SUBJECTIVE EVALUATION OF THE HEALTH STATE IN ROMANIA DURING 2006-2010 YEARS

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Abstract: *In the present paper we intend to estimate the subjective health state suggested by the individuals of two national representative samples selected from the population of Romania. The sociological analysis used the information collected by* Institute for Quality of Life Research (ICCV) *in the years 2006 and 2010. More statistics were given about the diagnosis of the quality of life data bases D2006 and D2010. The sample population was divided into disjointed groups depending on the age of the individuals, the person gender or on the place of residence. We proposed two statistical models, one being based simultaneously on the indicators mean-variance and the other taking into consideration a stochastic order. We also revealed the risk categories from the both samples for which the health individual score could be improved. We mention here that in the years 2006-2010 we have not significant changes regarding internal structure of the proposed statistical health system E-V. A comparative dynamic study about the population health state in the years 2006 and 2010 was also performed.*

Key-words: *health; program; indicators risk categories; social policies*

1. Introduction - General aspects

Knowing the health state of the people composing a population is particularly important in practice, first for an in-depth social analysis of the evolution of that population.

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This paper makes an evaluation of the health state of the Romanian people between 2006 and 2010, as it was perceived by the inhabitants. The correct evaluation of the health state of the people from Romania is absolutely necessary in order to make adequate decisions of social policies, for the optimal redirection of some social work funds (Zamfir C., Zamfir E., 1995; Zamfir C., 1999).

The data of this study have been collected by questionnaires, by the Institute for Quality of Life Research (ICCV), Romanian Academy, in 2006-2010. Two databases have been established on the "Quality of life diagnosis" for 2006 and 2010 (ICCV, 2006; ICCV, 2010). Samples D2006 and D2010 are representative at the national level and they include 1132 and 1161 people, respectively.

All the interviewed people responded to the following question regarding the individual health state perceived by each person:

> *A lot of conditions and circumstances occur in the life of all people. They can be good or less good. Please characterise your health state by checking the proper figure. Please select just one answer.*

The score ranged on a scale from 1 to 5, which described the following variants of answer: "very bad", "bad", satisfactory", "good", "very good".

The answers of the population to the question regarding their personal health state are characterised at the level of the entire sample by the ordinal variable *E*. In order to distinguish between the different categories of persons included in the sample, the name of the variable that defines the health state of a particular person shows the particular group to which the person belongs, as follows: *R* (**r**ural), *U* (**u**rban), *B* (**b**ărbați - *men*), *F* (**f**emei - *women*), *T* (**t**ineri - *young people*), *M* (**m**aturi - *mature people*), *V* (**v**ârstnici – *old people*).

2. Methodological details

The databases D2006 and D2010 include the questionnaire answers of the persons included in the representative samples from 2006 and 2010 which were determined by ICCV staff.

The surveyed population has been divided in several age categories. In order to simplify the statistical analysis, we only considered three age categories: the young people (*T*, aged below 40); the mature people (*M*, aged 40 to 60); old people (*V*, people aged 60+).

This classification can be changed taking into consideration disjunctive intervals that define the age groups, the number of categories not being set firmly to three. However, it is essential that the group of variables *T, M* and *V* has the possibility to characterise the process of "ageing" of the Romanian population.

For the convenience of expression we will mark by *X6* and *X0* variable *X* related to the sample D2006 and D2010, respectively.

The statistical analyses will use mainly the percentages, not the frequencies. This way we may make a correct comparison of two samples with different size.

Furthermore, we use with priority indicators regarding the average value, the dispersion or repartition. We avoided thus the errors due to an improper calibration of category from the sample in relation with the data for the whole population.

Variables *E*, *R*, *U*, *B*, *F*, *T*, *M*, *V* are ordinal and each of them may take 5 possible scores. Therefore, the repartition of these variables is defined completely by the values of 4 parameters. Consequently, we will have a "good representation" of these variables by the simultaneous use of the average and of the particular dispersion. We may thus use two essential parameters which characterise the analysed repartitions from a total of 4 parameters that define these repartitions.

Thus, the graphic representation of the variables *E*, *R*, *U*, *B*, *F*, *T*, *M*, *V* is done fool proof within a space with four dimensions. Such image would be difficult to interpret practically, however, because it presumes several other sections in that space, as well as adequate rotations of the coordinate axes. However, a graphic representation of these variables in a bidimensional space avoids all these inconveniencies and creates, at the same time, a synthetic image that is easy to interpret in terms of the general trend.

Concretely, we preferred the bidimensional representation of *W* variable through a point of coordinates (w_1, w_2), where w_1 defines the mean of variable *W* and w_2 is its dispersion. Thus, the graphic position of point *W* has an immediate practical interpretation.

For two simple, discrete random variables *X* and *Y* which have the distribution functions $F(k)$, and $G(k)$, $k \in \{1, 2, 3, 4, 5\}$, we define the relation of stochastic ordering $X > Y$ when $F(2) < G(2)$, $F(3) < G(3)$, $F(4) < G(4)$. Obviously, $F(1) = G(1) = 0$ and $F(5) = G(5) = 1$. Therefore, $X > Y$ if the distribution function of variable *X* is below the repartition function of variable *Y*. In such situation, variable *X* may take higher values than variable *Y* (variable *X* is "more optimistic" in evaluation than *Y*). Sometimes, instead of $X > Y$ we will write $Y < X$. We may notice that relations " < " and " > " are transitive.

The reader may go through papers Iosifescu M., Moineagu C., Trebici V., Ursianu E. (1985); Joaquim P. Marques de Sá (2007); Mărginean I., Precupețu I. (2011) in order to clarify some theoretical aspects regarding the suggested statistical approaches. The statistical models were written with *MatLab* (Joaquim P. Marques de Sá, 2007); Quarteroni A., Saleri F., 2006). Databases D2006 and D2010 have been retrieved from

ICCV archives (ICCV, 2006; ICCV, 2010) as SPSS files (Gerber S. B., Voelkl K. F., 2005).

We intend to expand the proposed statistical models by developing some ideas which have already been presented in Mărginean I., Precupețu I. (2011).

3. Sample characteristics

Table 1 gives the values of some indicators that characterise samples D2006 and D2010, values related to variables *E*, *B*, *F*, *R*, *U*, *T*, *M*, *V* defined previously.

Table 1
Indicators regarding samples D2006 and D2010

Indicator	Data	Variables							
		E	***B***	***F***	***R***	***U***	***T***	***M***	***V***
number	D2006	1132	552	580	500	632	426	425	281
	D2010	1161	549	612	514	647	453	387	321
average	D2006	3.182	3.317	3.053	3.038	3.296	3.749	3.139	2.388
	D2010	3.194	3.324	3.077	3.029	3.325	3.834	3.109	2.393
dispersion	D2006	1.167	1.101	1.195	1.237	1.082	0.709	0.995	0.999
	D2010	1.161	1.108	1.179	1.312	1.001	0.593	0.934	1.005

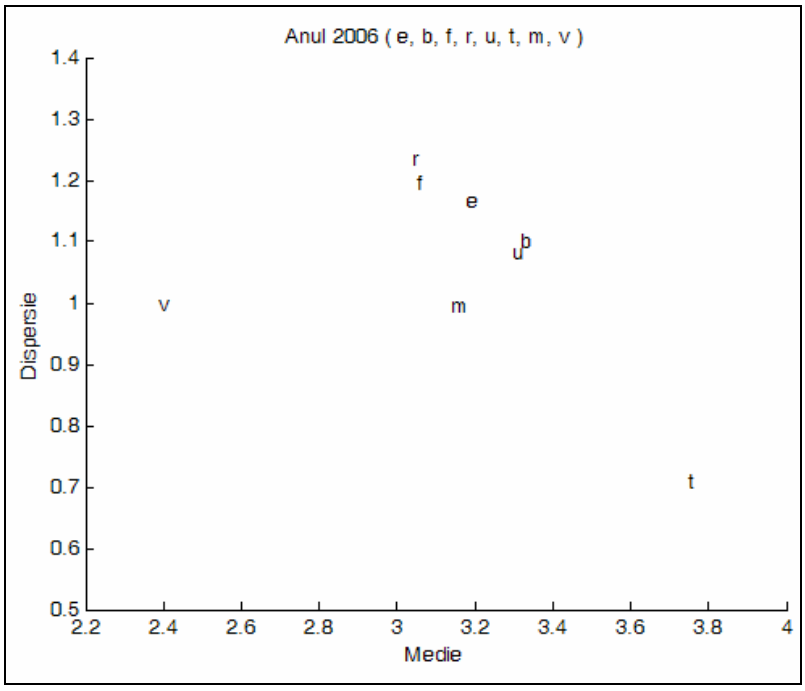
Chart 1 shows synthetically the relative position of variables *E*-*V* within D2006 sample.

Analysing *Chart 1* reveals that:

- The age categories *T* (young people), *M* (mature people), *V* (old people) characterise best the variation of the subjective health state on the people included in sample D2006. Entities *T*, *M*, *V* from *Chart 1* are "very distanced" which confirms their status as reference points.
- Of the 8 analysed variables, variable *T* (young people) is characterised by a much higher average than the other groups, and it also has an extremely low dispersion. Under such circumstances, we may say that the multitude of the "young people" is the most stable one; this group didn't display particular health problems.
- Except *T*, variables *V* and *M* have the lowest dispersions, with very close values (*Chart 1*). Therefore, categories *M* (mature people) and *V* (old people) are rather stable in their subjective opinion about their actual health state. The average score for the individual health state on the mature people (variable *M*) is almost identical with the average score of the people included in sample D2006 (*Chart 1*).

– As expected, variable *V* (old people) has the lowest average, the old people usually having health problems. As the dispersion of *V* is not too large, we may certify a mass alteration of the people aged 60+, the group of the old people being rather homogenous.

Chart 1
Position of variables E-V in sample D2006.



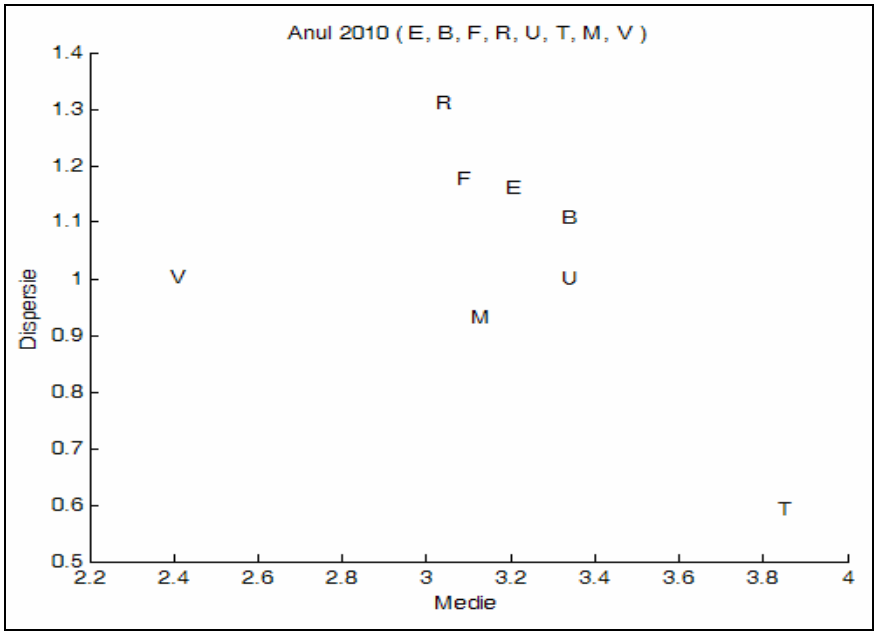
– The people from urban areas (variable *U*) are advantaged compared to the people living in rural areas in terms of their individual health state. Thus, the average value for variable *R* is obviously lower than the average value for variable *U*. On the other hand, the dispersion of variable *R* is clearly higher than the dispersion of variable *U*. This shows a higher inhomogeneity of the health state in the rural areas than in the urban areas.

– A similar characterisation can be done for categories *F* (women) and *B* (men). Compared to the men, the women have more health problems and their group also is less homogenous.

– We can also notice that in *Chart 1* points *U* and *B*, and points *R* and *F* are very close. This shows rather similar repartitions within the sets of variables (*U*, *B*), and (*R*, *F*). Under these conditions, the average health state of the men identifies with the average health state of the people living in urban areas. Likewise, the average health state of the women is very similar with the average health state of the people living in rural areas.

Chart 2 gives us a global view of the positions taken by entities *E-V* in sample D2010.

Chart 2
Position of variables E-V in sample D2010



Analysing the arrangement of points *E-V* in *Chart 2* as well as the "distances" between these points we may notice that all the previous observations regarding variables *E-V* from sample D2006 can be found, with no essential differences, in sample D2010 too.

There are, however, some nuances, that we would like to highlight:

– Except for *T*, variable *M* has the lowest dispersion, which proves the stability in options of the persons composing the group of the mature people (*Chart 2*). This

time, group *V* of the old people, is likewise "stable" compared to the people living in urban areas, but more fluctuant than multitude *M* of the "mature" people.

– Like in 2006, in 2010 there are outstanding differences between entities *R* (rural) and *U* (urban) and between variables *B* (men) and *F* (women). Unlike 2006, in 2010 we cannot highlight a similar behaviour of the pairs of variables (*B*, *U*), and (*F*, *R*). This might suggest the presence of beneficial evolutions in time, hypotheses that will be approached in detail in the following section.

4. Dynamic evolution of the population

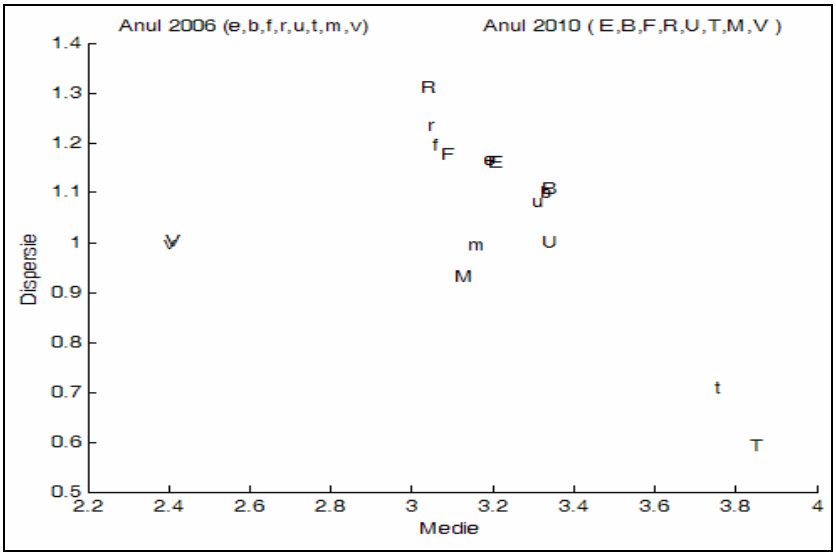
The positioning of points *E-V* in *Charts 1-2* is rather similar. However, we noticed in the previous section some small differences regarding the status of *E-V* variables in 2006 and 2010.

We may wonder, however, whether during the four years that elapsed between the two points in time there has been any progress in the subjective perception of the population regarding the personal health state. The comparative analysis of *Chart 3*, which is a combination of *Charts 1 and 2*, may provide an answer.

To make it easier, we will add suffix *0* or *6* to the individual variables, thus showing that it refers to year 2010 or 2006.

Chart 3

Position of variables E-V in the samples D2006 and D2010



The comparative analysis of the position taken by variables *e-v* (*E6*-*V6*) and *E-V* (*E0*-*V0*) in *Chart 3* shows that:

- Points *E6* and *E0* overlap in *Chart 3* which suggests that the population had the same opinions about the personal health state in 2006 and 2010. However, the hypothesis that "nothing has changed during this period" is contradicted by the different position of the other key-points associated to years 2006 and 2010. See, for instance, the rather different position in *Chart 3,* of points *U6* and *U0* or *T6* and *T0*. In conclusion, we may say that "something has happened, nevertheless, between 2006 and 2010".
- In *Chart 3,* the two components from the following pairs of variables (*R6*, *R0*), (*U6*, *U0*), (*B6*, *B0*), (*F6*, *F0*), (*T6*, *T0*), (*M6*, *M0*), (*V6*, *V0*) take sometimes the same position or are rather close. This suggests that the global structure of the system of variables *E-V* was preserved, the "fundamental problems" of the system remaining.
- A proof that the main characteristics of system *E-V* were preserved throughout 2006-2010, is the location on almost identical positions of entities *V6* and *V0*. Therefore, the opinions of the old people regarding their state of health seem not to have changed in time. This statistical hypothesis should be, however, validated, correlating the opinion of the person with his/her actual age. The statistical model becomes thus much more elaborated. Actually, the hypothesis of the "lack of variance in time of the subjective opinion on the health state of the old people" resulted from a simplified correlation if the individual opinion in relation with the age class.
- The opinion on the individual health state of the men or women didn't change much throughout 2006 to 2010. A proof is the very close position, in *Chart 3*, of points *B6* and *B0* (men), and of points *F6* and *F0* (women).
- The differences of opinion between the rural and urban didn't change, in average, in 2006 and 2010. Thus, in *Chart 3*, points *R6* and *R0* (rural) or *U6* and *U0* (urban) have approximately the same abscises, the mentioned variables preserving the same average. On the other hand, we witness a higher instability of opinion in the rural (the dispersion of variable *R0* is higher than that of variable *R6*, *Chart 3*). In the urban areas things are rather opposite, by a higher stability in time of the opinions (the dispersion of variable *U0* is lower than that of variable *U6*, *Chart 3*). The "distance" between points *R0* and *U0* is clearly higher than the distance between points *R6* and *U6* (*Chart 3*). This supports a higher difference of the repartition of variables *R* and *U* in 2010 compared to 2006.
- The larger dispersion of the answers in the rural environment signifies a higher polarization of the individual health state in the villages. This should be, however,

correlated in a subsequent study with the higher phenomenon of polarization, at multiple levels in the Romanian society, present at the level of the entire country, the rural population being the most affected.

– Some positive aspects may, nevertheless, be noticed in this evolution. This is the case of the "young people" (variable *T*). Thus, variable *T0*, compared to *T6* is located lower and more to the right in *Chart 3*. Thus, the "young people" had a higher health score in 2010 and the fluctuation of their variants of answer is lower. This means that the group of the "young people" was more "stable" in 2010.

5. Disfavoured categories

We showed that although transformations took place in 2006-2010, the 2006 structure of the system of variable *E-V* was not altered significantly. Most relations between variables *E-V* were preserved in 2010.

Given this, and with the aim to reveal some essential structural aspects of the set of variables *E-V*, we will subsequently reveal some fundamental contradictions existing within the current system.

The previous results (*Chart 3*) already suggested possible major differences between the village and town, men and women or between different categories of age. We are interested to quantify these differences between groups with the intention to evaluate in the future the efficiency of particular social policies which alleviate the dissimilarities.

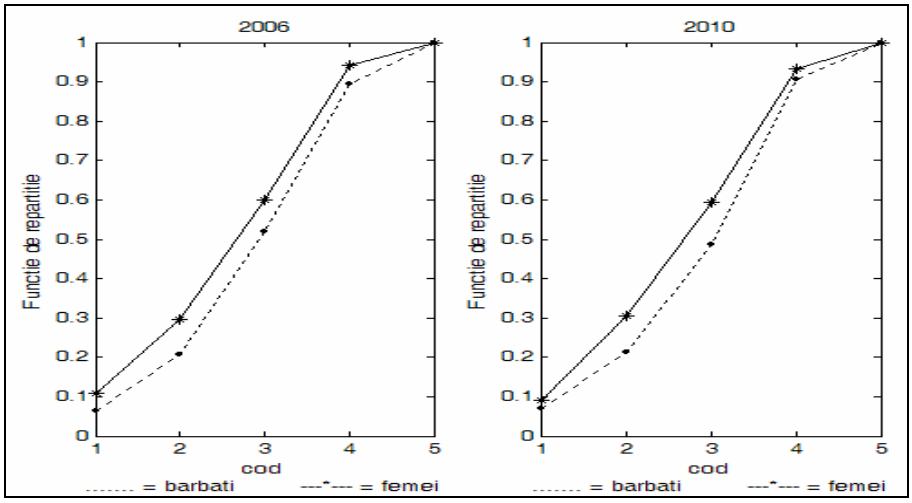
Within this context the statistical analysis will rely on the concept of stochastic analysis, concept already defined at section 2. We remind you that the "stochastic order" is not a relation of total order: there may be variables that cannot be compared between them. Actually, there may exist variables *X* and *Y* for which none of the relations $X \leq Y$ or $Y \leq X$ is not true.

Interpreting the images from *Chart 4*, differences may be identified between men and women, both in 2006 and in 2010. Furthermore, there also is a historic order relation between some entities: *F6* < *B6* and *F0* < *B0*.

In conclusion, in both samples, women are more favoured than men in terms of their health state; this is a surprising aspect that should not be normally present in an evolved society.

Chart 4

2006-2010 comparison of "men-women" categories



A similar analysis covered the people from the villages and those from towns. In terms of the health state, compared to the individuals from the urban environment, the people from the rural environment are more disadvantaged (*Chart 5*). This aspect existed in 2006 and didn't improve in 2010 (*Chart 5*). We have: *R6* < *U6* and *R0* < *U0* (*Chart 5*).

Chart 5

2006-2010 comparison of villages vs. towns

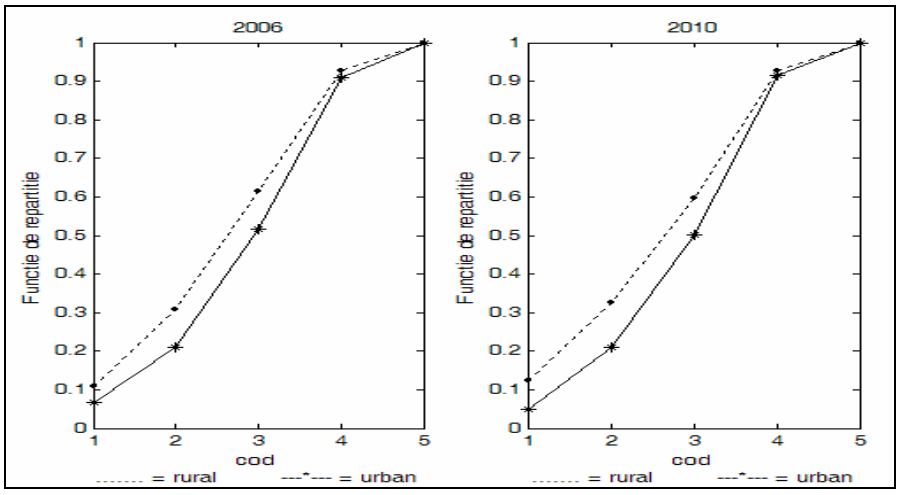
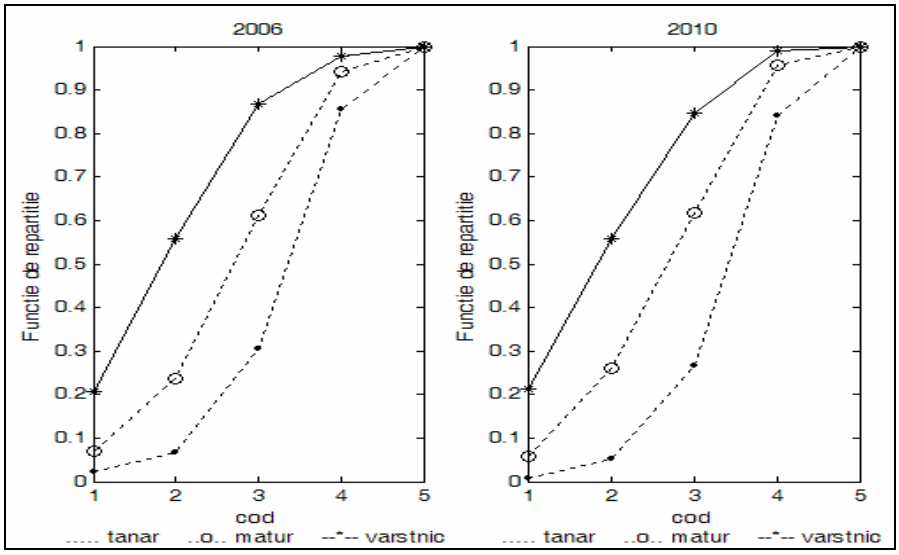


Chart 6

2006-2010 comparison of the age categories



Intuitively, the personal health state is strongly influenced by the age category. This hypothesis is supported by *Chart 6*.

The differences in the personal health state are considerably higher for the age categories than for the rural-urban or men-women comparisons (*Charts 4-6*). This is normal, because the health state is strongly influenced by the age (*Chart 6*). Such result validates indirectly the proposed statistical model. Furthermore, as it was intuitively predictable, the age categories are more obvious in relation or stochastic order, which independent of the studied period (*Chart 6*). Actually, we have relations of "subordination": $V6 < M6 < T6$, $V0 < M0 < T0$.

6. Other aspects

As already mentioned, there were no major structural evolutions of *E-V* system in 2006-2010. However, some transformations were highlighted partially in section 4. Such transformations concerned particularly the category of the "young people".

Chart 7

Health state of the young people and of the mature people in 2006-2010

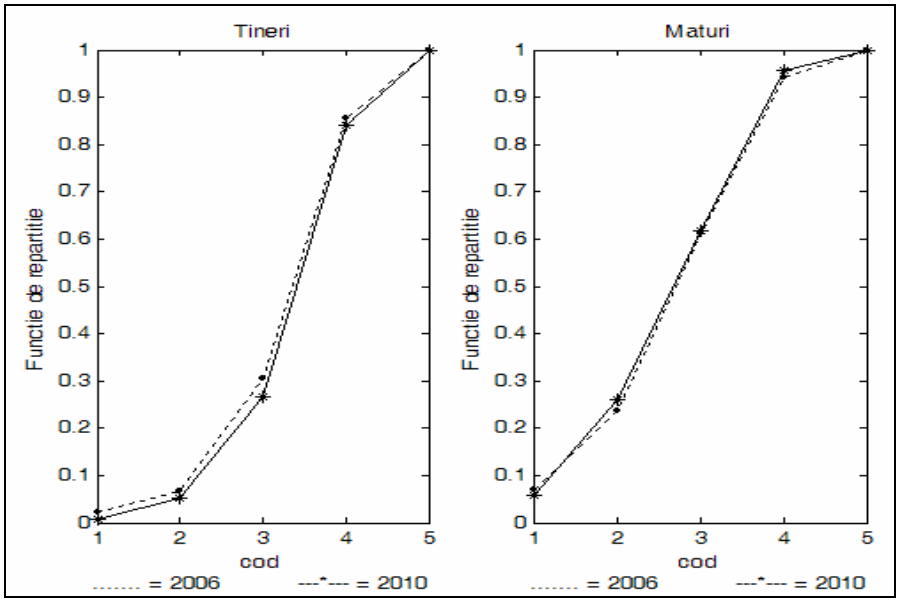


Chart 7 displays the comparison of variables *T* (young people) and *M* (mature people). In agreement with the previous results for both samples, there are no essential differences between these distributions (*Chart 7*). However, compared to the mature persons, differences may be noticed among the young people (*Chart 7*). Furthermore, *T6* < *T0*, which supports the presence of a relation of "slight subordination" in time (Therefore, in relation with 2006, in 2010 the young people perceived a slightly better health state. This aspect has also been highlighted by *Chart 3*.

On the other hand, we may not draw the same conclusions for the mature people. We cannot day that *M6* < *M0*: the reader should thus go over the distribution of variables *M6* and *M0* from *Chart 7*. Relation *M6* > *M0* is not valid either: the curves describing the distribution of these two variables intersect in interval (0, 1) as shown in *Chart 7*.

Therefore, it is possible to witness beneficial transformations in time of system *E-V*. Nevertheless, to validate such hypothesis, we need to cover a longer period of investigations, larger than four years, and to design dynamic statistical models with a higher level of complexity.

7. Conclusions

As expected, the health state is more precarious in the rural environment than in the urban areas (interpretation of the distribution of points *R* and *U* in *Charts 1-2*).

For this evaluation we didn't correlate, however, the personal health state with the actual age of the people. Thus, compared with the men, women have more serious health problems. However, both in rural and in urban areas, women have a significantly longer life expectancy than men.

Predictably, the major health problems usually are among the old people (distribution of variable *V* in *Charts 1-2*). This group is rather stable in its opinions, the dispersion of answers being the lowest, second only to that of the "young people" (*Charts 1-2*). The fluctuation of the health state opinions produced by the old people is comparable with that of the mature people (*Charts 1-2*). We may thus say that the subjective health state of the old people is rather similar, not being influenced seriously by other factors than the age.

These results are rather similar for samples D2006 and D2010. Actually, in all these four years, no urgent and special measures have been taken in Romania which to change radically the subjective perception of the Romanian people about their personal health state. Actually, there is a relative conservation of *E-V* system. However, we must not forget that the period for statistical analysis is extremely short, of just four years.

Period 2006-2010 displayed, nevertheless, several beneficial evolutions too. This is the case of the young people, who had a more positive and less fluctuating opinion about their health state in 2010. This prompts for a positive interpretation of the distribution of variables *T6* and *T0* in *Chart 3*, as well the relation of "slight subordination" *T6* < *T0* from *Chart 7*.

The relation of stochastic ordering confirmed rather large differences of the health state existing between rural and urban areas (*Chart* 5), the decisive influence of ageing (*Chart* 6) and even the significant, apparent inexplicable, differences between men and women (*Chart* 4).

The statistical methods that we applied revealed vulnerable categories such as the old people, the rural people or the women. In practice, we may perceive the existence of all these "disfavoured" groups, which validates indirectly the correctitude of the statistical methods that we used. Unlike the common intuition, however, the statistical procedures also show the measure of the intensity of these phenomena (Iosifescu M., Moineagu C., Trebici V., Ursianu E., 1985).

Given all these aspects, it is advisable to develop further a statistical analysis directed with priority towards the most disfavoured group, the "old women living in

rural areas". This calls for a correlation of the individual health state with the general phenomena of inequality, poverty and social polarization, phenomena which are highly present in Romania in this decade (Mărginean I., Precupețu I., 2011).

This study aimed mainly to reveal some punctual aspects, without giving the measure of the level of functional efficiency of *E-V* system. In a subsequent study we intend to analyse intensively all these "disfavoured" categories. This study will focus on the ways to improve the health state of some categories of individuals. We will then quantify the importance of the some factors for the improvement of the public health in Romania. Among these factors we will necessarily consider the personal level of education, the material resources available to the individual and the correct application of some measures of social policies (Zamfir C., Zamfir E., 1995; Zamfir C., 1999).

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Book Review

SOCIAL ECONOMY. COMPARATIVE ANALYSIS IN EIGHT MEMBER STATES OF THE EUROPEAN UNION

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Before going into the technical details of this book I would like to emphasize that the social economy, although a new concept, received a lot of attention in the recent years, mainly due to the efforts of the European Union to develop this sector. The European Social Fund boosted the development of the social economy in the member states through the Operational Program Human Resources Development, 2007-2013. The coordinators of this book have also displayed a constant interest for the social economy, as shown by the number of reference papers they have published (Cace S., Nicolăescu V., Scoican A., 2010; Cace S, Nicolăescu V., Anton A.N., Rotaru S., 2011; Neguț A., Nicolăescu V. Preoteasa A.M., Cace C., 2011; Cace C., Cace S., Cojocaru S., Nicolăescu V. 2012; Nicolăescu V., Cace C, Hatzantonis D., 2012; Cace C., Nicolăescu V., Katsikaris L., Parcharidis I., 2012)

The book I intend to describe briefly in this article was developed within the framework of the project „INTEGRAT – Resources for the socially excluded women

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