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The differentiation of the health situation in European post-Communist countries after 1990

Abstract: The objective of the study is to evaluate changes in the health situation in European post-Communist countries in the period of 1990–2012. The spatial range covers the European part of the former Warsaw Pact (within the limits from 1956) plus the former Yugoslavia, but without the former German Democratic Republic and Russia. Five variables were analysed: crude death rate per 1,000 population; estimated infant deaths per 1,000 live births; difference between life expectancy at birth between males and females (in years); incidence of tuberculosis per 100,000 population; incidence of syphilis and gonorrhoea infections per 100,000 population.

Four groups of countries differing from one another in the health situation in the analysed period. The first two groups (with a relatively good or average health situation) include the former Communist countries that in the past did not belong to the former Soviet Union. All post-Soviet countries plus Bulgaria and Romania qualified as countries with a poor or very poor health situation. Belonging or not to the former USSR in the past and fast and efficient system reforms were considered to be the main factors differentiating the situation. Of secondary importance are regional factors, such as: substantial demographic age in some societies, the status of women as a result of historical circumstances, civil wars and a different diet.

Keywords: health situation, post-Communist countries, Central Europe, Eastern Europe

1. Introduction

The objective of the study is to evaluate changes in the health situation in European post-Communist countries in the period from the creation of the first non-Communist government in this part of Europe to the present times. The spatial range covers the European part of the former Warsaw Pact (within the limits from 1956) plus the former Yugoslavia. An exception has been made for two countries: the former German Democratic Republic (because it is now part of united Germany) and Russia (due to too large an area and a diversity of the health situation and the fact that it partially lies in Asia). Furthermore, due to incomplete data, only partial analysis was conducted for some countries (Bosnia and Herzegovina, Bulgaria, Kosovo, Montenegro, Serbia, Slovakia).

In analysis of a health situation of the population, scholars most commonly use the so-called negative health measures describing mortality, death rate, incidence rate, morbidity or life expectancy. It is no different in this study. While selecting variables for the analysis of differentiation in the health situation in the surveyed countries, both the relevance of these variables to its description and the availability and the quality of statistical data were taken into consideration. As a result, five variables were used in the analysis:

1. Crude death rate per 1,000 population.
2. Estimated[1] infant deaths per 1,000 live births. The infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year. Estimates developed by the

[1] Based on estimated data, because the data coming from certain countries are understated (for various reasons). For example, the infant mortality rate in 2000 reported by Moldovan authorities amounted to 11.8 per 1000 live births, while the estimated one was 16.1 (HFA-DB, 2015).

UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division) at www.childmortality.org.
3. Difference between life expectancy at birth between males and females (in years).
4. Incidence of tuberculosis per 100,000 population.
5. Incidence of syphilis and gonorrhoea infection per 100,000 population.

Mortality is a comprehensive indicator showing the public health situation. There are two indicators describing mortality. The first one is the crude death rate (CDR) describing the number of registered deaths, for example, per 1,000 inhabitants. The second one is the age-standardized death rate (SDR) describing what the level of mortality would be, if the age structure of the population was just as the model one (cf. Hinde, 2009; Kudelski, 1990). CDR strongly depends on the age structure of the population; therefore, SDR is more often applied in international comparisons. In this study, CDR was chosen due to an emphasis on identifying the actual health situation of populations in post-Communist countries.

Infant mortality is a very sensitive indicator of the health situation of a society, because it depends both on parents' pro-health behaviours (especially on mothers during pregnancy) and on the living conditions and the quality of medical care of a pregnant woman and then of the infant (cf. Masuy-Stroobat, 2006; Szczyt, 2006).

Most of the Eastern European countries for years have had much higher levels of premature mortality of men compared to women (Michniewicz-Ankiersztajn et al., 2013; Watson, 1995). Only the biological determinants make the average life expectancy of a man shorter than of a woman by one to two years (Abdulraheem et al., 2011; Luty, 2003; Ram, 1993). Larger differences are conditioned by non-biological factors, especially men's anti-health behaviours (such as alcoholism or nicotinism), but also safety at work or the situation in prisons.

Tuberculosis (ICD–10[2]: A15–A19) may be considered as an infectious disease associated with the level of the society's wealth, in particular its housing and sanitary conditions and nutrition. Also the level of the development of preventive screening has an impact. The progress of civilization and an improvement in living conditions meant that for a long time in economically developed countries tuberculosis seemed to be of marginal importance. But military activities or a crisis resulting in impoverishment of the society, cuts in aid and prevention programmes, etc. cause the "rebirth" of the disease[3]. A similar impact is exerted by the HIV/AIDS epidemic (difficulties in treating TB patients) and the emergence of drug-resistant TB strains (Zielonka, 2014; Sonnenberg et al, 2005; Szczuka, 2000).

In turn, sexually transmitted diseases (STD) can be considered as diseases associated, on the one hand, with the mental condition of societies (especially in the aspect of morality), and, on the other hand, with the level of the population's awareness of the risks and the level of the development of prevention programmes. Sexually transmitted diseases, especially syphilis, in fact significantly fluctuate under the influence of all kinds of disasters and crises. The analysis was based on two diseases: syphilis (ICD-10: A50-A53) and gonorrhoea (ICD-10: A54) (cf. Serwin et al., 2014).

Data taken for analysis came from two main sources. In the case of the first four variables, the source was the World Bank database. In the case of the last variable, the data source was the database of the WHO Regional Office for Europe (HFA-DB). An attempt has been made to complete lacking data primarily on the basis of statistical data coming from particular countries. If this failed, in the case of small gaps in data, interpolations were made. In the case of gaps exceeding four years – the country would be excluded from analysis.

Standard methods of analysis were applied in the study:
– to calculate the average level of intensity – a geometric mean, and a breakdown of the countries into groups was based on the

[2] ICD-10 is the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD).

[3] A good example would be an increase in tuberculosis incidence in Bosnia and Herzegovina in the aftermath of the war, from slightly above zero in 1991 to 52.5 cases per 100,000 population 5 years later (Puvacic et al., 1997).

so-called Hellwig's critical distance (Hellwig, 1968);
– to determine the similarity of the changes in the intensity, using Mc Quitty's method (Runge, 2006), the countries were joined in the same types at PPMCC of 0.800 or more;
– to calculate a synthetic index of the health situation – Perkal's index was calculated (Parysek, Wojtasiewicz, 1979).

2. Analysis

The average level of the crude death rate for years 1990–2012 ranged from 6.0 deaths per 1,000 inhabitants in Albania to 15.0 in Ukraine. By comparison, in Russia it amounted to 14.3. As expected, the situation was hardly diversified between countries, since the relative standard deviation (RSD) amounted to 22.2%.

Looking at the spatial diversity of average mortality (Fig. 1), no clear spatial patterns emerge beside the fact that this level is rather higher in post-Soviet countries.

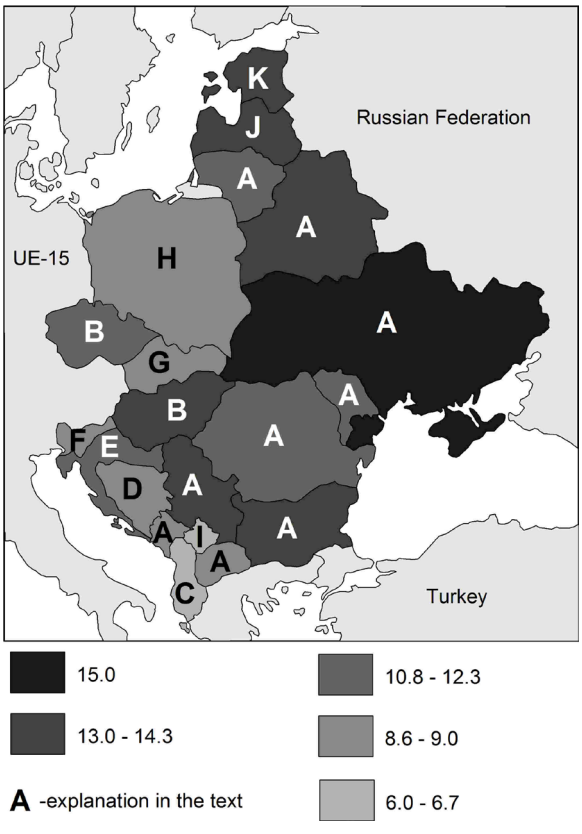

Figure 1. The mean level of the crude death rate per 1,000 population and the types of its changes over time for 1990–2012 (Source: based on the World Bank database)

Also the similarity of temporal changes in the level of the characterised mortality was analysed. We see here the dichotomy of change (Fig. 1). On the one hand, there are nine countries included in type A with an overwhelming upward trend. Transformations taking place in Moldova can be regarded representative, which can be described by the formula $y=0.18x+10.24$ ($R^2=0.99$). These are countries situated in the East and the South of the characterized area. On the other hand, there are the remaining countries with much diversified changes in the analysed death rates, and almost all of them[4] were in one-element groups. Apart from three countries (Bosnia and Herzegovina[5] and Estonia and Latvia[6]), rather small changes in the death rate are a common feature of these countries. And apart from the Czech Republic[7], no major changes in the situation between the beginning and the end of the analysis period can be seen.

Trying to explain such and no other temporal and spatial variation in the crude death rate, it should be noted that it is a result of several factors, of which the following should be regarded as the most important ones:
– demographic old age of the societies, because age directly affects the likelihood of death;
– the level of prosperity of the societies as it affects the quality of the functioning of the public health care system, on the one hand, and the citizens' health related behaviour on the other hand (Bobak et al., 2000; Brainerd, 1998);
– cultural determinants, primarily their impact on the spread of anti-health behaviour (especially alcoholism and tobacco use), but also other factors, such as the spread of corruption in the health sector (Shakarishvili ed., 2005).

[4] Apart from the Czech Republic and Hungary being in one type: B.
[5] For which the maximum occurred from 1992 to 1994.
[6] For which there has been a clear maximum for the period of 1993-1995.
[7] There has been a clear downward trend, which can be described by the formula $y=-0.76\ln(x)+12.53$ ($R^2=0.95$).

The average level of estimated infant deaths for years 1990–2013 fell in the range of 4.3 per 1,000 live births in Slovenia to 21.6 in Albania and Moldova[8]. For comparison, in Russia it amounted to 16.1. The diversity of the situation in the analysed respect between countries was significant because the relative standard deviation (RSD) amounted to 43.8%.

Looking at the spatial diversity of the analysed type of mortality, we see a dichotomy of the surveyed area (Fig. 2). A worse situation exists in the south and the south-east, and a better one in its remaining part.

In all countries, changes in the level of estimated infant deaths were very similar to each other; hence all countries were put in one type A (Fig. 2). Everywhere there is a clearly visible downward trend, particularly large one in the case of countries with an initially high level of mortality, such as Albania, Macedonia and Romania[9]. In addition, in the first half of the 1990s in some countries (Belarus, Bulgaria, Lithuania, Latvia, Moldova, Ukraine) slight increases in the discussed infant mortality were noted, which only later changed into a declining trend.

Trying to explain such and no other temporal and spatial diversity of the level of estimated infant deaths, first and foremost one should pay attention to the improvement in medical care of the pregnant woman and the infant as a result of technological progress. However, the factors mentioned below influence the spatial diversity of the situation in the region, rather than the trend of changes:

– the level of the society's prosperity because, firstly, it affects the quality of functioning of the public health care system; secondly, it defines the citizens' financial resources for medical care; thirdly, it influences the housing conditions of the pregnant woman and then the infant;
– cultural determinants, primarily the status of women in the society, but also other factors, such as, for example, corruption in the health sector.

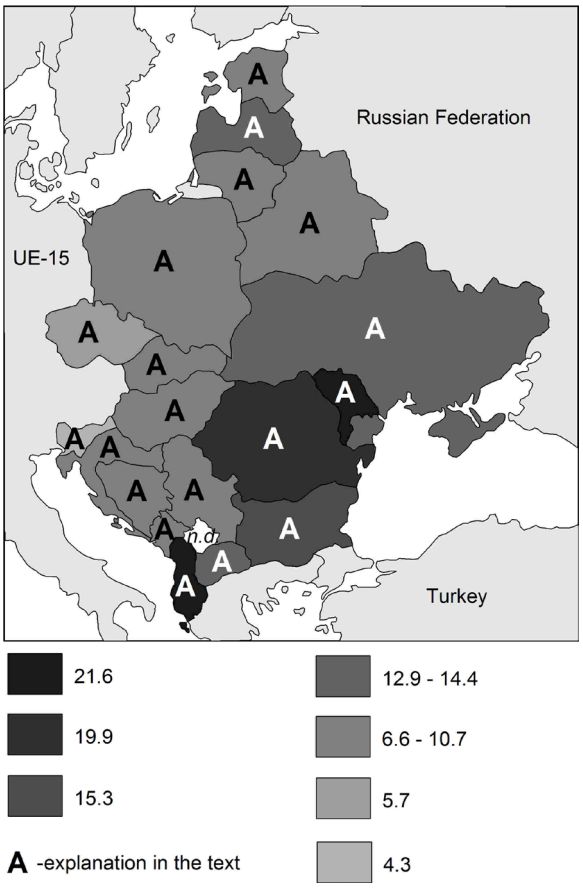

Figure 2. The mean level of estimated infant deaths per 1,000 live births and the types of its changes over time for years 1990–2013 (Source: based on the World Bank database).

The average level of differences in the mean life expectancy at birth for women and men for years 1990–2012 ranged from 4.2 years in Kosovo to 11.4 in Belarus. For comparison, in Russia it was even higher, as much as 12.3. The diversity of the situation between countries in the analysed field, for such a variable, can be considered high, because the relative standard deviation (RSD) reached the value of 27.9%.

In the whole area the average life expectancy for men is much shorter than for women than it would seem based on biological determinants. A particularly unfavourable situation can be seen in the countries of the former Soviet Union[10] (except Moldova) (Fig. 3). By contrast, the smallest differences were reported in the Balkans[11].

Tracking changes over time in the differences between the average life expectancy at

[8] Due to the lack of data, Kosovo was excluded from analysis.
[9] This can be adequately described by the following formulas: $y=37.31e^{-0.044x}$ ($R^2=1.00$); $y=33.61e^{-0.068x}$ ($R^2=0.97$); $y=-0.94x+32.87$ ($R^2=0.99$).
[10] Also Russia (not directly analysed) should be included in this group.
[11] From 4.2 to 6.1 years in Kosovo, Macedonia, Serbia, Montenegro and Albania.

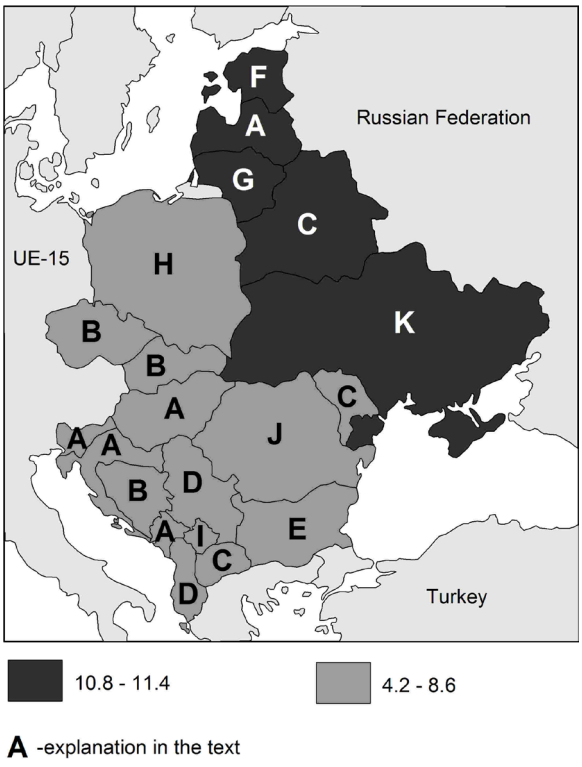

Figure 3. The mean level of life expectancy at birth for women and men (in years) and the types of its changes over time for years 1990–2012 (Source: based on the World Bank database).

birth for women and men, one cannot oversee one clear pattern (Fig. 3). There are four groups with more than one element (A÷D) and seven one-element groups (E÷K). In addition, no clear spatial patterns in the spatial distribution of countries belonging to the first four groups are visible. By analysing the very changes in time, we cannot notice any particular regularities or greater changes. A very high level of these differences in Bosnia-Herzegovina in the first half of the 1990s[12] is an exception, but this can be explained by the civil war. But, for example, for the Republic of Moldova no such changes caused by the war of Transnistria can be noticed.

While attempting to explain such temporal and spatial diversity of the differences between average life expectancy at birth for women and men, first of all one should pay attention to cultural factors. In the first place, this will be an extremely high intensity of anti-health behaviours among men in the former Soviet Union, especially alcoholism and nicotine use (cf. Cockerham et al., 2006). This is partly due to widespread alcoholism of the vodka type (Levchuk, 2009) still in the times of Imperial Russia, and partly it is an element of the *homo sovieticus*. The cultural factor associated with a lower status of women in some areas being under the dominion of the Ottoman Empire in the past seems to be of minor importance.

The average level of the incidence of tuberculosis for 1990–2012 ranged from 13.7 per 100,000 inhabitants in the Czech Republic to 152.4 in Romania[13]. By comparison, in Russia it was 104.0. As predicted, the diversity of the situation in this respect between countries was high because the relative standard deviation (RSD) amounted to 67.7%.

In the whole discussed area the average level of the incidence of tuberculosis showed spatial regularities (Fig. 4). A worse situation was in the countries of the former Soviet Union (except Estonia) and in Romania.

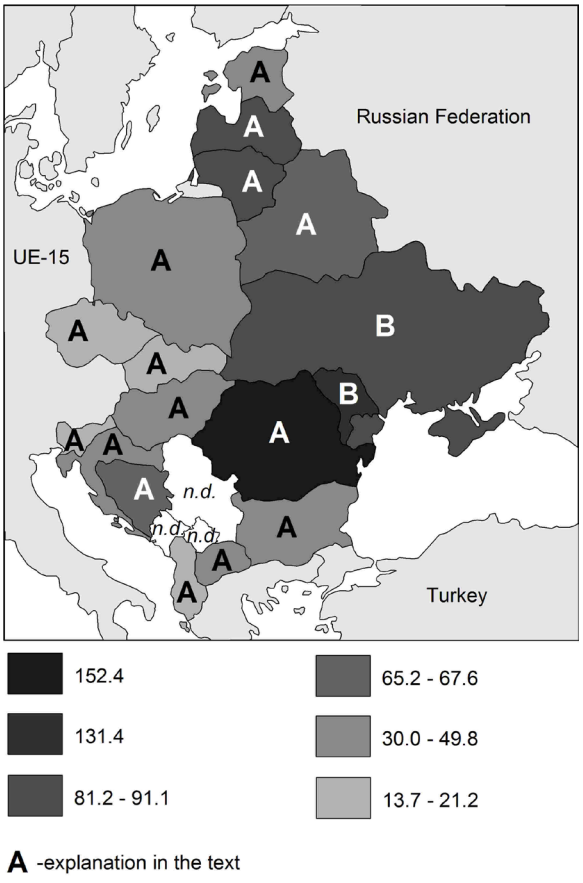

Figure 4. The mean level of the incidence of tuberculosis per 100,000 people and the types of its changes over time for years 1990–2012 (Source: based on the World Bank database).

[12] In 1993, these differences were as much as 14.9 years, while the mean for the years 1999 to 2012 is 5.0 years.
[13] Due to lack of data or incomplete data, Kosovo, Montenegro, and Serbia have been omitted from the analysis.

With regard to changes in the level of the incidence of tuberculosis, nearly all countries[14] were put in one type A. However, countries included in it are partly differentiated among one another in terms of the incidence rate intensity. Extreme courses are designated by Latvia, with a clear increase in the incidence rates in the second half of the 1990s, which only in the next period changed into a downward trend[15], and Macedonia with a clear downward trend maintained throughout the period[16]. In turn, Moldova and Ukraine (classified as type B) throughout most of the analysis period were characterised by an increase in the incidence rate, which only around 2005 turned into a decline[17].

Trying to interpret temporal and spatial diversity of the incidence of tuberculosis, we should primarily pay attention to cultural factors and only then to the economic ones. In the countries of the former Soviet Union (except Estonia), the analysed situation is constantly unfavourable, which can be explained by poor functioning of the health care system (for financial reasons, but also due to corruption), the residents' reluctance to examinations or the spread of alcoholism. However, tracking changes in the incidence of tuberculosis in Bosnia and Herzegovina, Moldova and Ukraine we also observe a relationship between destabilisation of the country as a result of war or a very bad economic situation and changes in the level of the incidence of tuberculosis. Romania with still a high incidence of tuberculosis takes a special place in the analysis. Ibraim et al. (2010) pay attention to the terrible state of the public health care system in Romania insofar as the prevention and treatment of tuberculosis and the lack of consistency in the treatment of patients, while J. Stillo (2012) additionally emphasises the role of poverty and poor social welfare.

The average level of the joint incidence of syphilis and gonorrhoea for 1990–2012 ranged from 0.8 per 100,000 inhabitants in Macedonia to 153.7 in Moldova[18]. By comparison, in Russia it was even more, as much as 187.7. As expected, the diversity of the situation in this respect between the countries was very high, as indicated by the value of the relative standard deviation (RSD) of as much as 101.1%.

In the whole area the average level of the incidence of the discussed STD showed the regularities similar to those in the case of tuberculosis. That is to say, countries belonging to the USSR in the past had a definitely worse situation. It was better in the other post-Communist countries. While for Bulgaria, Bosnia and Herzegovina, Montenegro, Serbia and Slovakia there are not complete data, on the basis of the partial ones, it can be concluded that also in them the incidence of syphilis and gonorrhoea was low, not exceeding the average value[19] of 9.5 per 100,000 inhabitants.

Focusing on temporal changes in the level of the joint incidence of syphilis and gonorrhoea, a clear distinction into two numerous groups plus a single-element one containing Romania (Fig. 5) is noticeable. Type A comprises almost all (except Romania) the analysed countries that in the past did not belong to the Soviet Union. They are characterised by a marked downward trend in the incidence of both diseases. The boundaries of this decline are designated on the one side by changes in the Czech Republic ($y=83.21x^{-0.606}$, $R^2=0.82$) and on the other one in Macedonia ($y=-2.19\ln(x)+6.29$, $R^2=0.85$). Type B comprises post-Soviet countries[20]. Their characteristic feature is an increase in the incidence for the period of 1994–1996 (the maximum depending on the country), and then its decline, albeit with fluctuations. Changes in Latvia may be considered representative of the countries of this type,

[14] Except for Moldova and Ukraine included in type (B).

[15] In a satisfactory way we can only express these changes by means of the following formula: $y=0.066x^3-2.883x^2+32.96x+18.91$ ($R^2=0.99$).

[16] We can express this by means of the formula: $y=86.72e^{-0.067x}$ ($R^2=1.00$).

[17] These changes can be respectively described by formulas $y=-0.42x^2+15.24x+34.44$ ($R^2=0.99$) and $y=-0.37x^2+11.81x+23.53$ ($R^2=0.97$).

[18] Due to the lack of data or incomplete data, Bosnia and Herzegovina, Bulgaria, Kosovo, Montenegro, Serbia, Slovakia have been omitted from the analysis.

[19] Calculated for particular countries for different years.

[20] Plus Russia excluded from direct analysis.

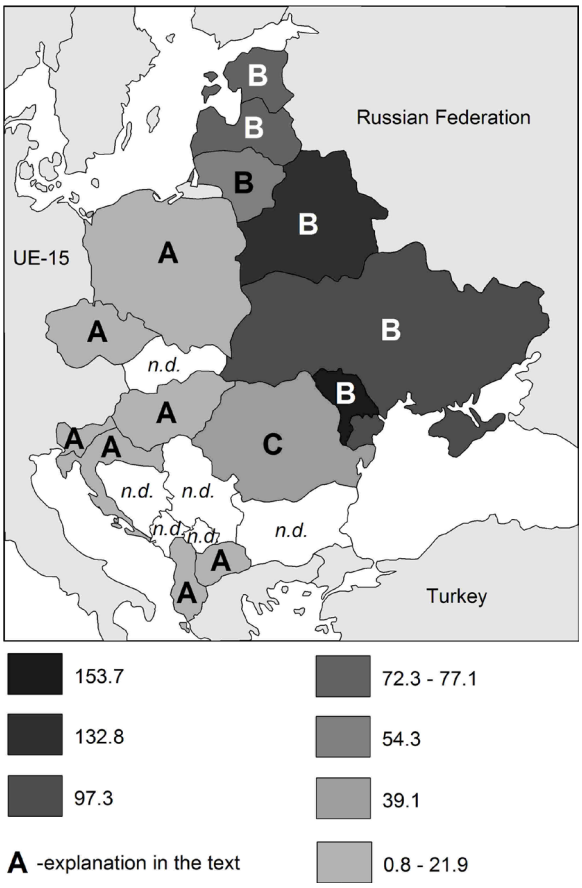

Figure 5. The mean level of the joint incidence of syphilis and gonorrhoea per 100,000 population and the types of its changes over time for years 1990–2011 (Source: based on the HFA-DB database).

and they can be described by the formula: $y=0.16x^3-5.84x^2+50.50x+56.00$ ($R^2=0.85$). In turn, changes in Romania, included in type C, slightly resembled the changes in the countries included in type B, although the maximum occurred in 2001-2002, only to plunge afterwards.

When trying to explain the spatial differentiation of the intensity of STD incidence and its changes over time, the greatest attention should be paid to cultural determinants. On the one hand, in fact, a rapid deterioration of the situation in post-Soviet countries may be considered to be a moral effect of the dissolution of the USSR with its heavily exposed Soviet morality. On the other hand, the already mentioned widespread alcoholism in those countries is of great importance. A low level of prevention is also of significance (cf. Mavrov, Bondarenko, 2002). These negative processes did not occur with such severity or did not take place at all in post-Communist countries not belonging to the Soviet Union in the past. Pretending by the authorities of some post-Soviet countries that they have no health problems associated with the spreading of STD, especially HIV/AIDS is also of some significance. This is particularly evident in Russia.

3. Synthetic evaluation

To assess synthetically the differentiation and changes in the health situation in the analysed period in post-Communist countries, Perkal's synthetic index was used. First, all five variables were standardized, and then the synthetic indicator was calculated on their basis. Because all variables are destimulants, so the higher the value of the index, the worse the situation.

The results are shown in Figure 6. Since complete data are not available for all countries, the decision was made to supplement the statistical analysis with the behavioural one. As a result, the following countries were assigned to the types of countries distinguished at the stage of statistical analysis: Bosnia and Herzegovina, Bulgaria, Montenegro, Serbia, and Slovakia[21]. However, in the case of Kosovo, the data were considered too scarce to assign it to any of the types.

Four groups of countries differing from one another in the health situation in the period of 1990–2012 were distinguished (Fig. 6). Still, it should be noted that in the case of countries marked with "?" this classification is partial, because of incomplete statistical data. The first two groups (with a relatively good or average health situation) include the former Communist countries that in the past did not belong to the former Soviet Union. All post-Soviet countries plus Bulgaria and Romania[22] qualified as countries with a poor or very poor health

[21] In Figure 6 in those countries "?" was placed to indicate that this is not an effect of a full statistical analysis.

[22] Such a division largely corresponds with the classification proposed by Michalski (2010) for the period of 1990–2003 made on the basis of partly different variables.

situation. Not directly analysed Russia should also be classified as a country with a very poor health situation.

An analysis of the changes of the health situation included only countries for which data were full. All of them were in one type A (Fig. 6). However, significant differences exist among them. On the one hand, there are countries in which the health situation is constantly improving: Albania, Croatia, the Czech Republic, Macedonia, Poland, Slovenia, Hungary. On the other hand, there are post-Soviet countries, in which a deterioration of the situation was initially noted, which only in the period of 1994-1996 (the maximum depending on the country) shifted into a downward trend: Belarus, Estonia, Latvia, Lithuania, Moldova, Ukraine. Intermediate changes between these two subtypes were reported in Romania.

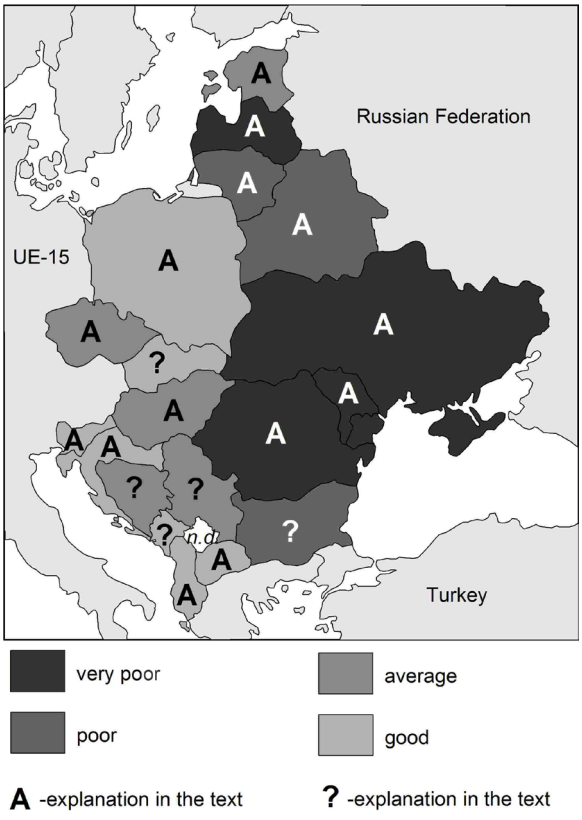

Figure 6. A synthetic evaluation of the health situation in the period of 1990–2012 (Source: based on the World Bank database and the HFA-DB database).

Analysing the health situation and its changes in time, one should primarily pay attention to two factors that seem to have a decisive influence. The first one is the fact of belonging or not to the former Soviet Union – as post-Soviet countries are characterised by a worse health situation. The causes of this condition should be found first and foremost in cultural determinants related to the *homo sovieticus* and to the economic situation. Among the cultural determinants these are mostly widespread anti-health behaviour, especially alcoholism of the vodka type and tobacco use as well as corruption in the health sector in post-Soviet countries. The economic situation also partly results from the previously mentioned division into post-Soviet countries and the remaining ones (because economies of the former ones very painfully felt the disintegration of the Soviet Union), but, above all, from the direction and the pace of the transition from the centrally controlled economy to the free market one (Bąk, 2006). In fact, relatively prosperous societies, in the absence of the influence of other factors, will always be characterised by a better health situation, because both the state and the citizens can allocate greater financial resources to preserve health.

Of secondary importance are regional factors, such as: substantial demographic age in some societies (especially Bulgaria), the status of women as a result of historical circumstances (a lower one in the south of the analysed region), civil wars (part of the countries of the former Yugoslavia and Moldova), and a different diet (healthier in the South).

Referring to the epidemiologic transition theory (Wróblewska, 2009), one may have an impression that there are two different versions among the analysed countries. While the situation in countries with the most advanced political, social and economic reforms (simply speaking: the former Communist countries which are currently members of the European Union, with reservations about Bulgaria, Estonia, Latvia, Lithuania and Romania) increasingly seems to resemble a hybrid stage, the situation is unusual in countries which failed to carry out reforms (in particular: Albania, Kosovo, Moldova, Ukraine, partly Belarus and Bosnia and Herzegovina). This primarily results from the advancing pauperisation of societies in effect of wars and/or the lack of reforms. But accurate confirmation of these hypotheses requires separate empirical research.

In addition, it should be noted that in the near future migration will have a clearly negative impact on the health situation of the

population in this part of Europe. In the initial period after the fall of the USSR these were post-imperial migrations and mainly involved Russians or the Russian-speaking population returning from countries previously occupied by Moscow[23] (Brunarska, 2013). Migration within Germany is an exception here (cf. Szymańska et al., 2009). At present these are mostly economic migrations. These processes clearly have gained momentum since 2004, when the EU was expanded for the first time including post-Communist countries and have been associated with emigration of the inhabitants of these countries to the rich member states of the EEA area. But today, in view of the apparent crisis in Belarus, Russia and Ukraine, one can also expect an increased influx of economic emigrants from those countries. These migrations, involving mainly individuals in a mobile economically productive age, will result in quick ageing of the populations of the analysed countries and depopulation, and hence, deterioration of the health situation in them (cf. Sojka, 2012, 2014).

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[23] However, it must be stressed that there are other authors who draw quite reverse conclusions on the basis of the same data (e.g. Kuznetsova, 2010).

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