

## **MEDICAL-GEOGRAPHICAL ANALYSIS OF THE SUCEAVA COUNTY TERRITORY (POPULATION MORTALITY RATE)**

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**Key words:** medical-geographical analysis, mortality rate, Suceava county.

**Abstract.** The territorial medical-geographical analysis for Suceava County showed that Suceava Plateau has a higher general mortality indicator of 12 ‰ than Bukovina's Carpathians that have a rate of 11,5 ‰ (where we can find more favorable geo-ecological conditions). The minimum mortality level (9,0 ‰) is characteristic for the Radauti Depression, where landscape complexes, with a favorable regime and a lower anthropogenic influence (of pollutants, etc.) are outspread.

### **Introduction**

The research of territorial morbidity and mortality distribution, the evaluation of this phenomenon's intensity in various geographic areas and the comparison of the results obtained represent the basic condition and the first study phase of the ecological situation. Not knowing the real mortality rate values for a certain territory makes it impossible to establish the actual role of the physical-geographical, socio-economic, genetic and other factors in the creation of this situation.

It is known that the population morbidity and mortality rate can be used as an integral indicator of the environment's quality. A very important issue related is the study of the territorial units' medical-geographical particularities (administrative and physical-geographical), especially in the context of the European Ecoregions program.

In this case, the object of study is the territory of Suceava County, which is part of the "Suceava County – Cernauti Region" cross-border region. The aim of the research is the medical-geographical analysis of the population's mortality, as one of the indicators of the ecological status.

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### 1. Materials and methods

We investigated the structure and the rate of mortality and morbidity in Suceava County, based on statistical data, for the 2004-2006 period.

We made the comparative medical-geographical analysis for the following physical-geographical units: the mountain area, the Radauti Depression and the Suceava Plateau.

Suceava County territory is characterized by a high diversity of physical-geographical conditions (landscape). In this paper, we present two types of geographical landscape: mountainous (the Carpathians) and hilly (Suceava Plateau), within which various types of landscape can be identified (mountainous, woody, hills covered by meadows and forests, alluvial plains and forest steppe terraces etc.).

Tab. 1 - The dynamics of the general mortality rate of Suceava County population, by physical-geographical units (per 1000 persons).

| Physical-geographical unit | Year |      |      |                               |
|----------------------------|------|------|------|-------------------------------|
|                            | 2004 | 2005 | 2006 | Period's average<br>2004-2006 |
| Bukovina's Carpathians     | 11,5 | 11,6 | 11,2 | 11,4                          |
| Radauti Depression         | 12,6 | 12,8 | 12,4 | 12,6                          |
| Suceava Plateau            | 10,4 | 11,0 | 9,9  | 10,4                          |
| Total per county           | 11,6 | 11,7 | 11,4 | 11,6                          |

In the plateau part of the county, almost all landscapes are highly anthropized, as settlements have an elevated density. Suceava Plateau is fragmented by a dense network of valleys and there are numerous alluvial terraces. We present the characteristics of the underground (drinking) waters in table 2 and we can notice that hydrocarbonate waters, with normal hardness, predominate for the analyzed profile.

In the mountainous part of the county, the landscape is characterized by mountain chains and deep valleys, where human settlements are situated. Here, the predominantly acclivous relief and the vertical zoning, especially through climatic zoning, play an important role in the differentiation of the ecological conditions.

We mention that, from a geo-ecological point of view, the territory of Suceava County was subject to a low degree of air, water and soil pollution. The mining in the mountain area and the industrial platform of Suceava municipality

stand out from this point of view. Today, the increase of the vehicle traffic and the garbage dumps are major problems. Measures are being taken to minimize their influence on the environment.

Among the mortality causes for the Suceava County population, we can distinguish cardiovascular diseases (BC), oncological diseases (Onco), digestive diseases (BAD), respiratory diseases (BR) and so on.

In the territorial medical-ecological analysis, we use various approaches: geo-systemic, ecological, landscape and so on. The integrated approach in the medical-ecological research of the “man – environment” system offers the possibility of investigating the spatial and temporal particularities of the population health.

The main steps and methods of the medical-ecological research of the “man-environment” system were:

- Collection and primary processing of information: stationary and expeditionary research, data gathering and formation of certain cadastres (characteristics of the environmental conditions and of the various forms of diseases, social-economic information etc.); primary processing of statistical data and mapping.

- Analytical and integrative step. Analysis of the particularities of spatial distribution of the various types of diseases that caused population mortality, of the living and activity conditions, using the geographic - comparative method and the conjugated mapping method. We identified the existent empirical relations. Using cartographical modeling methods of the dispersion correlation and other analytical methods we established the statistical interdependency (link) between the components: the geographical environment factors and the appearance of the diseases (fields of disease distribution). In the integrative phase of the research, it was necessary to establish the importance of each factor in the occurrence of the diseases, to establish the interdependencies and the mutual influence. We made a complex (integral) evaluation of the environment. The total of the medical-geographical research was made using territory typology (classification) and division methods.

The background of the medical-geographical maps drawing was the principle of complex (conjugated) cartography, which gives the possibility of cartographic analysis of mortality, in this case according to territorial units.

Using the geographical-comparative method, we analyzed the distribution of the mortality index in Suceava County (the average for the 2004-2006 period). For this, we used the data from the Suceava County Statistics Directorate, other statistics materials and the specialty bibliography.

To compare the frequency of general mortality rate to the mortality rate according to gender in the landscape-functional zones, first of all, it is necessary to

establish the ratio of absolute value of the mortality for the same number of population in that living area. This way, we obtain the mortality intensity coefficient (the relative values of the frequency).

Tab. 2 - Cations and anions concentrations in the underground waters of Suceava County (on the profile Siret town – Suceava municipality)

| No. of the sample and locality | h (m) | pH  | HCO <sub>3</sub> | Cl  | 2- SO4 | 2+ Ca | 2+ Mg | + + Na+K | Total mineralization, mg/l | Hardness (Ca+Mg) mg-ecv/l |
|--------------------------------|-------|-----|------------------|-----|--------|-------|-------|----------|----------------------------|---------------------------|
| 1. Siret town                  | 3,5   | 6,9 | 293              | 105 | 121    | 150   | 17    | 35       | 570                        | 0,70                      |
|                                |       |     | 4,8              | 3,0 | 2,6    | 7,5   | 1,4   | 1,4      |                            |                           |
| 2. Siret town                  | 2,5   | 7,1 | 342              | 260 | 85     | 238   | 32    | 5        | 790                        | 0,45                      |
|                                |       |     | 5,6              | 7,3 | 1,8    | 11,9  | 2,6   | 0,2      |                            |                           |
| 3. Balcauti village            | 2,0   | 7,2 | 403              | 95  | 125    | 158   | 39    | 20       | 640                        | 0,40                      |
|                                |       |     | 6,6              | 2,7 | 2,6    | 7,9   | 3,2   | 0,8      |                            |                           |
| 4. Graniceni village           | 2,0   | 6,6 | 268              | 50  | 76     | 114   | 17    | 8        | 400                        | 0,60                      |
|                                |       |     | 4,4              | 1,4 | 1,6    | 5,7   | 1,4   | 0,3      |                            |                           |
| 5. Romanesti village           | 4,5   | 6,6 | 329              | 185 | 55     | 202   | 18    | 4        | 630                        | 0,50                      |
|                                |       |     | 5,4              | 5,2 | 1,2    | 10,1  | 1,5   | 0,2      |                            |                           |
| 6. Darmanesti village          | 5,0   | 7,2 | 232              | 40  | 72     | 108   | 12    | 11       | 370                        | 0,55                      |
|                                |       |     | 3,8              | 1,1 | 1,5    | 5,4   | 1,0   | 0,4      |                            |                           |
| 7. Suceava city                | 12,0  | 7,0 | 281              | 35  | 68     | 126   | 13    | 5        | 410                        | 0,59                      |
|                                |       |     | 4,6              | 1,0 | 1,4    | 6,3   | 1,1   | 0,2      |                            |                           |

Note: numerator - mg/l, denominator - mg-ecv/l

To establish the mortality general coefficients, in medical statistics, they use the ratio of the number of deaths or illnesses per 1000 persons (promile). Mortality amongst children under one year of age is calculated per 1000 children of the same age. To compare the population of different ages, it is necessary to standardize the mortality structure according to age, because the “old” population will have a higher mortality coefficient. The same way, mortality index in children under one year of age is considered to reflect the quality and the accessibility of medical assistance for children and the population’s way of living.

The relative number of population for which we establish the mortality rate level (1000,10000,100000) has to be chosen according to the real number of the population and the number of deaths in the studied territory. For the mortality statistics, where usually pretty low coefficients are used, we took into consideration the ratio of deaths per 1000 persons that belong to the same group, gender and territory for different periods.

## 2. Results and conclusions

The medical-geographical analysis of the region's population mortality is brought to the form of relative (intensity) indicators per 1000 persons, the average for the years 2004-2006. The general mortality index for Suceava County is of 11,8 ‰ (fig.1).

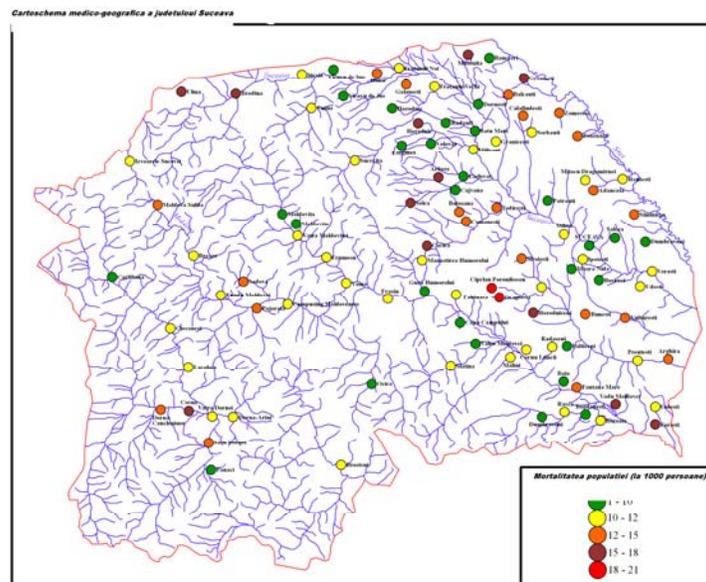


Fig. 1 - The general mortality index for Suceava County

The territorial medical-geographical analysis for Suceava County showed that Suceava Plateau has a higher general mortality indicator of 12 ‰ than Bukovina's Carpathians that have a rate of 11,5 ‰ (where we can find more favorable geo-ecological conditions). The minimum mortality level (9,0 ‰) is characteristic for the Radauti Depression, where landscape complexes, with a

favorable regime and a lower anthropogenic influence (of pollutants, etc.) are outspread.

The analysis of rural and urban population mortality rate in Suceava County showed a lower percentage of deaths amongst urban population. Compared to the county average mortality rate, which is of 11,9‰, it is of 6,2‰ for Suceava city; of 7,7‰ for Falticeni town; of 9,9‰ for Gura Humorului town; of 9,7‰ for Radauti town and of 8,5‰ for Siret town. These results are also due to the existence of better medical and social assistance services in towns. In 2004-2006, we can notice a slight decrease of the mortality rate in the county (by 1-2‰).

The comparative medical-geographical analysis of Suceava County and of the districts close to the border of the Cernauti region in Ukraine did not show significant differences between the mortality rates of these districts (approximately of 1,5-2‰).

Totalizing the results of the mortality rate study amongst the population of Suceava County according to physical-geographical units (of landscape), we can draw the conclusion that mortality rate depends considerably on the living conditions and on the ecological factor.

Generally, natural conditions of Suceava County are favorable to human activity. Among the best, we can distinguish the types of landscape covered by meadows and forests compared to the forest steppe ones, much more anthropized (the cultivated chernozem soils areas), which have a higher mortality rate (12‰).

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