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THE SUPPLY OF OUTPATIENT SERVICES AND ITS GEOGRAPHICAL DISTRIBUTION WITHIN THE REGIONS OF THE CZECH REPUBLIC

Nabídka ambulantních služeb a její rozdělení v rámci krajů České republiky

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Annotation
Equal quality of care for everyone should be an important public policy goal. The goal of this paper is to analyze the geographical distribution of the health care in the Czech Republic; the method used in the research is the calculation of the four inequalities measurements: the absolute range, relative range, Robin Hood index and the Gini coefficient. The trend over time is analyzed quantitatively in the case of 1) the outpatient care and 2) the dentist care. The results of our analysis show that the supply of outpatient services and the supply of the dental care are inequitably distributed in the Czech Republic. For example, 13 % of the dentist was concentrated in the capital in 2003 and even 15.5 % of the dentists in 2013. The analysis showed that the distribution of the outpatient physicians has become less equitable during the observed period both for the physicians and for the special case of the outpatient care – the dentists. In the second part, we focus on the central government's activities encouraging the supply in the undersupplied regions. In this context, the role of the region´s government is discussed.

Klíčová slova
health economics, resource allocation

Anotace
Rovný přístup ke zdravotní péči by měl být jedním z hlavních cílů veřejné politiky. Cílem našeho výzkumu bylo analyzovat regionální rozdělení zdravotní péče v České Republice. Metodou použitou k výzkumu byl výpočet nerovnosti na základě čtyřech ukazatelů: absolutní variační rozpětí, relativní variační rozpětí, Robin Hood indexu and Gini koeficientu. Trend byl analyzován kvantitativně a to na příkladu 1) rozdělení ambulantní péče a 2) rozložení ambulantních ordinací zubařů. Výsledky naší analýzy ukazují, že nabídla ambulantní péče lékařů je v České Republice rozložena nerovnoměrně. Například v roce 2003 bylo 13 % zubařů koncentrováno v hlavním městě, v roce 2013 se jednalo o 15.5 % zubařů. Analýza ukázala zejména rostoucí trend směrem k nerovnoměrnému rozložení (2003, 2013) a to jak pro ambulantní lékaře, tak i pro speciální případ ambulantní péče (zubaře). V další části jsme se zaměřili na aktivity centrální vlády, které by měly vést ke zvýšení nabídky zdravotních služeb v relativně méně zásobených regionech, v daném kontextu je také navíc diskutována role regionálních vlád.

Klíčová slova
ekonomie zdravotnictví, rozdělení zdrojů

JEL classification: *I14, I18*

1. Úvod

The monitoring of health inequality is a practice that fosters continuous improvement within health care systems (WHO, 2015). The importance of such some practices is emphasized with both World Health Organization (WHO)

and the Organization for Economic Co-operation and Development (OECD) (Devaux, 2015). Both organizations emphasize the necessity of measuring equity in the distribution of system resources. The report of WHO claims, that data disaggregation to a regional level presents a major challenge for many countries with the purpose of the regional monitoring to help to identify the disadvantaged populations. Equality in the health services, even from the geographical point of view in relation to the political aim of the universal access to health services is considering being one of the basic principles of the health systems. If the issue of equity is related to the public policy, we can define the ensuring of equal access to the health care as an important policy goal (e.g. Scott, 2001). Even if the social background of the equity is more often emphasized topic, we can argue that the understanding of the geographic distribution of health care resource and trends inequality of access to health care can offer a different.

In the study, which we present here we use the Gini coefficient and Robin Hood index to measure variations in the distribution of physicians. The Gini Coefficient measures departure from a uniform distribution, indicating if resources within a 14 Czech´s regions. We try to find if the resources are distributed equally or not across all the Czech´s regions relative to their population size. The approach we applied was inspired by international studies of measuring inequalities. Even if the Gini coefficient was originally used to make comparisons of inequalities in the distribution of income and welfare, it is an often a tool how to measure these inequalities in health care resources allocation from the geographic point of view (e.g. Chang, 1998; Horev, 2004; Jian 2015; Omrani-Khoo, 2013; Mobaraki, 2013; Chen, 2014; Gravelle 2001). On the other hand it is not the only approach how to study and understand the inequalities on the health care allocation, e.g. Wilkinson (2000) use a Robin Hood Index to describe the distribution of general practitioners in States and Territories of the Australia.

During our study of the topic we have found only one study which try to describe the geographical supply of outpatient services in the Czech Republic with respect to individual regions. The research was made by Dlouhý (2000) on the data for the period of 1990 to 2002; it was found that the supply of outpatient services is unevenly distributed with the trend to more inequality from 1990 to 2002. The inequality of geographical distribution was measured by the Gini coefficient, and with the help of simple indicators of the absolute range and the relative range. This study becomes also our inspiration to try to measure the inequalities in distribution of outpatient care on a newer data.

In our paper the geographical disparities is discussed in the context of the supply of the health care in the Czech´s regions. Our hypothesis is that the Czech Republic faces the increasing the inequalities over time.
The main goal of our research in this paper was specified by its partial research targets:

- Analysis of the differences in supply of the outpatient care and dentist care among Czechs Regions was made. Trends over time during the chosen period will be described and discussed.
- Analysis of the activities made by the central government, government of the regions and health insurance companies

2. Data a method used

Open data were used for our research. The data of the location of outpatient practitioners and dentists were extracted from the Institute of Health Information and Statistics of the Czech Republic, the subsection prepared by the Institute for the individual regions was used (e.g. "A year book of Health care in the Vysočina region"). Period 2003 and 2013 was used to examine trends in inequalities over time. The number of outpatient physicians includes both those with independent practices and those from hospital department (outpatient hospital care); the same principle is valid for the data concerning the amounts of the dentist physician. Further, it was used the population size as a need for the care (obtained from the Institute of Health Information and Statistics of the Czech Republic furthermore). The calculation of the number of physician per 10 000 patients followed. For the measurement of inequality, we used four measures: the absolute and Relative Range, which both are a simple indicators based on extreme values and Gini coefficient and Robin Hood index.

The Absolute Range is a simple descriptive statistic based on the maximum values only, it gives us an indication of that how spread the values for the individual regions is by subtracting the minimum from maximum values.
The relative range is a similar statistic to an absolute range with the only difference that it is calculated relatively. The percent relative range refers to the percentage ratio of the range to the average value in the set.
The Robin Hood index (originally used for measuring the income inequalities in the society) is the proportion of the whole supply (amount of outpatient physicians or amount of dentist) which is needed to be redistributed so to reach a perfect equality among the regions.

The Gini Coefficient was as the Robin Hood index primarily used for the measurement of income inequalities. It relates to the well-known economic theory. The Gini coefficient is approached from the summary of the Lorenz Curve of the income distribution. We can derive the Gini Coefficient as the difference between the area under the Lorenz Curve for a population in which everyone receives the same income (for the regions in which each of them has the same amount of the physicians or dentists per 10 000 patients). The Gini coefficient ranges from 0, in the case of perfect equality, to 1, in the case of perfect inequality.

For the analysis of the activities aimed at reducing inequalities and improving access to health care in less-supplied regions, we used the documents of the Ministry of Health Care, the statements of the insurance companies and the strategic plans for Healthcare of individual regions.

3. Regional Distribution - analysis

The results of our analysis can be shown in Table 1 and in Table 2. The numbers of the physicians extracted from the yearbooks of the particular regions where extracted and recalculated to the number of the physicians (resp. dentists) per 10 000 patients. The inequalities among the supply of the health care in individual regions we can see even from the first dataset (tab.1). Especially the regions Středočeský, Vysočina, Liberecký, Ústecký are deeply under the average of the Czech Republic, the average for the Czech Republic is 27.27 outpatient physician per 10 000 patients. The trend in the development of the inequalities can be described on the example of the region Středočeský and Ústecký. These relatively undersupplied regions belong to those, where the increase of the outpatient's physicians is deeply under the average of the Czech Republic (the average change is 12. 2 %).

Tab. 1: The number of physicians and dentists in individual regions – absolute numbers

Region	Population		2003	2003	2013	2013
	2003	2013	Physicians	Dentists	Physicians	Dentists
Prague	1,161,851	1,244,762	5,736	1,123	7,385	1,452
Středočeský	1,131,402	1,297,209	2,440	528	2,823	619
Jihočeský	624,958	636,443	1,597	381	1,877	409
Plzeňský	549,307	572,882	1,709	402	1,877	423
Karlovarský	304,078	300,999	717	160	834	171
Ústecký	819,851	825,842	1,930	416	2,039	425
Liberecký	427,096	438,473	993	234	1,156	253
Královéhradecký	547,720	552,053	1,573	354	1,841	398
Pardubický	506,389	515,781	1,262	283	1,374	303
Vysočina	517,572	510,522	1,154	283	1,267	315
Jihomoravský	1,121,669	1,168,577	3,400	760	4,075	924
Olomoucký	636,227	636,659	1,807	415	2,070	451
Zlínský	592,300	586,594	1,425	381	1,640	419
Moravskoslezský	1,261,229	1,223,923	3,165	712	3,499	802
Czech Republic	10,201,649	10,512,732	28,908	6,432	33,757	7,364

Source: Author, based on data

When considering the amount of special case outpatient physicians, the dentist in our case, relatively the most under-supplied are Středočeský, Ústecký and Karlovarský region. If we examine the trend over time, the Plzeňský, Ústecký and Středočeský are regions which suffer from the lowest increase in the amount of dentist. We do again pose the situation when the regions with the lowest supply belong to the regions with the lowest increase of the dentists (case of Ústecký and Středočeský region). On the other hand, the capital, Prague, which holds a unique position with the far highest supply of services per capita both for outpatient physicians and for the dentists, we witness the further increase by 20.2 % concerning all outpatient physicians and 20.7 concerning the dentists see Table 2.

Tab. 2: The number of physicians and dentists recalculated per 10 000 patients

Region	Population		2003	2003	2013	2013	Physicians	Dentists
	2003	2013	Physicians	Dentists	Physicians	Dentists	Change in %	Change in %
Prague	1,161,851	1,244,762	49.37	9.67	59.33	11.66	20.2	20.7
Středočeský	1,131,402	1,297,209	21.57	4.67	21.76	4.77	0.9	2.3
Jihočeský	624,958	636,443	25.55	6.10	29.49	6.43	15.4	5.4
Plzeňský	549,307	572,882	31.11	7.32	32.76	7.38	5.3	0.9
Karlovarský	304,078	300,999	23.58	5.26	27.71	5.68	17.5	8.0
Ústecký	819,851	825,842	23.54	5.07	24.69	5.15	4.9	1.4
Liberecký	427,096	438,473	23.25	5.48	26.36	5.77	13.4	5.3
Královéhradecký	547,720	552,053	28.72	6.46	33.35	7.21	16.1	11.5
Pardubický	506,389	515,781	24.92	5.59	26.64	5.87	6.9	5.1
Vysočina	517,572	510,522	22.30	5.47	24.82	6.17	11.3	12.8
Jihomoravský	1,121,669	1,168,577	30.31	6.78	34.87	7.91	15.0	16.7
Olomoucký	636,227	636,659	28.40	6.52	32.51	7.08	14.5	8.6
Zlínský	592,300	586,594	24.06	6.43	27.96	7.14	16.2	11.0
Moravskoslezský	1,261,229	1,223,923	25.09	5.65	28.59	6.55	13.9	16.1
Czech Republic	10,201,649	10,512,732	27.27	6.18	30.3	6.77	11.1	9.5

Source: Author, based on data

Relative range is based on the difference of the extreme values, when the percent relative range was calculated (the percentage ratio of the range to the average value in the set).

Tab. 3: The inequality of the regional distribution of the physicians

Inequality Measure	Physicians	
	2003	2013
Absolute range	27.8	37.57
Relative Range	1.02	1.22
Robin Hood index (in%)	5.8	6.6
Gini coefficint	0.1102	0.1259

Source:Author, own processing

Firstly we have investigated the developments in the total supply of the outpatient's services, regardless of the type of specialty. To examine, if the total numbers may hide the great variability among the specialties we explore furthermore the development of dentists as a one selected specialty. The results from the measures of inequality on the 2003 data were: the relative range was increased from 1.02 to 1.22. The Robin Hood index increased from 5.8 to 6.6 and the Gini coefficient increased from 0.11 to 0.12. All measurement of inequalities showed trend to its increase over time 10 years. As for the concentration of the care in the city of Prag (18.5 % in 2003 and 20 % in 2013 of the all outpatient physician were concentrated in the capital.

Further we have focused (from the reasons mentioned above) for a special outpatient care, the dentist outpatient care. There were 8,435 of the dentists in 2003 and 9,377 in 2013 in the Czech Republic. The growth rate of the number of the dentists was 11 % between 2003 and 2013. This is a lower rate than the average rate for all outpatient services 15.7 % between 2003 and 2013. The results from the measures of inequality on the 2003 data were: the relative range was 1.02 the Robin Hood index was 7.1 and the Gini coefficient was 0.0983. These numbers imply a greater inequality in the distribution of outpatient dentist services than that of all outpatient services. The dental care is less concentrated in the city of Prag, where 13 % of the dentist are concentrated in the capital in 2003 and 15 % in 2013, than the outpatient physician care as a whole (18.5 % in 2003 and 20 % in 2013).

Tab. 4: The inequality of regional distribution of the dentist

Inequality Measure	Dentists	
	2003	2013
Absolute range	5	6.89
Relative Range	1.00	1.02
Robin Hood index (in %)	7.1	8.2
Gini coefficient	0.0983	0.1832

Source:Author, own processing

4. The institutions and their efforts to a better geographical distribution of health care services

The Healthcare in the Czech Republic is based on statutory health insurance, which is provided by nine health insurance companies. Financing healthcare is controlled by a wide range of legislation, but the main law is the Act No. 48/1997 Coll., on Public Health Insurance, which regulates public health insurance and extent conditions under which healthcare is provided.

The Ministry of Health is a central administrative body created by a state and its framework of responsibilities includes the health care and its ensurement. As the activities of the Ministry concerning the inequalities in the supply of health care, the Ministry recently announced that subsidies will be provided to 100 new dentists. In total, it has over 4 million euro should be provided. The aim of the program should ensure sufficient availability of dental care in all regions of the Czech Republic so that the care would be available and not concentrated only in larger cities. The ministry wants to motivate physicians to set up practices in remote areas.

A similar program concerning outpatient care in the less supplied regions was announced in 2017. Up to half a million crowns to equip the nursing practice can be applied by a practitioner. The grant can be applied for the places where the tender for a practitioner´s position was repeatedly unsuccessful. The declaration of the health insurance company to ensure the contract for the contract for a potential doctor is an enclosure of the application for this kind of support. The role of the Health insurance companies is very important because the system is based on the capitation payments.

The governments of individual regions especially those, where the care is lacking rarely mention this problem in their strategic plans. We have found evidence that only the region Ústecký, which disposal of a quite comprehensive health care concept emphasizes that the average number of the outpatient is deeply below the average values for the Czech Republic. Further, the text describes the development of outpatient health care in the Region as insufficient. Namely the document describes that the situation is more complicated in the domain of the intern, diabetology, orthopedics, ocular, radiation, clinical oncology and medical genetics. From the concept it can be seen that the region´s government realizes its disadvantage in healthcare supply and as a result the strategic document accents that activities to strength the outpatient physician extent is needed. Further we do not find evidence, that the activities are further more concrete described. From the press releases ensues that negotiation between the region´s governor and representatives of the General Health Insurance Company in 2014 aimed at the finding a concept leading to increasing no of the outpatient physician was carried out.

Conclusion

We have not found evidence that the outpatient services are well geographically distributed. Both based on our observations and based on the inequality measurement it can be stated, that the supply of outpatient services is inequitably distributed. This is not surprising that the Capital city has most favourable situation. The uniqueness of the Prague is obvious in most of comparativeness studies (Wokoun, Viturka, 2014). Our results are similar with the results of research from which academic literature describes. In the whole outpatient's patient, for example, 20 % of the supply was concentrated in the capital in 2013. We identified the region with the lowest number of the physician per 10 000 (Středočeský, Vysočina, Liberecký, Ústecký). What is more important is that further the measurement of inequalities shows, that the trend to a higher inequality over time (2003 – 2013) is increasing. When comparing our results with study of Dlouhý, where the tendency to more inequitable distribution is emphasized on the data for 1996 and 2002, we show here that the trend to more inequitable distribution is ongoing.

From the point of view of central government, we described that subsidies are provided by the State under the given conditions. Concerning the government's regions, we have found that only one region, the Ústecký region shows on the region´s disadvantage in its health strategic plan, but proposal of measures lacks. In the future

research the Czech experience with encouraging supply in the relatively undersupplied regions should be more detailed described and discussed, but therefore we argue that our analysis has managed to outline this problem. Further (but more complicated) would be a research to determine implications for health outcomes.

The distribution of outpatient care tends to unequal distribution from 2003 to 2013. For the future research we suggest to try to find the reasons why the care is inequitably distributed, e. g. to examine if the outpatient physician concentrates in the regions with high per capita income or which role plays the university hospitals. In our opinion, the geographic distribution of the outpatient physician in the Czech Republic can require a more complex policy aimed at improvement of distribution in undersupplied regions, hardly current effort of the government, the ad hoc subsidies can significantly help and lead to a better geographical distribution of the outpatient care.

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