Chapter 1

Introduction

This thesis deals with regional differentiation of mortality and tries to contribute to the understanding of socioeconomic and ethnic inequalities in relation to mortality. This chapter covers the theoretical background of the thesis, describes the aims and the theoretical model used for the study and presents the research questions and the structure of this thesis.

1.1 Mortality of the population

Mortality is one of the basic demographic processes that directly affect natural changes in the population. It is an unavoidable and inevitable phenomenon with important implications for the formation and progress of society. The level and structure of mortality at the same time play a key role in assessing the health of a population; mortality is an indicator of the quality and accessibility of health care (Šprocha, 2008).

Mortality of a particular population is the result of the interaction between many conditions and factors of a biogenetic, physical and psychosocial character, some of which affect mortality directly (e.g. age, sex, genetic changes, smoking, food, radiation), and others indirectly (socioeconomic factors, particularly – for example living standard, employment, education) (Sobotík and Rychtaříková, 1992). Factors contributing to mortality may also be divided into endogenous and exogenous. Endogenous factors are those based on genetic characteristics, while exogenous factors are those mainly related to the impact of environment, the behaviour of the individual, lifestyle and socio-cultural influences. Endogenous factors are in principle not affected; they influence spontaneously and are not responsible for significant changes. Changes in the intensity of mortality are usually caused by exogenous factors. They can be influenced relatively easily, and thus it is possible to directly influence the final outcome of death (Caselli et al., 2006). These factors all have different intensities in different societies and regions. Thus, people are exposed to a spatial differentiation of the determinants of mortality (Jurčová et al., 2004).

The basic characteristic of mortality is the crude death rate, which highlights the differences in the frequency of deaths across regions. The number of deaths in each region strongly correlates with the age structure of the population, mainly to the number of older people in a region. Regions with a high proportion of older people have the highest crude death rates. Taking the effect of age into account, age-standardised death rates show geographic differences in the risk of dying. Regions with the highest age-standardised death rates are often the most economically disadvantaged regions. (Health statistics – Atlas on mortality in the European Union, 2009)

Mortality is significantly differentiated by age, gender and by causes of death,
though it is mainly a function of age. The intensity of mortality differs by age, as the probability of death is greater for older people than for younger people, and a high probability of death is also present in infants under the age of one year (Vaňo et al., 2003). Age-specific mortality is calculated differently by gender due to differences between male and female mortality rates. Male mortality is higher in all age groups, most notably in those aged 20–34 years. The infant mortality indicator plays an important role in terms of life expectancy. Infant mortality is universally considered a useful indicator of the general level of health, environmental and socioeconomic development and the development and quality of governance (Health statistics – Atlas on mortality in the European Union, 2009; Fantini et al., 2006; Zatonski et al., 2006; Reidpath and Allotey, 2003; Murray et al., 2000). Infant mortality tends to be higher in countries with greater social and health-related inequalities and tends to rise in countries that suffer substantial socioeconomic, cultural and political disruption (Zatonski et al., 2006).

An important aspect of analyses of mortality are causes of death. Statistics use the underlying cause of death, e.g. what is the disease or other incident that began a series of pathological events that led directly to death (Vaňo et al., 2003). Over 90% of all deaths in the Europe Union occur in five of the 20 chapters of the 10th revision of International Classification of Diseases (ICD-10): Chapter II – Neoplasms, Chapter IX – Diseases of the circulatory system, Chapter X – Diseases of the respiratory system, Chapter XI – Diseases of the digestive system and Chapter XX – External causes of morbidity and mortality. A phenomenon with increasing importance is alcohol-related mortality. The negative impact of alcohol on human health is indisputable; alcohol is a major determinant of premature death. It has been estimated that alcohol contributes more than 3% to global mortality (Mohapatra et al., 2010; Herttua et al., 2007; Rehm et al., 2007; Blomgren et al., 2004). Alcohol-related causes of death are but a crude proxy of true alcohol-related mortality. The codes used aggregate the mortality caused by cancers of the mouth, throat and oesophagus, chronic liver disease and alcohol abuse (Health statistics – Atlas on mortality in the European Union, 2009). Alcohol is also an important risk factor for road traffic injuries, suicide and other violent causes of death, and alcohol abuse has been correlated with circulatory disease mortality. Furthermore, methodological differences in coding alcohol-related causes of mortality should lead to even more caution in interpreting the differences between regions (Health statistics – Atlas on mortality in the European Union, 2009).

1.2 Overall mortality trends in European countries

The intensity of mortality in European countries is low when compared with global mortality. Nevertheless, large differences are visible between European countries (Chromeček, 2009; Health statistics – Atlas on mortality in the European Union, 2009). Mortality has declined strongly in all European countries over the last century. All of these countries have experienced similar patterns of change. In the first half of the 20th century the decline in mortality was caused by a sharp decline in infectious diseases, which led to a considerable downturn in mortality at younger ages. Consequently, at the same time, cancer and cardiovascular disease were on the rise, and in the second half of the 20th century these diseases became the prominent causes of death (Health statistics – Atlas on mortality in the European Union, 2009). Despite these similar trends across all European countries, there are still considerable
differences in the level of mortality within Europe. In the old EU-15 Member States, average life expectancy stagnated between 1950 and 1970, particularly among men, but it then went up again for both genders, though more so in men. Since the 1970s, these sharp mortality declines have not occurred in the former socialist economies, giving rise to increasing mortality gaps with the market economies (Health statistics – Atlas on mortality in the European Union, 2009). At the end of the 1980s, during the rapid transition from socialist economies to market economies, there was a sharp increase in mortality, thus decreasing life expectancy even more. As a result, the level of mortality in Central and Eastern European Member States was significantly higher than in the EU-15 countries. After this period of turmoil, mortality trends in the new Member States took a turn for the better (Health statistics – Atlas on mortality in the European Union, 2009). Nevertheless, there are still considerable differences in the level of mortality between the new Member States and the EU-15 countries. Moreover, considerable differences still exist even within the group of EU-15 countries and among regions in the same country. As mentioned above, these differences can be explained by various lifestyle factors and differences in the effectiveness of or access to healthcare (Health statistics – Atlas on mortality in the European Union, 2009).

One characteristic of mortality in Europe is the marked difference between genders. Although there is a tendency at present for this gap to narrow in certain Member States, the difference nevertheless warrants separate treatment of female and male mortality. Differences in mortality between the genders are found for most of the causes of death, and the patterns of mortality according to gender and age vary from one Member State to another. Women seem more resilient to cancer and cardiovascular disease and to risk taking behaviour; they have smoked less than men (although this has converged in the EU-15), suffer less from alcohol related mortality, have fewer fatal transport accidents and commit suicide far less frequently (Health statistics – Atlas on mortality in the European Union, 2009).

Infant mortality may vary between countries based on the way they define a live birth. The World Health Organization (WHO) defines a live birth as any born human being who breathes or shows any other evidence of life – e.g. beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles (Health Status Statistics: Mortality, 2012). All EU Member States adopted the WHO definition in the late 1980s or early 1990s. The adoption of the WHO recommendations for defining live and stillbirths has caused abrupt increases in registered infant mortality in many countries. Since that adoption, the comparability of infant mortality rates between EU Member States has likely been improved. The average infant mortality rate now stands at around 5 deaths per 1,000 life births, with the lowest values in south-west and northern European countries and highest values in the countries of Central and Eastern Europe (Health statistics – Atlas on mortality in the European Union, 2009).

Analyses of alcohol-related mortality (Health statistics – Atlas on mortality in the European Union, 2009) have indicated a quite large mortality gradient in Europe between high- and low-mortality countries. Among women alcohol-related mortality is four times lower than among men. Countries with a high burden of alcohol-related premature mortality compared with the EU-27 are Hungary (3.8 times the EU-27 average), Romania (2.2 times the EU-27 average), Estonia (1.9 times the EU-27 average), Slovenia (1.7 times the EU-27 average) and the Slovak Republic (1.6 times the EU-27 average). Countries with a low burden of alcohol related premature mortality
compared with the EU-27 are Sweden (0.4 times the EU-27 average), Norway (0.4 times the EU-27 average), Malta (0.3 times the EU-27 average), Greece (0.2 times the EU-27 average) and Iceland (0.1 times the EU-27 average) (Health statistics – Atlas on mortality in the European Union, 2009). In other words, the burden of alcohol related premature mortality is 40 times greater in Hungary than in Iceland (a non-EU country). Such large differentials in the burden of mortality show an important potential for prevention. It is obvious that strict alcohol policies and guidance preventing alcohol abuse are a major public health priority.

1.3 Mortality trends in the Slovak Republic

The Slovak Republic is one of the countries (together with the other countries of the former Eastern bloc) with the highest mortality rates in the Europe Union (Health statistics – Atlas on mortality in the European Union, 2009). The current level of mortality in the Slovak Republic is marked by adverse development in the second half of the 20th century, especially in the male population. In the early 1990s a positive trend in mortality started which persists to the present. This is also reflected in the regions of the Slovak Republic, although regional differences in mortality remain significant and are demonstrated mainly by urbanisation. Generally speaking, lower mortality can be found in cities rather than in rural areas, and lower mortality levels can be found in the western and northern parts of Slovakia compared with the southern and eastern part (Šprocha, 2008; Jurčová, 2006).

The positive trend in overall mortality in the Slovak Republic is also reflected in the development of mortality by age. Over the last 15 years the level of infant mortality has decreased, as has mortality in all age groups below 85 years of age in both genders (Šprocha, 2008; Jurčová et al., 2004). The intensity of infant mortality is decreasing faster in urban areas, which is also evident in the development of regional infant mortality, with significant differences between districts in the western part of the Slovak Republic having a higher percentage of urban population and the eastern part (Šprocha, 2008). For all age groups a typical excess male mortality exists, mainly in middle age (15-49 years) and more significantly in rural areas (Šprocha, 2008; Jurčová et al., 2004).

In terms of mortality by causes of death, the percentage of the distribution of deaths did not change in both genders during the last 15 years. Among males the highest proportion of deaths is by diseases of the circulatory system (46% in the year 2011), neoplasms (26%) and external causes of mortality (8%). Among females the highest proportion of deaths is caused by the two big groups of diseases – diseases of the circulatory system (60% in 2011) and by neoplasms (20%). Alcohol is an important factor of the external causes of mortality. Mortality by causes of death directly or indirectly caused by alcohol increased in most districts of the Slovak Republic in both genders, mainly in the central and eastern parts of country (Mészáros, 2008).

A forecast of mortality in the Slovak Republic (Bleha and Vaňo, 2007) assumed a further decrease in mortality ratios at the national and district levels, of course, taking into account the fact that regional differences in mortality are significant. This basic trend applies for all districts of the Slovak Republic, for all age groups and for both genders. Differences are present in the intensity of the decrease in mortality. At the district level, a reduction of disparities in mortality and a greater decline in mortality in districts with less favourable levels of mortality is expected. A reduction
of disparities in mortality by age and gender is also expected. In some districts, the
greatest reduction in mortality is expected at older ages for both genders and in
middle-aged men. As a result of those assumptions, the forecasted pattern will slightly
reduce the current significant difference in mortality between men and women.

1.4 Socioeconomic determinants of health

The World Health Organisation defines ‘health’ as “a state of complete physical,
mental and social wellbeing and not merely the absence of disease, injury or
infirmity” (World Health Organisation, 1948). Social determinants of health are the
conditions in which people are born, grow, live, work and age, including the health
system. These circumstances are shaped by the distribution of money, power and
resources at the global, national and local levels. The social determinants of health
are mostly responsible for health inequities – the unfair and avoidable differences
in health status seen within and between countries (Social determinants of health,
2012).

Social and economic factors are extremely powerful predictors of death and ill
health across the wide range of diseases and injuries that exist across society (Ansari
et al., 2003). It is a well-established fact that people with worse living conditions have
worse health and that their life span is shorter in comparison with those better well-
off (Marmot et al., 2010). The Commission on Social Determinants of Health (2007)
set up by the World Health Organisation concluded that social inequalities in health
arise because of inequalities in the conditions of daily life – the conditions in which
people are born, grow, live, work and age – and the fundamental drivers that give rise
to them: inequalities in power, money and resources.

Figure 1.1 – Social model of health

Source: Dahlgren and Whitehead, 1991
A number of theoretical models have been developed to explain the relationship between social determinants and health. Dahlgren and Whitehead (1991) discuss in their social model the layers of influence on health and describe a social ecological theory to health (Figure 1.1). They attempt to map the relationship between individuals, their environment and disease. Individuals are at the centre with a set of fixed genes. Surrounding them are influences on health that can be modified. The first layer is personal behaviour and ways of living that can promote or endanger health. Individuals are affected by friendship patterns and the norms of their community. The next layer consists of social and community influences which may provide mutual support for members of the community in unfavourable conditions, although they can also provide no support or have a negative effect. The third layer includes structural factors, such as housing, working conditions, access to services and provision of essential facilities (Dahlgren and Whitehead, 1991).

The WHO Department of Equity, Poverty and Social Determinants of Health defines health equity as ‘the absence of unfair and avoidable or remediable differences in health among population groups defined socially, economically, demographically or geographically’. In essence, health inequities are health differences, and they are socially produced; furthermore, they are systematic in their distribution across the population; and finally, they are unfair (Commission on Social Determinants of Health, 2007).

The framework developed by the Commission on Social Determinants of Health (Figure 1.2) shows how social, economic and political mechanisms give rise to a set of socioeconomic positions, whereby populations are stratified according to income, education, occupation, gender, race/ethnicity and other factors. These socioeconomic positions in turn shape the specific determinants of health status (intermediary determinants) reflective of a person’s place within social hierarchies. Individuals experience differences in exposure and vulnerability to health-compromising conditions (Commission on Social Determinants of Health, 2007).

Figure 1.2 – Model of the pathways and mechanisms of social determinants of health inequities

Source: Commission on Social Determinants of Health, 2007
1.5 Socioeconomic inequalities in mortality

Inequalities in health between socioeconomic groups are one of the main challenges for public health worldwide and have been an object of study in recent decades (Mackenbach et al., 2008; Marmot, 2005). A number of studies indicate significant distinctions between different social groups in terms of health, morbidity and mortality (Gallo et al., 2012; Suzuki et al., 2012; Mackenbach et al., 2008; Zatonski et al., 2008; Ginter and Hulanska, 2007; Starfield, 2007; Mackenbach, 2006; Carr-Hill and Chalmers-Dixon, 2005; Dominguez-Berjón et al., 2005; Marmot, 2005; Fukuda et al., 2004; García-Gil et al., 2004; Graham, 2004; Kopp et al., 2004; Mackenbach et al., 2003). Rates of mortality are consistently higher among those with a lower socioeconomic position than among those with a higher socioeconomic position. In all European countries, people with a lower level of education, a lower occupational class or a lower level of income tend to die at a younger age and to have a higher prevalence of most types of health problems (Mackenbach, 2006).

An individual’s position in the social hierarchy is mainly determined by education, income and occupation. Although these three dimensions of socioeconomic status are strongly related to one another, each has its own specific influence on health and mortality. All of these selected socioeconomic indicators feature among the basic social determinants of health (Graham, 2004).

Level of education is one of the most important socioeconomic indicators that is significantly (directly or indirectly) reflected in health, morbidity and mortality of the population (Sobotík and Rychtaříková, 1992). Information about education is available for everyone, and educational attainment remains relatively stable over time. Also, a cohort effect may occur as the socioeconomic status of a certain educational attainment group probably changes over time (Bossuyt et al., 2004). Many studies confirm the well-known finding that people with high education (including both sexes) have lower mortality compared with the least educated (Gallo et al., 2012; Borrell et al., 2007; Rognerud and Zahl, 2005; Bossuyt et al., 2004; Bopp and Minder, 2003; Osler and Prescott, 2003; Muller, 2002; Kunst and Mackenbach, 1994; Sobotík and Rychtaříková, 1992). Furthermore, ecological studies have shown that the educational level of an area strongly correlates with local mortality rates (Gallo et al., 2012; Kravadal, 2009; Shkolnikov et al., 2006; Von dem Knesebeck et al., 2006; Rognerud and Zahl, 2005; Bopp and Minder, 2003; Deaton and Lubotsky, 2003; Osler and Prescott, 2003; Muller, 2002).

The level of education correlates with the level of income, which is the basis for measuring socioeconomic position. Income is one of the main determinants influencing not only survival but also death (Sen, 1998). Several studies have reported a positive correlation between income inequality and mortality (Dowd et al., 2011; Jusot, 2006; Gerdtham and Johannesson, 2005; Materia et al., 2005; Rognerud and Zahl, 2005; Deaton and Paxson, 2004; Lopez, 2004; Deaton and Lubotsky, 2003; Muller, 2002). Mortality rates are higher in populations experiencing highly unequal income distributions (high income inequality) compared with populations having a relatively more equal income distribution (low income inequality), regardless of sex. Regional mortality is significantly higher in regions with larger income inequalities (Elstad, 2011; Backlund et al., 2007; Henriksson et al., 2006). Additionally, the direct effects of income inequality are evident for those aged 25-64 and much stronger for males (Backlund et al., 2007).

An important measure of social position as well as an indication of a person's
income may be that person’s employment status. Unemployment typically involves income loss for the individual. It has furthermore been argued that unemployment may be a health hazard, and many studies have shown that unemployed people have poorer health and higher mortality than employed people. It is generally recognised that unemployed persons have a lower quality of life, probably worse health, a shorter life and a higher risk of premature death than those who are employed, particularly among males (Roelfs et al., 2011; Tobiasz-Adamczyk, 2007; Leclerc et al., 2006; Brenner, 2005; Carr-Hill and Chalmers-Dixon, 2005; Domínguez-Berjón et al., 2005; Gerdtham and Johannesson, 2005; Artazcoz et al., 2004; Fukuda et al., 2004; García-Gil et al., 2004; Gerdtham and Johannesson, 2003; Skrabski et al., 2003; Šmajsova Buchtová, 2002; Waters and Moore, 2002).

Socioeconomic inequalities in mortality are evident in both total mortality rates as well as in age- or cause-related mortality. Infant mortality is associated with a number of socioeconomic indicators, such as family income (Olson et al., 2010; Domínguez-Berjón, 2005; Mayer and Sarin, 2005; Macinko et al., 2004; Finch, 2003; Kawachi et al., 1997), unemployment (Tita ley et al., 2008), mother’s or father’s social class (Gissler et al., 2003), mother’s education (Dostal et al., 2010; Singh and Kogan, 2007; Bobak et al., 2005) and ethnic groups (Pamuk et al., 1998). Moreover, it is known that infant mortality tends to be higher in countries with greater social and health-related inequalities and tends to rise in countries having suffered from substantial socioeconomic, cultural and political disruption (Zatonski et al., 2006).

Alcohol is a health determinant; it is responsible for more than 7% of all disability and premature deaths in the European Union (Anderson and Baum berg, 2006). For the past two decades, studies have consistently shown inequalities and the relations between socioeconomic factors and alcohol-related mortality (Anderson et al., 2012; Shield et al., 2012; Schmidt et al., 2010; Mäki and Martikainen, 2009; Zatonski et al., 2008; Mackenbach et al., 2007; Rehm et al., 2007; Mackenbach, 2006; Blomgren et al., 2004; Schnohr et al., 2004; Benach et al., 2003; Hemstrom, 2002; Makela, 1999; Kunst, 1997). Alcohol-related morbidity or alcohol-induced premature retirement may decrease a person’s socioeconomic status before death from an alcohol-related cause. Evidence suggests that groups with low socioeconomic status experience a higher burden of alcohol-attributable disease, often despite lower overall consumption levels. Health outcomes and socioeconomic consequences are determined not only by the amount of alcohol consumed, but also by the pattern of consumption and the quality of the alcohol consumed (Schmidt et al., 2010). Many of the existing studies (Mohapatra et al., 2010; Kovács, 2008; Herttau et al., 2007; Men vielle et al., 2007; Van Oyen et al., 2007; Huisman et al., 2005; Schnohr et al., 2004; Hemstrom, 2002) are only partial in the sense of considering the impact of one factor or one dimension of inequality (mainly education level, income, social position, social class or occupation) on alcohol-related mortality, and not considering the interrelated impact of several dimensions of variation.

1.6 Ethnicity

According to various estimates, the number of Roma living in Europe ranges from between 5 and 10 million, with most of the Roma population and their highest proportion in the new member states of Central and Eastern Europe – in particular, Romania, Bulgaria, Hungary and Slovakia (Kosa et al., 2007; Vaño and Haviarová,
The most realistic estimate of the number of Roma living in the Slovak Republic is that of the Demographic Research Centre, which indicates that about 380,000 Roma are living in the Slovak Republic (7% of the total population), about two-thirds of whom are of productive age (Vaňo, 2002). Officially only 105,738 inhabitants declared themselves as ethnic Roma in the 2011 Population and Housing Census (2.0% of the total population of the Slovak Republic) (Population and Housing Census 2011, 2012).

Several studies have shown that regardless of the region they live in, Roma have poorer health, lower life expectancy and higher rates of illness compared with the national average or with the majority population (Kolarcik, 2012; Kosa et al., 2007; Filadelfiova et al., 2006; Vaňo and Haviarová, 2003; Ginter et al., 2001; Koupilova et al., 2001; Hajioff and Mcke, 2000). Results from these studies also indicate higher birth and fertility rates among the adult Roma population, but also higher death rates, an earlier start to reproductive activity and a longer reproduction period. The health of the adult Roma population in the Slovak Republic is assessed as being worse compared with that of the majority, which might be due to their poor socioeconomic situation (low educational level, high unemployment rate, high proportion of poverty) and the related unsuitable living conditions and infrastructure in their places of abode, especially in the so-called settlements (EU-MIDIS 2009; Filadelfiova et al., 2006; Šaško, 2003; Vasecka and Dzambazovic, 2000).

1.7 Aims of the study and research questions

The general aim of this thesis was to explore the relationship between the regional distribution of mortality and selected socioeconomic indicators (educational level, unemployment, income and material need) and ethnicity (Roma population). Regarding regional mortality, specific types of mortality by age, causes (alcohol) and area level were explored. The relationships examined within this thesis are shown in Figure 1.3.

Based on the previous literature overview, five main research questions were formulated:

**Research question 1:**
Are socioeconomic indicators and ethnicity of the population associated with the geographic distribution of mortality of the population aged 20-64 years by gender in the districts of the Slovak Republic? (Chapter 3)

**Research question 2:**
Are socioeconomic indicators associated with regional differences in mortality in the population aged 20-64 years by gender in the districts of the Slovak Republic and did the strength and trend of this relationship change during a 10-year period? (Chapter 4)

**Research question 3:**
Are area and individual socioeconomic indicators and ethnicity associated with urban mortality in individuals aged 20-64 years in the two biggest cities of the Slovak Republic? (Chapter 5)
Research question 4:
Are socioeconomic indicators and the ethnicity of the population associated with the geographic distribution of perinatal and infant mortality in the districts of the Slovak Republic? (Chapter 6)

Research question 5:
Are socioeconomic indicators and the ethnicity of the population associated with the geographic distribution of alcohol-related mortality in those aged 20-64 years by gender in the districts of the Slovak Republic? (Chapter 7)

1.8 Structure of the thesis
This thesis is divided into eight chapters.

Chapter 1 provides a general introduction to the mortality of the population and its main trends in Europe and in the Slovak Republic and to socioeconomic inequalities in mortality. At the end of the chapter, the aims of the study and the research questions are presented.

Chapter 2 presents the data collections and the several research samples used in this thesis. Further, it gives a brief description of the measures and statistical analyses used.

Chapter 3 explores the geographical distribution of mortality of the population aged 20-64 years in the districts of the Slovak Republic and assesses the associations between socioeconomic indicators (education, unemployment, income) and ethnicity and mortality during this period.

Chapter 4 explores the associations between socioeconomic indicators (unemployment, income, recipients of material need benefits) and mortality in those aged 20-64 years in the districts of the Slovak Republic and assesses changes over a 10-year period.

Chapter 5 assesses the mortality of the population aged 20-64 years of the urban population and explores the associations between area indicators – their socioeconomic indicators (education, unemployment, income) and ethnicity – and the mortality of individuals.

Chapter 6 explores the geographical distribution of perinatal and infant mortality in the districts of the Slovak Republic and assesses the associations between socioeconomic indicators (education, unemployment, income) and ethnicity and mortality during this period.

Chapter 7 explores the geographical distribution of alcohol-related mortality of the population aged 20-64 years in the districts of the Slovak Republic and assesses the associations between socioeconomic indicators (education, unemployment, income) and ethnicity and mortality due to this diagnosis and during this period.

Chapter 8 presents and discusses the main findings of this thesis as well as its strengths, limitations as well as its possible implications for practice and future research.
Regional mortality in Slovakia: socioeconomic indicators and ethnicity

Figure 1.3 – Model of the relationships examined in the thesis

- Neighbourhood level
  - Mortality aged 20-64 years
  - Roma population

- Socioeconomic indicators
  - Education
  - Unemployment Rate
  - Income
  - Material need

- Ethnicity
  - Roma population

- District level
  - Infant mortality
  - Mortality aged 20-64 years
  - Alcohol-related mortality aged 20-64 years
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