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REGIONAL ANALYSIS OF INEQUALITIES IN ROMANIAN HEALTHCARE SYSTEM

Andreea-Oana IACOBUTĂ¹, Mircea ASANDULUI²,
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Abstract

This paper aims to analyse several inequalities in the Romanian healthcare system at regional level and to highlight the resemblances and the differences, taking into account the socio-economic development, the population health status and the material and human resources allocated to healthcare, in different Romanian regions. We use secondary data registered at NUTS 2 level for eight Romanian regions collected from Eurostat (2009 – 2010). The results show large discrepancies between Romanian regions in most of analysed variables. Bucharest, North-West and West regions are characterized by a higher level of resources allocated to healthcare, a higher level of education and a lower poverty rate, unlike North-East, South-West and South regions, which display the opposite situation.

Keywords: health inequalities; health determinants; health resources allocation.

Introduction

“Inequalities in health arise because of inequalities in society – in the conditions in which people are born, grow, live, work and age” (Sir Michael Marmot, 2010). The causes of health inequality are complex but they do not arise by chance. The social, economic and environmental conditions in which we live strongly in-

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fluence health. These conditions are known as the social determinants of health, and are largely the results of public policy. Health inequalities at global level are an intensively debated issue. Although progress has been made, there are still huge discrepancies to cover among the rich and the poor countries worldwide. The causes of health inequalities are very complex and lie in all aspects of our lives. They are a results of the social, economic, and political mechanisms that lead to social stratification according to income, education, occupation, gender, and race or ethnicity” (Beaglehole & Bonita, 2008; 1991). They are, at the same time, “manifestations and determinants of existing inequalities in various other economic and social dimensions” and they exist in terms of health outcomes, in relation to the availability and access to health resources, in relation to the quality and availability of medical treatment (United Nations, 2009).

Health inequalities are preventable and unjust differences in health status experienced by certain population groups. People in lower socio-economic groups are more likely to experience chronic ill-health and die earlier than those who are more advantaged. Health inequalities are not only apparent between people of different socio-economic groups – they exist between different genders and different ethnic groups. Health inequalities are often observed along a social gradient. This means that the more favourable your social circumstances such as income or education, the better your chance of enjoying good health and a longer life. While there is a significant gap between the wealthy and the poor, the relationship between social circumstances in health is in fact a graded one

Romania is the ninth largest country of the European Union with 20.2 million people. Romania began in 1989 its transition towards democracy and a capitalist market economy. According to the data released by World Health Organization, among the EU countries Romania registers the lowest percentage of GDP spent on health, of 5.6% in 2010; a low life expectancy at birth, of only 73 years in 2009; the highest infant mortality rate per 1000 live births, of 10% in 2009; and the highest under-five mortality rate per 1000 live births, of 12% in 2009. The issue of health inequalities are currently high on the political agenda within Romania. The overall Romanian policy response is mainly driven at a national level. The policies are designed at the national level, and then applied at the regional and local level. 1.

These inequalities exist not only between Romania and EU countries but there also inequalities within Romania, between the eight development regions at NUTS 2 level. Starting from these considerations, this paper analyses several inequalities in the Romanian healthcare system at regional level. According to NUTS 2 Classification in Romania there are eight development regions: North-East (N-E), North-West (N-W), Center (Center), South-East (S-E), South (S), Bucharest-Ilfov (Bucharest), South-West (S-W), West (W).

The aim of this study is to provide an overview of several health inequalities and to identify the resemblances and the differences from the perspective of socio-economic development, population health status and material and human resources allocated to healthcare, at the level of the Romanian development regions.

In the first part of the paper, using numerical descriptive statistics and comparative analysis we highlight the disparities at the socio-economic level between Romanian regions, taking into consideration:

- the most important macroeconomic indicators registered in 2009: *Unemployment rate (%)*, *Employment rate of the age group 15-64 (%)*, *At-risk-of-poverty rate (%)*, *Regional gross domestic product (PPS per inhabitant)*, *Primary income of private households (PPS per inhabitant)* and *Pupils and students in all levels of education (%)*;
- the population health status in 2010 using *Standardised death rate all causes of death per 100 000 inhabitants*, *3 years average 2008-2010*, *Life expectancy at birth (years)* and *Infant mortality* as health outcomes;
- the inequalities in the level of the material and human resources allocated to healthcare in 2010 by taking into consideration *Available beds in hospitals (per 100000 inhabitants)*, *Physicians or doctors (per 100000 inhabitants)* and *Dentists (per 100000 inhabitants)*, as input indicators.

In the second part of the paper we apply correlation analysis to observe the interaction between the variable and to measure the strength of the relationships between them. The identification of the significant correlations is made using Pearson correlation coefficient. The statistical significance of the Pearson correlation coefficient is tested using Student t - test. The statistical hypotheses are: the null hypothesis, the absence of correlation between the two analyzed variables ($H_0 : \rho = 0$), and the alternative hypothesis, the presence of significant correlation ($H_1 : \rho \neq 0$). If Sig probability associated to the calculated value of t statistic is higher than the conventional probability α , $Sig \geq \alpha$, the null hypothesis is validated. On the contrary, if $Sig < \alpha$, we reject the null hypothesis, with assumed risk.

An overview of the direction and intensity of the relationships between the variables included in the analysis but also of the resemblances and differences between the statistical units (the Romanian development regions) is obtained using Principal Components Analysis (PCA). Using PCA we reduce the dimensionality of data by creating principal components from the original variables. These principal components are then used to identify and describe relationships between variables and also similarities and differences between statistical units, from the perspective of the analysed variables (Pintilescu, 2007). The advantage of this method consists in the synthetic graphical representation in a system of factorial axes of statistical units and statistical variables (Pintilescu & Baciu, 2011). The third part of the paper uses Principal Components Analysis in order to highlight the resemblances and the discrepancies among the Romania's regions, from the point of view of the indicators describing poverty, education and health resources.

Results and discussion

The results show large discrepancies between the Romanian regions from the point of view of the analysed variables. The regions Bucharest, North-West, and West are characterized by a high level of resources allocated to healthcare, a high level of education and a low poverty rate, unlike North-East, South-West and South regions, which display the opposite situation.

Table 1 presents the descriptive statistics for included variables.

Table 1. Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Unemployment rate regions (% total)	8	4.0	10.7	6.825	1.9891
Employment rate of the age group 15-64 (% total)	8	55.1	63.8	58.588	3.1403
At-risk-of-poverty rate (% total population)	8	6.4	37.4	21.788	9.5084
Regional gross domestic product (PPS per inhabitant)	8	6900	26100	11587.50	6066.168
Primary income of private households (PPS per inhabitant)	8	3190.8	12980.1	5451.775	3130.5346
Pupils and students in all levels of education (% of total population)	8	16.7	34.0	21.475	5.3125
Standardised death rate per 100 000 inhabitants (all causes of death, 3 years average 2008-2010)	8	854.4	1006.0	957.350	49.0596
Life expectancy at birth (years)	8	73.3	75.7	73.863	.8228
Infant mortality	8	149	434	259.75	97.567
Available beds in hospitals (per 100000 inhabitants)	8	480.9	990.1	644.100	159.3283
Physicians or doctors (per 100000 inhabitants)	8	137	517	250.25	122.494
Dentists (per 100000 inhabitants)	8	34	125	63.68	30.143
Valid N (listwise)	8				

As can be observed in the table above, there are large discrepancies between the best and the worst performing from the point of view of the analysed variables among the Romanian regions. Socio-economic data point out that between the

two categories of regions the unemployment is 2.6 times higher, poverty is almost 6 times higher, regional GDP is 3.8 lower and primary income of private households measured in PPS per inhabitant is also 4 times lower.

The allocation of health resources is also unequal among the Romanian regions, approximately two times higher in the best than in the worst performing if referring to material resources (available beds in hospitals per 100000 inhabitants), and 3.8 times higher if considering the number of physicians per 100000 inhabitants. The consequence of these inequalities resides in inequalities in population health status taking into consideration the fact that infant mortality is approximately 3 times higher in the worst than in the best performing region and the differences in the levels of life expectancy at birth and standardized death rate by all causes of death per 100000 inhabitants.

Table 2 provides a picture of the economic and social disparities at regional level in Romania by considering the most important macroeconomic indicators registered in 2009. The indicators describe aspects of socio-economic level which are proven in literature as determinants of population health status.

Table 2. Socio-economic regional profile, in 2009 Source: Eurostat database.

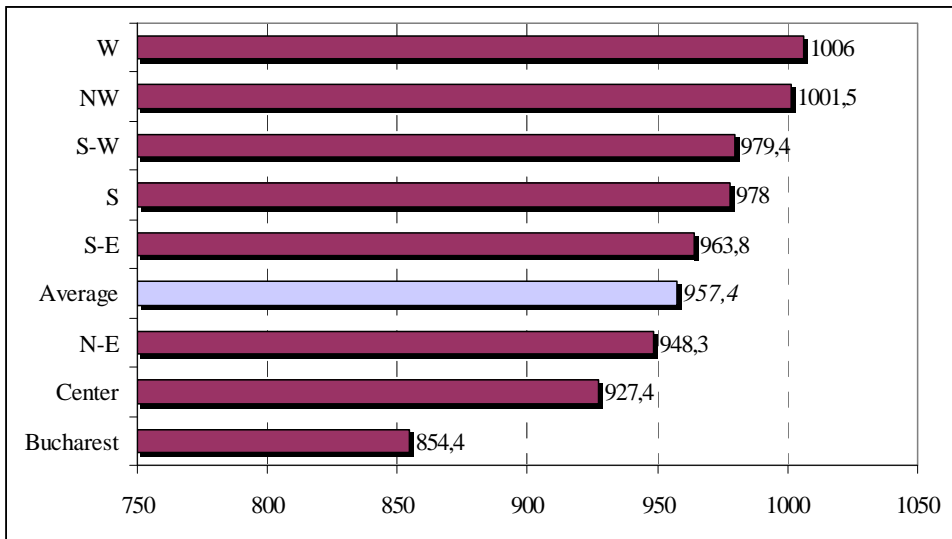
	Unemployment rate regions (% total)	Employment rate of the age group 15-64 (% total)	At-risk-of-poverty rate (% total population)	Regional gross domestic product (PPS per inhabitant)	Primary income of private households (PPS per inhabitant)	Pupils and students in all levels of education (% of total population)
NW	5.6	55.2	18.7	10100	4597.7	21.2
Center	10.7	55.1	19.4	10700	4900.8	21.2
N-E	6	60.6	31.5	6900	3190.8	20.3
S-E	7.5	55.4	22.5	8900	4300.4	18.1
S	8	60.1	23	9500	3980.7	16.7
Bucharest	4	63.8	6.4	26100	12980.1	34.0
S-W	6.8	59.9	37.4	8400	3959.3	19.3
W	6	58.6	15.4	12100	5704.4	21

The most significant differences between the Romanian regions can be noticed at the level of economic development. The poverty rate varies from 6.4% in Bucharest to 37.4% in South-West Romania, with other three regions namely, North-East, South-East and South, registering above the average values for this indicator. If taking into account the Regional GDP in PPS per inhabitant, this indicator varies from 26100 in Bucharest to 6900 in North-East Romania, the average value being 11587. As data in the table above show, six of the regions

register values below the average. The same discrepancies can be noticed in the level of Primary income of private households measured in PPS per inhabitant, Employment and Unemployment. The level of education measured in this paper by Pupils and students in all levels of education (% of total population) also varies among regions, from 16.7% in South Romania to 34% in Bucharest.

The health determinants presented so far may have an impact on population health status. Consequently, we expect variations in the indicators describing health status at the regional level. Figure 1 presents the Standardised death rate, all causes of death, per 100 000 inhabitants, computed as 3 years average (2008-2010). The est region has the highest value for this indicator while Bucharest the lowest. Five of the Romanian regions register values above the national average.

Figure 1. Standardised death rate, all causes of death, per 100 000 inhabitants, 3 years average 2008-2010 (Source: Eurostat database)



In 2010, Life expectancy, a complex health status indicator, showed differences of 2.4 years between Bucharest (75.7 years) and North-East and West regions (73.3 years). Six of the Romanian regions register below the average values for this indicator. (Figure 2)

Figure 3 displays the comparison between the Romanian regions for Infant mortality in 2010. This indicator is relevant for the need of medical services. The available presented data point out significant differences between Bucharest, on one side and North-East Romania, on the other.

Figure 2. Life expectancy at birth (years), in 2010. (Source: Eurostat database)

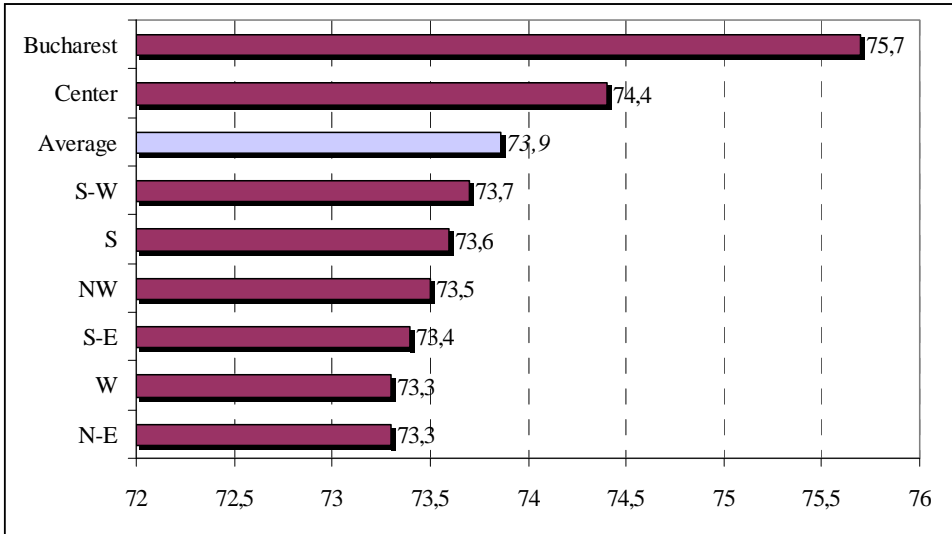
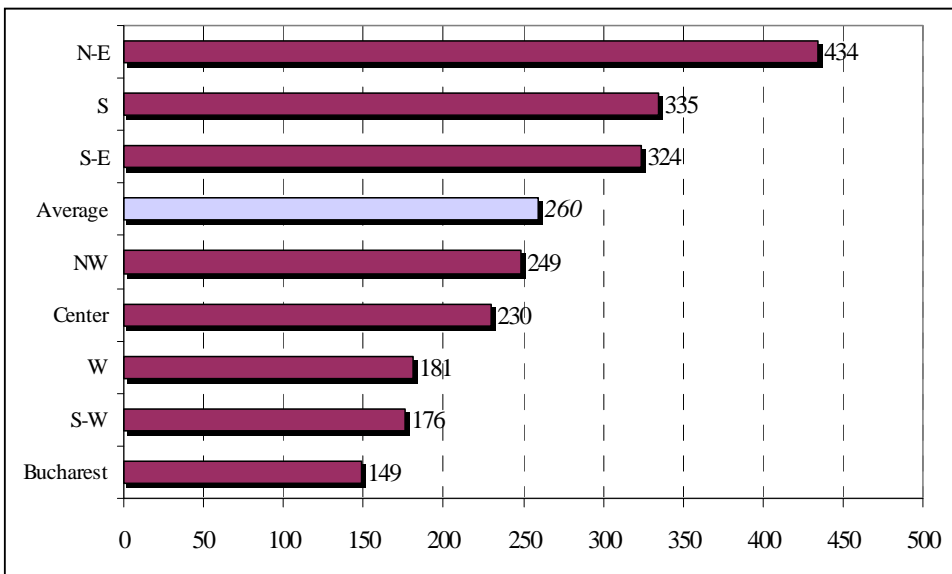


Figure 3. Infant mortality, in 2010. Source: on Eurostat database.



The comparative analysis of the distribution of material and human health resources reveals important inequalities among regions (Table 3).

Table 3. Healthcare resources, in 2010 Source: on Eurostat database.

	Available beds in hospitals (per 100000 inhabitants)	Physicians or doctors (per 100000 inhabitants)	Dentists (per 100000 inhabitants)
NW	671.1	266	76
Center	649.3	228.4	59.2
N-E	566.6	173.8	42.8
S-E	521.3	163.4	48.6
S	480.9	136.7	33.8
Bucharest	990.1	517.4	124.5
S-W	568.2	201	40.7
W	705.3	315.3	83.8

The assessment of the distribution of available hospital beds indicates a times variation between the best and the worst performing, the values of this indicator ranging from 990.1 beds in hospitals per 100000 inhabitants in Bucharest to only 480.9 beds in South Romania. The analysis of the distribution of human health resources points out that the rate of physicians per 100000 inhabitants is 3.7 times higher in Bucharest than in South-East Romania. The explanation of such situation may reside in internal and external migration. If analysing the rate of dentists per 100000 inhabitants the proportion between the highest value (Bucharest region, with 124.5 dentists per 100000 inhabitants) and the lowest value (South region, with 33.8 dentists per 100000 inhabitants) is approximately of 4:1.

Table 4 presents the significant correlations we obtained and, for each correlation, the estimated value of Pearson correlation coefficient (r) and Sig probability associated to the computed value of Student statistic.

Our results also showed with a probability of 95%, the existence of a positive strong relationship between the variables describing level of health resources (available beds, physicians and dentists) and variables of the socio-economic development, including education (regional GDP, primary income private household, pupils and students in all levels of education). Also, there is a strong correlation between life expectancy at birth and the previously mentioned socio-economic variables. At the same time, we notice a negative strong correlation between the rate of poverty and the level of the human and material resources allocated to healthcare.

Tabel 4. Correlation Matrix

		Available beds	Physicians	Dentists	Life expectancy at birth	At-risk-of-poverty rate	Regional GDP	Primary income private households	Pupils and students in all levels of education
Available beds	r	1	.992(**)	.972(**)	.817(*)	-.758(*)	.929(**)	.935(**)	.970(**)
	Sig.		.000	.000	.013	.029	.001	.001	.000
Physicians	r	.992(**)	1	.978(**)	.791(*)	-.765(*)	.941(**)	.946(**)	.955(**)
	Sig.	.000		.000	.019	.027	.001	.000	.000
Dentists	r	.972(**)	.978(**)	1	.713(*)	-.847(**)	.901(**)	.905(**)	.908(**)
	Sig.	.000	.000		.047	.008	.002	.002	.002
Life expectancy at birth	r	.817(*)	.791(*)	.713(*)	1	-.612	.898(**)	.895(**)	.884(**)
	Sig.	.013	.019	.047		.107	.002	.003	.004
At-risk-of-poverty rate	r	-.758(*)	-.765(*)	-.847(**)	-.612	1	-.792(*)	-.774(*)	-.684
	Sig.	.029	.027	.008	.107		.019	.024	.062
Regional GDP	r	.929(**)	.941(**)	.901(**)	.898(**)	-.792(*)	1	.998(**)	.947(**)
	Sig.	.001	.001	.002	.002	.019		.000	.000
Primary income private household	r	.935(**)	.946(**)	.905(**)	.895(**)	-.774(*)	.998(**)	1	.957(**)
	Sig.	.001	.000	.002	.003	.024	.000		.000
Pupils and students in all levels of education	r	.970(**)	.955(**)	.908(**)	.884(**)	-.684	.947(**)	.957(**)	1
	Sig.	.000	.000	.002	.004	.062	.000	.000	

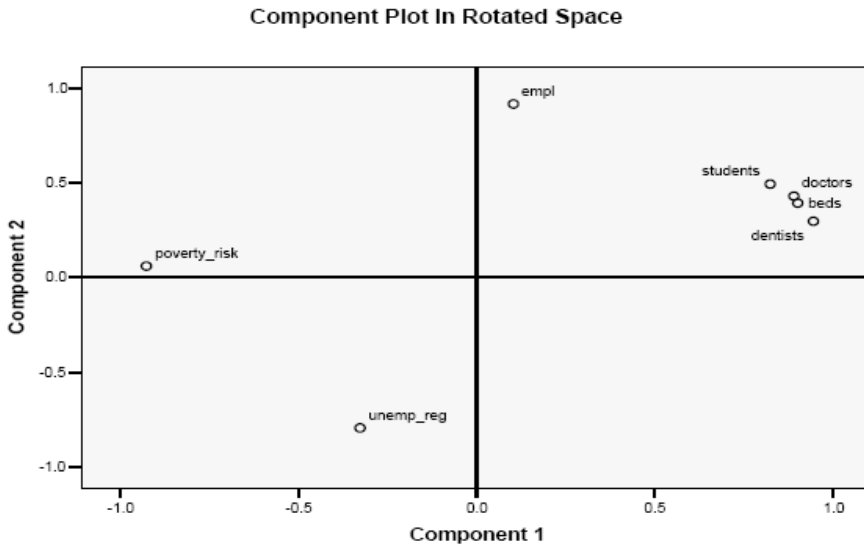
Note: **. Correlations are significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed).

In order to highlight the resemblances and the discrepancies among the country's regions, from the point of view of the indicators describing poverty, education and health resources registered in Romania, we used *Principal Components Analysis* (PCA.)

After the data processing, the following results were obtained, presented in figure 4. It shows the variables' grouping in the system of the first two factorial axes, according to their coordinates.

Figure 4. The graphical representation in the system of the first two factorial axes of the variables registered in Romanian regions, in 2010



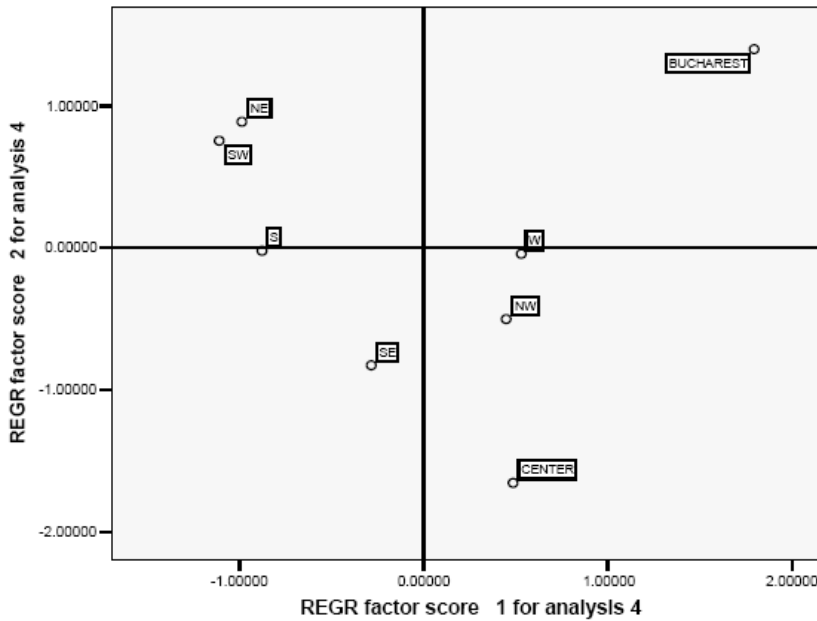
Source: Authors' computing based on Eurostat database.

The most important inter-regional disparities relates to a positive correlation between the indicators *Available beds in hospitals (per 100000 inhabitants)*, *Physicians or doctors (per 100000 inhabitants)*, *Dentists (per 100000 inhabitants)* and *Pupils and students in all levels of education (% of total population)*. The analysis of these variables and the variable *At-risk-of-poverty rate (% total population)* shows a negative correlation between them.

The graphical representation of the regions in the system of the two factorial axes allows the assessment of the disparities between regions from the point of view the considered variables. Figure 5 displays the positioning of the Romanian regions' in the system of the first two factorial axes.

The most significant regional disparities in Romania in 2010 are registered between the Bucharest, North-West, and West regions, on one hand, and the North-East, South-West and South regions, on the other hand. Overlapping of the graphical representation of the Romanian regions on the factorial map (Figure 5) and variables map obtained with PCA (Figure 4 above), allows us to identify several characteristics of the Romanian regions from the point of view of poverty, education and health resources. The diagrams mark important disparities among the country's regions. The regions Bucharest, North-West, and West are characterized by a high level of *Available beds in hospitals (per 100000 inhabitants)*, *Physicians or doctors (per 100000 inhabitants)*, *Dentists (per 100000 inhabitants)* and *Pupils and students in all levels of education (% of total population)* and a reduced level of *At-risk-of-poverty rate (% total population)*, unlike North-East, South-West and South regions, which display the opposite situation.

Figure 5. The graphical representation in the system of the first two factorial axes of the Romanian regions, in 2010



Conclusions

We highlighted several inequalities in the Romanian healthcare system at regional level and to profile the regions from the perspective of socio-economic development, population health status and the level of resources allocated to healthcare. The results reveal significant inequalities between the Romanian development regions. They are consistent with previous studies in this area (Dragomiristeanu, 2010) and they confirm the fact that where there are inequalities in socio-economic development there are also inequalities in health.

Our analysis reveals large disparities between the best and the worst performing regions in terms of unemployment, poverty, regional GDP and primary income of private households. Also, there are significant differences between the best and the worst performing when taking into consideration material and human resources. All of these lead to inequalities in the levels of population health status. The correlation analysis we performed allowed us to identify strong positive relationships between the resources allocated to healthcare and the level of socio-economic development, including education. We have also identified a strong negative correlation the rate of poverty and the level of the human and material resources allocated to healthcare.

Using Principal Components Analysis important disparities were identified between the Bucharest, North-West and West, characterized by a large number of a high level of health care resources and a reduced level of poverty and the North-East, South-West and South. It can be noticed that the regions having the highest level of economic development are also the ones with a high level of education and a high level of material and human resources allocated to healthcare. This last aspect suggests that financing healthcare policies should specifically address the less favoured development regions and the criteria of resources allocation should address the population needs in order to reduce the differences in terms of health outcomes.

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References

- Beaglehole, R., & Bonita, R. (2008). Global public health: a scorecard. *The Lancet*, 372, 1988-1996.
- Dragomirișteanu, A. (2010). Reducing inequities in healthcare: a priority for European policies and measures. *Management in Health*, Vol. XIV, No.3, 14-19.
- Eurostat, Regional Statistics. Available from http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics
- Pintilescu, C., & Baciu, L. (2011). Regional analysis of impact factors of the graduation of pre-academic studies in Romania. *Transformations in Business & Economics*, 10, 2B(23B), 701-714.
- Pintilescu, C. (2007). *Analiză statistică multivariată*, Iasi: Editura Universității Alexandru Ioan Cuza din Iași.
- United Nations (2009). *Implementing the Millennium Development Goals: Health Inequality and the Role of Global Health Partnerships*, Policy Note, Committee for Development Policy. Available from http://www.unicef.org/health/files/MDG_and_Health_Inequalities_UN_2009.pdf