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Perception of the Rural and Urban Population about Healthcare in Romania during 1990-2010

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Abstract

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The aim of the present paper is to analyse the opinions of Romanians regarding the quality of the healthcare. This study used self-assessed health (SAH) data obtained from 13 representative samples during the period 1990-2010. We measured comparatively the intensity of the polarization and inequality healthcare aspects in rural and urban areas too. The indicators which were selected are specific for ordinal variables. Concerning the healthcare in Romania, the polarization phenomenon is usually greater in the villages. Contrary, the inequality between the perception of the individuals is in general more accentuated in the cities.

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Keywords: Healthcare; self-assessed data; polarization; inequality; rural-urban; ordinal variable.



1. Introduction

It is very difficult to evaluate the future evolution of the healthcare in Romania. The progress in time of the healthcare domain is closely related with the solving of many specific problems. We enumerate some of the main factors, whose importance should be estimated more precisely for healthcare: the professional competence of the medical staff, the population's medical education, the public policies for the prevention of different diseases and lastly the way the system is organized and financed (see, for example, the OECD indicators, 2009).

In literature, there are a lot of indicators referring to the characterization of the evolution of the public healthcare system. For instance, there are coefficients proposed by OECD, indexes that are classified using multiple criteria such as: health status, health workforce, health care activities, quality of health, access to care, health expenditure and financing (the OECD report 2009).

Nevertheless the population's opinion regarding healthcare has a major importance in order to correct nowadays problems from the healthcare system. Following this idea, for the current presentation we will limit ourselves to a statistical analysis of the perception of the population in urban and rural areas regarding Romanian healthcare from 1990 to 2010.

More concretely, we will analyse comparatively the population's answers from rural and urban areas regarding question QI : "How do you evaluate the received medical care?". The persons interviewed have to choose between 5 possible answers: very bad (code 1), bad (code 2), so and so (code 3), good (code 4), very good (code 5).

2 Methodology

Our statistical study was based on 13 nationally representative samples obtained from the Research Institute for Quality of Life – Romanian Academy (RIQL) during 1990-2010 (the RIQL data bases).

In fact, the variable QI , which characterizes the perception of the population regarding healthcare, is an ordinal one. The five ordinal classes are defined as the answering codes 1-5 (from very bad to very good). Practically, we will study the evolution of the ordinal variables $QI_{y,z}$, where the indexes y, z represent the year, and the respondent's residential area respectively. More precisely, $y \in \{1990, 1991, \dots, 2010\}$, $z \in \{\text{rural}, \text{urban}\}$.

An ordinal variable $QI_{y,z}$ is defined by the distribution $\underline{p}_{y,z} = (p_{y,z,1}, p_{y,z,2}, p_{y,z,3}, p_{y,z,4}, p_{y,z,5})$, where $p_{y,z,k}$ represents the probability that the persons interviewed in the year y and who live in zone z will give the answer k to the question QI , $1 \leq k \leq 5$.

The statistical model for the analysis of the system's $\{QI_{y,z}\}_{y,z}$ will be based on the evaluation of similarities / dissimilarities between the system's components.

Most of the time, working directly with the distributions of the ordinal variables $QI_{y,z}$ is difficult. That is why we prefer to use the values of indicators applied to these variables. Concretely, we have chosen to monitor the polarization and inequality phenomena defined by the distributions of the variables $QI_{y,z}$. In this way, we will use the indicators $POA(QI_{y,z})$ and $IGO(QI_{y,z})$ respectively.

So, Atkinson proposed in (Atkinson, 1970) a class of inequality measures which are applicable to cardinal variables. But the variables $QI_{y,z}$ used in our research have an ordinal type. For this reason we

cannot apply the Atkinson inequality measures defined in [5]. Agresti developed in his books from 2002 and 2007 (Agresti, 2002; 2007) an unitary methodology for modeling categorical data, that are systems with nominal and ordinal variables. Allison and Foster suggested in 2004 (Allison & Foster, 2004) how to measure the inequality in health when the data are qualitative. In the last years, Giudici and Raffinetti (1996) adapted in the case of ordinal data the classic Gini coefficient which is a very used inequality measure for cardinal random variables. In the subsequent we will denote by $IGO(\underline{p})$ the Giudici-Raffinetti inequality index (Giudici & Raffinetti, 1996) applied to an ordinal variable X which has the distribution \underline{p} .

The standard mean indicator $Mean(X)$ has not always a right interpretation when the the variable X is an ordinal one. The same discussion can be made for the variance coefficient $Var(X)$ of X . In 1992 Berry and Mielke proposed more indices for ordinal variation (Berry & Mielke, 1992). These ideas were developed by Blair and Lacy (Blair & Lacy, 1996). Later, Apouey (2007) takes one of Blair-Lacy variation index and proved that this coefficient accomplishes some axioms which are specific to a polarization phenomenon. In the following we will designate by $POA(\underline{p})$ the polarization indicator used by Apouey in 2007 to measure the polarization for self-assessed health (SAH) data having distribution \underline{p} . More details about the concrete definitions of the indicators $POA(\underline{p})$ and $IGO(\underline{p})$ could be found in Apouey (2007), Giudici & Raffinetti (2011) and Ștefănescu (2015).

Both coefficients $POA(\underline{p})$ and $IGO(\underline{p})$ vary in the interval $[0, 1]$ and they measure the polarization, respectively the inequality level from the distribution \underline{p} . The two indicators are “independent” (see Ștefănescu, 2015). So a high value of one of the indexes does not necessarily determine a high value in the other index. In fact between the inequality and the polarization processes there is not a dependence relation all the time (see *Table 4.1* and *Graphic 4.2* from Ștefănescu, 2015).

3 Data presentation

Our study is based on 13 nationally representative samples, which were designed at the Research Institute for Quality of Life (RIQL) – Romanian Academy during 1990-2010. The *Table 3.1* presents the size of the samples, neglecting the non-response cases.

Table 1. The volume of the used samples.

		rural area						
year		1990	1991	1992	1993	1994	1995	1996
size		841	637	698	687	677	687	675
year		1997	1998	1999	2003	2006	2010	
size		544	513	530	467	497	512	
		urban area						
year		1990	1991	1992	1993	1994	1995	1996
size		1163	761	782	787	810	820	819
year		1997	1998	1999	2003	2006	2010	
size		645	605	637	534	631	645	

The distribution functions of the ordinal variables $QI_{y,z}$ represent the cumulative probabilities of the population’s answers in year y , who have residence in zone z .

The probabilities $Pr(QI_{y,z} \leq k)$, $y \in \{1990, 1991, \dots, 2010\}$, $z \in \{\text{rural, urban}\}$, $k \in \{1, 2, 3, 4, 5\}$, of the ordinal variables $QI_{y,z}$ are represented synthetically in *Fig. 3.1* and *Fig. 3.2*.

Healthcare is considered “more positive” in 1995 for the rural area (Fig. 3.1) and in 1994 for the urban residents (Fig. 3.2). The “most negative” for both areas is the year 1991 (Fig. 3.1-3.2).

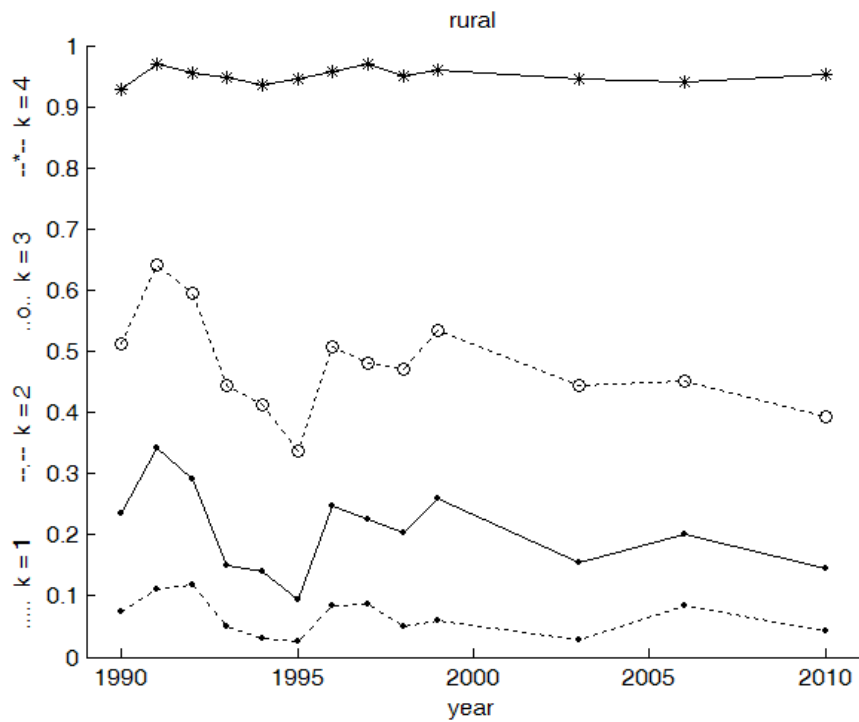


Fig. 1. The cumulative probabilities $\Pr(Q1 \leq k)$ (rural samples).

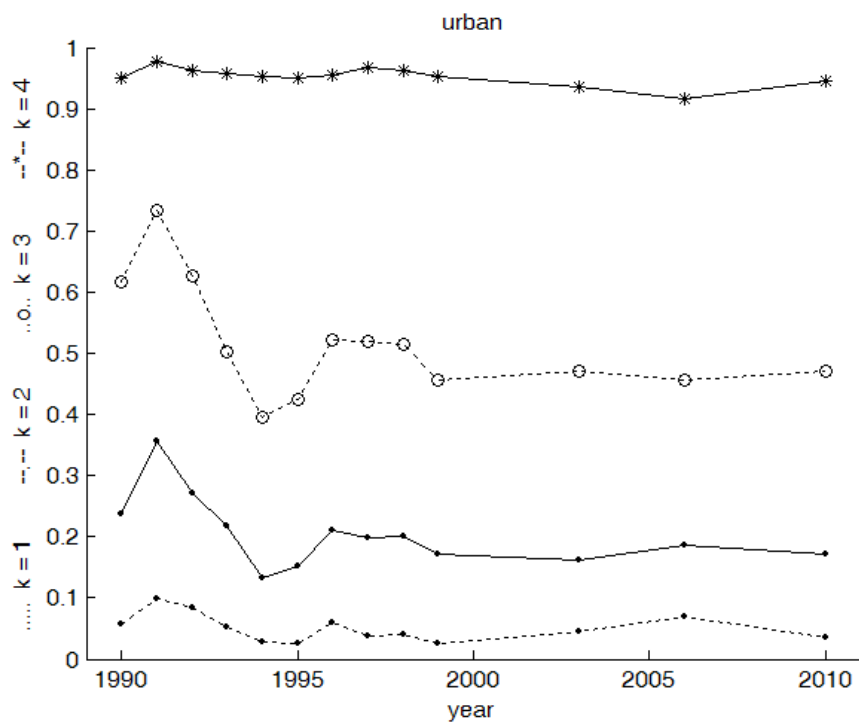


Fig. 2. The cumulative probabilities $\Pr(Q1 \leq k)$ (urban samples).

4 Polarization aspects

In Fig. 4.1 are represented graphically the values of the polarization index $POA(\underline{p})$ where \underline{p} are the vector of probabilities which characterize the ordinal variable $QI_{y,z}$, $y \in \{1990, 1991, \dots, 2010\}$, $z \in \{\underline{rural}, \underline{urban}\}$.

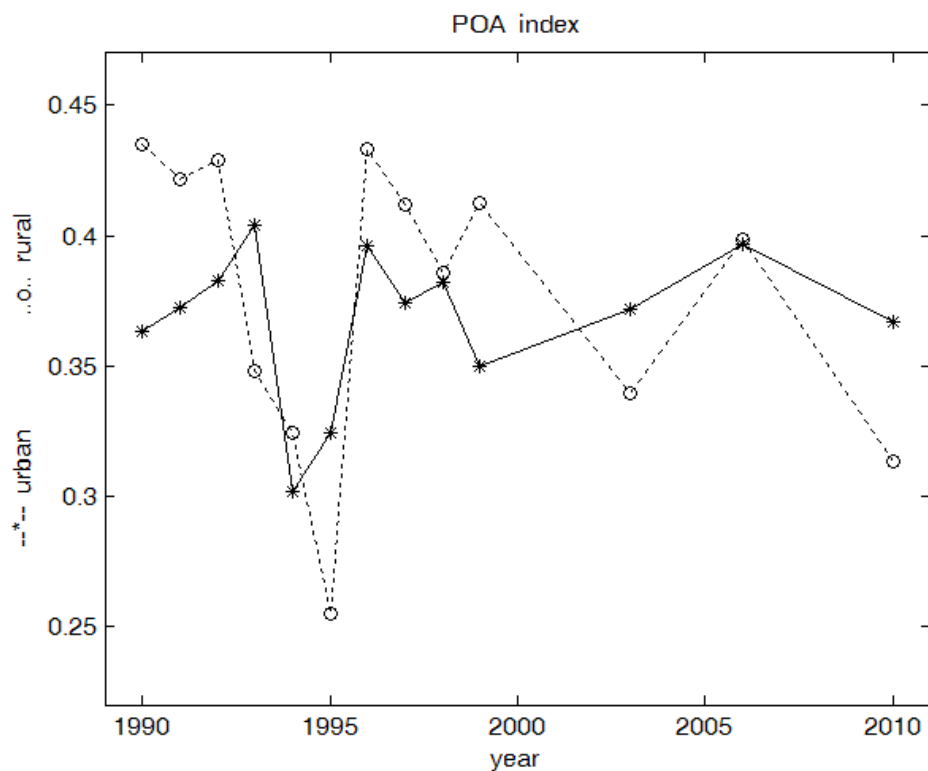


Fig. 3. The fluctuations of the polarization index (rural and urban samples).

Taking into consideration the values POA of the polarization phenomenon, from Fig. 4.1 we conclude :

- In the rural areas, the polarization is more intense than in the urban areas.
- The smallest value for the polarization is in the year 1995 for the rural areas.
- But the smallest value for the polarization in the urban areas is in the year 1994.
- In the analysis of public health, the rural is “inferior” to the urban.
- The greater polarization in the rural area is present in 1990-1993 and in the year 1996.
- For the urban zone the situation is a little different, that is in the years 1990-1994, 1996 and also in 2006 we have a maximum of the polarization indicator POA . Almost always, in the urban districts, comparing with the rural communities, we have less fluctuations of POA coefficient.
- The variations of POA index in time are very similar in rural and urban districts. So we have the same trend for the entire population.

5 Measuring the inequalities

In Fig. 5.1 we summarize the variations in time of the inequality index IGO , for rural and also for urban communities.

Concluding the behaviour of the inequality index *IGO* in Fig. 5.1 we mention the following aspects:

- In the urban areas , the inequality is more intense than in the rural areas.
- The smallest value for inequality is in 1994 year for the urban zone.
- The smallest value for inequality in the rural areas is in the year 1995.
- Taking into consideration the inequality phenomenon in the analysis of public health, the rural is “superior” to the urban.
- We notice a decrease of inequality in urban areas and at last a relative stability after the year 1995.
- After 1999, in the rural areas there is a continuous decrease of Gini type inequality, arriving in 2010 to its smallest value for the entire period 1990-2010. The smallest perceived value for healthcare for Gini inequality is approximately 0.32, value that results also at national level for incomes.
- We observe “turbulences” during entire period 1991-1996.
- With some exceptions (for years 1994, 1999), usually Gini inequality for healthcare has greater values in the urban areas. But this aspect is not always true if we consider other variables as, for example “the perceived health state” (an unpublished research).

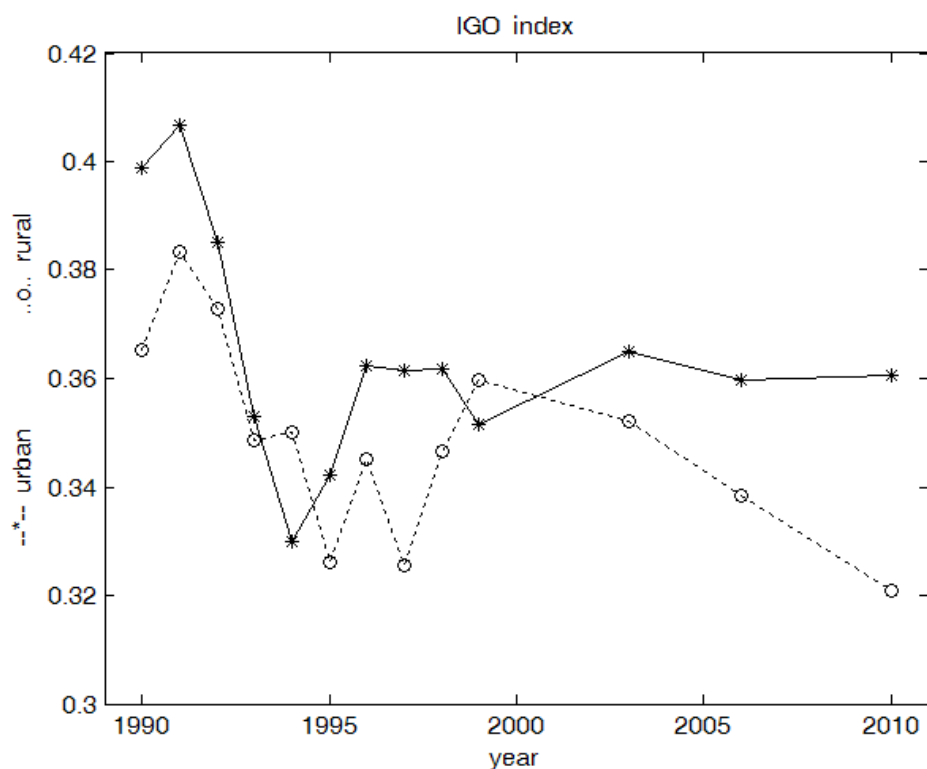


Fig. 4. The fluctuations for the inequality index (rural and urban samples).

6 Final conclusions

- The main aim of this paper is to analyse the perception of the rural and urban people regarding the healthcare in Romania. The study is based on 13 nationally representative samples designated during 1990-2010 years (RIQL, 1990-2010).
- In the literature are used frequently the mean, variance or the classical Gini coefficient as indices for measuring the evolution, polarization, respectively for the inequalities between different cardinal

- variables (see Atkinson, 1970). But these indicators are not suitable for SAH data which are often interpreted as categorical variables (Agresti, 2002; 2007).
- For the statistical analysis of the polarization and inequality phenomena in healthcare were chosen two recent indicators (Apouey, 2007; Giudici & Raffinetti, 2011). The numerical calculus and also the graphs were programmed in Matlab language.
 - We do not notice a relatively rapid improvement of the situation regarding the positive evaluation of the healthcare system by the Romanian population (*Fig. 4.1, 5.1*).
 - The polarization and inequality phenomena do not overlap (*Fig. 4.1, 5.1*).
 - The polarization of the population's answers is higher in the rural area (*Fig. 4.1*). But Gini's inequality index associated to the population's perception is more intense in the urban area (*Fig. 5.1*). For the last period 1999-2010 we notice stationarity in the urban zone with relatively high values of the inequality phenomenon. This phenomenon decreases in the rural area in the second period 1999-2010 (*Fig. 5.1*).
 - We could divide the period 1990-2010 in two great periods 1990-1998 (period 1), respectively 1999-2010 (period 2). In the first stage, we have "turbulences", while in the second phase we have a relative stability with a decreasing tendency for inequality in the rural areas and a stability of inequality in the urban area (*Fig.5.1*), with similar tendencies for the urban areas for polarization (*Fig. 4.1*).
 - In fact we have overlapped two different phenomena, sometimes complementary, with similar dynamic tendencies for the evaluation of the evolution of the rural and urban areas. We speak about the polarization and on the inequality aspects. Summarizing, from the healthcare point of view the polarization phenomenon is usually greater in the villages, while the inequality aspect is in general more accentuated in the cities.
 - For the future we intend to take into consideration new processes as the diversity, the progress or to establish an evolution trend. We have in mind to correlate the healthcare with other variables as the satisfaction with the life, the age of the individuals, the income of the persons and also with different vulnerable categories from the population.

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