, 54:1063-70.

Simić S, Bjegović V, Jelača P, Kosanović R, Erić-Marinković J, Mladenović D (2001). Osnove za reformu sistema zdravstvene zaštite u Republici Srbiji. Beograd: Centar za proučavanje alternativa.

Simić S, Šaulić A, Grozdanov J, Bjegović V, Atanasijević D (2003). Bolje zdravlje za sve u trećem milenijumu. Ministarstvo zdravlja Republike Srbije, Beograd.

Sokić S et al. (1994). Risk factors for thyroid cancer. Neoplasma 41:43-47.

Sokić S, Adanja B, Marinković J and Vlajinac H (1995). Risk factors for laryngeal cancer. European Journal of Epidemiology 11:431-433.

Stouthard M, Essink-Bot M, Bonsel G, Barendregt J, Kramers P (1997). Disability weights for diseases in the Netherlands. Rotterdam: Department of Public Health, Erasmus University.

Šantrić-Milićević M (2002). Uspostavljanje prioriteta u prevenciji bolesti i povreda na nacionalnom nivou. Magistarska teza. Beograd: Medicinski fakultet Univerziteta u Beogradu.

Tengs TO (1996). Enormous variation in the cost-effectiveness of prevention: implications for public policy. Current Issues in Public Health; 2: 13-17.

Thylefors B, Négrel AD, Pararajasegaram R, Dadzie KY (1995). Global data on blindness. Bulletin of the World Health Organization; 73(1): 115-121.

Tobias M, Borman B, Forbes G, Hemona P (2001). The Burden of Disease and Injury in New Zealand. Public Health Intelligence Occasional Bulletin No. 1. Ministry of Health, Wellington, New Zealand. Also available on the worldwibe web at www.moh.govt.nz

United Nations (1983). Brass growth balance method. In: United Nations, Manual X. Indirect techniques for demographic estimation. New York: United Nations.

Viegi G, Annesi I, Matteelli (2003). Epidemiology of asthma. In: Chung F, Fabbri LM, eds. Asthma. European Respiratory Monograph. European Society Journals Ltd; pp.1-22.

Vasiljević N et al. (1998). Evaluation of the nutritional status and tumor characteristics in premenopausal and postmenopausal breast cancer patients. Neoplasma 45(6):389-394.

Vlajinac H, Ilić M and Marinković J (1992). Cardiovascular risk factors and prevalence of coronary heart disease in Type 2 diabetes. European Journal of Epidemiology 8:783-788.

Vlajinac H, Ilić M and Marinković J (1995). Coronary heart disease incidence in diabetic patients and its relationship to general risk factors. European Journal of Epidemiology 11:351-354.

Vlajinac H, Marinković J, Ilić M and Kocev N (1997). Diet and prostate cancer: a case control study. European Journal of Cancer 33:101-107.

Vlajinac HD, Marinković JM, Kocev NI, Adanja BJ, Pekmezović TD, Šipetić SB, Jovanović DJ (1997). Infectious disease mortality in Central Serbia. J Epidemiol Community Health 51:172-174.

Voss T, Timæus I, Gareeboo H, Roussety F, Huttly S, Murray C. (1995). Mauritius Health Sector Reform. National Burden of Disease Study. Final report of consultancy. London: London School of Hygiene and Tropical Medicine.

Ware JF & Sherbourne CD (1992). The MOS 36-item Short-Form Health Survey (SF-36): conceptual framework and item selection. Medical Care 30:473–483.

Wild S, Roglic G, Sicree R, Green A, King H (2000). Global burden of diabetes mellitus in the year 2000. Drafft 11-02-03. In Global Burden of Disease 2000. Geneva: WHO.

Wilkins R, Adams OB (1992). Quality-adjusted life expectancy: weighting of expected years in each state of health. In Robine J-M, Blanchet M, Dowd JE (eds) Health expectancy, OPCS studies on medical and population subjects no. 54, HMSO, London.

Williams A. (1999). Calculating the global burden of disease: time for a strategic reappraisal? Health Economics, 8:1-8.

Witteman JC et al. (1998). A prospective study of nutritional factors and hypertension among US women. Circulation 80(5):1320-1327.

Wolfson MC (1996). Health-adjusted life expectancy. Health Reports 8(1): 41-45.

World Health Organization (1992). International Classification of Diseases and related health problems – Tenth Revision (ICD 10). Geneva, WHO.

Wong T (2002). Rapid assessment of Serbia HIV/AIDS/STI surveillance system. Field Investigation Report (September 23-28). Belgrade: CPHA.

World Bank (1993). World Development Report 1993: investing in health. New York: Oxford University Press for the World Bank.

World Health Organization (1994). Terminology for the European Health Policy Conference. Copenhagen: World Health Organization Regional Office for Europe.

World Health Organization (1996). Investing in health research and development. Report of the Ad Hoc Committee on Health Research Relating to Future Intervention Options. Geneva: World Health Organization.

World Health Organization (1998). Speech on burden of disease concept. Office of the Director-General. (cited 1998, December 15). Available from URL: http://www.who.int

World Health Organization (2000). World Health Report 2000. Geneva: World Health Organization. Also available on the worldwide web at www.who.int/whr.

World Health Organization (2001). World Health Report 2001. Mental health: New Understanding. New hope. Geneva, World Health Organization 2001. Also available on the worldwide web at www.who.int/whr

World Health Organization (2002). World Health Report 2002. Reducing Risks, Promoting Healthy Life. Geneva, World Health Organization 2001. Also available on the worldwide web at www.who.int/whr.

World Health Organization and Burden of Disease Unit, Harvard Center for Population and Development Studies (2002). Workshop on Evidence for Health Policy 2002: Burden of Disease, Cost-effectiveness, Health Systems Performance, and Poverty & Health. Module 2. Workbook 4. Geneva: World Health Organization.

Živković Z (2002). Prevalence of childhood asthma, rhinitis and eczema in Belgrade area and Serbia. Children's pulmonology, 10, 1-2:61-73.

GLOSSARIES

Cucić V, Simić S, Bjegović V, Vuković D, Erić-Marinković J, Jelača P, Ananijević-Pandej J (2000). Terminološki rečnik kvaliteta u zdravstvenoj zaštiti. Beograd: Medicinski fakultet Univerziteta u Beogradu.

Last JM, Radovanović Z (2001). Epidemiološki rečnik. Drugo jugoslovensko izdanje. Beograd: Medicinski fakultet.

SOFTWARE PACKAGES

Palisade (1996). @RISK: advanced risk analysis for spreadsheets. New York: Palisade.

United Nations (1988). MORTPAK-LITE, version 3.0/CP. The United Nations software package for mortality measurement. New York: United Nations.

StatSoft, Inc. (2003). STATISTICA (data analysis software system), version 6. www.statsoft.com

NCSS Statistical Software (2001). NCSS 2001 Statistical Analysis System. www.ncss.com

Microsoft Corporation (2002). Microsoft®Excel 2002. www.microsoft.com

World Health Organization, Global Programme on Evidence for policy (2001). DISMOD II, version 1.01. www.who.int/evidence/dismod/

11. APPENDICES

Appendix A. Years of Life with Disabilities (YLD) Worksheet Example: Tuberculosis

DISEASE: ***Tuberculosis (ICD10 code A15-A19, B90)*** Updated: ########
REGION: ***SERBIA without Kosovo and Metohia and Belgrade*** By: Hristina Vlajinac
PERIOD: ***Year 2000*** Status: Finale

Notes:

1. Incidence

Incidence estimates are based on data from Serbian Central TB Registry [1]. Incidence comprised active new or relapsed cases of tuberculosis. We have assumed that these data are a good approximation of all active cases in Serbia without Kosovo and Metohia. During the last decade incidence rate was stable ranging from 31.4 to 36.0 per 100,000 inhabitants [2]. The vast majority of cases had pulmonary tuberculosis. During the year 2000, extrapulmonary tuberculosis was present in 3.3% of female and 13% of male TB cases [1].

2. Disability weights (DWs)

The decision was made to use the GDB disability weights. The GBD provided varying disability weights by age group, without accounting for the clinical picture:

Age group	0-4	5-14	15-44	45-59	60+
GBD DWs	0.294	0.294	0.264	0.274	0.274

3. Average duration for TB

The average duration for TB in the region of the former socialist economies (FSE) was assumed to be 6 months in GBD study, and we used 6 months duration of TB disability for YLD calculation. Average duration of treatment was 6 months. More than 80% of cases were successfully cured [2]. In Central Serbia, during the period 1992-2000, initial and acquired resistance to izoniazid (H), izoniazid and rifampicin (H+R) and other drugs were 6.3% (range 2.6%-11.5%) and 5.3% (range 2.7-8.3%) respectively [3].

References:
1. ***** Institute of Lung Diseases and Tuberculosis, Clinical Center of Serbia, Belgrade, Annual Report 2000
2. Pesut DP. Tuberculosis Epidemiology in Serbia - 10-year analysis (1991-2000) (in Serbian). 45th Serbian Pulmologists Meeting in Belgrade, 2001. Proceedings 2002: 63-70.
3. Pesut DP, Stefanovic G, Tomic LJ, Danilovic M, Bogdanovic N and Vukicevic M. Antituberculosis Drug Resistance in Serbia in the Last Decade of the 20th Century. 33rd World Conference on Lung Health of the IUATLD, Montreal, Canada, 2002. International Journal of Tuberculosis and Lung Disease - Abstract Book 2002: S194.

YLD for Serbia

	Population	Incidence	Incidence per 1,000	Age at onset	Duration (years)	Disability Weight	YLDs	YLD per 1,000
Males								
0-4	185,238	5	0.03	2.5	0.5	0.294	0	0.00
5--14	446,943	4	0.01	10	0.5	0.294	1	0.00
15-29	773,912	194	0.25	22.5	0.5	0.264	39	0.05
30-44	767,037	385	0.50	37.5	0.5	0.264	70	0.09
45-59	767,184	531	0.69	52.5	0.5	0.274	77	0.10
60-69	437,511	320	0.73	65	0.5	0.274	35	0.08
70+	295,704	217	0.73	75	0.5	0.274	18	0.06
Total	3,673,529	1,656	0.50				239	0.07
Females								
0-4	175,169	2	0.01	2.5	0.5	0.294	0	0.00
5--14	424,590	9	0.02	10	0.5	0.294	1	0.00
15-29	752,297	193	0.26	22.5	0.5	0.264	38	0.05
30-44	779,353	209	0.27	37.5	0.5	0.264	38	0.05
45-59	794,483	209	0.26	52.5	0.5	0.274	30	0.04
60-69	509,761	201	0.39	65	0.5	0.274	22	0.04
70+	441,673	225	0.51	75	0.5	0.274	19	0.04
Total	3,877,326	1,048	0.30				149	0.04

DALY for Serbia

	Males Population	DALYs	DALYs per 1,000	Females Population	DALYs	DALYs per 1,000	Persons Population	DALYs	DALYs per 1,000
Age									
0-4	185,238	0	0.00	175169	0	0.00	360,407	0	0.00
5--14	446,943	1	0.00	424590	1	0.00	871,533	2	0.00
15-29	773,912	39	0.05	752297	38	0.05	1,526,209	77	0.05
30-44	767,037	610	0.80	779353	186	0.24	1,546,390	796	0.51
45-59	767,184	850	1.11	794483	130	0.16	1,561,667	980	0.63
60-69	437,511	608	1.39	509761	209	0.41	947,272	817	0.86
70+	295,704	324	1.10	441673	241	0.55	737,377	565	0.77
Total	3,673,529	2431	0.66	3877326	805	0.21	7,550,855	3236	0.43

YLD for Belgrade

	Population	Incidence	Incidence per 1,000	Age at onset	Duration (years)	Disability Weight	YLDs	YLD per 1000
Males								
0-4	37,097	1	0.03	2.5	0.5	0.294	0	0
5--14	86,515	1	0.01	10	0.5	0.294	0	0
15-29	165,094	41	0.25	22.5	0.5	0.264	8	0.05
30-44	155,926	78	0.5	37.5	0.5	0.264	14	0.09
45-59	161,764	112	0.69	52.5	0.5	0.274	16	0.1
60-69	89,011	65	0.73	65	0.5	0.274	7	0.08
70+	57,700	42	0.73	75	0.5	0.274	4	0.06
Total	753,107	340	0.45				49	0.07
Females								
0-4	34,694	0	0.01	2.5	0.5	0.294	0	0
5--14	82,326	2	0.02	10	0.5	0.294	0	0
15-29	167,782	43	0.26	22.5	0.5	0.264	9	0.05
30-44	172,818	46	0.27	37.5	0.5	0.264	8.33	0.05
45-59	184,644	49	0.26	52.5	0.5	0.274	7.07	0.04
60-69	104,243	41	0.39	65	0.5	0.274	4.44	0.04
70+	85,521	44	0.51	75	0.5	0.274	3.68	0.04
Total	832,028	80	0.1				32	0.04

DALY for Belgrade

	Population Males	Population Females	DALYs Males	DALYs Females	DALY per 1,000 Males	DALY per 1,000 Females
0-4	37,097	34,694	0	0	0	0
5--14	86,515	82,326	0	0	0	0
15-29	165,094	167,782	8	9	0.05	0.05
30-44	155,926	172,818	126	36	0.81	0.21
45-59	161,764	184,644	123	56	0.76	0.3
60-69	89,011	104,243	141	43	1.58	0.41
70+	57,700	85,521	69	49	1.2	0.57
Total	753,107	832,028	467	193	0.62	0.23

Comparison with Australia and EURO estimates from GBD

Region	*Incidence per 1,000*			*YLD per 1,000*			*DALY per 1,000*		
	Males	*Females*	*Persons*	*Males*	*Females*	*Persons*	*Males*	*Females*	*Persons*
Serbia	0.50	0.30	0.36	0.07	0.04	0.05	0.66	0.21	0.43
Belgrade	0.45	0.10	0.36	0.07	0.04	0.05	0.62	0.23	0.42
Australia	0.06	0.05	0.06	0.09	0.08	0.01			0.05
EURO			0.56			0.21			1.83
EURO A			0.17			0.05			0.15
EURO B			0.62			0.31			2.03
EURO C			1.16			0.55			4.51

	YLD/DALY (%) Persons
Serbia	12%
Belgrade	12%
Australia	18%
EURO	11%
EURO A	33%
EURO B	15%
EURO C	12%

Years of Life with Disabilities (YLD) Worksheet Example: Diabetes Mellitus

DISEASE: Diabetes mellitus (ICD-10 code E10-E14)

REGION:	**Serbia without Kosovo and Metohia**	**Updated:**	**15.06.2003.**
		By:	**Sandra Šipetić-Grujičić**
YEAR:	**2000**	**Status:**	**Finale**

Prevalence data for Belgrade population were obtained from Diabetes Registry of Belgrade for the year 2000 (unpublished data of Institute of Public Health of Belgrade).

Because of the lack of data for Serbia without Kosovo and Metohia, the estimation of prevalence for this region was based on data for Belgrade.

Raw registry data referring to NIDDM were first corrected for 46.66% according to suggestion of Ljubinke Marcetic, MD, MSc, who is engaged in the Diabetes Registry in the City Institute for Health Care, Belgrade. Dr. Ljubinka Marcetic assessed, by comparison of registry data with records on death causes, that the Registry covered only 53.34% of diagnosed diabetic cases.

After words, the obtained NIDDM prevalence was corrected for 50%, since it has been estimated that the ratio of diagnosed and undiagnosed diabetes in subjects 20 years and over was approximately 1 : 0.5.

The prevalence of diabetics with different complications (blindness due to retinopathy, neuropathy, diabetic foot and amputation) was calculated on the basis of estimates for former socialist economics of Europe performed by Sarah and associates (Table 1) (Wild et al,2000).

GBD disability weights (DWs) were used to measure YLD (Murray and Lopez,1996). DW for uncomplicated cases and cases with complications was assessed on the basis of estimation of proportion of treated and untreated persons. Since, DW of diabetic cases was 0.012 for untreated and 0.033 for treated cases, with the assumption that 20% were treated and 80% untreated, an average GBD disability weight was 0.20*0.033+0.80*0.012 = 0.016.

In order to estimate YLDs in diabetes, GBD disease model was used (Figure 1) (Wild et al,2000). Total YLD was obtained by gathering YLD for diabetic patients without complications and YLD for patients with complications (blindness due to retinopathy, neuropathy, diabetic foot and amputation). Renal and cardiovascular diseases were the complications not included in YLD estimates. YLD template for prevalence was used to calculate YLD.

Prevalence data for DM from Registry of Belgrade

	Population Belgrade	Prevalence of IDDM	Prevalence of NIDDM	Corrected prevalence NIDDM*	Adjusted prevalence NIDDM**	Total prevalence of DM	Total prevalence per 1,000
Males							
0-4	37,097	7	1	1	1	8	0.22
5-14	86,515	34	30	44	44	78	0.90
15-24	110,934	40	111	163	244	284	2.56
25-34	103,918	47	157	230	345	392	3.78
35-44	106,168	77	548	804	1206	1283	12.08
45-54	120,306	175	2488	3649	5474	5649	46.95
55-64	88,004	154	4040	5925	8888	9042	102.74
65-74	73,551	135	4775	7003	10505	10640	144.66
75+	26,614	35	2936	4306	6459	6494	244.01
Total	**753,107**	**704**	**15086**	**22126**	**33166**	**33870**	**44.97**
Females							
0-4	34,694	2	0	0	0	2	0.06
5-14	82,326	39	29	43	43	82	1.00
15-24	109,975	42	87	128	192	234	2.13
25-34	111,328	35	166	243	365	400	3.59
35-44	119,297	45	444	651	977	1022	8.57
45-54	137,072	99	2191	3213	4820	4919	35.89
55-64	100,430	143	3962	5811	8716	8859	88.21
65-74	93,754	183	6081	8919	13378	13561	144.65
75+	43,152	64	4785	7018	10527	10591	245.43
Total	**832,028**	**652**	**17745**	**26026**	**39019**	**39671**	**47.68**

***Corrected prevalence of NIDDM for 46.66%**
****Adjusted prevalence of NIDDM by factor 1.5**

Figure 1. Diabetes model for DM

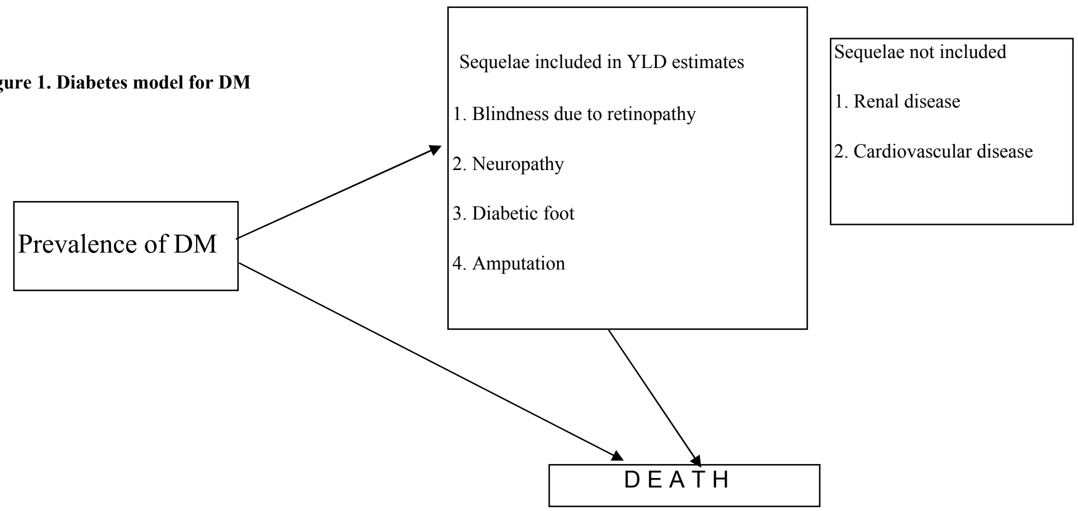

Table 1. Prcentage of people with DM with each seguela in 2000 year for the region of FSE (1) :

1. Blindness due to retinopathy - 0.5%
2. Neuropathy - 28%
3. Diabetic foot - 6.2%
4. Amputation - 0.18%

Estimates of prevalence of people with diabetic complications in Belgrade population

	Population Belgrade	Cases with DM	Blindness due to retinopathy Number	Prev per 1,000	Neuropathy Number	Prev per 1,000	Diabetic foot Number	Prev per 1,000	Amputation Number	Prev per 1,000
Males										
0-4	37,097	8	0	0.00	2	0.06	0	0.01	0	0.00
5-14	86,515	78	0	0.00	22	0.25	5	0.06	0	0.00
15-24	110,934	284	1	0.01	80	0.72	18	0.16	1	0.00
25-34	103,918	392	2	0.02	110	1.06	24	0.23	1	0.01
35-44	106,168	1283	6	0.06	359	3.38	80	0.75	2	0.02
45-54	120,306	5,649	28	0.23	1582	13.15	350	2.91	10	0.08
55-64	88,004	9,042	45	0.51	2532	28.77	561	6.37	16	0.18
65-74	73,551	10,640	53	0.72	2979	40.51	660	8.97	19	0.26
75+	26,614	6,494	32	1.22	1818	68.32	403	15.13	12	0.44
Total	**753,107**	**33,870**	**169**	**0.22**	**9,484**	**12.59**	**2,100**	**2.79**	**61**	**0.08**

Females										
0-4	34,694	2	0	0.00	1	0.02	0	0.00	0	0.00
5-14	82,326	82	0	0.00	23	0.28	5	0.06	0	0.00
15-24	109,975	234	1	0.01	66	0.60	15	0.13	0	0.00
25-34	111,328	400	2	0.02	112	1.01	25	0.22	1	0.01
35-44	119,297	1022	5	0.04	286	2.40	63	0.53	2	0.02
45-54	137,072	4919	25	0.18	1377	10.05	305	2.22	9	0.06
55-64	100,430	8,859	44	0.44	2481	24.70	549	5.47	16	0.16
65-74	93,754	13,561	68	0.72	3797	40.50	841	8.97	24	0.26
75+	43,152	10,591	53	1.23	2965	68.72	657	15.22	19	0.44
Total	**832,028**	**39,671**	**198**	**0.24**	**11,108**	**13.35**	**2,460**	**2.96**	**71**	**0.09**

Estimates of prevalence of people with diabetic complications in Serbia without Kosovo and Metohia

	Population Serbia	Cases with DM Number	Prev per 1,000	Blindness due to retinopathy Number	Prev per 1,000	Neuropathy Number	Prev per 1,000	Diabetic foot Number	Prev per 1,000	Amputation Number	Prev per 1,000
Males											
0-4	185,238	41	0.22	0.00	0.00	0.00	0.00	0	0.00	0	0
5-14	446,943	402	0.90	0.00	0.00	0.00	0.00	0	0.00	0	0
15-24	523,877	1,341	2.56	5.00	0.01	377.00	0.72	84	0.16	0	0
25-34	488,848	1,848	3.78	10.00	0.02	518.00	1.06	112	0.23	5	0.01
35-44	528,224	6,381	12.08	32.00	0.06	1785.00	3.38	396	0.75	11	0.02
45-54	572,314	26,870	46.95	132.00	0.23	7526.00	13.15	1665	2.91	46	0.08
55-64	416,534	42,795	102.74	212.00	0.51	11984.00	28.77	2653	6.37	75	0.18
65-74	376,352	54,443	144.66	271.00	0.72	15246.00	40.51	3376	8.97	98	0.26
75+	135,199	32,990	244.01	165.00	1.22	9237.00	68.32	2046	15.13	59	0.44
Total	**3,673,529**	**167,070**	**45.48**	**827.00**	**0.23**	**46,673**	**12.71**	**10,333**	**2.81**	294	0.08
Females											
0-4	175,169	11	0.06	0.00	0.00	0.00	0.00	0	0.00	0	0
5-14	424,590	425	1.00	0.00	0.00	0.00	0.00	0	0.00	0	0
15-24	505,014	1,076	2.13	5.00	0.01	303.00	0.60	66	0.13	0	0
25-34	489,817	1,758	3.59	10.00	0.02	495.00	1.01	108	0.22	5	0.01
35-44	536,819	4,601	8.57	21.00	0.04	1288.00	2.40	285	0.53	11	0.02
45-54	583,232	20,932	35.89	105.00	0.18	5861.00	10.05	1295	2.22	35	0.06
55-64	462,601	40,806	88.21	204.00	0.44	11426.00	24.70	2530	5.47	74	0.16
65-74	476,845	68,976	144.65	343.00	0.72	19312.00	40.50	4277	8.97	124	0.26
75+	223,239	54,790	245.43	275.00	1.23	15341.00	68.72	3398	15.22	98	0.44
Total	**3,877,326**	**193,363**	**49.87**	**963.00**	**0.25**	**54,027**	**13.93**	**11,958**	**3.08**	347	0.09

Age specific disability weights for untreated and treated forms of sequelae included in the GBD Study

	Cases		Blindness due to retinopathy		Neuropathy		Diabetic foot		Amputation	
	Untreated	**Treated**	**Untreated**	**Treated**	**Untreated**	**Treated**	**Untreated**	**Treated**	**Untreated**	**Treated**
Males										
0-4	0.012	0.033	0.600	0.493	0.078	0.064	0.137	0.129	0.129	0.068
5-14	0.012	0.033	0.600	0.491	0.078	0.064	0.137	0.129	0.129	0.068
15-44	0.012	0.033	0.600	0.488	0.078	0.064	0.137	0.129	0.129	0.068
45-59	0.012	0.033	0.600	0.488	0.078	0.064	0.137	0.129	0.129	0.068
60+	0.012	0.033	0.600	0.488	0.078	0.064	0.137	0.129	0.129	0.068
Females										
0-4	0.012	0.033	0.600	0.493	0.078	0.064	0.137	0.129	0.129	0.068
5-14	0.012	0.033	0.600	0.491	0.078	0.064	0.137	0.129	0.129	0.068
15-44	0.012	0.033	0.600	0.488	0.078	0.064	0.137	0.129	0.129	0.068
45-59	0.012	0.033	0.600	0.488	0.078	0.064	0.137	0.129	0.129	0.068
60+	0.012	0.033	0.600	0.488	0.078	0.064	0.137	0.129	0.129	0.068

Estimated DW for all age groups among:

	%treated	% untreated	Average DW
Cases	20	80	0.016
Blindness due to retinopathy	65	35	0.528
Neuropathy	70	30	0.068
Diabetic foot	70	30	0.131
Amputation	65	35	0.099

YLD for Serbia without Kosovo and Metohia

Cases

	Population Serbia	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1,000
Males						
0-4	185,238	41	0.22	0.016	1	0.004
5-14	446,943	402	0.9	0.016	7	0.015
15-24	523,877	1,341	2.56	0.016	22	0.041
25-34	488,848	1,848	3.78	0.016	30	0.061
35-44	528,224	6,381	12.08	0.016	103	0.196
45-54	572,314	26,870	46.95	0.016	435	0.761
55-64	416,534	42,795	102.74	0.016	693	1.664
65-74	376,352	54,443	144.66	0.016	882	2.343
75+	135,199	32,990	244.01	0.016	534	3.953
Total	**3,673,529**	**167,070**	**45.48**	**0.02**	**2,707**	**0.737**

Females						
0-4	175,169	11	0.06	0.016	0	0.001
5-14	424,590	425	1	0.016	7	0.016
15-24	505,014	1,076	2.13	0.016	17	0.035
25-34	489,817	1,758	3.59	0.016	28	0.058
35-44	536,819	4,601	8.57	0.016	75	0.139
45-54	583,232	20,932	35.89	0.016	339	0.581
55-64	462,601	40,806	88.21	0.016	661	1.429
65-74	476,845	68,976	144.65	0.016	1,117	2.343
75+	223,239	54,790	245.43	0.016	888	3.976
Total	**3,877,326**	**193,363**	**49.87**	**0.02**	**3,132**	**0.808**

Blindness due to diabetes retinopathy

	Population Serbia	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1000
Males						
0-4	185,238	0	0	0.528	-	0
5-14	446,943	0	0	0.528	-	0
15-24	523,877	5	0.01	0.528	3	0.005
25-34	488,848	10	0.02	0.528	5	0.011
35-44	528,224	32	0.06	0.528	17	0.032
45-54	572,314	132	0.23	0.528	70	0.121
55-64	416,534	212	0.51	0.528	112	0.269
65-74	376,352	271	0.72	0.528	143	0.38
75+	135,199	165	1.22	0.528	87	0.644
Total	**3,673,529**	**827**	**0.23**	**0.53**	**436**	**0.119**
Females						
0-4	175,169	0	0	0.528	-	0
5-14	424,590	0	0	0.528	-	0
15-24	505,014	5	0.01	0.528	3	0.005
25-34	489,817	10	0.02	0.528	5	0.011
35-44	536,819	21	0.04	0.528	11	0.021
45-54	583,232	105	0.18	0.528	55	0.095
55-64	462,601	204	0.44	0.528	107	0.232
65-74	476,845	343	0.72	0.528	181	0.38
75+	223,239	275	1.23	0.528	145	0.649
Total	**3,877,326**	**963**	**0.25**	**0.53**	**508**	**0.131**

Neuropathy

	Population Serbia	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1000
Males						
0-4	185,238	0	0	0.068	-	0
5-14	446,943	0	0	0.068	-	0
15-24	523,877	377	0.72	0.068	26	0.049
25-34	488,848	518	1.06	0.068	35	0.072
35-44	528,224	1,785	3.38	0.068	121	0.23
45-54	572,314	7,526	13.15	0.068	512	0.894
55-64	416,534	11,984	28.77	0.068	815	1.956
65-74	376,352	15,246	40.51	0.068	1,037	2.755
75+	135,199	9,237	68.32	0.068	628	4.646
Total	**3,673,529**	**46,673**	**12.71**	**0.07**	**3,174**	**0.864**
Females						
0-4	175,169	0	0	0.068	-	0
5-14	424,590	0	0	0.068	-	0
15-24	505,014	303	0.6	0.068	21	0.041
25-34	489,817	495	1.01	0.068	34	0.069
35-44	536,819	1,288	2.4	0.068	88	0.163
45-54	583,232	5,861	10.05	0.068	399	0.683
55-64	462,601	11,426	24.7	0.068	777	1.68
65-74	476,845	19,312	40.5	0.068	1,313	2.754
75+	223,239	15,341	68.72	0.068	1,043	4.673
Total	**3,877,326**	**54,027**	**13.93**	**0.07**	**3,674**	**0.948**

Diabetic foot

	Population Serbia	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1000
Males						
0-4	185,238	0	0	0.131	0	0
5-14	446,943	0	0	0.131	0	0
15-24	523,877	84	0.16	0.131	11	0.021
25-34	488,848	112	0.23	0.131	15	0.03
35-44	528,224	396	0.75	0.131	52	0.098
45-54	572,314	1,665	2.91	0.131	218	0.381
55-64	416,534	2,653	6.37	0.131	348	0.834
65-74	376,352	3,376	8.97	0.131	442	1.175
75+	135,199	2,046	15.13	0.131	268	1.982
Total	**3,673,529**	**10,333**	**2.81**	**0.13**	**1,354**	**0.368**

Females						
0-4	175,169	0	0	0.131	0	0
5-14	424,590	0	0	0.131	0	0
15-24	505,014	66	0.13	0.131	9	0.017
25-34	489,817	108	0.22	0.131	14	0.029
35-44	536,819	285	0.53	0.131	37	0.069
45-54	583,232	1,295	2.22	0.131	170	0.291
55-64	462,601	2,530	5.47	0.131	331	0.717
65-74	476,845	4,277	8.97	0.131	560	1.175
75+	223,239	3,398	15.22	0.131	445	1.994
Total	**3,877,326**	**11,958**	**3.08**	**0.13**	**1,567**	**0.404**

Amputation

	Population Serbia	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1000
Males						
0-4	185,238	0	0	0.098	0	0
5-14	446,943	0	0	0.098	0	0
15-24	523,877	0	0	0.098	0	0
25-34	488,848	5	0.01	0.098	0	0.001
35-44	528,224	11	0.02	0.098	1	0.002
45-54	572,314	46	0.08	0.098	4	0.008
55-64	416,534	75	0.18	0.098	7	0.018
65-74	376,352	98	0.26	0.098	10	0.025
75+	135,199	59	0.44	0.098	6	0.043
Total	**3,673,529**	**294**	**0.08**	**0.1**	**29**	**0.008**

	Population Serbia	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1000
Females						
0-4	175,169	0	0	0.098	0	0
5-14	424,590	0	0	0.098	0	0
15-24	505,014	0	0	0.098	0	0
25-34	489,817	5	0.01	0.098	0	0.001
35-44	536,819	11	0.02	0.098	1	0.002
45-54	583,232	35	0.06	0.098	3	0.006
55-64	462,601	74	0.16	0.098	7	0.016
65-74	476,845	124	0.26	0.098	12	0.025
75+	223,239	98	0.44	0.098	10	0.043
Total	**3,877,326**	**347**	**0.09**	**0.1**	**34**	**0.009**

Total for Serbia without Kosovo and Metohia

	Population Serbia	YLDs	YLD per 1,000	YLL	YLL per 1,000	DALYs	DALY per 1,000
Males							
0-4	185,238	1	0	0	0	1	0
5-14	446,943	7	0.01	0	0	7	0.01
15-24	523,877	61	0.12	112	0.21	173	0.33
25-34	488,848	86	0.17	245	0.5	331	0.68
35-44	528,224	294	0.56	657	1.24	951	1.8
45-54	572,314	1,239	2.17	1590	2.78	2829	4.94
55-64	416,534	1,975	4.74	2408	5.78	4383	10.52
65-74	376,352	2,514	6.68	3453	9.17	5967	15.85
75+	135,199	1,523	11.27	972	7.19	2495	18.46
Total	**3,673,529**	**7,700**	**2.1**	**9,438**	**2.57**	**17,137**	**4.66**

	Population Serbia	YLDs	YLD per 1,000	YLL	YLL per 1,000	DALYs	DALY per 1,000
Females							
0-4	175,169	0	0	0	0	0	0
5-14	424,590	7	0.02	0	0	7	0.02
15-24	505,014	49	0.1	229	0.45	278	0.55
25-34	489,817	82	0.17	380	0.78	462	0.94
35-44	536,819	212	0.39	336	0.63	548	1.02
45-54	583,232	966	1.66	645	1.11	1611	2.76
55-64	462,601	1,884	4.07	2504	5.41	4388	9.49
65-74	476,845	3,184	6.68	4920	10.32	8104	17
75+	223,239	2,530	11.34	2270	10.17	4800	21.5
Total	**3,877,326**	**8,915**	**2.3**	**11,283**	**2.91**	**20,199**	**5.21**

Comparison with EURO (Murray and Lopez,1996;Mathers et al,2002))

Regions	Prevalence per 1,000	YLD per 1,000	YLL per 1,000	DALY per 1,000	YLD/DALY (%)	Source of data
Belgrade	**46.39**	**2.14**	**1.75**	**3.89**	**55.00**	
Serbia without K&M	**47.73**	**2.20**	**2.74**	**4.94**	**44.50**	
EURO	41.47	1.51	1.10	2.61	57.80	**GBD 2000**
EURO A	43.35	1.52	1.10	2.62	58.00	**GBD 2000**
EURO B	29.94	1.14	1.23	2.37	48.10	**GBD 2000**
EURO C	48.62	1.83	0.97	2.80	65.40	**GBD 2000**
EURO	40.60	1.81	1.07	2.88	62.85	GBD 1990
EURO A	32.89	1.40	1.05	2.45	57.14	GBD 1990
EURO B	30.31	1.90	1.15	3.05	62.30	GBD 1990
EURO C	62.91	2.43	0.97	3.40	71.47	GBD 1990

References:

Wild S, Roglic G, Sicree R, Green A, King H (2000). Global burden of diabetes mellitus in the year 2000. Drafft 11-02-03. In: Global burden of disease 2000, Geneva: WHO.

Murray CJL, Lopez, AD, eds (1996). The global burden of disease: a comprehensive assessment of mortality and disability from disease, injuries and risk factors in 1990 and projected to 2002. Cambridge, Harvard University Press (Global Burden of disease and Injury Series, Vol. 1).

Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N et al (2002). Global burden of disease 2000: version 2 methods and results. Global programme on evidence for health policy discussion paper no. 50. World Health Organization.

Diabetes mellitus (ICD-10 code E10-E14)

Belgrade

Year 2000

Updated: 15.06.2003.
By: Sandra [ipeti}-Gruji~i}
Status: Finale

YLD for Belgrade

Cases

	Population Belgrade	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1,000
Males						
0-4	37,097	8	0.22	0.016	0	0.004
5-14	86,515	78	0.9	0.016	1	0.015
15-24	110,934	284	2.56	0.016	5	0.041
25-34	103,918	393	3.78	0.016	6	0.061
35-44	106,168	1,283	12.08	0.016	21	0.196
45-54	120,306	5,648	46.95	0.016	92	0.761
55-64	88,004	9,042	102.74	0.016	146	1.664
65-74	73,551	10,640	144.66	0.016	172	2.343
75+	26,614	6,494	244.01	0.016	105	3.953
Total	**753,107**	**33,861**	**44.96**	**0.02**	**549**	**0.728**

	Population Belgrade	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1,000
Females						
0-4	34,694	2	0.06	0.016	0	0.001
5-14	82,326	82	1	0.016	1	0.016
15-24	109,975	234	2.13	0.016	4	0.035
25-34	111,328	400	3.59	0.016	6	0.058
35-44	119,297	1,022	8.57	0.016	17	0.139
45-54	137,072	4,920	35.89	0.016	80	0.581
55-64	100,430	8,859	88.21	0.016	144	1.429
65-74	93,754	13,562	144.65	0.016	220	2.343
75+	43,152	10,591	245.43	0.016	172	3.976
Total	**832,028**	**39,669**	**47.68**	**0.02**	**643**	**0.772**

Blindness due to diabetes retinopathy

	Population Belgrade	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1,000
Males						
0-4	37,097	0	0	0.528	-	0
5-14	86,515	0	0	0.528	-	0
15-24	110,934	1	0.01	0.528	1	0.005
25-34	103,918	2	0.02	0.528	1	0.011
35-44	106,168	6	0.06	0.528	3	0.032
45-54	120,306	28	0.23	0.528	15	0.121
55-64	88,004	45	0.51	0.528	24	0.269
65-74	73,551	53	0.72	0.528	28	0.38
75+	26,614	32	1.22	0.528	17	0.644
Total	**753,107**	**168**	**0.22**	**0.53**	**88**	**0.117**
Females						
0-4	34,694	0	0	0.528	-	0
5-14	82,326	0	0	0.528	-	0
15-24	109,975	1	0.01	0.528	1	0.005
25-34	111,328	2	0.02	0.528	1	0.011
35-44	119,297	5	0.04	0.528	3	0.021
45-54	137,072	25	0.18	0.528	13	0.095
55-64	100,430	44	0.44	0.528	23	0.232
65-74	93,754	68	0.72	0.528	36	0.38
75+	43,152	53	1.23	0.528	28	0.649
Total	**832,028**	**198**	**0.24**	**0.53**	**104**	**0.125**

Neuropathy

	Population Belgrade	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1000
Males						
0-4	37,097	0	0	0.068	-	0
5-14	86,515	0	0	0.068	-	0
15-24	110,934	80	0.72	0.068	5	0.049
25-34	103,918	110	1.06	0.068	7	0.072
35-44	106,168	359	3.38	0.068	24	0.23
45-54	120,306	1,582	13.15	0.068	108	0.894
55-64	88,004	2,532	28.77	0.068	172	1.956
65-74	73,551	2,980	40.51	0.068	203	2.755
75+	26,614	1,818	68.32	0.068	124	4.646
Total	**753,107**	**9,461**	**12.56**	**0.07**	**643**	**0.854**
Females						
0-4	34,694	0	0	0.068	-	0
5-14	82,326	0	0	0.068	-	0
15-24	109,975	66	0.6	0.068	4	0.041
25-34	111,328	112	1.01	0.068	8	0.069
35-44	119,297	286	2.4	0.068	19	0.163
45-54	137,072	1,378	10.05	0.068	94	0.683
55-64	100,430	2,481	24.7	0.068	169	1.68
65-74	93,754	3,797	40.5	0.068	258	2.754
75+	43,152	2,965	68.72	0.068	202	4.673
Total	**832,028**	**11,085**	**13.32**	**0.07**	**754**	**0.906**

Diabetic foot

	Population Belgrade	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1,000
Males						
0-4	37,097	0	0	0.131	-	0
5-14	86,515	0	0	0.131	-	0
15-24	110,934	18	0.16	0.131	2	0.021
25-34	103,918	24	0.23	0.131	3	0.03
35-44	106,168	80	0.75	0.131	10	0.098
45-54	120,306	350	2.91	0.131	46	0.381
55-64	88,004	561	6.37	0.131	73	0.834
65-74	73,551	660	8.97	0.131	86	1.175
75+	26,614	403	15.13	0.131	53	1.982
Total	**753,107**	**2,094**	**2.78**	**0.13**	**274**	**0.364**
Females						
0-4	34,694	0	0	0.131	-	0
5-14	82,326	0	0	0.131	-	0
15-24	109,975	14	0.13	0.131	2	0.017
25-34	111,328	24	0.22	0.131	3	0.029
35-44	119,297	63	0.53	0.131	8	0.069
45-54	137,072	304	2.22	0.131	40	0.291
55-64	100,430	549	5.47	0.131	72	0.717
65-74	93,754	841	8.97	0.131	110	1.175
75+	43,152	657	15.22	0.131	86	1.994
Total	**832,028**	**2,453**	**2.95**	**0.13**	**321**	**0.386**

Amputation

	Population Belgrade	Prevalence	Prevalence per 1,000	Disability Weight	YLDs	YLD per 1,000
Males						
0-4	37,097	0	0	0.098	-	0
5-14	86,515	0	0	0.098	-	0
15-24	110,934	0	0	0.098	-	0
25-34	103,918	1	0.01	0.098	0	0.001
35-44	106,168	2	0.02	0.098	0	0.002
45-54	120,306	10	0.08	0.098	1	0.008
55-64	88,004	16	0.18	0.098	2	0.018
65-74	73,551	19	0.26	0.098	2	0.025
75+	26,614	12	0.44	0.098	1	0.043
Total	**753,107**	**59**	**0.08**	**0.1**	**6**	**0.008**
Females						
0-4	34,694	0	0	0.098	0	0
5-14	82,326	0	0	0.098	0	0
15-24	109,975	0	0	0.098	0	0
25-34	111,328	1	0.01	0.098	0	0.001
35-44	119,297	2	0.02	0.098	0	0.002
45-54	137,072	8	0.06	0.098	1	0.006
55-64	100,430	16	0.16	0.098	2	0.016
65-74	93,754	24	0.26	0.098	2	0.025
75+	43,152	19	0.44	0.098	2	0.043
Total	**832,028**	**71**	**0.09**	**0.1**	**7**	**0.008**

Total for Belgrade

	Population Belgrade	YLDs	YLD per 1,000	YLL	YLL per 1,000	DALYs	DALY per 1,000
Males							
0-4	37,097	0	0	0	0	0	0
5-14	86,515	1	0.01	0	0	1	0.01
15-24	110,934	13	0.12	0	0	13	0.12
25-34	103,918	18	0.17	0	0	18	0.17
35-44	106,168	59	1	32	0	91	1
45-54	120,306	260	2.17	342	2.84	602	5
55-64	88,004	417	4.74	272	3.09	689	7.83
65-74	73,551	491	6.68	542	7.37	1034	14.05
75+	26,614	300	11.27	126	4.75	426	16.02
Total	**753,107**	**1,561**	**2.07**	**1,314**	**1.74**	**2,874**	**3.82**
Females							
0-4	34,694	0	0	0	0	0	0
5-14	82,326	1	0.02	0	0	1	0.02
15-24	109,975	11	0.1	0	0	11	0.1
25-34	111,328	19	0.17	185	1.66	203	1.83
35-44	119,297	47	0.39	25	0.21	72	0.61
45-54	137,072	227	1.66	91	0.67	318	2.32
55-64	100,430	409	4.07	286	2.84	695	6.92
65-74	93,754	626	6.68	581	6.2	1207	12.88
75+	43,152	489	11.34	289	6.69	778	18.02
Total	**832,028**	**1,829**	**2.2**	**1,457**	**1.75**	**3,286**	**3.95**

Appendix C-a. Attributable mortality burden: Tobacco by age, sex and cause

		Males		Females	
	Relative risks (CDC)	35-64	65+	35-64	65+
U061	1 Ca mouth	10.89	10.89	5.08	5.08
U067	2 Ca lung	23.26	23.26	12.69	12.69
U062	3 Ca oesophagus	6.76	6.76	7.75	7.75
U062	4 Ca pancreas	2.31	2.31	2.25	2.25
U074	5 Ca bladder	3.27	3.27	2.22	2.22
U070	6 Ca Cervix			1.59	1.59
U107	7 Ischaemic heart disease	2.8	1.51	3.08	1.6
U108	8 Stroke	3.27	1.63	4	1.49
U112	9 COPD	17.1	17.1	12.04	12.04

		Male 35 to 39	Male 40 to44	Male 45 to 49	Male 50 to 54	Male 55 to 59	Male 60 to 64	Male 65 to 69	Male 70 to 74	Male 75 to 79	Male 80+	Total Male	Female 35 to 39	Female 40 to44	Female 45 to 49	Female 50 to 54	Female 55 to 59	Female 60 to 64	Female 65 to 69	Female 70 to 74	Female 75 to 79	Female 80+	Total Female
	Population Serbia (without KiM)	250185	278039	315237	257077	194870	221664	215847	160505	88071	47128	2,028,623	255457	281362	315430	267802	211251	251350	258411	218434	141650	81589	2,282,736
	Population Belgrade	49950	56218	66890	53416	41458	46546	42465	31086	18013	8601	414,643	55916	63381	75456	61616	47572	52858	51385	42369	28209	14943	493,705
	Prevalence tobacco %	43.34	42.59	37.17	34.44	25.91	18.94	17.92	14.67	12.57	7.35	47.53%	34.66	33.73	28.73	20.23	13.97	10.07	8.52	5.99	6.28	1.89	33.1%
	A. Attributable fractions																						
U061	1 Ca mouth	0.81	0.81	0.79	0.77	0.72	0.65	0.64	0.59	0.55	0.42		0.59	0.58	0.54	0.45	0.36	0.29	0.26	0.20	0.20	0.07	
U067	2 Ca lung	0.91	0.90	0.89	0.88	0.85	0.81	0.80	0.77	0.74	0.62		0.80	0.80	0.77	0.70	0.62	0.54	0.50	0.41	0.42	0.18	
U062	3 Ca oesophagus	0.71	0.71	0.68	0.66	0.60	0.52	0.51	0.46	0.42	0.30		0.70	0.69	0.66	0.58	0.49	0.40	0.37	0.29	0.30	0.11	
U062	4 Ca pancreas	0.36	0.36	0.33	0.31	0.25	0.20	0.19	0.16	0.14	0.09		0.30	0.30	0.26	0.20	0.15	0.11	0.10	0.07	0.07	0.02	
U074	5 Ca bladder	0.50	0.49	0.46	0.44	0.37	0.30	0.29	0.25	0.22	0.14		0.30	0.29	0.26	0.20	0.15	0.11	0.09	0.07	0.07	0.02	
U070	7 Ca Cervix												0.17	0.17	0.14	0.11	0.08	0.06	0.05	0.03	0.04	0.01	
U107	9 Ischaemic heart disease	0.44	0.43	0.40	0.38	0.32	0.25	0.08	0.07	0.06	0.04		0.42	0.41	0.37	0.30	0.23	0.17	0.05	0.03	0.04	0.01	
U108	10 Stroke	0.50	0.49	0.46	0.44	0.37	0.30	0.10	0.08	0.07	0.04		0.51	0.50	0.46	0.38	0.30	0.23	0.04	0.03	0.03	0.01	
U112	11 COPD	0.87	0.87	0.86	0.85	0.81	0.75	0.74	0.70	0.67	0.54		0.79	0.79	0.76	0.69	0.61	0.53	0.48	0.40	0.41	0.17	
	B. % Attributable fractions																						
U061	1 Ca mouth	81.08	80.81	78.61	77.30	71.93	65.20	63.93	59.20	55.42	42.09		58.58	57.92	53.96	45.22	36.30	29.12	25.79	19.64	20.40	7.16	
U067	2 Ca lung	90.61	90.46	89.22	88.46	85.22	80.83	79.96	76.56	73.67	62.07		80.20	79.77	77.06	70.28	62.02	54.07	49.90	41.18	42.33	18.10	
U062	3 Ca oesophagus	71.40	71.04	68.16	66.49	59.88	52.17	50.79	45.80	42.00	29.74		70.06	69.48	65.98	57.73	48.53	40.47	36.51	28.79	29.77	11.31	
U062	4 Ca pancreas	36.21	35.81	32.75	31.09	25.34	19.88	19.01	16.12	14.14	8.78		30.23	29.66	26.42	20.18	14.87	11.18	9.62	6.97	7.28	2.31	
U074	5 Ca bladder	49.59	49.16	45.76	43.88	37.03	30.07	28.92	24.98	22.20	14.30		29.72	29.15	25.95	19.80	14.56	10.94	9.42	6.81	7.12	2.25	
U070	7 Ca Cervix	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		16.98	16.60	14.49	10.66	7.61	5.61	4.79	3.41	3.57	1.10	
U107	9 Ischaemic heart disease	43.82	43.39	40.09	38.27	31.80	25.42	8.37	6.96	6.02	3.61		41.89	41.23	37.41	29.62	22.52	17.32	4.86	3.47	3.63	1.12	
U108	10 Stroke	49.59	49.16	45.76	43.88	37.03	30.07	10.14	8.46	7.34	4.43		50.98	50.30	46.29	37.77	29.53	23.20	4.01	2.85	2.99	0.92	
U112	11 COPD	87.47	87.27	85.68	84.72	80.66	75.30	74.26	70.25	66.93	54.20		79.28	78.83	76.03	69.07	60.67	52.65	48.47	39.81	40.94	17.26	
	C. Attributable Deaths, Serbia, 2000																						
U061	1 Ca mouth	4	21	32	55	51	61	54	35	14	9	336	0	1	2	6	2	2	4	3	5	1	27
U067	2 Ca lung	41	105	295	417	403	586	740	583	258	74	3502	10	36	62	63	72	85	112	82	65	12	599
U062	3 Ca oesophagus	1	2	16	17	22	29	30	20	10	3	151	1	1	0	4	2	2	6	4	2	1	22
U062	4 Ca pancreas	3	6	5	14	17	17	25	16	8	3	113	0	2	2	5	6	7	10	7	5	1	45
U074	5 Ca bladder	0	0	2	3	3	4	11	11	8	5	46	0	0	1	2	0	3	2	3	3	1	15
U070	7 Ca Cervix	0	0	0	0	0	0	0	0	0	0	0	4	7	9	7	4	4	3	3	3	0	45
U107	9 Ischaemic heart disease	27	74	164	262	280	332	164	148	112	50	1612	6	14	28	48	69	109	56	56	62	22	470
U108	10 Stroke	22	56	89	112	157	250	144	152	124	68	1173	14	25	65	81	84	147	55	64	83	25	643
U112	11 COPD	3	5	16	32	46	116	244	274	208	134	1079	2	3	6	11	20	30	47	74	80	38	311
	D. Attributable Deaths Belgrade 2000																						
U061	1 Ca mouth	2	6	9	8	8	7	9	8	1	1	59	0	1	1	1	0	0	1	2	1	0	8
U067	2 Ca lung	11	23	71	104	95	152	173	121	70	21	843	5	8	17	20	19	29	37	27	22	4	188
U062	3 Ca oesophagus	0	3	4	4	4	6	5	1	2	1	30	0	0	0	1	1	0	2	1	1	0	5
U062	4 Ca pancreas	0	1	1	1	2	4	4	5	1	1	21	0	0	0	1	1	2	2	2	1	0	9
U074	5 Ca bladder	0	1	0	1	2	4	7	4	4	2	25	0	0	0	1	0	1	0	1	1	0	5
U070	7 Ca Cervix	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	1	1	1	1	1	0	10
U107	9 Ischaemic heart disease	5	13	32	53	51	65	30	29	21	6	304	0	2	4	9	11	19	11	12	10	3	80
U108	10 Stroke	3	10	16	23	40	57	27	31	23	13	243	2	5	15	14	16	30	10	11	14	4	121
U112	11 COPD	1	0	1	5	7	12	31	36	16	21	131	0	2	1	1	3	3	8	8	8	4	36

		Male 35 to 39	Male 40 to44	Male 45 to 49	Male 50 to 54	Male 55 to 59	Male 60 to 64	Male 65 to 69	Male 70 to 74	Male 75 to 79	Male 80+	Total Male	Female 35 to 39	Female 40 to44	Female 45 to 49	Female 50 to 54	Female 55 to 59	Female 60 to 64	Female 65 to 69	Female 70 to 74	Female 75 to 79	Female 80+	Total Female
	E. Attributable Deaths rate per 1000, Serbia 2000																						
U061	1 Ca mouth	0.02	0.08	0.10	0.21	0.26	0.27	0.25	0.22	0.15	0.20	0.17	0.00	0.00	0.01	0.02	0.01	0.01	0.02	0.02	0.04	0.01	0.01
U067	2 Ca lung	0.17	0.38	0.94	1.62	2.07	2.64	3.43	3.63	2.93	1.57	1.73	0.04	0.13	0.20	0.23	0.34	0.34	0.43	0.38	0.46	0.14	0.26
U062	3 Ca oesophagus	0.01	0.01	0.05	0.06	0.11	0.13	0.14	0.12	0.12	0.07	0.07	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01
U062	4 Ca pancreas	0.01	0.02	0.02	0.06	0.09	0.08	0.11	0.10	0.09	0.05	0.06	0.00	0.01	0.01	0.02	0.03	0.03	0.04	0.03	0.04	0.02	0.02
U074	5 Ca bladder	0.00	0.00	0.01	0.01	0.02	0.02	0.05	0.07	0.09	0.10	0.02	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.01
U070	7 Ca Cervix	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.02	0.00	0.02
U107	9 Ischaemic heart disease	0.11	0.27	0.52	1.02	1.44	1.50	0.76	0.92	1.27	1.06	0.79	0.02	0.05	0.09	0.18	0.33	0.43	0.22	0.26	0.44	0.27	0.21
U108	10 Stroke	0.09	0.20	0.28	0.43	0.80	1.13	0.67	0.95	1.41	1.43	0.58	0.05	0.09	0.21	0.30	0.40	0.58	0.21	0.29	0.58	0.30	0.28
U112	11 COPD	0.01	0.02	0.05	0.13	0.24	0.52	1.13	1.71	2.36	2.83	0.53	0.01	0.01	0.02	0.04	0.09	0.12	0.18	0.34	0.56	0.47	0.14
	F. Attributable Deaths rate per 1000, Belgrade 2000																						
U061	1 Ca mouth	0.04	0.11	0.13	0.15	0.19	0.15	0.22	0.26	0.08	0.06	0.14	0.00	0.01	0.02	0.01	0.01	0.00	0.02	0.04	0.04	0.01	0.02
U067	2 Ca lung	0.23	0.41	1.06	1.94	2.30	3.27	4.08	3.89	3.91	2.45	2.03	0.09	0.12	0.23	0.32	0.41	0.55	0.71	0.65	0.78	0.24	0.38
U062	3 Ca oesophagus	0.00	0.05	0.06	0.08	0.09	0.14	0.11	0.04	0.09	0.14	0.07	0.00	0.00	0.00	0.01	0.01	0.00	0.03	0.02	0.04	0.01	0.01
U062	4 Ca pancreas	0.00	0.01	0.02	0.02	0.06	0.09	0.10	0.16	0.07	0.10	0.05	0.00	0.00	0.00	0.01	0.02	0.04	0.04	0.05	0.04	0.03	0.02
U074	5 Ca bladder	0.00	0.02	0.00	0.01	0.06	0.09	0.17	0.13	0.22	0.20	0.06	0.01	0.00	0.00	0.02	0.00	0.01	0.01	0.01	0.03	0.02	0.01
U070	7 Ca Cervix												0.02	0.01	0.03	0.04	0.02	0.01	0.01	0.01	0.02	0.00	0.02
U107	9 Ischaemic heart disease	0.09	0.22	0.47	1.00	1.24	1.40	0.71	0.95	1.14	0.64	0.73	0.00	0.04	0.06	0.14	0.23	0.36	0.20	0.28	0.36	0.17	0.16
U108	10 Stroke	0.06	0.18	0.23	0.43	0.97	1.21	0.63	1.01	1.30	1.48	0.59	0.03	0.07	0.20	0.22	0.34	0.58	0.19	0.27	0.49	0.28	0.24
U112	11 COPD	0.03	0.00	0.02	0.09	0.18	0.25	0.73	1.16	0.88	2.43	0.32	0.00	0.03	0.01	0.01	0.06	0.05	0.15	0.18	0.28	0.28	0.07
	G. Attributable YLL Serbia 2000																						
U061	1 Ca mouth	111	461	589	854	660	619	423	197	54	21	3991	0	17	41	94	32	17	36	22	23	3	285
U067	2 Ca lung	1034	2276	5500	6518	5164	5970	5774	3330	1034	175	36775	1069	2380	2541	2267	542	177	502	631	615	284	11006
U062	3 Ca oesophagus	33	48	303	260	286	299	231	112	41	7	1619	23	21	0	60	25	18	52	23	10	2	232
U062	4 Ca pancreas	66	120	100	222	223	175	191	92	31	5	1225	0	53	46	80	75	71	83	48	23	3	483
U074	5 Ca bladder	0	33	64	111	143	181	254	146	64	16	1011	10	0	20	25	3	32	13	20	14	2	138
U070	7 Ca Cervix	0	0	0	0	0	0	0	0	0	0	0	111	162	182	115	50	43	29	19	12	1	725
U107	9 Ischaemic heart disease	662	1618	3055	4096	3589	3383	1275	848	447	92	19064	147	301	535	775	937	1191	482	362	286	47	5063
U108	10 Stroke	542	1228	1653	1747	2009	2548	1124	869	496	132	12348	344	563	1251	1314	1139	1611	474	412	380	55	7543
U112	11 COPD	84	115	295	507	594	1180	1907	1566	832	268	7347	46	58	112	183	265	334	405	475	367	84	2329
	H. Attributable YLL Belgrade 2000																						
U061	1 Ca mouth	51	129	159	129	103	73	74	46	6	1	770	0	21	28	9	6	0	10	12	5	0	91
U067	2 Ca lung	285	504	1325	1623	1222	1553	1352	690	282	50	8885	293	706	784	743	181	82	107	178	191	77	3343
U062	3 Ca oesophagus	0	57	69	63	49	66	37	7	7	2	357	0	0	0	12	9	0	14	5	5	0	45
U062	4 Ca pancreas	0	14	22	15	31	45	34	28	5	2	196	0	0	0	8	16	25	17	13	5	1	84
U074	5 Ca bladder	0	20	0	10	30	42	58	23	16	3	202	11	0	7	16	3	8	3	4	3	1	55
U070	7 Ca Cervix	0	0	0	0	0	0	0	0	0	0	0	26	18	41	39	15	6	6	4	3	0	157
U107	9 Ischaemic heart disease	114	274	591	833	659	664	235	168	82	11	3632	0	52	85	140	146	209	90	76	47	6	850
U108	10 Stroke	74	218	291	361	517	576	208	180	94	25	2542	49	102	286	221	219	334	85	73	64	9	1441
U112	11 COPD	32	0	21	77	96	120	243	207	64	37	897	0	40	17	13	36	31	67	50	36	8	297
	I. Attributable YLL per 1000,Serbia 2000																						
U061	1 Ca mouth	0.44	1.66	1.87	3.32	3.39	2.79	1.96	1.23	0.61	0.44	1.97	0.00	0.06	0.13	0.35	0.15	0.07	0.14	0.10	0.17	0.03	0.12
U067	2 Ca lung	4.13	8.19	17.45	25.35	26.50	26.93	26.75	20.75	11.74	3.71	18.13	4.19	8.46	8.06	8.46	2.56	0.70	1.94	2.89	4.34	3.48	4.82
U062	3 Ca oesophagus	0.13	0.17	0.96	1.01	1.47	1.35	1.07	0.70	0.47	0.14	0.80	0.09	0.07	0.00	0.22	0.12	0.07	0.20	0.10	0.07	0.02	0.10
U062	4 Ca pancreas	0.26	0.43	0.32	0.86	1.15	0.79	0.89	0.57	0.35	0.10	0.60	0.00	0.19	0.15	0.30	0.36	0.28	0.32	0.22	0.16	0.04	0.21
U074	5 Ca bladder	0.00	0.12	0.20	0.43	0.73	0.81	1.18	0.91	0.73	0.33	0.50	0.04	0.00	0.06	0.09	0.01	0.13	0.05	0.09	0.10	0.03	0.06
U070	7 Ca Cervix	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.58	0.58	0.43	0.24	0.17	0.11	0.09	0.08	0.01	0.32
U107	9 Ischaemic heart disease	2.65	5.82	9.69	15.93	18.42	15.26	5.91	5.28	5.07	1.95	9.40	0.58	1.07	1.70	2.89	4.43	4.74	1.87	1.66	2.02	0.58	2.22
U108	10 Stroke	2.17	4.42	5.24	6.79	10.31	11.50	5.21	5.41	5.63	2.81	6.09	1.35	2.00	3.96	4.91	5.39	6.41	1.83	1.89	2.68	0.68	3.30
U112	11 COPD	0.34	0.41	0.93	1.97	3.05	5.32	8.83	9.76	9.45	5.68	3.62	0.18	0.20	0.36	0.68	1.25	1.33	1.57	2.18	2.59	1.03	1.02
	J. Attributable YLL per 1000, Belgrade 2000																						
U061	1 Ca mouth	1.02	2.29	2.38	2.41	2.49	1.57	1.74	1.47	0.33	0.08	1.86	0.00	0.33	0.36	0.15	0.13	0.00	0.19	0.28	0.18	0.03	0.18
U067	2 Ca lung	5.70	8.96	19.81	30.39	29.49	33.36	31.83	22.19	15.65	5.76	21.43	5.24	11.14	10.40	12.07	3.80	1.55	2.08	4.21	6.78	5.13	6.77
U062	3 Ca oesophagus	0.00	1.01	1.03	1.19	1.18	1.41	0.88	0.23	0.38	0.24	0.86	0.00	0.00	0.00	0.19	0.18	0.00	0.26	0.12	0.19	0.02	0.09
U062	4 Ca pancreas	0.00	0.25	0.33	0.28	0.75	0.96	0.80	0.92	0.30	0.18	0.47	0.00	0.00	0.00	0.13	0.33	0.47	0.32	0.30	0.19	0.07	0.17
U074	5 Ca bladder	0.00	0.35	0.00	0.20	0.73	0.91	1.36	0.74	0.86	0.38	0.49	0.20	0.00	0.09	0.26	0.05	0.14	0.07	0.08	0.12	0.04	0.11
U070	7 Ca Cervix	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.28	0.54	0.64	0.31	0.12	0.11	0.08	0.11	0.01	0.32
U107	9 Ischaemic heart disease	2.28	4.88	8.84	15.60	15.91	14.26	5.55	5.41	4.56	1.25	8.76	0.00	0.82	1.13	2.27	3.06	3.95	1.76	1.79	1.65	0.37	1.72
U108	10 Stroke	1.47	3.87	4.34	6.75	12.46	12.38	4.89	5.79	5.20	2.86	6.13	0.88	1.60	3.78	3.58	4.60	6.32	1.66	1.71	2.27	0.62	2.92
U112	11 COPD	0.65	0.00	0.31	1.45	2.31	2.58	5.72	6.65	3.53	4.25	2.16	0.00	0.63	0.22	0.20	0.76	0.58	1.31	1.17	1.28	0.53	0.60

	Male 35 to 39	Male 40 to44	Male 45 to 49	Male 50 to 54	Male 55 to 59	Male 60 to 64	Male 65 to 69	Male 70 to 74	Male 75 to 79	Male 80+	Total Male	Female 35 to 39	Female 40 to44	Female 45 to 49	Female 50 to 54	Female 55 to 59	Female 60 to 64	Female 65 to 69	Female 70 to 74	Female 75 to 79	Female 80+	Total Female
K. Attributable burden of tobacco- all causes, Serbia 2000																						
Deaths	102	270	619	910	980	1394	1411	1240	742	345	8012	37	89	176	225	259	388	295	297	308	102	2175
YLL	2532	5898	11559	14316	12669	14354	11180	7160	2998	715	83380	1751	3554	4727	4912	3067	3495	2077	2012	1730	481	27805
L. Attributable burden of tobacco- all causes, Belgrade 2000																						
Deaths	22	56	133	199	211	308	287	236	139	64	1656	8	18	42	48	53	85	70	64	59	16	462
YLL	556	1215	2478	3113	2708	3139	2241	1349	555	129	17482	379	938	1247	1201	629	694	398	413	360	102	6361

M. **As % of total burden, Serbia 2000**	***Male***	***Female***	***Persons***
Deaths	**14.91%**	**4.33%**	**9.79%**
YLL	**18.05%**	**7.90%**	**13.66%**

N. **As % of total burden, Belgrade 2000**	***Male***	***Female***	***Persons***
Deaths	**16.10%**	**4.87%**	**10.72%**
YLL	**19.04%**	**9.14%**	**14.77%**

Appendix C-b. Attributable burden: Tobacco by age, sex and cause, YLL, YLD, DALY

		Males		Females	
	Relative risks	35-64	65+	35-64	65+
U067	1 Ca lung	23.26	23.26	12.69	12.69
U070	2 Ca Cervix			1.59	1.59
U107	3 IHD	2.8	1.51	3.08	1.6
U108	4 Stroke	3.27	1.63	4	1.49

		Male 35-44	Male 45-54	Male 55-64	Male 65-74	Male 75+	Total Male	Female 35-44	Female 45-54	Female 55-64	Female 65-74	Female 75+	Total Female
	Population Serbia (without KiM)	528,224	572,314	416,534	376,352	135,199	2,028,623	536,819	583,232	462,601	476,845	223,239	2,282,736
	Population Belgrade	106,168	120,306	88,004	73,551	26,614	414,643	119,297	137,072	100,430	93,754	43,152	493,705
	Prevalence tobacco %	42.98	35.98	22.31	16.53	11.11	47.53%	34.17	24.90	11.92	7.38	4.93	33.1%
	A. Attributable fractions												
U067	1 Ca lung	0.91	0.89	0.83	0.79	0.71		0.80	0.74	0.58	0.46	0.37	
U070	2 Ca Cervix							0.17	0.13	0.07	0.04	0.03	
U107	3 IHD	0.44	0.39	0.29	0.23	0.17		0.42	0.34	0.20	0.13	0.09	
U108	4 Stroke	0.49	0.45	0.34	0.27	0.20		0.51	0.43	0.26	0.18	0.13	
	B. % Attributable fractions												
U067	1 Ca lung	90.54	88.90	83.24	78.63	71.21		64.18	59.47	55.70	42.37	36.55	
U070	2 Ca Cervix							16.78	12.81	6.57	4.17	2.83	
U107	3 IHD	43.62	39.30	28.65	22.93	16.67		9.71	8.09	7.01	4.23	9.30	
U108	4 Stroke	49.39	44.95	33.62	27.28	20.14		10.43	8.71	7.55	4.56	12.88	
	C. Attributable Deaths, Serbia, 2000												
U067	1 Ca lung	146	712	988	1324	332	3502	47	124	157	195	77	599
U070	2 Ca Cervix						0	12	17	8	6	3	45
U107	3 IHD	101	426	612	312	161	1612	19	76	178	112	84	470
U108	4 Stroke	78	200	407	296	192	1173	39	146	231	119	107	643
	D. Attributable Deaths Belgrade 2000												
U067	1 Ca lung	35	175	248	294	92	843	12	37	49	64	26	188
U070	2 Ca Cervix						0	2	5	2	1	1	10
U107	3 IHD	17	85	117	60	26	304	2	13	30	22	13	80
U108	4 Stroke	13	39	97	58	36	243	7	28	47	21	18	121
	E Attributable Deaths Rate per 1000, Serbia, 2000												
U067	1 Ca lung	0.28	1.24	2.37	3.52	2.46	1.73	0.09	0.21	0.34	0.41	0.34	0.30
U070	2 Ca Cervix							0.02	0.03	0.02	0.01	0.01	0.02
U107	3 IHD	0.19	0.74	1.47	0.83	1.19	0.79	0.04	0.13	0.38	0.24	0.38	0.23
U108	4 Stroke	0.15	0.35	0.98	0.79	1.42	0.58	0.07	0.25	0.50	0.25	0.48	0.32
	F. Attributable Deaths Rate per 1000, Belgrade 2000												
U067	1 Ca lung	0.33	1.45	2.81	4.00	3.44	2.03	0.10	0.27	0.49	0.68	0.59	0.45
U070	2 Ca Cervix							0.02	0.03	0.02	0.01	0.02	0.02
U107	3 IHD	0.16	0.71	1.32	0.81	0.98	0.73	0.02	0.10	0.30	0.24	0.30	0.19
U108	4 Stroke	0.12	0.32	1.10	0.79	1.36	0.59	0.05	0.21	0.46	0.23	0.42	0.29

		Male 35-44	Male 45-54	Male 55-64	Male 65-74	Male 75+	Total Male	Female 35-44	Female 45-54	Female 55-64	Female 65-74	Female 75+	Total Female
	G. Attributable YLL Serbia 2000												
U067	1 Ca lung	3310	12018	11134	9105	1209	36775	3449	4808	719	1133	898	11006
U070	2 Ca Cervix						0	273	297	94	49	12	725
U071	3 IHD	2280	7151	6972	2123	538	19064	449	1310	2128	844	333	5063
U107	4 Stroke	1770	3400	4557	1992	628	12348	907	2565	2750	886	436	7543
	H. Attributable YLL Belgrade 2000												
U067	1 Ca lung	789	2948	2775	2041	331	8885	999	1528	263	285	268	3343
U070	2 Ca Cervix						0	43	80	21	9	3	157
U107	3 IHD	388	1425	1323	404	93	3632	52	225	354	166	52	850
U108	4 Stroke	291	651	1093	388	118	2542	151	506	553	158	73	1441
	I. Attributable YLL per 1000, Serbia 2000												
U067	1 Ca lung	6.27	21.00	26.73	24.19	8.94	18.13	6.42	8.24	1.55	2.38	4.02	4.82
U070	2 Ca Cervix							0.51	0.51	0.20	0.10	0.06	0.32
U107	3 IHD	4.32	12.50	16.74	5.64	3.98	9.40	0.84	2.25	4.60	1.77	1.49	2.22
U108	4 Stroke	3.35	5.94	10.94	5.29	4.65	6.09	1.69	4.40	5.95	1.86	1.95	3.30
	J. Attributable YLL per 1000, Belgrade 2000												
U067	1 Ca lung	7.43	24.51	31.54	27.76	12.46	21.43	8.37	11.15	2.62	3.04	6.21	8.06
U070	2 Ca Cervix							0.36	0.58	0.21	0.10	0.07	0.38
U107	3 IHD	3.66	11.84	15.03	5.49	3.49	8.76	0.44	1.64	3.53	1.77	1.21	2.05
U108	4 Stroke	2.75	5.41	12.42	5.27	4.45	6.13	1.26	3.69	5.50	1.68	1.70	3.47
	K. Attributable YLD Serbia 2000												
U067	1 Ca lung	111	481	587	500	89	1768	43	109	79	63	16	309
U070	2 Ca Cervix						0	28	20	6	3	0	57
U107	3 IHD	311	695	864	569	132	2570	86	379	304	302	73	1144
U108	4 Stroke	314	826	1303	415	58	2915	314	532	474	221	76	1617
	L. Attributable YLD Belgrade 2000												
U067	1 Ca lung	33	154	186	162	30	565	14	39	33	26	7	120
U070	2 Ca Cervix						0	9	6	2	1	0	18
U107	3 IHD	62	146	183	111	26	528	19	89	66	59	14	248
U108	4 Stroke	63	174	275	81	11	604	70	125	103	44	15	356
	M. Attributable YLD per 1000 Serbia 2000												
U067	1 Ca lung	0.21	0.84	1.41	1.33	0.66	0.87	0.08	0.19	0.17	0.13	0.07	0.14
U070	2 Ca Cervix							0.24	0.03	0.01	0.01	0.00	0.02
U107	3 IHD	0.59	1.21	2.08	1.51	0.97	1.27	0.16	0.65	0.66	0.63	0.32	0.50
U108	4 Stroke	0.59	1.56	2.47	0.79	0.11	5.09	0.60	1.01	0.90	0.42	0.14	0.71
	N. Attributable YLD per 1000 Belgrade 2000												
U067	1 Ca lung	0.31	1.28	2.12	2.20	1.12	1.36	0.12	0.29	0.32	0.28	0.17	0.24
U070	2 Ca Cervix							0.08	0.04	0.02	0.01	0.00	0.04
U107	3 IHD	0.59	1.21	2.08	1.51	0.97	1.27	0.16	0.65	0.66	0.63	0.33	0.50
U088	4 Stroke	0.59	1.44	3.13	1.11	0.42	1.46	0.59	0.91	1.02	0.46	0.34	0.72
	O. Attributable DALYs Serbia 2000												
U067	1 Ca lung	3421	12499	11721	9605	1298	38543	3492	4916	797	1195	915	11315
U070	2 Ca Cervix							301	317	99	52	13	782
U107	3 IHD	2591	7846	7837	2692	670	21635	535	1689	2432	1147	406	6208
U108	4 Stroke	2084	4225	5860	2408	686	15263	1221	3097	3224	1107	511	9160

		Male 35-44	Male 45-54	Male 55-64	Male 65-74	Male 75+	Total Male	Female 35-44	Female 45-54	Female 55-64	Female 65-74	Female 75+	Total Female
	P. Attributable DALYs Belgrade 2000												
U067	1 Ca lung	821	3102	2962	2203	361	9450	1013	1567	295	311	275	3462
U070	2 Ca Cervix							53	86	23	10	3	175
U107	3 IHD	451	1570	1506	515	119	4160	71	314	420	226	66	1097
U108	4 Stroke	354	825	1368	469	130	3146	220	631	656	201	88	1796
	Q. Attributable DALYs per 1000, Serbia 2000												
U067	1 Ca lung	6.48	21.84	28.14	25.52	9.60	19.00	6.51	8.43	1.72	2.51	4.10	4.96
U070	2 Ca Cervix	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.54	0.21	0.11	0.06	0.00
U107	3 IHD	4.90	13.71	18.81	7.15	4.95	10.66	1.00	2.90	5.26	2.40	1.82	2.72
U108	4 Stroke	3.94	7.38	14.07	6.40	5.08	7.52	2.28	5.31	6.97	2.32	2.29	4.01
	R. Attributable DALYs per 1000, Belgrade 2000												
U067	1 Ca lung	7.74	25.79	33.65	29.96	13.58	22.79	8.49	11.43	2.94	3.32	6.38	7.01
U070	2 Ca Cervix	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.63	0.22	0.11	0.08	0.35
U107	3 IHD	4.24	13.05	17.11	7.00	4.46	10.03	0.60	2.29	4.19	2.41	1.54	2.22
U108	4 Stroke	3.34	6.86	15.55	6.38	4.87	7.59	1.85	4.60	6.53	2.15	2.04	3.64
	S. Attributable burden of Tobacco- all causes- Serbia 2000												
	Deaths	325	1338	2007	1932	685	6287	117	363	574	432	272	1757
	YLL	7359	22569	22664	13220	2376	68187	5078	8979	5690	2911	1680	24338
	YLD	736	2001	2754	1484	278	7254	472	1039	862	589	165	3127
	DALY	8095	24570	25418	14704	2654	75441	5550	10018	6552	3500	1845	27465
	DALY per 1000	15.33	42.93	61.02	39.07	19.63	37.19	10.34	17.18	14.16	7.34	8.26	12.03
	DALY per 1000 stand WHO	35.225					37.188	12.447					
	T. Attributable burden of Tobacco- all causes- Belgrade 2000												
	Deaths	65	299	461	412	154	1390	23	83	127	108	57	399
	YLL	1468	5024	5191	2833	543	15059	1245	2339	1191	619	397	5790
	YLD	158	473	645	354	67	1697	113	259	203	130	36	741
	DALY	1626	5497	5836	3187	610	16756	1358	2599	1394	748	433	6531
	DALY per 1000	15.31	45.70	66.31	43.33	22.91	40.41	11.38	18.96	13.88	7.98	10.03	13.23
	DALY per 1000 stand Serbia	40.04						13.15					

APPENDIX D.

EXTRACTION OF THE STANDARD PROCEDURES FROM NATIONAL SERBIAN GUIDELINE ON THE MANAGEMENT OF DIABETES (NSGDM)

NATIONAL COMMITTEE FOR CLINICAL GUIDELINES DEVELOPMENT IN SERBIA AND EAR IN 2002.

1. DEFINITION OF TYPE 2 DIABETES

Diabetes mellitus signifies a group of metabolic disorders characterized by hyperglycemia which is caused ether by insufficient insulin secretion or by defect in its action, as well as by mutual existence of both.

Type 2 diabetes is one of the most common types of clinically apparent diabetes (it is diagnosed at 70-75 % of all diabetes patients). It is characterized by heterogeneous disorders, but for it genesis it is necessary to have compound effects of genetic and exogenous factors. Disorders which are found in this type of diabetes are insulin resistance, insulin secretory defect and increased hepatic gluconeogenesis. Insulin resistance (although it is not completely proved) precede the dysfunctional insulin secretion, and it is responsible for appearance of hyperglycemia at the hepatic and muscular level. It is considered that post receptor resistance (defect insulin receptor-signal transduction pathway with decreased translocation of glucose transporters) is usually present in this type of diabetes.

Risk Factors for Type 2 Diabetes

- Family history of type 2 diabetes in first-degree or second-degree relative (parent or twin)
- Obesity (>20% of desirable weight or BMI > 27 kg/m…)
- Age > 45 years
- Previously detected impaired glucose intolerance syndrome (IGT) or impaired fasting glucose syndrome (IGF)
- Gestational diabetes or delivery of baby more than 4kg of weight
- Hypertension (>140/90 mmHg)
- HDL Cholesterol < 0.9 mmol/L and/or triglycerides > 2.8 mmol/L
- Polycystic ovary syndrome (PCO Syndrome)

2. DIAGNOSIS OF TYPE 2 DIABETES

Diagnosis is being set up according to anamnesis, physical examination and laboratory testing.

From anamnesis it is possible to find out signs and symptoms of type 2 diabetes: hyperglycemia, glucosuria, poliuria, polydipsia (thirstiness), polyphagia (increased hungriness), weight loss, general weakness, dryness of skin and mucosis, acetonuria and acetone smell. Also the presence of nonspecific signs is possible, like facial redness and itch, gastric and rheumatic pains.

During the physical examination of patient, high blood pressure is being found as well as increased plasma lipoprotein levels besides increased plasma glucose (PG) level.

In the scope of laboratory assesment the following is done:

- Fasting plasma glucose (FPG) level (no caloric intake for at least 8 hours)
- When fasting plasma glucose (FPG) level is lower then 11.1 mmol/L, the oral glucose-tolerance test (OGTT) is conducted and plasma glucose level 2 hours after 75 g glucose intake.

2.1. Criteria for classification of glucose intolerance disorders

<u>According to single values of glycemia (two results from two different days):</u>

Normal fasting glucose:

- Fasting glucose level < 6.1 mmol/L (110 mg/dL)

Impaired fasting glucose; IFG

- Fasting glucose level ≥ 6.1 mmol (110 mg/dL) and < 7.0 mmol/L (126 mg/dL)

Diabetes

- Fasting glucose level > 7.0 mmol/L ((126 mg/dL) or glucose in any random sample of blood (no matter of calorie intake) > 11.0 mmol/L (200 mg/dL) with presence of typical symptoms of diabetes (polyuria, polydipsia and weight loss)

<u>According to glycemia during an OGTT:</u>

Normal glucose tolerance

- 2-hour plasma glucose (PG) level during an OGTT < 7.8 mmol/L (< 140.0 mg/dL)

Impaired glucose tolerance IGT

- 2-hour plasma glucose (PG) level during an OGTT > 7.8 mmol/L (>140.0 mg/dL) and < 11.1 mmol/L (<200 mg/dL)

Diabetes

- 2-hour plasma glucose (PG) level during an OGTT > 11.1 mmol/L (< 200 mg/dL)

2.2. Therapy of type 2 diabetes

It therapy of each patient with type 2 diabetes it is necessary to define individual goal values of glycemia, HbA1c and lipoproteins level according to the following criteria (Table 2.2.1, Table 2.2.2.). It is also necessary to define individual goal levels of arterial tension according to the recommendations that there is low vascular risk when arterial tension level is under 130/80 mmHg.

Table 2.2.1. Levels of glycemia and HbA1c

HbA1c %	**Low vascular risk**	**Macro vascular risk**	**Micro vascular risk**
	< 6.5	**> 6.5**	**>7.5**
Self monitoring of blood glucose level (mmol/L)			
Pre-prandial	<5.5	>5.5	>6.0
Postprandial	<7.5	>7.5	>9.0

Table 2.2.2. Therapy of type 2 diabetes: goal levels of lipoproteins

	Low vascular risk	**Macro vascular risk**	**Micro vascular risk**
Total cholesterol			
mmol/L	< 4.8	4.8 – 6.0	> 6.0
mg/dL	< 185	185 – 230	> 230
LDL cholesterol			
mmol/L	<3.0	3.0 – 4.0	>4.0
mg/dL	< 115	115 – 155	>155
HDL cholesterol			
mmol/L	>1.2	1.0 – 1.2	<1.0
mg/dL	>46	39 – 46	< 39
Triglycerides			
mmol/L	< 1.7	1.7 – 2.2	> 2.2
mg/dL	<150	150 – 200	> 200

Therapy of type 2 diabetes can be:

1. Non-medicament therapy

a) Nutrition therapy

b) Physical activity therapy (Exercises)

2. Medicament therapy (Pharmacologic therapy)

2.1. Medicament therapy of glugoregularion disorders

a) Glucose-lowering oral agents

b) Combined: glucose-lowering oral agents + insulin therapy

c) Insulin therapy

2.2. Medicament (pharmacologic) therapy of lipoprotein disorders

2.3. Medicament (pharmacologic) therapy of arterial hypertehsion

Nutrition

Nutrition therapy should provide an adequate caloric intake, obesity correction and correction of lipoprotein disorders and arterial hypertension. Recommendations for nutrition therapy of type 2 diabetes address total calorie intake, caloric distribution among the nutritional elements and daily time schedule of calorie intake.

In nutrition therapy it is also necessary to make permanent control and analysis of possible reasons for not compliance this recommendations. In that way it is necessary to analyze at regular controls the following: is adequate nutrition became part of a accepted life style; is daily time schedule of calorie intake appropriate to: the type of insulin therapy, life style and local nutrition habits; is calorie intake appropriate to desirable weight; are the meals been taken in appropriate time; is alcohol intake remarkable and does it contribute to hypoglycemia appearance; is there a need for special diets (special life style, complications development). It is also necessary to evaluate a need for a complete change of a nutrition pattern: regularly once a year as a routine procedure in control examination, or more frequently if necessary; with changes of insuline dose and changes of a life style (school, university, temporary or permanent employment).

Physical activity (exercises)

Physical activity therapy is necessary for both, adequate and even use of calories, and reduction of risk factors for development of late complications.

Before the beginning of physical activity therapy, it should check out physical capability and habits of the patient (spontaneous daily activities, recreational activities and possibility of continuous performing of planned physical activity). Physical activity therapy is applied according to the recommendations, and during the control examinations, reasons for deviations this recommendations are being controlled and analyzed.

Glucose-lowering oral agents' therapy

Glucose-lowering oral agents' therapy is applied when non-medicament therapy did not provide satisfactory glycoregulation.

The types of glucose-lowering oral agents and their mechanisms of action are showen in the Table 2.2.3.

Table 2.2.3. Glucose-lowering oral agents

Mechanism of action		
Promotion of insulin secretion (Insulin secretagogues)	Sulfonilurea	**I Generation** Tolbutamid, chlorpropamid Acetoheksamidin, tolazamine **II Generation** Glibenclamide, gliclazide, glipizide,glcvidone **III Generation** Glimepiride
	Metilglinides	repaglinide, nateglinide
Insulin sensitivity stimulation	Bigvanides	metformin
	Thiazolidinedioides	rosiglitazone, pioglitazone
Inhibition of glucose absorbtion	Alphaglucosidase infibitors	acarbose, miglitol

Before the beginning with glucose-lowering oral agents' therapy, it is necessary:

- To define optimal kind of therapy for each patient
- To choose appropriate medicament (positive effect can be gained with the combination of two oral agents- usually the combination is made out of agents with different mechanism of action, for example, combining the stimulators of insulin secretion and stimulators of insulin sensitivity)
- To match the characteristics of the agents with individual needs for gaining optimal glicoregulation
- To detect the existence of obesity (in the case of obesity, the best results are shown when therapy with insulin sensitivity stimulation agens is introducing with continuing of nonmedicament treatment, especially weight decrease; in case of patient with normal body weight optimal therapeutic option is application of promotors of insulin secretion (insulin secretagogues), also alongside continuing with nonmedicament treatment.)
- To gain strict glicoregulation in a way to prevent the late complications of the disease. It is also very important to gain goal values of glucose level (fasting as well as postprandial)

Recommendations for the introduction of glucose-lowering oral agents' therapy (therapy choice and optimal beginning) are shown in the Table 2.2.4.

Table 2.2.4. Recommendations for the introduction of glucose-lowering oral agents' therapy

Introduction of glucose-lowering oral agents' therapy when besides adequate nonmedicament therapy/education the level of fasting glucose (FG) is: • >6.0 mmol/L, HbA1c > 6.5 % at patients with obesity • >7.0 mmol/l, HbA1c > 7.5 % at patients without obesity
Therapy agents choice: <u>Promotors of insulin secretion</u> • sulfonilurea agents: spetially effitient in fasting glicemia correcton • metilglinides: spetially effitient in postprandial glicemia correcton <u>Insulin sensitivity stimulators</u> • metformin and tiazolidinoides: effitient at patients with obesity (metabolic syndrom) <u>Inhibitors of glucose absorbtion</u> • alfa glucosidse inhibitors: spetially effitient in postprandial glicemia correcton
<u>The beginning ot the therapy</u> • patients with obesity: Insulin sensitivity stimulators + nonmedicament therapy • patients without obesity: Promotors of insulin secretion + nonmedicament therapy

2.3. Education concerning the follow-up of the therapy effects in type 2 diabetes

It is necessary to give recommendations, to educate and train the patients with type 2 diabetes, on the life style adjustment, procedures glucose level and ketone body self-control in blood and urine. All these procedures are considered to be in the domain of education for follow-up the therapy effects.

Education for glucose level and ketone body self-control

- To provide adequate training
- To educate patient to proceed with regular self-controls
- To advise an extra self-control in the cases of insulin dose changes, treatments and avoiding of hypoglycemia, during the diseases and new life situations
- To educate patient on effects of diet and physical activity on the glycemia level
- To asses patients’ capacity for routine self-control procedures
- To control devices once a year, or if the problem in self-control occurs
- To evaluate accuracy of self-control through examination of self-control technique, in comparison with the appropriate laboratory results, by analysis of results in the context of HbA1c level, by checking the self-control book.

Advises for adjusting the life style to needs of efficient therapy

<table>
<tr><td>GENERAL EXAMINATION</td><td></td></tr>
<tr><td colspan="2">Estimate the congruence of diabetes with:
• employment
• social or sport activities
• traveling</td></tr>
<tr><td colspan="2">SPECIAL ASPECTS</td></tr>
<tr><td>Employment
Provide:
• individual advices
• advising and contacts with ones who have problems</td><td>Driver’s license
Provide:
• individual estimation for patients with unrecognizable hypoglycemia
• prompt and adequate report on patient’s demand
• support when driving is not advisable any more</td></tr>
<tr><td>Psychological problems
Provide:
• advising, if necessary, by the members of the diabetes team
• adequate education to overcome worry caused by diabetes diagnosis and development of complications
• special advises for shift working and for high – risk jobs
• contact with employees on demand of the person with diabetes</td><td>Traveling
Provide advice:
• on therapy dosage and nutrition during travel
• on ways of insulin transportation and means for insulin administering
• on special health risks in foreign countries to be visited
• on different types and concentrations of insulin in different countries</td></tr>
</table>

Monitoring of the effect of the therapy, regular and annual control examinations

Examinations

Regular control (at least once in 3-4 months)

- Examination of the problem
    - Identification
        - of the recent events and new situations
        - newly created troubles in practicing of the diabetes selfcontrol
    - Analysis
        - of the glycemia selfcontrol results and HbA1c level control
        - of the lipoprotein level control results
        - of the arterial blood pressure measurements results
        - of the way of nutrition, physical activities and habits (smoking)
        - of the education effects (feet care)
        - of the insulin therapy and experiences with hypoglycemias
        - of the other conditions and therapy which can create influence on diabetes
        - of the state and therapies of other vascular risk factors
        - state and therapy of the complications and other problems identified on the annual control
- Analysis and planing
    - Of the agreement on
        - treatment success of the major problems
        - goals for future period
        - therapy changes
        - interval till next control

    Annual control

    - Symptom analysis of the
        - ischemial heart disorder, peripheral vascular disease
        - neuropathy, erectly dysfunction
    - Evaluation of the vascular risk
        - lipid level, arterial blood pressure, smoking
    - Evaluation of the diabetes foot occurrence
        - skin changes, ischemia, ulceration, lack of pulses, sensory function damage, deformity/rigidity of the joints, footwear
    - Evaluation of the neuropathy occurrence
        - albumin excretion and serum creatin level
    - Evaluation of the retinopathy occurrence
        - ocular bottom examination and sight sharpness
        - examinations at other specialists, if needed

Examination schedules for therapy effect monitoring for patients with diabetes type II are practiced by investigation of illness history, vascular risk factors, general examination and examination of complications, diabetes selfcontrol during the first visit, regular control and annual control (Table 2.3.1).

Table 2.3.1. Therapy effect monitoring for diabetes type II: examination schedule

	First visit	**Regular control**	**Annual control**
Patient's history of illness			
Socioepidemyiological facts/habits	+	+	
History/present state of diabetes	+	+	
History of complications/symptoms	+		+
Other data from patient's history	+		
Family anamnesis/vascular illnesses	+		+
Prior and present therapy	+	+	+
Diabetes selfcontrol	+	+	+
Capability of selfcontrol/results	+	+	+
Vascular risk factors	+	+	+
HbA1c	+	+	+
Lipids	+	+	+
Arterial blood pressure	+	if problematic	+
Smoking	+		+
Urinary excretion of albumin (not necessary in case of existing proteinuria +)			
Examination/complications			
General examination	+		
Weight/index of body mass	+	+	+
Feet examination	+	if problematic	+
Examination of ocular bottom/vision sharpness	+	if problematic	+
Proteinuria	+	+	+
Creatine level	+	if problematic	+

In the estimation of the glycoregulation disorder, lipoprotein metabolic disorder and arterial hypertension treatment, for diabetes type II it is recommended :

1. to control patient's, who is on nonmedicamentous therapy, diurnal glycemia profile (before and 1.5-2 hours after main meal, before sleep and at 03 am) once in two months and in the meantime to control glycemia level before morning meal (fasting glucose (FG)level) and postprandialy at least once more a month.
2. to control patient's, who is on oral medicamentous therapy, diurnal glycemia profile once a month and in the mean time to control glycemia level before morning meal (FGL) and postprandialy once more a week.
3. to control patient's, who is on insulin medicamentous therapy or combined oral agents + insulin therapy, diurnal glycemia profile once a week and in the mean time to control glycemia level before morning meal (FGL) and postprandialy once more a week.
4. the control of glycosuria can be practiced without glycemia control 1-7 times a week, postprandialy, if the results are constantly negative and aimed values of glycemia are achieved.
5. to control glycemia level several times a day during the illness, change of life habits or in case of unrecognizable hypoglycemia's.
6. to control patient's, who is on medicamentous therapy with insulin or on combined oral agents + insulin therapy, glycemia level especially nocturnal (02-04 am) if there is a suspicious unrecognizable nocturnal hypoglycemia.
7. it is necessary to control glycemia level more often, if the variation in nutrition habits or physical activity exists
8. special equipment is needed for glycemia selfcontrol for persons with impaired vision.
9. to control patient's, who is solely on nonmedicamentous therapy or on medicamentous therapy with oral agents, level of HbA1c every 2-6 months and in patients, who are on medicamentous therapy with insulin or combined oral agents + insulin, every 2 months.
10. to analyze existing hypoglycemia episodes in case of normal or low levels of HbA1c.

11. to analyze lipid profile (total cholesterol, LDL HDL cholesterol, tryglicerides) every 2-6 months in case of unachieved aimed values, otherwise to control once a year.
12. to analyze arterial pressure on every control examination until the values are below the aimed values.
13. to analyze individual connection betwixt aimed therapy values of glycemia, HbA1c lipoprotein and arterial blood pressure and change of life quality, with goal to harmonize them.

ANNEX TABLES

Annex Table 1a: GBD 2000 disease and injury categories and ICD – 10 codes

Code	GBD Cause Name	ICD-10 code
U000	**All Causes**	
U001	**I. Communicable, maternal, perinatal and nutritional conditions**	A00-B99, G00-G04, N70-N73, J00-J06, J10-J18, J20-J22, H65-H66, O00-O99, P00-P96, E00-E02, E40-E46, E50, D50-D64
U002	**A. Infectious and parasitic diseases**	A00-B99, G00, N70-N73
U003	1. **Tuberculosis**	A15-A19, B90
U004	2. **Sexually transmitted diseases excluding HIV**	A50-A64, N70-N73
U005	a. Syphilis	A50-A53
U006	b. Chlamydia	A55-A56
U007	c. Gonorrhoea	A54
U008	Other STDs	A57-A64, N70-N73
U009	3. **HIV/AIDS**	B20-B24
U010	4. **Diarrhoeal diseases**	A00,A01,A03,A04,A06-A09
U011	5. **Childhood-cluster diseases**	A33-37, A80, B05, B91
U012	a. Pertussis	A37
U013	b. Poliomyelitis	A80,B91
U014	c. Diphtheria	A36
U015	d. Measles	B05
U016	e. Tetanus	A33-A35
U017	6. **Meningitis**	A39, G00, G03
U018	7. **Hepatitis B**	B16-B19
U019	**Hepatitis C**	B17.1, B18.2
U020	8. **Malaria**	B50-B54
U021	9. **Tropical-cluster diseases**	B55-B57, B65, B73, B74.0-B74.2
U022	a. Trypanosomiasis	B56
U023	b. Chagas disease	B57
U024	c. Schistosomiasis	B65
U025	d. Leishmaniasis	B55
U026	e. Lymphatic filariasis	B74.0-B74.2
U027	f. Onchocerciasis	B73
U028	10. **Leprosy**	A30
U029	11. **Dengue**	A90-A91
U030	12. **Japanese encephalitis**	A83.0
U031	13. **Trachoma**	A71
U032	14. **Intestinal nematode infections**	B76-B81
U033	a. Ascariasis	B77
U034	b. Trichuriasis	B79
U035	c. Hookworm disease (Ancylostomiasis and necatoriasis)	B76
U036	Other intestinal infections	B78, B80,B81
U037	Other infectious diseases	A02, A05, A20-A28, A31, A32, A38, A40-A49, A65-A70, A74-A79, A81, A82, A83.1-A83.9, A84-A89, A92-A99, B00-B04, B06-B15, B25-B49, B58-B60, B64, B66-B72, B74.3-B74.9, B75, B82-B89,B92-B99, G04

Code	GBD Cause Name	ICD-10 code
U038	**B. Respiratory infections**	J00-J06, J10-J18, J20-J22, H65-H66
U039	1. Lower respiratory infections	J10-J18, J20-J22
U040	2. Upper respiratory infections	J00-J06
U041	3. Otitis media	H65-H66
U042	**C. Maternal conditions**	O00-O99
U043	1. Maternal haemorrhage	O44-O46, O67, O72
U044	2. Maternal sepsis	O85-O86
U045	3. Hypertensive disorders of pregnancy	O10-O16
U046	4. Obstructed labour	O64-O66
U047	5. Abortion	O00-O08
U048	Other maternal conditions	O20-O43,O47-O63,O68-O71,O73-O84,O87-O99
U049	**D. Conditions arising during the perinatal period**	P00-*P96*
U050	1. Low birth weight	P05-P07
U051	2. Birth asphyxia and birth trauma	P03, P10-P15, P20-P29
U052	Other perinatal conditions	P00-P02, P04, P08, P35-P96
U053	**E. Nutritional deficiencies**	E00-E02, E40-E46, E50, D50-D64
U054	1. Protein-energy malnutrition	E40-E46
U055	2. Iodine deficiency	E00-E02
U056	3. Vitamin A deficiency	E50
U057	4. Iron-deficiency anaemia	D50-D64
U058	Other nutritional disorders	
U059	**II. Noncommunicable diseases**	C00-C97, D00-D48, *D65-D89*, E03-E07, E10-E16, E20-E34, E51-E89, F01-F99, G06-G99, H00-H61, H68-H95, I00-I99, J30-J99, K00-K92, N00-N64, N75-N99, L00-L99, M00-M99, Q00-Q99
U060	**A. Malignant neoplasms**	C00-C97
U061	1. Mouth and oropharynx cancers	C00-C14
U062	2. Oesophagus cancer	C15
U063	3. Stomach cancer	C16
U064	4. Colon and rectum cancers	C18-C21
U065	5. Liver cancer	C22
U066	6. Pancreas cancer	C25
U067	7. Trachea, bronchus and lung cancers	C33-C34
U068	8. Melanoma and other skin cancers	C43-C44
U069	9. Breast cancer	C50
U070	10. Cervix uteri cancer	C53
U071	11. Corpus uteri cancer	C54-C55
U072	12. Ovary cancer	C56
U073	13. Prostate cancer	C61
U074	14. Bladder cancer	C67
U075	15. Lymphomas and multiple myeloma	C81-C90, C96
U076	16. Leukaemia	C91-C95
U077	Other malignant neoplasms	C17, C23, C24, C26-C32, C37-C41, C45-C49, C51, C52, C57-C60, C62-C66, C68-C80, C97
U078	**B. Other neoplasms**	D00-D48
U079	**C. Diabetes mellitus**	E10-E14
U080	**D. Endocrine disorders**	D65-D89, E03-E07, E15-E16, E20-E34, E51-E89
U081	**E. Neuro-psychiatric conditions**	F01-F99, G06-G99

Code	GBD Cause Name	ICD-10 code
U082	1. Unipolar depressive disorders	F32-F33
U083	2. Bipolar affective disorder	F30-F31
U084	3. Schizophrenia	F20-F29
U085	4. Epilepsy	G40-G41
U086	5. Alcohol use disorders	F10
U087	6. Alzheimer and other dementias	F01, F03, G30-G31
U088	7. Parkinson disease	G20-G21
U089	8. Multiple sclerosis	G35
U090	9. Drug use disorders	F11-F16, F18-F19
U091	10. Post-traumatic stress disorder	F43
U092	11. Obsessive-compulsive disorder	F42
U093	12. Panic disorder	F40.0, F41.0
U094	13. Insomnia (primary)	F51
U095	14. Migraine	G43
U096	Mental Retardation attributable to lead exposure	F70-F73 (part)
U097	Other neuropsychiatric disorders	F04-F09, F17, F34-F39, F401-F409, F411-F419, F44-F50, F52-F69, F74-F99, G06-G011, G12, G23-G25, G36, G37, G44-G99
U098	**F. Sense organ diseases**	H00-H61, H68-H95
U099	1. Glaucoma	H40
U100	2. Cataracts	H25-H26
U101	3. Vision disorders, age-related	
U102	4. Hearing loss, adult onset	
U103	Other sense organ disorders	H00-H21, H27-H35, H43-H61, H68-H95
U104	**G. Cardiovascular diseases**	I00-I99
U105	1. Rheumatic heart disease	I01-I09
U106	2. Hypertensive heart disease	I10-I15
U107	3. Ischaemic heart disease	I20-I25
U108	4. Cerebrovascular disease	I60-I69
U109	5. Inflammatory heart diseases	I30-I33, I38, I40, I42
U110	Other cardiovascular diseases	I00, I26-I28, I34-I37, I44-I51, I70-I99
U111	**H. Respiratory diseases**	J30-J99
U112	1. Chronic obstructive pulmonary disease	J40-J44
U113	2. Asthma	J45-J46
U114	Other respiratory diseases	J30-J39, J47-J99
U115	**I. Digestive diseases**	K20-K92
U116	1. Peptic ulcer disease	K25-K27
U117	2. Cirrhosis of the liver	K70, K74
U118	3. Appendicitis	K35-K37
U119	Other digestive diseases	K20-K22, K28-K31, K38, 0-K66, K71-K73, K75-K92
U120	**J. Genito-urinary diseases**	N00-N64, N75-N99
U121	1. Nephritis and nephrosis	N00-N19
U122	2. Benign prostatic hypertrophy	N40
U123	Other genitourinary system diseases	N20-N39, N41-N64, N75-N99
U124	**K. Skin diseases**	L00-L99
U125	**L. Musculoskeletal diseases**	M00-M99
U126	1. Rheumatoid arthritis	M05-M06
U127	2. Osteoarthritis	M15-M19
U128	3. Gout	
U129	4. Low back pain	
U130	Other musculoskeletal disorders	M00-M02, M08-M13, M20-M99

Code	GBD Cause Name	ICD-10 code
U131	**M. Congenital anomalies**	Q00-Q99
U132	1. Abdominal wall defect	Q79.2-Q79.5
U133	2. Anencephaly	Q00
U134	3. Anorectal atresia	Q42
U135	4. Cleft lip	Q36
U136	5. Cleft palate	Q35, Q37
U137	6. Oesophageal atresia	Q39.0-Q39.1
U138	7. Renal agenesis	Q60
U139	8. Down syndrome	Q90
U140	9. Congenital heart anomalies	Q20-Q28
U141	10. Spina bifida	Q05
U142	Other Congenital anomalies	Q01-Q04, Q06-Q18, Q30-Q34, Q38, Q392-Q399, Q40-Q41, Q43-Q56, Q61-Q78, Q790, Q791, Q796, Q798, Q799, Q80-Q89, Q91-Q99
U143	**N. Oral conditions**	K00-K14
U144	1. Dental caries	K02
U145	2. Periodontal disease	K05
U146	3. Edentulism	-
U147	Other oral diseases	K00, K01,K03,K04,K06-K14
U148	**III.Injuries**	V01-Y89
U149	**A. Unintentional injuries**	V01-X59, Y40-Y86, Y88, Y89
U150	1. Road traffic accidents	V01-V04, V06, V09-V80, V87, V89, V99
U151	2. Poisonings	X40-X49
U152	3. Falls	W00-W19
U153	4. Fires	X00-X09
U154	5. Drownings	W65-W74
U155	6. Other unintentional injuries	Rest of V, W20-W64, W75-W99, X10-X39, X50-X59, Y40-Y86, Y88, Y89
U156	**B. Intentional injuries**	X60-Y09, Y35-Y36, Y870, Y871
U157	1. Self-inflicted injuries	X60-X84, Y870
U158	2. Violence	X85-Y09, Y871
U159	3. War	Y36
U160	Other intentional injuries	Y35

* FOR COUNTRIES WITH 3-DIGIT ICD10 DATA, for Road traffic accidents use: V01-V04, V06, V09-V80, V87, V89, V99.

Source: Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N, Bernard C, Lopez A, Murray C (2002). Global Burden of Disease 2000: Version 2 methods and results. GPE Disccussion Paper No. 50. Geneva, WHO. Available on the worlwide web at www.who.int./evidence.

Annex Table 1b. Disease categories and selected disability weights

<table>
<tr><th>Disease</th><th>Code</th><th>ICD-10</th><th colspan="2"></th><th>Disability weights</th><th>Comment</th></tr>
<tr><td>Tuberculosis</td><td>U003</td><td>A15-19, B90</td><td colspan="2">Age group 0-4
5-14
15-44
45-59
60+</td><td>0.294
0.294
0.264
0.274
0.274</td><td>GDB disability weights [Murray and Lopez 1996b]</td></tr>
<tr><td>HIV/AIDS</td><td>U009</td><td>B20-24</td><td colspan="2">Early HIV
Late HIV
AIDS
AIDS - terminal phase</td><td>0.200
0.310
0.560
0.930</td><td>Dutch disability weights</td></tr>
<tr><td>Conditions arising during the perinatal period
Low birth weight
Birth asphyxia and birth trauma</td><td>

U050
U051</td><td>P00-96</td><td colspan="2">LBW untreated
LBW treated
Birth asphyxia and trauma untreated
Birth asphyxia and trauma treated</td><td>0.291
0.256
0.381
0.334</td><td>GBD disability weights</td></tr>
<tr><td rowspan="2">Stomach cancer</td><td rowspan="2">U063</td><td rowspan="2">C16</td><td>Treated</td><td>Diagnosis & therapy
Control/Waiting
Metastasis
Terminal</td><td rowspan="2">0.200
0.200
0.750
0.809
0.750
0.809</td><td rowspan="2">GBD disability weights for cancer stages [Mathers and Boschi-Pinto 2003].</td></tr>
<tr><td>Untreated</td><td>Metastasis
Terminal</td></tr>
<tr><td>Colon and rectum Cancers</td><td>U064</td><td>C18-21</td><td colspan="2">Diagnosis and primary therapy
Control/Waiting
Disseminated
Terminal stage</td><td>0.200
0.200
0.750
0.809</td><td>GBD disability weights for cancer stages</td></tr>
<tr><td>Trachea, bronchus and
lung cancers</td><td>U067</td><td>C33-34</td><td>Treated</td><td>Diagnosis & therapy
Cured phase
Control/Waiting
Metastasis
Terminal</td><td>0.146
0.150
0.150
0.750
0.809</td><td>GBD disability weights for cancer stages [Mathers and Boschi-Pinto 2003].</td></tr>
</table>

			Untreated	Metastasis Terminal	0.750 0.809	
Breast cancer	U069	C50	Treated	Diagnosis & therapy Cured phase Control/Waiting Metastasis Terminal	0.086 0.090 0.090 0.750 0.809	GBD disability weights for cancer stages [Mathers and Boschi-Pinto 2003].
			Untreated	Metastasis Terminal	0.750 0.809	

Cervix uteri cancer	U070	C53	Treated	Diagnosis & therapy Cured phase Control/Waiting Metastasis Terminal	0.075 0.080 0.080 0.750 0.809	GBD disability weights for cancer stages [Mathers and Boschi-Pinto 2003].
			Untreated	Metastasis Terminal	0.750 0.809	
Diabetes mellitus	U079	E10-14			0.016	GBD disability weight
Unipolar depressive disorders	U082	F32-33	Depressive episodes males Depressive episodes females		0.390 0.380	Composite Dutch disability weights
Sense organ diseases Vision disorders, age-related Hearing loss, adult onset	 U101 U102	H54-59, H524 H90-91	Vision disorders, age-related Hearing loss, adult onset		0.400	Dutch disability weights
Ischaemic heart disease	U107	I20-25	AMI Angina pectoris Congestive heart faiture		0.4142 0.1214 0.2014	Slightly modified GBD weights [Murray and Lopez 1996a].
Cerebrovascular disease (Stroke)	U108	I60-69	Die within 28 days Age group for survivors 0-4 5-14 15-44 45-54 55-64		0.809 0.231 0.231 0.231 0.233 0.250	Slightly modified GBD weights [Murray and Lopez 1996a].

			65+	0.267	
Asthma	U113	J45-46	Treated asthma Untreated asthma	0.059 0.099	GBD disability weights
Nephritis and nephrosis	U121	N18	End-stage renal failure with dialysis End-stage renal failure with transplant Transplated patients Untreated end-stage renal failure	0.290 0.290 0.110 0.104	Dutch weights for diabetic nephropathy GBD weights for untreated renal failure

Injury category	Code	ICD-10		Disability weights		Comment
Fractured skull – long term		S02.0/1/7/9,T90.2	Age group 0-4 5-14 15-44 45-59 60+	Treated 0.350 0.350 0.350 0.404	Untreated 0.410 0.410 0.410 0.419	GBD disability weights (Murray & Lopez, 1996)
Injured spinal cord		S14,S24,S34,T06.0/1,T08,T91.3	Treated and untreated	0.725		GBD disability weights (Murray & Lopez, 1996)
Fractured femur – long term		S72,S79.7	Treated and untreated	0.272		GBD disability weights (Murray & Lopez, 1996)
Intracranial injuries – short term		S06,T90.5	Treated and untreated	0.359		GBD disability weights (Murray & Lopez, 1996)
Intracranial injuries – long term		S06,T90.5	Age group 0-4 Treated 5-14 15-44 45-59 60+	0.350 0.350 0.350 0.350 0.404		GBD disability weights (Murray & Lopez, 1996)
Self-inflicted injuries	U157	X60-X84,Y870		0.477		GBD disability weights (Murray & Lopez, 1996)

Annex Table 2. Regional epidemiological analysis categories for Global Burden of Disease 2000 project: GBD regions and 17 subregions

GBD region	Mortality stratum	Region code	WHO Member States	Reporting subregion
AFRO	D	1	Algeria, Angola, Benin, Burkina Faso, Cameroon, Cape Verde, Chad, Comoros, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mauritania, Mauritius, Niger, Nigeria, Sao Tome And Principe, Senegal, Seychelles, Sierra Leone, Togo,	AFRO D
			Djibouti, Somalia, Sudan	EMRO D
AFRO	E	2	Botswana, Burundi, Central African Republic, Congo, Côte d'Ivoire, Democratic Republic Of The Congo, Eritrea, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia, Zimbabwe	AFRO E
AMRO	A	3	Canada, United States Of America	AMRO A
AMRO	B	4	Antigua And Barbuda, Argentina, Bahamas, Barbados, Belize, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guyana, Honduras, Jamaica, Mexico, Panama, Paraguay, Saint Kitts And Nevis, Saint Lucia, Saint Vincent And The Grenadines, Suriname, Trinidad And Tobago, Uruguay, Venezuela	AMRO B
			Cuba	AMRO A
AMRO	D	5	Bolivia, Ecuador, Guatemala, Haiti, Nicaragua, Peru	AMRO D
EMRO	B	6	Bahrain, Cyprus, Iran (Islamic Republic Of), Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, United Arab Emirates	EMRO B
EMRO	D	7	Egypt, Iraq, Morocco, Yemen	EMRO D
EURO	A	8	Andorra, Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland, United Kingdom	EURO A
EURO	B1	9	Albania, Bosnia And Herzegovina, Bulgaria, Georgia, Poland, Romania, Slovakia, The Former Yugoslav Republic Of Macedonia, Turkey, Serbia and Montenegro	EURO B
EURO	B2	10	Armenia, Azerbaijan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan	EURO B
EURO	C	11	Belarus, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine	EURO C
SEARO	B	12	Indonesia, Sri Lanka, Thailand	SEARO B
			Malaysia, Philippines	WPRO B
			Brunei Darussalam, Singapore	WPRO A
SEARO	D	13	Bangladesh, Bhutan, India, Maldives, Nepal	SEARO D
			Afghanistan, Pakistan	EMRO D
WPRO	A	14	Australia, Japan, New Zealand	WPRO A
WPRO	B1	15	China, Mongolia, Republic Of Korea	WPRO B
			DPR Korea	SEARO D

WPRO	B2	16	Cambodia, Lao People's Democratic Republic, Viet Nam	WPRO B
			Myanmar	SEARO D
WPRO	B3	17	Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia (Federated States Of), Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu	WPRO B

Source: Mathers C, Stein C, Ma Fat D, Rao C, Inoue M, Tomijima N, Bernard C, Lopez A, Murray C (2002). Global Burden of Disease 2000: Version 2 methods and results. GPE Disccussion Paper No. 50. Geneva, WHO. Available on the worlwide web at www.who.int./evidence.

Annex Table 3a. Death counts and death structure, Serbia 2000

Code	Cause			Both sexes		Female		Male	
U000	All Causes			104 042	%	50 291	%	53 751	%
U001	Communicable, maternal, perinatal and nutritional conditions			2 350	2.26	974	1.94	1 376	2.56
U002	A	Infectious and parasitic diseases		700	0.67	247	0.49	453	0.84
U003		1.	Tuberculosis	284	0.27	78	0.16	206	0.38
U038	B	Respiratory infections		1 062	1.02	486	0.97	576	1.07
U039		1.	Lower respiratory infections	1 061	1.02	486	0.97	575	1.07
U042	C	Maternal conditions		7	0.01	7	0.01	0	0.00
U049	D	Perinatal conditions		543	0.52	212	0.42	331	0.62
U051		2.	Birth asphyxia and birth trauma	390	0.37	155	0.31	235	0.44
U053	E	Nutritional deficiencies		38	0.04	23	0.05	15	0.03
U059	Noncommunicable diseases			97 570	93.69	48 205	95.85	49 365	91.84
U060	A	Malignant neoplasms		19 606	18.83	8 353	16.61	11 253	20.94
U061		1.	Mouth and oropharynx cancers	618	0.59	105	0.21	513	0.95
U062		2.	Oesophagus cancer	347	0.33	63	0.13	284	0.53
U063		3.	Stomach cancer	1 734	1.67	632	1.26	1 102	2.05
U064		4.	Colon and rectum cancers	2 835	2.72	1 192	2.37	1 643	3.06
U065		5.	Liver cancer	1 119	1.07	457	0.91	661	1.23
U066		6.	Pancreas cancer	1 023	0.98	471	0.94	552	1.03
U067		7.	Trachea, bronchus, lung cancers	5 491	5.27	1 155	2.30	4 336	8.07
U068		8.	Melanoma and other skin cancers	421	0.40	201	0.40	220	0.41
U069		9.	Breast cancer	1 978	1.90	1 942	3.86	35	0.07
U070		10.	Cervix uteri cancer	605	0.58	605	1.20	0	0.00
U071		11.	Corpus uteri cancer	423	0.41	423	0.84	0	0.00
U072		12.	Ovary cancer	409	0.39	409	0.81	0	0.00
U073		13.	Prostate cancer	741	0.71	0	0.00	741	1.38
U074		14.	Bladder cancer	640	0.61	183	0.36	457	0.85
U075		15.	Lymphomas, multiple myeloma	571	0.55	248	0.49	323	0.60
U076		16.	Leukaemia	651	0.62	265	0.53	386	0.72
U078	B	Other neoplasms		225	0.22	101	0.20	124	0.23
U079	C	Diabetes mellitus		2 731	2.62	1 568	3.12	1 163	2.16
U080	D	Endocrine disorders		119	0.11	71	0.14	48	0.09
U081	E	Neuropsychiatric conditions		1 354	1.30	504	1.00	849	1.58
U085		4.	Epilepsy	148	0.14	57	0.11	91	0.17
U086		5.	Alcohol use disorders	293	0.28	17	0.03	276	0.51
U087		6.	Alzheimer and other dementias	123	0.12	67	0.13	56	0.10
U088		7.	Parkinson disease	316	0.30	133	0.27	183	0.34

U098	F	Sense organ diseases		0	0.00	0	0.00	0	0.00
U104	G	Cardiovascular diseases		64 015	61.47	33 788	67.19	30 227	56.23
U105		1.	Rheumatic heart disease	172	0.17	93	0.19	79	0.15
U106		2.	Hypertensive heart disease	1 642	1.58	968	1.93	674	1.25
U107		3.	Ischaemic heart disease	18 583	17.84	7 698	15.31	10 884	20.25
U108		4.	Cerebrovascular disease	18 785	18.04	10 448	20.78	8 336	15.51
U109		5.	Inflammatory heart diseases	18 250	17.52	10 344	20.57	7 905	14.71
U111	H	Respiratory diseases		4 066	3.90	1 545	3.07	2 521	4.69
U112		1.	Chronic obstructive pulmonary disease	2 379	2.28	821	1.63	1 558	2.90
U113		2.	Asthma	703	0.67	263	0.52	439	0.82
U115	I	Digestive diseases		3 313	3.18	1 258	2.50	2 055	3.82
U116		1.	Peptic ulcer disease	540	0.52	208	0.41	332	0.62
U117		2.	Cirrhosis of the liver	1 052	1.01	245	0.49	807	1.50
U120	J.	Genitourinary diseases		1 722	1.65	788	1.57	934	1.74
U121		1.	Nephritis and nephrosis	1 530	1.47	779	1.55	751	1.40
U122		2.	Benign prostatic hypertrophy	153	0.15	0	0.00	153	0.28
U124	K	Skin diseases		51	0.05	20	0.04	31	0.06
U125	L	Musculoskeletal diseases		117	0.11	89	0.18	28	0.05
U131	M	Congenital anomalies		248	0.24	120	0.24	129	0.24
U140		9.	Congenital heart anomalies	140	0.13	66	0.13	74	0.14
U143	N	Oral conditions		2	0.00	0	0.00	2	0.00
U148	Injuries			4 122	3.96	1 112	2.21	3 010	5.60
U149	A	Unintentional injuries		1 965	1.89	473	0.94	1 493	2.78
U150		1.	Road traffic accidents	849	0.81	179	0.36	669	1.25
U152		3.	Falls	182	0.18	78	0.15	105	0.19
U154		5.	Drownings	154	0.15	46	0.09	108	0.20
U156	B	Intentional injuries		2 156	2.07	639	1.27	1 517	2.82
U157		1.	Self-inflicted injuries	1 908	1.83	575	1.14	1 333	2.48
U158		2.	Violence	248	0.24	64	0.13	184	0.34

Annex Table 3b. Hospital's episodes counts and their structure, Belgrade 2000

Code	Cause				Both sexes	%	Female	%	Male	%
U000	All Causes				201 179		110 520		90 659	
U001	Communicable, maternal, perinatal and nutritional conditions				34 873	17.33	29 293	26.50	5 580	6.15
U002	A.	Infectious and parasitic diseases			5 021	2.50	2 856	2.58	2 165	2.39
U003		1.	Tuberculosis		753	0.37	294	0.27	459	0.51
U004		2.	STDs excluding HIV		1 236	0.61	1 225	1.11	11	0.01
U008			d.	Other STDs	1 227	0.61	1 220	1.10	7	0.01
U009		3.	HIV/AIDS		170	0.08	46	0.04	124	0.14
U010		4.	Diarrhoeal diseases		548	0.27	266	0.24	282	0.31
U017		6.	Meningitis		181	0.09	70	0.06	111	0.12
U018		7.	Hepatitis B		440	0.22	160	0.14	280	0.31
U038	B.	Respiratory infections			3 759	1.87	1 717	1.55	2 042	2.25
U039		1.	Lower respiratory infections		2 559	1.27	1 105	1.00	1 454	1.60
U040		2.	Upper respiratory infections		418	0.21	247	0.22	171	0.19
U041		3.	Otitis media		782	0.39	365	0.33	417	0.46
U042	C.	Maternal conditions			23 336	11.60	23 336	21.11	0	0.00
U046		4.	Obstructed labour		455	0.23	455	0.41	0	0.00
U047		5.	Abortion		3 173	1.58	3 173	2.87	0	0.00
U049	D.	Perinatal conditions*			1 837	0.91	798	0.72	1 039	1.15
U050		1.	Low birth weight		1 059	0.53	476	0.43	583	0.64
U051		2.	Birth asphyxia and birth trauma		245	0.12	100	0.09	145	0.16
U053	E.	Nutritional deficiencies			918	0.46	585	0.53	333	0.37
U057		4.	Iron-deficiency anaemia		723	0.36	466	0.42	257	0.28
U059	Noncommunicable diseases				154 102	76.60	76 353	69.09	77 749	85.76
U060	A.	Malignant neoplasms			19 592	9.74	8 720	7.89	10 872	11.99
U061		1.	Mouth and oropharynx cancers		771	0.38	181	0.16	590	0.65
U062		2.	Oesophagus cancer		292	0.15	60	0.05	232	0.26
U063		3.	Stomach cancer		625	0.31	223	0.20	402	0.44
U064		4.	Colon and rectum cancers		1 694	0.84	701	0.63	993	1.10
U065		5.	Liver cancer		195	0.10	87	0.08	108	0.12
U066		6.	Pancreas cancer		323	0.16	153	0.14	170	0.19
U067		7.	Trachea, bronchus, lung cancers		2 190	1.09	499	0.45	1 691	1.87
U068		8.	Melanoma and other skin cancers		448	0.22	188	0.17	260	0.29
U069		9.	Breast cancer		1 436	0.71	1 406	1.27	30	0.03
U070		10.	Cervix uteri cancer		786	0.39	786	0.71	0	0.00
U071		11.	Corpus uteri cancer		313	0.16	313	0.28	0	0.00
U072		12.	Ovary cancer		284	0.14	284	0.26	0	0.00
U073		13.	Prostate cancer		474	0.24	0	0.00	474	0.52
U074		14.	Bladder cancer		693	0.34	153	0.14	540	0.60
U075		15.	Lymphomas, multiple myeloma		2 054	1.02	951	0.86	1 103	1.22
U076		16.	Leukaemia		1 305	0.65	583	0.53	722	0.80
U078	B.	Other neoplasms			9 576	4.76	6 270	5.67	3 306	3.65
U079	C.	Diabetes mellitus			4 638	2.31	2 239	2.03	2 399	2.65
U080	D.	Endocrine disorders			3 816	1.90	2 348	2.12	1 468	1.62

U081	E.	Neuropsychiatric conditions		15 724	7.82	7 680	6.95	8 044	8.87
U082		1.	Unipolar depressive disorders	1 219	0.61	796	0.72	423	0.47
U083		2.	Bipolar disorder	375	0.19	269	0.24	106	0.12
U084		3.	Schizophrenia	2 795	1.39	1 396	1.26	1 399	1.54
U085		4.	Epilepsy	1 109	0.55	490	0.44	619	0.68
U086		5.	Alcohol use disorders	619	0.31	77	0.07	542	0.60
U087		6.	Alzheimer and other dementias	532	0.26	243	0.22	289	0.32
U088		7.	Parkinson disease	254	0.13	98	0.09	156	0.17
U089		8.	Multiple sclerosis	730	0.36	468	0.42	262	0.29
U090		9.	Drug use disorders	451	0.22	88	0.08	363	0.40
U091		10.	Post-traumatic stress disorder	95	0.05	44	0.04	51	0.06
U096		15.	Mental retardation, lead-caused	369	0.18	146	0.13	223	0.25
U098	F.	Sense organ diseases		7 190	3.57	3 630	3.28	3 560	3.93
U099		1.	Glaucoma	702	0.35	344	0.31	358	0.39
U100		2.	Cataracts	3 494	1.74	1 743	1.58	1 751	1.93
U104	G.	Cardiovascular diseases		32 505	16.16	14 006	12.67	18 499	20.41
U105		1.	Rheumatic heart disease	152	0.08	75	0.07	77	0.08
U106		2.	Hypertensive heart disease	2 402	1.19	1 448	1.31	954	1.05
U107		3.	Ischaemic heart disease	9 693	4.82	3 196	2.89	6 497	7.17
U108		4.	Cerebrovascular disease	9 440	4.69	4 665	4.22	4 775	5.27
U109		5.	Inflammatory heart diseases	2 485	1.24	1 090	0.99	1 395	1.54
U111	H.	Respiratory diseases		10 693	5.32	4 870	4.41	5 823	6.42
U112		1.	Chronic obstructive pulmonary disease	2 290	1.14	817	0.74	1 473	1.62
U113		2.	Asthma	1 485	0.74	775	0.70	710	0.78
U115	I.	Digestive diseases		18 034	8.96	7 929	7.17	10 105	11.15
U116		1.	Peptic ulcer disease	1 559	0.77	635	0.57	924	1.02
U117		2.	Cirrhosis of the liver	771	0.38	274	0.25	497	0.55
U118		3.	Appendicitis	1 755	0.87	792	0.72	963	1.06
U120	J.	Genitourinary diseases		12 365	6.15	7 766	7.03	4 599	5.07
U121		1.	Nephritis and nephrosis	2 740	1.36	1 377	1.25	1 363	1.50
U122		2.	Benign prostatic hypertrophy	1 075	0.53	11	0.01	1 064	1.17
U124	K.	Skin diseases		4 161	2.07	2 279	2.06	1 882	2.08
U125	L.	Musculoskeletal diseases		11 401	5.67	6 708	6.07	4 693	5.18
U126		1.	Rheumatoid arthritis	1 022	0.51	809	0.73	213	0.23
U127		2.	Osteoarthritis	1 625	0.81	1 167	1.06	458	0.51
U129		4.	Low back pain	1 822	0.91	1 024	0.93	798	0.88
U131	M.	Congenital anomalies		4 176	2.08	1 778	1.61	2 398	2.65
U140		9.	Congenital heart anomalies	790	0.39	386	0.35	404	0.45
U143	N.	Oral conditions		165	0.08	79	0.07	86	0.09
U148	Injuries			8 464	4.21	3 089	2.79	5 375	5.93
U149	A.	Unintentional injuries		4 690	2.33	1 983	1.79	2 707	2.99
U150		1.	Road traffic accidents	1 000	0.50	342	0.31	658	0.73
U152		3.	Falls	2 143	1.07	1 184	1.07	959	1.06
U156	B.	Intentional injuries		319	0.16	59	0.05	260	0.29
U157		1.	Self-inflicted injuries	67	0.03	25	0.02	42	0.05
U158		2.	Violence	245	0.12	34	0.03	211	0.23

Annex Table 4. Principal data sources for estimation of YLD

Disease	**Data source**	**Year**
Tuberculosis	Serbian Central TB Registry [Institute of Lung Diseases and Tuberculosis]	2000
HIV/AIDS	Institute of Public Health of Serbia Institute of Public Health of Belgrade	2000
Conditions arising during perinatal period (Low birth weight and Birth asphyxia and trauma)r	Data Collection Unit in City Institute of Public Health, Belgrade, unpublished data	2000
Stomach cancer	Cancer Registry of Central Serbia Cancer Registry of Vojvodina	1999 1998
Colon and rectum cancers	Cancer Registry of Central Serbia Cancer Registry of Vojvodina	1999 1998
Trachea, bronchus and lung cancers	Cancer Registry of Central Serbia Cancer Registry of Vojvodina	1999 1998
Breast cancer	Cancer Registry of Central Serbia Cancer Registry of Vojvodina	1999 1998
Cervix uteri cancer	Cancer Registry of Central Serbia Cancer Registry of Vojvodina	1999 1998
Diabetes mellitus	Diabetes Registry of Belgrade (unpublished data of City Institute for Health Care, Belgrade)	2000
Unipolar depressive disorders	Global health statistics (Murray and Lopez)	1996
Sense organ diseases (Vision disorders and hearing loss)	Prevalence study “The Disabled and the Environment” (Cucić et al)	2001
Ischaemic heart disease	Registry of Myocardial Infarction and Stroke - Cindy and Monica Collaborative Center, Novi Sad, unpublished data	1998
Cerebrovascular disease (Stroke)	Registry of Myocardial Infarction and Stroke - Cindy and Monica Collaborative Center, Novi Sad, unpublished data	1998
Asthma	Global health statistics (Murray and Lopez)	1996
Nephritis and nephrosis	Dialysis and kidney transplantation centers in Belgrade Belgrade’s Registry of patients on dialysis Annual Report on regular dialysis and transplantation in Yugoslavia	2000
Road-traffic accidents	Global health statistics (Murray and Lopez)	1996
Self-inflicted injuries	Global health statistics (Murray and Lopez)	1996

Annex Table 5: Deaths by age, sex and cause, Serbia (without Kosovo and Metohia), 2000

Disease category		Both	FTOT	MTOT	MALE M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	FEMALE F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U000	**All Causes**	**104**	**50,291**	**53,751**	**548**	**134**	**827**	**2,063**	**8,370**	**14,534**	**18,441**	**8,833**	**391**	**87**	**314**	**1,005**	**4,278**	**9,759**	**20**	**14**
U001	**Communicable, maternal, perinatal**	**2,350**	**974**	**1,376**	**384**	**7**	**27**	**71**	**159**	**256**	**302**	**170**	**257**	**7**	**23**	**32**	**76**	**120**	**261**	**198**
U002	**A. Infectious and parasitic diseases**	**700**	**247**	**453**	**26**	**3**	**13**	**54**	**110**	**128**	**91**	**28**	**22**	**4**	**10**	**21**	**38**	**62**	**68**	**22**
U003	1. Tuberculosis	284	78	206	-	-	-	23	51	65	54	13	-	-	-	6	6	20	37	9
U004	2. STDs excluding HIV	2	2	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-
U005	a. Syphilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U006	b. Chlamydia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U007	c. Gonorrhoea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U008	d. Other STDs	2	2	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-
U009	3. HIV/AIDS	41	10	31	2	-	2	12	11	4	-	-	-	1	1	8	-	-	-	-
U010	4. Diarrhoeal diseases	12	7	4	2	-	-	-	-	1	1	-	5	-	-	-	-	-	1	1
U011	5. Childhood-cluster diseases	11	8	3	1	-	-	-	-	-	1	1	-	-	-	-	1	3	1	3
U012	a. Pertussis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U013	b. Poliomyelitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U014	c. Diphtheria	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U015	d. Measles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U016	e. Tetanus	10	8	2	-	-	-	-	-	-	1	1	-	-	-	-	1	3	1	3
U017	6. Meningitis*	40	11	29	10	-	-	1	7	6	4	1	4	-	-	-	-	2	5	-
U018	7. Hepatitis B	18	6	12	-	1	-	1	2	5	3	-	-	-	1	1	-	3	1	-
U019	Hepatitis C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U020	8. Malaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U021	9. Tropical-cluster diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U022	a. Trypanosomiasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U023	b. Chagas disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U024	c. Schistosomiasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U025	d. Leishmaniasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U026	e. lymphatic filariasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U027	f. Onchocerciasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U028	10 Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U029	11 Dengue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U030	12 Japanese encephalitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U031	13 Trachoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U032	14 Intestinal nematode infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U033	a. Ascariasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U034	b. Trichuriasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U035	c. Hookworm disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U036	Other intestinal infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U037	Other infectious diseases	291	123	167	10	2	11	17	39	47	28	13	12	3	7	6	29	34	23	9
U038	**B. Respiratory infections**	**1,062**	**486**	**576**	**24**	**4**	**14**	**16**	**46**	**124**	**208**	**140**	**23**	**3**	**10**	**7**	**36**	**56**	**184**	**167**
U039	1. Lower respiratory infections	1,061	486	575	24	4	14	16	46	123	208	140	23	3	10	7	36	56	184	167
U040	2. Upper respiratory infections	1	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
U041	3. Otitis media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U042	**C. Maternal conditions**	**7**	**7**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**4**	**-**	**-**	**-**	**-**
U043	1. Maternal haemorrhage	4	4	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-
U044	2. Maternal sepsis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U045	3. Hypertensive disorders*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U046	4. Obstructed labour	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U047	5. Abortion	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
U048	Other maternal conditions	2	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
U049	**D. Perinatal conditions***	**543**	**212**	**331**	**331**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**212**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Annex Table 5: Deaths by age, sex and cause, Serbia (without Kosovo and Metohia), 2000

Disease category		Both	FTOT	MTOT	MALE								FEMALE							
					M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U050	1. Low birth weight	45	18	27	27	-	-	-	-	-	-	-	18	-	-	-	-	-	-	-
U051	2. Birth asphyxia and birth trauma	390	155	235	235	-	-	-	-	-	-	-	155	-	-	-	-	-	-	-
U052	Other perinatal conditions	109	39	70	70	-	-	-	-	-	-	-	39	-	-	-	-	-	-	-
U053	**E. Nutritional deficiencies**	**38**	**23**	**15**	**2**	**-**	**-**	**1**	**3**	**4**	**3**	**2**	**1**	**-**	**-**	**-**	**2**	**2**	**9**	**9**
U054	1. Protein-energy malnutrition	6	3	3	2	-	-	-	-	-	-	1	-	-	-	-	-	-	1	2
U055	2. Iodine deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U056	3. Vitamin A deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U057	4. Iron-deficiency anaemia	24	14	10	-	-	-	1	3	4	2	-	-	-	-	-	2	1	5	6
U058	Other nutritional disorders	8	6	2	-	-	-	-	-	-	1	1	1	-	-	-	-	1	3	1
U059	**Noncommunicable diseases**	**97,570**	**48,205**	**49,365**	**135**	**76**	**340**	**1,438**	**7,485**	**13,751**	**17,624**	**8,516**	**117**	**56**	**182**	**846**	**4,009**	**9,401**	**19.718**	**13.877**
U060	**A. Malignant neoplasms**	**19,606**	**8,353**	**11,253**	**5**	**35**	**113**	**460**	**2,636**	**3,978**	**3,390**	**636**	**8**	**15**	**65**	**469**	**1,805**	**2,474**	**2,702**	**816**
U061	1. Mouth and oropharynx cancers	618	105	513	-	3	4	41	182	178	83	22	-	-	-	1	23	22	43	16
U062	2. Oesophagus cancer	347	63	284	-	-	-	5	86	115	67	11	-	-	2	3	10	20	19	9
U063	3. Stomach cancer	1,734	632	1,102	-	3	9	51	228	371	380	60	-	-	2	21	96	187	258	69
U064	4. Colon and rectum cancers	2,835	1,192	1,643	-	-	19	47	305	563	593	115	-	-	4	31	147	350	489	171
U065	5. Liver cancer	1,119	457	661	-	-	3	12	130	248	229	40	1	-	-	7	66	153	193	38
U066	6. Pancreas cancer	1,023	471	552	-	-	-	23	131	215	154	29	-	-	-	9	71	158	177	55
U067	7. Trachea, bronchus, lung cancers	5,491	1,155	4,336	-	-	3	177	1,274	1,651	1,113	119	-	-	2	67	285	383	354	65
U068	8. Melanoma and other skin cancers	421	201	220	-	-	3	31	57	55	52	22	-	-	5	16	26	39	62	53
U069	9. Breast cancer	1,978	1,942	35	-	-	-	-	9	7	14	6	-	-	-	141	600	554	465	182
U070	10 Cervix uteri cancer	605	605	-	-	-	-	-	-	-	-	-	-	-	5	89	181	142	160	29
U071	11 Corpus uteri cancer	423	423	-	-	-	-	-	-	-	-	-	-	-	4	19	77	139	136	48
U072	12 Ovary cancer	409	409	-	-	-	-	-	-	-	-	-	-	-	4	32	121	141	98	13
U073	13 Prostate cancer	741	-	741	-	-	-	2	45	215	351	128	-	-	-	-	-	-	-	-
U074	14 Bladder cancer	640	183	457	-	-	-	3	54	172	174	54	-	-	-	1	13	43	88	38
U075	15 Lymphomas, multiple myeloma	571	248	323	-	7	32	28	76	95	76	8	-	8	25	12	44	76	69	13
U076	16 Leukaemia	651	265	386	5	22	39	41	58	95	103	21	7	7	13	18	45	66	92	17
U077	Other malignant neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U078	**B. Other neoplasms**	**225**	**101**	**124**	**1**	**-**	**3**	**8**	**22**	**39**	**41**	**9**	**-**	**-**	**-**	**-**	**16**	**26**	**40**	**19**
U079	**C. Diabetes mellitus**	**2,731**	**1,568**	**1,163**	**-**	**-**	**8**	**32**	**174**	**384**	**442**	**123**	**-**	**-**	**12**	**22**	**101**	**402**	**799**	**232**
U080	**D. Endocrine disorders**	**119**	**71**	**48**	**7**	**1**	**5**	**5**	**11**	**9**	**6**	**3**	**1**	**3**	**7**	**9**	**8**	**17**	**21**	**4**
U081	**E. Neuropsychiatric conditions**	**1,354**	**504**	**849**	**6**	**8**	**66**	**75**	**211**	**197**	**232**	**54**	**6**	**11**	**27**	**31**	**52**	**99**	**199**	**80**
U082	1. Unipolar depressive disorders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U083	2. Bipolar disorder	7	4	2	-	-	-	-	2	-	-	-	-	-	-	-	-	2	1	1
U084	3. Schizophrenia	25	16	9	-	-	-	-	5	1	2	1	-	-	-	2	1	8	4	-
U085	4. Epilepsy	148	57	91	1	3	21	18	19	13	14	2	1	8	15	8	4	7	10	3
U086	5. Alcohol use disorders	293	17	276	-	-	3	31	123	68	43	7	-	-	-	-	5	5	6	-
U087	6. Alzheimer and other dementias*	123	67	56	1	-	-	2	9	21	17	6	-	-	-	1	3	13	28	22
U088	7. Parkinson disease	316	133	183	-	-	-	-	3	50	105	25	-	-	-	-	-	22	80	31
U089	8. Multiple sclerosis	88	56	32	-	-	-	6	16	3	6	-	-	-	3	14	16	13	9	2
U090	9. Drug use disorders	16	2	13	-	-	10	3	1	-	-	-	-	-	1	-	-	-	1	-
U091	10 Post-traumatic stress disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U092	11 Obsessive-compulsive disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U093	12 Panic disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U094	13 Insomnia (primary)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U095	14 Migraine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U096	15 Mental retardation, lead-caused	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U097	Other neuropsychiatric disorders	338	151	187	4	5	32	15	33	41	44	13	5	3	8	6	22	28	60	20
U098	**F. Sense organ diseases**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U099	1. Glaucoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Annex Table 5: Deaths by age, sex and cause, Serbia (without Kosovo and Metohia), 2000

					MALE								FEMALE							
Disease category		**Both**	**FTOT**	**MTOT**	**M0 - 4**	**M5 - 14**	**M15 - 29**	**M30 - 44**	**M45 - 59**	**M60 - 69**	**M70 - 79**	**M80+**	**F0 - 4**	**F5 - 14**	**F15 - 29**	**F30 - 44**	**F45 - 59**	**F60 - 69**	**F70 - 79**	**F80+**
U100	2. Cataracts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U101	3. Vision disorders, age-related	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U102	4. Hearing loss, adult onset	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U103	Other sense organ disorders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U104	**G. Cardiovascular diseases**	**64,015**	**33,788**	**30,227**	**5**	**9**	**88**	**633**	**3,598**	**7,521**	**11,427**	**6,945**	**4**	**12**	**39**	**232**	**1,649**	**5,455**	**14.402**	**11.994**
U105	1. Rheumatic heart disease	172	93	79	-	-	-	5	10	21	37	7	-	-	-	-	13	24	39	18
U106	2. Hypertensive heart disease	1,642	968	674	-	-	-	14	104	162	259	134	-	-	-	14	53	161	425	315
U107	3. Ischaemic heart disease	18,583	7,698	10,884	-	-	23	266	1,973	3,258	3,985	1,380	-	-	5	53	543	1,781	3,331	1,985
U108	4. Cerebrovascular disease	18,785	10,448	8,336	1	4	23	172	871	2,252	3,488	1,525	3	5	11	86	640	2,008	5,015	2,682
U109	5. Inflammatory heart diseases	18,250	10,344	7,905	1	3	18	62	420	1,552	3,126	2,725	-	1	5	13	216	1,150	4,169	4,791
U110	Other cardiovascular diseases	6,584	4,235	2,348	3	3	25	116	219	277	533	1,174	1	6	18	66	184	332	1,425	2,203
U111	**H. Respiratory diseases**	**4,066**	**1,545**	**2,521**	**2**	**7**	**18**	**36**	**225**	**749**	**1,080**	**404**	**4**	**3**	**7**	**22**	**112**	**307**	**682**	**409**
U112	1. Chronic obstructive pulmonary dise	2,379	821	1,558	-	-	3	10	114	483	701	246	-	-	-	7	56	155	380	222
U113	2. Asthma	703	263	439	1	4	3	7	36	111	196	80	-	-	5	5	25	49	95	85
U114	Other respiratory diseases	985	461	524	1	3	11	19	75	155	182	77	4	3	1	10	30	103	207	103
U115	**I. Digestive diseases**	**3,313**	**1,258**	**2,055**	**1**	**4**	**23**	**140**	**480**	**620**	**622**	**165**	**1**	**3**	**7**	**33**	**151**	**367**	**509**	**187**
U116	1. Peptic ulcer disease	540	208	332	-	1	-	15	43	106	133	34	-	-	-	1	16	50	100	40
U117	2. Cirrhosis of the liver	1,052	245	807	-	-	7	63	288	267	166	17	-	-	1	15	46	95	70	18
U118	3. Appendicitis	25	12	13	-	-	2	-	5	2	2	2	-	-	-	1	1	3	4	2
U119	Other digestive diseases	1,697	794	903	1	3	15	62	145	245	321	111	1	3	5	16	88	218	335	127
U120	**J. Genitourinary diseases**	**1,722**	**788**	**934**	**1**	**3**	**12**	**40**	**117**	**237**	**357**	**168**	**1**	**2**	**9**	**19**	**88**	**221**	**337**	**110**
U121	1. Nephritis and nephrosis	1,530	779	751	1	1	12	38	111	217	278	93	1	2	9	19	88	219	331	110
U122	2. Benign prostatic hypertrophy	153	-	153	-	-	-	-	2	15	67	69	-	-	-	-	-	-	-	-
U123	Other genitourinary system disease	38	9	30	-	1	-	1	3	5	12	7	-	-	-	-	-	2	6	-
U124	**K. Skin diseases**	**51**	**20**	**31**	**-**	**3**	**-**	**2**	**1**	**5**	**14**	**6**	**-**	**2**	**1**	**1**	**3**	**5**	**1**	**6**
U125	**L. Musculoskeletal diseases**	**117**	**89**	**28**	**-**	**-**	**2**	**1**	**4**	**5**	**12**	**3**	**-**	**-**	**1**	**6**	**19**	**24**	**23**	**17**
U126	1. Rheumatoid arthritis	22	18	3	-	-	-	-	2	-	1	-	-	-	-	-	3	9	5	1
U127	2. Osteoarthritis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U128	3. Gout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U129	4. Low back pain*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U130	Other musculoskeletal disorders	96	71	25	-	-	2	1	2	5	11	3	-	-	1	6	15	15	17	16
U131	**M. Congenital anomalies**	**248**	**120**	**129**	**107**	**6**	**3**	**4**	**3**	**4**	**-**	**1**	**92**	**6**	**7**	**2**	**7**	**4**	**2**	**-**
U132	1. Abdominal wall defect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U133	2. Anencephaly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U134	3. Anorectal atresia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U135	4. Cleft lip	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U136	5. Cleft palate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U137	6. Oesophageal atresia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U138	7. Renal agenesis	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
U139	8. Down syndrome	24	14	10	10	-	-	-	-	-	-	-	8	4	-	-	2	-	-	-
U140	9. Congenital heart anomalies	140	66	74	60	4	2	1	3	2	-	1	51	-	5	1	4	3	1	-
U141	10 Spina bifida	5	1	4	4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
U142	Other Congenital anomalies	78	37	41	33	1	2	3	-	2	-	-	31	2	1	1	-	1	1	-
U143	**N. Oral conditions**	**2**	**-**	**2**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U144	1. Dental caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U145	2. Periodontal disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U146	3. Edentulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U147	Other oral diseases	2	-	2	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-
U148	**Injuries**	**4,122**	**1,112**	**3,010**	**29**	**51**	**460**	**554**	**726**	**527**	**515**	**147**	**17**	**24**	**109**	**127**	**193**	**238**	**287**	**117**
U149	**A. Unintentional injuries**	**1,965**	**473**	**1,493**	**29**	**44**	**258**	**291**	**352**	**240**	**224**	**55**	**17**	**18**	**68**	**34**	**74**	**76**	**121**	**63**

Annex Table 5: Deaths by age, sex and cause, Serbia (without Kosovo and Metohia), 2000

					MALE								FEMALE							
Disease category		**Both**	**FTOT**	**MTOT**	**M0 - 4**	**M5 - 14**	**M15 - 29**	**M30 - 44**	**M45 - 59**	**M60 - 69**	**M70 - 79**	**M80+**	**F0 - 4**	**F5 - 14**	**F15 - 29**	**F30 - 44**	**F45 - 59**	**F60 - 69**	**F70 - 79**	**F80+**
U150	1. Road traffic accidents	849	179	669	5	18	146	145	170	102	74	9	4	11	51	20	35	30	24	2
U151	2. Poisonings	57	14	43	1	-	6	16	3	9	6	2	1	2	-	2	1	1	4	2
U152	3. Falls	182	78	105	1	-	6	8	19	20	33	17	-	-	2	-	7	10	27	32
U153	4. Fires	92	36	56	4	1	2	8	14	9	10	7	3	-	-	1	6	8	9	9
U154	5. Drownings	154	46	108	4	14	40	19	14	9	6	1	1	5	6	6	4	7	15	2
U155	6. Other unintentional injuries	632	119	512	14	11	57	94	133	89	96	18	8	-	9	4	20	19	42	16
U156	**B. Intentional injuries**	**2,156**	**639**	**1,517**	**-**	**7**	**203**	**263**	**374**	**287**	**292**	**92**	**-**	**6**	**41**	**93**	**119**	**162**	**166**	**54**
U157	1. Self-inflicted injuries	1,908	575	1,333	-	6	145	208	333	273	279	88	-	5	31	78	102	153	157	49
U158	2. Violence	244	63	181	-	-	57	55	39	14	11	5	-	1	10	15	15	8	9	5
U159	3. War	2	-	2	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
U160	Other intentional injuries	2	1	1	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-
Serbian population ('000)		7,551	3,877	3,674	185	447	774	767	767	438	249	47	175	425	752	779	794	510	360	82
Deaths per 1000		13.78	12.97	14.63	2.96	0.30	1.07	2.69	10.91	33.22	74.19	187.43	2.23	0.20	0.42	1.29	5.38	19.14	56.28	173.94
Deaths per 1000 stand WHO		8.90	7.37	10.75	2.96	0.30	1.07	2.57	11.24	32.44	76.07	186.91	2.23	0.20	0.42	1.24	5.49	18.47	56.77	168.29

Annex Table 6: Deaths by age, sex and cause, Belgrade, 2000

	Disease category	Both	FTOT	MTOT	MALE								FEMALE							
					M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U000	**All Causes**	**19,758**	**9,474**	**10,284**	**104**	**20**	**184**	**406**	**1,746**	**2,839**	**3,510**	**1,475**	**70**	**18**	**61**	**219**	**959**	**1,900**	**3,761**	**2,486**
U001	**Communicable, maternal, perinatal**	**596**	**234**	**362**	**74**	**-**	**5**	**18**	**42**	**75**	**93**	**55**	**57**	**1**	**3**	**10**	**19**	**24**	**66**	**54**
U002	**A. Infectious and parasitic diseases**	**182**	**62**	**120**	**5**	**-**	**2**	**16**	**32**	**35**	**23**	**7**	**4**	**1**	**1**	**8**	**11**	**14**	**17**	**6**
U003	1. Tuberculosis	61	19	42	-	-	-	5	7	15	11	4	-	-	-	1	3	4	7	4
U004	2. STDs excluding HIV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U005	a. Syphilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U006	b. Chlamydia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U007	c. Gonorrhoea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U008	d. Other STDs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U009	3. HIV/AIDS	25	6	19	1	-	-	8	7	3	-	-	-	-	1	5	-	-	-	-
U010	4. Diarrhoeal diseases	2	1	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
U011	5. Childhood-cluster diseases	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
U012	a. Pertussis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U013	b. Poliomyelitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U014	c. Diphtheria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U015	d. Measles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U016	e. Tetanus	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
U017	6. Meningitis*	7	-	7	2	-	-	-	3	2	-	-	-	-	-	-	-	-	-	-
U018	7. Hepatitis B	5	-	5	-	-	-	1	2	2	-	-	-	-	-	-	-	-	-	-
U019	Hepatitis C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U020	8. Malaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U021	9. Tropical-cluster diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U022	a. Trypanosomiasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U023	b. Chagas disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U024	c. Schistosomiasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U025	d. Leishmaniasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U026	e. lymphatic filariasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U027	f. Onchocerciasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U028	10 Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U029	11 Dengue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U030	12 Japanese encephalitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U031	13 Trachoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U032	14 Intestinal nematode infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U033	a. Ascariasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U034	b. Trichuriasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U035	c. Hookworm disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U036	Other intestinal infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U037	Other infectious diseases	80	34	46	2	-	2	2	13	13	11	3	4	1	-	2	8	9	10	-
U038	**B. Respiratory infections**	**290**	**117**	**173**	**3**	**-**	**3**	**2**	**10**	**38**	**70**	**47**	**3**	**-**	**2**	**2**	**8**	**10**	**45**	**47**
U039	1. Lower respiratory infections	290	117	173	3	-	3	2	10	38	70	47	3	-	2	2	8	10	45	47
U040	2. Upper respiratory infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U041	3. Otitis media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U042	**C. Maternal conditions**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U043	1. Maternal haemorrhage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U044	2. Maternal sepsis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U045	3. Hypertensive disorders*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U046	4. Obstructed labour	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U047	5. Abortion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U048	Other maternal conditions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U049	**D. Perinatal conditions***	**115**	**50**	**65**	**65**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**50**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Annex Table 6: Deaths by age, sex and cause, Belgrade, 2000

Disease category		Both	FTOT	MTOT	MALE								FEMALE							
					M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U050	1. Low birth weight	9	2	7	7	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
U051	2. Birth asphyxia and birth trauma	84	41	44	44	-	-	-	-	-	-	-	41	-	-	-	-	-	-	-
U052	Other perinatal conditions	22	7	15	15	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-
U053	**E. Nutritional deficiencies**	**8**	**5**	**3**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**4**	**1**
U054	1. Protein-energy malnutrition	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
U055	2. Iodine deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U056	3. Vitamin A deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U057	4. Iron-deficiency anaemia	5	3	2	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2	1
U058	Other nutritional disorders	2	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-
U059	**Noncommunicable diseases**	**18,340**	**8,978**	**9,362**	**24**	**14**	**76**	**295**	**1,582**	**2,662**	**3,319**	**1,390**	**11**	**9**	**34**	**177**	**897**	**1,823**	**3,638**	**2,389**
U060	**A. Malignant neoplasms**	**4,557**	**2,057**	**2,499**	**2**	**9**	**34**	**110**	**586**	**868**	**745**	**144**	**1**	**1**	**15**	**99**	**486**	**594**	**653**	**208**
U061	1. Mouth and oropharynx cancers	119	28	91	-	-	5	10	33	26	16	1	-	-	-	2	5	4	15	3
U062	2. Oesophagus cancer	69	15	54	-	-	-	4	18	22	7	4	-	-	-	-	3	4	7	1
U063	3. Stomach cancer	345	115	230	-	-	-	16	49	82	75	8	-	-	-	1	18	38	40	17
U064	4. Colon and rectum cancers	661	286	375	-	-	5	9	66	128	137	30	-	-	-	2	28	88	129	39
U065	5. Liver cancer	182	85	97	-	-	-	2	15	35	39	5	-	-	-	2	17	21	33	12
U066	6. Pancreas cancer	226	114	113	-	-	-	2	16	45	40	9	-	-	-	2	10	40	44	17
U067	7. Trachea, bronchus, lung cancers	1,407	367	1,040	-	-	-	38	309	405	253	34	-	-	2	17	82	127	118	20
U068	8. Melanoma and other skin cancers	99	37	62	-	-	-	18	23	11	9	1	-	-	-	3	9	7	11	7
U069	9. Breast cancer	536	532	4	-	-	-	-	-	-	4	-	-	-	-	35	178	154	113	52
U070	10 Cervix uteri cancer	130	130	-	-	-	-	-	-	-	-	-	-	-	-	14	52	24	35	5
U071	11 Corpus uteri cancer	88	88	-	-	-	-	-	-	-	-	-	-	-	-	6	19	24	27	12
U072	12 Ovary cancer	90	90	-	-	-	-	-	-	-	-	-	-	-	-	5	35	22	25	3
U073	13 Prostate cancer	182	-	182	-	-	-	-	18	49	82	34	-	-	-	-	-	-	-	-
U074	14 Bladder cancer	144	49	95	-	-	-	2	8	39	34	12	-	-	-	1	8	11	19	11
U075	15 Lymphomas, multiple myeloma	128	63	65	-	-	5	5	15	16	23	1	-	-	8	2	13	19	17	4
U076	16 Leukaemia	150	58	92	2	9	20	5	16	11	24	4	1	1	5	6	9	10	21	4
U077	Other malignant neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U078	**B. Other neoplasms**	**17**	**7**	**10**	**-**	**-**	**-**	**-**	**4**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**2**	**2**	**-**
U079	**C. Diabetes mellitus**	**364**	**196**	**168**	**-**	**-**	**-**	**1**	**27**	**52**	**71**	**16**	**-**	**-**	**3**	**4**	**15**	**43**	**96**	**34**
U080	**D. Endocrine disorders**	**21**	**16**	**5**	**1**	**-**	**-**	**3**	**1**	**-**	**-**	**-**	**-**	**5**	**2**	**-**	**1**	**2**	**4**	**1**
U081	**E. Neuropsychiatric conditions**	**254**	**93**	**162**	**1**	**2**	**24**	**13**	**40**	**26**	**36**	**20**	**-**	**-**	**6**	**3**	**13**	**14**	**32**	**25**
U082	1. Unipolar depressive disorders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U083	2. Bipolar disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U084	3. Schizophrenia	4	1	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-	1	-
U085	4. Epilepsy	19	5	14	-	-	6	1	2	1	2	1	-	-	2	-	-	1	2	-
U086	5. Alcohol use disorders	35	2	33	-	-	-	5	22	3	1	1	-	-	-	-	1	-	1	-
U087	6. Alzheimer and other dementias*	44	29	15	-	-	-	-	1	4	5	4	-	-	-	-	-	3	14	12
U088	7. Parkinson disease	56	21	35	-	-	-	-	-	7	19	10	-	-	-	-	-	3	7	11
U089	8. Multiple sclerosis	19	15	5	-	-	-	-	2	1	1	-	-	-	-	3	7	3	2	-
U090	9. Drug use disorders	4	2	3	-	-	-	1	1	-	-	-	-	-	2	-	-	-	-	-
U091	10 Post-traumatic stress disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U092	11 Obsessive-compulsive disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U093	12 Panic disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U094	13 Insomnia (primary)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U095	14 Migraine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U096	15 Mental retardation, lead-caused	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U097	Other neuropsychiatric disorders	72	18	54	1	2	18	5	9	9	8	3	-	-	3	-	6	3	4	2
U098	**F. Sense organ diseases**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U099	1. Glaucoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Annex Table 6: Deaths by age, sex and cause, Belgrade, 2000

					MALE								FEMALE							
Disease category		Both	FTOT	MTOT	M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U100	2. Cataracts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U101	3. Vision disorders, age-related	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U102	4. Hearing loss, adult onset	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U103	Other sense organ disorders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U104	**G. Cardiovascular diseases**	**11,663**	**6,008**	**5,655**	**-**	**-**	**10**	**122**	**763**	**1,472**	**2,179**	**1,109**	**-**	**3**	**4**	**43**	**306**	**1,021**	**2,608**	**2,022**
U105	1. Rheumatic heart disease	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
U106	2. Hypertensive heart disease	383	212	171	-	-	-	4	38	48	51	30	-	-	-	4	18	31	95	65
U107	3. Ischaemic heart disease	3,238	1,271	1,966	-	-	5	49	380	617	763	153	-	-	-	6	89	326	618	233
U108	4. Cerebrovascular disease	3,490	1,837	1,653	-	-	-	29	195	451	692	287	-	-	-	17	123	378	861	457
U109	5. Inflammatory heart diseases	3,245	1,844	1,401	-	-	3	13	100	288	546	451	-	-	-	1	43	201	709	888
U110	Other cardiovascular diseases	1,306	843	464	-	-	2	27	49	68	127	189	-	3	4	16	33	83	324	379
U111	**H. Respiratory diseases**	**454**	**162**	**292**	**-**	**2**	**3**	**4**	**31**	**90**	**114**	**48**	**-**	**-**	**2**	**8**	**16**	**34**	**62**	**40**
U112	1. Chronic obstructive pulmonary dise	282	93	189	-	-	-	1	16	58	75	39	-	-	-	2	7	21	38	24
U113	2. Asthma	108	49	60	-	2	-	1	6	14	29	7	-	-	2	4	9	10	15	10
U114	Other respiratory diseases	64	21	43	-	-	3	1	8	18	10	3	-	-	-	3	-	3	9	7
U115	**I. Digestive diseases**	**657**	**258**	**399**	**-**	**-**	**5**	**27**	**102**	**111**	**117**	**35**	**-**	**-**	**-**	**5**	**36**	**70**	**112**	**35**
U116	1. Peptic ulcer disease	101	39	63	-	-	-	-	5	20	30	8	-	-	-	-	4	8	16	11
U117	2. Cirrhosis of the liver	210	50	160	-	-	3	12	74	44	26	1	-	-	-	3	6	26	15	1
U118	3. Appendicitis	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
U119	Other digestive diseases	344	169	176	-	-	2	16	24	47	61	26	-	-	-	3	26	36	80	24
U120	**J. Genitourinary diseases**	**299**	**156**	**142**	**-**	**-**	**-**	**10**	**27**	**39**	**52**	**14**	**-**	**-**	**2**	**10**	**19**	**36**	**67**	**23**
U121	1. Nephritis and nephrosis	295	155	139	-	-	-	10	27	39	50	13	-	-	2	10	19	36	66	23
U122	2. Benign prostatic hypertrophy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U123	Other genitourinary system disease	4	1	3	-	-	-	-	-	-	2	1	-	-	-	-	-	-	1	-
U124	**K. Skin diseases**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
U125	**L. Musculoskeletal diseases**	**17**	**11**	**6**	**-**	**-**	**-**	**1**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**3**	**2**	**5**	**1**	**-**
U126	1. Rheumatoid arthritis	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
U127	2. Osteoarthritis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U128	3. Gout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U129	4. Low back pain*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U130	Other musculoskeletal disorders	15	10	5	-	-	-	1	-	2	1	-	-	-	-	3	2	5	-	-
U131	**M. Congenital anomalies**	**35**	**13**	**23**	**20**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**10**	**-**	**-**	**3**	**-**	**-**	**-**	**-**
U132	1. Abdominal wall defect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U133	2. Anencephaly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U134	3. Anorectal atresia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U135	4. Cleft lip	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U136	5. Cleft palate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U137	6. Oesophageal atresia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U138	7. Renal agenesis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U139	8. Down syndrome	2	1	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
U140	9. Congenital heart anomalies	20	7	12	11	1	-	-	-	-	-	-	6	-	-	1	-	-	-	-
U141	10 Spina bifida	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U142	Other Congenital anomalies	13	4	8	7	-	-	1	-	-	-	-	3	-	-	1	-	-	-	-
U143	**N. Oral conditions**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U144	1. Dental caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U145	2. Periodontal disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U146	3. Edentulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U147	Other oral diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U148	**Injuries**	**822**	**262**	**560**	**6**	**6**	**103**	**93**	**122**	**102**	**98**	**30**	**2**	**8**	**24**	**32**	**43**	**53**	**57**	**43**
U149	**A. Unintentional injuries**	**356**	**121**	**236**	**6**	**4**	**41**	**32**	**45**	**57**	**39**	**13**	**2**	**5**	**10**	**7**	**16**	**13**	**32**	**36**

Annex Table 6: Deaths by age, sex and cause, Belgrade, 2000

					MALE								FEMALE							
Disease category		**Both**	**FTOT**	**MTOT**	**M0 - 4**	**M5 - 14**	**M15 - 29**	**M30 - 44**	**M45 - 59**	**M60 - 69**	**M70 - 79**	**M80+**	**F0 - 4**	**F5 - 14**	**F15 - 29**	**F30 - 44**	**F45 - 59**	**F60 - 69**	**F70 - 79**	**F80+**
U150	1. Road traffic accidents	135	30	105	1	1	24	20	23	21	14	-	1	3	8	3	9	3	3	-
U151	2. Poisonings	7	3	4	1	-	1	-	-	2	-	-	-	2	-	-	-	-	2	-
U152	3. Falls	107	61	46	-	-	4	1	3	11	15	13	-	-	1	-	4	4	24	29
U153	4. Fires	16	6	9	-	-	-	4	3	2	2	-	1	-	-	-	1	3	2	-
U154	5. Drownings	18	5	13	1	1	7	1	-	3	-	-	-	1	-	2	-	-	2	-
U155	6. Other unintentional injuries	72	15	58	2	1	5	6	16	19	7	-	-	-	1	1	2	3	-	7
U156	**B. Intentional injuries**	**466**	**141**	**324**	**-**	**2**	**62**	**61**	**77**	**45**	**59**	**17**	**-**	**3**	**14**	**25**	**27**	**40**	**26**	**7**
U157	1. Self-inflicted injuries	375	125	250	-	1	33	43	62	41	57	14	-	2	10	19	21	40	26	7
U158	2. Violence	89	17	73	-	-	29	18	16	5	3	3	-	1	3	6	6	-	-	-
U159	3. War	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U160	Other intentional injuries	1	-	1	-	1	-	-	-	-	-	-								
Belgrade population ('000)		1,585	832	753	37	87	165	156	162	89	49	9	35	82	168	173	185	104	71	15
Deaths per 1000		12.46	11.39	13.66	2.80	0.23	1.11	2.60	10.80	31.89	71.49	171.49	2.02	0.22	0.36	1.27	5.19	18.23	53.29	166.37
Deaths per 1000 stand Serbia		13.15	12.39	14.02	2.80	0.23	1.11	2.61	10.80	32.12	71.19	169.81	2.02	0.22	0.36	1.27	5.24	18.36	53.11	167.75

Annex Table 7: YLL by age, sex and cause, Serbia (without Kosovo and Metohia), 2000

Code	ause	TOTAL	FTOT	MTOT	MALE M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	FEMALE F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U000	**All Causes**	**814,022**	**351,972**	**462,050**	**18,296**	**4,993**	**27,600**	**49,046**	**127.799**	**126.936**	**90,695**	**16,685**	**13,151**	**3,256**	**10,545**	**24,486**	**67,584**	**92,140**	**110.318**	**30,493**
U001	**Communicable, maternal, perinatal and**	**36,720**	**14,655**	**22,066**	**12,751**	**261**	**910**	**1,674**	**2,423**	**2,269**	**1,456**	**322**	**8,585**	**262**	**784**	**813**	**1,221**	**1,141**	**1,408**	**441**
U002	**A. Infectious and parasitic diseases**	**9,433**	**3,402**	**6,031**	**875**	**112**	**431**	**1,263**	**1,683**	**1,144**	**458**	**65**	**740**	**150**	**339**	**534**	**617**	**597**	**375**	**49**
U003	1. Tuberculosis	2,865	661	2,204	-	-	-	541	777	579	276	31	-	-	-	149	101	189	203	20
U004	2. STDs excluding HIV	55	55	-	-	-	-	-	-	-	-	-	-	-	36	-	19	-	-	-
U005	a. Syphilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U006	b. Chlamydia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U007	c. Gonorrhoea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U008	d. Other STDs	55	55	-	-	-	-	-	-	-	-	-	-	-	36	-	19	-	-	-
U009	3. HIV/AIDS	923	284	640	77	-	65	286	176	36	-	-	-	37	31	215	-	-	-	-
U010	4. Diarrhoeal diseases	281	189	93	77	-	-	-	-	10	6	-	179	-	-	-	-	-	6	3
U011	5. Childhood-cluster diseases	101	54	47	38	-	-	-	-	-	6	3	-	-	-	-	16	26	5	8
U012	a. Pertussis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U013	b. Poliomyelitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U014	c. Diphtheria	38	-	38	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U015	d. Measles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U016	e. Tetanus	63	54	8	-	-	-	-	-	-	6	3	-	-	-	-	16	26	5	8
U017	6. Meningitis*	728	190	538	338	-	-	22	98	56	21	3	142	-	-	-	-	20	29	-
U018	7. Hepatitis B	246	100	146	-	37	-	22	31	41	14	-	-	-	34	28	-	33	5	-
U019	Hepatitis C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U020	8. Malaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U021	9. Tropical-cluster diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U022	a. Trypanosomiasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U023	b. Chagas disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U024	c. Schistosomiasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U025	d. Leishmaniasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U026	e. lymphatic filariasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U027	f. Onchocerciasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U028	10. Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U029	11. Dengue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U030	12. Japanese encephalitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U031	13. Trachoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U032	14. Intestinal nematode infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U033	a. Ascariasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U034	b. Trichuriasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U035	c. Hookworm disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U036	Other intestinal infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U037	Other infectious diseases	4,217	1,853	2,365	345	75	366	392	601	422	136	29	419	112	237	142	465	330	128	18
U038	**B. Respiratory infections**	**8,729**	**3,860**	**4,869**	**829**	**149**	**479**	**389**	**693**	**1,092**	**984**	**254**	**778**	**112**	**346**	**177**	**571**	**524**	**980**	**372**
U039	1. Lower respiratory infections	8,721	3,860	4,861	829	149	479	389	693	1,084	984	254	778	112	346	177	571	524	980	372
U040	2. Upper respiratory infections	8	-	8	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-
U041	3. Otitis media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U042	**C. Maternal conditions**	**201**	**201**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**100**	**101**	**-**	**-**	**-**	**-**
U043	1. Maternal haemorrhage	101	101	-	-	-	-	-	-	-	-	-	-	-	-	101	-	-	-	-
U044	2. Maternal sepsis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U045	3. Hypertensive disorders*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U046	4. Obstructed labour	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U047	5. Abortion	34	34	-	-	-	-	-	-	-	-	-	-	-	34	-	-	-	-	-
U048	Other maternal conditions	65	65	-	-	-	-	-	-	-	-	-	-	-	65	-	-	-	-	-
U049	**D. Perinatal conditions***	**18,000**	**7,029**	**10,971**	**10,971**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**7,029**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U050	1. Low birth weight	1,477	595	882	882	-	-	-	-	-	-	-	595	-	-	-	-	-	-	-
U051	2. Birth asphyxia and birth trauma	12,920	5,133	7,787	7,787	-	-	-	-	-	-	-	5,133	-	-	-	-	-	-	-
U052	Other perinatal conditions	3,603	1,302	2,302	2,302	-	-	-	-	-	-	-	1,302	-	-	-	-	-	-	-
U053	**E. Nutritional deficiencies**	**357**	**162**	**195**	**77**	**-**	**-**	**22**	**47**	**34**	**14**	**3**	**37**	**-**	**-**	**-**	**33**	**20**	**52**	**20**
U054	1. Protein-energy malnutrition	89	11	78	77	-	-	-	-	-	-	1	-	-	-	-	-	-	6	5
U055	2. Iodine deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U056	3. Vitamin A deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Annex Table 7: YLL by age, sex and cause, Serbia (without Kosovo and Metohia), 2000

Code	ause	TOTAL	FTOT	MTOT	MALE								FEMALE							
					M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U057	4. Iron-deficiency anaemia	196	84	112	-	-	-	22	47	34	10	-	-	-	-	-	33	11	29	12
U058	Other nutritional disorders	72	66	5	-	-	-	-	-	-	4	1	37	-	-	-	-	9	17	3
U059	**Noncommunicable diseases**	**710,403**	**321,593**	**388,810**	**4,541**	**2,832**	**11,260**	**33,715**	**113,762**	**120,014**	**86,633**	**16,053**	**3,973**	**2,096**	**6,059**	**20,451**	**63,250**	**88,692**	**107.296**	**29,775**
U060	**A. Malignant neoplasms**	**193,977**	**84,125**	**109,852**	**176**	**1,308**	**3,736**	**10,859**	**40,310**	**35,010**	**17,112**	**1,342**	**280**	**560**	**2,142**	**11,284**	**28,935**	**23,778**	**15,164**	**1,982**
U061	1. Mouth and oropharynx cancers	6,924	864	6,060	-	110	124	960	2,773	1,612	431	50	-	-	-	30	370	200	229	36
U062	2. Oesophagus cancer	3,405	588	2,818	-	-	-	113	1,313	1,028	342	22	-	-	55	62	156	185	111	18
U063	3. Stomach cancer	15,902	5,487	10,415	-	110	317	1,198	3,502	3,261	1,895	132	-	-	55	533	1,506	1,786	1,428	178
U064	4. Colon and rectum cancers	24,223	9,680	14,542	-	-	618	1,124	4,696	4,914	2,954	237	-	-	117	746	2,352	3,342	2,711	412
U065	5. Liver cancer	9,649	3,856	5,793	-	-	101	286	1,972	2,197	1,144	94	33	-	-	164	1,029	1,445	1,097	89
U066	6. Pancreas cancer	9,100	3,954	5,146	-	-	-	518	1,901	1,886	787	55	-	-	-	220	1,075	1,500	1,014	145
U067	7. Trachea, bronchus, lung cancers	56,434	12,027	44,407	-	-	93	4,078	19,593	14,607	5,754	282	-	-	62	1,585	4,551	3,663	1,996	169
U068	8. Melanoma and other skin cancers	4,403	1,870	2,533	-	-	93	762	908	471	253	46	-	-	172	417	432	380	345	122
U069	9. Breast cancer	21,734	21,463	271	-	-	-	-	129	63	70	9	-	-	-	3,368	9,677	5,394	2,600	424
U070	10. Cervix uteri cancer	7,701	7,701	-	-	-	-	-	-	-	-	-	-	-	172	2,177	2,996	1,383	898	75
U071	11. Corpus uteri cancer	4,011	4,011	-	-	-	-	-	-	-	-	-	-	-	117	449	1,222	1,321	791	111
U072	12. Ovary cancer	4,765	4,765	-	-	-	-	-	-	-	-	-	-	-	125	773	1,942	1,347	548	31
U073	13. Prostate cancer	4,511	-	4,511	-	-	-	46	663	1,843	1,714	245	-	-	-	-	-	-	-	-
U074	14. Bladder cancer	4,571	1,263	3,308	-	-	-	67	778	1,480	873	110	-	-	-	33	217	432	488	93
U075	15. Lymphomas, multiple myeloma	7,780	3,340	4,440	-	255	1,068	707	1,199	821	374	16	-	303	851	288	707	771	387	33
U076	16. Leukaemia	8,866	3,257	5,610	176	832	1,323	1,002	885	829	520	44	247	257	414	441	702	630	520	46
U077	Other malignant neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U078	**B. Other neoplasms**	**2,031**	**775**	**1,256**	**35**	**-**	**109**	**213**	**344**	**343**	**194**	**18**	**-**	**-**	**-**	**-**	**269**	**246**	**218**	**41**
U079	**C. Diabetes mellitus**	**20,722**	**11,284**	**9,438**	**-**	**-**	**268**	**747**	**2,610**	**3,325**	**2,223**	**266**	**-**	**-**	**401**	**544**	**1,504**	**3,812**	**4,462**	**561**
U080	**D. Endocrine disorders**	**1,924**	**1,042**	**881**	**240**	**53**	**165**	**123**	**181**	**81**	**31**	**7**	**33**	**121**	**229**	**230**	**125**	**162**	**128**	**14**
U081	**E. Neuropsychiatric conditions**	**16,162**	**5,334**	**10,827**	**209**	**302**	**2,202**	**1,772**	**3,377**	**1,731**	**1,134**	**100**	**210**	**397**	**903**	**769**	**854**	**915**	**1,092**	**195**
U082	1. Unipolar depressive disorders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U083	2. Bipolar disorder	60	29	32	-	-	-	-	32	-	-	-	-	-	-	-	-	18	7	3
U084	3. Schizophrenia	292	186	107	-	-	-	-	82	11	10	3	-	-	-	69	21	70	26	-
U085	4. Epilepsy	3,011	1,264	1,747	35	102	690	433	301	117	65	3	35	294	502	211	84	72	56	9
U086	5. Alcohol use disorders	3,842	163	3,679	-	-	104	729	1,987	624	218	16	-	-	-	-	86	46	32	-
U087	6. Alzheimer and other dementias*	876	404	471	35	-	-	53	128	168	80	8	-	-	-	35	47	120	154	48
U088	7. Parkinson disease	1,728	711	1,017	-	-	-	-	46	411	511	49	-	-	-	-	-	203	429	79
U089	8. Multiple sclerosis	1,305	834	470	-	-	-	143	263	31	33	-	-	-	86	322	253	118	49	5
U090	9. Drug use disorders	454	48	406	-	-	326	58	21	-	-	-	-	-	43	-	-	-	5	-
U091	10. Post-traumatic stress disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U092	11. Obsessive-compulsive disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U093	12. Panic disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U094	13. Insomnia (primary)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U095	14. Migraine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U096	15. Mental retardation, lead-caused	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U097	Other neuropsychiatric disorders	4,594	1,695	2,899	139	200	1,083	356	516	368	216	21	174	103	272	132	362	267	334	51
U098	**F. Sense organ diseases**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U099	1. Glaucoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U100	2. Cataracts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U101	3. Vision disorders, age-related	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U102	4. Hearing loss, adult onset	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U103	Other sense organ disorders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U104	**G. Cardiovascular diseases**	**393,579**	**187,179**	**206,400**	**172**	**351**	**2,904**	**14,745**	**54,307**	**65,424**	**55,665**	**12,832**	**139**	**467**	**1,291**	**5,555**	**25,620**	**51,063**	**77,672**	**25,373**
U105	1. Rheumatic heart disease	1,286	663	623	-	-	-	111	142	179	178	13	-	-	-	-	181	225	217	40
U106	2. Hypertensive heart disease	10,523	5,638	4,885	-	-	-	337	1,591	1,403	1,280	274	-	-	-	326	842	1,523	2,264	682
U107	3. Ischaemic heart disease	136,156	48,965	87,191	-	-	741	6,179	29,610	28,535	19,589	2,538	-	-	172	1,255	8,207	16,798	18,297	4,236
U108	4. Cerebrovascular disease	122,169	64,691	57,478	33	151	755	3,949	13,017	19,553	17,028	2,991	106	173	350	2,036	10,037	18,764	27,186	6,040
U109	5. Inflammatory heart diseases	88,116	46,539	41,577	33	98	592	1,426	6,190	13,290	14,997	4,952	-	51	178	313	3,284	10,659	22,168	9,885
U110	Other cardiovascular diseases	35,330	20,685	14,646	105	102	815	2,744	3,757	2,465	2,593	2,064	33	243	590	1,624	3,069	3,095	7,540	4,490
U111	**H. Respiratory diseases**	**27,911**	**10,225**	**17,686**	**68**	**253**	**602**	**834**	**3,372**	**6,439**	**5,318**	**800**	**137**	**103**	**232**	**538**	**1,697**	**2,903**	**3,734**	**883**
U112	1. Chronic obstructive pulmonary disease	15,172	5,061	10,111	-	-	104	228	1,679	4,134	3,472	494	-	-	-	166	849	1,470	2,090	485
U113	2. Asthma	4,896	1,836	3,060	35	151	112	169	547	950	940	155	-	-	184	107	392	466	512	175

Annex Table 7: YLL by age, sex and cause, Serbia (without Kosovo and Metohia), 2000

					MALE								FEMALE							
Code	**ause**	**TOTAL**	**FTOT**	**MTOT**	**M0 - 4**	**M5 - 14**	**M15 - 29**	**M30 - 44**	**M45 - 59**	**M60 - 69**	**M70 - 79**	**M80+**	**F0 - 4**	**F5 - 14**	**F15 - 29**	**F30 - 44**	**F45 - 59**	**F60 - 69**	**F70 - 79**	**F80+**
U114	Other respiratory diseases	7,843	3,328	4,515	33	102	386	436	1,145	1,354	906	152	137	103	49	264	455	966	1,131	223
U115	**I. Digestive diseases**	**30,725**	**10,268**	**20,456**	**35**	**147**	**743**	**3,290**	**7,369**	**5,450**	**3,093**	**330**	**33**	**112**	**229**	**822**	**2,375**	**3,430**	**2,841**	**427**
U116	1. Peptic ulcer disease	4,038	1,387	2,651	-	49	-	369	637	889	634	73	-	-	-	29	257	475	541	85
U117	2. Cirrhosis of the liver	11,784	2,475	9,310	-	-	212	1,435	4,418	2,372	841	31	-	-	43	347	711	917	417	40
U118	3. Appendicitis	261	102	159	-	-	54	-	70	20	10	4	-	-	-	24	21	28	22	7
U119	Other digestive diseases	14,641	6,305	8,336	35	98	476	1,486	2,243	2,169	1,607	221	33	112	186	421	1,387	2,009	1,861	296
U120	**J. Genitourinary diseases**	**13,733**	**6,405**	**7,328**	**35**	**102**	**371**	**930**	**1,732**	**2,086**	**1,734**	**337**	**35**	**61**	**313**	**454**	**1,377**	**2,058**	**1,851**	**256**
U121	1. Nephritis and nephrosis	12,836	6,349	6,487	35	53	371	904	1,655	1,901	1,374	193	35	61	313	454	1,377	2,037	1,816	256
U122	2. Benign prostatic hypertrophy	598	-	598	-	-	-	-	32	134	303	129	-	-	-	-	-	-	-	-
U123	Other genitourinary system diseases	299	56	243	-	49	-	26	46	50	57	15	-	-	-	-	-	21	36	-
U124	**K. Skin diseases**	**576**	**265**	**311**	**-**	**106**	**-**	**53**	**21**	**45**	**73**	**13**	**-**	**61**	**43**	**35**	**60**	**51**	**5**	**10**
U125	**L. Musculoskeletal diseases**	**1,154**	**904**	**250**	**-**	**-**	**54**	**26**	**60**	**45**	**59**	**6**	**-**	**-**	**43**	**157**	**322**	**233**	**116**	**33**
U126	1. Rheumatoid arthritis	206	172	34	-	-	-	-	28	-	6	-	-	-	-	-	53	86	31	2
U127	2. Osteoarthritis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U128	3. Gout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U129	4. Low back pain*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U130	Other musculoskeletal disorders	947	732	216	-	-	54	26	32	45	52	6	-	-	43	157	269	147	85	31
U131	**M. Congenital anomalies**	**7,860**	**3,786**	**4,075**	**3,571**	**208**	**106**	**91**	**61**	**36**	**-**	**2**	**3,106**	**215**	**232**	**64**	**113**	**42**	**14**	**-**
U132	1. Abdominal wall defect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U133	2. Anencephaly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U134	3. Anorectal atresia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U135	4. Cleft lip	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U136	5. Cleft palate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U137	6. Oesophageal atresia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U138	7. Renal agenesis	33	33	-	-	-	-	-	-	-	-	-	33	-	-	-	-	-	-	-
U139	8. Down syndrome	803	470	333	333	-	-	-	-	-	-	-	274	154	-	-	42	-	-	-
U140	9. Congenital heart anomalies	4,359	2,042	2,318	2,003	155	54	26	61	17	-	2	1,717	-	187	29	71	30	7	-
U141	10. Spina bifida	166	33	132	132	-	-	-	-	-	-	-	33	-	-	-	-	-	-	-
U142	Other Congenital anomalies	2,499	1,207	1,292	1,103	53	52	64	-	20	-	-	1,048	61	45	35	-	12	7	-
U143	**N. Oral conditions**	**50**	**-**	**50**	**-**	**-**	**-**	**32**	**18**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U144	1. Dental caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U145	2. Periodontal disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U146	3. Edentulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U147	Other oral diseases	50	-	50	-	-	-	32	18	-	-	-	-	-	-	-	-	-	-	-
U148	**Injuries**	**66,899**	**15,725**	**51,174**	**1,003**	**1,900**	**15,430**	**13,658**	**11,614**	**4,653**	**2,606**	**310**	**594**	**898**	**3,702**	**3,222**	**3,113**	**2,307**	**1,613**	**276**
U149	**A. Unintentional injuries**	**34,757**	**7,246**	**27,511**	**1,003**	**1,651**	**8,671**	**7,120**	**5,675**	**2,155**	**1,127**	**108**	**594**	**686**	**2,330**	**865**	**1,199**	**736**	**686**	**151**
U150	1. Road traffic accidents	17,233	3,893	13,340	174	658	4,902	3,541	2,739	929	378	19	141	429	1,749	534	608	284	143	6
U151	2. Poisonings	1,049	251	798	43	-	193	402	44	83	28	5	35	86	-	62	23	13	25	6
U152	3. Falls	1,588	497	1,092	43	-	200	202	284	177	154	32	-	-	75	-	107	95	148	72
U153	4. Fires	1,209	383	826	125	41	75	210	230	83	50	12	106	-	-	33	95	82	46	21
U154	5. Drownings	3,622	754	2,868	130	539	1,389	481	211	86	28	3	35	171	200	134	60	71	76	6
U155	6. Other unintentional injuries	10,057	1,469	8,588	488	413	1,912	2,285	2,168	796	488	37	276	-	307	101	306	190	249	40
U156	**B. Intentional injuries**	**32,141**	**8,479**	**23,663**	**-**	**250**	**6,759**	**6,537**	**5,938**	**2,498**	**1,478**	**202**	**-**	**212**	**1,372**	**2,357**	**1,913**	**1,571**	**927**	**126**
U157	1. Self-inflicted injuries	26,836	7,319	19,517	-	209	4,865	5,164	5,279	2,389	1,422	189	-	170	1,050	1,988	1,633	1,493	874	112
U158	2. Violence	5,216	1,139	4,077	-	-	1,894	1,373	635	110	52	13	-	42	322	369	260	79	53	14
U159	3. War	64	-	64	-	41	-	-	24	-	-	-	-	-	-	-	-	-	-	-
U160	Other intentional injuries	25	21	5	-	-	-	-	-	-	5	-								
	Serbian population ('000)	7,551	3,877	3,674	185	447	774	767	767	438	249	47	175	425	752	779	794	510	360	82
	YLL per 1000	107.81	90.78	125.78	98.77	11.17	35.66	63.94	166.58	290.13	364.86	354.04	75.08	7.67	14.02	31.42	85.07	180.75	306.37	373.74
	YLL per 1000 stand WHO	78.76	60.66	97.89	98.77	11.11	35.56	61.74	169.64	287.18	366.77	354.13	75.08	7.59	13.96	30.62	86.09	177.08	307.51	376.49

Annex Table 8: YLL by age, sex and cause, Belgrade, 2000

Disease category		Both	FTOT	MTOT	MALE								FEMALE							
					M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U000	**All Causes**	**161.451**	**69,617**	**91,835**	**3,470**	**746**	**6,112**	**9,689**	**26,739**	**24,942**	**17,376**	**2,762**	**2,342**	**674**	**2,044**	**5,397**	**15.281**	**18.029**	**20.591**	**5,259**
U001	**Communicable, maternal, perinatal**	**8,261**	**3,340**	**4,921**	**2,458**	**-**	**164**	**420**	**656**	**666**	**452**	**104**	**1,904**	**37**	**104**	**262**	**321**	**223**	**363**	**126**
U002	**A. Infectious and parasitic diseases**	**2,405**	**840**	**1,564**	**184**	**-**	**65**	**373**	**497**	**314**	**114**	**17**	**134**	**37**	**31**	**212**	**188**	**127**	**97**	**14**
U003	1. Tuberculosis	580	162	418	-	-	-	112	107	134	56	9	-	-	-	28	49	39	38	8
U004	2. STDs excluding HIV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U005	a. Syphilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U006	b. Chlamydia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U007	c. Gonorrhoea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U008	d. Other STDs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U009	3. HIV/AIDS	542	167	375	38	-	-	193	116	28	-	-	-	-	31	136	-	-	-	-
U010	4. Diarrhoeal diseases	9	3	6	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	3
U011	5. Childhood-cluster diseases	12	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	3
U012	a. Pertussis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U013	b. Poliomyelitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U014	c. Diphtheria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U015	d. Measles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U016	e. Tetanus	12	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	3
U017	6. Meningitis*	135	-	135	70	-	-	-	44	20	-	-	-	-	-	-	-	-	-	-
U018	7. Hepatitis B	69	-	69	-	-	-	22	31	16	-	-	-	-	-	-	-	-	-	-
U019	Hepatitis C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U020	8. Malaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U021	9. Tropical-cluster diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U022	a. Trypanosomiasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U023	b. Chagas disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U024	c. Schistosomiasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U025	d. Leishmaniasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U026	e. lymphatic filariasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U027	f. Onchocerciasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U028	10 Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U029	11 Dengue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U030	12 Japanese encephalitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U031	13 Trachoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U032	14 Intestinal nematode infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U033	a. Ascariasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U034	b. Trichuriasis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U035	c. Hookworm disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U036	Other intestinal infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U037	Other infectious diseases	1,059	496	562	76	-	65	47	198	116	53	8	134	37	-	47	139	80	59	-
U038	**B. Respiratory infections**	**1,993**	**819**	**1,174**	**108**	**-**	**99**	**47**	**160**	**337**	**338**	**86**	**118**	**-**	**72**	**51**	**133**	**95**	**240**	**109**
U039	1. Lower respiratory infections	1,993	819	1,174	108	-	99	47	160	337	338	86	118	-	72	51	133	95	240	109
U040	2. Upper respiratory infections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U041	3. Otitis media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U042	**C. Maternal conditions**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U043	1. Maternal haemorrhage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U044	2. Maternal sepsis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U045	3. Hypertensive disorders*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U046	4. Obstructed labour	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U047	5. Abortion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U048	Other maternal conditions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U049	**D. Perinatal conditions***	**3,818**	**1,652**	**2,165**	**2,165**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,652**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Annex Table 8: YLL by age, sex and cause, Belgrade, 2000

Disease category		Both	FTOT	MTOT	MALE								FEMALE							
					M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U050	1. Low birth weight	303	75	228	228	-	-	-	-	-	-	-	75	-	-	-	-	-	-	-
U051	2. Birth asphyxia and birth trauma	2,795	1,352	1,444	1,444	-	-	-	-	-	-	-	1,352	-	-	-	-	-	-	-
U052	Other perinatal conditions	719	225	494	494	-	-	-	-	-	-	-	225	-	-	-	-	-	-	-
U053	**E. Nutritional deficiencies**	**46**	**29**	**17**	**-**	**-**	**-**	**-**	**-**	**16**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**26**	**3**
U054	1. Protein-energy malnutrition	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-
U055	2. Iodine deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U056	3. Vitamin A deficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U057	4. Iron-deficiency anaemia	32	16	16	-	-	-	-	-	16	-	-	-	-	-	-	-	-	13	3
U058	Other nutritional disorders	8	6	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	6	-
U059	**Noncommunicable diseases**	**139.993**	**62,663**	**77,330**	**803**	**522**	**2,522**	**6,981**	**24,117**	**23,365**	**16,425**	**2,595**	**367**	**337**	**1,126**	**4,335**	**14.255**	**17.298**	**19.911**	**5,034**
U060	**A. Malignant neoplasms**	**45,634**	**20,737**	**24,897**	**70**	**348**	**1,128**	**2,593**	**9,039**	**7,678**	**3,747**	**294**	**35**	**37**	**504**	**2,413**	**7,813**	**5,768**	**3,669**	**497**
U061	1. Mouth and oropharynx cancers	1,468	252	1,216	-	-	164	222	513	228	88	2	-	-	-	36	89	37	84	6
U062	2. Oesophagus cancer	709	113	596	-	-	-	80	279	200	32	7	-	-	-	-	38	37	35	2
U063	3. Stomach cancer	3,245	976	2,269	-	-	-	389	758	725	383	14	-	-	-	38	300	368	225	45
U064	4. Colon and rectum cancers	5,404	2,140	3,264	-	-	148	230	1,026	1,121	681	57	-	-	-	36	444	846	723	91
U065	5. Liver cancer	1,535	733	801	-	-	-	40	244	312	191	15	-	-	-	50	277	192	187	27
U066	6. Pancreas cancer	1,804	891	913	-	-	-	40	238	403	214	18	-	-	-	50	147	394	253	47
U067	7. Trachea, bronchus, lung cancers	14,349	3,748	10,601	-	-	-	871	4,755	3,612	1,284	80	-	-	80	415	1,309	1,223	667	53
U068	8. Melanoma and other skin cancers	1,339	394	945	-	-	-	436	373	88	47	2	-	-	-	99	153	66	61	14
U069	9. Breast cancer	5,977	5,956	21	-	-	-	-	-	-	21	-	-	-	-	842	2,865	1,509	630	110
U070	10 Cervix uteri cancer	1,638	1,638	-	-	-	-	-	-	-	-	-	-	-	-	358	844	234	188	14
U071	11 Corpus uteri cancer	880	880	-	-	-	-	-	-	-	-	-	-	-	-	147	306	235	159	33
U072	12 Ovary cancer	1,060	1,060	-	-	-	-	-	-	-	-	-	-	-	-	109	570	226	148	6
U073	13 Prostate cancer	1,146	-	1,146	-	-	-	-	265	410	407	64	-	-	-	-	-	-	-	-
U074	14 Bladder cancer	1,067	396	671	-	-	-	40	106	340	162	23	-	-	-	38	125	106	100	27
U075	15 Lymphomas, multiple myeloma	1,576	802	774	-	-	148	126	234	147	117	2	-	-	273	36	203	186	94	10
U076	16 Leukaemia	2,437	758	1,679	70	348	668	119	248	95	120	11	35	37	151	161	143	108	112	10
U077	Other malignant neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U078	**B. Other neoplasms**	**151**	**65**	**86**	**-**	**-**	**-**	**-**	**58**	**17**	**9**	**3**	**-**	**-**	**-**	**-**	**37**	**18**	**10**	**-**
U079	**C. Diabetes mellitus**	**2,770**	**1,457**	**1,314**	**-**	**-**	**-**	**32**	**431**	**449**	**366**	**36**	**-**	**-**	**107**	**103**	**225**	**401**	**537**	**84**
U080	**D. Endocrine disorders**	**434**	**314**	**120**	**33**	**-**	**-**	**69**	**18**	**-**	**-**	**-**	**-**	**200**	**53**	**-**	**15**	**21**	**22**	**3**
U081	**E. Neuropsychiatric conditions**	**3,173**	**844**	**2,329**	**35**	**62**	**805**	**323**	**665**	**220**	**183**	**34**	**-**	**-**	**204**	**64**	**214**	**127**	**175**	**61**
U082	1. Unipolar depressive disorders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U083	2. Bipolar disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U084	3. Schizophrenia	56	7	49	-	-	-	-	49	-	-	-	-	-	-	-	-	-	7	-
U085	4. Epilepsy	362	75	288	-	-	196	32	37	11	11	1	-	-	54	-	-	9	12	-
U086	5. Alcohol use disorders	560	27	533	-	-	-	127	369	31	4	1	-	-	-	-	22	-	5	-
U087	6. Alzheimer and other dementias*	214	131	83	-	-	-	-	15	37	25	6	-	-	-	-	-	28	74	29
U088	7. Parkinson disease	266	94	172	-	-	-	-	-	52	99	22	-	-	-	-	-	28	40	26
U089	8. Multiple sclerosis	266	209	57	-	-	-	-	39	11	6	-	-	-	-	64	103	28	14	-
U090	9. Drug use disorders	109	53	56	-	-	-	32	24	-	-	-	-	-	53	-	-	-	-	-
U091	10 Post-traumatic stress disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U092	11 Obsessive-compulsive disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U093	12 Panic disorder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U094	13 Insomnia (primary)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U095	14 Migraine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U096	15 Mental retardation, lead-caused	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U097	Other neuropsychiatric disorders	1,340	249	1,091	35	62	609	133	133	77	38	4	-	-	97	-	89	35	24	5
U098	**F. Sense organ diseases**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U099	1. Glaucoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Annex Table 8: YLL by age, sex and cause, Belgrade, 2000

	Disease category	Both	FTOT	MTOT	MALE								FEMALE							
					M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U100	2. Cataracts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U101	3. Vision disorders, age-related	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U102	4. Hearing loss, adult onset	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U103	Other sense organ disorders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U104	**G. Cardiovascular diseases**	**74,299**	**33,968**	**40,330**	**-**	**-**	**321**	**2,873**	**11,491**	**12,902**	**10,701**	**2,043**	**-**	**100**	**150**	**1,045**	**4,762**	**9,576**	**14.161**	**4,174**
U105	1. Rheumatic heart disease	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-
U106	2. Hypertensive heart disease	2,736	1,317	1,419	-	-	-	106	590	418	248	57	-	-	-	83	287	302	506	140
U107	3. Ischaemic heart disease	25,018	8,501	16,517	-	-	148	1,147	5,726	5,422	3,777	297	-	-	-	126	1,346	3,064	3,468	497
U108	4. Cerebrovascular disease	23,054	11,622	11,432	-	-	-	655	2,852	3,965	3,403	555	-	-	-	415	1,942	3,563	4,689	1,013
U109	5. Inflammatory heart diseases	15,919	8,105	7,813	-	-	98	296	1,490	2,482	2,647	801	-	-	-	39	649	1,876	3,767	1,774
U110	Other cardiovascular diseases	7,564	4,414	3,150	-	-	74	669	832	615	626	333	-	100	150	383	537	762	1,732	750
U111	**H. Respiratory diseases**	**3,388**	**1,243**	**2,145**	**-**	**62**	**96**	**106**	**448**	**762**	**583**	**88**	**-**	**-**	**54**	**204**	**243**	**328**	**338**	**77**
U112	1. Chronic obstructive pulmonary dise	1,821	606	1,215	-	-	-	37	235	487	389	67	-	-	-	50	100	197	212	46
U113	2. Asthma	947	480	467	-	62	-	32	97	118	146	13	-	-	54	89	143	95	81	18
U114	Other respiratory diseases	621	158	463	-	-	96	37	117	157	49	7	-	-	-	64	-	35	45	13
U115	**I. Digestive diseases**	**6,094**	**2,091**	**4,003**	**-**	**-**	**172**	**678**	**1,542**	**978**	**561**	**70**	**-**	**-**	**-**	**128**	**605**	**652**	**622**	**84**
U116	1. Peptic ulcer disease	656	249	407	-	-	-	-	76	172	142	17	-	-	-	-	73	70	81	25
U117	2. Cirrhosis of the liver	2,525	505	2,020	-	-	98	291	1,107	395	127	1	-	-	-	64	99	246	93	3
U118	3. Appendicitis	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
U119	Other digestive diseases	2,908	1,332	1,576	-	-	74	387	359	412	292	52	-	-	-	64	433	336	443	56
U120	**J. Genitourinary diseases**	**2,629**	**1,350**	**1,279**	**-**	**-**	**-**	**239**	**411**	**338**	**267**	**24**	**-**	**-**	**54**	**229**	**302**	**341**	**371**	**54**
U121	1. Nephritis and nephrosis	2,610	1,343	1,267	-	-	-	239	411	338	257	23	-	-	54	229	302	341	364	54
U122	2. Benign prostatic hypertrophy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U123	Other genitourinary system disease	19	7	12	-	-	-	-	-	-	11	1	-	-	-	-	-	-	7	-
U124	**K. Skin diseases**	**15**	**12**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**12**	**-**	**-**
U125	**L. Musculoskeletal diseases**	**251**	**179**	**73**	**-**	**-**	**-**	**32**	**15**	**20**	**6**	**-**	**-**	**-**	**-**	**78**	**40**	**54**	**7**	**-**
U126	1. Rheumatoid arthritis	22	7	15	-	-	-	-	15	-	-	-	-	-	-	-	-	-	7	-
U127	2. Osteoarthritis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U128	3. Gout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U129	4. Low back pain*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U130	Other musculoskeletal disorders	230	172	58	-	-	-	32	-	20	6	-	-	-	-	78	40	54	-	-
U131	**M. Congenital anomalies**	**1,154**	**403**	**751**	**664**	**50**	**-**	**37**	**-**	**-**	**-**	**-**	**332**	**-**	**-**	**71**	**-**	**-**	**-**	**-**
U132	1. Abdominal wall defect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U133	2. Anencephaly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U134	3. Anorectal atresia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U135	4. Cleft lip	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U136	5. Cleft palate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U137	6. Oesophageal atresia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U138	7. Renal agenesis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U139	8. Down syndrome	66	33	33	33	-	-	-	-	-	-	-	33	-	-	-	-	-	-	-
U140	9. Congenital heart anomalies	647	231	416	366	50	-	-	-	-	-	-	199	-	-	32	-	-	-	-
U141	10 Spina bifida	33	-	33	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U142	Other Congenital anomalies	407	139	269	232	-	-	37	-	-	-	-	100	-	-	39	-	-	-	-
U143	**N. Oral conditions**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
U144	1. Dental caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U145	2. Periodontal disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U146	3. Edentulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U147	Other oral diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U148	**Injuries**	**13,198**	**3,614**	**9,584**	**209**	**224**	**3,426**	**2,288**	**1,966**	**911**	**498**	**62**	**71**	**299**	**814**	**800**	**704**	**508**	**317**	**100**
U149	**A. Unintentional injuries**	**5,386**	**1,408**	**3,979**	**209**	**140**	**1,378**	**796**	**724**	**521**	**190**	**21**	**71**	**187**	**345**	**172**	**257**	**112**	**178**	**87**

Annex Table 8: YLL by age, sex and cause, Belgrade, 2000

					MALE								FEMALE							
Disease category		Both	FTOT	MTOT	M0 - 4	M5 - 14	M15 - 29	M30 - 44	M45 - 59	M60 - 69	M70 - 79	M80+	F0 - 4	F5 - 14	F15 - 29	F30 - 44	F45 - 59	F60 - 69	F70 - 79	F80+
U150	1. Road traffic accidents	2,681	691	1,990	44	47	784	496	358	189	73	-	35	93	271	92	156	24	19	-
U151	2. Poisonings	173	66	107	44	-	48	-	-	15	-	-	-	56	-	-	-	-	10	-
U152	3. Falls	705	320	385	-	-	136	27	44	89	69	21	-	-	37	-	51	39	130	64
U153	4. Fires	260	88	172	-	-	-	100	48	15	9	-	35	-	-	-	19	24	10	-
U154	5. Drownings	474	100	373	44	47	234	27	-	22	-	-	-	37	-	53	-	-	10	-
U155	6. Other unintentional injuries	1,093	142	951	77	47	176	148	274	190	40	-	-	-	37	27	32	24	-	23
U156	**B. Intentional injuries**	**7,811**	**2,206**	**5,605**	**-**	**84**	**2,048**	**1,492**	**1,242**	**390**	**308**	**42**	**-**	**112**	**469**	**628**	**448**	**396**	**139**	**13**
U157	1. Self-inflicted injuries	5,616	1,782	3,835	-	47	1,086	1,059	960	352	297	34	-	75	351	474	333	396	139	13
U158	2. Violence	2,158	424	1,734	-	-	962	433	282	39	11	8	-	37	118	154	115	-	-	-
U159	3. War	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U160	Other intentional injuries	37	-	37	-	37	-	-	-	-	-	-								
Belgrade population ('000)		1,585.14	832.03	753.11	37.10	86.52	165.09	155.93	161.76	89.01	49.10	8.60	37.10	86.52	165.09	155.93	161.76	89.01	49.10	8.60
YLL per 1 000		101.85	83.67	121.94	93.53	8.62	37.02	62.14	165.30	280.21	353.89	321.09	63.13	7.79	12.38	34.61	94.46	202.55	419.39	611.48
YLL 1 000 stand Serbia		103.67	86.92	122.63	93.53	8.55	36.94	62.30	165.36	281.02	354.04	321.44	60.48	7.33	11.17	30.05	81.63	191.70	400.00	577.31

Annex Table 9. Total Years of Life with Disability (YLD), Disability Adjusted Life Years (DALY) and YLD/DALY (%) for Serbia without Kosovo and Metohia, 2000

Disease	Male			Female			Persons		
	YLD	DALY	YLD/DALY	YLD	DALY	YLD/DALY	YLD	DALY	YLD/DALY
Tuberculosis	239	2 431	10%	149	805	18%	388	3 236	12%
HIV/AIDS	587	1 227	48%	230	514	45%	817	1 740	45%
Low birth weight	1 637	2 519	65%	1 645	2 240	73%	3 282	4 759	69%
Birth asphyxia and birth trauma	290	8 077	4%	320	5 443	6%	610	13 520	5%
Stomach cancer	386	10 802	4%	198	5 685	3%	584	16 487	3%
Colon and rectum cancers	983	15 525	6%	802	10 482	8%	1 785	26 007	7%
Trachea, bronchus and lung cancers	2 136	46 543	5%	518	12 545	4%	2 654	59 088	5%
Breast cancer	56	327	17%	2 078	23 541	9%	2 134	23 868	9%
Cervix uteri cancer	-	-	-	529	8 230	7%	529	8230	7 %
Diabetes mellitus	7 700	17 137	45%	8 915	20 199	44%	16 615	37 336	44%
Unipolar depressive disorders	19 073	19 073	100%	33 828	33 828	100%	52 901	52 901	100%
Sense organ disorders (Vision and Hearing Loss)	1 054	1 054	100%	1 182	1 182	100%	2 236	2 236	100%
Ischaemic heart disease	8 833	96 023	9%	5 902	54 866	11%	14 735	150 886	10%
Cerebrovascular disease (Stroke)	8 316	65 795	13%	5 604	70 295	8%	13 920	136 090	10%
Asthma	4 257	7 317	58%	3 835	5 672	52%	8 093	12 988	62%
Nephritis and nephrosis	931	7 417	12%	449	6 798	7%	1 380	14 215	10%
Road-traffic accidents	10 698	24 038	44%	2 537	6 430	39%	13 235	30 468	43%
Self-inflicted injuries	791	20 308	4%	312	7 630	4%	1 103	27 938	4%

Annex Table 10. Total Years of Life with Disabilities (YLD), Disability Adjusted Life Years (DALY) and YLD/DALY (%) for Belgrade

Disease	Male			Female			Persons		
	YLD	DALY	YLD/DALY	YLD	DALY	YLD/DALY	YLD	DALY	YLD/DALY
Tuberculosis	49	467	10%	32	193	17%	81	660	12%
HIV/AIDS	403	778	52%	139	306	45%	542	1 084	50%
Low birth weight	1 637	1 925	85%	1 645	1 720	96%	3 282	3 645	90%
Birth asphyxia and birth trauma	310	1 754	18%	320	1 672	19%	630	3 426	18%
Stomach cancer	77	2 436	3%	48	1 024	5%	125	3 460	4%
Colon and rectum cancers	200	3 464	6%	170	2 310	7%	370	5 774	6%
Trachea, bronchus and lung cancers	682	11 283	6%	205	3 953	5%	887	15 236	6%
Breast cancer	5.4	26.4	20%	549	6 505	8%	554	6 531	8%
Cervix uteri cancer	-	-	-	165	1 803	9%	165	1 803	9%
Diabetes mellitus	1 561	2 874	54%	1 829	3 286	56%	3 390	6 160	55%
Unipolar depressive disorders	3 949	3 949	100%	7 486	7 486	100%	11 436	11 436	100%
Sense organ disorders (Vision and hearing loss)	216	216	100%	254	254	100%	470	470	100%
Ischaemic heart disease	1 806	18 323	10%	1 238	9 739	13%	3 044	28 062	11%
Cerebrovascular disease (Stroke)	1 721	13 153	13%	1 205	12 827	9%	2 926	25 980	11%
Asthma	873	1 340	65%	835	1 315	63%	1 708	2 655	64%
Nephritis and nephrosis	194	1 461	13%	100	1 443	7%	294	2 904	10%
Road-traffic accidents	2 212	4 201	53%	559	1 250	45%	2 771	5 452	51%
Self-inflicted injuries	164	3 998	4%	69	1 850	4%	232	5 848	4%

Annex Table 11. Disability Adjusted Life Years (DALYs rates per 1 000 population*) by age, sex and selected cause, Serbia (without Kosovo and Metohia), 2000

Selected cause	Males	Females
Tuberculosis	0.36	0.12
HIV/AIDS	0.14	0.15
Low birth weight	1.20	1.12
Birth asphyxia and birth trauma	3.86	2.75
Stomach cancer	2.13	0.92
Colon and rectum cancers	2.99	1.66
Lung cancer	8.82	7.68
Breast cancer	0.06	4.27
Cervix uteri cancer	-	1.65
Diabetes mellitus	3.23	3.02
Unipolar depressive disorders	5.32	9.17
Hearing and vision loss	0.31	0.22
Ischaemic heart disease	18.11	17.91
Cerebrovascular disease - stroke	12.39	10.31
Asthma	2.06	1.53
Nephritis and nephrosis	1.53	1.14
Road traffic accidents	6.74	1.83
Self– inflicted injuries	5.03	1.69

* Standardized according to WHO World population.

Annex Table 12. Disability Adjusted Life Years (DALYs per 1 000 population*) by age, sex and selected cause, Belgrade, 2000

Selected cause	**Males**	**Females**
Tuberculosis	0.68	0.26
HIV/AIDS	0.86	0.34.
Low birth weight	2.45	2.34
Birth asphyxia and birth trauma	2.23	2.27
Stomach cancer	3.24	1.17
Colon and rectum cancers	4.86	2.65
Lung cancer	17.74	4.54
Breast cancer	0.04	5.53
Cervix uteri cancer	-	2.05
Diabetes mellitus	4.14	3.77
Unipolar depressive disorders	5.09	8.87
Hearing and vision loss	2.93	0.30
Ischaemic heart disease	25.79	11.23
Cerebrovascular disease - stroke	18.93	14.69
Asthma	1.29	1.54
Nephritis and nephrosis	2.01	1.66
Road traffic accidents	5.40	1.51
Self– inflicted injuries	5.25	2.14

* Standardized according to Serbia 2000 population.

Annex Table 13. Disability Adjusted Life Years (DALYs per 1 000 population*) by sex and selected risk factors, Serbia (without Kosovo and Metohia), 2000

Selected risk factors	**Males**	**Females**
Smoking	35.22	12.45
Alcohol benefit	4.56	7.51
Alcohol harm	5.73	1.49
Physical inactivity	19.45	16.31
Fruit & vegetable	3.27	1.61
Hypertension	21.68	17.52
Obesity	14.99	12.19
Cholesterol	3.04	1.69

* Standardized according to WHO World population.

Annex Table 14. Disability Adjusted Life Years (DALYs per 1 000 population*) by sex and selected risk factors, Belgrade, 2000

Selected risk factors	Males	Females
Smoking	40.04	13.15
Alcohol benefit	5.68	8.46
Alcohol harm	1.08	0.36
Physical inactivity	21.13	17.52
Fruit & vegetable	3.46	1.68
Hypertension	24.69	19.40
Obesity	14.09	11.83
Cholesterol	3.19	1.02

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