STATISTICAL METHODS AND TECHNIQUES USED IN STUDYING DERMATO-VENEREAL DISEASES IN ROMANIA

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Summary

The present study aims to evaluate the effects of economic growth upon the occurrence of dermatologic diseases during 2007-2016, using the unifactorial regression model. The model results point out the fact that a 1 euro increase of the gross domestic product per capita leads to an average 7.07 decrease of the amount of hospital discharged patients treated for skin and subcutaneous tissue diseases.

***Key words:** diseases of the skin and subcutaneous tissue, gross domestic product (GDP) per capita, correlation, regression, sanitary infrastructure.*

Introduction

Living in good health is an important element of human well-being. A high standard of national health may also be considered a crucial element of a country's human capital and an asset to its international competitiveness (Alber and Kohler, 2004). For that matter, any society regards health maintenance efforts as a public asset. In some societies, goods are seen as equal to life value and to the welfare of all members of the society, which make the state responsible for implementing additional financial and social policies (Cobzari *et al.*, 2016).

In Romania, the share of health expenses in GDP increased from 5.08 percent in 2007 to 5.89 percent in 2010, and then shrank to 4.68 percent in 2011. Further on, this share went up to 4.71 percent in 2012 and 5.18 percent in 2013, to oscillate around the value of 5.0 percent during the next three years. In 2016, Romania allocated 431.99 euro/inhabitant for health expenses, compared to 555.64 euro/inhabitant in Bulgaria,

794.11 euro/inhabitant in Latvia, 731.01 euro/inhabitant in Poland, 853.48 euro/inhabitant in Hungary and 1,071.71 euro/inhabitant in Estonia. Health expenses were centred mainly on curative care and rehabilitative care (50.2 percent of the total, up 6.2 percentage points from 2007), medical goods (32.3 percent, up 5.57 percentage points) and long-term care (6.43 percent, down 3.82 percentage points). Concerning health care expenditure by provider, the expenses were centred mostly on hospitals (39.94 percent), retailers and other providers of medical goods (31.26 percent) and providers of ambulatory health care (15.65 percent).

Between 2007 and 2016 major changes occurred in the network of sanitary units. The number of hospitals and speciality medical centres, for instance, rose from 447 to 567 units and from 133 to 667 units, respectively, whereas the number of pharmaceutical storehouses decreased from 424 to 259 units, and the number of tuberculosis sanatoria decreased from 5 to 2 units. However, the number of family surgeries

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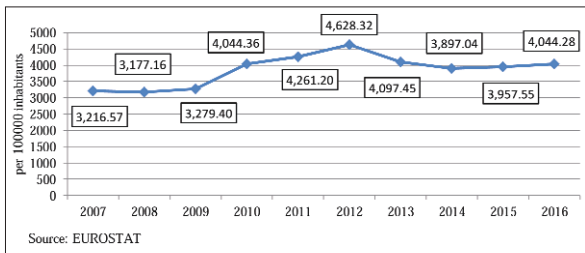
*Fig. 1. The occurrence rate for skin and subcutaneous
tissue diseases, in the period 2007 - 2016*

*Fig. 2. Number of hospital discharged patients and average
hospitalisation period for skin
and subcutaneous tissue diseases in 2016*

*Fig. 3. The number of hospital discharges, day cases, for
skin and subcutaneous diseases, in EU member countries,
in the period 2007 - 2016*

fluctuated around the average of 11,224.1 units. In 2016, for 100,000 inhabitants there were 284.10 medical doctors (up 33.93 percent against 2007), 82.66 dentists (up 53.41 percent), 86.81 pharmacists (up 70.21 percent), 682.85 nursing professionals and midwives (up 16.05 percent). In addition, between 2007 and 2016 the number of hospital beds had an annual variation rate of -0.49 percent, compared to -0.56 percent in Hungary and 0.35 percent in Poland, with start bases of 140,889, 72,260 and, 244,877, respectively. These results occurred amid a gradual decrase of the number of hospital beds belonging to the dermato-venereal speciality from 1,982 in 2007 to 1,608 in 2010, and from 1,613 in 2011 to 1,442 in 2016. For this speciality, the rate of occurrence of skin and subcutaneous tissue diseases had an average of 3.855 per 100,000 inhabitants between 2007 and 2016, the limits of the interval of variation oscillating between 3,177.16 and 4,628.32 for 100,000 inhabitants (Fig. 1). Moreover, the number of new cases of skin and subcutaneous diseases declared by family pshysicians was 671,716 in 2007 and 652,520 in 2008, followed by an ascending trend during the interval 2009 – 2012 up to 928,449. Furthermore, in 2013 it went down to 819,026, and fluctuated around an approximative value of 786,000 during the interval 2014-2016. On the other hand, concerning the segment of skin and subcutaneous tissue diseases, in 2016 the number of hospital discharged patients for 100,000 inhabitants was 698.9 which is 52.73 percent more than the average of the Eastern European countries (the Czech Republic, Slovakia, Slovenia, Hungary, Poland). Another shortcoming is the average hospitalisation duration, which was 5.9 days, whereas for the other mentioned countries it ranged between 6.5 days in Hungary and 10.6
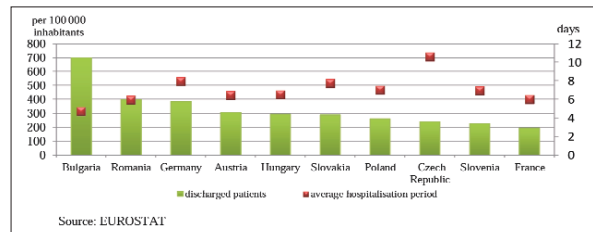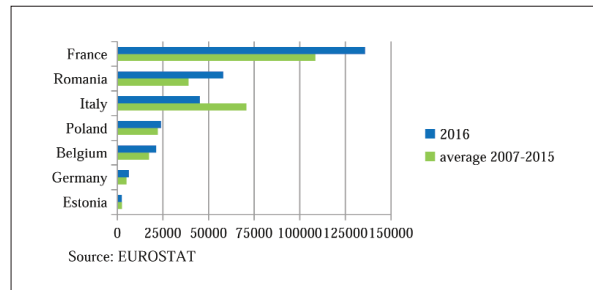
days in the Czech Republic (Fig. 2). However, the number of hospital discharges, day cases, was 58,015, compared to 23,998 in Poland and 2,379 in Estonia (Fig. 3). In 2015, there were 82 death cases registered in Romania that were caused by skin and subcutaneous tissue diseases, with 16.75 percent less than the average of the interval 2011-2014. In comparison with the EU 10 countries, this level is inferior to what was recorded in Hungay (96 dead), Slovakia (143 dead), the Czech Republic (179) and Poland (179) (Fig. 4).

In this context, the present study aims to evaluate the effects of Romania's economic growth upon the occurrence of dermatologic diseases in the time interval 2007-2016, amid the mix of economic policies implemented by the monetary authority, which paid a particular attention to financial stability.

Material and method

The present study uses the unifactorial regression model, similar to the one described by Jula, N and Jula, D. (2010). The following
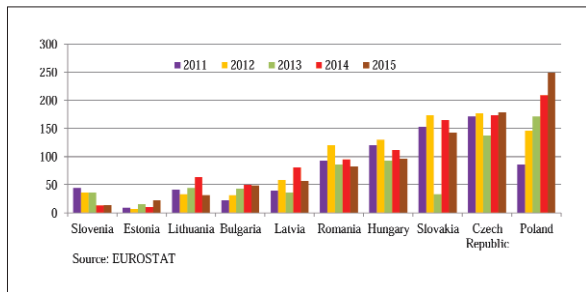
Fig. 4. Number of death cases caused by skin and subcutaneous tissue diseases in EU member countries, in the period 2007 - 2016

Table 1. Descriptive indicators

Time series: Perioada: 2007-2016	PEBP	GDP/capita
Mean	88887,60	7010,000
Median	88815,00	6850,000
Maximum	102068,0	8600,000
Minimum	78592,00	6100,000
Standard Deviation	8631,555	872,3531
Skewness	0,285384	0,580000
Kurtosis	1,788597	2,094125
Jarque-Bera	0,747197	0,902586
Probability	0,688253	0,636804

variables were used: the number of hospital discharged patients treated for skin and subcutaneous tissue diseases (PEBP) and the gross domestic product per capita (GDP/capita), expressed in euro. The data series have a yearly frequency, cover the time interval 2007-2016 and were provided by the EUROSTAT website.

Results and interpretation

The main descriptive indicators, calculated for the examined data series, are displayed in Table 1. Thus, we have noticed during the analysed interval that the number of hospital discharged patients treated for skin and subcutaneous diseases fluctuated between 102,068 in 2010 and 78,592 in 2016, the relative amplitude of the variation being of 26.41 percent. The series is defined by a variation quotient lower than 10 percent, with a slight asymmetry on the right. At the same time, the GDP per capita fluctuated between 6,100 euro in 2007 and 8,600 euro in 2016, which represents a ratio of 1.41 times between the two extreme values, the minimal value being 70.93 percent of the maximal one. Moreover, the series is homogeneous and moderately asymmetrical.

Further on, the regression model was estimated by the least-squares method using the Eviews 7. The results are shown in Table 2. The estimation of the model quotients leads to the following relation:

$$PEBP_t = 138,453.2 - 7.07 * PIB/capita_t$$

The model is statistically valid, as long as the calculated value of the F test is 8.348 and the significance F is 0.02 (a value that is less than

0.05), which explains 51.07 percent of the total variation of the number of hospital discharged patients treated for skin and subcutaneous tissue diseases. The mutiple R reveals a strong bind (R = 0,71) between the involved variables. The two quotients of the model proved to be statistically significant after the "t" test was applied (Student). The Durbin Watson test was used in order to test the autocorrelation of the residues. The calculated value of the test is $d_{calc}=1.163$. For a number of 10 observations, an exogenous variable and a result guarantee probability of 0.95, the critical limits of the test are $d_{inf} = 0.604$ and $d_{sup}= 1.001$. As long as $d_{sup}<d_{calc}<4\text{-}d_{sup}$, we can state that the errors are not autocorrelated. Besides, the results reveal that, for the interval 2007-2016, a rise of 1 euro of the GDP/capita leads to an average fall of 7.07 in the number of hospital discharged patients treated for skin and subcutaneous tissue diseases.

Conclusions

During the interval 2007-2016, for dermato-venereal diseases the number of hospital discharged patients decreased with a yearly average of 0.38 percent (the start base being 81,325), amid a decrease in the number of new cases of syphilis and erysipelas and an increase of the number of hospital discharges, day cases. It is worth mentioning that the average hospitalisation period stayed within an interval of 5.7 and 6.3 days. In 2012, 119.2 thousand employable persons (aged between 15 and 64 years) reported long-term skin and subcutaneous tissue diseases, compared to 54.0 thousand in Latvia, 72.8 thousand in Lithuania and 137.9

Table 2. Model estimation results

Dependent Variable: PEBP
Method: Least Squares
Sample: 2007-2016

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	138453.2	17273.51	8.015351	0.0000
PIB/locuitor	-7.070705	2.447129	-2.889388	0.0202
R-squared	0.510660	Mean dependent var		88887.60
Adjusted R-squared	0.449493	S.D. dependent var		8631.555
S.E. of regression	6404.283	Akaike info criterion		20.54418
Sum squared resid	3.28E+08	Schwarz criterion		20.60470
Log likelihood	-100.7209	Hannan-Quinn criter.		20.47779
F-statistic	8.348560	Durbin-Watson stat		1.163085
Prob(F-statistic)	0.020218			

thousand in Bulgaria. In 2016, Romania allocated 431,99 euro/capita for health, 21.34 percent more than the average of the interval 2007-2015, when co-ordination of the monetary and financial politics was done according with the mix of politics made by the EU, FMI and World Bank. In this context, the results of the unifactorial regression model estimation reveal a negative correlation between the economic growth and the number of discharged patients treated for skin and subcutaneous tissue diseases.

According to Mărginean (2010), both the objective and the subjective indicators place Romania among the UE states that have a poor health care situation. The data reveal that health, as a key branch, needs interventions made by social politics, in order to improve health nationwide and diminish the inequalities among the citizens.

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Conflict of interest
NONE DECLARED

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