

AN ANALYSIS OF VITAL STATISTICS AND DEATH CAUSES EVOLUTION IN ROMANIA IN 1990-2010 PERIOD

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Abstract:

In the last two decades the population of Romania had always a negative natural increase. On the other hand the population age structure has changed significantly. This paper, based on these general findings, analyzes in parallel with births and deaths dynamics, the evolution of the main causes of death in the period analyzed, both numerically and of the structural changes.

Key words: statistical analysis, dynamics, causes of death

JEL classification: C44, C46

General considerations

Political changes, social and economic which started in December 1989 had, over the past two decades, a significant impact on the dynamics of population by age, and on the main causes of death. The liberalization of abortion, changes in lifestyle, priorities shift and not least, some changes in individual behavior of citizens, made their mark on birth and hence on the natural increase of population in Romania.

To capture these aspects, the paper has started from the statistical series published by the National Institute of Statistics about Romania's population. For the analysis performed, have been using absolute indicators: Population by age group and sex, on July 1, Live-births, Deaths, Natural Increase, Infant Deaths, Deaths by causes deaths, Deaths by age group and sex.

The relative indicators used are: Birth rate per 1000 inhabitants, Mortality rates per 1000 inhabitants, Infant mortality rate per 1000 live births, Mortality specific rates per 1000 inhabitants. Also, in some cases, Mortality rates and Specific mortality rates were calculated per 100000 inhabitants

The dynamics of population by age group and sex in 1990-2010 period

On July 1, 1990 population structure by age and sex looked like a pyramid (Figure 1). On July 1, 2010 graphical representation is significantly different (Figure 3). This situation is a consequence of the fact that since 1992 mortality rate has exceeded birth rate, leading to a negative natural increase of Romanian's population.

Thus, if on the July 1, 1990, the population in the age group of 0-4 years counted a total of 1,804,577 inhabitants of which 920,789 men and 883,788 women, due to significantly reduce of the birth rate from 13.6 life-births per 1,000 inhabitants in 1990, to 11.0 life-births in 1993, the population aged 0-4 years declined to 1,344,603 inhabitants in 1994, representing a decrease of 25.49%. The trend of declining birth rate was maintained until 2002 when it reaches the minimum level of 9.7 life-births per 1000 inhabitants after that, although it has a slight increase in 2009 reaching 10.4 life-births, in 2010 dropped to 9.9 life-births per 1000 inhabitants.

In the same period, except for 90-92 years, mortality rate, as shown in Figure 2, ranged from 12.7 deaths per 1000 inhabitants in 1996 and 11.6 deaths in 2001. In 2010 there was a mortality rate of 12.1 deaths compared to 9.9 life-births per 1000, natural increase rate of population of Romania being of -2.2.

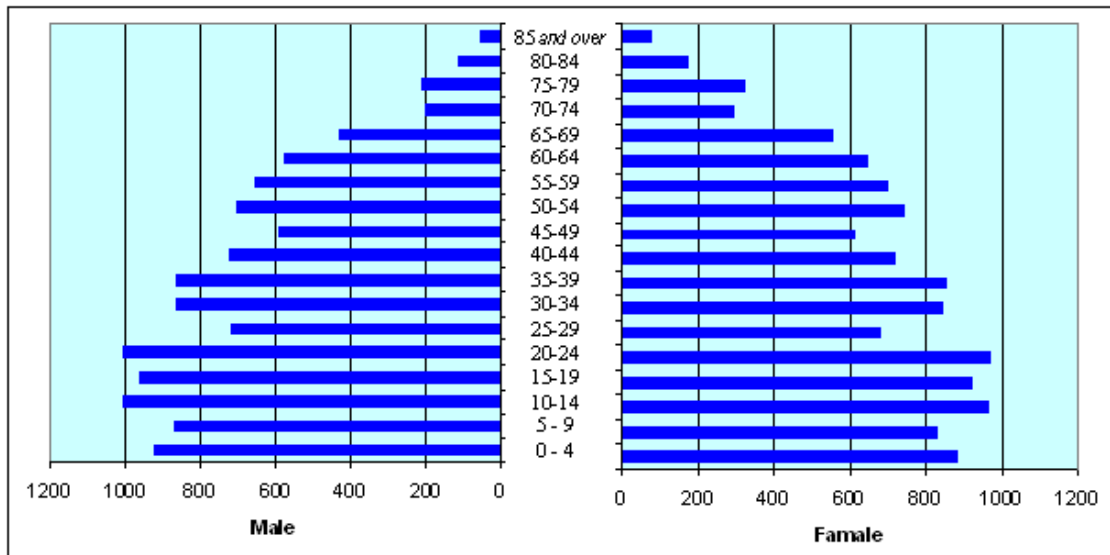


Figure 1 Population by age group and sex on July 1 1990 (thou persons)

The consequences of these evolutions can be seen in Figure 3. Population who in 1990 was in the age groups between 0 and 29 years comprised 10,716,540 people, respectively 46.81% of total, in 2010 there is in the age group between 20 and 49 counting 9,721,416 inhabitants, accounting for 45.36 % from total population, while in the same year, the population aged 0-29 years counts 7,781,483 inhabitants, with a share of only 36.31%. The aging of population is obvious.

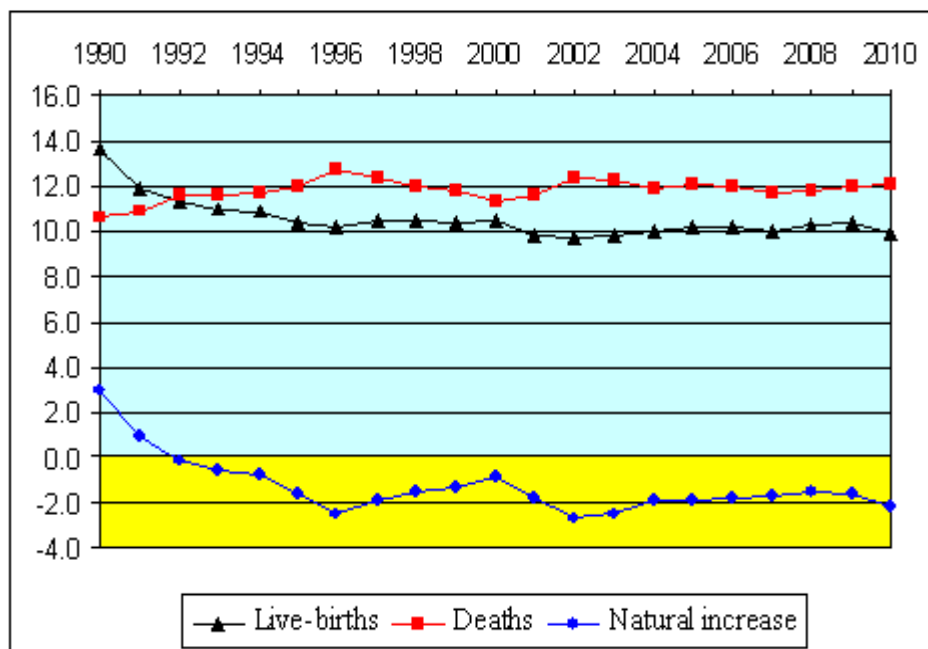


Figure 2 The evolution of life-births, deaths and natural increases rates per 1000 inhabitants, by the main death causes in 1990 – 2010 period

In terms of mortality evolution in the period 1990-2010, overall, for age groups over 4 years are not significant changes in specific rates of mortality, gender distribution, as shown in Figures 4 and 5 are similar. As numerical absolute values, however, are significant differences due, mainly, to reduce birth registered after 1992.

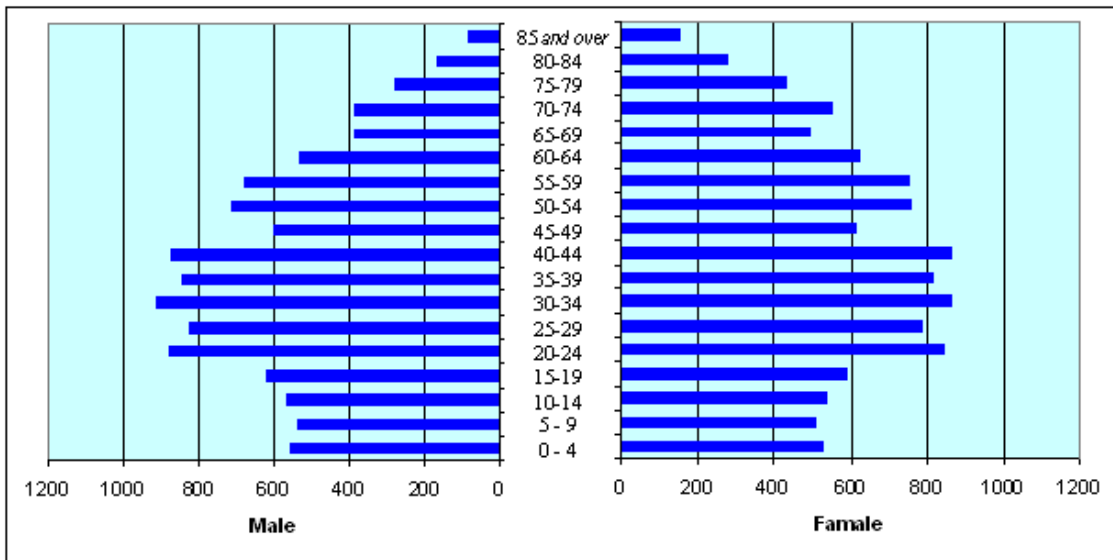


Figure 3 Population by age group and sex on July 1 2010 (thou persons)

Also, a different situation is recorded for the population between 0 and 4 years. Thus, in 1990 the number of deaths in this age group was 11,227 children (48.39 deaths per 100,000 inhabitants) of the 6312 males and 4915 females (Figure 4). Their large number was determined by a rate of 26.9 infant deaths per 1,000 life-births.

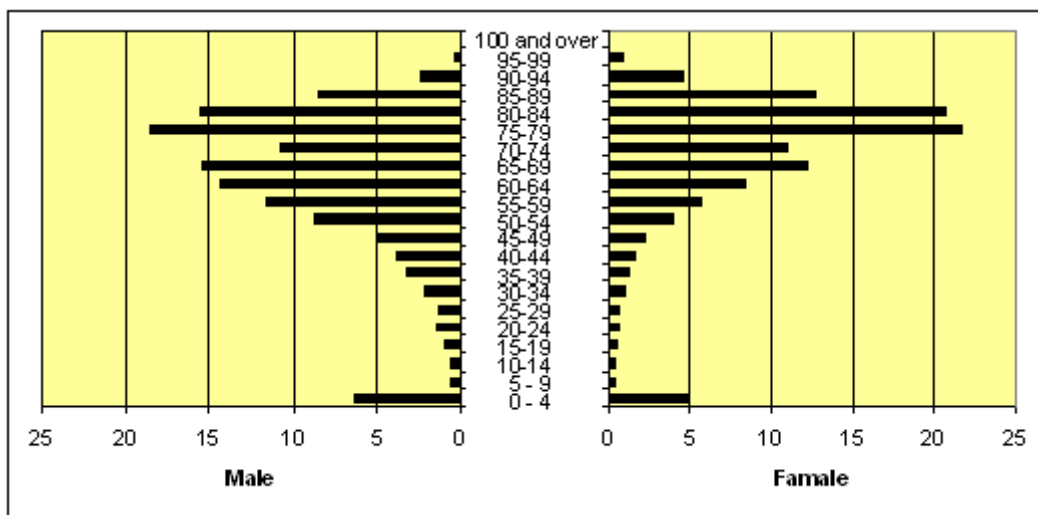


Figure 4 Deaths, by age group and sex in 1990

As a positive evolution, in the two decades that followed, the death rate declined significantly, in 2010 reaching a value of 9.8 infant deaths per 1000 live-births, bringing the indicator to the values recorded in the European Union, but higher than them.

The result of this evolution of the infant deaths per 1000 live-births was that the deaths of persons in this age group decreased to 1407 (6.56 deaths per 100,000 inhabitants) of which 791 males and respectively 616 females. The overall infant deaths rate per 100,000 inhabitants recorded in 2010 a value of 7.38 times lower than in 1990.

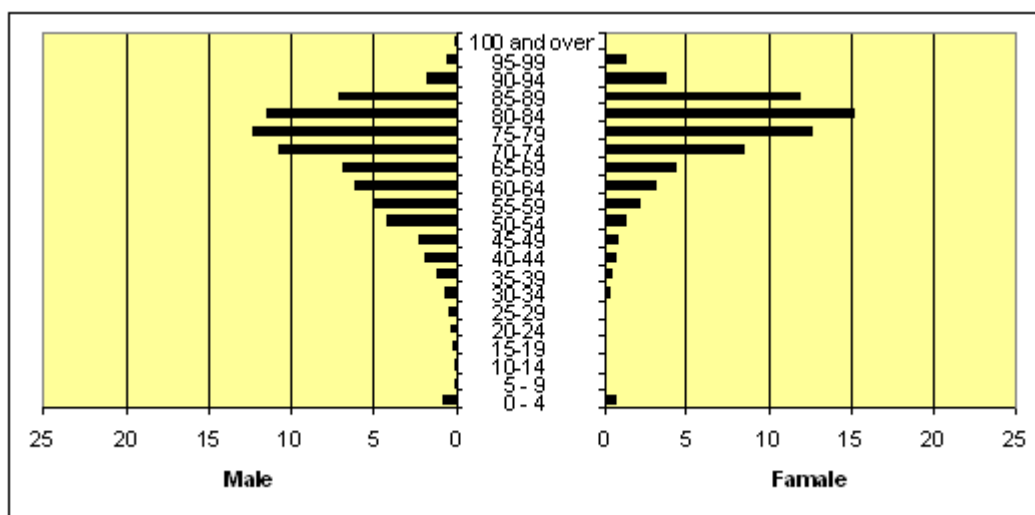


Figure 5 Deaths, by age group and sex in 2010

The evolution of deaths causes in 1990-2010 period

Changes in population structure by age in the period 1990-2010 and socio-economic development, during this period had an influence on the percentage of causes of death in the total deaths, and on their evolution.

Analyzing by the structural point of view, in 1990, leading causes of death were (Figure 6): diseases of circulatory system (59%), neoplasm (13%), diseases of respiratory system (9%), injury, poisoning and other external causes (7%), diseases of digestive system (5%) and other causes (7%). The category of other causes of death included cases whose share in total deaths is less than 1%, including: infectious diseases and parasitical, endocrine, nutritional and metabolic diseases, mental and behavior, Disorders, diseases of the nervous system, diseases of the genitourinary system, congenital malformations, deformations, and chromosome abnormalities and other.

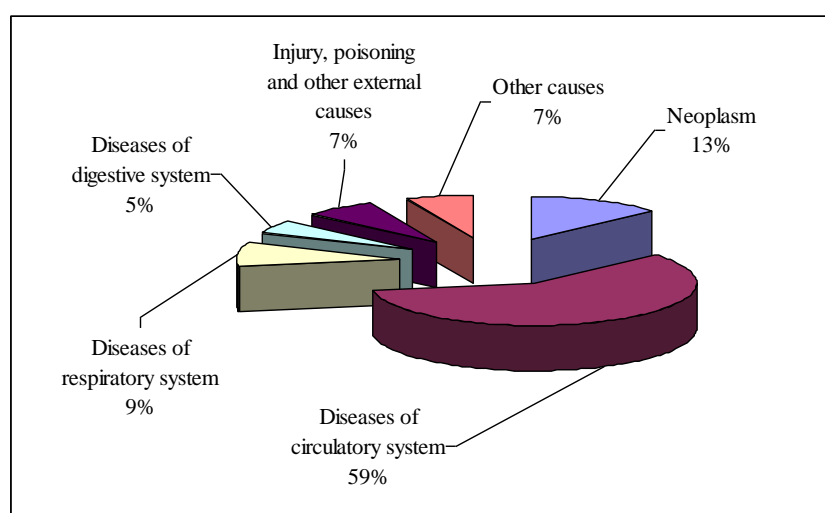


Figure 6 The percentages of the main death causes in 1990

Analyzing the structure of causes of death recorded in 2010 (Figure 7) we find that the main causes of death remained the same. But they were changed their weights. The main cause of death is diseases of circulatory system, increasing its share from 59% in 1990 to 60% in 2010. In second place is situated neoplasm, whose share in total deaths increased significantly from 13% in 1990 to 18% in 2010. Causes of death included in groups of respiratory system diseases, of injury, poisoning and other

external causes, and of digestive system diseases have reversed their positions. Thus, while deaths from diseases of respiratory system decreased from 9% in 1990 to 5% in 2010, and deaths from injury, poisoning and other external causes decreased from 7% in 1990 to 5% in 2010, the deaths from diseases of digestive system increased from 5% in 1990 to 6% in 2010.

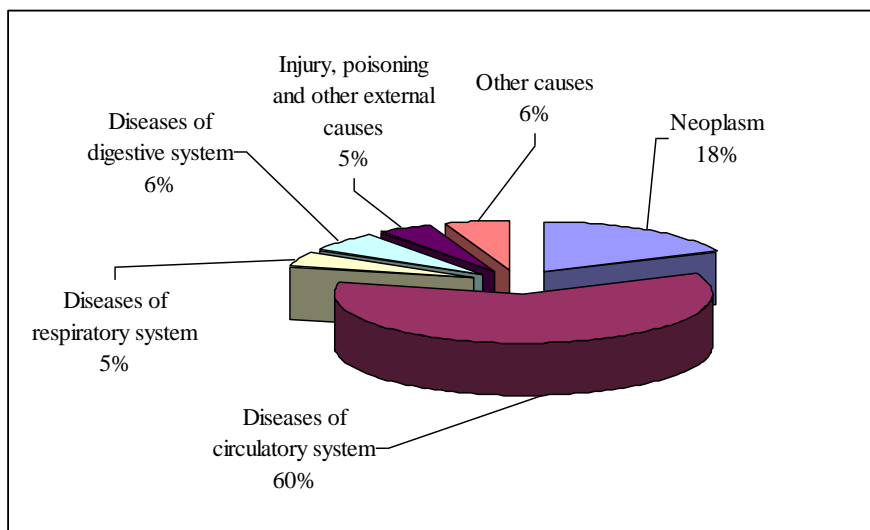


Figure 7 The percentages of the main death causes in 2010

In conclusion, in the period 1990-2010, on the one hand due to changes in population age structure (aging them), and secondly as a result of economic and social developments, increased shares of deaths from circulatory system diseases, cancer and diseases of digestive system. At the same time have low weights the deaths of respiratory system diseases and of injury, poisoning and other external causes.

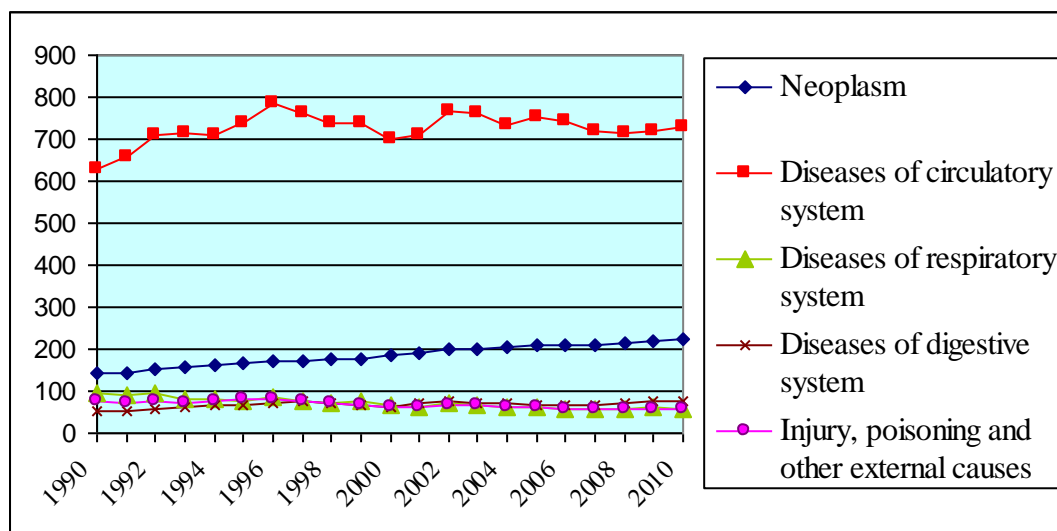


Figure 8 The evolution of mortality rates per 100,000 inhabitants, by the main death causes in 1990 – 2010 period

Analyzing the evolution of the main causes of death in the period 1990-2010 (Figure 8) we see that the rates of the main causes of death (diseases of circulatory system) had a fluctuating evolution from a minimum of 627 deaths per 100,000 inhabitants in 1990, reaching a peak of 786 deaths per 100,000 inhabitants in 1996 (which is the maximum period), then snaking around a declining trend with oscillations whose amplitude decreases exponentially. The downward trend is however hampered

by the economic crisis that has affected most countries of Europe. Stress and reducing living standards, in the post-2008, had result a trend of deaths increasing caused diseases of circulatory system from 720 deaths per 100,000 inhabitants in 2009 to 730 deaths per 100,000 inhabitants in 2010.

A model that approximates, in good condition, mortality rates evolution caused of circulatory system diseases (DCS) in the period 1996-2010 is:

$$DCS = 740 - 0.8 \cdot t + 46 \cdot e^{-0.06t} \cdot \cos\left(\frac{\pi}{4} \cdot t\right) \quad (1)$$

Equation 1 shows that after 1996 the trend series decreased by about 0.8 units per year. Over this trend overlapping oscillations with a period of approximately eight years and whose amplitude decreases exponentially.

The cause of death who, in the period, had the most significant growth is neoplasm. This mortality rate increased from 142 deaths per 100,000 inhabitants in 1990 to 222 deaths per 100,000 inhabitants in 2010. During the 1990-2010 neoplasm mortality rates per 100,000 inhabitants (MRN) showed a linear trend:

$$MRN = 4.05 \cdot t + 140.44 \quad (2)$$

Relationship 2, for which $R^2 = 0.99$, shows an annual increase rate of mortality caused by neoplasm with 4 deaths per 100,000 inhabitants.

The evolutions of death caused by ischemic heart disease, cerebrovascular diseases and in pregnancy, childbirth and puerperium periods

Special attention should be given to individual causes of death who, in the period under review, had significant developments. Thus, the category of circulatory system diseases, have highlighted the main causes of death, namely: ischemic heart disease and cerebrovascular diseases. Specific death rates by sex and the two cases are presented in Figure 9. Given their large share in the group of diseases of circulatory system, their evolution is similar with the evolution that is shown in Figure 8.

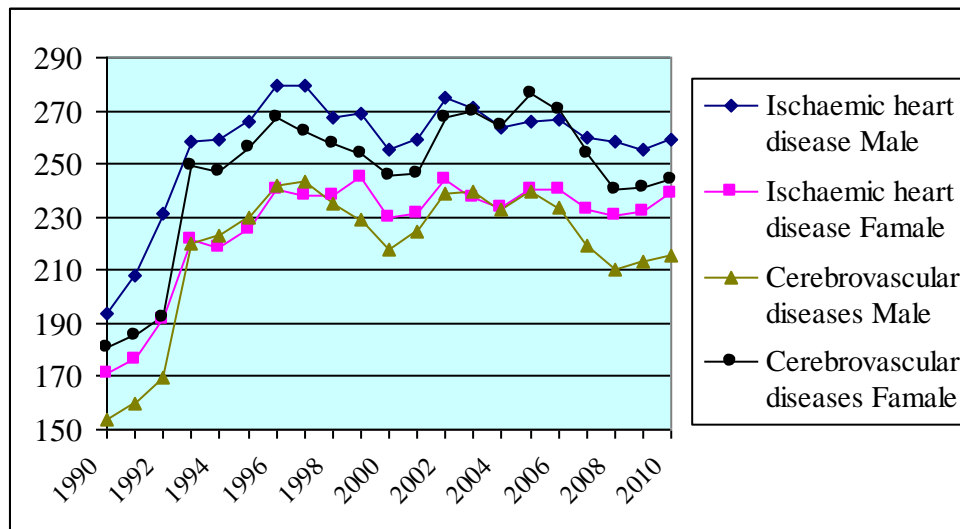


Figure 9 The evolution of specific mortality rates per 100000 inhabitants, by ischemic heart disease and cerebrovascular diseases in 1990 – 2010 period

It should be noted however, that these two causes of death affects the inhabitants in different proportions of male and female respectively. Thus, the male population is

affected in ischemic heart disease greatly. For example, if we refer to 2010, the specific mortality rate, by ischemic heart disease for men is 259 deaths per 100,000 inhabitants, while for women is 238.9 deaths per 100,000 inhabitants.

Also, analyzing the dynamics shown in Figure 9, results two observations. A first observation is that during the period analyzed the two specific death rates were close in value. If in 1990 the difference between them was 13.03%, in 2010 it is only 8.36%. The second observation concerns the reaction to the economic crisis. For women the specific mortality rates begin to increase from 2008 (year in which records a minimum of 230.9 deaths per 100,000 inhabitants), while for men, the specific mortality rates begin to increase until 2009 (when recorded a minimum of 255.2 deaths per 100,000 inhabitants)

On the other hand, for cerebrovascular diseases deaths the situation is reversed, the specific mortality rates for female being higher than specific mortality rates for male. In 1990 specific mortality rates was 180.5 deaths per 100000 inhabitants for female and 153.8 deaths per 100000 inhabitants for male. After a significant increase, also recorded in this case, in the period 1990-1997 the developments are oscillating with absolute minimum of 240.5 deaths per 100,000 inhabitants for female and 210.5 deaths per 100,000 inhabitants for male, in 2008. After 2008, the specific mortality rate for both male and female begin to grow, in 2010 reaching 215.5 deaths per 100,000 inhabitants for male and 243.8 respectively deaths per 100,000 inhabitants for female.

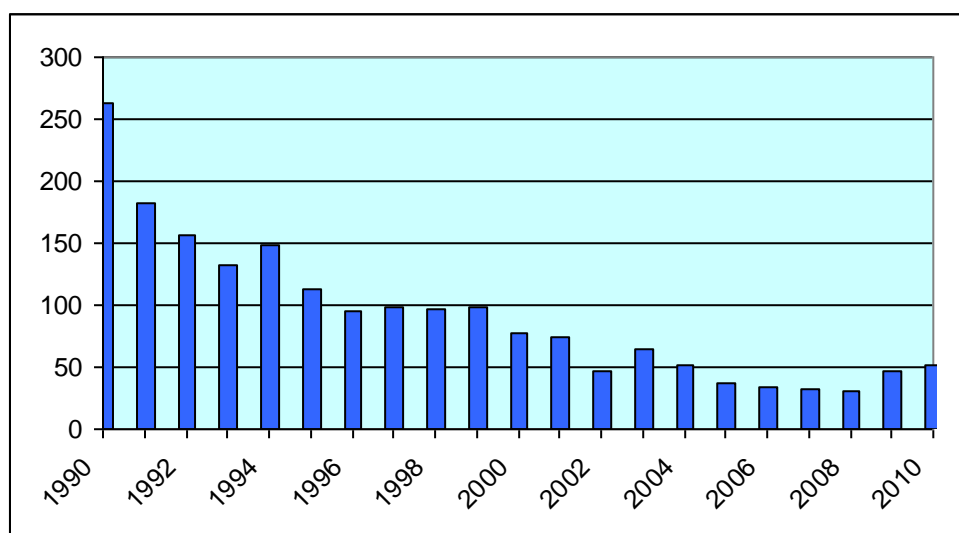


Figure 10 *The evolution of specific mortality rates for pregnancy, childbirth and puerperium per 100000 births in 1990 – 2010 period*

Another specific mortality rate, which had a significant evolution in the period 1990-2010, is the specific mortality rates for pregnancy, childbirth and puerperium per 100000 births (Figure 10). This has been a significant drop, especially during 1990-1996. If in 1990 the specific mortality rates for pregnancy, childbirth and puerperium was 263 deaths per 100,000 births, in 1996 it is reduced by approximately 2.77 times reaching 95 deaths per 100,000 births.

After 1996 the trend series is still down but at a rate more attenuated than in the past, over which is superimposed on an oscillating evolution. Absolute minimum is 30 deaths per 100,000 births were achieved in 2008.

The economic crisis started after 2008 has an impact on mortality and pregnancy, childbirth and puerperium periods, the specific mortality rates recorded values of 47 death in 2009 and 52 deaths per 100,000 births, in 2010.

Conclusions

Between 1990 and 2010 Romania's population has suffered a process of aging and of the numerical reduction due to the fact that from 1993 to 2010 natural increase was always negative. This development led to significant changes of population on age groups.

The main causes of death recorded in the analyzed period were: diseases of circulatory system, neoplasm, diseases of respiratory system, diseases of digestive system injury and poisoning and other external causes. Of these, the one who had a significant increase in deaths is neoplasm. Also, shares increased deaths caused of diseases of digestive system and of diseases of circulatory system.

In terms of reducing causes of mortality, a significant evolution have had deaths in pregnancy, childbirth and puerperium periods, which, throughout the period, or low of 5.15 times.

Last but not least, the economic crisis triggered after 2008 resulted in increased deaths caused by ischemic heart disease and cerebrovascular diseases, as well as in pregnancy, childbirth and puerperium periods.

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