

LIFE EXPECTANCY IN ROMÂNIA

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Abstract. Aim. The present descriptive survey was aimed to find the appropriate patterns for life expectancy at birth by gender and area in România during 1997-2006 and to identify the counties with low life expectancies and low changes rates. **Method.** Descriptive statistics and specific methods recommended by WHO have been employed in order to calculate the gain in life expectancy and the changes in rates by gender and area. These methods have been accompanied by cluster analysis based on deterministic allocation aiming at identifying relatively homogenous groups of counties. **Results.** According to the analysis performed in this paper, a notable similarity in life expectancy trends in România and other EU countries could be observed. Also, an important fact was that against this ascending trend in life expectancy, the national average was still very low compared to the EU average. The pattern in life expectancy in România was different by gender, area, and development regions. The cluster analysis showed that there is a great number of counties for which the life expectancy falls below the first quartile. **Conclusions.** The patterns in life expectancy in România are different by gender, area and development regions. It is important to explore the association between life expectancy and life quality indices before confirming the hypothesis that the gain in life expectancy at different ages in România is also a gain in life quality.

Key words: life expectancy, gain in life expectancy, cluster analysis

Rezumat. Scop. Studiul de fata a avut drept scopuri descrierea modelului speranței de viață la naștere în România, pe sexe și medii, pentru perioada 1997–2006 și identificarea județelor cu nivele scăzute ale speranței de viață și ale ratei de schimbare a acesteia. **Metodă.** Pentru calcularea creșterii ratei între două momente date precum și pentru stabilirea diferențelor ratelor pe sexe și medii s-au utilizat elemente de statistică descriptivă și metodele specifice recomandate de OMS. Acestea au fost însoțite de o analiză *cluster* bazată pe o alocare deterministă cu scopul de a identifica grupuri de județe relativ omogene. **Rezultate.** Conform analizelor prezentate în această lucrare un rezultat notabil este dat de faptul că deși evoluția speranței de viață în România este similară cu cea a celorlalte țări din UE, media națională este mult sub nivelul mediei UE. Analiza *cluster* indică un număr mare de județe pentru care valoarea speranței de viață este sub prima cvartilă. **Concluzie.** Modelul speranței de viață în România este diferit pe sexe, medii și zone de dezvoltare. Pentru a vedea în ce măsură câștigul în speranța de viață la diferite vârste este și un câștig în calitatea vieții, este necesar ca acesta să fie corelat cu indicatorii de calitate ai vieții.

Cuvinte cheie: speranța de viață, ani de viață câștigați, analiza cluster

INTRODUCTION

Life expectancy is a measure that is independent of the size and structure of the population (1). Studying its evolution it can be noticed that, year

by year, EU citizens are living longer, but the extent to which these gains in life represent gains in quality of life is uneven in different states.

LIFE EXPECTANCY IN ROMANIA

These increases are not uniform but exists an important convergence for EU member states although not between men and women (2, 3).

MATERIAL AND METHODS

This epidemiologic descriptive survey was based on information gathered from different sources, through which the most important ones are: the Statistical Office of the European Commission (EUROSTAT), European Regional Office of the WHO (*Europe health for all databases (HFA –DB)*, July, 2008), and National Institute of Statistics România. The analysis of life expectancy was performed at national level and on development regions by gender and area, for the period 1997-2006; comparison between România and EU average value was also done aiming for establishing its rank among the EU member states (1, 2, 3, 4, 10, 11, 12). Exploratory data analysis tools were employed to explain the behaviour of life expectancy. Thus, a hierarchical cluster algorithm was used to organize data into meaningful structures. Among the available methods a bottom-up procedure (agglomerative algorithm) was selected: the between groups linkage method based on the squared Euclidian distance.

RESULTS AND DISCUSSION

Trends in life expectancy

Analyzing the trends in life expectancy in România for the last 10 years, there has been noticed that although it has been increasing for both women and men, following a

similar evolution as the one of EU member states, it was still at a lower level, with almost 6 years below the EU average value. The EU average value of life expectancy was 78.73 years in 2006 while in România for the same year it reached 72.69 years with an increasing trend to 73.27 years for 2007. (5, 6, 7)

A brief analysis of figure 1 shows a small increase (2.48 years) in life expectancy at birth for România from 69.74 years in 1997 to 72.22 years in 2006. To be mention, also that the gender evolution of the life expectancy at birth between 1997 and 2006 was smooth, but with a bigger increase for men (2.69 years) than for women (2.13 years) (8, 9).

Considering the time interval 1970 – 2006 it can be noticed that the life expectancy at birth increased with 3.64 years, from 68.58 years (1970) to 72.22 years (2006), following different gender trends: for men the increase was of 2.47 years (from 66.27 years to 68.74 years) while for women it attained 4.95 years (from 70.85 years to 75.80 years) (fig. 2).

Life expectancy at birth had a sinusoidal evolution between 1970 and 2006.

The different gender trends of life expectancy at birth kept during the whole studied period (1970 – 2006) and had a more favorable evolution for women than men until 1997 when the increase in life expectancy at birth became a little faster for the latter category (fig. 2).

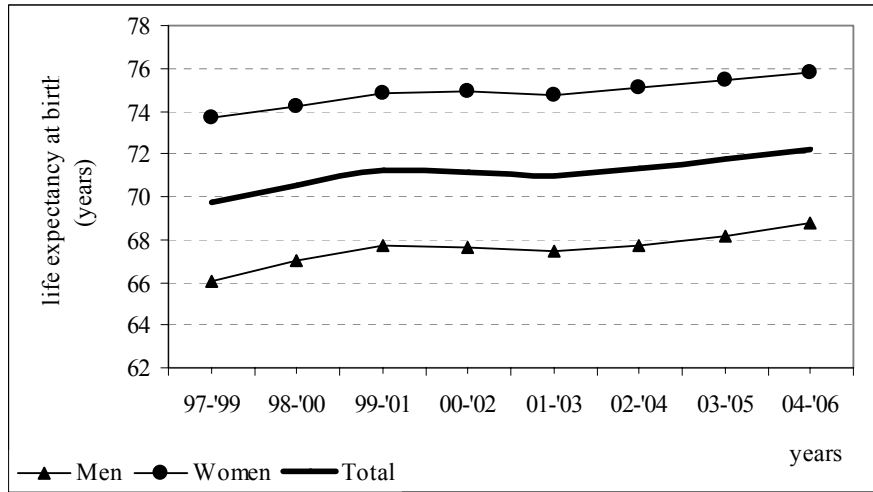


Fig. 1. Trends of life expectancy at birth by sex in România, 1997 – 2006

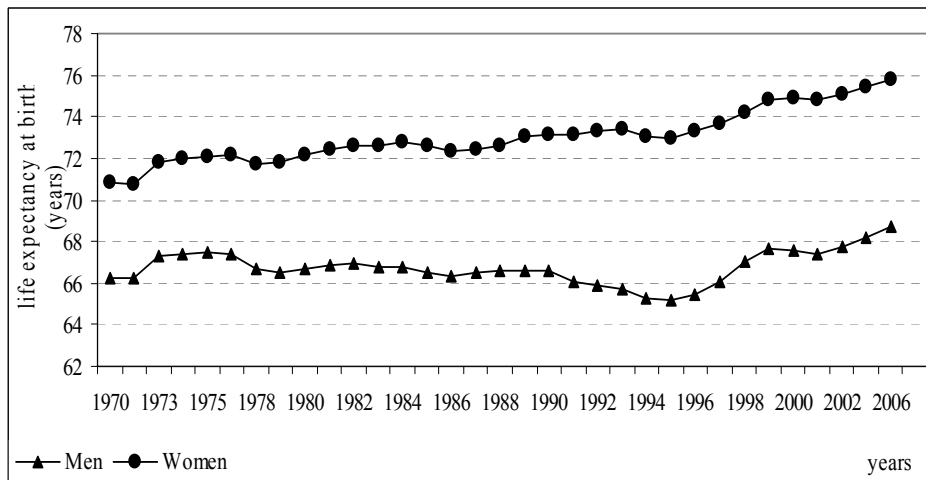


Fig. 2. Trends of life expectancy at birth by sex in România, 1970 – 2006

LIFE EXPECTANCY IN ROMANIA

Thus, the life expectancy for men continually decreased from 1989 (66.59) to 1997 (66.05) with (-0.54) years reaching the lowest value between 1970 and 2006 in 1995 (65.19 years) when it started to have small fluctuations but with an increasing trend.

Comparing with men, the women life expectancy at birth had an increase of (+0.62) years during the same time period (1989 – 1997) from a value of 73.05 years in 1989 to 73.67 years in 1997.

The disparity in life expectancy at birth between men and women in România increased smoothly from 4.58 years in 1970 to 7.62 years in 1997 when it started to follow a decrease trend such as it attained 7.06 years in 2006 (9). The European trend is similar but the convergence process of the two levels was slower in România.

According to the international sources (5, 6, 7), the gap in life expectancy in men and women in EU slightly decreased from 6.81 years (80.05-73.24) in 1997 to 6.15 years (81.77-75.62) in 2006. For România the

change in gender gap in life expectancy was higher, decreasing from 8.08 years (73.35 – 65.27) in 1997 to 6.99 years (76.23-69.24) in 2006. In România, like in the other member states, women are living more than men. In this context it is important for decision-makers to elaborate and develop appropriate strategies to diminish this gender gap (2, 3).

Among the 27 EU member states, România has had the lowest values of life expectancy at birth: it hold the rank 25 for both sexes, 22 for men and 27 for women (fig. 3).

Regarding the value of total life expectancy at 65 years old România owns the position 22 (5, 6, 7). In this framework we used cluster analysis for detecting relatively homogenous groups of countries. In light of this, hierarchical cluster analysis was performed, using a squared Euclidian distance and the between groups linkage method. The clustering procedures provided seven groups according to the life expectancy of birth with the following membership:

- Cluster 1:** Spain (81.1 years), Sweden (81.0 years), France (80.9 years);
- Cluster 2:** Cyprus (80.6 years), Italy (80.3 years), Austria (80.1 years), Netherlands (80.0 years), Germany (79.9 years), Ireland (79.7 years), Finland (79.6 years), Malta (79.5 years), Greece (79.5 years), Belgium (79.5 years), Luxembourg (79.4 years), UK (79.2 years), Portugal (78.9 years);
- Cluster 3:** Denmark (78.4 years), Slovenia (78.3 years);
- Cluster 4:** Czech Rep (76.8 years);
- Cluster 5:** Poland (75.3 years), Slovakia (74.4 years)
- Cluster 6:** Hungary (73.5 years), Estonia (73.1 years), Bulgaria (72.7 years), **România (72.6 years);**
- Cluster 7:** Latvia (70.9 years), Lithuania (71.7 years).

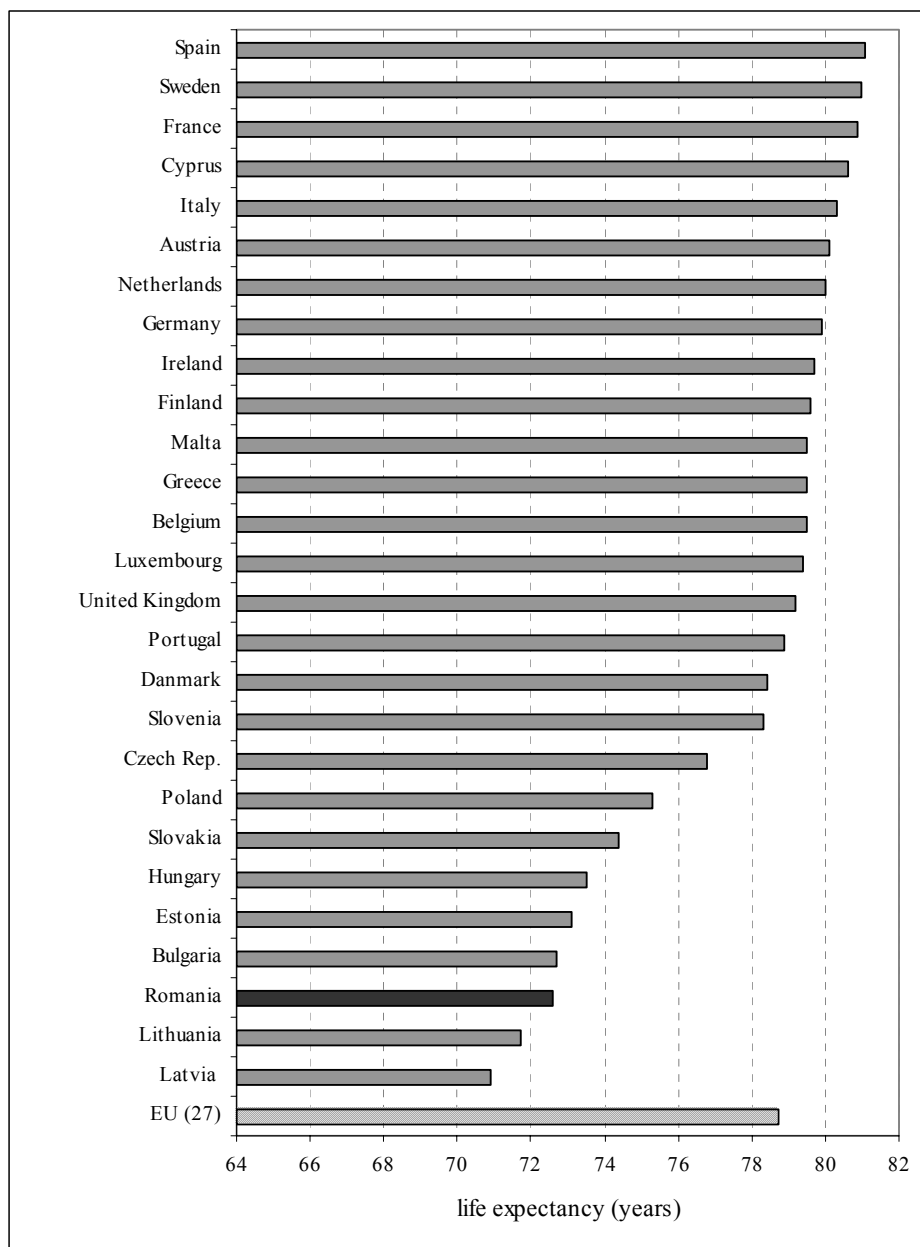


Fig. 3. Life expectancy at birth in EU member states in 2006

LIFE EXPECTANCY IN ROMANIA

The value of the first quartile was 74.4 years. There can be noticed from the above analysis that clusters six and seven have the lowest life expectancy at birth.

Although the evolution of life expectancy was favorable, a close analysis envisages an important gap between men and women, residential area (urban/rural) and socioeconomic groups.

The analysis of life expectancy evolution at different ages in România based on the gains in life expectancy during 1997 – 2006 and compared with

EU-27 average value involve the following results (5,6,7) (fig. 4, tab. 1):

- although the general trend indicates a higher life expectancy for women than men, the quickness of life expectancy increasing is higher for men than women; an exception can be noticed for the life expectancy at 65 years;
- the growth in life expectancy at 65 years was lower for men (0.92 years for România and 1.38 for EU) than women (1.16 years for România and 1.14 for EU).

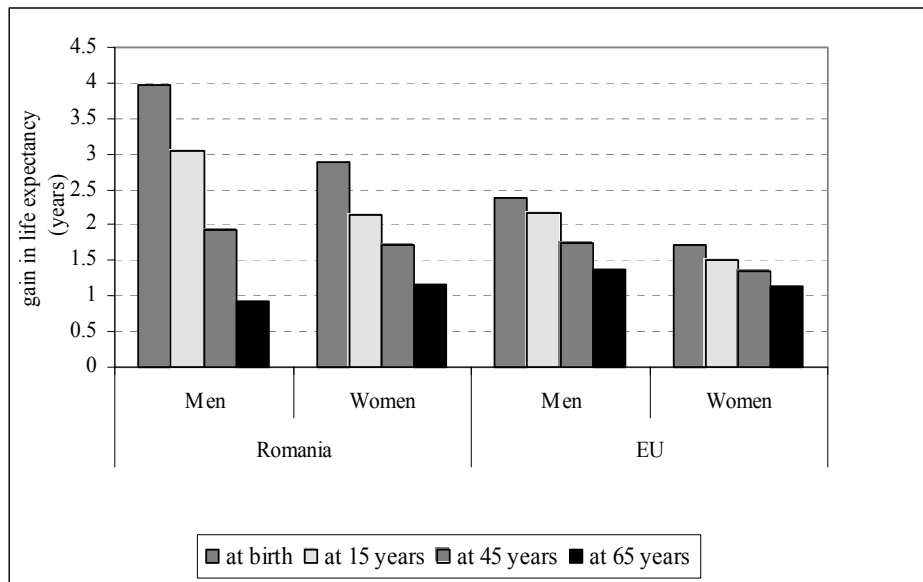


Fig. 4. Gains in life expectancy by sex and age for România and EU, 1997-2006

Table 1. Life expectancy and gain in life expectancy by sex and age for România and EU, 1997-2006

Men						
România				UE -27 average value		
	1997 (years)	2006 (years)	change rate (years)	1997 (years)	2006 (years)	change rate (years)
At birth	65.27	69.24	3.97	73.24	75.62	2.38
At 15 years	52.66	55.71	3.05	59.03	61.19	2.16
At 45 years	25.85	27.78	1.93	31.01	32.76	1.75
At 65 years	12.73	13.65	0.92	15.17	16.55	1.38
Women						
România				UE -27 average value		
	1997 (years)	2006 (years)	change rate (years)	1997 (years)	2006 (years)	change rate (years)
At birth	73.35	76.23	2.88	80.05	81.77	1.72
At 15 years	60.40	62.54	2.14	65.75	67.27	1.52
At 45 years	31.85	33.56	1.71	36.67	38.01	1.34
At 65 years	15.34	16.5	1.16	19.0	20.14	1.14

Source: Eurostat, 2008; WHO, HFA, July, 2008

A thoroughgoing study indicates that in EU the gender-related differences in life expectancy gain are lower than in România.

Life expectancy at birth by area and sex in România

The figures which describe the patterns of life expectancy by area and sex have been included in table 2. A graphical representation of this evolution is showed in figures 5a, 5b, 5c and 5d.

LIFE EXPECTANCY IN ROMANIA

Table 2. Life expectancy and gain in life expectancy by area and sex, România 1997-2006

Life expectancy and gain in life expectancy									
	1997 (years)			2006 (years)			Change rate (years)		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
România	69.74	66.05	73.67	72.22	68.74	75.80	2.48	2.69	2.13
Urban	70.58	66.92	74.38	72.98	69.56	76.34	2.40	2.64	1.96
Rural	68.66	64.85	72.91	71.23	67.69	75.13	2.57	2.84	2.22
Gap in life expectancy between urban and rural area (ex. 70.58-68.66 = 1.92)	1.92	2.07	1.47	1.75	1.87	1.21			

Source: Romanian Statistical Yearbook, 2007

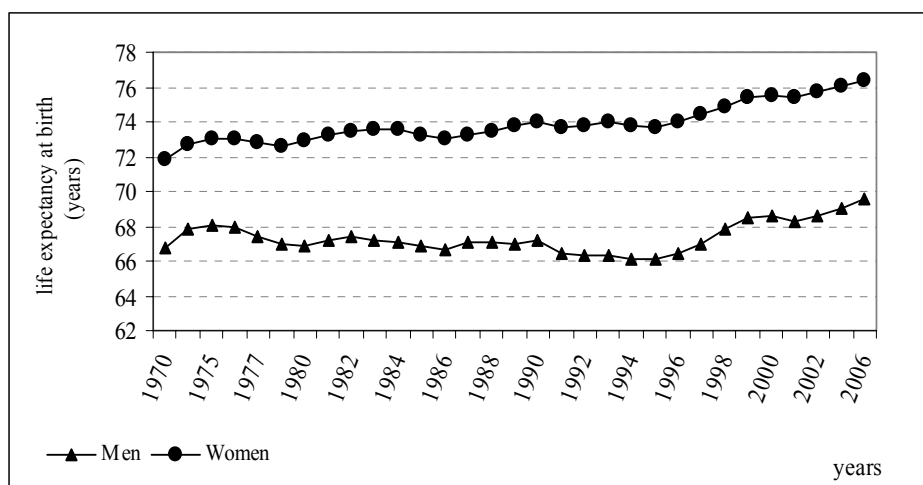


Fig.5a. Trends in life expectancy at birth by sex in urban area, 1970-2006

Anca Vitcu, Luminița Vitcu, Elena Lungu, Adriana Galan

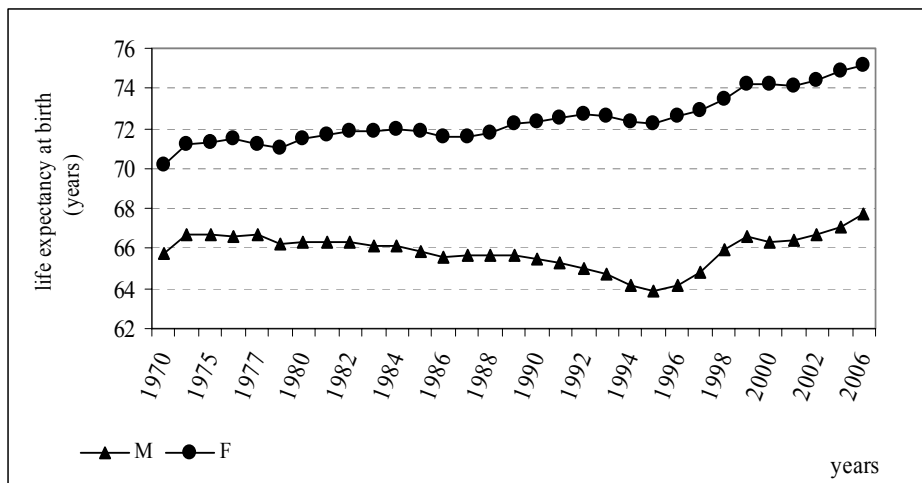


Fig. 5b. Trends in life expectancy at birth by sex in rural area, 1970 – 2006

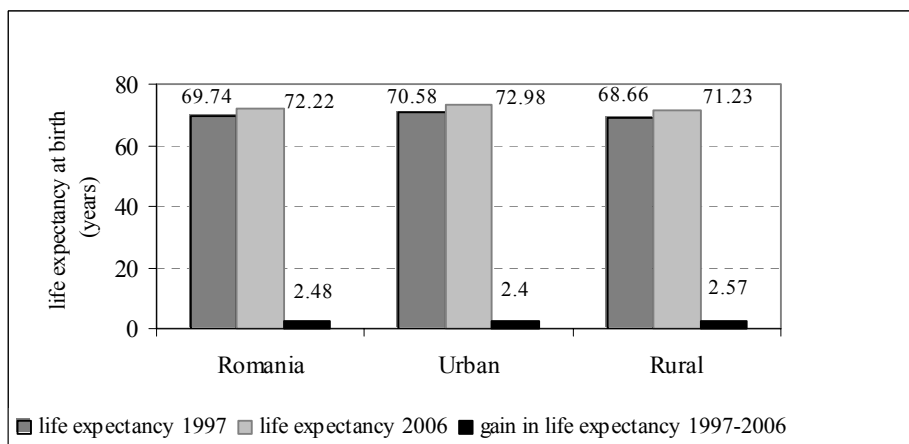


Fig. 5c. Gains in life expectancy at birth by area, 1997 – 2006

LIFE EXPECTANCY IN ROMANIA

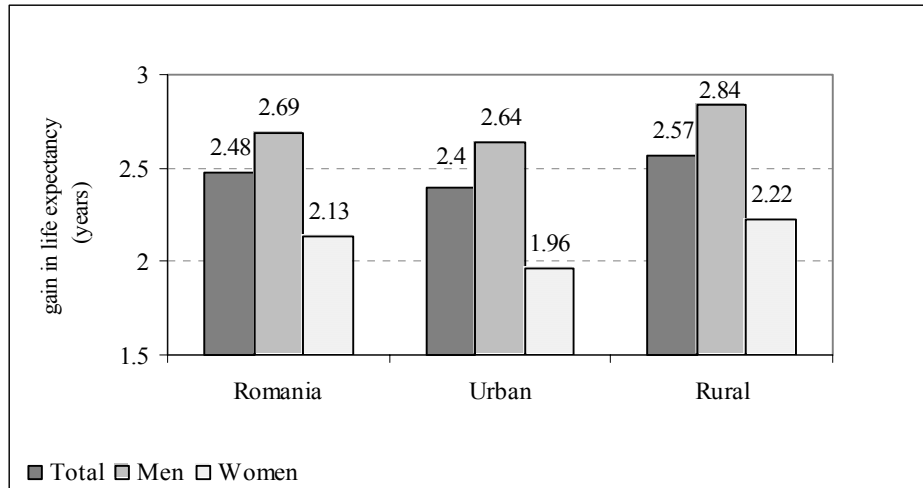


Fig. 5d. Gains in life expectancy at birth by area and sex, 1997 - 2006

Based on the analysis of these there can be concluded that the life expectancy at birth has different trends by area and sex such as (2):

- the life expectancy in 2006 was lower in rural area (71.23 years) than urban area (72.98 years);
- the life expectancy in urban area in 2006 was higher than in rural area with 1.75 years compared with 1997 when the gap was of 1.92 years (70.58 years for urban area and 68.66 years for rural area); in 2006 the gap in life expectancy between the areas is narrowed;
- the life expectancy at birth was higher for women than men in both areas but the gain in life expectancy is faster for men;
- the gain in life expectancy from 1997 to 2006 had close values for both areas (2.40 years for urban

area and 2.57 for rural area) (Fig. 5c);

- the gain in life expectancy between 1997 – 2006 was higher for men in both urban (2.64 years) and rural (2.84 years) area;
- during the same period 1997 - 2006 the gains in life expectancy for women from urban and rural area were 1.96 years and 2.22 years respectively (fig. 5a, fig. 5b);
- the gap in life expectancy between men from urban and rural area decreased from 2.07 years (66.92 years and 64.85 years respectively) in 1997 to 1.87 years (69.56 years and 67.69 years respectively) in 2006;
- the gap in life expectancy between women from urban and rural area decreased from 1.47 years (74.38 years and 72.91 years respectively) in 1997 to 1.21 years (76.34 years and 75.13 years) in 2006;

- the gap in life expectancy between urban and rural areas slightly decreased from 1.92 years in 1997 to 1.75 years in 2006.

Life expectancy at birth by development regions

The life expectancy at birth develops different patterns for each development region according to the risk factors acting in each specific region (8, 9). A brief analysis of data provides the following results:

- region București – Ilfov had the highest life expectancy (73.98 years);
- other regions with a life expectancy higher than the national average value (72.22 years) were: Center

Region (72.48 years), North-East Region (72.39 years), South-East Region (72.35 years);

- life expectancy had the lowest value in North-West Region (71.38 years). In ascending order it is followed by the West Region (71.46 years), South-West (72.00 years) and South (72.07 years) (fig. 6, tab. 3);
- low values of life expectancy could be noticed for both men and women in North-West and West regions; in South Region the men life expectancy was lower than the national average.

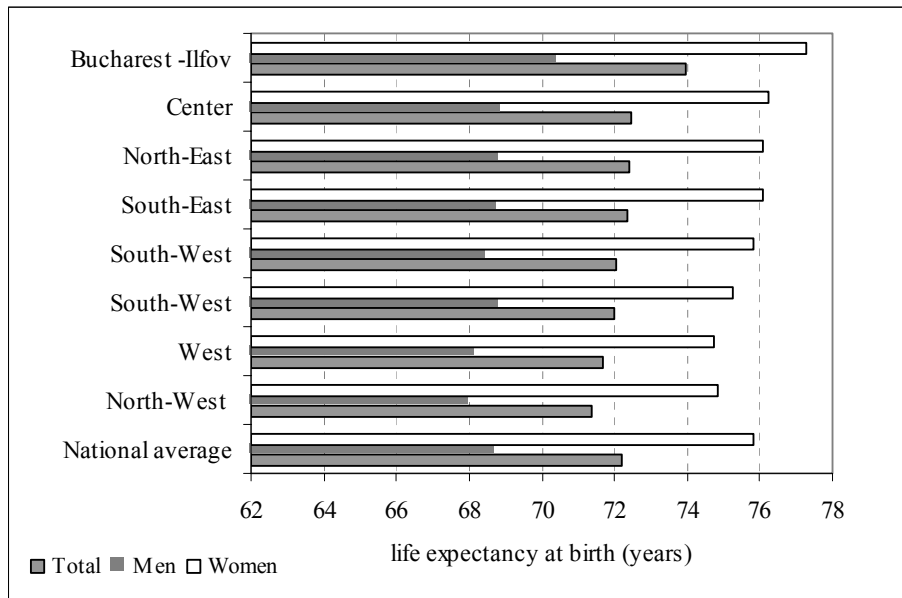


Fig. 6. Life expectancy at birth by development regions, România 2004-2006

Table 3. Life expectancy at birth by development regions, România 2004-2006

LIFE EXPECTANCY IN ROMANIA

Life expectancy at birth by development regions			
	Total (years)	Men (years)	Women (years)
National average	72.22	68.74	75.80
Development regions			
București -Ilfov	73.98	70.42	77.28
Centre	72.48	68.88	76.24
North-East	72.39	68.86	76.11
South-East	72.35	68.78	76.10
South	72.07	68.45	75.85
South-West	72.00	68.85	75.27
West	71.46	68.17	74.76
North-West	71.38	68.01	74.86

Source: Romanian Statistical Yearbook, 2007

To generate gender relatively homogenous groups of counties we performed a hierarchical cluster analysis based on the squared Euclidian

distance and between groups linkage method. Considering the life expectancy values the clustering procedures provided the following groups:

- **For men**

- Cluster 1:** București (70.7 years), Vâlcea (70.3 years), Suceava (70 years), Vrancea (69.9 years);
- Cluster 2:** Bistrița-Năsăud (69.6 years), Cluj (69.6 years), Gorj (69.5 years), Brașov (69.4 years), Brăila (69.3 years), Buzău (69.3 years), Vaslui (69.2 years), Covasna (69.1 years), Argeș (69 years), Iași (69 years), Prahova (69 years), Sibiu (69 years), Mehedinți (68.9 years), Neamț (68.9 years), Alba (68.8 years);
- Cluster 3:** Timiș (68.7 years), Dolj (68.6 years), Ilfov (68.6 years), Harghita (68.5 years), Dâmbovița (68.4 years), Galați (68.4 years), Mureș (68.4 years), Ialomița (68.3 years), Arad (68.2 years), Teleorman (68.2 years), Tulcea (68.2 years), Constanța (68.1 years);
- Cluster 4:** Bacău (68 years), Hunedoara (68 years), Botoșani (67.9 years), Maramureș (67.8 years), Bihor (67.7 years), Caraș-Severin (67.6 years), Călărași (67.6 years), Olt (67.6 years), Sălaj (67.5 years), Giurgiu (67.1 years);
- Cluster 5:** Satu-Mare (65.1 years).

Regarding the life expectancy by county we can notice that the lowest value of men expectancy of life was recorded in Satu-Mare (65.1 years) while the highest value was recorded

in București (70.7 years). The clusters structures indicate that clusters 1 and 2 were composed of counties for which the life expectancy was higher than the national average value (68.6 years)

while clusters 4 and 5 are composed of the first quartile (68.00 years).
counties with values equal or less with

- **For women**

- Cluster 1:** București (77.4), Vrancea (77.1), Dâmbovița (76.9), Brașov (76.8), Neamț (76.7), Sălaj (76.8), Suceava (76.8);
- Cluster 2:** Galați (76.5 years), Iași (76.5 years), Buzău (76.4 years), Harghita (76.4 years), Brăila (76.3 years), Covasna (76.3 years), Prahova (76.3 years), Vâlcea (76.3 years), Cluj (76.2 years), Ilfov (76.2 years), Argeș (76.1 years), Sibiu (76.1 years), Bistrița-Năsăud (76 years), Alba (75.9 years), Mureș (75.9 years);
- Cluster 3:** Gorj (75.7 years), Botoșani (75.6 years), Timiș (75.6 years), Vaslui (75.6 years), Ialomița (75.5 years), Bacău (75.3 years), Teleorman (75.3 years), Olt (75.2 years), Tulcea (75.2 years), Constanța (75.1 years), Giurgiu (75.1 years);
- Cluster 4:** Dolj (75.0 years), Arad (74.9 years), Călărași (74.8 years), Maramureș (74.6 years);
- Cluster 5:** Hunedoara (74.3 years), Mehedinți (74.3 years), Bihor (74.1 years), Caraș-Severin (73.8 years);
- Cluster 6:** Satu-Mare (73.2 years).

For women the lowest life expectancy was recorded in Satu-Mare (73.2 years) while the highest value was recorded in București (77.4 years). The lowest life expectancy values belong to the counties included in clusters 4, 5 and 6, findings arising from the clusters structure analysis. These values were less than the value of the first quartile (75.1 years). Clusters 1 and 2 were composed of counties for which the life expectancy was equal or higher than the median value (75.9 years).

CONCLUSIONS

The trend in life expectancy was almost similar for România and EU countries, but the discrepancy in life expectancy values between România and the other member states was still

wide, placing România among the countries with a very low level in life expectancy.

In România, the trends in life expectancy were different by gender and area. The analyses undertaken in this paper envisages the fact that the gaps in area and gender-related differences in life expectancy have a descending trend.

No research has, yet, been undertaken to provide more details about the factors that have contributed to the gender-related differences in the trends in life expectancy. As consequence, the explanation regarding the gap in life expectancy and gains in life expectancy in women and men were not clearly justified by epidemiologists, but one hypothesis which can be formulated is that women might be less affected by

LIFE EXPECTANCY IN ROMANIA

the causes of high mortality. In this context, factors like lifestyle, behavior and diet probably have a substantial impact in life expectancy in gender and counties differences.

It is important to explore the association between life expectancy and life quality indicators before confirming the hypothesis that the gain in life expectancy at different ages in România is also a gain in life quality.

The cluster analysis provided relatively homogenous groups of counties in terms of life expectancy. Subsequent analysis would discover the features of each cluster and identify common issues which determine the level in life expectancy in the associated counties.

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