Regional differences in access to health care in Poland from the perspective of health care resources

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Abstract

Objective. To examine disparities in access to the public in Poland, in association of the resources of health care, socio-economic development of Provinces and their level of urbanization.

Materials and method. The Provinces were divided into four groups, using the quartile method, according to the urbanization and level of socio-economic development. The socio-economic development level was identified by the Human Development Index (HDI) for each Province. The urbanization level of each Province was determined by the Index of Urbanization (URBI). Disparities level to access to public health care was identified by taxonomic measure of accessibility (TMA), calculated using resources of health care data. TMA index was compared in the different regions, depending on the level of HDI and URBI.

Results. There was no linear relationship between accessibility to public healthcare and socio-economic development of each tested region, nor between accessibility to public health care in the Provinces and their urbanization level. During the study, the correlation between the TMA and HDI and URBI alsdo produced a negative result.

Conclusions. An insufficient number of physicians and the limited value of contracts within the public health service may cause a drop in the availability of the public medical service sector, regardless of regional level of urbanization and socio-economic development.

Key words

health care resources, public health care services, socio-economic development of the region, urbanisation

INTRODUCTION

Health care is one of the basic tasks of modern states, and issues relating to them are of interest to various disciplines, including: public health, economics, politics and the law. Events of the transformation started in the second half of the twentieth century shaped the domain of economic and social policy, including health, caused a delay in relations with the 'old' EU members. The good side of this delay is that Poland could benefit from the achievements and experiences of these countries and mitigate the existing differences. Access to health care in Poland is regulated by an appropriate law Act [1].The presented study demonstrates the existence of regional differences in access to public health services in Poland in 2010.

MATERIALS AND METHOD

Poland is divided into 16 Provinces, and to show the regional disparities and inequality in access to the public health care system in Poland in 2010, the Provinces were used as entities of regional autonomy, because of the fact that the Provincial branches of the National Health Fund oversee and coordinate the implementation the health policy. Due to the GDP *per capita* not including information about the

distribution of income in society, and not indicating the level of illiteracy, infant mortality and life expectancy of people, it cannot be treated as the sole determinant of the level of economic development. For this purpose, the Human Development Index (HDI) for each Proviunce of Poland was analyzed. The methodology to calculate the HDI is well known and is presented by the UNDP [2]. The HDI is a synthetic measurement that describes the effects of socio-economic development of individual Provinces. This system was first introduced by the United Nations for the purpose of international comparisons, and because of its universality it could also be implemented in regional research. The HDI measures the average achievements of a region in three basic dimensions of human development:

1. a healthy and long life, assessed using the ratio of the average length of life;
2. education (knowledge), a measure which indicats aiteracy – the ability to read and write comprehensibly;
3. standard of living – defined by the GDP per capita in PPP terms. Individual measures have fixe ranges of values, which currently are the averagelife expectancy (25–85 years), overall enrollment rate (0–100%), reading comprehension and writing (0–100%) indicato, gross domestic product *per capita* at purchasing power parity in USD.

Using the quartile method, the Provinces were divided into four groups according to the HDI. The calculated value of the HDI is shown in. Using the same method, the Provinces were also divided into four groups according to the urbanization index (URBI).

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To determine the degree of accessibility to public health services in Poland, the taxonomic measure of accessibility (TMA) was used. This measure was used as the indicator of access to health care and calculated using the Hellwig method [3]. First, statistical features were selected ().

Table 1. Statistical features

X_1	No. of physicians in public health care service sector per 10,000 inhabitants
X_2	Specialists involved in the total No. of physicians in public health care service sector [%]
X_3	No. of nurses per 10,000 inhabitants in the public sector
X_4	No. of hospital beds per 10,000 inhabitants in the public sector
X_5	No. of GPs teams (GP contracts with NHF) per 10,000 inhabitants
X_6	No. of physicians in GPs team per 10,000 inhabitants
X_7	Health expenditure in the Provinces *per capita* [PLN]

After determining the pattern of Access to medical services $y_{0j} = max y_{ij}$ where "j" is a stimulant, the taxonomic distance between the individual and the object model was established. To determine the object model, the average values for each feature were used. The maximum TMA index for the model object is equal to "1". The syntheticmeasure for each unit is describedby the formula:

$$d_i = 1 - \frac{c_i}{c_0}$$

where, d_i – a measure of accessibility; c_{i0} – taxonomic distance of each unit z_{ij} to model object z_{0j};c0 – the critical distance from the model of the unit. Used multiplicities are expressed as:

$$c_{i0} = \sqrt{\sum_{j=1}^{n}(z_{ij} - z_{oj})} \quad \text{where } z_{ij} = \frac{x_{ij} - \acute{x}_j}{s_j},$$

and $c_0 = \acute{c}_0 + 2^{S_d}$ and $\acute{c}_0 = \frac{1}{n}\sum_{j=1}^{n} c_{i0}$

and $S_d = \sqrt{\frac{1}{n}\sum_{j=1}^{n}(c_{i0} - c_0)^2}$

Values of taxonomic measure of accessibility (TMA) are presented in Disparities can be observed in access to public health care, according to TMA.

Table 2. URBI, HDI and TMA indexes

Province	URBI	HDI	TMA
Dolnośląskie	0,701	0,895	0,718
Kujawsko-pomorskie	0,605	0,881	0,701
Lubelskie	0,466	0,887	0,728
Lubuskie	0,635	0,867	0,623
Łódzkie	0,640	0,877	0,725
Małopolskie	0,492	0,891	0,653
Mazowieckie	0,646	0,926	0,729
Opolskie	0,523	0,880	0,673
Podkarpackie	0,414	0,879	0,708
Podlaskie	0,604	0,879	0,704
Pomorskie	0,660	0,896	0,634
Śląskie	0,780	0,893	0,745
Świętokrzyskie	0,450	0,880	0,767
Warmińsko-mazurskie	0,597	0,873	0,672
Wielkopolskie	0,559	0,900	0,661
Zachodniopomorskie	0,688	0,881	0,715

To examine the relationship between the availability of health care represented by TMA, and HDI and URBI, analysis of variance was used. The Provinces were divided into four groups based on the quartile of HDI and URBI. Two hypotheses were posed:
1) hypothesis 0 – mean values are equal in quartile groups;
2) alternative hypothesis – mean values are different.

Table 3. URBI and HDI quartile groups

Quartile	Province	URBI	Province	HDI
I	Lubelskie	0,466	Warmińsko-mazurskie	0,873
	Małopolskie	0,492	Podlaskie	0,879
	Podkarpackie	0,414	Łódzkie	0,877
	Świętokrzyskie	0,450	Lubuskie	0,867
II	Opolskie	0,523	Świętokrzyskie	0,880
	Podlaskie	0,604	Podkarpackie	0,879
	Warmińsko-mazurskie	0,597	Opolskie	0,880
	Wielkopolskie	0,559	Kujawsko-pomorskie	0,881
III	Kujawsko-pomorskie	0,605	Zachodniopomorskie	0,881
	Lubuskie	0,635	Śląskie	0,893
	Łódzkie	0,640	Małopolskie	0,891
	Mazowieckie	0,646	Lubelskie	0,887
IV	Dolnośląskie	0,701	Wielkopolskie	0,900
	Pomorskie	0,660	Pomorskie	0,896
	Śląskie	0,780	Mazowieckie	0,926
	Zachodniopomorskie	0,688	Dolnośląskie	0,895

Data sources. Data for calculating HDI as population, schooling indexes, life expectancy and Gross Domestic Product *per capita* (GDP) derived from purchasing power parity calculations, obtained from the Database of the Central Statistical Office. Index of urbanization (URBI), was calculated based on data from the Central Statistical Office. Data for calculating the taxonomic measure of accessibility (TMA) includes such data as: number of physicians and nurses, number of hospital and hospital beds, GPs teams and number of GP contracts with the National Health Fund, and health expenditure in each Province. The above data were collected from the databases of the Ministry of Health, National Health Fund (NHF), Fund and ZOZ Registry – Registry CSIOZ Health Care Facilities, and the Central Statistical Office. The number of physicians, nurses, number of hospital and hospital beds were taken from the database of the Ministry of Health [4]. Data on the GP teams and contracts with the NHF and health care services provided under these contracts were obtained from the database of the Fund and ZOZ Registry – Registry CSIOZ Health Care Facilities[5, 6]. Population, schooling indexes, life expectancy and GDP data were obtained from the Database of the Central Statistical Office[7, 8, 9].

Statistical analysis. The measure of socio-economic development (HDI) and the urbanization level (URBI) were tested for correlation with the taxonomic measure of access to medical services (TMA). The level of statistical significance was set at $P < 0.05$. Data were analysed with STATISTICA

version 9.1. StatSoft, Inc. (2010). Figures were prepared using the Quantum GIS version 1.6.0 'Copiapó' programme.

RESULTS

Analysis of variance indicated that there was no reason to reject the null hypothesis in both the HDI and URBI, because no significant differences were observed. The mean in quartile groups were not significantly differ from each other. This value indicated the F-statistic and *P* value were significantly higher than the assumed level of alpha = 0.05.

Table 4. Table of correlation

Index	TMA	HDI	URBI
TMA	1.0000	0	0
	p= ---	p=0.521	p=0.998
HDI	0	1.0000	0
	p=0.521	p= ---	p=0.418
URBI	0	0	1.0000
	p=0.998	p=0.418	p= ---

Table of correlation () indicated that there was no linear relationship between accessibility to public health care and socio-economic development in each of the tested region, nor between accessibility to public health care in the Provinces and their level of urbanization. The correlation between the TMA and HDI and URBI also produced a negative result. Access to medical services in public health care in Poland is therefore not dependent on the degree of urbanization and level of socio-economic development of the Provinces. However, there are Provinces where access to public health services is inadequate, which means there is less than 65% of the TMA index to the object model (Fig. 1).
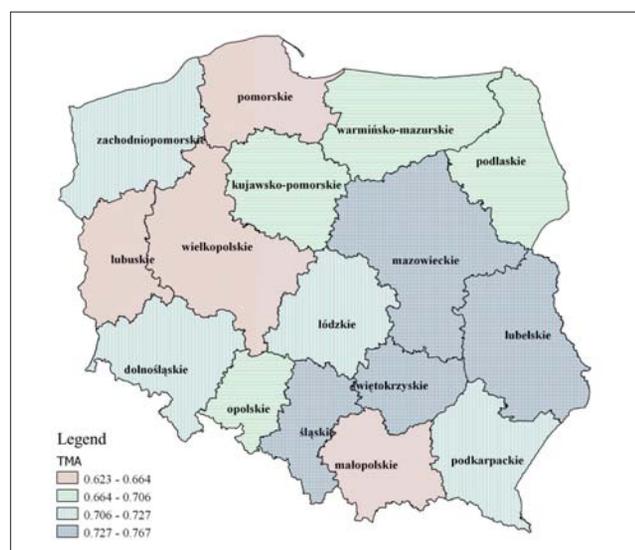

Figure 1. Accessibility to public healthcare in Poland in 2010

DISCUSSION

The study shows that in principle there are no rules that may tie together the analysed indexes, and that in 2010 there was an inadequate access to basic health care in certain Provinces. The low level of accessibility to public health services in Poland can be observed both in typical urban or urban-rural and rural-urban regions, such as the Pomorskie, Lubuskie or Wielkopolskie Provinces. This was confirmed by statistical analyse and observed during figures comparison (Figure 1, 2).

There was also no correlation between the TMA and level of HDI. Only in the Mazowieckie Province could it be unequivocally stated that the high level of access to public health services correlated with a high level of socio-economic development. The Mazowieckie Province, with Warsaw as its capitalcity, offers more possibilities for physicians than other parts of Poland. It is significant that the shortage of specialists, which has a significant impact on access to basic health care, occurs substantially in regions with a high HDI (Pomorskie, Zachodniopomorskie, Malopolskie Provinces) and a low level of the index (Lubuskie Province). One of the reasons could be the migration of physicians [10,11], who choose the place of their employment, depending on the offer and demand on the labour market and on the advantages that each environment offers. As early as during their internship, physicians mostly choose to work in the main cities of regions where medical and other universities are to be found, rather than in other parts of Poland, or even try to create their own future abroad [12,13]. The following factors play a considerable role in forming this situation:

1. international migration of physicians;
2. circular migration – in border areas, locum work, shift work – mostly to Germany, the UK and Scandinavian countries (Pomorskie, Zachodniopomorskie, Lubuskie);
3. internal migration: a) from regions where medical universities are located, and where specialist live and are employed (as the first working place) to regions where there are no such units and the demand for specialists are higher than in their home regions;
4. from the public to the private sector.

Inter-regional and international migration is not confined only to Polish territory, it is also evident in many other countries [14, 15, 16, 17, 18, 19], but unlike in other countries, the salaries of Polish physicians cannot be the only explanation for the uneven distribution of physicians between richer and poorer Provinces. The value of the taxonomic measure of accessibility to public health care in one of the reachest region in Poland, the Wielkopolskie Province, is lower than in the poorest Provinces, Warmińsko-Mazurskie or Łódzkie.

Another reason for the emigration of physicians is the deteriorating situation of public hospitals. The funding bodies for health care facilities operating in the public sector are mainly government bodies and local universities or medical (clinical unit). Although the Act does not specify the rules for the distribution and use of public funds by both providers, in fact, the public sector is favoured when contracts are awarded. One of the most serious problems of the system since the reform of 1999 is the debt of multidisciplinary hospitals, chich account for 90% of the debts of all public health care facilities. The primary cause was the so-called 'over the limit realization services' – services rendered beyond the contracted limit of NHF, for which the NHF did not pay [20]. Other factors contributing to the already mentioned failure is the ownership status and lack of supervision of the actual activity. Hospitals are not always managed effectively, and become involved in unsuccessful investments. Hospital debts

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and the year-by-year reduction of annual contracts by the NHF for public health is the main reason for professionals seeking alternative sources of income. The remuneration received by a doctor with two degrees of specialization, with a PhD in medical science and decades of experience, varies in the amount of 625.00 Euros per month.

Figure 2. Urbanization index

For this reason, in the wealthier areas of Poland tere occurs the transfer of specialists from the public sector to the private sector which offers much better conditions. Paradoxically, this situation is inspired by the current health care system in Poland; on the one hand, we have poorly paid medical specialists in public health care and limited health care contracts by the NHF, and on the other hand, the private sector which fills the gap created in the medical services as a result of the NHF activity, but is still too expensive for the ordinary citizen.

After transformation and reorganization of the political system, the necessity for reform of the health care system became crucial, the main objective of chich was the changing and implementation of the insurance system. In 1997, parliament passed a document entitled 'The Law of Universal Health Insurance', which came into force in 1999. According to this Act, 16 Provincial offices and one for the uniformed services were created. As a result of the reforms, all three levels of government were given the tasks of health promotion and protection. Local governments have become authorities made independent of incorporation for public health care, while taking responsibility for providing access to benefits. No transfer of funds took place to carry out their tasks, and inaccurate clarification limited their ability to carry out government health policy. Unable to repay their debt, local governments have asked for help from the State. The disadvantage of preventing the smooth functioning of the system has limited the benefit. It arose from the limited amount of resources and the failure to take account of local governments established by the actual insurance plans and health care needs of patients. On April 2003, there took place a further transformation of the Polish health care system, a new Act establishing a central public payer – the National Health Fund (NFZ). In the place closed down health insurance branches, the NHF established Provincial branches. After the

two reforms, the current shape of the system can be described as mixed. It takes the characteristics of the insurance model because of the way the funding of benefits and operation of service providers (declared equality of public and private entities) and choice of provider by the patient which is limited to the units contracted, otherwise, other finance is needed for a provider. Due to the solution of the payer or monopoly insurer deciding the terms of the contract and fixing the rates, the system has the characteristics of a budget model.

Currently, one of the most important problems of the Polish system is the low level of funding. In the period 1990–2007, the share of public expenditure in general expenses decreased from 92% to 70.8% [21].

CONCLUSIONS

The right to health is one of the basic human rights and, as such, is guaranteed by the Constitution of the Republic of Poland. Therefore, greater commitment from of all the stakeholders is required to uphold that right and it should not be closely connected with financial sources only. To increase the number of physicians, it is necessary to offer some incitements for medical students and young physicians, such as the existing salaried internship and residency programmes, or a solution to the housing problem. However, due to significant differences between counties, the incentives should be tailored to the needs of a specific environment, rather than applied uniformly to all regions. An insufficient number of physicians and the limited value of contracts within the public health service may cause a drop in the availability of public medical services, regardless of the level of urbanization and socio-economic development of the individual Provinces.

Acknowledgment

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