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Inequalities in the distribution of inpatient health care beds in Poland from 2010 to 2017

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ABSTRACT: *Infrastructure resources are the major input of health systems therefore the equitable distribution of beds at inpatients health care providers remain critical in making progress towards the goal of universal health coverage. The aim of this study is to evaluate the distribution of infrastructure resources in inpatient health care across regions of Poland between 2010 and 2017 and estimate the level of equity.This research by applying to Polish conditions will allow to fill in the gap in existing literature. Data was derived from the Knowledge Database Health and Health Care of Statistic Poland and Polish Statistical Yearbook. In purpose to examine the distribution of beds of inpatient health care providers against population size and geographic size in Poland, the Gini coefficient calculated based on the Lorenz Curve was engaged. This study has several major findings. The amount of most types of beds - apart from psychiatric hospitals beds - when expressed as number of them per 10,000 population or 1 square km increased in 2017 compared to 2010. Moreover, for most types inpatient health care beds, the level of access slightly changed during analyzed period however in case of nursing homes, hospices and psychiatric hospitals, the decrease of equity to access to them was found when considering distribution against population size. The Gini coefficients against geographic distribution showed inequity in the access to beds in nursing homes, however slight improvement towards lower inequity in the analyzed period was also noticed. It was also recognize that the decrease in equity took place in case of hospices and psychiatric. So, the geographical distribution of all types of inpatient health care beds is less equitable then in case of population distribution. The most troublesome is relatively lower equity in case of nursing homes in both population and geographical distribution. Thus this research provides some implications for policy and practice.*

KEY WORD*: health care, inpatient care, inequality, Gini coefficient, Poland;*

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I. INTRODUCTION AND THE SIGNIFICANCE OF RESEARCH

The significant importance of health arises from its impact on human well-being. Health influences the children ability to better learn, then their ability to work or pursue an education and at general the range of opportunities and life plans. In both way as direct and indirect through income and wealth, health contributes to development and the overall well-being of society (WHO, 2014). As healthy adults are better able to contribute not only socially but also economically (WHO, 2018). Thus good health has impact on the human capital quality, which then can positively influence the economic growth (Rój, 2006).

Therefore, the rights to health have been saved in the Constitution of World Health Organization (WHO), as it is underlined that "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition". It is important as "health of all peoples is fundamental to the attainment of peace and security" and thus essential to the fullest attainment of health is the extension of the benefits of medical, psychological and related knowledge to all peoples. Governments are made responsible for the health of their societies (WHO, 1948).

Thus realization of the right to health must involve not only a concerted and sustained effort to improve health across all populations but also reduction of inequities in the enjoyment health. According to WHO, equity must be reached not only between countries but also within countries (Mossialos, 2011).

A common interpretation of equity in health care is that health care services ought to be allocated on the basis of medical need, rather than on the basis of such features as race, income, gender or area of residence (Wagstaff and van Doorslaer, 2000). Equity matters as it refers to fair opportunity for everyone to attain their full health potential regardless of biological or demographic, geographic, social, economic status. It entails the minimization of differences in access, quality, coverage, use and utility of health care between groups of the population categorized by above characteristics (Whitehead, 2000). "The equity arguments usually reflect the requirement to secure equal access to health care for equal health needs and equal contributions in the form of premiums or taxes for equal income or wealth" (Balázs, 2015)

That's way, since 1948 the WHO has endorsed several programs to improve equity in health for example by undertaking the Global Health Equity Initiative in 1996, then in 2005, the Commission on Social Determinants was established to promote equity in health (Smits, Toelsie, Eersel and Krishnadath, 2018). Therefore, many countries explicitly approved equality of access to health care for all people as an objective of their health policy and noted it in their policy documents (Devaux and de Looper, 2012). Thus health policy interest focuses on the reduction of inequalities in health (after controlling by health) especially in access to or in utilization of health care resources (Drummond and Mc Guire, 2006).

Moreover, in 2005 all WHO Member States made the commitment to universal health coverage, which is seen as a mean of both improving health and promoting human development (WHO, 2010). The goal of universal health coverage is defined as ensuring that "all people obtain the health services they need – prevention, promotion, treatment, rehabilitation and palliation – without risk of financial ruin or impoverishment, now and in the future". Therefore the universal coverage became an ambition for many nations and not only for developed countries but also developing as well. Although, the goal is everywhere common as to ensure that all people can use the needed health services without risk of financial hardship however the priorities and timetable differ between countries (WHO, 2010). And that's because specific characteristics of societies, their history as well as culture, then also social and political considerations used to have a significant influence on the structure of the health system and adopted solutions (Jaworzyńska, 2016).

Undoubtedly, universal health coverage takes a broad view of the services that are needed for good health and well-being. These services range from clinical care for individual patients to the public services that protect the health of whole populations. It includes services that come from both within and beyond the health sector. In fact quite wide range of services are covered as approaches to prevention, promotion, treatment, rehabilitation and palliative care, and these services must be sufficient to meet health needs, both in quantity and in quality as universal health coverage express also concern for equity and for honoring everyone's right to health (WHO, 2010).

Thus, most of industrialized countries have been developing their health care systems continuously in purpose to improve their equality, efficiency as well as quality of health care. However, to devise an effective, fair, accessible and cost-conscious healthcare system is difficult for any country (Rój, 2009). One of the main reason of such difficulties is the nature of health needs as they require involvement of varied and wide range of resources, including human, financial and infrastructural ones. While in every country, there is limitation of health resources which also means that the treatment options are infinite, it required tough decisions on allocation of scarce resources. Then inappropriate resource allocation can lead to inequalities in health as ineffective allocation will cause that more people would not have sufficient access to health benefits. As, if resources are allocated equitably, then it would be reflected in health outcomes (Ucieklak-Jeż, Bem and Prędkiewicz, 2015). It means that the better health system, then the people would live longer (Jaworzyńska, 2016). Thus better allocation and/or utilization of health care resources is so important as it is a way to reach an approximation to European levels of health status (Balázs, 2015). Even, the health system would have plentiful health care resources with excellent infrastructure, equipment and personnel skills, still could face impending crisis if there is inequitable access do them. Therefore, the management of such resources is so important and especially providing the equal access to them (WHO, 2000).

As a significant share of gross domestic product is consumed by the health services and especially for these provided in the form of inpatient care , thus inpatient care seems to be also crucial from the point of view of society's welfare (Siedlecki, Bem, Prędkiewicz and Ucieklak-Jeż, 2015). The difference between the inpatient and outpatient care is how long a patient must remain in the facility to have their procedure to be performed. In case of inpatient care, the overnight hospitalization is required, which means that patients must stay at the health care providers where their procedure was done for at least one night. During this time, they will be supervised by nurses or doctors. In case of outpatient care, such procedures are performed, which do not require the patients to spend night being supervised (Pbmchealth, 2018)

One of the major determinant of access to inpatient care is bed, and this kind of infrastructural resources is in fact one of the major resource, which is needed to provide health care services especially inpatient one. That's way it is important to verify whether they are equitably distributed in the country. Whether the equitable access to them are quarried, which is so important for the achieving good health of all population thus it is important to analyze the distribution of infrastructure resources – especially by area and population. Because of importance of this topic and shortage of such research in the context of Poland, the purpose of this study is to evaluate the distribution of infrastructure resources of inpatient care across regions in Poland between 2010 and 2017 and estimate the level of equity. There is no such structured studies in the context of Poland and this research will allow to fill in the gap in existing literature (there is some studies conducted from different context (e.g. Bem, Ucieklak-Jeż, Siedlecki, 2013). While this topic is widely analyzed in some other countries (e.g. Zhang, Xu, Ren, Sun and Liu, 2017; Ilu, Zeng, 2018).

Moreover, for many years, Polish health care system has been going through a series of reforms in purpose to improve its functioning and especially in order to achieve a more efficient and equitable system. Although many changes have been successfully made, in some publication, it is underline, that the access to health care seems to be still inequitable and even sometimes limited (Balázs, 2015).

Therefore, to understand the trend of access to health care infrastructure of inpatient care in Poland is important as these results are put within the context of the health reforms that have caused this development, which may be of interest to policy makers. Moreover, the equitable distribution of infrastructure resources in health care remain critical in making progress towards the goal of universal health coverage.

1.1. The characteristics of health care system in Poland

The Republic of Poland is a country with the location in central and eastern Europe with both population of 38.1 million and area of 312 685 km2 in 2018 (Statistic Poland, 2018). It is also the largest country among the new Member States admitted to the EU after 2004. The Human Development Index for Poland was 0.865 in 2018.

The elimination of geographical and social inequalities in health is being one of the strategic objectives of the past and present National Health Programs in Poland (Mossialos, 2011). National health policy is formulated in the National Health Program [NHP]. Now, the fifth edition of this is under the realization and it covers years from 2016 to 2020. The first NHP was developed in 1990 as a response to the WHO Health for All 2000 strategy. The key objective of the current edition of the NHP is to extend the life of Poles in health, improving the quality of life related to health and also to limit social inequities in health (MZ, 2018)..

In some way, these goals arise from the Polish Constitutions. As according to Article 68 of the 1997 Constitution of the Republic of Poland, all citizens, regardless of their financial status have the right to equal access, which should be ensured by the public authorities. Thus, the Polish Constitution of 1997 grants a general right to health care to every citizen as detailed conditions for as well as the scope of, the provision of services shall be established by statute. Moreover, special health care should be granted to children, pregnant women, handicapped people and persons of advanced age. In addition, public authorities are mandated to combat epidemics illnesses and prevent the negative health consequences of environmental degradation. They should also support the development of physical culture especially among children and adolescents (Constitution..., 1997).

In Poland, many reforms were performed. The national government budget has historically been the main source of health care financing and radical change of this system happened in 1999 while the implementation of market economy took place earlier, it means in 1989 **(**Rój, 2004). However, the first important regulation, which applied to the supply side of the market of health care services was the Act on Health Care Units of 1991 (Lachowska, 2017), implemented just after the beginning of political and economic transition in 1989. This 1991 Act on Health Care Units was a legal framework governing the activities of Polish health care institutions - both public and non-public - in the period from year 1991 to year 2011 (Sagan and Sobczak, 2014). By this Act, also the new legal form of health care institutions was introduced, it means Independent Health Care Facilities [IHCF] (Samodzielne Publiczne Zakłady Opieki Zdrowotnej – SPZOZ). This new legal form was modeled after the British NHS trusts in purpose to enable an "internal market" development in health care sector. Before the late-1990s, for example most of public hospitals, operated as budgetary units and they were run by by the Ministry of Health (and some other ministries), medical academies, and the regional State administration (voivodeship). And the budgetary funds were main source of their activity financing (Sagan and Sobczak, 2014). By this regulation, the independence of public providers was implemented and also the nonpublic entities were allowed to provide the health care services in public health care system (Lachowska, 2017).

This new legal form of health care institutions had a several advantages comparing to a budgetary unit. First it had a legal personality, a significant autonomy in the area of internal organization and regarding to employing staff. Also, it was obligated to follow general accounting regulations and what it is most important to cover all the costs of its activity from its revenues (coming mainly from public payers). Such changes have dragged behind some more changes as restructurization of hospitals (e.g. changes in the number and structure of beds and personnel) and also required to provide intensive training of their management and other personnel. The main source of this newly established IHCF became voivodeship' health care budgets and they were financed according to global budgets and contracting instead of funding based on budgetary rules (Sagan and Sobczak, 2014).

The radical change in health care system took place in January 1999 – by introducing the 1997 General Health Insurance Act – a new general obligatory health insurance system entered into force, which changed the system of financing. with a system of financing from health contributions, based on social health insurance (SHI) rules. And as a result of this reform the purchaser and provider functions were split. It can be said that the decentralization of the system was placed (Rój, 2004). The main source of healthcare system financing became

the obligatory health insurance (Jaworzyńska, 2016). And the process of health care services purchase has been based on selective contracting between the payer/purchaser (initially the Sickness Funds) and health care providers (Mossialos, 2011). Earlier all budgetary units had to be transformed into IHCF in order to contract health care services with public payers / purchasers. These transformations had to be done quickly, often with no or minor internal changes (Sagan and Sobczak, 2014). What is also important, that in this same year (1999), a new administrative organization of the country was introduced: as powiats (districts/counties) were entered as the intermediate level of territorial self-government, between the gminas (municipalities), at the lowest level, and the voivodeship (regions). It is important in the context of health care as powiat authorities became the owners/funding bodies for the with the remaining public hospitals owned by the voivodeship and medical universities and others (mainly the Ministry of Health). Moreover, the number of voivodeships was reduced from 49 to 16. As a result of this reform and changes the ownership structure of public hospitals became not only more complex but also more fragmented (Sagan and Sobczak, 2014; Balázs, 2015).

As it was mentioned above, the function of purchaser / payers was taken over by – 16 regional Health Insurance Organizations (the so-called Sickness Funds – one in each region) and one trade (nationwide) Health Insurance Organization (Rój, 2009). However, because of considerable differentiation of the number and quality of services in individual regions this system met with the criticism of new left - side government, which adopted of different solutions - instead of improving this system. It means the law on general insurance in the National Health Fund, was enforced on April 1, 2003 (Kuszewski and Gericke 2005). So under this law Sickness Funds ceased to exist. They have been replaced by the National Health Fund [NHF] - a single central insurance institution – with the Head Office of the NHF and 16 regional branches, one in each voivodeship. It meant that the public funds for health care were again centralized. To eliminate regional differences in access to health care, **t**he Law introduced uniform contracting procedures and point limits for contracted services (Mossialos, 2011). However, shortly after – in January 2004, the law on universal insurance in the National Health Fund was legally qualified as not standing in accordance with the Constitution. As a result, the Sejm of the Republic of Poland passed the law on health benefits financed from public means on 30 July 2004, but the general idea of insurance in National Health Fund remained (Rój, 2007). The regional branches of NHF not only establish general rules for contracting but also are responsible for contracting health care services and divide their budgets between various types of services (Balázs, 2015).

While, the major task of the NHF is to finance health services provided to the entitled population, it also manages the process of contracting health services with public and non-public service providers (setting their value, volume and structure), monitors the fulfillment of contractual terms and being in charge of contract accounting. The quality and accessibility of health care services are to a certain extent influenced by the negotiated terms (Kuszewski and Gericke 2005). It means that NHF regional branches are responsible for the entire process of contracting and as result of it, each regional branch of the NHF is responsible for securing continuous provision of health care services for its population within the available financial resources. All health care providers must meet certain criteria to be able to apply and compete for the contracts with the NHF (Mossialos, 2011). Thus the provision of is determined by health care service provider resources on the one hand while also by the ability to finance the services by the NHF on the other hand (Balázs, 2015).

All principles regarding to contracting are specified in the 2004 Law on Health Care Services Financed from Public Sources and are also regulated by the Civil Code. The specification of contracting procedures for various types of service is provided in the decrees of the President of the NHF (Mossialos, 2011).

Since 2005, the stewardship, management and financing functions in the Polish health care system are divided between the Ministry of Health, the National Health Funds (NHF) and territorial self-governments. Ministry of Health has progressively evolved from health care funder and organizer of health care provision to health policymaker and regulator. Mainly, the Ministry of Health has the overall responsibility for governance of the health sector and its organization. It is responsible for national health policy strategy and planning, implementation and coordination of health policy programs, major capital investments and also for medical research and education. The Ministry also has a number of supervisory functions. In addition, among others, it also regulates medical professions, jointly with the voivodeship evaluation of access to health care (Kuszewski and Gericke 2005). As Poland has three levels of territorial self-government, at each administrative level, territorial health authorities are responsible for the identification of the health needs of their respective populations, for planning of health services delivery, health promotion and the management of public health care institutions (Mossialos, 2011).

However, the formula of Independent Health Care Facilities [IHCF], which was introduced in 1991, had several shortcomings especially in case of inpatient health care providers. The most important that the given operational independence of the IHCF was unmatched with financial responsibility on one side and limitation of their supervision by the territorial self-governments on the other hand. The consequence of such shortcomings was accumulating debts of IHCF with impunity. It was a reason that just with the beginning of 21st century there have been many attempts to transform this IHCF into Commercial Code companies and

finally the new regulations – it means the 2011 Law on Therapeutic Activity, which came into force on 1 July 2011' (Sagan and Sobczak, 2015). Apart from transformation of many public providers into companies governed by the Commercial Code (i.e. a limited liability company or a joint stock company), the Act on Therapeutic Activity introduced major changes to health care services provision. One of the most important was the introduction of a new legal term, such as 'therapeutic entity', which replaced the term health care unit, introduced by the 1991 Act on Health Care Units (Sagan and Sobczak, 2015).

According to the 2011 Law on Therapeutic Activity, health care services can be provided by public and non-public health care units as well as by individual and group medical practices. Therapeutic activity comprises inpatient services (in hospitals and other institutions, such as hospices or nursing homes etc – article 8 of this Act) and outpatient services (Sagan and Sobczak, 2015). According to articles 8 and 9 of Act 2011 inpatient care can be provided by either hospital or units different then hospitals such as: chronic medical care homes, nursing homes and hospices. In hospices, comprehensive healthcare, psychological and social care for patients in the terminal state are provided as well as a care for the families of these patients. In nursing homes, 24-hour health services are provided that cover the care and rehabilitation of patients who do not require hospitalization, and provide them with medicinal products and medical devices, rooms and meals appropriate to their health, as well as providing health education for patients and their family members, and preparing them for self-care and self-care at home. In chronic medical care homes, providing 24-hour health services that cover the care, care and rehabilitation of patients who do not require hospitalization, and provide them with medicinal products needed to continue treatment, rooms and meals appropriate to health, as well as providing health education for patients and their family members, and preparing these people for self-care and self-care at home.

While the hospital is characterized by offering permanent readiness to admit patients and providing them with medical services. General hospitals provide the most complex health services and of the highest level of specialization thus they play an extremely important role in the health care system. That's why, so much attention on their activity is paid by local communities especially on public hospitals especially that apart of provision of health services they also often fulfill additional social tasks (Bem, Prędkiewicz, Ucieklak-Jeż, Siedlecki, 2015).

1.2. Research objective

The aim of this study is to evaluate the distribution of infrastructure resources such as beds of inpatient health care providers across regions of Poland between 2010 and 2017 and estimate the level of equity.

1.3. Research Methodology and Data Analysis

Data related to inpatient health care providers used in this study was derived from the Knowledge Database Health and Health Care of Statistic Poland (Statistics Poland, 2010-2017) for the period from year 2010 to year 2017. As Poland is divided into 16 voivodeships, thus this study used, voivodeship - level data on inpatient health care providers and each voivodeship was considered as a unit of analysis. The study data consisted of the number of beds of the following types inpatient health care providers: general hospitals and psychiatric hospitals and then chronic medical care homes, nursing homes and hospices expressed as number of them per 10,000 people and then also converted and expressed as number of them per square meter. Population and geographic area data was obtained from Polish Statistical Yearbook 2010–2017 (Statistics Poland, 2010-2017). Number of them were used as the indicators of different types of health care bed resources in each voivodeship.

In purpose to exam the distribution of beds against population size and geographic size in Poland, the Gini coefficient calculated based on the Lorenz Curve was engaged, because it is recognized as one of the most common measure of distribution and also as one of the superior tool for measuring inequity (Druckman and Jackson, 2008; Wagstaff, Paci and van Doorslaer, 1991). The Italian Statistician Corrado Gini (1955) has developed the Gini coefficient as a summary measure of income inequality in society (Gini, 2005). In this research, the Gini coefficient was calculated based on the Lorenz curve as a graphical representation (Zhang, Xu, Ren, Sun and Liu, 2017; Jin, Wang, Ma, Wang and Li, 2015). The Gini coefficient can be also defined as the ratio, while the numerator is the area between the Lorenz curve of the distribution and the uniform distribution line and the denominator is the area under the uniform distribution line. Thus the actual extent of inequality is presented by the area between Lorenz Curve and the line of perfect equality. Less deviation from the line of perfect equality means more even distribution. The value of this ratio can take value from 0 to 1 with 0 corresponding to perfect beds distribution (i.e. every units has this same number of beds per 10,000 people) and with 1, which means perfect beds inequality (i.e. one has all the beds, while everyone else has zero of them). Then the value of Gini coefficient below 0.3 means preferred equity status, and from 0.3 to 0.4 means normal condition, while Gini coefficient with the value between 0.4-0.6 triggers an alert of inequity and the value exceeding 0.6 represents a highly inequitable state.

Two indicators were used for measuring inequity, reflecting the distribution of inpatients care beds – the first among populations and the second among geographical location. And the following formula was used:

$$G(y)= \frac{\sum^{n}_{i=1}(2i-n-1)y_i}{n^2 y} \qquad (1)$$

Where:
y_i = value of i-observation
n= number of observations

1.4. Findings and Interpretation

This empirical research covered the inpatients health care providers such as general hospitals and psychiatric hospitals and then chronic medical care homes, nursing homes and hospices in Poland. The number of them varies over the period of analysis but at average the empirical research includes the group of at 916 general hospitals yearly. Generally the number of general hospitals presents the growing tendency. It increased from 795 in 2010 to 951 in 2017, which means by 19,62%. There are also at average 381 chronical medical care homes, also with growing tendency from 330 in 2010 to 415 in 2017, which means the increase by almost 26 %. There is almost a half less nursing homes compering to chornical medical care homes as at average 151 of them with growing tendency in analyzed period. Number of nursing homes increased from 2010 to 2017 by 17,52%. Then the slight change can be observed in case of psychiatric hospitals as from 47 to 48 with the average 48. The relatively highest change can be observed in case of hospices as by almost 42% from 67 to 95 with the average in the analyzed period of 79 hospices.

Table 1: Number of inpatients care providers in Poland in the years from 2010 to 2017

year	general hospitals	psychiatric hospitals	chronic medical care home	nursing homes	hospices
2010	795	47	330	137	67
2011	814	48	367	138	79
2012	913	49	361	158	83
2013	966	48	379	152	73
2014	979	49	388	155	73
2015	956	48	408	152	82
2016	957	48	400	154	80
2017	951	48	415	161	95
average	916	48	381	151	79
change	19.62%	2.13%	25.76%	17.52%	41.79%

Source: Statistics Poland (2010-2017)

According to the data, which are presented in the table 2, it is appeared that at average the highest base of beds are in the disposition of general hospitals (185.656 beds), then of chronic medical care homes (22.827) and psychiatrist hospitals (17.705). Relatively smaller base of beds is in the dispositions of nursing homes as at average it was 6.569 and in case of hospices as it was 1.427. Moreover, the number of beds also increased in analyzed period at inpatient health care providers apart from psychiatric hospitals, where slight decrease of beds took place.

Table 2: Number of beds of inpatient care providers in Poland in the years from 2010 to 2017

year	general hospitals	psychiatric hospitals	chronic medical care homes	nursing homes	hospices
2010	181 077	17 750	19 250	5 688	1 126
2011	180 606	17 761	21 118	5 699	1 263
2012	188 820	17 529	21 187	6 755	1 389
2013	187 763	17 505	22 302	6 401	1 307
2014	188 116	17 736	23 099	7 027	1 334
2015	186 994	17 759	24 872	6 706	1 550
2016	186 607	17 868	25 176	6 749	1 640
2017	185 263	17 730	25 615	7 528	1 809
average	185 656	17 705	22 827	6 569	1 427
change	2.31%	-0.11%	33.06%	32.35%	60.66%

Source: Statistics Poland (2010-2017)

The results of this study showed that the number of beds in different types of inpatient health care providers expressed as per 10,000 population in Poland (table 3) has increased from the year 2010 to 2017 – apart from psychiatric hospitals, where the slight decrease can be noticed. The relatively higher increase was observed for hospices as almost 67%, then around 33-34% in case of chronic medical care homes and nursing homes. Number of beds in general hospitals per 10,000 people has increased by 2.60%.

Table 3: Number of beds per 10,000 population in Poland in the years from 2010 to 2017

year	general hospitals	psychiatric hospitals	chronic medical care homes	nursing homes	hospices
2010	47.0	4.7	5.5	1.5	0.3
2011	46.9	4.6	5.5	1.5	0.3
2012	49.0	4.5	5.5	1.8	0.4
2013	48.8	4.5	5.8	1.7	0.3
2014	48.9	4.6	6.0	1.8	0.3
2015	48.6	4.6	6.5	1.7	0.4
2016	48.6	4.6	6.6	1.8	0.4
2017	48.2	4.6	6.7	2.0	0.5
change	2.60%	-0.80%	34.00%	33.30%	66.70%

Source: own calculation

Table 4 presents the number of beds in each types of inpatient health care providers per 1 square km, which has been generally increased from 2010 compared to 2017. So it means that similar tendency of changes can be observed when expressing number of each types of inpatient health care beds per 1 square km. The most significant changed can be observed in case of hospices (60.70%) and then at around 33.00% in case of chronic medical care homes and nursing homes, while in case of general hospitals only 2.30%. However, there is also slight decrease of number of bed per 1 square km in psychiatric hospitals by 0.10%.

Table 4: Number of beds per 1 square km in Poland in the years from 2010 to 2017

year	general hospitals	psychiatric hospitals	chronic medical care homes	nursing homes	hospices
2010	0.579	0.057	0.062	0.018	0.004
2011	0.578	0.057	0.068	0.018	0.004
2012	0.604	0.056	0.068	0.022	0.004
2013	0.600	0.056	0.071	0.020	0.004
2014	0.602	0.057	0.074	0.022	0.004
2015	0.598	0.057	0.080	0.021	0.005
2016	0.597	0.057	0.081	0.022	0.005
2017	0.593	0.057	0.082	0.024	0.006

Change	2.30%	-0.10%	33.10%	32.30%	60.70%

[1] Source: own calculation

From the analysis of Gini coefficients values it was noticed then the Gini coefficients against population size (table 5) ranged between 0.043 and 0.391. The most equitable access to beds can be observed in case of general hospitals (0.043-0.058) and then still quite equitable access – as it still below 0.3 – is in case of chronic medical care homes beds (0.205-0.271) and psychiatric beds (0.232-0.251). The less equitable access is to beds in hospices (0.228-0.335) and nursing homes (0.353-0.391).

Table 5: Gini coefficients of population distribution of beds in the years from 2010 to 2017

year	general hospitals	psychiatric hospitals	chronic medical care homes	nursing homes	hospices
2010	0.058	0.233	0.271	0.380	0.228
2011	0.055	0.240	0.266	0.383	0.278
2012	0.047	0.232	0.244	0.388	0.256
2013	0.048	0.251	0.218	0.364	0.248
2014	0.044	0.246	0.223	0.356	0.278
2015	0.043	0.247	0.207	0.381	0.335
2016	0.046	0.248	0.213	0.353	0.334
2017	0.044	0.242	0.205	0.391	0.314

Source: own calculation

In the analyzed period, a slight improvement can be observed in the level of equality to access to beds in general hospital as well as to beds in chronic medical care homes. However, in case of beds resources in nursing homes, hospices and psychiatric, the increase of the Gini coefficients was noticed which means the decrease of equity to assess to them.

The Gini coefficients against geographic distribution (Table 6) of beds of different types of inpatient health care providers ranged between 0.285 and 0.531. Only for psychiatric and general hospitals beds, Gini coefficients are below 0.30, then for hospices as well as chronic medical care homes are in the range between 0.35 to 0.39 in 2017. While for nursing homes, it is above 0.5 in 2017, which is not good as it started to triggers an alert of inequity. What is positive that, a slight improvement in the level of equality to access to nursing homes, chronic medical care homes, general hospital is also recognized, while the he decrease in equity is noted in case of hospices and psychiatric as the values of Gini coefficients increased slightly from 2010 to 2017.

Table 6: Gini coefficients of geographic distribution of beds in the years from 2010 to 2017

year	general hospitals	psychiatric hospitals	chronic medical care homes	nursing homes	hospices
2010	0.296	0.287	0.406	0.523	0.308
2011	0.294	0.285	0.405	0.523	0.344
2012	0.285	0.285	0.391	0.531	0.343
2013	0.288	0.294	0.379	0.494	0.335
2014	0.286	0.294	0.386	0.492	0.336
2015	0.285	0.291	0.383	0.528	0.365
2016	0.285	0.292	0.391	0.493	0.370
2017	0.286	0.290	0.387	0.518	0.359

Source: own calculation

The results showed that the geographical distribution of beds in different types of inpatient health care providers is less equitable then in case of population distribution. The Gini coefficients against geographical ranged between 0.285 and 0.531, while against populations ranged between 0.043 and 0.391.

1.5. Conclusions

On basis of the Gini coefficient, this paper reports on a comparative analysis of some slight inequality of health care inpatients beds distribution in Poland. This study has several major findings. Firstly, the amount of all types of inpatient health care providers (general hospitals, psychiatric hospitals, chronic medical care homes, nursing homes and hospices) increased in the range from 2,13% to 41.79%. In case of the total number of beds in different types of inpatient health care providers there is the increase of them in the range from 2,31% to almost 60,66 % in hospices but the decrease of psychiatric bed took place.

Also, similar tendency can be observed when number of beds is expressed as per 10,000 population as well as per 1 square km. The highest increased was noted in case of hospices beds as almost 67% and 60.70% respectively. Number of beds when expressed both per 10,000 and per square km increased around 33-34% in case of chronic medical care homes and nursing homes. The lower increased was noted for general hospitals beds as above 2%. Number of beds per 10,000 peoples and per 1 square km in psychiatric hospitals decreased slightly.

Secondly, population distribution of all main types of inpatient health care beds is quite equitable as Gini coefficients for distribution by population were between 0.043 and 0.391 while the Gini ratio for geographical distribution was between 0.285 and 0.531, which means that geographical distribution of analyzed types of inpatient health care beds is less equitable. The most equitable population distribution can be observed for the beds of general hospitals and the less for beds of nursing homes. And this same tendency is noticed when analyzing geographical distribution.

Negative aspect was also noticed as there was an decrease of equity to access to beds resources in nursing homes, hospices and psychiatric in case of population distribution and also decrease in equity is noted in case of hospices and psychiatric in geographical distribution.

Thus this research provides some implications for policy and practice. As the main reason to establish National Health Fund (which meant also the centralization of the system) in Poland was to to eliminate regional differences in access to health care, thus this research confirms that still some more corrective actions, in this field, should be undertaken. On the one hand, the findings also confirm the Polish government's effort and input in increasing and thus providence with better access to health care infrastructure in inpatient health care especially for nursing homes. The results show the need to correct the health policy conducted by Ministry of Health as well as contracting system conducted by National Funds of Health in Poland.

This paper focuses on the equity to access to infrastructure in inpatient health care and this research allowed to identify some inequities in health care system of Poland. This focus on the one particular country such as Poland results from this that every country adopts its unique solutions when implementing universal health coverage, because of differences in the culture, social, political as well as because of societies characteristic. Although the distribution of health care inpatient infrastructure was more adequate for the population size with some little variation among types of inpatient providers , a striking difference was found in terms of the distribution per area. Higher geographical imbalances were recognized and should be taken into consideration when formulating policy rather than simply increasing the number of health care resource. This study is a kind of diagnosis and can be used as the basis for health systems planning to correct the unequal distribution of health care resources such as beds.

BIBLIOGRAPHY

[1]. Balázs N., Improving the allocation of health care resources in Poland. Available online:(http:// www.euro.who.int/ data/assets/ pdf_file/0011/273863/ImprovingAllocationHealthCareresourcesPoland.pdf?ua=1; (accessed on 12/10/18)

[2]. Bem A., Ucieklak-Jeż P., Siedlecki R. (2013). Effects of inequalities in access to health services in rural areas in Poland, Management theory and studies for rural business and infrastructure development, Vol. 35. No. 4. p.491-497.

[3]. Bem A., Prędkiewicz P., Ucieklak-Jeż P., Siedlecki R. (2015), Impact of hospital's profitability on structure of its liabilities, Strategica 2015 proceedings, p.657-665.

[4]. Devaux, M., de Looper M. (2012). Income-Related Inequalities in Health Service Utilisation in 19 OECD Countries, 2008-2009", OECD Health Working Papers, No. 58, OECD Publishing. Available online: http://dx.doi.org/10.1787/5k95xd6stnxt-en (accessed on 12/10/18)

[5]. Druckman A, Jackson T. (2008). Measuring resource inequalities: the concepts and methodology for an area-based gini coefficient. Ecol Econ. 65: p.242-252.

[6]. Drummond M., McGuire A. (2006). Economic Evaluation in Health care. Merging theroy with practice. Oxford University Press. p.286

[7]. Gini C. (1955). Variabilita e mutabilita 1912 reprinted in Memorie di metodologica statistica (Ed. Pizetti E, Salvemini, T). Rome: Libreria Eredi Virgilio Veschi.

[8]. Gini C. (2005). On the measurement of concentration and variability of characters, Metron International Journal of Statistics vol. LXIII, issue 1

[9]. Ilu L., Zeng J. (2018) Inequalities in the geographical distribution of hsopitals beds and doctors in traditional Chineses medicine from 2004 to 2014, International Jounral for Equity in Health, Vol. 17:165; p.1-9

[10]. Jachowicz R. (1970). Zarys technologii współczesnego szpitala, Państwowy Zakład Wydawnictw Lekarskich, Warszawa. p.167.

[11]. Jaworzyńska, M. (2016). A Comparative Analysis of the Health System Financing in Poland and Selected Countries, Economics and Sociology, Vol. 9, No 3, pp. 41-51.

[12]. Jin J., Wang J., Ma X., Wang Y., Li R., (2015), Equality of Medical Health Resources – Iran Journal Public Health Vol.44, No 4. p. 445-457.

[13]. Kuszewski K., Gericke Ch. (2005). Health systems In transitions Poland, WHO. p.130.
[14]. Lachowska A. (2017). Efficiency of public and nonpublic primary health care providers in Poland, Economics & Management, Vol. 9. iss. 2, p. 57-63.
[15]. Ministry of Health (2018). Available online: https://www.gov.pl/web/zdrowie; (accessed on 12/10/18).
[16]. Mossialos E. (2011). Health Systems in Transition Vol.13 No. 8; Poland. Health system review.European Observatory on Health Systems and Policies. Available online:http://www.euro.who.int/__data/assets/pdf_file/0018/163053/e96443.pdf (accessed on 12/10/18);
[17]. Rój J. (2004). Relationship between Funding Mechanism and Service Effectiveness of Hospital. In:J. N. Yfantopoulos (ed), The economics of health reforms, Athens: ATINER p.507-518.
[18]. Rój J. (2006). Ochorna zdrowia jako forma inwestycji w kapitał ludzki. Acta Universitatis Lodziensis. Folia Oeconomica 197; Wydawnictwo Uniwersytetu Łódzkiego; p.399-406.
[19]. Rój J. (2009). The Cost Efficiency of Hospitals in Poland in Zoe Boutsioli (ed),Themes on Health Care: Challenges and Future Actions, Athens: ATINER. p.306-320.
[20]. Sagan A., Sobczak A. (2014). Implementation of the 2011 Therapeutic Activity Act: Will commercialization improve the financial performance of Polish hospitals?, Health Policy, Vol. 118, iss.2, p.153-158.
[21]. Siedlecki R ., Bem A ., Prędkiewicz P ., Ucieklak-Jeż P (2015). Measures of hospital's financial condition – empirical study, Strategica. Local versus global. International academic conference, p. 666-675.
[22]. Smits, CCF. Toelsie JR, Eersel MGM., Krishnadath ISK., (2018), Equity in health care: An urban and rural, and gender perspective; the Suriname Health Study, AIMS Public Health Vol.5 iss.1 p.1-12.
[23]. Statistics Poland (2010-2017). Polish Statistical Yearbook. Available online: https:// stat.gov.pl/obszary- tematyczne/ ludnosc/powierzchnia-i-ludnosc-w-przekroju-terytorialnym-w-2018-roku,7,15.html. (accessed on 12/10/18)
[24]. Statistics Poland (2010-2017), Knowledge Database Health and Health Care of Statistic Poland. Statistics Poland, Available online: http://swaid.stat.gov.pl/ZdrowieOchronaZdrowia_dashboards/Raporty_predefiniowane/RAP_DBDZDR_5.aspx (accessed on 12/10/18)
[25]. Ucieklak-Jeż P ., Bem A., Prędkiewicz P ., (2015) Effectiveness of allocation of health system non-financial resources, Strategica international academic conference–third edition-local versus global. SNSPA, Faculty of Management, Bucharest, Romania p. 647-656.
[26]. Wagstaff A, Paci P. Van Doorslaer E., (1991) On the measurement of inequalities in health, Soc. Sci Med.33; p.545-557.
[27]. Wagstaff A., van Doorslaer E. (2000), Measuring and Testing for Inequity in the Delivery of Health Care, Journal of Human Resources. Vol. 35 Issue 4, p. 716-733.
[28]. Whitehead M. (2000). The concepts and principles of equity and health. Available online: http:// salud.ciee.flacso.org.ar/ flacso/optativas/equity_and_health.pdf. (accessed on 12/10/18);
[29]. WHO (1948). Constitution of WHO Available online: http://apps.who.int/gb/bd/PDF/bd47/EN/constitution-en.pdf?ua=1
[30]. WHO (2000). The world health report 2000 – health systems: improving performance,. Available online:https:/ www.who.int/whr/2000/en/ (accessed on 12/10/18);
[31]. WHO (2010) The world health report 2010. Health systems financing: the path to universal coverage. Geneva, World Health Organization, 2010.
[32]. WHO (2013). Arguing for Universal Health Coverage, World Health Organization 2013, Available online:https:// apps.who.int/iris/ handle/10665/204355. (accessed on 12/10/18)
[33]. WHO (2014). Making fair choices on the path to universal health coverage. Final report of the WHO Consultative Group on Equity and Universal Health Coverage, World Health Organisation.
[34]. WHO (2018). Universal Health Coverage. Available online: https://www.who.int/health systems/universal_health_coverage/en/ (accessed on 12/10/18)
[35]. Zhang T., Xu, Y., Ren J.., Sun L., Liu Ch., (2017) Inequlity in the distribution of health resources and health services in China: hospitals versus primary care institutions., International Journal for Equity Health 16:42, p.1-8.
[36]. The Constitution of the Republic of Poland of 2nd April, 1997,
[37]. The 1991 Act on Health Care Units
[38]. The 1997 General Health Insurance Act
[39]. Act of 27 August 2004 About Health Care Benefits Financed From Public Funds
[40]. Act of 1 July 2011 about Therapeutic Activity
[41]. PBMCHHEALTH (2018). The Difference Between Inpatient and Outpatient Care, Available online:(accessed on 12/10/18).

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