SURVEILLANCE

Health status of the Slovakia population at its entry to the European Union

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Abstract

The health status of the Slovak Republic (SR) population on the eve of its entry to the European Union (EU) was generally worse than the EU average. Life expectancy at birth was in SR for males 70 years, in EU 75.5 years and for females 78 in SR and 82 in EU. Premature mortality for the age interval 0 – 64 years (standardized death rates – SDR per 100 000) was mostly higher in SR; male mortality being almost twice as high as in EU. The reason was a significantly higher mortality caused by cardiovasc ular diseases, malignant neoplasms and mortality from external causes. Also mortality caused by diseases of respiratory and digestive system, by cirrhosis and diabetes is higher in SR both in male and female populations. However, there were some positive aspects in SR. Mortality caused by infectious and parasitic diseases was lower in SR for both males and females. The prevalence of HIV/AIDS in EU was five times higher than in SR. SR has one of the lowest concentrations of newly registered AIDS cas es in all Europe. Immunization coverage in SR is higher than in many EU countries. The health status of children population in SR is not significantly worse than in EU. However, the global health status image seems worse due to values of the Gypsy minority. Trends of premature mortality are favourable in SR. Mortality from cardiovascular diseases, external causes of injury and poison and from diseases of respiratory system is falling. Infant mortality is falling while the average life expectancy of both men and women is rising. However, with health care improving constantly in EU countries in all these areas, it will not be easy for SR to catch up with EU. We estimate that this process might possibly take up to 20 years. *(Tab. 5, Fig. 11, Ref. 26.)*

Key words: life expectancy, premature mortality, cardiovascular and cancer diseases, Slovak Republic, European Union.

Over the last decade, Slovak Republic (SR) completed the process of accession to European Union (EU) and joined the EU on 1 May 2004. The aim of this survey is to give a clear overview of the health status of the population of SR immediately before the entry. The survey is based on newest information taken from both home and foreign sources (1 – 5). The data for EU before the entry of the new countries are marked EU_{15}, after the the entry as EU_{25}. Area of SR is approximately 50 000 km^2 with 5 400 000 population, equal to Denmark. SR population is 80 % of Slovak and Czech nationality, 10 % Hungarians and approx. 10 % Gypsies, Ukrainians, Germans and Poles. Age structure of SR: 0 – 14 years 19 % (EU_{15} average 18 %), 65+ years SR 11.5 % (EU_{15} 17 %). As age and case-specific mortality rates are very different in SR, this survey is divided into several chapters.

Productive male population

One of the artificial indicators of the general health status of the population is life expectancy at birth (LE_0). It is defined as age which an individual could reach provided the stability of mortality conditions in the given period. This indicator stagnated during the communist period. In 1984 LE_0 in SR males was 66.8, in EU 71.8 (difference 5 years), in SR females 75.0, in EU 79.0 (difference 4 years). The collapse of communism was followed

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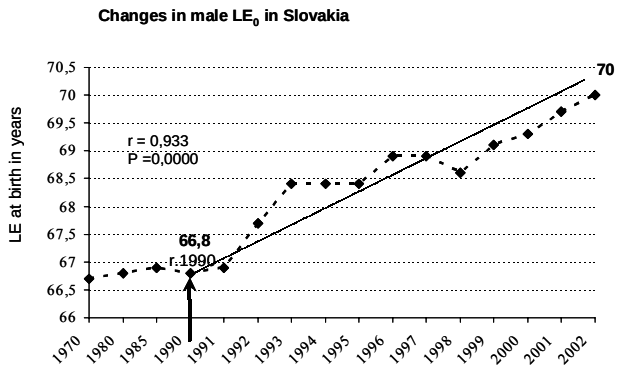

Fig. 1. Sharp increase in the life expectancy at birth in men (LE_0) in SR after the collapse of the communist regime

by an unexpected rise of the male LE_0 in SR (Fig. 1). At present, male LE_0 in SR is about 70 years, in EU_{15} 75.5 years (5). Even though, the actual score of SR males in Europe is not satisfactory (Tab. 1).

In most EU countries the LE_0 in males lies between 75–78 years. Only a few EU member countries (eg. Portugal) have LE_0 less than 74. The average LE_0 in EU_{15} males is 75.5 years (6). LE_0 of males from the post-communist countries remains lower than in EU_{15}. Only in Slovenia, Czech Republic and Poland is LE_0 higher than 70 years. The data given for SR in the Table 1 equals in some sources 70 years (6). Men in most other post-communist countries have LE_0 less than 69 years; the lowest rates being found in Ukraine and Russia. The expected life expectancy of a Russian male child born in 2002 is 20 years lower than

Tab. 1. Life expectancy at birth (years) of males and females in Europe. Last available WHO data for the year 2002 (4).

Country	Males	Females
Sweden	78.0	82.6
Switzerland	77.7	83.3
Italy	76.8	82.5
Austria	76.4	82.2
Norway	76.4	81.7
Spain	76.1	83.0
Netherlands	76.0	81.1
France	75.9	83.5
Greece	75.8	81.1
United Kingdom	75.8	80.5
Germany	75.6	81.6
Finland	74.8	81.5
Portugal	73.6	80.5
Slovenia	72.8	80.5
Czech Republic	72.4	79.0
Poland	70.6	78.7
Slovakia	69.8	78.3
Bulgaria	68.7	75.3
Hungary	68.4	76.8
Romania	68.0	75.0
Albania	67.3	74.1
Lithuania	66.2	77.6
Ukraine	61.7	72.9
Russian federation	58.4	72.1

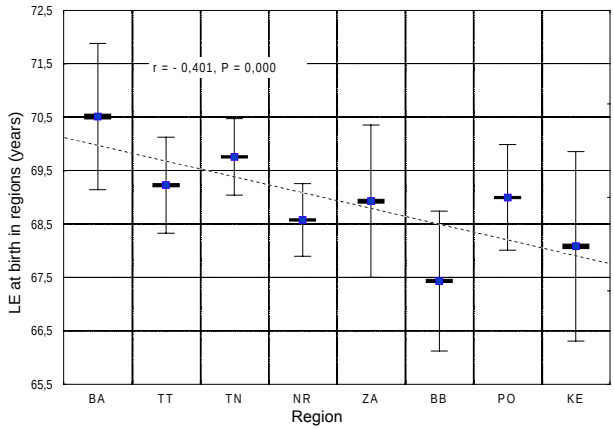

Fig. 2. Life expectancy (LE_0) in the individual regions of SR falling in the West-South-East gradient (means 1996–2000 ±SD).

in Sweden. Moreover, the development of LE_0 in Russia is not favourable – contrary to the countries of Central Europe.

The reasons of the improving health status in SR after the collapse of communism are not known with precision. They are certainly linked with the improved social climate, lifestyle, eating habits etc. However, the changes have had various impacts in different regions of Slovakia. Within the MONIKA project (3) we have calculated the data of LE_0 for each region for the period of 1996–2000 in order to avoid the fluctuation in individual years. On the basis of these data, we then have calculated the average LE_0 for males in each region. We have found out that this indicator is falling significantly from West to South-East (Fig. 2).

The program used for statistic evaluation was STATISTICA 6, which was used to weighing the number of inhabitants in various regions. We have further used the variation analysis (ANOVA). It shows average values ±SD (= standard deviation) and/or ±SE (standard error). Correlations and multifactiorial analysis is presented in graphs.

The map of SR in Figure 3 shows the highest LE_0 values in males especially in all Bratislava districts whereas the lowest rates were observed in the south-eastern area. The difference between the districts of Bratislava and the regions of Krupina, Detva and Trebisov is approximately 7 years. The values of Bratislava are approaching those of the Czech Republic. There are several socially determining factors of health such as social status, ethnic origin, stress, social isolation, working conditions, unemployment, social support, dependence on alcohol, tobacco and drugs, further nutrition components, transport and education. For most of these factors there are not enough reliable data available. A simple regression has found a significant but not a close correlation between the life expectancy of males and the percentage of the Hungarians in the region (r=-0.24), the percentage of the Gypsies (r=-0.32) and infant mortality (r=-0.31). Much more closer relations were found between the level of education in the region and the male LE_0.

We have analysed by the multifactorial regression the relations between average male life expectancy in the regions (means 1996–2000) and the line of independent factors (actual ethnic,

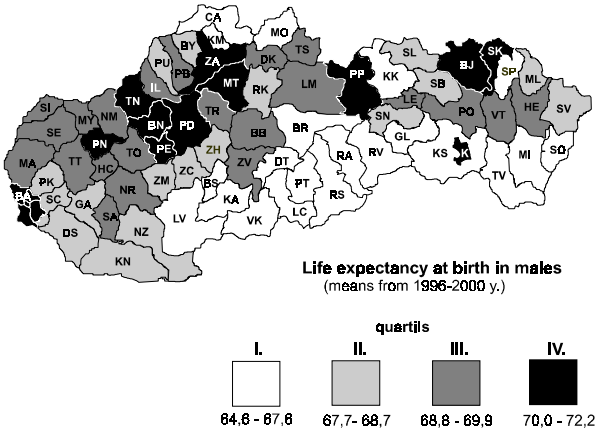

Fig. 3. Map of SR showing the average life expectancy at birth (LE_0) in different departments, divided into quartiles (means 1996–2000).

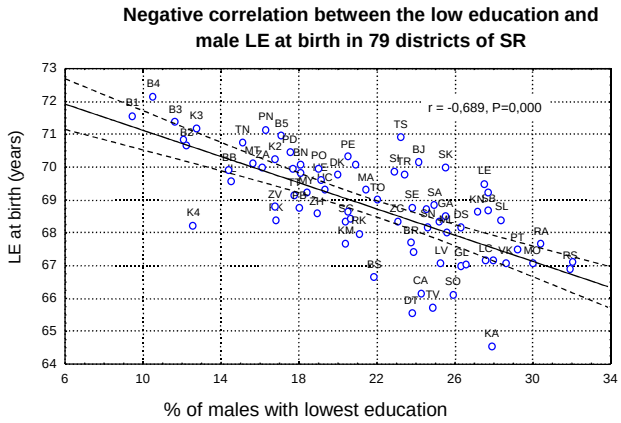

Fig. 4. Male life expectancy (LE_0) in the individual departments is falling with the rising percentage of men with basic education.

educational and religious composition of individual regions). At weighting the number of inhabitants in the regions, educational level has appeared as most important factor (multifactorial regression coefficient R=0.745, p=0.000) (Fig. 4).

Logarithmic calculation of the % of Hungarians with the purpose to accommodate them to the normal distribution and additon of another factor – infant mortality – only very slightly increased the value of multifactorial coefficient: R=0.758, p=0.000. Counting of the educational level of the region came from the data of counting inhabitants, houses and flats 2001 (2). More important was the influence of the Gypsy minority. The Gypsies are known to have shorter average life expectancy than the majority population. There is a separate chapter dedicated to the health status of the Gypsy population further in this survey.

Another important factor is a low economic potential of the regions marked by high unemployment. This is particularly true for the Eastern and Central Slovakia. Recent per cent data about unemployment show very high values for the regions of Kosice (22 %), Banska Bystrica (21.7 %) and Presov (17.8 %) while only 4 % in Bratislava. Figure 5. shows tight correlation between the life expectation of the regions' population (means 1996–2000) and recent data about unemployment (2003–2004). This relation probably equally reflects the level of education of the region as there is a close link between education and unemployment. It seems certain that mental health and dietary habits of the unemployed deteriorate considerably so that the closeness of the correlation is not surprising. These data coincide with the results of other authors (7, 8).

The actual difference in male LE_0 at birth between SR and EU (5.5 years to the disadvantage of SR) is due to higher infant mortality and higher premature mortality caused by cardiovascular diseases, malignant neoplasms, external causes (injury, poisons etc.) and diseases of the digestive system (5).

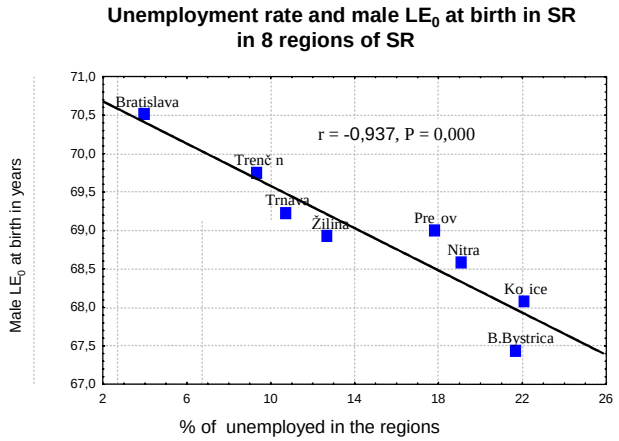

Fig. 5. Male average life expectancy is falling with the rising percentage of the unemployed in the concerned region.

Productive female population

Like for the males, the synthetic indicator of the global health status for females is the average life expectancy at birth (LE_0). This indicator stagnated during the period of the totalitarian regime. After its collapse LE_0 has grown by approx. 2 years. The average female LE_0 in the different regions does not vary much. Unlike the male LE_0, it only fluctuates within one year. The highest LE_0 value in females was in the Zilina region, similarly to Bratislava and Trencin and evidently higher than in other regions. The falling tendency from West to East was milder compared to that of males and was not statistically significant. In terms of regional differences (means 1996–2000) the highest female LE_0 could be observed in all Bratislava districts as well as in regions situated in Northern and Central Slovakia (78–79 years). The lowest values (75–76 years) were observed in the regions of Krupina, Levoca, Trebisov, Revuca, Roznava, Medzilaborce, Komarno a Senica. With the exception of Bratislava and Kosice, the South is a part of Slovakia with low LE_0 values (3).

The indicator of the difference between the male and the female LE_0 is worth a closer look. Generally speaking, women live longer than men. The reasons are mostly genetic but social factors are also important. In Islamic countries there is only a minimal or no difference between the male and female LE_0. The prob-

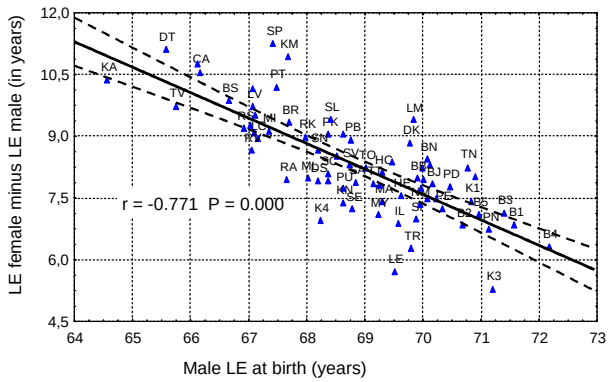

Fig. 6. The difference between the male and the female (LE_0) depending on the male (LE_0).

able cause is the low social status of Muslim women. In the developed countries this difference mostly oscillates between 5–10 years in the favour of women. In some post-communist countries with extremely high alcoholism prevalence the difference is much higher (e.g. in Russia 14 years, in Belarus 12 years and in Ukraine 11 years in favour of women) (5).

The LE_0 difference between men and women in Slovakia was 8.4 years in favour of women (between 1996–2000). This difference has been falling constantly and it reached 7.7 years in 2002, approx. 1 year more than the EU average. It is theoretically possible to suppose that the shrinking difference between the male and the female LE_0 is a result of their convergence. In Slovak regions, however, the female LE_0 does not play any role in the levelling process (r=0.048 for the correlation between the female LE_0 and the difference between males and females). In SR the decisive factor is the male LE_0 – the rising male LE_0 accounts for the significantly diminishing difference between men and women (Fig. 6).

The biggest difference (10–11 years) is found in sociologically and economically problematic regions such as Stropkov, Detva, Kysucke Nove Mesto, Sobrance, Cadca, Krupina, Poltar and Namestovo. These regions thus place themselves close to Ukraine. The least difference between males and females (5–7 years) is in cities (Bratislava, Kosice) and in sociologically and economically favourable regions like Levoca, Piestany and Turcianske Teplice. Health care is probably better accessible in cities as well as in spa resorts. The difference between the male and the female LE_0 is interesting from the sociological point of view. It might be a result of a healthier lifestyle of men, an improved social status of women and a better family life.

As with men, the female LE_0 is influenced by a number of social health determinants. These are for example unemployment, education, social status, nutrition, social isolation, working conditions, ethnic social pattern, dependency on alcohol, tobacco and drugs etc. Simple regression with weighing region size found significant relation between female LE_0 and infant mortality (r=-0.50, p=0.00) and % of Gypsy's ethnic in the region (r=-0.40, p=0.00). We have analysed by multiple regression relations be tween female LE_0 in individual regions (averages from years 1996–2000) and group of independent factors (ethnic, educational and religious structure and also employment of women in the regions). In contrast to men, where the computer programme chose the level of education in the region as the only significant parameter, the female LE_0 was determined by four different factors. The most important parameter was the level of education. For the percentage of women with basic, unfinished or no educat ion the value of the regression coeficient was β=-0.39. For the % of Hungarian population in the region β= 0.31, for infant mortality β=0.17 and for the % of Gypsy population β=-0.10. The final value of the multiple regression coeficient was R=0.702, the adjusted square of the coefficient =0.49, which means that the model explained approx. 50 % of the female LE_0 in the region. The influence of the Hungarian population is statistically proven but not high. For example in the region of Dunajska Streda, with 83 % of Hungarian population the female LE_0 was 76.12 in the period 1996–2000, while the Slovak average was 77.22 years (approx. 1 year difference). The influence of education, was equally small although statistically significant: in regions with less than 30 % of women with basic education the LE_0 was 77.8 years compared to 76.9 years in regions where women with basic education represented more than 30 %. Similarly, the unemployment has had a small though statistically significant influence. In regions with female unemployment of more than 20 % the LE_0 value was 76.7; in regions with lesser female unemployment it was 77.5 years. The recent difference between male and female LE_0 in SR and EU stays 4 years. The most important causes are higher infant mortality and premature mortality caused by cardiovascular diseases, malignant neoplasms and diseases of digestive system in the Slovak female population (5, 6).

Children population

Between 1985–2000, the infant mortality fell very clearly from 16.3 to 6.2 per 1000 live-born children (3) and this over the whole territory of Slovakia (SR). The EU_{15} average is 4.7/1000 (6). At the beginning of the 21st century, the Slovak values are similar to those of Greece and slightly higher than those of Great Britain and Portugal.

The infant mortality histogramme in SR regions (Fig. 7) has lognormal distribution and proves that in one third of Slovak regions the infant mortality rate oscillated between 2–6 deaths/1000 live-born, which corresponds to the rates of most developed countries. These regions are situated mainly in the Western part of SR. In the Trebisov region, on the other hand, the infant mortality exceeded 17/1000 in the given period. The only other European country with still higher infant mortality rate is Romania. The infant mortality in the majority of the regions in Eastern Slovakia exceeded 10 deaths/1000 which corresponds roughly to the situation in Ukraine and in Russia.

Probably the main cause of this situation is the high infant mortality among the Gypsy population. Official sources from the last census give an unrealistically low number of Gypsies in

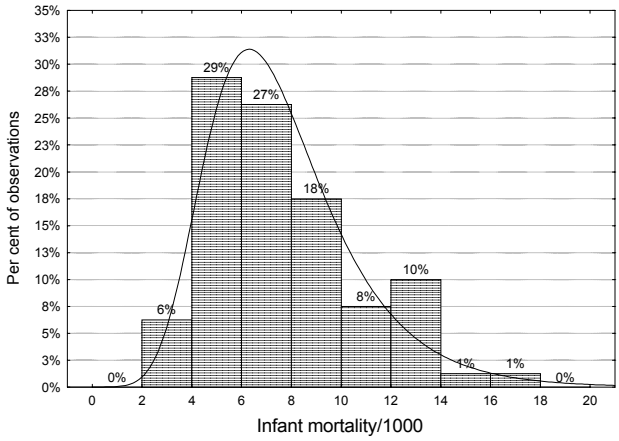

Fig. 7. Infant mortality histogram in the individual SR districts (means 1996–2000).

Slovakia (2). To avoid this mistake, the official data about the Gypsy population in each region have been divided into quartiles. It occurred that in the first quartile (the highest rate of Gypsies in the region) the infant mortality is significantly higher (11/1000) than in all three quartiles with low Gypsy po pulation (5–6/1000).

The number of deaths due to the most frequent death causes did not vary much in the last 20 years. The main death cause (approx. 75 % of infants) remain malformations and perinatal malfunctions. In EU, this rate is similar (82 %). The sudden-death syndrome was lower in SR than in EU (3.6 % vs 11 %). Respiratory diseases caused nearly 12 % of infant deaths in SR. The SR newborn death rate (death in the 28 days which follow the birth per 1000 live-born) was falling together with the infant mortality rate until it reached 5 deaths/1000 in 2001. The ratio of newborns with birth weight under 2500 g is about 7 %, which is almost the same as in EU (6.5 %). Brest-feeding is recently in constant progression in SR. More than 60 % mothers breast-feed their children up to the age of 3 months and 37 % up to the age of 6 months. These data correspond to those of Scandinavian countries (1). The vaccination of children is very widespread (98/99 %), more than in Austria or Germany. There are both global and partial data available for the occurrence of allergies and dental health in children population. However, we do not have data concerning the individual regions. Also available is a register of child diabetes in children between 1–14, according to regions.

As far as older children are concerned, we have the WHO estimations for 2002 about the probability of deaths of children under five years (4). The data for SR (boys 9/1000, girls 7/1000) are only slightly higher than those for most EU countries (as examples: Germany and Austria – boys 6/1000, girls 4/1000). Global standardized mortality (SDR) of children between 1–14 (both sexes) in 2001 in SR was 29/100 000, in EU 17/100 000. It is half the value of the ex-USSR countries, Bulgaria and Romania. Major death causes with 37.2 % of all deaths in the age group of 1–14 are external (road accidents, accidents at work and play, intoxications, suicides etc.). On second position are malign tumours (15.7 %), followed by respiratory diseases. Infectious and parasitic diseases and diseases of the digestive and circulatory systems caused 7.4 % of all deaths in 2001.

Tab. 2. Male and female life expectancy in years in Europe at age 65 years ((LE_{65}). Data mostly for the years 2001–2002) (1).

Country	Males	Females
Switzerland	17.1	21.0
Sweden	17.0	20.3
Spain	16.8	21.0
Greece	16.8	19.1
France	16.7	21.3
Italy	16.7	21.0
Austria	16.4	19.9
Norway	16.3	20.0
Germany	16.3	19.9
Albania	15.9	19.5
United Kingdom	15.9	19.2
Finland	15.9	19.9
Netherlands	15.1	19.4
Portugal	14.8	18.3
Slovenia	14.7	19.1
Czech Republic	14.0	17.4
Poland	14.0	17.8
Lithuania	13.4	17.9
Hungary	13.2	17.1
Slovakia	13.2	17.0
Bulgaria	13.1	15.8
Romania	13.0	15.8
Ukraine	11.6	15.4
Russian Federation	10.9	15.1

We possess data concerning the mortality of children between 1–14 due to external causes (esp. injuries) for all regions of SR (average rates from 1997–2000) (3). The layout of the mortality of boys shows high values of external death causes mainly in regions with high ratio of the Gypsy population. The analysis of variation has shown that in the first quartile (the highest Gypsy population) the mortality rate in boys between 1–14 is significantly higher than in all the other quartiles (regions with low Gypsy population in the region).

In conclusion, we can say than the health status of children population in SR is not much worse than in EU_{15}. The Gypsy minority obviously has a clear influence on the health status on national level.

Male and female seniors

There is no universal definition of the seniors. Older sources define seniors as people over 60. Given the constantly prolonging average life expectancy, we now consider as seniors people older than 65. In this survey we use both descriptions, depending on the sources of information that had been used.

One of the synthetic indicators of the global health status is life expectancy (LE). It can be calculated not only as LE_0 at birth but also as for each age. It is defined as age which an individual could reach provided the stability of the mortality conditions in the given period. Table 2 taken from recent WHO data (mainly for years 2001–2002) gives LE_{65} = life expectancy of men and

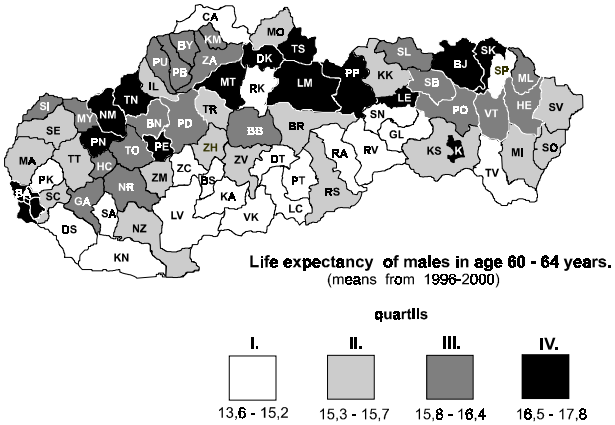

Fig. 8. Map of SR showing the average male life expectancy aged 60–64 (LE_{60-64}) in individual regions divided into quartiles (LE_{60-64}) (means 1996–2000).

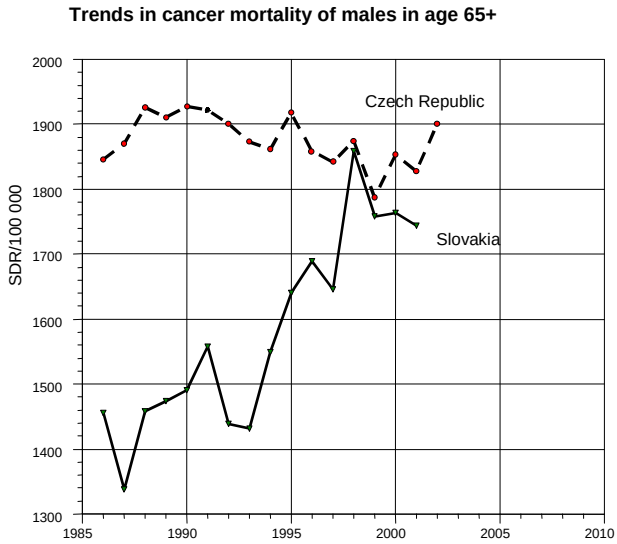

Fig. 9. Male age-specific trends (aged 65+) in malignant neoplasms in SR and Czech Republic. WHO data (1).

women at the age of 65 in 24 European countries (1). The placement of Slovak men is not ideal. The life expectancy for men aged now 65 is almost one year shorter than in the Czech Republic and for both men and women 3–4 years shorter than in Switzerland, Spain or Sweden. A 65-year-old citizen of Russia can expect to live 7 years less than a citizen of Sweden or Switzerland.

Similarly as with LE_0, the LE_{60-64} for men aged 60–64 varies considerably from one region to another (Fig. 8) (means 1996–2000) (3). The longest LE_{60-64} is in the two biggest cities Bratislava and Kosice, in the Central Povazie region (Piestany, Nove Mesto n/Vahom and Trencin) and in the northern hilly regions (Martin, Dolny Kubin, Liptovsky Mikulas, Tvrdosin, Poprad, Levoca, Bardejov and Stropkov). The LE_{60-64} of the best placed provinces approaches the values of Western Europe. The regions of Southern Slovakia form an almost continuous belt of low LE_{60-64} values.

The LE_0 of the Gypsy population, and in particular of men at birth, is significantly lower than that of the majority. This is why the part of the Gypsy men in the age group of 60–64 is considerably lower than in the younger age groups (10, 11). It seems thus probable that premature deceases of the Gypsies do not have much influence on the on the LE_{60-64} of the region. This demographic specificity explains the rather high LE_{60-64} even in regions with a high Gypsy population. This is the reason w hy provinces such as Levoca, Poprad, Liptovsky Mikulas, Bardejov and Svidnik belong to regions with the highest LE_{60-64} values. The map of regions with high LE_{60-64} of women corresponds to that of men. The reason why men and women in different regions have different life expectancy seem to be quite complex. There are also differences in the senior mortality from circulatory diseases and malignant tumours.

Mortality from diseases of the circulatory system for both men and women over 65 is highest in southern and south-eastern SR regions (3). This concerns as well the brain stroke as ischemic heart diseases and myocardial infarction. One of possible reasons might be high consumption of animal fat as these are regions with highest concentration of pig, goose and duck farming. The consumption of protective substances from fruits and vegetables in these regions is high only in summer and autumn (tomatoes, pepper etc.) but low in winter, due to widespread canning and bottling, which destroys most of these substances. The farmers from the Southern regions do not relax sufficiently as they cannot afford to take long holidays because of agricultural work. There are also many smokers in the South as people from this part of Slovakia share the lifestyle of Hungarians. In comparison with the Czech Republic (5), seniors in Slovakia have a very unfavourable tendency to diseases of the circulatory system (with the exception of coronary brain diseases) and to malign tumours (Fig. 9).

The most important information for seniors is not the number of years ahead but the quality of life during this period. The vision of living up to eighty confined to bed because the person had been the victim of a brain stroke at sixty is more of a horror than pleasure. This is also true about the Alzheimer disease and a number of other diseases linked to high age. That is why the notion of HALE (health-adjusted life expectancy) has been introduced by an WHO expert committee due to complicated calcu lations. HALE adjusts the average life length to years spent in "full health". Detailed data can be found in the last WHO yearbook (4). It is obvious that HALE values are lower than LE_0 because hardly anybody spends the whole life in full health. HALE can be calculated for the senior age and these WHO data were used for Table 3. The placement of Slovak men in the table is surprisingly bad. The HALE value for SR is not only lower compared to the Czech Republic but also compared to China, Cuba, Mexico, Turkey and Poland. The placement of women is only slightly better. The importance of health care of seniors is growing and there is no doubt that it is still insufficient in SR. It is however improbably that it should be worse than in Poland, China, Cuba or even in Turkey or Mexico. The HALE value

Tab. 3. Healthy life expectancy (HALE) at the age of 60 in WHO member states. Estimates for the year 2002 (2).

Country	Males	Females
Japan	17.5	21.7
Switzerland	17.1	20.4
Sweden	17.1	19.6
France	16.5	20.3
Spain	16.4	19.9
Italy	16.4	19.4
Austria	16.2	19.3
Greece	16.0	18.1
Germany	15.9	19.0
United Kingdom	15.7	18.1
U.S.A.	15.3	17.9
Cuba	15.2	16.7
Portugal	14.9	17.7
Mexico	14.5	16.3
Czech Republic	13.5	16.8
China	13.1	14.7
Poland	12.8	16.1
Turkey	12.8	14.2
Bulgaria	12.4	14.9
Slovakia	12.3	16.1
Romania	12.3	14.6
Hungary	12.2	15.9
Ukraine	10.3	13.7
Russian Federation	10.1	14.2

seems to reflect all flaws of the lifestyle, nutrition, mental state etc. during the whole life including childhood (12–14). The proof is the negative tendency in the mortality from circulatory diseases and malign tumours in elderly Slovak men and women as these malfunctions often have their origin in the early childhood.

Globally speaking, all data leads to the conclusion that it is necessary to improve the healthcare of elderly people in SR. From the point of view of prevention it is equally important to promote a healthy lifestyle and dietary habits in children and the young generations.

The Gypsy population

As a result of the politically incorrect, dismissing every research on the specific health problems of the Gypsy population as racial discrimination, there is now an absolute lack of reliable data about the Gypsy minority. It is precisely this fact that must be considered as racial discrimination. The EU, the Government of the US as well as WHO are stressing the necessity of research of the health status of minorities and pursue this policy in practical terms. The official bodies in Slovakia, on the contrary, have not even been able to answer the four basic questions concerning the Gypsy minority:

1) What is the real number of Gypsies living in SR?
2) What is the average life length of Gypsies?
3) Which illnesses present a particular threat for the Gypsies?
4) What is the reason of the high mortality of the Gypsies from these illnesses?

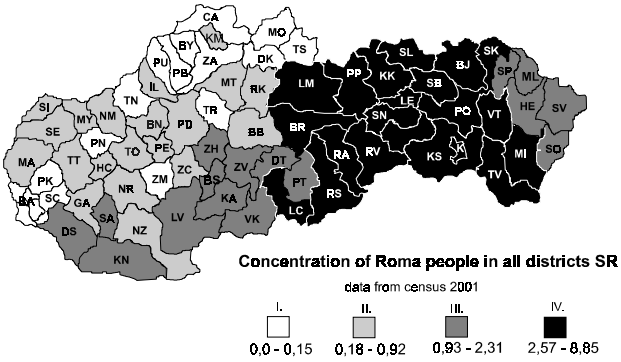

Fig. 10. Distribution of Gypsies on the SR territory. Percentage numbers below each quartile derive from the 2001 census and are unrealistically low.

According to many Western experts and politicians it is no longer acceptable for the European governments to ignore medical needs of large parts of their populations (15). The aim of the following survey is to respond to this criticism by a short analysis of the present-day health status of the Gypsy population in SR.

According to several – probably over-estimated – calculations of foreign Gypsy institutions Slovakia would be the country with the world's highest concentration of the Gypsies (about 12 % of the SR population). Real numbers, however, can only be found out in collaboration with experts who know the particular region. The data of the population census in the year 2001 indicate unrealistically low numbers of the Gypsies and can only be used in order to work out the dispersion of the Gypsy population over the SR territory (Fig. 10).

A hypothetic calculation of the average life expectation at birth (10) gives the result of 69.9 years for the majority population (Slovaks and Hungarians) and 62.4 for the Gypsy men's population (difference of 7.5 years). Similar values have been supplied by Slovak statisticians (11). The supposed difference in women's populations (6.6 to the disadvantage for the Gypsy women) can also be considered as realistic. However, reliable values about the life expectation of the Gypsy population can only be obtained by using standardized demographic procedures. In the population of the Gypsy children, there is generally higher prevalence of infectious diseases, injuries, poisonings and other results of external causes, which are mostly due to their exposal to environmental risks. Infant mortality and the mortality of boys aged 0–14 due to injuries is up to twice as high in regions with a high share of the Gypsy population. The Gypsy newborns have lower birth weight as well as head and breast perimeter (16). The Slovak Gypsies have the highest inbreeding coefficient in Europe, which increases the probability of genetic malfunctions (17).

We have no answer to the question which diseases represent the highest threat to the adult Gypsy population. All Slovak and foreign studies confirm a worse health status of the Gypsies compared to the majority population. Most of these studies are general, only some are specialized in pathologies due to infections or genetic causes. Unfortunately, there is no research as for the occurrence of the most widespread diseases such as circulatory

diseases or malign tumours in the Gypsy population. We p ossess average values (years 1997–2000) concerning the mortality of men and women in the most active life period (25–64 years) caused by circulatory diseases, malign tumours and accidents for each region in SR (3). We also have census data about the ethnic composition of each region (2). The division of the regions in quartiles according to the number of the Gypsies made possible to compare the mortality from these diseases in 20 regions with virtually no Gypsy population and in 20 regions with ma ximum share of this population. The results for the male population are summarized in the in Table 4.

As we had expected, the study has shown a significantly shorter average life expectancy at birth and a significantly (almost twice) higher infant mortality in the regions with a high share of the Gypsy population. Further are significantly higher premature deceases due to circulatory diseases and malign tumours and the mortality from accidents. Supposing the share of Gypsies in the population is 10 %; it is possible to calculate their hypothetic mortality with the formula:

Mortality of the Gypsies = (100*nationwide mortality – 90 % mortality of the majority) / 10.

The calculated values can be found in Figure 11. A shorter life expectancy at birth of the Gypsies is determined by a considerably elevated infant mortality and exceptionally high number of premature deceases in the age group of 25–64, due to diseases of the circulatory system and malignant tumours. We would like to emphasize that the presented values are a rough calculation, as we have compared two files with different economic and educational parameters. It is the first attempt at quantification of the case-specific mortality in Gypsy population. The majority population probably participates in the high mortality from circulatory diseases and malign tumours in the regions with high share of Gypsy population. The extremely high value of the mortality from circulatory diseases of the Gypsy men is only slightly higher than the mortality of the same age-group in Belarus and in Ukraine and significantly lower than the mortality from circulatory diseases in Russia (1.5). The mortality from malign neoplasms is extremely high, exceeding even Hungary. Mortality from accidents, on the other hand, is rather low, equal to Hungary and clearly lower than in the Ex-Soviet countries. This rather surprising fact is probably due to the low employment-rate and low living standards of Gypsies bearing smaller risks of industrial and traffic accidents. The average life expectancy value calculated in the same way showed to be similar than the one calculated differently (10, 11). As for women, the differences between the Gypsy and the majority population proved to be similar though smaller.

Tab. 4. Comparison of chosen demographic indicators for men in the first quartile of 20 regions (low occurrence of the Gypsies) and in the fourth quartile of 20 regions (maximum occurrence of Gypsies) in Slovakia. Means from 1997–2000.
Standardized mortality/100 000 for the 25–64 age group ±SD.

Parameter	Minimum of Gypsy (20 districts)	Maximum of Gypsy (20 districts)	p<
% of Gypsy	0.1±0.05	4.5±1.64	0.000
Life expectancy (years)	69.8±1.6	68.3±1.4	0.000
Cardiovascular mortality	274±58	336±57	0.000
Cancer mortality	245±50	276±43	0.000
Mortality from external causes	130±25	125±28	NS
Infant mortality	5.8±1.5	11.5±2.6	0.000

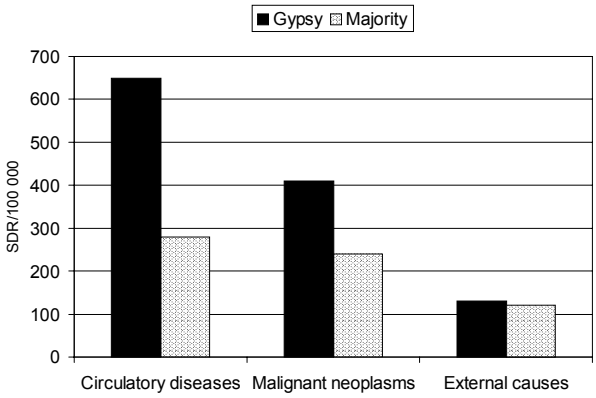

Fig. 11. Hypothetic data of premature mortality of Gypsy men from cardiovascular and cancerous diseases and from injuries. SDR for age 25–64 years, means 1997–2000.

The basic causes of the of the high mortality of Gypsies are probably both external and internal: deficient nutrition and lifestyle in general as well as genetic reasons. Repeated research about the Western-Slovak Gypsies showed high consumption of animal fat like fat meat and sausages, and low consumption of wholemeal products (many Gypsies have almost never tasted wholemeal bread), vegetables and especially fruit (18). They also have high consumption of sugar and sweet drinks. On the contrary, they do not consume enough food of vegetal origin, the primary source of protective antioxidants, fibres, folic acid and other vitamins. In collaboration with a Czech research team we have also found out a low supply with the vitamin C already in newborn babies, due to vitamin C deficiency in mothers (19).

Energetic intake in the Gypsy minority was higher and the expenditure lower compared to the majority. Typical for the Gypsies in Western Slovakia is also a high occurrence of overweight and obesity. While 18 % of men of the majority were obese or very obese, they were 38 % among the Gypsies.

In the female population the difference was 15 % in the majority against 34 % of the Gypsy women. The difference grew significantly with age. The data concerning nutrition and obesity occurrence must still be verified in Eastern Slovakia, in the Gypsy population with much lower life status.

The Gypsy population also contains a significantly higher number of smokers (men and women) than the majority. According to the information of regional public health committees, there

is a 100% occurrence of smokers in some Gypsy settlements, already by the age of 16.

Biochemical examination have shown that Gypsies are particularly exposed to the X-syndrome (insulin resistance). These are pathologic changes representing a major risk factor for diabetes type 2 and for cardiovascular diseases. It is characterized by a combination of five factors: obesity (surplus of centrally stored fat), insulin resistance (high level of insulin while fasting, abnormal glucose test), high level of triglycerides, low level of the protective HDL-cholesterol and high blood pressure. These changes can already be found in the young Gypsy population (20, 21). We probably know what causes the high occurrence of the X-syndrome in the Gypsy population.

The X-syndrome combined with obesity can be found not only in the Gypsy population but also in many economically weak but developing countries. As a consequence of urbanization boom in this type of countries, poor country population have massively moved to cities. According to UNO sources, there has been an increase in the urban population from 17.8 % to 56.2 % in the last 25 years. Urbanization brings about changes in lifestyle such as dietary changes and less physical activity, which may represent a risk of obesity and the X-syndrome.

Genetic factors equally play a role in this process. Changes in diet and physical activity create conditions, in which predisposed individuals become obese. This predisposition is either due to genetic factors or malnutrition in the prenatal period. A typical example is the Indian population of the Pima tribe. In their home environment in Mexico, its members have normal weight as well as a normal prevalence of chronic diseases. The same Pima tribe living in the USA is characterized by morbid obesity and high occurrence of diabetes. It is supposed that the Pima possess a so called "thrifty gene" predisposing them to obesity if they switch to a highly energetic and high-fat diet or if they reduce their physical activity (22, 23). This fact has been thoroughly examined by American molecular biology experts. It seems possible that their research will confirm the existence of such a gene in the Gypsy population, which might have developed in the course of their long and troublesome migration from India to Central Europe (24, 25).

Another similar case is that of the nomadic Arab Bedouins. Their tribes, originate of the Negev desert, became citizens of Israel and gradually changed their lifestyle. One part settled down in newly built towns, reduced their physical activity and changed their dietary habits. Whereas in 1970 there was minimal occurrence of chronic diseases such diabetes mellitus, myocardial infarction and brainstroke, the recent prevalence of diabetes is twice as high as in the Israeli population (26).

The sample of West-Slovak Gypsies that we have examined, belongs to the economically developed group. Their lifestyle resembles that of Mexican Indians in the USA, the urbanized population in India or the Bedouin tribes in Israel. In summary, all indicators show higher risk of aterogenesis in the Gypsy ethnic group. These factors are aggravated by extremely high prevalence of smoking and deficiency of protective substances, which represent at the same time a risk of cancer. It is absolutely necessary that national, cultural and social organizations change their two-faced attitude to the Gypsy population. They should understand that labelling and identification of a population group as Gypsies is by no means an expression of racism but a term equal to that of Slovak or Hungarian. Only then it will be possible to deal seriously with the complex Gypsy situation by placing emphasis on the education and change of life of Gypsy children. We think that it might prove necessary, for the good of the Gypsy population and their health status, to take even quite unpopular measures including placing Gypsy children in boarding schools.

Tab. 5. Standardized death rate (SDR/100 000) for the Slovak and EU populations aged 0–64 years. WHO data for the years 2000–2001.

Causes of death (disease of ...)	Males		Females	
	Slovakia	EU	Slovakia	EU
All causes	521	281	196	141
Circulatory system	169	67	55	24
Malignant neoplasms	148	91	75	63
External causes	87	46	17	14
Respiratory system	20	11	7.5	5.9
Digestive system	49	19	17	8
Liver, cirrhosis	34	13	12	5
Diabetes	6.3	3.6	3.7	1.8
Mental, nervous system	10.9	12.0	5.2	5.8
Infections, parazites	2.4	4.3	1.2	2.1

Conclusion

The health status of the SR population at the eve of entering the EU was generally worse than the EU average. We do not think it suitable to compare the health status of the whole population articulated as the percentage of deaths caused by individual diseases as done by some WHO authors (6), because this number does not take into consideration the differences in the life expectancy at birth: Slovak males 70 years, EU males 75.5 years, Slovak females 78 years, EU females 82 years. Given as percentag e there should be 16% deaths from cancer in Slovakia against 27 % (2) in the EU, which would mean a better situation in SR. However, this value is misleading, because the EU citizens live longer and their risk of dying from cancer is higher. It is more correct to express premature mortality as a standardized death rate (SDR per 100 000) for the age group between 0–64 years (Tab. 5). Values in the grid prove that global mortality in this age scale is significantly higher in SR than the EU average, being almost the double in the male population. The cause is significantly higher mortality due to cardiovascular diseases, malignant neoplasms and external injuries. SR also has a higher mortality from diseases of the respiratory and digestive systems and from diabetes in both male and female populations.

On the other hand, there are some positive facts in SR. Mortality from infectious and parasitic diseases is lower both in men and women. The prevalence of HIV/AIDS in SR is 0.04 per 100 000, while EU average is five times higher (0.2 per 100 000). The annual incidence of new HIV infections in SR is 0.2, in EU

4.3 per 100 000. SR has one of the lowest concentrations of newly registered AIDS cases in all Europe (6). Immunization coverage in SR is between 95 % and 99 %, higher than in many EU countries. The health status of children population in SR is generally not worse than in EU. However, it might seem worse due to the values concerning the Gypsy minority.

Trends of premature mortality in SR are favourable in many diseases. There is a decrease in mortality from cardiovascular diseases, external causes of injury and poison and from diseases of respiratory system. Infant mortality is equally falling. Average life expectance of both men and women is rising. However, it is not going to be easy for SR to catch up with the EU due to the fact that health care is improving steadily in all EU countries. We suppose that this process might take up to 20 years.

In conclusion we would like to emphasize that the differences between SR and EU as well as the differences between various SR regions are the result of several historical factors such as educational and economic achievements and ethnic composition of the SR. A take-off of backward regions can not be reached only by improvements in the health system but rather by a common effort of all governmental institutions, especially those responsible for economics and education. Let us quote the WHO Verona initiative (loose quotation): An investment into health and related domains is not only a social and economic imperative but also an investment into further development. Today's politicians will be judged according to health and prosperity of future generations. We have both moral and social responsibility not to fail.

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