INTRODUCTION

Stillbirth rate is a global health problem - essential indicator of population health and it is much more common than expected. Stillbirths are invisible in many societies and on the worldwide policy agenda, but are very real to families who experience a death [1]. Worldwide in 2015, for every 1000 total births, 18.4 babies were stillborn, mostly in low- and middle-income countries. Progress in reducing this rate has been slow and if its trend would remain unchanged, then 160 years will be needed for a pregnant woman in Africa to have the same chance of her baby being born alive as a woman in a high-income country today [2]. Even in high-income countries, stillbirth rates vary from 1.3 to 8 per 1000 births - a variation that shows further improvements are possible [3, 4].

The International Classification of Diseases (ICD) and WHO recommendations are now widely recognized and used for reporting of stillbirth rates, enabling comparisons between countries whilst recognising other definitions might be applied for internal use [5]. Variability in definitions occurs mainly among high-income countries with a range from 20 weeks of gestational age or more, with many countries reducing the gestational age of reporting due to increasing survival at earlier gestational age with the improvement in neonatal intensive care.

One of the major challenges in Millennium Development Goals was to reduce by two-thirds the mortality under the age of 5 and to achieve a significant reduction in the child mortality between 1990 and 2015 (Goal 4) [6]. A number of regions, including the European region, have reached this goal.

Globally, under-five mortality rate has decreased by 58%, from an estimated rate of 93 deaths per 1000 live births in 1990 to 39 deaths per 1000 live births in 2017. Despite the population growth in developing regions, the number of under-five deaths has fallen from 12.7 million to 6 million in 2015 [7].

In 2017, 4.1 million (75% of all under-five deaths) occurred within the first year of life. Infant mortality has been reduced globally from 63 per 1000 live births in 1990 to 32 per 1000 in 2015, from 8.9 million to 4.5 million [8]. For the European region this trend is even more significant:

- U5MR - from 19.5‰ for 1990 to 9‰ in 2017;

Along with this unprecedented progress, a serious global problem continues to be stillbirth rate. WHO reports 2.6 million stillbirths in the world for 2015 which means 7178 per day. Most of them occur in developing countries, but the problem is also important for Europe in the context of an aging population, low birth rates and highly expressed socio-economic inequalities.

In 2011, Lancet launched a series of significant articles dedicated to stillbirths [9, 10, 11, 12, 13]. In 2016, Editor-in-Chief Richard Horton emphasized: “Not all global health problems are really global, but the neglected breakout of stillbirths is very worrying” [14, 15, 16]. Today, stillbirth rate is seen as an integral part of the Global Sustainable Development Goals adopted by the UN General Assembly in 2015 and by the Global Health Strategy for Women, Children and Adolescents [17].

The aim of this study is to analyse the trends of stillbirths in the European region and its correlation with countries’ socio-economic development and some other factors related to maternal and children health.
METHODS

Data on stillbirths were derived from the European database "Health for All". Out of 53 countries in WHO European Region, three small countries with a population of less than 100,000 (Andorra, Monaco and San Marino) were excluded, as well as Albania and Turkey for a large data incompleteness.

Due to the significant societal transformations in European Region, data for 2013-2015 were compared with 2000 when most European countries have complete data. The 48 selected countries were classified into four groups according to the newest World Bank ranking 2018-2019 by Gross National Income (GNI) per capita [18]:

1. Low-income < 995 US$
2. Lower-middle income 996 - 3,895 US$
3. Upper-middle income 3,896 - 12,055 US$
4. High-income > 12,055 US$

The same criteria were applied for the years 2000 and 2015, which made it possible to better track the changes in the countries' development.

The level of stillbirth rates in 2000 and 2013-2015 was analysed in relation to the following variables:

- infant mortality rate (per 1000 live births);
- the proportion of live births to mothers aged under 20 years;
- Gross National Income per capita;
- crude birth rate (per 1000 mid-year population).

The data were processed with IBM SPSS v.24. The following descriptive statistics were applied:

- distribution of countries by GNI level;
- average stillbirth rate and other analysed variables by groups of countries;
- correlation coefficients;
- scatter diagrams.

RESULTS

First step in our research was to categorise all countries in WHO European region according to World Bank ranking. The comparison between 2000 and 2013-2015 presents many changes – 12 countries have moved from middle-income countries to high-income countries, 8 countries - from low-income to middle-income. Tajikistan is the only country in European region, which is still in the group of low-income countries. (Figure 1) The distribution of European countries by GNI is changing in a positive direction, with an increase in the proportion of high-income and upper-middle income by 2015. (Table 1)

The analysis of stillbirth rates in the selected 48 European countries shows vast differences in the value of this indicator. The low-income countries have 2-3 times higher stillbirth rate in comparison with high-income ones. The trend observed in Figure 1 in comparing 2000 and 2013-2015 manifests that for the most groups of countries the value of stillbirth rate is increasing, which may be due to changes in the GNI categorization of the countries.

The same results were observed in further analysis of the four selected independent variables (Figure 2):

- Gross National Income per capita;
- crude birth rate (per 1000);
- infant mortality rate;
- the proportion of live births to mothers aged under 20 years.

As it can be seen, the comparison of the four groups of countries by the absolute level of GNI displays enormous differences. While in high-income countries the average level of GNI for 2013-2015 has reached $37640, on the other site, in low-middle income countries it has been only $2662 (about 15 times less). With Tajikistan, the only low-income country where GNI is equal to $990, the distortion is even near to 40 times. The expressed health inequalities between different groups of countries underline that they could be overcome by greater societal efforts for the improvement of socio-economic conditions in low-middle income and low-income countries and by more effective support of high-income European countries.

The crude birth rate is about two-times higher in the poorer countries. At the opposite site, infant mortality rate in these countries is more than 3-times higher compared to high-income countries. The same trend is presented in the proportion of live births to mothers aged under 20 years. For the latest years, the difference between high- and low-/low-middle income counties is around 4 times.
As far as the correlation with the gross national income is concerned, it is significant and negative (inverse). The relation of stillbirth rate with crude birth rate shows significance for the period 2000-2015 ($r=0.460$, -tailed significance $p=0.001$).

The above correlations were supported by scatter diagrams, presented at Figures 3, 4 and 5.

Table 2. Correlation coefficient for analysed variables

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<td>Pearson r</td>
<td>Signif. (2-tailed)</td>
<td>Pearson r</td>
<td>Signif. (2-tailed)</td>
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<tr>
<td>Gross National Income per capita</td>
<td>-0.444</td>
<td>0.002</td>
<td>-0.320</td>
<td>0.027</td>
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<tr>
<td>crude birth rate</td>
<td>0.138</td>
<td>0.349</td>
<td>0.460</td>
<td>0.001</td>
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<tr>
<td>infant mortality rate</td>
<td>0.571</td>
<td>0.000</td>
<td>0.541</td>
<td>0.000</td>
</tr>
<tr>
<td>the proportion of live births to mothers aged under 20 years</td>
<td>0.649</td>
<td>0.000</td>
<td>0.502</td>
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spect to Gross National Income. Its impact is very important as GNI may be considered as “the cause of causes” and determines the levels of all other variables, especially for infant mortality.

Correlation between stillbirth rate and the proportion of live births to mothers aged under 20 years and infant mortality is quite strong. Thus, the reduction of teenage pregnancies and births would contribute to visible improvement of stillbirths.

The issue of foetal death is an important global health problem and this is completely valid for the European region in socio-economic development and population health status.

The analysed data about the stillbirth rate and a number of factor variables showed that significant progress has been made in European region in socio-economic development and population health status.

The classification of European countries by GNI displays significant differences between countries and a positive trend, with an increase in the proportion of high and upper-middle income countries. The study identified serious variations in the levels of all analysed variables with respect to Gross National Income. Its impact is very important as GNI may be considered as “the cause of causes” and determines the levels of all other variables, especially for infant mortality.

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**CONCLUSIONS**

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European region. Its significance is further enhanced by taking into account the fact that all present and foreseeable data on the size and age structure of European population are highly pessimistic.

Efforts to further improvement in maternal and child health to implement the Global Strategy on Women’s and Children’s Health and the fight for any saved foetus should be a priority for all countries. Traducere: Dr. Mihaela Gălăon

Figure 5. Scatter diagrams of correlation between the proportion of live births to mothers aged under 20 years and still-birth rate, 2000, 2013-2015

the proportion of live births to mothers aged under 20 years, 2000, 2013-2015

References
4. VICKI FLENADY, PHILIPPA MIDDLETON, GORDON C SMITH et al, Stillbirths: the way forward in high-income countries, for The Lancet’s Stillbirths Series steering committee, Lancet 2011; 377: 1703–17