A CLUSTER ANALYSIS OF THE ROMANIAN COUNTIES BASED ON THE NUMBER OF HEALTHCARE INSTITUTIONS AND HEALTH WORKFORCE: PUBLIC VERSUS PRIVATE SECTOR

Andreea Gabriela ZOTA
Bucharest University of Economic Studies, Piata Romana, 6, Bucharest, Romania
zzottaa@yahoo.com

Andra RADULESCU
Bucharest University of Economic Studies, Piata Romana 6, Bucharest, Romania
radulescu.andra12@gmail.com

Abstract

The purpose of this research is to cluster Romania's 41 counties, along with the municipality of Bucharest, based on 2016 data retrieved from both public and the private health systems.This paper classifies the counties in 3 separate clusters, considered low, medium or high-level groups, using the K-means cluster analysis. Various factors are taken into consideration, such as: the number of hospitals, pharmacies, dental practices, as well as the number of physicians, pharmacists and mid-level practitioners. The major findings as the result of the analysis, are the emphasizing differences between Bucharest, Iasi, Cluj and all the other 39 counties regarding the number of healthcare providers andhealthcare institutions.

Keywords: health system; private sector; public sector; k-means.

1. INTRODUCTION

Romania is a beautiful country, well known for its breath-taking landscapes, with both mountain and seaside destinations, hospitable people and good food. Since 1989, the fall of the communism era in Romania, the population was faced with the liberty of choice, of travelling the world and many other aspects that were forbidden before the revolution. As a result, Romanians started embracing the modern world, and tried to keep up with what they have been missing for so many years, but they were also facing the financial problems that came with the major political changes. The country was suffering a tremendous remake and many years had to pass by to build the Romania of today.Because of the constant improvements and hard work, Romania became anEuropean Union member in 2007 (European Union).

The aim of this paper is to tackle a statistical comparison between the public and the private health sectors of Romania in 2016, by counties, taking into consideration the number of professionals providing the people with health care services and the available institutions where the services can be sustained.

The pillars of a country, such as the educational and the health systems, need constant improvements and remodelling in order tosustain the constant changes of today's society. In Romania, the employees of these systems, such as teachers, physicians, pharmacists, nurses etc. are wrongfully paid, which is the main cause why educational and health workers choose to emigrate to other countries, especially after the EU accession. This fact is considered as "the brain drain" of the Romanian elite, the "fourth wave" of migration as of 1989 (Ulrich et al. 2011).

Brain drain phenomenon represents the departure of highly skilled professionals from a country with poor levels of income, to better working conditions and higher wages, whereas, brain circulation is defined by a positive movement of labour force leading to a knowledge transfer and brain return is considered a positive consequence of brain circulation (Boncea 2015).

A study conducted from 2013 until 2015, among 957 license-degree students from the University of Medicine and Pharmacy "Iuliu Hatieganu" in Cluj-Napoca, Romania, revealed that 84.7% of the respondents planned on seeking employment abroad after graduation, choosing as the main reason for migration: "Better working and

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living conditions abroad", after "Higher wage abroad" and "I am disappointed in the healthcare system in Romania" (Suciu et al. 2017).

As a solution against the "bran drain" of Romania, the government implemented the15/2017 Law, regarding the remuneration of the employees paid from budgetary funds, which implies an increase between 70-172% from the incomes of January 2018, effective since 1st March of 2018 for the employees working in the medical institutions(Ministry of Health, Romania 2018).

2. LITERATURE REVIEW

In Europe, healthcare is affordable to almost everyone, poor or rich. What matters is the accessibility and the quality of the health services, which is far from faultless in many nations.

Health Consumer Powerhouse, a Swedish research institute, produces the Euro Health Consumer Index (EHCI) used to compare the European healthcare systems, based on the quality of various indicators covering the following sub-disciplines: patient rights and information, accessibility, outcomes, range and reach of services, prevention and pharmaceuticals. Their quality is described as Good, Intermediary or Not-so-good (Wikipedia: Euro health consumer index 2017,Health Consumer Powerhouse 2018).

Based on the EHCI, the publicly funded healthcare systems of Europe have steadily improved over the last ten years. In 2016, The Netherlands scored 927 points and qualified as the country with the strongest healthcare system, followed by Switzerland with 904 points and Norway with 865 points. At the opposite side, Romania is ranked last, on the 35th place among a total of 35 analyzed European countries (Health Consumer Powerhouse 2017). The following year, The Netherlands and Switzerland kept their top-class positions, and Denmark bettered Norway and took the third place with 864 points (Norway 850 points). Discriminations of minority groups such as romashows as poor Outcomes rations, are keeping Romania on the last place, with 439 points (Health Consumer Powerhouse 2018).

Therefore, what is keeping The Netherlands first and Romania last? Well, the Dutch system doesn't have any weak spots and can be considered "the best healthcare system in Europe" whilst Romania has only a few Good grades, and those are for: Healthcare law based on patient's rights, Patient organizations in decision making, Registry of bona-fide doctors (doctors has ongoing responsibility for the care and treatment of the patient), E-prescriptions, Accident and emergency (A&E) waiting times and Layman-adapted pharmacopeia. The latter indicator represents a comprehensive data collection on all drugs registered and offered for sale in a country, containing understandable information for non-professionals (Dobrota 2014).The ToErr is Humanand Crossing the Quality Chasm reports identified organizational failings as one of the main reasons of poor quality in health service delivery (IOM 1999) (IOM 2001). Healthcare organizations should be perceived as complex multi-level systems, where regulation, accreditation, policy and payments rules are strongly influencing hospitals, but also smaller healthcare delivery units (Robert et al. 2011). The responsibilities of clinical professionals nowadays have increased, as they had to develop several other skills, with managerial tasks or techniques of accounting, and they are no longer exclusively curative in their aspirations (Kirkpatrick et al. 2016), which may affect the overall quality of the provided health services to the patients. Due to the adjustments of the healthcare system in order to cope with the economic environment that focused on management efficiency, in many European countries, nurses have been exposed to intense pressure over the last 25 years, which led to intensified work, deteriorating working conditions and therefore, low quality of the provided health services (Hasselhorn et al. 2003).

There is no country in the European Union that provides its citizens with services only from the public-sector. Furthermore, the trend has been for a decrease in the state's role in service provision. For example, in Germany, Belgium and France, the private-owned hospitals are a dominant feature. UK introduced the General Practitioner fundholding system that provided with several practitioners to supply primary care services themselves and to contract for hospital and specialist services, all paid for out of a fixed budget (Jakubowski 1998). This system provided general practices with annual funds to purchase specific health services for a designated population. Practices were permitted to retain the surpluses, which created incentives to search for cheaper suppliers, and therefore to reduce unnecessary and overly expensive prescriptions. Overall, the

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fundholding system met its overall objective of more appropriate care and reduced expenditure in the United Kingdom (Shortt 2003).

The private sector claims to cover for the flaws of the public system, bringing professionalism in management and strategies to innovate and to gain recognition amongst people, to compete alongside public hospitals in the quality of healthcare services. As the privately-owned hospitals are mainly businesses driven on profit rather than institutions created to answer the needs of the general public, there are many debates about the health systems of Europe, focusing on the value of outcomes of the health systems in relation to cost, or VBHC – Value Based Health Care (Martens 2017). VBHC focuses on optimizing the value of care for patients and minimizing the cost of health care, to transform reimbursement systems closer to patient's satisfactions(Value Based HealthCare 2010).

A study representing more than 5,500 hospitals across Europe demonstrated that public hospitals have a better economic performance compared to private for profit (PFP) or private not for profit (PNFP) hospitals, and showed that the trend of public hospitals is to treat patients with lower socioeconomic status, slightly older and riskier lifestyles than patients in private health institutions. Private providers have to optimize efficiency in order to compete with the public sector, while political and administrative pressures are decisive for the public providers (Tynkkynen and Vrangbæk 2018). Another comparative study of the performance between private and public healthcare in low and middle-income countries, abolished the general claim where the private sector is more efficient, medically effective than the public sector and confirmed the lack of punctuality and hospitality towards patients in public hospitals (Basu et al. 2012).

Based on a segmented regression analysis of a longitudinal data series of the number of hospitals in China, Fujian province,using data from 1990 until 2009, there has been a continuous increase in private hospitals after 2001. In 2008, a rough estimation of 22% of the physicians in private hospitals are over 60 years old, whereas in public hospitals only 2.97%, with 145 private hospitals and 231 public health institutions. Female healthcare workers dominated the hospital system, technical secondary school was the highest level of education obtained by most workers in public and private hospitals and only 0.59% of public and 0.09% of private healthcare employees attained a doctoral degree (Tang et al. 2014). In the Czech Republic, a few hospitals were privatized when control of the public institutions was transferred to the municipalities (Nemec and Kolisnichenko 2006), in Ukraine, approximately 1,500 private hospitals were registered by 2007 (Plugaru 2009) and in Bulgaria, a policy has been approved, with its focus on full privatization of hospitals (Ivanova and Mudeva 2010).

As an overview on the global health workforce, the World Health Organization (WHO) estimates a shortage of 4.3 million physicians, nurses and other health workers, with only 1.13 doctors for 1,000 population (Wikipedia-Physician supply 2018).

In a cross-country analysis of the nurse practitioner workforce of 6 OECD countries:Australia, Canada, Ireland, The Netherlands, New Zealand and USA.The latter showed the highest absolute number of nurse practitioners with a 40.5 rate per 100,000 population and The Netherlands as second place (12.6), followed by: Canada (9.8), Australia (4.4) and Ireland and New Zealand (3.1). Growth rates among NPs were between three and nine times higher is comparison with physicians (Maier et al. 2016). Between the 28 members of the European Union, Bulgaria had the highest number of dentists per 100,000 inhabitants (105) in 2015, slightly higher than Cyprus (103). In the European Union of 2015, there were over 434 thousand working pharmacists, with the record in Malta, 129 pharmacists per 100,000 population (Eurostat Statistics Explained2017).

3. RESEARCH DESIGN

This paper brings to the attention different aspects regarding the Romanian health system in 2016, by counties (41 plus Bucharest), comparing the public versus the private sectors. For this purpose, the counties were clustered using K means statistical analysis, with IBM SPSS Statistics 20, the visualisations were created in SAP Lumira 2.0 and the data was provided by the Romanian National Institute of Statistics.

The following variables were used (for both public and private sectors):

- Per 100,000 population:
- Hospitals, Dental practices and Pharmacies.

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- Per 1,000 population:
- Number of Physicians, Pharmacists, Dentists and Mid-level practitioners.

For the statistical analysis, the data imported from the source was cleansed and prepared by creating the units of measure: per 100,000 (institutions) and 1,000 population (providers of health services) based on the total population of each Romanian county. Having different amplitudes on the data, the variables were also saved and used with standardized values. In order to group the counties into 3 groups low (poor), medium, high (good) the data was classified once with the variables describing the public sector, and once more for the private environment, using K-Means Cluster Analysis, with maximum of 10 iterations. For the descriptive statistics, the data was used in the raw form, as downloaded from the National Institute's portal.

4. DESCRIPTIVE ANALYSIS

Every nation has its healthcare systems split between public and private provision, where health is mostly provided publicly, as it is financed by the population through the taxes applied on their income and the private health services are either individually paid at the time of use, or through private health insurance or mixed income. The private individuals working in Romania, must pay 10 % of their income as a health contribution to the State, known as C.A.S/C.A.S.S (Sintescu 2018).

TABLE 1- HEALTH CARE EXPENDITURE BY GOVERNMENT SCHEMES, ROMANIA. AVAILABLE DATA: FROM 2010 UNTIL 2015.

Unit of measure	2010	2011	2012	2013	2014	2015
Million NCU*	4388	2579	2795	4264	4443	4755
in current NCU* per capita	216	128	139	213	223	239
in million current US$	1380	846	805	1281	1326	1186
% General government expenditure (GGE)	2.08	1.17	1.26	1.89	1.91	1.87

Data Source: http://apps.who.int Global Health Expenditure Database

*NCU – National Currency Unit (RON)

In 2015, Romania's health expenditure by government schemes was 1,186 million current US$, whereas in the United Kingdom, the highest expenditure from the European Union reached over 224,713 million current US$, and the lowest in Croatia, with only 86 million current US$. Amongst all the 28 European Union countries, Romania is on the 17th place, after Czech Republic (1,626 mill US$) and before Hungary (981 mill US$) (Table 1, Figure 1).
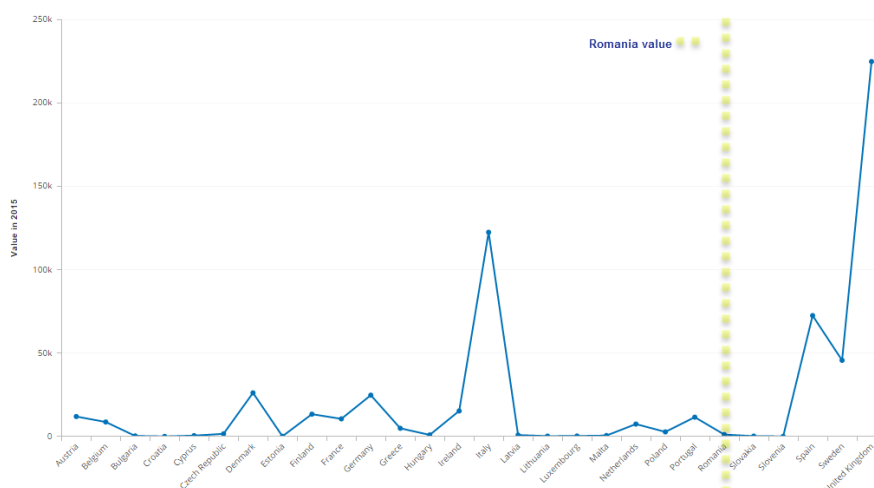

FIGURE 1- GOVERNMENT SCHEMES IN MILLION CURRENT US$, 2015.
Data source: http://apps.who.int Global Health Expenditure Database

As the private sector has known a growing development, physicians tend to migrate from the public sector to the private area, or to work in both systems, although their main commitment is to the national health service as seen in Figure 2 and Figure 3. In 2016, 8,050 physicians were working in the public sector of Bucharest, whilst the private figures show less than 4,500 physicians. Counties with the highest numbers of physicians

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from 2016, working in the public sectors: Cluj (2,989), Iasi (2,534), Timis (2,447), and in the private sectors: Timis (1,468), Dolj (1,121), Constanta (1,087) – Figure 2.
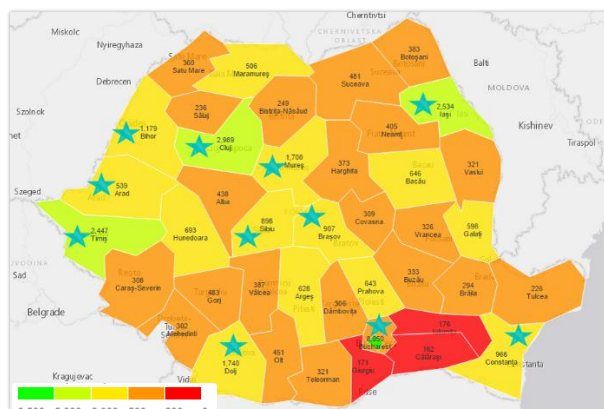

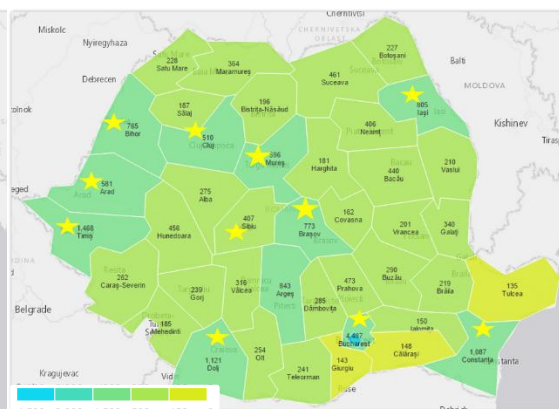Figure 2- Number of physicians working in the public sector

Figure 3- Number of physicians working in the private sector

⭐ Family doctors are included   ⭐ counties with medical universities

2016, Data source: http://statistici.insse.ro Tempo-online

As presented in the above figures, the counties with the highest numbers of working physicians in the public sector (excluding Bucharest) are the top 6 populated counties, except Prahova county. Although Prahova is the 3rdhighest populated county (Table 2), it lacks in physicians (public: 643, private: 473). The situation is similar regarding the counties that lack in physicians, Ialomita, Giurgiu and Calarasi – not in the bottom 7, but the lowest number in public working physicians (Table 3).

TABLE 2 - TOP 7 HIGHEST POPULATED COUNTIES OF ROMANIA, 2016.

No	County	Population, 1st January	Year
1	***Bucuresti***	***1,835,623***	***2016***
2	Iasi	789,372	2016
3	Prahova	736,749	2016
4	Cluj	702,230	2016
5	Timis	697,508	2016
6	Constanta	679,902	2016
7	Dolj	638,449	2016

Data source: http://statistici.insse.ro Tempo-online

TABLE 3- BOTTOM 7 LOWEST POPULATED COUNTIES OF ROMANIA, 2016.

No	County	Population, 1st January	Year
42	Tulcea	202,059	2016
41	Covasna	205,745	2016
40	Salaj	216,739	2016
39	Mehedinti	251,191	2016
38	Ialomita	263,413	2016
37	Giurgiu	274,421	2016
36	Caras-Severin	280,888	2016

Data source: http://statistici.insse.ro Tempo-online

Considering an increase of only 2% in the total number of physicians in 2015, it is safe to assume that the drop down of almost 7,000 physicians from the public sector is defined by their migration to the private environment (Figure 4).

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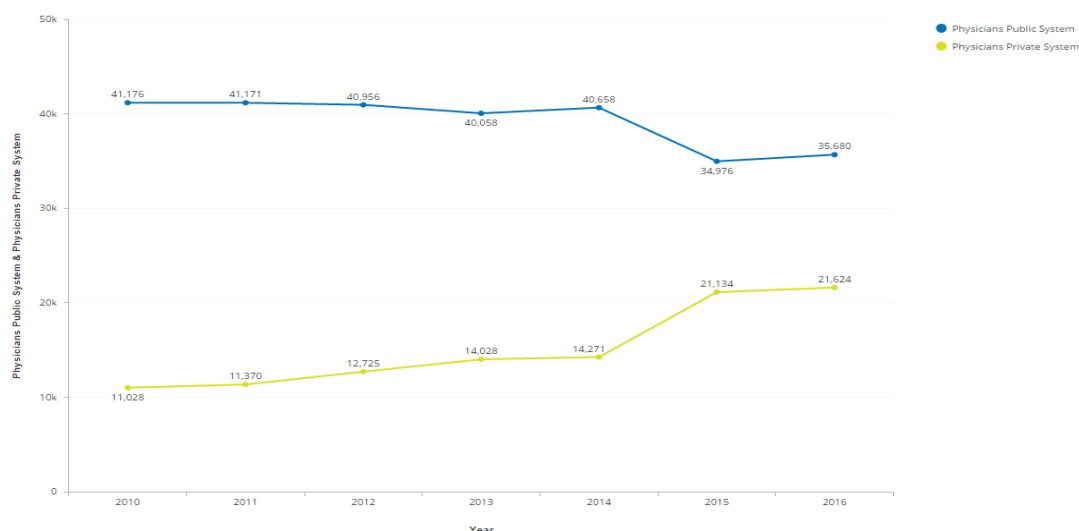Physicians Public System and Physicians Private System by Year

FIGURE 4- TOTAL NUMBER OF PHYSICIANS, PUBLIC VERSUS PRIVATE SYSTEMS, FROM 2010 UNTIL 2016.
Data source: http://statistici.insse.ro Tempo-online

According to the Romanian law regarding the financing of hospitals, the State should invest in both the construction of new hospitals, and in the development of the existing ones.The number of public hospitals had been constant through the years, whereasthe number of private hospitals continue to increase, in numbers, technology used etc. in order to attract the public to pay extra for their health services.

As shown in Figure 5, the numbers of public hospitals in the last years are mainly steady, while the privately-owned hospitals are continuously growing in numbers.

The county with the highest number of dentists working in the public sector is Iasi, with over 200 dental specialists (Bucharest: 385 dentists), followed by Cluj 166, Timis 153 and Dolj 110. At the opposite side, in Harghita, there is only 1 dentist, or 2 dentists in: Calarasi and Salaj, 3 in Botosani, but the critically low records are counterbalanced by the dentists working in the private sector, Harghita 163, Calarasi 83, Salaj 158, Botosani 144.

In Romania, the number of pharmacies is limited through the Law of Pharmacy no 266/2008, based on the number of inhabitants of every city (The Official Journal of Romania 2008):

- In Bucharest, 1 pharmacy per every 3,000 inhabitants;
- In the county capitals, 1 pharmacy per 3,500 inhabitants;
- In every other city/village, 1 pharmacy per 4,000 inhabitants.

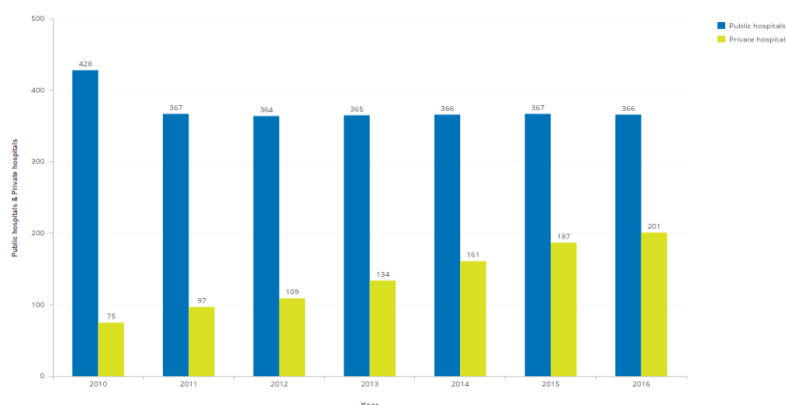Public hospitals and Private hospitals by Year

FIGURE 5 - TOTAL NUMBER OF HOSPITALS IN ROMANIA, PUBLIC VERSUS PRIVATE, FROM 2010 UNTIL 2016.
Data source: http://statistici.insse.ro Tempo-online

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Since 2010, the number of public pharmacies had decreased, while in 2016, there were 7,403 private pharmacies.

The number of pharmacies can drastically change only due to a shift in the population's dynamics, according to the Romanian law regarding limitations.Most pharmacies are owned by a private owner, rather than belonging to a public hospital (Table 4).

TABLE 4- TOTAL NUMBER OF PHARMACIES IN ROMANIA, PUBLIC VERSUS PRIVATE, FROM 2010 UNTIL 2016.

	No of total pharmacies	
Year	Public	Private
2016	399	7403
2015	402	7356
2014	404	7421
2013	406	7154
2012	403	6823
2011	404	6565
2010	492	6190

Data source: http://statistici.insse.ro Tempo-online

The maximum number of pharmacists working in public pharmaciesis 140, in the Iasi county (excluding Bucharest: 243). On the other side, in Teleorman, Calarasi and Tulcea, there are less than 100 pharmacists working in the private sector, while in Iasi, there are over 1,000.

The term "mid-level practitioner" is used for the health care professionals who received specific training and accreditation, with a more restricted scope of practice than physicians. Mid-level practitioners or Advanced Practice Providers (APP), are the terms used for Nurse practitioners, Physician Assistants, Nurse Anesthetists, Nurse Midwives, Clinical Nurse Specialists etc. In 2016 were 14,702 mid-level practitioners working in public hospitals in the capital city, 4,727 in Iasi, 3,253 in Timis and 3,147 In Dolj. The second largest counts of APP from the private system are in Dolj (2,662), and the third: Timis (2,536), after Bucharest (6,080) (Figure 10, Figure 11).
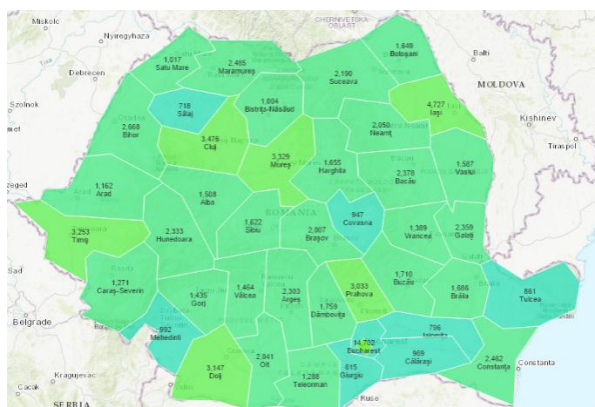

FIGURE 10 - NUMBER OF MID-LEVEL PRACTITIONERS WORKING IN THE PUBLIC SECTOR
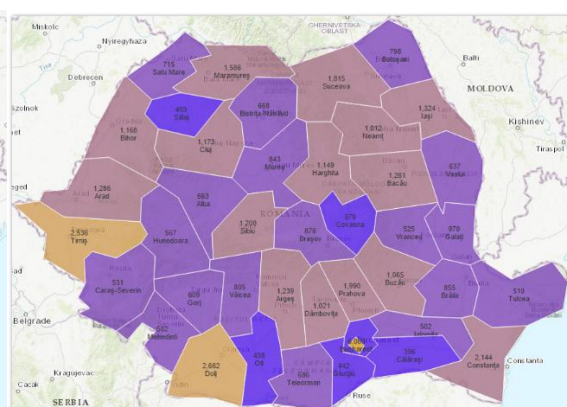
FIGURE 11 - NUMBER OF MID-LEVEL PRACTITIONERS WORKING IN THE PRIVATE SECTOR

2016, Data source: http://statistici.insse.ro Tempo-online

5. STATISTICAL ANALYSIS:

Counties were clustered into 3 groups using the K-means algorithm with the SPSS software, based on the data for 2016.

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5.1. *Clustering the counties of Romania using number of healthcare institutions and health workforce, from the Public sector*
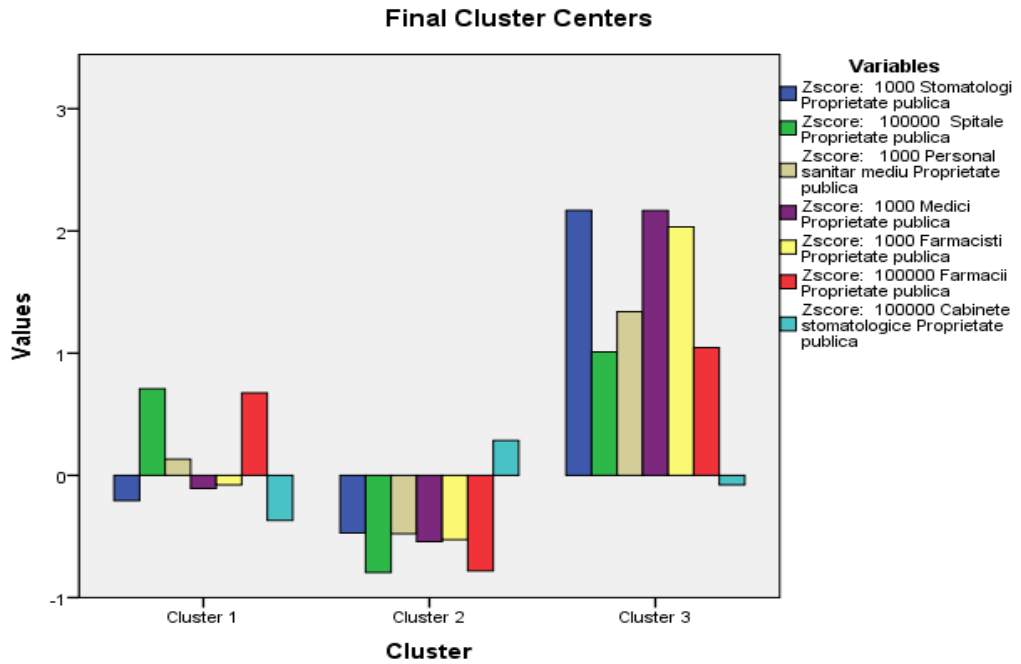

FIGURE 12 - FINAL CLUSTER CENTERS. DATA FOR THE PUBLIC SECTOR. 2016

Figure 12 describes the differences amongst the 3 clusters that Romania's counties where split into, based on the analyzed indicators for the public system. Cluster 3 is considered as 'Good', Cluster 1-'Medium' and Cluster 2-'Low'.

Although Prahova is the 3rdlargest populated county in Romania, it belongs to cluster 1, as well as 14 other more: Alba, Arges, Bihor, Brasov, Caras-Severin, Covasna, Galati, Gorj, Hunedoara, Maramures, Sibiu, Teleorman, Valcea, Vrancea.

The number of dental practices per 100,000 population does not have the Significance impact on determining which cluster a county was grouped into (Sig. value of 0.150 - ANOVA 1).

The inhabitants of Cluj, Dolj, Iasi, Mures, Timis and of the capital city, Bucharest are the beneficiaries of the highest numbers of physicians, dentists, pharmacists, nurses and health institutions of the public system, with an average of 3.5 physicians, 5.78 mid-level practitioners per 1,000 population and 2.28 hospitals per 100,000 population and are clustered in the 'Good' class. At the opposite side, 21 counties lack in providers of health services (cluster 2 - Low cluster)(Table 5).

TABLE 5- NUMBER OF CASES IN EACH CLUSTER.

	1 -medium	15.000
Cluster	2 -low	21.000
	3 -good	6.000
Valid		42.000
Missing		.000

Data for the Public Sector. 2016

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5.2. Clustering the counties of Romania using number of healthcare institutions and health workforce, from the Private sector
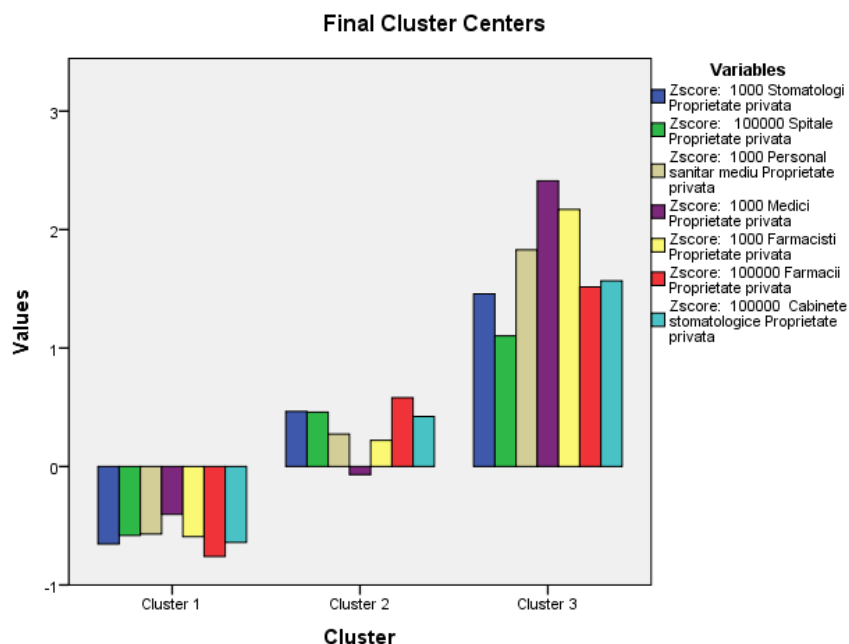

FIGURE 13 - FINAL CLUSTER CENTERS. DATA FOR THE PRIVATE SECTOR. 2016.

In Figure 13, Cluster 3 is classified as 'Good', Cluster 1-'Low' and Cluster 2-'Medium'. Cluster 3, represented by Bucharest, Constanta, Dolj, Timis, is described by the highest average scores per group: 2.13 private hospitals, 2.3 pharmacies, 0.14 dental practices per 100,000 population and 5.3 mid-level practitioners, 3 physicians, 0.08 pharmacists, 0.17 dentists per 1,000 population.

The 'Good' cluster is considered the group with the highest counts of medical staff and institutions. One of the main concerns, was the absence of the Cluj and Iasi counties from Cluster 3. Iasi and Cluj, as well as Arad, Bacau, Bihor, Braila, Brasov, Harghita, Maramures, Mures, Prahova, Salaj, Satu Mare, Sibiu, Suceava, Tulcea and Vrancea belong to Cluster 2 (Medium cluster).Although there are many private hospitals and dentists working in the private system in the Cluj county, the numbers are lower comparing to the counties from cluster 3, regarding the mid-level practitioners, physicians and pharmacists.The remaining 21 counties correspond to cluster 1 (Low cluster) (Table 6).

All the variables used in the analysis have the Significance impact on determining which cluster a county was grouped into (Sig. 0.000 -ANOVA 2).

TABLE 6 - NUMBER OF CASES IN EACH CLUSTER.

Cluster	1 -low	21.000
	2 -medium	17.000
	3 -good	4.000
Valid		42.000
Missing		.000

Data for the Private Sector. 2016

5.3. Comparison between the Public and the Private sector

At an aggregated level, Iasi and Cluj are the counties that provide their inhabitants the largest options regarding health care, as well as the capital city: Bucharest. Although the number of hospitals from the private sector almost reached the counts of public hospitals, in the public sector, the workforce is difficult to be surpassed,

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with almost 15,000 mid-level practitioners in Bucharest, 4,727 in Iasi and 3,476 in Cluj, more than twice the corresponding numbers from the private sector (Table 7).

Bucharest, Iasi, Mures, Cluj, Sibiu, Brasov, Dolj, Bihor, Arad, Timis and Constanta are the counties with medical universities available, out of which: Bucharest,Iasi,Mures, Cluj, Dolj, Timis and Cluj register the highest counts in medical staff.

TABLE 7- SUMMARY OF 2016 DATA USED FOR ANALYSIS.

Total counts		Bucharest	Iasi	Cluj
Public	**Hospitals**	50	19	19
	Mid-level practitioners	14702	4727	3476
	Physicians	8050	2534	2989
	Dental Practices	2	2	1
	Dentists	385	225	166
	Pharmacies	59	18	23
	Pharmacists	243	140	113
Private	**Hospitals**	43	16	22
	Mid-level practitioners	6080	1324	1173
	Physicians	4487	805	510
	Dental Practices	2973	594	855
	Dentists	2545	1047	855
	Pharmacies	911	339	292
	Pharmacists	3925	1107	432

Data source: http://statistici.insse.ro Tempo-online

6. CONCLUSIONS

In all the countries around the world, it is difficult for smaller regions to compete in living standards of the population with the capital city. In Romania, the highest populated counties have been clustered in the same group as Bucharest, providing accessibility to health care services, regardless of being public, private or even better, both. The following counties have been grouped into the "Good" clusters: Cluj, Dolj, Iasi, Mures and Timis in the public sector; Constanta, Dolj, Timis in the private sector. The absence of Prahova, which is the 3rd largest populated county, from both clusters, is an imperative reason for concern, as it also had the value of GDP in 2016, of 31,626.4 million RON, the 5th highest value after Bucharest (187,070), Timis (36,645.4), Cluj (36,021.7) and Constanta (34,433.7) (Data source: Tempo-online).

The public sector thrives in high numbers of physicians, mid-level practitioners and hospitals, whilst the Romanian population falls back to the private sector to fulfill the needs of pharmacies/pharmacists and dentists/dental practices.

Dentistry is almost inexistent in the public environment for the entire country, which implies the difficulty of the nationals to gain easy and free access to dental care. Also, regarding the officinal domains, people depend on the private owned pharmacies, that are limited as the law dictates.

Year by year the private sector rises and the public stagnates, the population ages and the need of medical care becomes more and more impetuous, while the healthcare services are harder to reach by the commoners.

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Appendix

ANOVA 1 - PUBLIC

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Zscore: 1000 StomatologiProprietatepublica	16.760	2	.192	39	87.384	.000
Zscore: 100000 SpitaleProprietatepublica	13.455	2	.361	39	37.240	.000
Zscore: 1000 Personal sanitarmediuProprietatepublica	7.917	2	.645	39	12.268	.000
Zscore: 1000 Medici Proprietatepublica	17.255	2	.166	39	103.703	.000
Zscore: 1000 FarmacistiProprietatepublica	15.355	2	.264	39	58.202	.000
Zscore: 100000 FarmaciiProprietatepublica	13.113	2	.379	39	34.613	.000
Zscore: 100000 CabinetestomatologiceProprietatepublica	1.899	2	.954	39	1.991	.150

The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

ANOVA 2 - PRIVATE

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Zscore: 1000 StomatologiProprietateprivata	10.556	2	.510	39	20.699	.000
Zscore: 100000 SpitaleProprietateprivata	7.767	2	.653	39	11.894	.000
Zscore: 1000 Personal sanitarmediuProprietateprivata	10.747	2	.500	39	21.486	.000
Zscore: 1000 Medici Proprietateprivata	13.370	2	.366	39	36.567	.000
Zscore: 1000 FarmacistiProprietateprivata	13.508	2	.359	39	37.669	.000
Zscore: 100000 FarmaciiProprietateprivata	13.525	2	.358	39	37.811	.000
Zscore: 100000 CabinetestomatologiceProprietateprivata	10.732	2	.501	39	21.426	.000

The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.