AVAILABILITY OF MEDICAL STAFF IN POLAND IN COMPARISON TO OTHER EU COUNTRIES

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Abstract
Access to medical staff differs across Europe. In 2011, the country that had the smallest number of physicians in all European Union was Poland. During last ten years, the number of doctors per capita increased in all European countries except Poland and Estonia. The aim of the study is to analyse the availability of medical staff in Poland and selected EU countries in the years 2003-2011. Particular attention is paid to the number of health personnel operating in each analysed EU country, such as: professionally active physicians, practising nurses and midwives. The analyses for physicians are conducted according to various criteria, such as: gender, age, medical speciality. The problem of availability of medical services in analysed countries is shown on the background of the average for the EU.

Key words: *availability of medical staff in EU countries, healthcare systems, number of physicians per 100 000 inhabitants, number of nurses per 100 000 inhabitants, number of midwives per 100 000 inhabitants, number of dentists per 100 000 inhabitants*

1. Introduction

The processes which take place in the health care sector affect the economic, as well as a social condition of the country. One of the important element in determining the level of social development of the country and the quality of life of its inhabitants is an analysis of the availability of medical services. The availability of medical services depends in great measure on the amount of human resources (medical personnel) in a health care system of the country. Lack of medical staff could be the cause of a reduction of the number of medical services and, as a consequence, the increase in the health problems of the population. Appropriate availability of the medical staff in the country based on the needs of its inhabitants is therefore one of the most important problem that has to be solved by the contemporary health policy (Włodarczyk 1996).

Well-educated and motivated medical staff is the base of the health system of each country that successfully realizes the health goals. Many authors emphasize the difficulties in achieving health policy objectives in countries with shortages of medical personnel, but also its excess may be the cause of problems (WHO 2006). The widespread availability to medical staff affects many other aspects of life of the population - the level of public health, mortality, and the living standard of the population.

The development and improvement of availability to medical staff and health care services is closely related to the health of population. Lack of health facilities and personnel near residence can reduce the number of provided medical services, which in turn results in unsatisfied health needs (Gruz 1997). The assumption is that within an universal health insurance system, all citizens should have 'reasonable' access to care regardless of where they live, and hence, physicians should be equitably distributed according to population needs. One of the important and difficult problem for the health care system are the inequalities in the distribution of infrastructure and health personnel that is critical to the delivery of high quality care to patients. All healthcare systems, need adequate numbers of well-trained staff to meet the needs of their populations. And as populations age and the range of treatments which can be provided increases, the demands on healthcare staff increase.

General economic growth and improvements in personal income, have created more demand for healthcare and constantly increasing patient expectations in Poland and in other EU countries. In

recent years there has been growing concern in a number of EU countries about shortages of healthcare professionals and the impact which this will have on the provision of healthcare. According to The World Health Organization, in the global scale there is shortfall of about 4.3 million doctors and nurses. Deficit of medical personnel is estimated at about 15 percent. (Crisp & Chen 2014). A serious crisis of human resources insufficient to meet the basic health needs of the population touches mainly the poor countries. Definitely highest number of professional medical staff is in Europe, but there are quite significant disparities between particular countries.

The article analyzes the territorial aspect of inequality in access to medical staff in Poland and in selected EU countries. The study took into account both state and private medical staff. The analysis was conducted in terms of the number of medical personnel per 10 0000 inhabitants (saturation index). Number of medical staff at various levels is an important indicator of the quality of health care. The higher the number of doctors, the shorter waiting time for a consultation or treatment. A sufficient number of nurses, in turn, provides full and adequate care in hospitals.

2. The differentiation between the countries

The aim of this paper is to analyze the availability of medical staff and the degree of its differentiation. The research includes the measurement of the number of health personnel operating in each analysed EU country, such as: professionally active physicians, practising nurses, midwives. The research material is based on the statistical data extracted from Eurostat databases.

The degree of differentiation between the countries was identified using the coefficient of variation (Fig 1). The coefficient of variation represents the ratio of the standard deviation to the mean, and it is an useful statistic measure for comparing the degree of variation from one data series to another. The coefficient of variation is a relative measure, which is dependent on the arithmetic mean:

$$V = \frac{s}{\overline{x}}, \quad \overline{x} \neq 0$$

where:

s - standard deviation of a sample,

$\overline{x}$- mean of a sample.

The coefficient of variation is the measure of variability of the data. When the value of coefficient of variation is higher, it means that the data has high variability and less stability. When the value of coefficient of variation is lower, it means the data has less variability and high stability. The values of the coefficient of variation ranging from 0 to 20% indicate a small variation of data, from 20% to 40% - medium variation, from 40% to 60% - large variation, and above 60% - very high data variation.

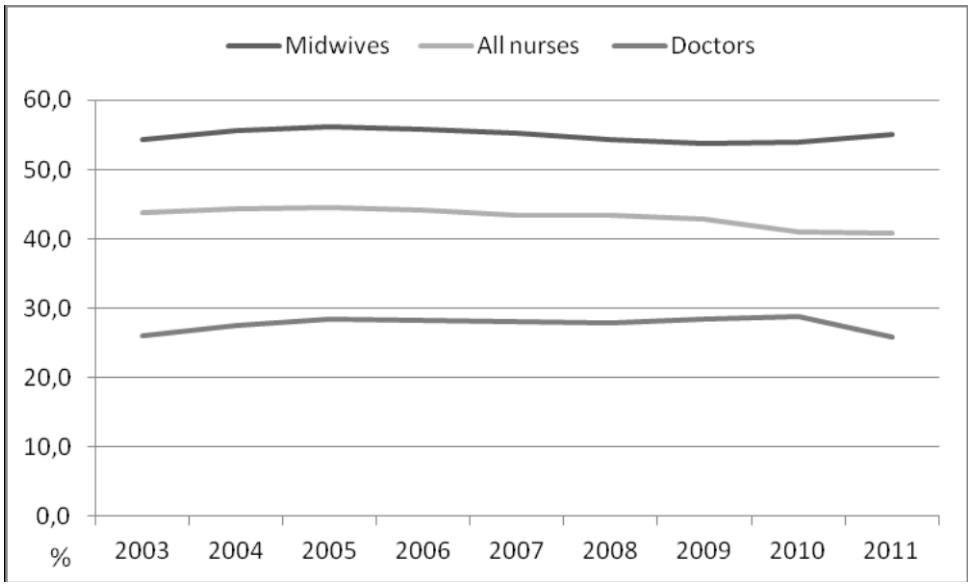


Fig. 1: The values of the coefficient of variation calculated for the medical staff in the period 2003-2011

Source: own work based on data from Eurostat

The coefficient of variation calculated for the number of midwives per 10 000 inhabitants stood at from about 54% to over 56% in the period 2003-2011, which indicates a very large variation between the analyzed countries. The coefficient of variation calculated for the number of nurses per 10000 inhabitants in the period 2003-2011 stood at 41-45%. Number of physicians per 10000 inhabitants indicated the smallest disproportion between the analyzed countries. In the period 2003-2011 the coefficient of variation stood at from about 26% to nearly 29%.

3. The availability of physicians

The average rate of change was calculated to illustrate the growth dynamics of the number of physicians per 10,000 population in various EU countries (Fig.2). The average rate of change is given by the following formula:

$$\overline{i_G} = \sqrt[n-1]{i_{n/n-1} \cdot i_{n-1/n-2} \cdot \ldots \cdot i_{2/1}} = \sqrt[n-1]{i_{n/1}} - 1$$

i_G – average rate of change

i – chain index $i = y_n/y_{n-1}$, where: y_n – analysed period; the current year, for which the index is calculated; y_{n-1} –base period; the year preceding the current year.

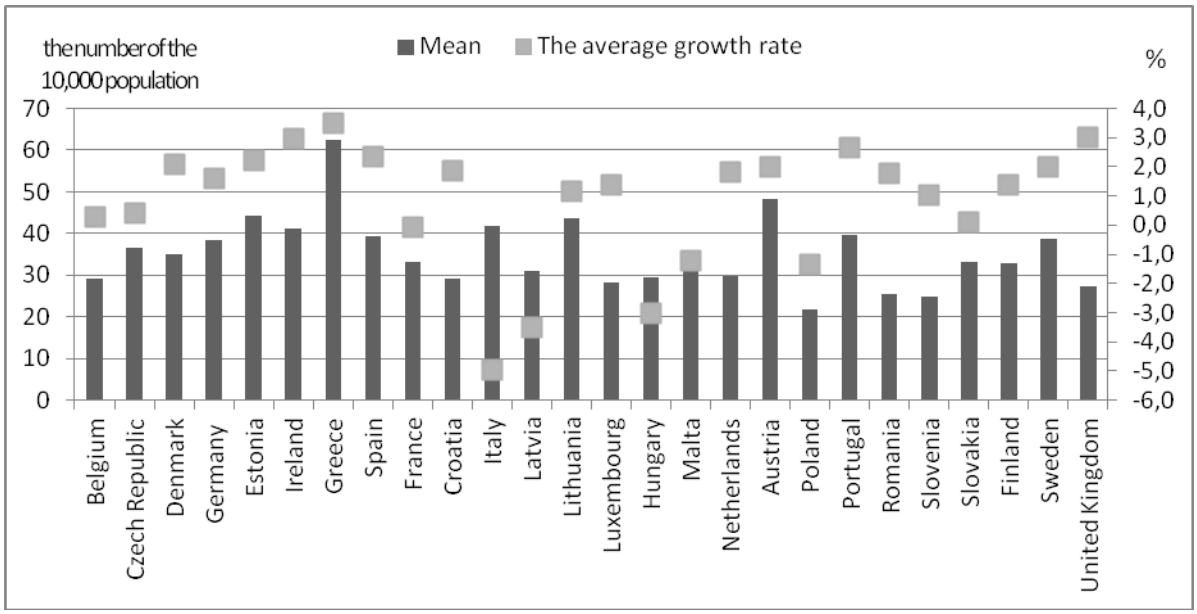


Fig. 2: The average number of physicians per 10 000 inhabitants in 2011 and the average rate of change in the period 2003-2011

Comment: Because of lack of data, the mean for the Netherlands and Sweden refers to 2010, and for Denmark to 2009

Source: own work based on data from EUROSTAT.

The number of doctors per 10 000 population has been rising steadily since 2003 in all European countries except Poland, Latvia, Italy and and Hungary - these countries recorded the negative rate of change. The highest positive rate of change in number of doctors per 10 000 inhabitants has been observed in Greece (3.3 percent), Ireland (3.0 percent), United Kingdom (3.0 percent) and Portugal (2.7). In France, this index remained unchanged.

There are quite high differences in the number of physicians per 10,000 population in various EU countries (Fig.3). Indicator of the number of physicians per 10,000 population is calculated by the following formula:

$$I_{PN} = \frac{NP_t}{NI_t} * 10{,}000$$

where:

NP_t - number of physicians in the year t

NI_t - number of inhabitants in the year t

It should be noted that methodology for calculating the number of medical staff is different in various countries. In Poland, the medical staff includes people working directly with the patient. Each person is counted only once, by primary place of employment. In some other countries, the medical staff also includes workers who don't practice in their profession (working in the administration or in the research). In the case of doctors such a situation takes place in France, Ireland, Netherlands, Portugal, Slovakia.

In 2011 the most physicians per 10 000 population work in Greece (62.4), Austria (48.4), Estonia (44,2) and Lithuania (431.7). In the case of Greece, the explanation for this situation is the fact that the number of employed physicians includes also doctors who don't work in their profession. The country with the least physicians per 10 000 population in European Union is Poland. The indicator of the number of physicians per 10,000 population is lower than the EU mean of 13,5 percent. What's more,

it is one of two countries, where over 10 years the number of physicians has decreased. In 2011, there were only 21.9 doctors per 10 000 population. For comparison in most developed countries, the index was much higher.

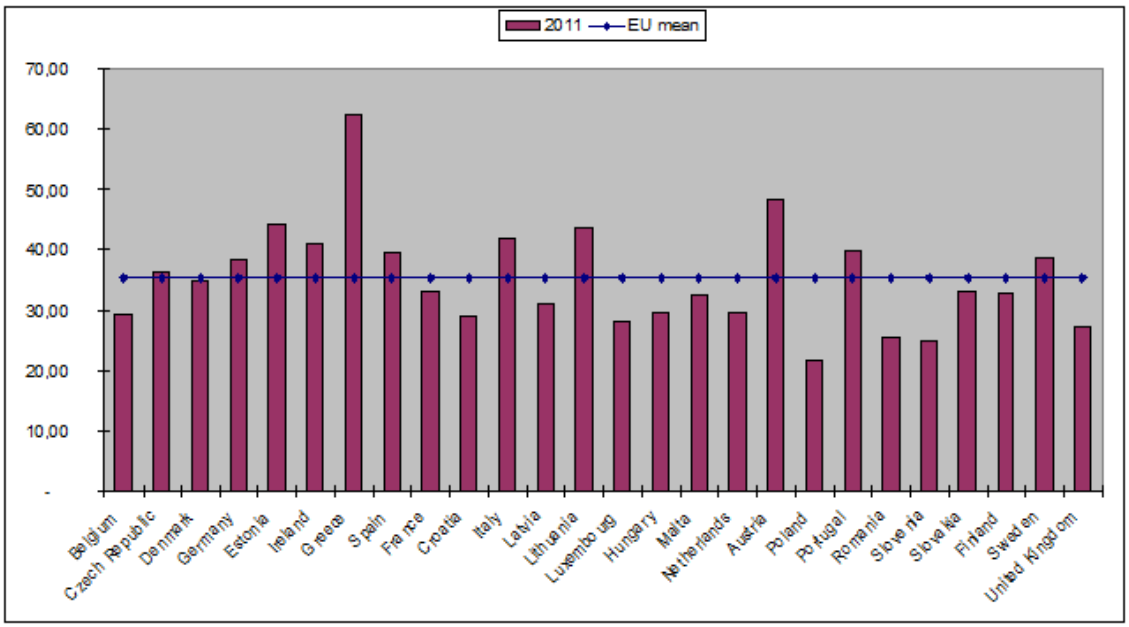


Fig. 3: Doctors per 1000 population, selected EU countries, 2011

Comment: Because of lack of data, the mean for the Netherlands and Sweden refers to 2010, and for Denmark to 2009

Source: own work based on data from EUROSTAT.

Eight years earlier, in 2003, the most physicians per 10 000 inhabitants was in Italy- 60.6. On the second place was Greece - 50.2, and on the third one Austria - 43.3. Poland achieved again the last place in the EU – 21.4.

The reason of the current situation was Polish accession to the European Union. The opening of the labor markets in the EU, which gradually followed after 2004, resulted in the partial outflow of medical staff employed in the Polish health care system to work outside of the country. Migration of doctors is problem of many less developed countries. The physicians are in demand worldwide, and they are often able and eager to move, to improve their salary and broaden their experience (Mullan 2005). Target countries of emigration for Polish medical staff in Europe are: United Kingdom, Ireland, Germany, Sweden, Norway and Denmark. Summarizing - the main factors motivating medical staff to search jobs abroad are: low wages, difficult working conditions and limited career opportunities in Poland (Jędrkiewicz 2012). The emigration contributes to the arduous labor shortages in some medical specialties, mainly in the field of anesthesiology and many types of surgery and orthopedics. To investigate the scale, the causes and possible consequences of this phenomenon, in 2004 the Ministry of Health has implemented a program to monitor the emigration of Polish doctors, nurses and midwives. Although the emigration of medical personnel to work abroad have already appeared before the Polish accession to the EU, it significantly increased after 2004, reaching a peak in 2006 - since then slightly decreases (Kautsch & Czabanowska 2011).

The problem is also a lack of places at medical universities. This is a state that regulates the number of students educating in medical schools. Factor of 22, that is calculated on the base of Eurostat data, was established in the 90s - then it was enough to be in the European average. At that time, it was considered that a large number of doctors would be too expensive for a country. Policy makers didn't

recognize the problem of workforce shortages on time. Now the need for integrated and systematic planning of the healthcare workforce is very urgent. The solution of the problem of emigration of Polish medical personnel may be the increase of salaries in the health sector. In addition, the increase of wages in the health sector could become an incentive for studying medicine.

The lack of physicians is not only problem of Polish health care system. There is still another one: the problem of replacement of generations. Due to demographic changes, a serious problem of reducing the number of doctors, can appear in the coming years. More than 20 percent of doctors already exceeded fifty years old. In one moment a large part of physicians in Poland may go into retirement and they won't be replaced by young medics. This problem may be also visible in other countries (Fig.4).

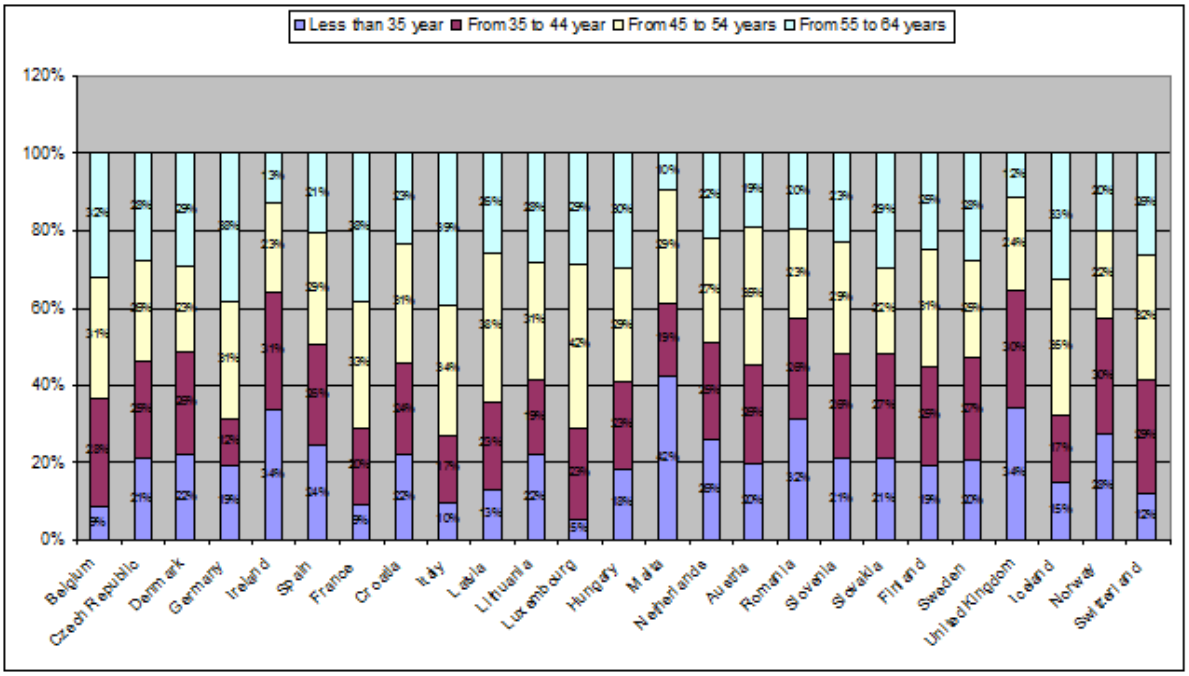


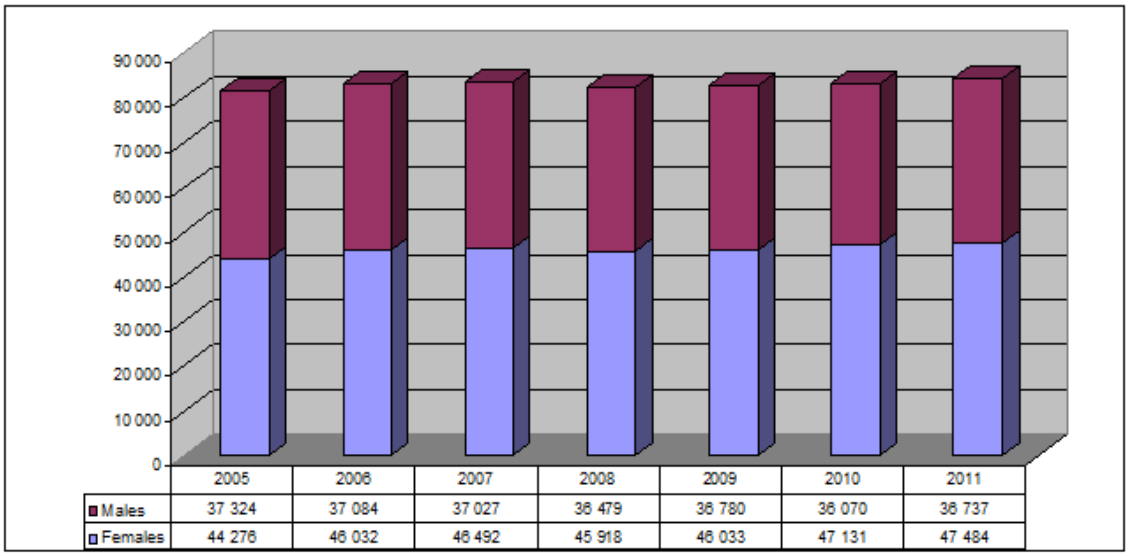
Fig. 4: The age structure of doctors in selected European countries in 2011

Comment: Because of lack of data, the mean for the Netherlands and Sweden refers to 2010, and for Denmark to 2009

Source: own work based on data from EUROSTAT.

The best age structure of doctors in 2011 is observed in Malta, where 42 percent of doctors is less than 35 years old and only 10 percent is over 55 years old. A little bit worse age structure is in United Kingdom, where 34 percent of doctors is less than 35 years old and 12 percent is over 55 years old. The country with the worst age structure of doctors is Italy, where 39 percent of doctors is over 55 years old and only 10% of the doctors is less than 35 years.

The Polish health care sector employs significantly more women than men. To prove it, we calculated the feminization index - a percentage of the number of women in the total number of employed physicians. Figure 5 illustrates that share of woman in the total number of physicians in Poland is higher (between 54-57 %) in whole analysed period. The feminization index reaches the highest value in 2010 – 57 percent.



	2005	2006	2007	2008	2009	2010	2011
Males	37 324	37 084	37 027	36 479	36 780	36 070	36 737
Females	44 276	46 032	46 492	45 918	46 033	47 131	47 484

Fig. 5: The number of physicians in Poland in the years 2005- 2011, by gender

Source: own work based on data from EUROSTAT.

However the Fig. 6 shows the high diversity with respect to the share of women in the total number of doctors in other EU countries. Data from other countries suggests that there may be differences in the share of male and female in total number of physicians depending on the level of economic development of the country.

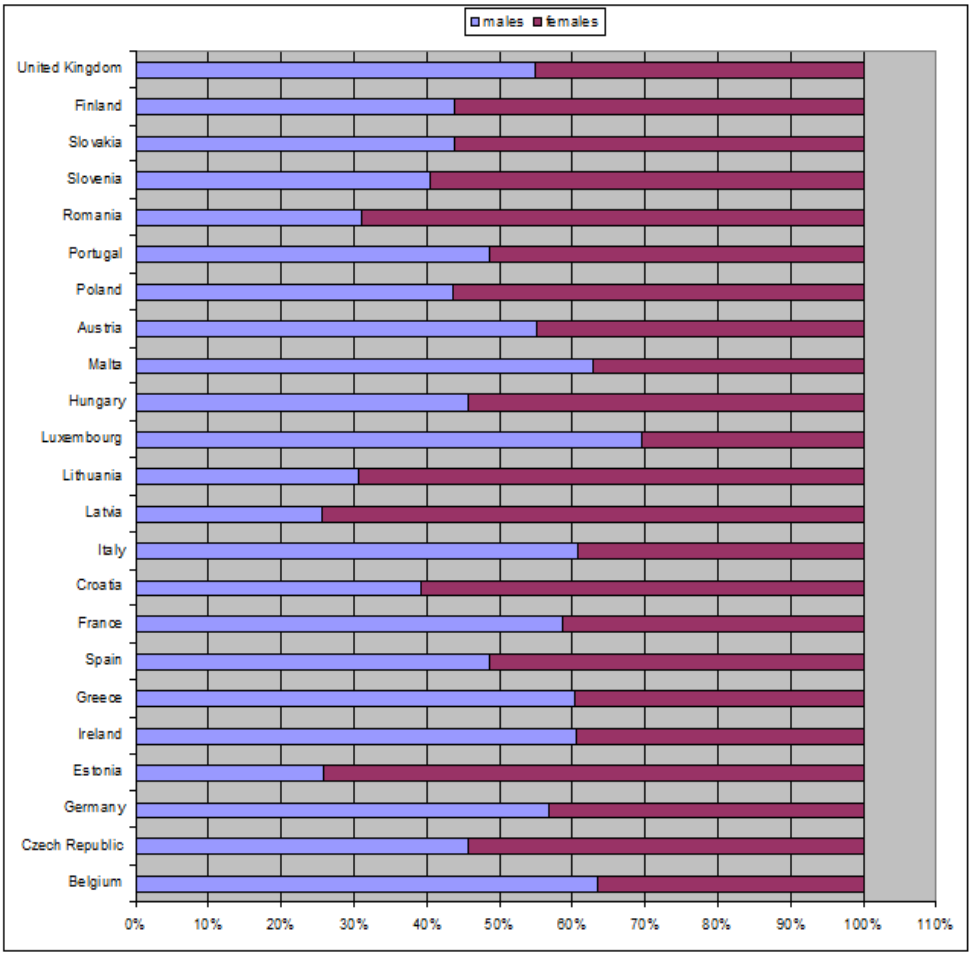


Fig. 6: The share of males and females doctors in total number of physicians in selected EU countries in 2011

Source: own work based on data from EUROSTAT.

Generally, the feminization index is much higher (exceeding 50%) in the new member states of the European Union than in the old EU countries. The highest share of female doctors is observed in the Eastern Bloc countries that are less developed comparing to other EU countries, such as Romania, Estonia, Lithuania, Latvia. A much lower feminization index we note in the old EU countries (about 40 %), but it has increasing trend in the period 2003-2011.

Compared to other countries belonging to the EU, Poland has a high number of specialists. In 2003 there was in particular an oversupply of hospital doctors and specialists and an undersupply of physicians working in primary care, especially in rural areas. In the analyzed period Poland and several EU Member States have attempted to decrease the number of specialists, who usually deploy more costly technical services, and to increase the role of general practice. It is worth to mention that higher doctor numbers may be associated with better patient outcomes.

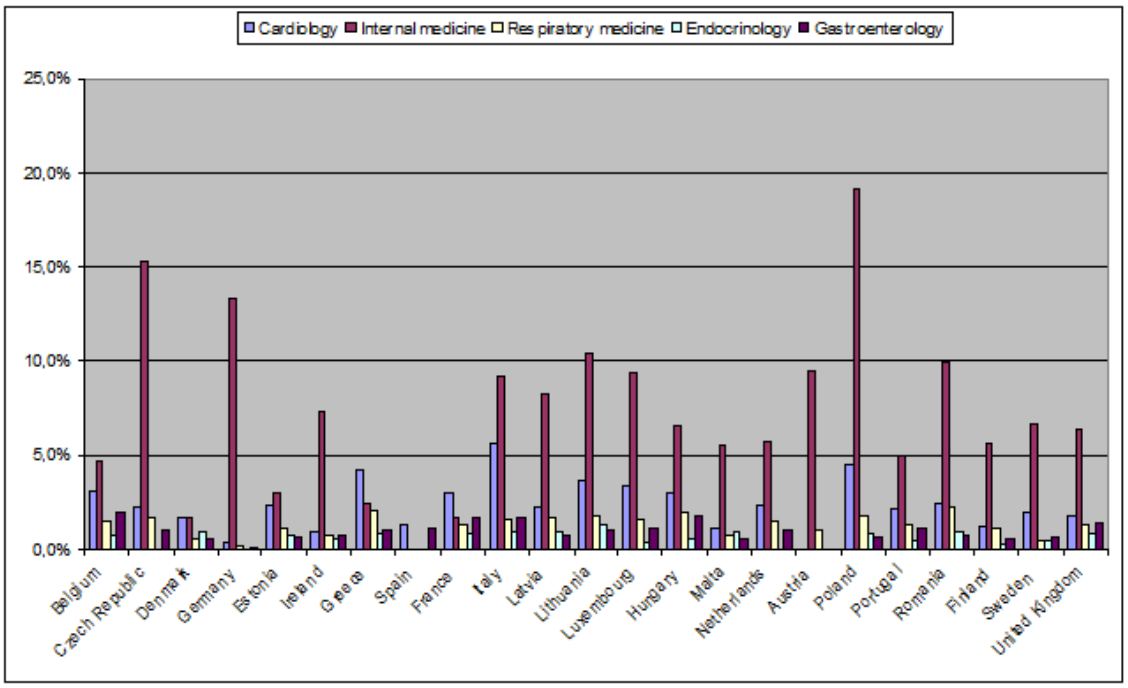


Fig. 7 : Specialists in the selected EU countries in 2011

Comment: Because of lack of data, the mean for the Netherlands and Sweden refers to 2010, and for Denmark and Hungary to 2009

Source: own work based on data from EUROSTAT.

In the years 2003-2011 the most commonly chosen specialization in Poland was the Internal medicine. In 2011 the share of the physicians representing this specialisation stood at 19,1 percent (4.2. internists per 10 000 inhabitants). It was the best result in the European Union. For example, in Denmark, internists represented only 1,6% of total number of physicians, in France – 1,6% and in Greece – 2,4%. The second most commonly chosen specialization in Poland is surgery (2 specialists per 10 000 inhabitants in 2010) Noteworthy is also the share of cardiologists in the total number of doctors – 4.5 percent in 2011. The higher share of these specialists was only in Italy (5.7 percent). In general, in

Poland in 2010 was 16.7 specialists per 10 000 of inhabitants. What is more, the share of specialists in all physicians in Poland between 2008 and 2011 has increased. For example, in 2008, the internists represented 16.8% of doctors, and three years later 19.1%. On the other hand the cardiologists represented 3.5% of doctors in 2008 and three years later 4.5 percent.

According to data compiled by the offices of voivodship governors, the biggest gaps were observed for the following specialities: anesthesiology and intensive care, emergency medicine, pediatrics, psychiatry, and geriatrics (Węgrzyn et al. 2009).

Today, we can observe changes in the structure of medical specialties - the number of pediatricians decreases, and the number of oncologists, cardiologists, psychiatrists or general practitioners increases. This may be related to the demographic forecasts - a society will be older and older, there will be also a smaller share of the children in the population. Also a number of oncological diseases becomes more and more serious problem.

There is established evidence in the literature that such association between doctor numbers and patient outcomes exists. For instance the number of doctors per 1000 population was used as a proxy for medical care inputs, and found to be strongly and significantly associated with premature mortality (Or 2000). However, simply expanding numbers of physicians can be extremely expensive. The other solution could be the better allocation of available resources that could be significantly more cost effective.

4. The availability of practising nurses and practising midwives

The situation with the number of nurses working in Poland is not better (Fig.8). Indicator of the number of nurses per 10,000 population is calculated by the following formula:

$$I_{NN} = \frac{NN_t}{NI_t} * 10{,}000$$

where:
NN_t - number of physicians in the year t
NI_t - number of inhabitants in the year t

Poland, where works 52 nurses per 10 000 population is again almost on the last place in Europe. The indicator of the number of nurses per 10,000 population is lower than the EU mean of 32,7 percent. A little bit worse situation is in Latvia (49 nurses per 10 000 population), Bulgaria (42 nurses per 10000 population) and the worst situation is in Greece (33 nurses per 10000 population). More than twice nurses per 10 000 population works in Finland (132.4), Ireland (121,5), Netherlands (117.9) and Luxembourg (114). Nearly three times more nurses per 10 000 population works in Denmark (155 nurses per 10 000 population). In the group of nursing professions the biggest gaps were observed for the long-term health care, intensive care, cardiology and emergency medicine (Węgrzyn et al. 2009).

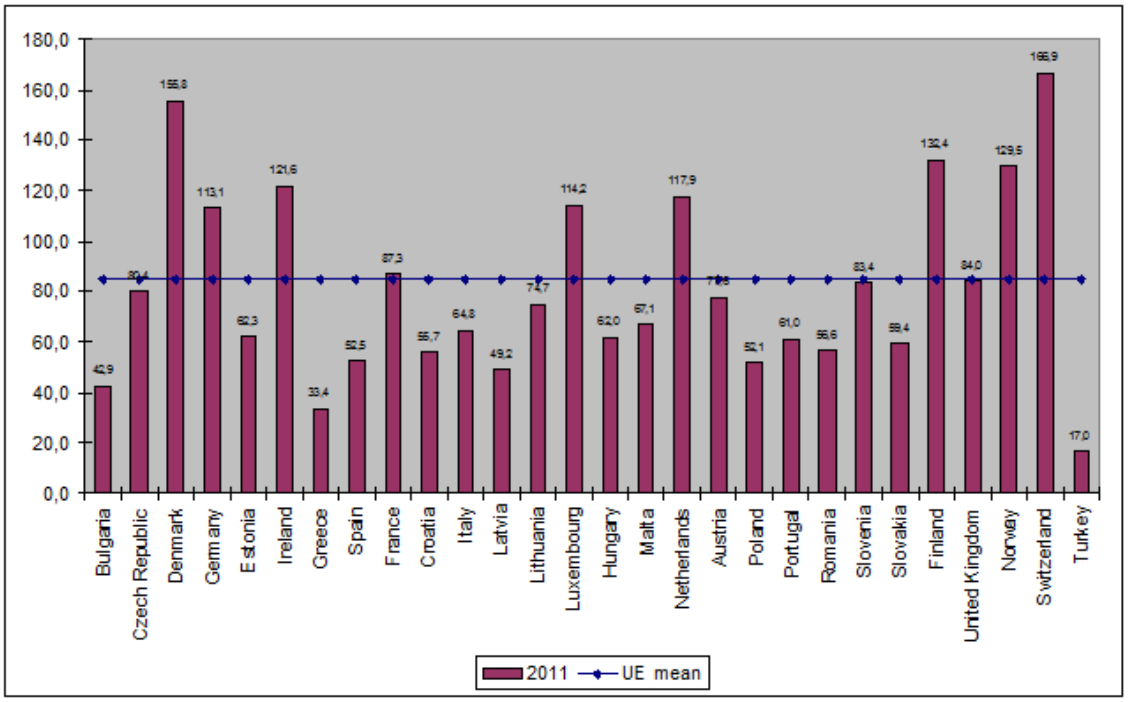


Fig. 8: Nurses per 10 000 population, selected EU countries, 2011

Comment: Because of lack of data, the mean for the Netherlands and Sweden refers to 2010, and for Denmark to 2009

Source: own work based on data from EUROSTAT.

Eight years earlier, in 2003, most nurses per 10 000 inhabitants worked again in Denmark - 136. On the second place was Finland - 117.9, and on the third one the Netherlands - 111.4. The data for Irland was not available that time. Poland achieved again one of the the last places in the EU – 47.4. The lowest indicator was in Greece- 33.

There will be an increasing demand for nursing services in the future. Because of the ageing of the European population, the EU is likely to face nursing shortages. To make the nursing profession more attractive for school leavers, it will be important to improve the professional and educational status of nurses in many European countries.

To compensate for the low number of nurses, the new nursing profession - Medical Guardian was introduced in 2007. Three years later (in 2009) there was already about 1 600 medical guardians in Poland. Because the medical guardian can not organize individual medical practices, there is no information about the number of medical guardians employed within the public health care system in Poland.

The increasing number of children can not benefit from guaranteed care of a school nurse. Significant increase is observed in the group of adult patients with difficult access to nursing services. The presented data show that in the coming years Poland will have a serious problem with restricted access to the services of nursing.

In the period 2003-2011, we observe an increase in the number of employed nurses in 10000 population in most EU countries (Fig. 9). The highest positive rate of change in number of nurses per 10 000 inhabitants was observed in Luxembourg - the number of nurses increased by 13.8 percent year-on-year. This rate was significantly higher compared to other countries. The next positions were taken by Portugal (the number of nurses increased by 5.4 percent year-on-year) and Sweden (the number of nurses increased by 3.4 percent year-on-year). The negative rate of change was recorded in the UK and Slovakia.

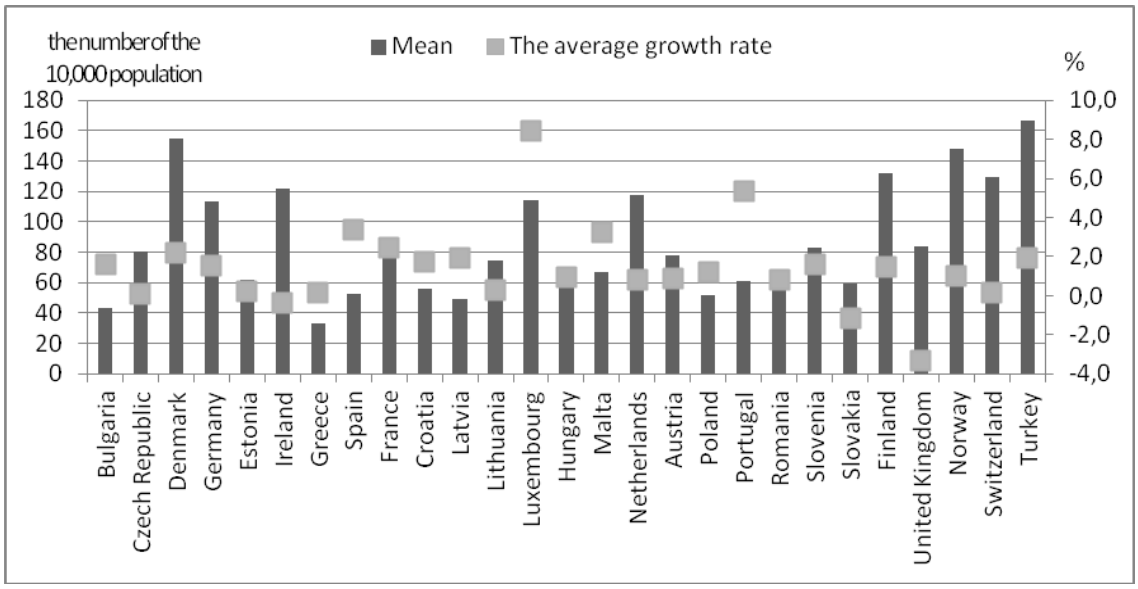


Fig. 9: The average number of nurses per 10 000 inhabitants in 2011, and the average rate of change in the period 2003-2011

Comment: Because of lack of data, the mean for the Netherlands and Sweden refers to 2010, and for Denmark to 2009

Source: own work based on data from EUROSTAT.

Due to the aging population the demand for nursing care will be increasing. Meanwhile, despite growing needs, young people do not want to learn this profession because of bad salary conditions. The solution to this problem may be to determine the remuneration of nurses and midwives at an appropriate level, as well as placing the nursing on a list of ordered fields of study. It would allow to offer students additional scholarships.

The higher proportion of registered nurses is considered to be associated with reduced adverse events in hospitals (Currie et al. 2005). Nurse outcomes are often as good as those of physicians. According to some researches the number of nurses is associated with higher patient satisfaction, probably arising from superior interpersonal skills, longer consultations, greater provision of information and higher recall (Bloor, Hendry & Maynard 2006).

Much better situation regards the number of midwives working in Poland (Fig.10). Indicator of the number of midwives per 10,000 population is calculated by the following formula:

$$I_{NM} = \frac{NM_t}{NI_t} * 10{,}000$$

where: NM_t - number of physicians in the year t NI_t - number of inhabitants in the year t

Poland where works almost 5 midwives per 10 000 population is on the third place in EU. The indicator of the number of midwives per 10,000 population is higher than the EU mean of 2,2 percent. A better situation is only in Nordic countries, such us: Sweden (7,5 per 10 000 population), Finland (7 per 10 000 population).

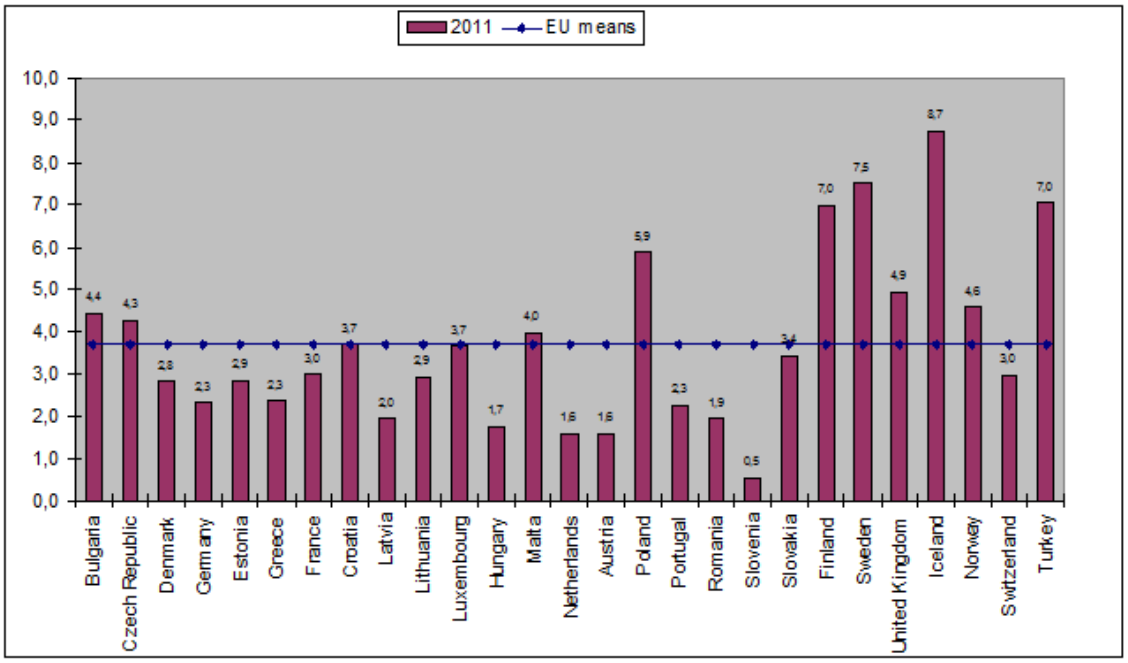


Fig. 10: Midwives per 10 000 population, selected EU countries, 2011

Comment: Because of lack of data, the mean for the Netherlands and Sweden refers to 2010, and for Denmark to 2009

Source: own work based on data from EUROSTAT.

It is worth mentioning that there are three other European countries that do not belong to the EU but also have a high ratio of the number of midwives per 10,000 population. They are: Iceland (8,7) and Turkey (7). About three times less midwives per 10 000 population than in Poland works in such countries as: Latvia (2), Hungary (1,8), Netherlands (1,6), Austria (1,6). The least number of midwives works in Slovenia (0,5 midwives per 10 000 population).

Eight years earlier, in 2003, most midwives per 10 000 inhabitants worked in Sweden - 7.1. On the second place was Finland – 6.4, and on the third one Poland - 5.5. The lowest indicator was in Slovenia – 0.2.

The highest rate of change in number of midwives per 10 000 inhabitants (Fig. 11) was recorded in the Slovenia - the number of midwives increased by nearly 16 percent year-on-year. The relatively high positive rate of change was also observed in Portugal (6.5. percent year-on-year growth) and Luxembourg (4.7 percent year-on-year growth). The negative rate of change was observed in Romania - the number of midwives decreased by 3.6 percent year-on-year.

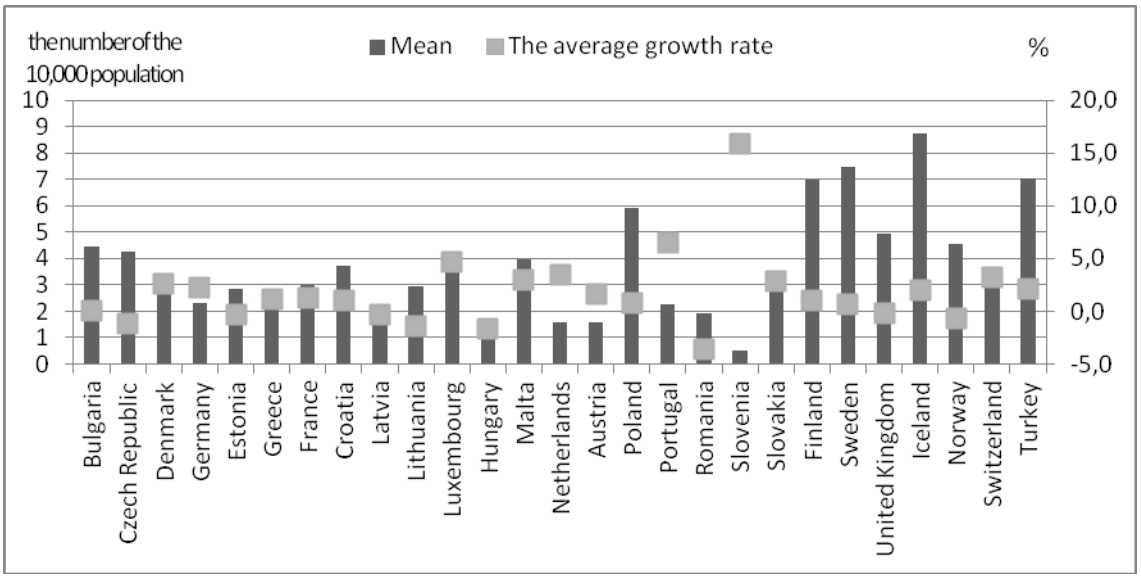


Fig. 11: The average number of midwives per 10 000 inhabitants in 2011, and the average rate of change in the period 2003-2011

Comment: Because of lack of data, the mean for the Netherlands and Sweden refers to 2010, and for Denmark to 2009

Source: own work based on data from EUROSTAT.

5. Conclusion

Problem of inequality in access to health services in territorial dimension was underestimated in literature of object for a long time. Conducted analysis indicated big territorial disparity in access to medical staff in EU countries.

There is a danger that the shortage of health care professionals will remain a huge problem of European countries in the near future. An aging population increases the demand for specific health services and physicians. Meanwhile in Poland the index of doctors per 10,000 population has not been changed for many years. It ruins the whole health care system and extend the queues to specialists. Another problem is that Polish physicians more and more often go to work abroad. It is worth to notice that the cause of a small index in Poland is a specific of its calculation, that it doesn't contain the doctors who work on the contracts or in any other form and big part of them is self-employed.

The EU countries identified a range of causes for the current workforce shortages**.** The main ones are (The Healthcare Workforce 2004):

- Reductions of training places in recent years, often as a result of financial pressures - one of the main causes of current workforce shortages is the failure to train adequate numbers of staff in earlier years.
- The perception that the healthcare professions were unattractive and had lost status over the years;
- Poor salary, particularly for nurses, and differential earning power in medical specialties – especially in Poland, critically low salaries result in poor motivation, low quality services, staff shortages and requests for informal payments;
- Societal trends towards reducing working hours and earlier retirement;
- Increased demands for healthcare and greater pressure of work which results that medical staff change employment for less stressful types of work.

The shortage of medical personnel in Poland is actually a small part of the broader systemic problem. Financing problems of health care system and unfavorable demographic changes, especially the aging of the population in the coming years may contribute to the further increase of the crisis of the Polish health care. Direct consequence of the shortage of medical personnel is a long queue to the medical specialists providing services within public health care system. In a case of some diseases, a long time of waiting to specialists contributes to permanent deterioration of the health condition of the patients. Long queues to the doctors are one of the reason of the situation, that part of Polish population does not meet of their medical needs.

Formally, the difficulty with an access to specialized medical services provided by physicians primarily affect the poorest people. Wealthy patients can often afford the paid visits to the private offices of doctors employed in public health facilities. Then the consequence of such visits are often free specialized medical services in a public hospital without official queue. This mechanism is the most common way of corruption in Polish health care system.

The conclusion is that Poland should immediately take more effort for the educating the medical personnel. Increasing the total number of practicing doctors and nurses can improve the efficiency of primary health care as well as the access to specialized medical services. However it is important to notice that expansion of the medical staff does not necessarily result in an efficient or equitable distribution of physicians, nurses and midwives either geographically or in terms of specialty distribution. There are a lot of doubts in the literature if expansion of medical schools and then more doctors really improves patient health (Bloor, Hendry & Maynard 2006).

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