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Impact of ageing on curative health care workforce. Country report Poland

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Abstract

The report discusses employment in the health care system in Poland based on analysis and projections of the demand and supply of medical workforce. The impact of the financial situation and policy on relativelly low employment level of medical personel was accounted for in the analysis while projections were driven by demographic changes in the following two decades. Results of different demographic variants of projections used in Neujobs project and additional scenarios show that while ageing is an important factor that may stimulate demand for provision of medical personnel, changes might be mitigated by further increase in efficiency of care. At the same time the supply of care will be affected by ageing too. The results indicate that more detailed monitoring of employment in the future will be needed in order to assure adequacy of provision of medical professionals, especially of nurses (critical gap), some medical specialists, physiotherapists and medical technical personnel.

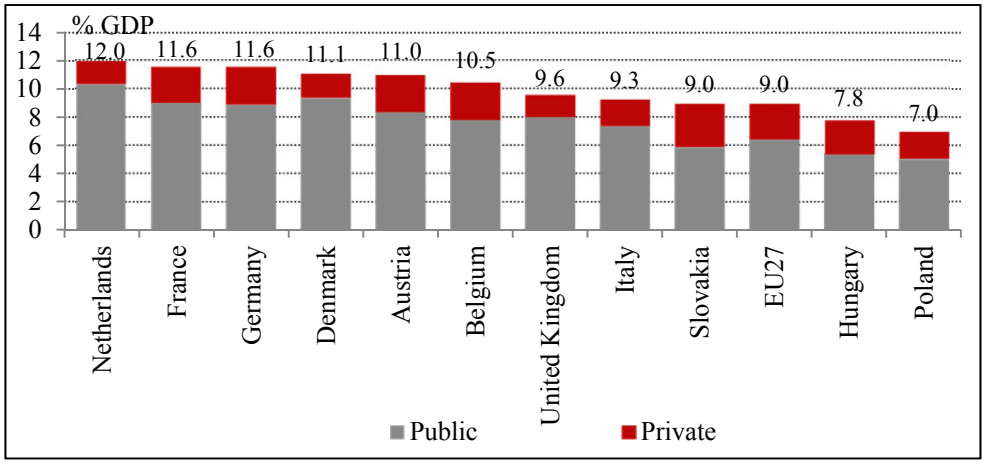
1. Introduction – general overview of the health care system

Poland's health care sector has long been suffering from insufficient funding, resulting in a lack of financial balance in the health care system (Ministry of Health 2004,2008; WHO 2008). On the one hand, this stems from a growing demand for health services, stimulated by higher income and education levels, as well as from a substantial increase in population ageing. On the other hand, there are many limitations in terms of the supply of health care services. The restructuring within the health sector that followed the 1999 health care reform[1] entails expanding the privatization of health care providers and restrictions on financing heath care services from public sources. Consequently, the level of health care expenditure has remained relatively low. Poland's share of GDP devoted to health, amounting to 7%, is one of the lowest among OECD countries (see Figure 1). In other EU countries, comparably low indicators were found only in Bulgaria and Lithuania, with only the Baltic countries (Latvia and Estonia) and Romania ranking lower.

The implementation of the health insurance reform (in 1999 the centralized budgetary model was replaced by a system of social health insurance – SHI) was followed by a decrease in the public financing of health services. The SHI contribution rate had been initially set below the level that would secure the previous level of funding: at 7% instead of 10%. From 2001 to 2007, the contribution rate rose by 0.25% annually until it reached 9%. Since 2002, the Polish economy had been characterized by a continual growth in GDP. Consequently, growth rates in health income and expenditure were high. In 2008, this trend reversed. The contribution rate reached its fixed level and at the same time the economy, affected by the global financial and economic crisis, showed signs of lower growth. The figure below presents a tendency of health care expenditure and of GDP in Poland. From 2000 to 2009, expenditure grew by approximately 7% annually, while from 2009 to 2010, it dropped to below 1%.

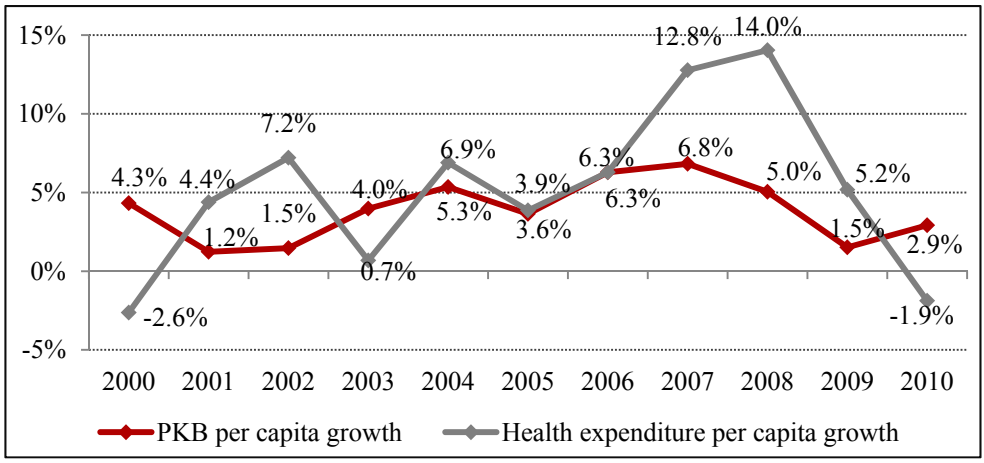
[1] Changes that have been introduced since the 1999 health care reform involve the large-scale privatization of health care providers and restrictions on the financing of health care services from public sources.

Figure 1. Total health expenditure as a share of GDP, 2010 (or nearest year) in selected EU countries



Source: OECD 2012 (Health at a Glance: Europe).

Figure 2. Annual average growth rate of health expenditure per capita and GDP in Poland in analysed period

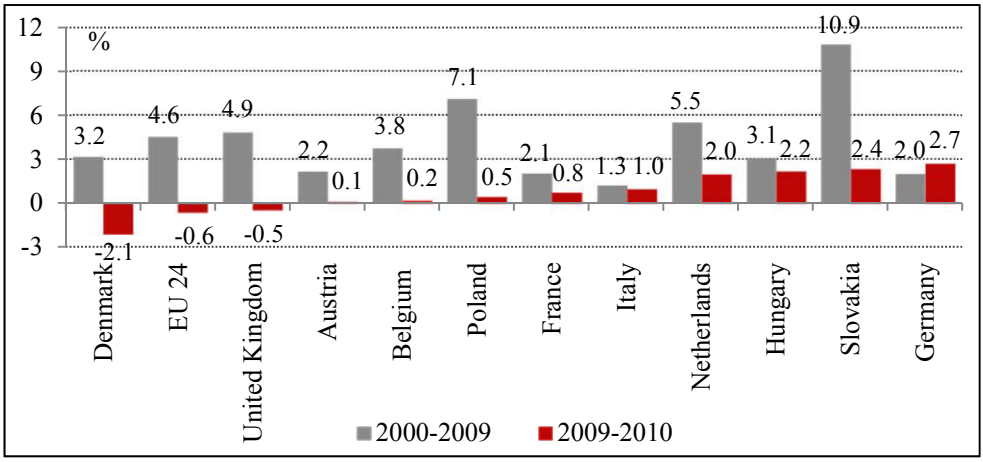


Source: Data from GUS (Central Statistical Office).

Similar tendencies can be observed in other EU countries, except for Germany (see Figure 3).

The proportion of public and private to total health care expenditure has long been fairly constant: approximately 70% and 30% respectively. Private expenditure on health care comprises mainly out-of-pocket expenses. Of those, pharmaceuticals account for the largest portion – above 60% (Golinowska, Tambor; 2012).

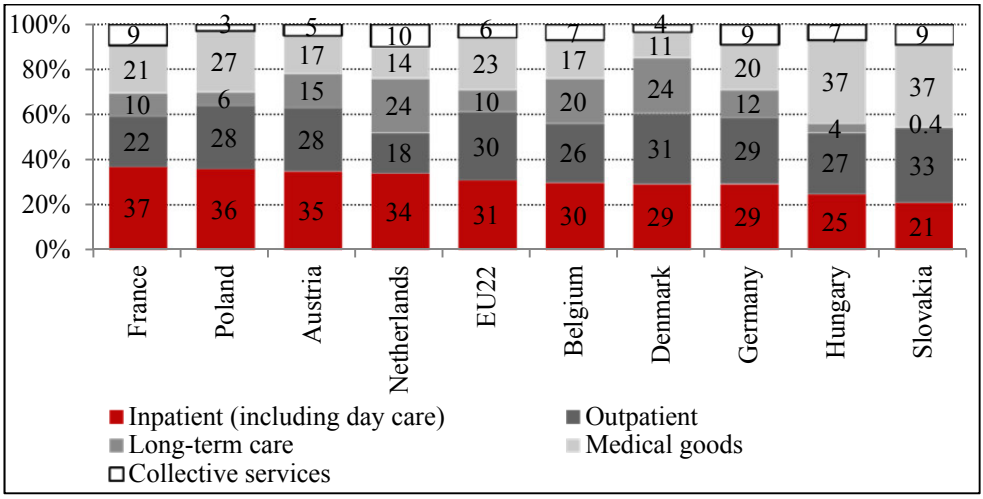
Figure 3. Annual average growth rate of health expenditure per capita in selected EU countries (real terms)



Source: OECD 2012 (Health at a Glance: Europe).

Public health expenditures cover not only the costs of treatment but also certain public health activities (such as public screening programmes, health programmes), a substantial portion of rehabilitation services, as well as long-term care (LTC). The estimated shares of LTC and public health activities in current health expenditure represent less than 6% and 3%, respectively (NFZ 2011 and OECD 2012).

Figure 4. Current health expenditure by function of health care in selected EU countries, 2010

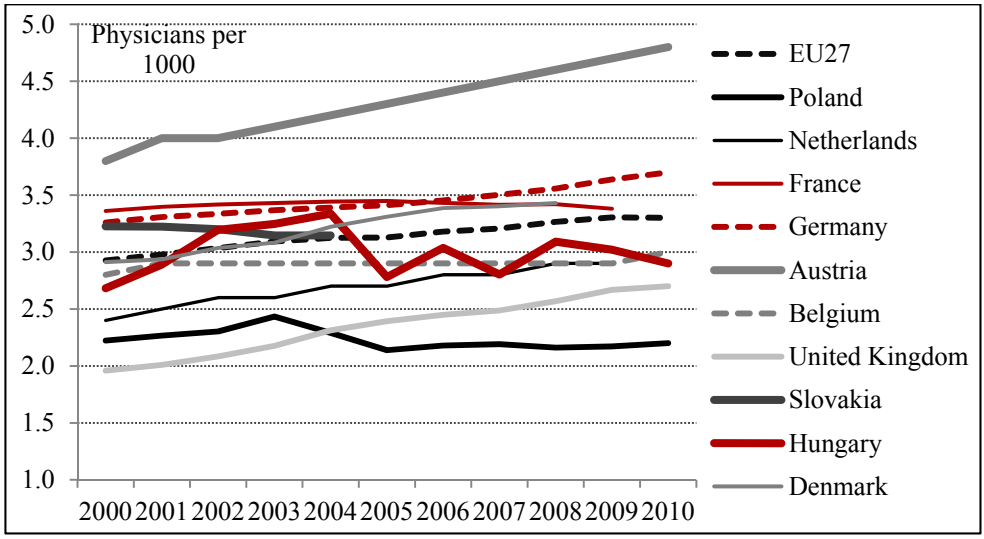


Source: OECD 2012 (Health at a Glance: Europe).

The implementation of the health care reform 1999 was accompanied by significant staff reductions. From 1999 to 2000, over 80,000 physicians left the public health sector (Domagała 2004). They either shifted to the pharmaceutical sector (the majority), established private medical practices (40%), medical facilities or complementary/alternative medicine centres, or retired. The next exodus of the health workforce from the health sector occurred during the EU accession period, which began as early as 2003. Poland has seen an increasing trend in emigration (attributable to better remuneration) to those EU countries that allowed unrestricted access to their labour markets, with United Kingdom, Ireland and Sweden being the main destination countries.

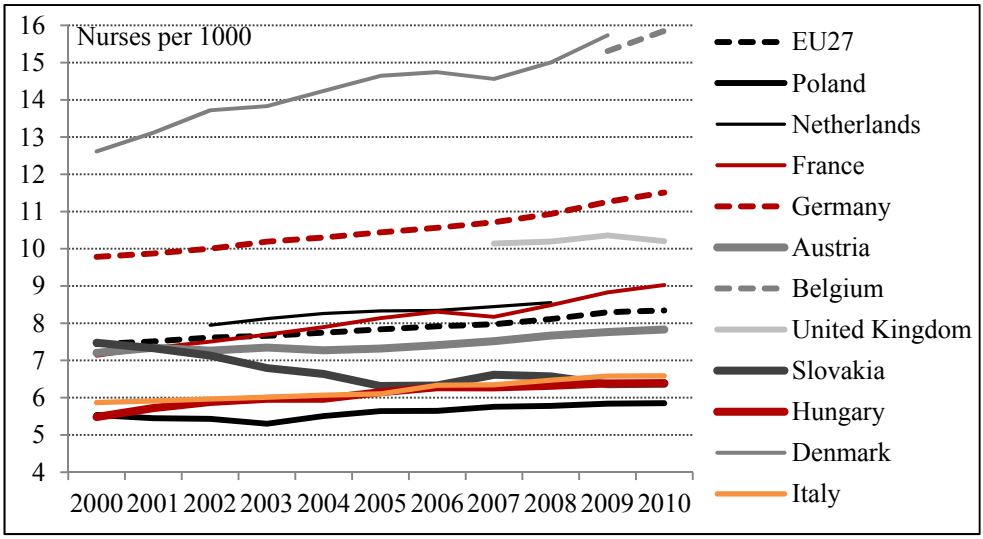
The emigration of health care professionals occurred despite low saturation with medical personnel in Polish health care sector. Other EU sending countries (mainly NMS countries) also experienced the labour-related emigration of physicians, which is apparent when looking at the trend in the number of physicians per 1,000 inhabitants over the last decade – see Figure below. Currently, Poland has 2.17 physicians per 1000 inhabitants, compared to an average of 3.30 in the EU, and ranks among the Member States with the lowest medical workforce saturation index. Considerable differences between Poland and the EU are also observed regarding nurses. There are 38.34 nurses per 1,000 inhabitants in Poland, compared to the EU27 average of 82.36 (WHO data).

Figure 5. Number of physicians per 1000 population in EU 27 and selected European countries



Source: WHO Regional Office for Europe; Health for All Database.

Figure 6. Number of nurses per 1000 population in EU 27 and selected European countries



Source: WHO Regional Office for Europe; Health for All Database.

In order to rebuild human resources in the health sector, numerous measures have been undertaken, including: (a) a significant raise in the salaries of health professionals (b) the introduction of the new nursing professions (health workers) not restricted by higher education requirements to offset shortages in LTC, and (c) a reduction of the duration of medical studies.

The insufficient supply of human resources wasn't considered a priority area within efforts to improve the situation in the health sector until the shortages of medical professionals started to radically limit access to health care services. The process of decreasing employment in the health care sector escaped public notice mainly due to the fact that according to National Health Accounts methodology, the education and training of health care personnel is an expenditure category not included in total health expenditure. This category, among others, is part of overall public expenditure defined as related to health but not as direct health expenditure. Consequently, the need to increase expenditure for the education of medical professionals has been ignored within the pursuit to increase public expenditure.

Only a few years ago, the influence of highly dynamic population ageing became a rationale for undertaking activities aimed at educating more professionals of specializations in high demand. External sources (the European Commission – ECFIN, the European programme of scientific research – AHEAD, the World Bank) indicated that the population ageing process would have

a considerable impact on the health care system both financially (growth of expenditure) and structurally (higher demand for medical personnel) over the next few years (Griffin, Golinowska, Kocot; 2010).

2. Current situation

2.1. Organisation, governance and financing

Over 20 years of economic transformations from the plan to the market system and after implementing numerous reforms in the health care sector in Poland have brought substantial changes to the functioning of health care providers. Public health care units have either been given substantial autonomy or have undergone privatization (restructuring of a state owned entites to a private ones or establishing a new prvite health facilities from below).

The current share of non-public entities in the provision of health care services accounts for 80% in respect to primary health and 71% in respect to specialized ambulatory care. Meanwhile, most hospitals are public. Based on the number of beds, private hospitals represent about 20%. The privatization process continues and major privatization deals are expected in 2013.

The vast majority of non-public entities apply for public funds to the National Health Fund. The National Health Fund (NFZ), the social health insurance fund, is the main source of financing for service providers.

2.1.1. Health care by functions

The disintegration of the health care system proceeded in parallel with an administrative decentralization (a shift towards three levels of territorial self-government). Since then, territorial health authorities at each level (gmina, powiat, voivodeship) have been responsible for different levels of care. Local self-governments (gminas) are responsible for the provision of primary health care, district self-governments (powiats) for specialist ambulatory care and powiat-level hospitals, and regional self-governments (voivodehips) are responsible for specialty hospitals and the identification of the health needs of their respective populations. Each level of territorial self-government is independent. Decentralization largely contributed to the disintegration of the health care system. Each healthcare function had been institutionalized separately.

Based on the concept of a family doctor, primary health care was organized at the local level as an entry point to the Polish health care system. Over the past

decade, family medicine was the only specialty that was given greater priority with regard to medical education and financing. Even though the last decade is characterized by a three-fold increase in the number of primary care physicians per 1000 inhabitants, the ratio is still very low and Poland ranks well below the EU15 and EU27 averages (WHO data).

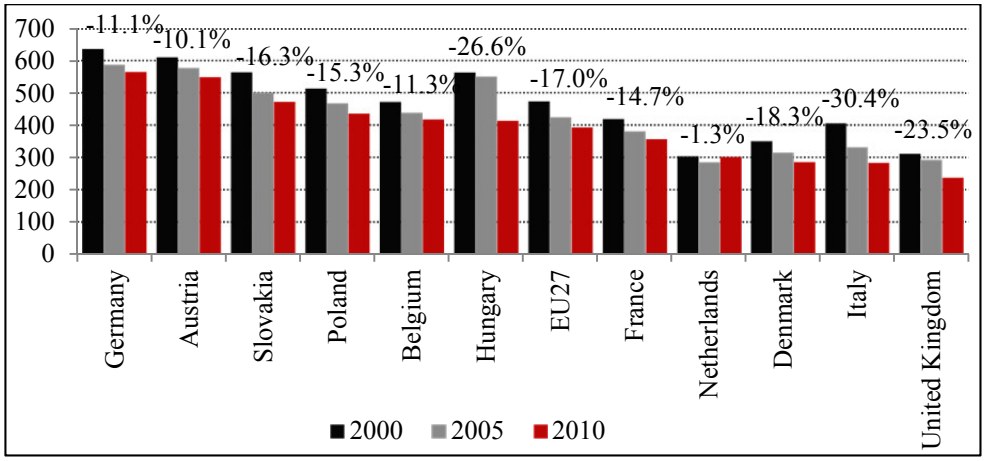
Table 1. Primary care physician per 100,000 inhabitants, 2000-2009

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Poland	7.8	8.8	9.6	11.9	13.3	14.3	13.6	16.3	22.3	20.5
EU15	92.7	93.5	94.0	94.7	95.3	96.0	96.0	96.2	96.5	96.9
EU12	42.7	42.5	42.2	41.8	41.1	44.5	47.4	58.4	61.9	50.4

Source: WHO Regional Office for Europe; Health for All Database.

The accessibility of stationary care is determined mainly by geographical distribution of powiat-level (district) hospitals with primary structures of wards, which dominate hospital infrastructure. At the regional level, hospitals are specialist hospitals. In addition, there are hospitals not accountable to territorial self-governments such as university and governmental clinics. Reforms concerning the transformation of hospital ownership and its organizational structure has led to a drop in the number of hospitals and a decrease in staffing levels. The reduction in the number of hospital beds per 100,000 inhabitants on average and in selected EU Member States is presented in the figure below. Poland's ratio decreased by 15% compared to the EU12 average of 17% (WHO data).

Figure 7. Acute care hospital beds per 100,000 inhabitants



Source: WHO Regional Office for Europe; Health for All Database.

Stationary long-term care had long been performed within general stationary health care, mostly in internal diseases wards or separated geriatric wards. Not until the health system reforms were implemented did the process of shifting away from providing LTC in hospitals begin. Two types of stationary LTC facilities were established: chronic medical care homes (ZOL) and nursing homes (ZPO). In 2009, the NFZ removed hospital LTC from the benefit basket, causing almost a complete shift of LTC services to the newly established facilities. The share of NFZ expenditure on services provided by those facilities is gradually growing. It currently represents (including palliative care) approximately 2% of the total NFZ budget. Services provided in ZOLs and ZPOs are subject to patient cost-sharing (the costs of accommodation and food).

Long-term care may also be received within the system of social assistance for various population groups in need of help who meet certain income criteria. It is financed from local budgets.

2.1.2. Patient empowerment

In the reformed health care system, patients have formally gained more freedom. Patients can freely choose to register with any primary care physician contracted by the NFZ as well as switch to a different one. However this doctor performs the function of gatekeeper in the system, therefore a referral is needed to access specialist care. Direct access is possible only for few specialist types: ophthalmologists, gynecologists, dermatologists, oncologist and psychiatrists.

Theoretically, a patient may also freely choose a hospital, but in practice, access is determined geographically (especially in emergency cases in which it is a dispatcher who decides which emergency hospital ward the patient is sent to) or by referral.

In 2009, patient rights were gathered and defined in a separate legal act and the post of patient rights Ombudsman was established. Apart from the right to information, special attention is devoted to medical malpractice and the liability of physicians and medical facilities for committing a medical error.

2.1.3. Payment mechanisms

Health system reforms involved changes in payment mechanisms for contracted services. The following table summarizes different payment mechanisms by service type.

Table 2. Payment mechanisms

Type of care	Payment mechanism	Payer
Primary health care	Capitation	NFZ
Outpatient specialists care /specialist ambulatory care	Fee for service	NFZ
Outpatient hospital care	Fee for service	NFZ
Inpatient care /inpatient hospital services/	DRG (Diagnosis-Related-Groups)	NFZ
Emergency care	Per diem & DRG	Voivodeships (regional budgets) and NFZ
Long-term care	Fee for service	Territorial authorities (gminas, powiats, voivodeships) and NFZ

The introduction of a DRG-like system (in Poland, it is referred to as Homogenous Patient Groups – Jednorodne Grupy Pacjentów, or JGP) to reimburse hospitals appears to be the most spectacular change. Although the mechanism is still heavily criticized for sometimes inadequate payment rates for services, technical efficiency at the hospital level has improved substantially. However allocative efficiency remains the main concern in this area.

2.1.4. Paying health care professionals

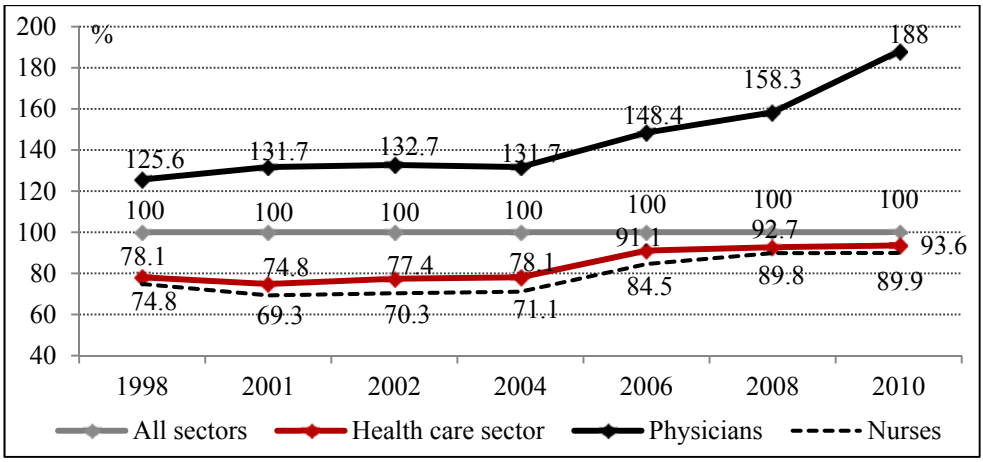
There are a few different methods of paying medical personnel. Contractual employment (fixed-term or open-ended employment contract, mandate) and civil law agreements (contracts with self-employed) have traditionally been the most common form of employment. An exception are medical students undergoing compulsory postgraduate training or medical physicians undergoing residency training who are employed under special agreements.

The form of employment has considerable effect on the level of income. Civil law agreements are the most lucrative form of employment but entail certain burdens and risks concerning the limited liability of the employer regarding work protection and insurance. Only a basic framework for remunerating contractual employees is set, with work regulations specifying individual fee levels. Remuneration for medical graduates and interns or trainees is regulated by the government and financed from the state budget.

Over the past decade, medical staff have been demanding pay raises. Strikes and protests have taken place. In response, the government has introduced various measures aimed at increasing salaries, even though its direct powers over this area

have been limited.[2] As a result, remuneration for physicians has increased significantly. Nurse salaries have also increased, though to a lesser extent.

Figure 8. Increasing of wages of medical staff in comparison to average wage increase in all sectors of the economy



Source: Golinowska at al 2012.

2.1.5. Effects of reforms in the area of health care financing

In the course of health care reforms, the importance of the state budget as a source of financing of health care services decreased in favour of the NFZ and territorial self-governments, who took over responsibility for more tasks. Several tasks have been transferred from the central budget to be financed by the NFZ and by local budgets. Even the enforcement of the law guaranteeing higher salaries for physicians (the so called 203 Law) was compromised by financial differences between territorial self-governments responsible for its implementation.

The table 3 below presents the structure of total health expenditure by source and financial responsibility. Currently, the NFZ covers 60% of expenditure, whereas the expenditures of government institutions from the central budget represent only a small percentage.

Inpatient care represents a large (and growing, up until 2008) NFZ expense. The share of expenditure dedicated to other health services has also experienced

[2] Decisions concerning salaries have left to independent providers institutions, which are supervised by the appropriate local authorities.

a slight uptrend. The share of pharmaceutical reimbursement, in turn, has dropped (see table 4). In consequence, Polish patients have limited access to innovative drugs, whose share among reimbursed pharmaceuticals is particularly low.

Table 3. Structure of total health expenditure by source (%) after introducing SHI (selected years)

Expenditures	1999	2002	2005	2007	2008	2009	2010
General government expenditure (excl. social security)	13.6	9.8	11.4	12.3	11.9	11.8	9.9
Social security funds – sickness funds (until 2003) and NFZ	57.6	61.3	57.9	58.6	60.3	60.4	61.8
OOPs	26.6	25.4	26.1	24.3	22.4	22.2	22.1
Voluntary Health Insurance	0.4	0.5	0.6	0.5	0.6	0.6	0.7
Other:							
Corporations	1.0	2.1	2.9	3.4	3.6	3.8	4.3
Non-profit institutions	0.8	0.7	1.0	0.9	1.6	1.0	0.7

Source: GUS (data from selected years in analysed period).

Table 4. NFZ expenditure on health services in 2004-2010

Type of services		2004	2006	2008	2010
Primary Health Care	mln PLN	3507.6	3988.0	5833.9	7248.8
	%	11.5	11.1	11.8	12.8
Outpatient specialist care	mln PLN	2032.9	2672.4	3940.4	4196.9
	%	6.7	7.4	8.0	7.4
Inpatient curative care	mln PLN	13241.2	15688.1	23802.1	26905.7
	%	43.4	43.6	48.2	47.5
Psychiatric care and addiction treatment	mln PLN	1026.3	1169.9	1677.9	1953.8
	%	3.4	3.3	3.4	3.5
Medical rehabilitation	mln PLN	814.6	1035.8	1561.3	1768.9
	%	2.7	2.9	3.2	3.1
Long-term and hospice care	mln PLN	466.8	578.1	912.0	1163.5
	%	1.6	1.8	2.0	2.1
Dental care	mln PLN	909.1	1058.1	1738.8	1689.3
	%	3.0	2.9	3.5	3.0
Health resort services	mln PLN	324.2	346.4	475.4	536.6
	%	1.1	1.0	1.0	1.0
First aid and medical transport	mln PLN	881.7	1017.5	30.5*	35.8*
	%	2.9	2.8	0.1	0.1
Prevention	mln PLN	0.0	103.3	94.9	130.9
	%	0.0	0.3	0.2	0.2
Separately contracted services	mln PLN	771.7	957.8	1156.0	1385.8
	%	2.5	2.7	2.3	2.5
Orthopedic equipment, medical aids and prostheses	mln PLN	386.4	495.3	577.0	589.9
	%	1.3	1.4	1.2	1.0

Type of services		2004	2006	2008	2010
Pharmaceutical reimbursement	mln PLN	6118.4	6695.8	7367.0	8546.3
	%	20.1	18.6	14.9	15.1
Cost of services provided abroad	mln PLN	6.2	161.3	154.6	228.1
	%	0.0	0.4	0.2	0.4
Total	mln PLN	30487.4	35965.8	49348.7	56643.9
	%	100.0	100.0	100.0	100.0

* The financing of emergency services (with the exception of hospital emergency departments) was taken over by the state budget in 2007.
Source: Author's calculations based on NFZ data.

2.2. Employment in the health sector

Three sources of statistical information on employment in the health care sector in Poland exist, what is presented in the comparison below.

Table 5. Comparison: Types of information on the health care sector employment

Source	Types of information and indicators	Comments
Legal-based information	Number of licensed medical professionals	Total number of entitled to medical professions (includes e.g. retirees, emigrants).
Administrative information	Number of practising medical personnel	Data by the main work position
	Number of work positions covered by medical employment	Data takes into account double employment.
Survey-based statistical information	Numer of employed in the health care sector	Estimation of the total employment in the sector, including administrative staff.

Source: Own compilation.

The content and the range of the statistical information varies depending of the source of data. As a result difficulties not only in the analysis, but also in monitoring employment changes and managing human resources in the health sector arise. Comparative analysis required estimation of differences and information gaps (presented in section 4 of the report).

2.2.1. Physicians entitled to perform medical profession

A labour market analysis of the health and social sectors identifies two types of information on professionals' labour supply, indicating two different trends. One type includes information on the human resources based on a license to practice a medical profession, whereas the other one includes information on medical profession practitioners.

Differences in the development of those two phenomena have been observed in Poland. As already mentioned, since the implementation of the 1999 health reform, there has been an outflow of professionals from the health care sector and a decrease in the number of practicing physicians and nurses. The increased outward migration of physicians (described above) has been an additional driver for these trends since 2003.

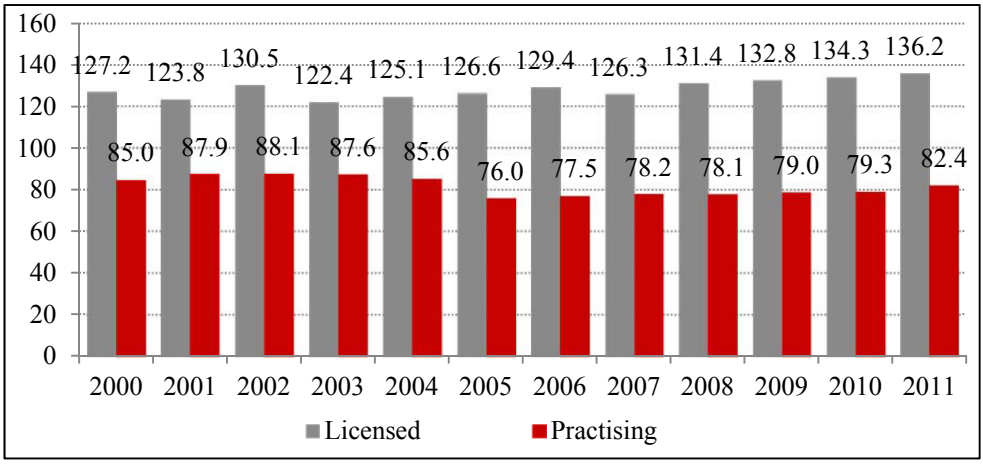
Migration has been especially sound in certain medical specialties, e.g. anesthesiology, surgery. The fact that many physicians who stayed in the country chose another career path, such as employment in pharmaceutical companies, also contributed to the outflow of personnel. This was especially prevalent in the 1990s and early 2000s, when the earnings of physicians were much lower in the private sector and employment in pharmaceutical companies may have seemed to be an interesting and profitable alternative for many medical professionals. At the same time, the education and licensing process for several professional groups: family doctors, nurses, pharmacists, and most recently medical rescuers, has shown an increasing trend, which has affected the average data on the licensed personnel resources by showing an increasing trend and hiding shortages in numerous and acute specializations: anesthesiology, neurosurgery, geriatrics. As a result of the processes described above, the gap between the number of licensed and practicing physicians grew in the 2003–2010 period (see Figure 9).

Despite the temporary fluctuations, statistical information on the number of physicians who have the right to practice[3] indicates a slowly increasing trend in the number of physicians.

Since 2000, the number of licensed physicians increased by 9,000. However, the increasing share of older physicians, combined with the decreasing inflow of young physicians to the profession has led to ageing in the population of physicians (see table 6). The profession is dominated by females.

[3] Statistical information on the number of licensed physicians is collected by the National Chamber of Physicians (NIZ) and is published on an annual basis by the CSIOZ.

Figure 9. Number of licensed and practicing physicians in thousands, end of year data



Source: CSIOZ data; Statistical Bulletin of the Ministry of Health (Biuletyn Statystyczny Ministerstwa Zdrowia), 2001-2012.

Table 6. Licensed physicians by sex and age, end of year data

Age group	2006		2007		2008		2009		2010		2011	
	M	F	M	F	M	F	M	F	M	F	M	F
below 35	16.1	18.0	15.7	17.7	14.9	17.9	14.5	18.0	14.2	17.9	14.2	18.3
35-44	27.1	24.7	25.9	24.2	25.6	23.0	24.2	21.9	22.8	20.9	21.6	20.0
45-54	24.8	24.6	25.3	24.4	25.4	24.2	25.6	23.8	25.9	23.4	26.0	23.0
55-64	13.5	14.9	16.3	13.7	15.2	16.3	16.5	17.1	17.8	18.0	18.5	18.4
65 and over	18.5	17.7	18.6	19.5	18.9	18.6	19.3	19.7	19.3	19.7	19.7	20.3
Total number of physicians	56927	72464	53473	72882	57483	73935	57586	75246	57918	76374	58328	77880

Source: CSIOZ data, Statistical Bulletin of the Ministry of Health, 2007-2012.

Statistical information on licensed physicians includes individuals past the retirement age, as many physicians after reaching the statutory retirement age (60 for females and 65 for males) continue their professional activity in the form of private practice.

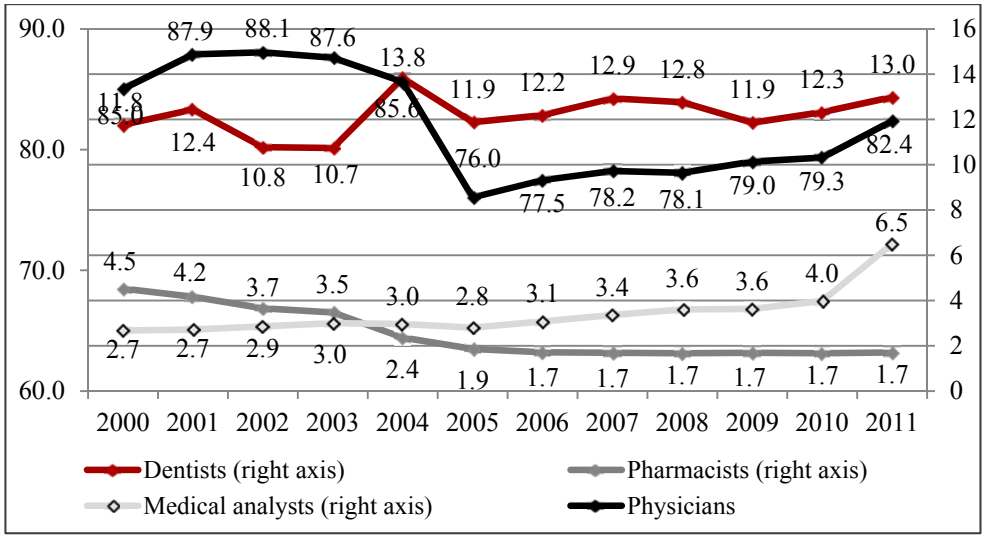
2.2.2. Employment in health care by the primary work position

Administrative, statistical information on employment in the health care sector collected by governmental Centre for Information Systems in Healthcare

(CSIOZ) is of dual character. Firstly, it provides information on number of employed medical personnel by the main work position – number of persons. This information is used in most of the further analysis in this report. The second type of information indicates the number of work positions[4] . It reflects the fact that many doctors are employed in more than one work position (so called dual employment). This information is used in the supply projections, however with own estimation of differences between the two approaches (indicator of dual employment is presented in section 4 of the report).

Analysis of administrative data on employment by the main work position shows that employment of medical personnel evolved differently across specializations. The most dramatic change concerns physicians: the number of physicians had shown an increasing trend since 2000, until it reversed sharply in 2004, due to the reasons described above. The number of both dentists and medical analysts has slightly increased over the last decade. Meanwhile, despite significant growth in the number of pharmacies and their increased availability (Boulhol et. al 2012), the number of pharmacists employed at hostpitals recorded a slight decline.

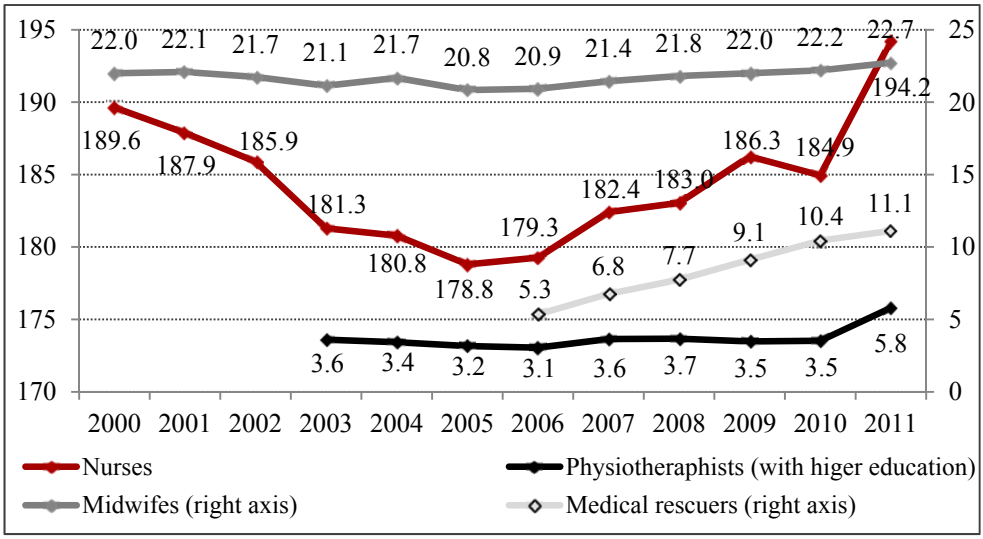
Figure 10. Physicians, dentists, pharmacists, and medical analysts employed in health care facilities, end of year data



Source: Data from CSIOZ Statistical Bulletin of the Ministry of Health, 2001-2012.

[4] In the centrally planned economy the indicator of full-time regural posts (so called 'etat') was used for presenting employment data.

Figure 11. Nurses, midwives, physiotherapists and medical rescuers employed in health care facilities, end of year data



Source: CSIOZ data; Statistical Bulletin of the Ministry of Health, 2001-2012.

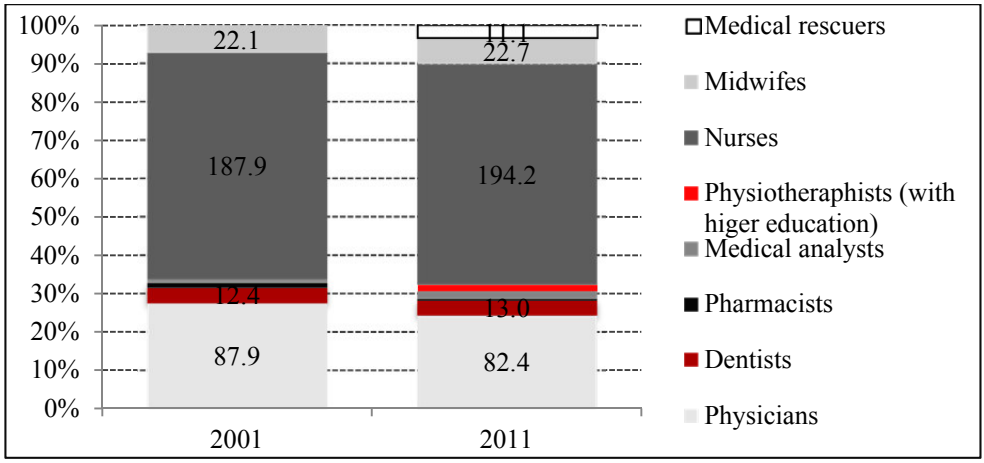
Similar trends in employment have been observed among nurses, albeit to a lesser extent. The decline in employment of nurses began earlier and was mostly driven by migration (for nursing and/or caregiver positions) to the EU15 countries.

The trend reversed in the second half of the 2000 and the number of nurses has been slowly increasing since. Over the same period, education programmes and professional qualification requirements for nurses have changed (for further information see the following sections).

In 2006, a new profession was introduced – that of a „medical rescuer" working in emergency units. Employment in this category of medical professionals more than doubled by 2011: from 5.3 thousand professionals to 11.1 thousand professionals.

These changes in the number of professionals within individual medical professions have resulted in a slight modification in the employment structure of the health care sector. The most significant changes concern the decreasing number of practicing physicians and the increasing number of nurses – albeit not sharp until 2010-2011 – and the introduction of new medical professions such as medical rescuers.

Figure 12. Changes in employment structure in the health care sector

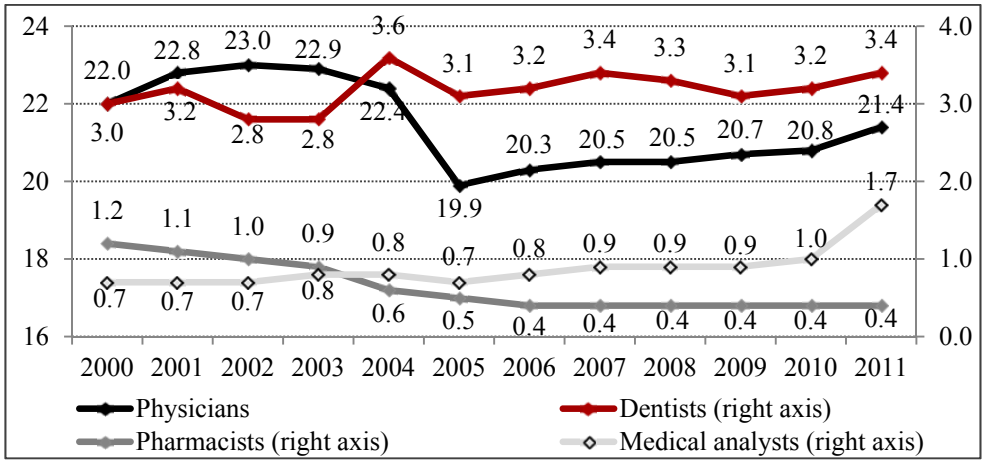


Source: CSIOZ data; Statistical Bulletin of the Ministry of Health, 2001-2012.

As already stated, the employment rate of medical personnel in relation to the Polish population is among the lowest in Europe. At the same time, in recent years, the accessibility of medical professionals has been changing in line with changes in the number of employed medical professionals.

The employment rate of physicians had been increasing until 2005, when it dropped sharply (from 22.4 in 2004 to 19.9 in 2005). Since then, the density of employment of physicians has improved, reaching 21.4 in 2011.

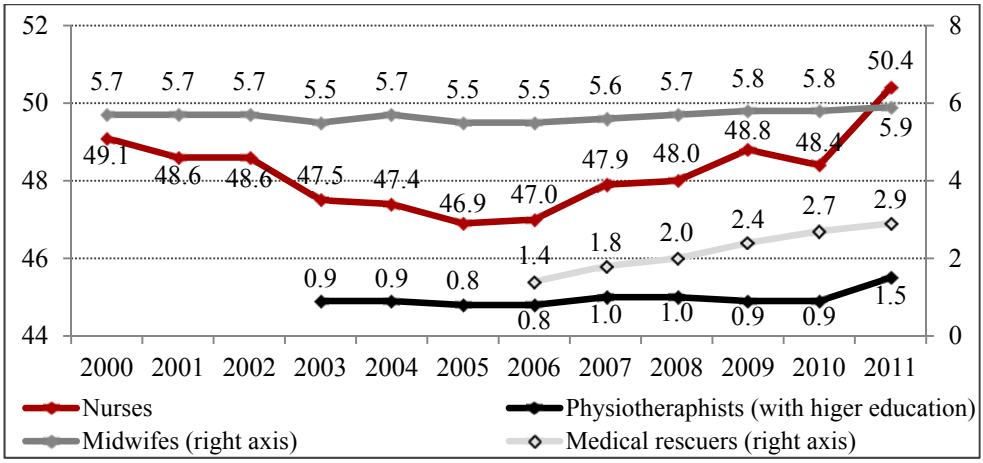
Figure 13. Physicians, dentists, pharmacists and medical analysts employed in health care facilities per 10 thousand population, end of year data



Source: CSIOZ data; Statistical Bulletin of the Ministry of Health, 2001-2012.

The accessibility of nurses also dropped in the 2004 -2005 period, but not as sharply as that of physicians, and it has increased slowly since then. The density of employment of other medical professionals per 10 thousand population has remained stable over the past ten years, but at very low levels.

Figure 14. Nurses, midwives, physiotherapists and medical rescuers employed in health care facilities per 10 thousand population, end of year data



Source: CSIOZ data; Statistical Bulletin of the Ministry of Health, 2001-2012.

2.2.3. Employment in health care by the type of provider

The analysis of the structure of employment is based on the administrative information on employment by the number of work positions. As it was mentioned, due to a variety of employment contracts and the fact that physicians, especially specialists employed in hospitals, often work in more than one medical facility, the risk of double counting cannot be avoided. For this reason, the data presenting employment[5] in primary and hospital care are more accurate (though there are cases of double counting), while the data concerning specialist care are less accurate, as it is often the case that:

- Specialists are employed in more than one secondary care facility: one public and one private facility, two different private facilities, etc.;

[5] Statistical information on employment by level of care is collected by the CSIOZ (Center for Information Systems in Healthcare). The data is collected from all medical service providers (public and private) in the country. It is published on an annual basis and presents employment statistics at the end of each year.

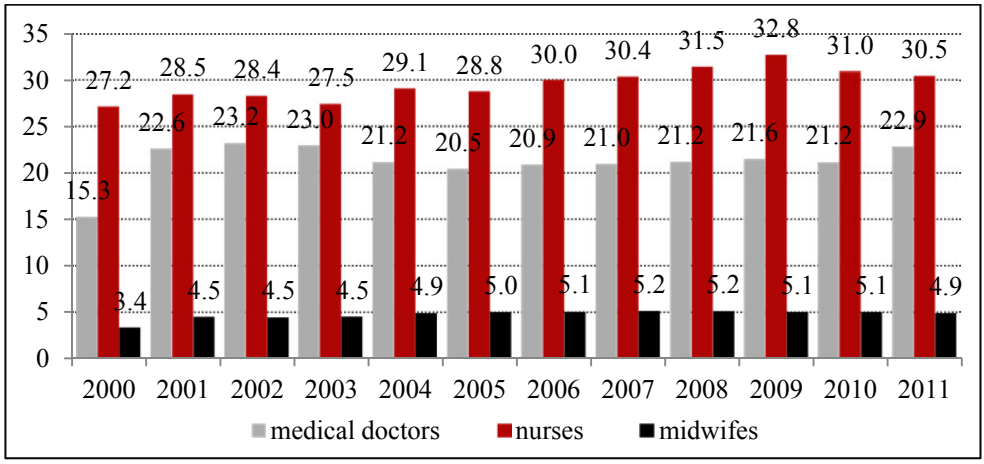
- Specialists are employed in a hospital and in one or more different public or private secondary care facilities.

Primary care

The development of primary health care was strongly driven by the 1999 health care reform. Consequently, the most significant changes in employment within PHC were observed between 2000 and 2002. In the following years, the number of medical professionals working in primary care stabilized and it has been fluctuating since. In 2011, 22.9 thousand physicians, 30.5 thousand nurses and 4.9 midwives were employed in primary care.

Family doctors and pediatricians accounted for the majority of primary health care physicians, representing 28.1% and 23.4%, respectively. Primary health care physicians constitute approximately 30% of all practicing physicians. Comparative studies show that the level of employment in primary care, especially that of general practitioners, is one of the lowest within the EU (Matrix Inside 2012).

Figure 15. Number of medical personnel employed in primary care, in thousands



Source: Based on CSIOZ data, Statistical Bulletin of the Ministry of Health (Biuletyn Statystyczny Ministerstwa Zdrowia), 2001-2012.

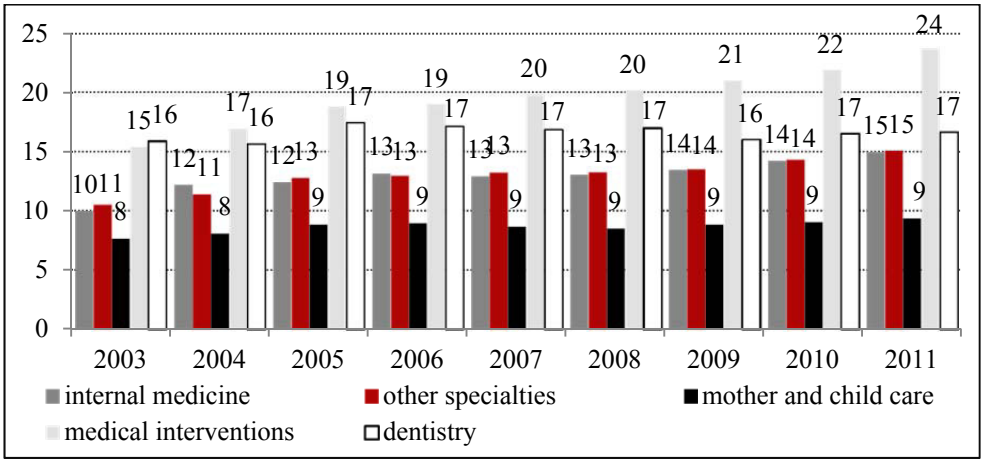
The number of nurses employed in primary care increased from 27.2 thousand in 2000 to 30.5 thousand in 2011, accounting for approximately 16% of all practicing nurses. Nurses employed in primary care include so called family community nurses (*pielęgniarki środowiskowe rodzinne*) who are responsible (among other duties) for the provision of home care. They constituted 38.7% of all nurses working in primary care in 2011.

Medical personnel in primary care also includes midwives. The employment levels of this group, after a period of increase in the early 2000s, stabilized at 5000 individuals, representing approximately 22% of all active midwives.

Specialist care

Since the complete and precise data on the exact number of physicians employed in secondary care are not available, the figure below presents only the number of physicians providing services in specialist care facilities. In 2011, there were 23.8 thousand physicians providing services in medical intervention units, 16.7 thousand dentists and 15 thousand physicians providing services in internal care units, and 9.4 thousand physicians providing services in mother and child care units.

Figure 16. Number of physicians providing services in specialist care facilities, in thousands



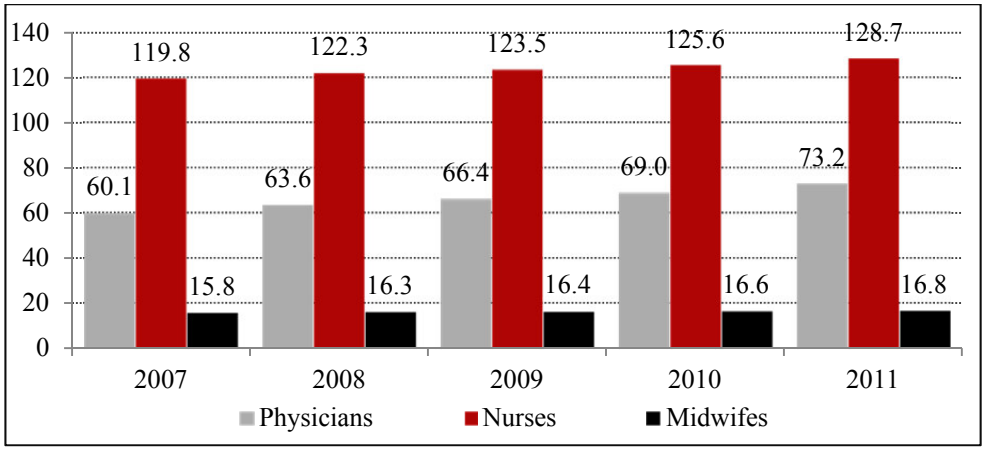
Source: CSIOZ data; Statistical Bulletin of the Ministry of Health, 2001-2012.

Hospital care

Currently, 72.3 thousand physicians, 128.7 thousand nurses and 16.8 thousand midwives work in hospitals. Data collected since 2007[6] show that the number of physicians has been systematically increasing in recent years.

[6] Statistical information on the number of medical personnel employed in hospitals has been published since 2007.

Figure 17. Number of medical professionals employed in hospitals



Source: CSIOZ data; Statistical Bulletin of the Ministry of Health, 2001-2012.

2.2.4. Employment according to the respresentative survey data

Since 1994 systematicaly, data from the representative Labour Force Survey (LFS) has been collected. These data allow for estimation of the total employment in each sector of the economy, including the health care sector. The research covers three sub-sections: human health (Q86), residential care activities (Q87) and social services without accommodation (Q88). The number of employed in the human health sub-section was slightly fluctuating over the past years between 650 and 712 thousand of employed. Human health sub-section dominates the structure of the Q sector constituting about three quarters of the Q sector employment while social care accounts to one quarter of the sector.

Table 7. The size (in thousands) and structure of employment in the Q sector – LFS data for 2008-2012

		Human health (Q86)	Residential care sector and social work (Q87 and Q88)	Total
2008	number	647.6	207.9	855.5
	(%)	*75.7*	*24.3*	*100.0*
2009	number	660.6	216.4	877.0
	(%)	*75.3*	*24.7*	*100.0*
2010	number	711.6	221.0	932.6
	(%)	*76.3*	*23.7*	*100.0*
2011	number	702.7	219.3	922.0
	(%)	*76.2*	*23.8*	*100.0*
2012	number	681.0	222.1	903.1
	(%)	*75.4*	*24.6*	*100.0*

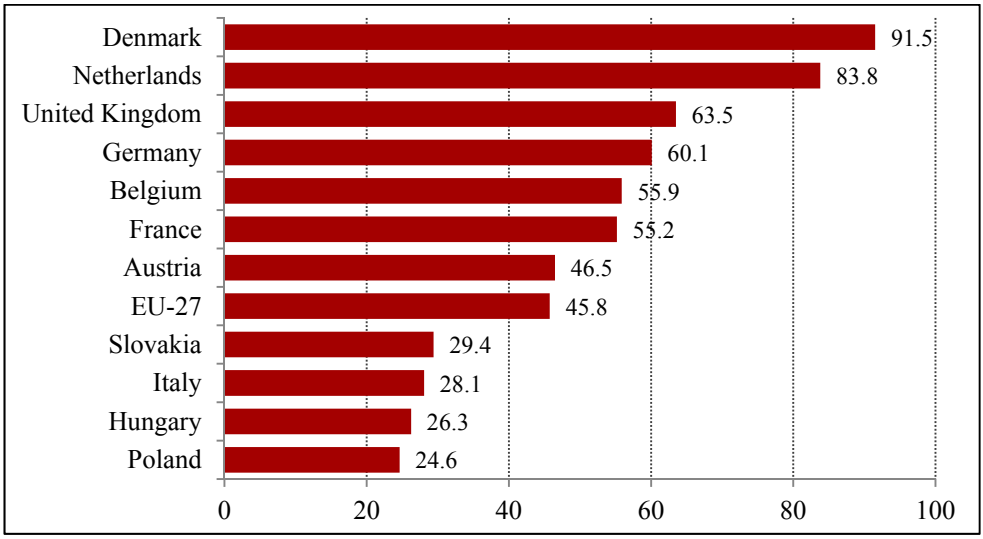
Source: Eurostat online based on GUS (LFS - BAEL).

2.3. International comparison of employment in the health sector

Employment levels of health and social work professionals in Poland is low, in line with relatively low expenditure on their wages and education (EU 2012). Other CEE regions and countries where social care is less developed have a similarly low density of health and social work professionals. In Nordic countries, where both medical and social services are well developed employment levels are much higher, employment levels are high.

The low employment rates of health and social work personnel in relation to population size in Central and Eastern Europe can be explained by the lower level of health care expenditure and policy prioritisation of the sector (Matrix Inside 2012). Additionally, in Poland, a number of factors generate an outflow of health care labour force to other countries or other sectors of the economy, including the above-mentioned migration and the absorption of the pharmaceutical sector.

Figure 18. Density of human health and social work professionals per 1,000 population in 2011



Source: Own calculations based on Labour Force Survey - Eurostat statistics[7].

[7] Employment by sex, age and economic activity, human health and social work section (from 2008 onwards, NACE Rev. 2) - 1 000 [lfsq_egan2] and Population statistics [lfsi_act_a_population], downloaded February 18th 2013.

2.4. Utilization

2.4.1. Ambulatory care

Overall, the annual number of primary care consultations over the year was slightly higher than 152 thousand in 2010. The number of secondary care consultations was nearly half that, and the number of dentist consultations constituted only one fifth of the number of primary care consultations. The elderly account for nearly one third of primary care patients and one fourth of secondary care patients.

Table 8. Number of consultations in ambulatory care

	Primary care - physicians	**Specialists**	**Dentists**
Total number	152 225.0	95 591.5	31 232.9
Patients under 18 years	35 825.4	14 051.1	9 250.3
Share of patients under 18 in the total	*23.5*	*14.7*	*29.6*
Patients 65+	43 290.5	21 374.9	4 121.4
Share of patients 65+ in the total	*28.4*	*22.4*	*13.2*

Source: GUS 2010.

The 65+ age group see specialists in cardiovascular system diseases, oncology, pulmonary system diseases, otolaryngology and ophthalmology more often that younger cohorts, reflecting the type of diseases prevalent in old age.

Table 9. Specialist care consultations

	Entire population	**Population aged 0-18**		**Population aged 65+**	
		Number of consultations	***share of total (%)***	**Number of consultations**	***share of total (%)***
Total number of consultations	95 591.5	14 051.1	*14.7*	21 374.9	*22.4*
Internal medicine	2 876.3	169.3	*5.9*	465.6	*16.2*
Allergology	3 246.8	1 634.6	*50.3*	145.5	*4.5*
Cardiovascular system diseases	4 951.3	344.8	*7.0*	2 153.3	*43.5*
Dermatology	6 005.1	1 173.3	*19.5*	1 129.2	*18.8*
Neurology	5 933.1	570.9	*9.6*	1 469.9	*24.8*
Oncology	2 206.8	53.9	*2.4*	707.0	*32.0*
Pulmonary diseases	2 565.8	485.7	*18.9*	776.5	*30.3*
Gynecology	13 122.8	399.9	*3.0*	987.6	*7.5*

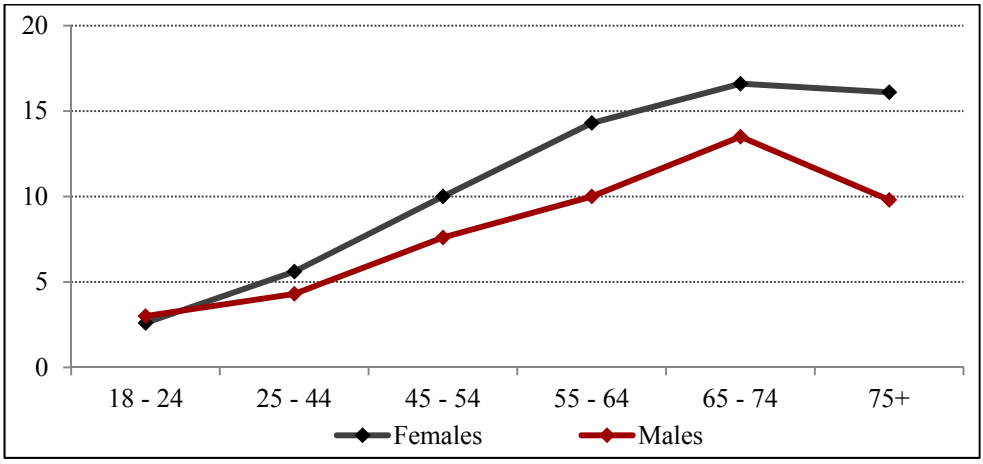
	Entire population	Population aged 0-18		Population aged 65+	
		Number of consultations	*share of total (%)*	Number of consultations	*share of total (%)*
Surgery	16 435.2	2 652.3	*16.1*	3 418.1	*20.8*
Ophthalmology	9 886.4	1 490.1	*15.1*	3 254.8	*32.9*
Otolaryngology	6 703.1	1 723.4	*25.7*	1 330.3	*19.8*
Mental health	4 275.5	292.2	*6.8*	669.8	*15.7*

Source: GUS 2010.

In the light of the available statistical information, it is difficult to track waiting times, as they strongly depend of the type of setting and provider of services. According to the administrative data provided by the Ministry of Health, in some areas and for some providers waiting times are substantial, while for others there might be no waiting times at all, even in the same medical specialty.

At the same time, survey data show that unmet needs for medical examination are greater for older cohorts and might account for up to 20% of the elderly population. The main reasons for unmet needs (declared by approximately 14-16% of the elderly aged 65-74) include high costs, a lack of geographical availability of medical professionals and long wait times.

Figure 19. Share of patients with unmet needs for medical examination due to high costs, lack of geographical availability and waiting time, 2010



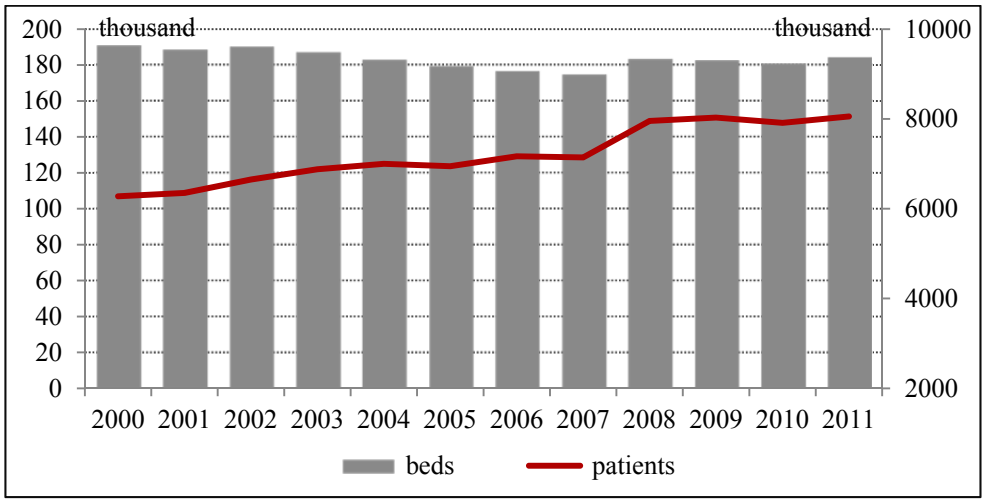
Source: Online data from Eurostat.

2.4.2. Hospital care

In recent years, the number of health care users has been systematically growing, due to a surge of income and education levels in the Polish population

that stimulated health awareness and the expression of health needs. In recent years, population ageing has become an additional factor. At the same time, the number of hospital beds per 100,000 inhabitants has been declining in all areas of curative care except LTC, but it is still higher than the EU average. The number of hospital patients is also higher than the EU average and shows an increasing trend.

Figure 20. Number of hospital beds and patients in Poland in 2000 - 2011



Source: CSIOZ (Centre for Health Information Systems), Statistical bulletins 2001-2012.

Table 10. Hospital beds per 100,000 inhabitants, average and in selected UE countries

Countries	Curative care beds in hospitals			Psychiatric care beds in hospitals		
	2000	2005	2010	2000	2005	2010
Poland	512.5	468.9	436.4	n.a.	67.4	63.1
Slovakia	566.6	501.3	473.2	93.4	83.6	79.5
Hungary	564.4	551.4	412.2	98.6	39.3	32.9
Germany	636.3	588.0	565.5	44.4	47.1	49.3
Netherlands	305.3	286.2	301.5	155.7	140.7	139.3
Denmark	350.3	314.9	286.5	75.7	65.3	57.0
Italy	406.9	330.9	283.3	14.8	13.2	9.8
France	406.2	368.5	345.9	103.4	93.0	86.2
UK	311.5	294.4	236.6	93.2	74.0	54.3
Belgium	472.1	439.7	411.8	259.2	250.0	177.1
EU 27	445.8	401.4	368.3	76.4	68.2	61.4

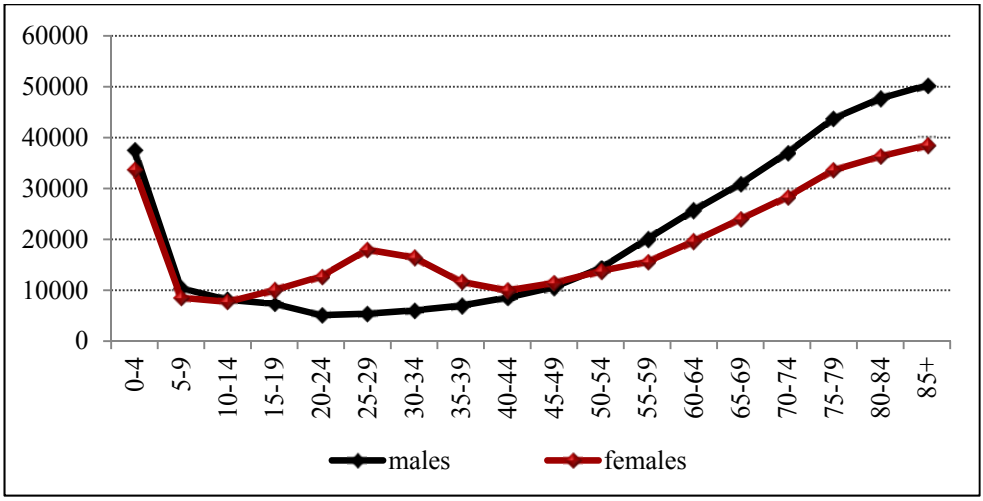
Source: Online data from Eurostat.

The number of hospitalizations is substantially higher in the older age groups. In Poland, the age factor plays a more important role in stationary care utilization

than in other EU countries for several reasons. Firstly, there are supply-side constraints to ambulatory care, mostly to specialist services and geriatric care in particular. In some cases, hospital access is easier than gaining access to a specialist. Secondly, there is still a culturally rooted belief that only serious conditions and life-threatening situations require medical attention (particularly in rural areas). As a result, patients are referred directly to the hospital. Thirdly, this occurs for epidemiological reasons. The health status of the Polish population has improved substantially (Wojtyniak et al; 2012). However, the incidence and mortality rates for most common chronic diseases such as cardiovascular diseases and neoplasms are high, and worse than those in more developed EU countries. Therefore, demand for hospital care is relatively higher.

As the below figure shows, hospitalization progresses slowly from age 40, and rapidly increases after age 60.

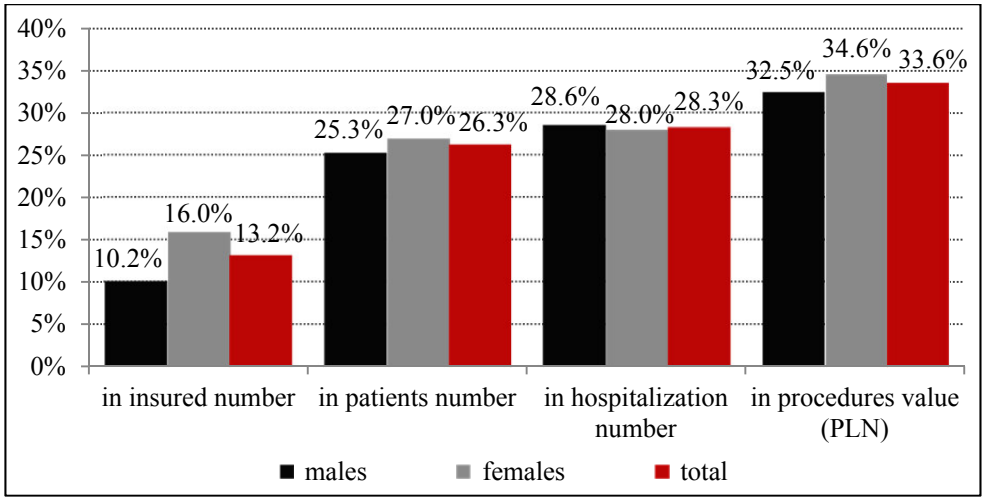
Figure 21. Hospital discharges by age and sex in 2010



Source: Online data from Eurostat.

Based on NFZ data, patients over the age of 65 account for 28% of all hospital patients while the cost of their hospitalization represents 34% of total expenditure in hospital care. There are no major differences between genders. Utilization is only slightly higher for women, which reflects the higher survival rates of females.

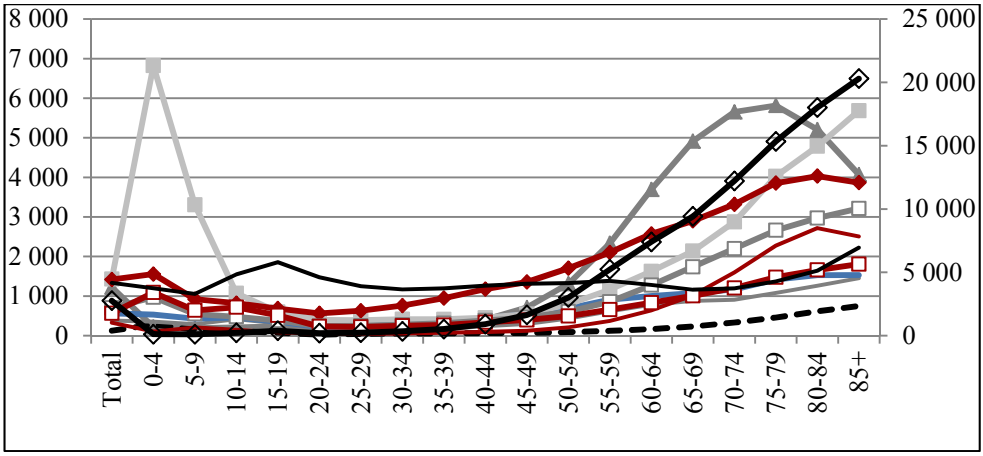
Figure 22. Share of patients over age 65



Source: Data from NFZ (National Health Fund).

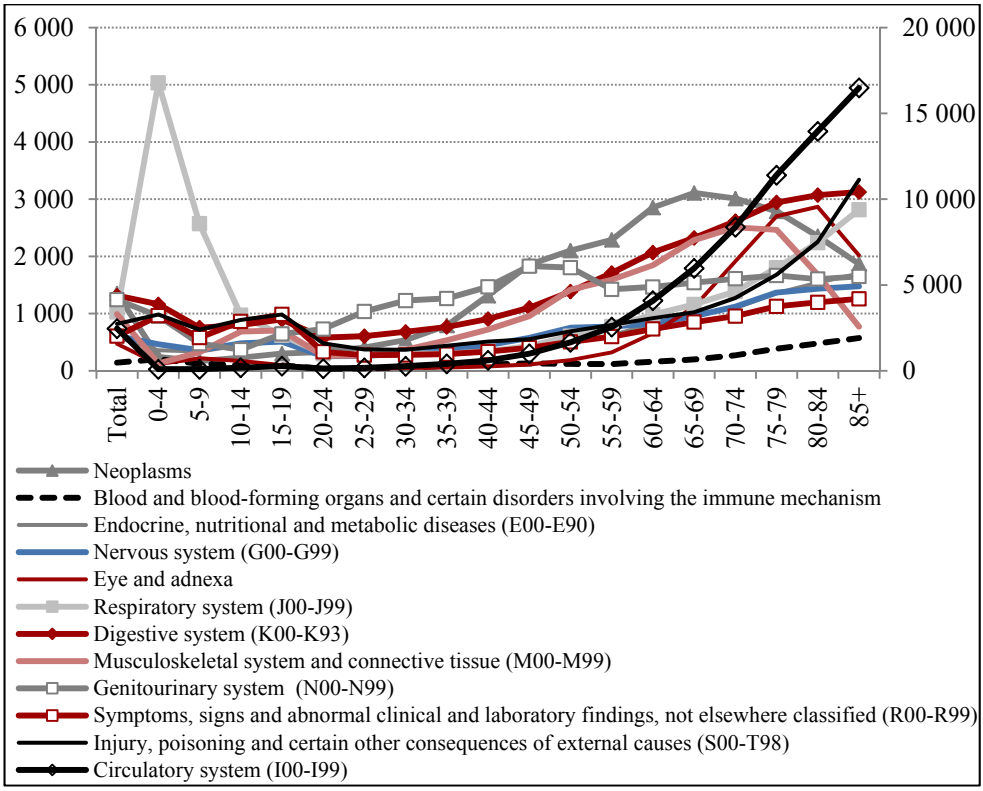
The main causes of hospitalization of the elderly are: cardiovascular system diseases, cancer, respiratory diseases and digestive system diseases. Age-specific survey research targeted at the elderly in Poland (POLSENIOR) shows that older cohorts suffer from co-morbidity and that the hospitalizations by specific diseases mentioned above do not fully reflect the morbidity pattern. Only in the case of heart failure (a quite common cause of hospital treatment among the elderly), the main co-morbidities include diabetes, renal failure, COPD or asthma and obesity. One should not forget that while the above-mentioned diseases are the most common causes of hospitalization among elderly, the main causes of morbidity also include diabetes, nervous system diseases (dementia mostly) vision impairments and muscosceletal diseases (Grodzicki 2012). Also, depression becomes a serious health threat to the elderly population. The same survey research shows that more than 20% of the elderly population suffers from some form of depression. To sum up, the two graphs presented below based on Eurostat reports show only the main trends in hospitalization, while morbidity patterns are much more complex and the variation in treatment options (type and longevity of treatment) can vary substantially among the elderly.

Figure 23. Hospital discharges by type of disease, males, 2010 data



Note. See legend below (figure 24).
Source: Online data from Eurostat.

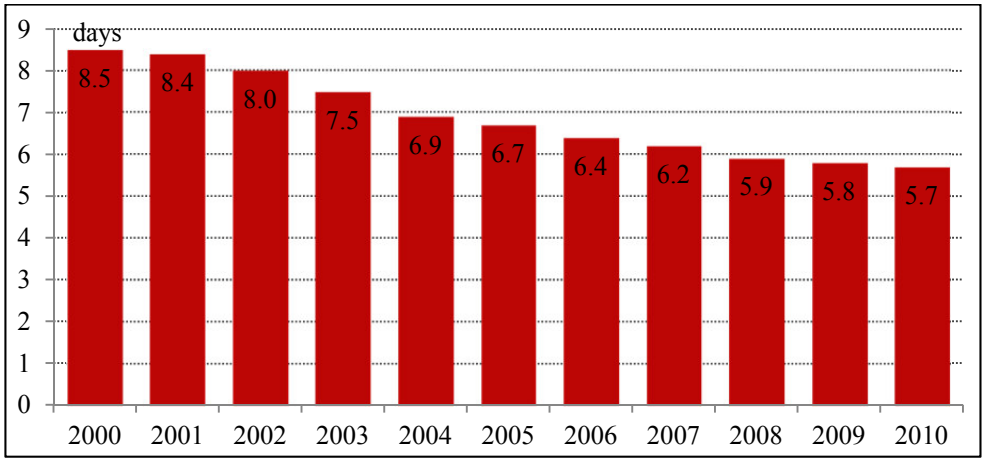
Figure 24. Hospital discharges by type of disease, females, 2010 data



Note. Right axis - circulatory system.
Source: Online data from Eurostat.

The technical efficiency of hospitals has improved over the years resulting in a decrease in the average length of stay (ALOS) for stationary care, from 8.5 days in 2000 to 5.7 in 2010.

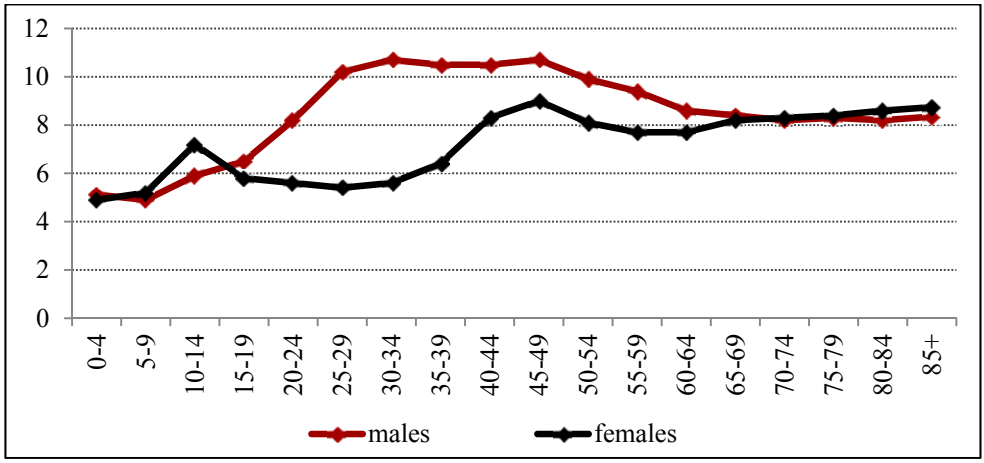
Figure 25. Average length of general hospital stay (in days)



Source: Golinowska et al 2012.

Still, the longest hospital treatment is provided not to the elderly, but to the population between 25-45 years of age for males and 40-49 years of life for females. This might be caused by the fact that the longest treatment is provided in for injuries and accidents as well as circulatory system diseases and neoplasm at younger ages.

Figure 26. Average length of stay by age and sex



Source: Online data from Eurostat.

Average lengths of stay vary considerably for different types of diseases. Chronic diseases, that affect mostly elderly people, usually entail a longer stay. In addition, complications frequently occur among elderly people, which is related to multiple morbidities (Polsenior 2012). The longest hospital stay for the elderly is reported for mental and behavioural disorders, nervous system diseases and muscosceletal diseases.

Table 11. ALOS by selected disease groups, 2010

Countries	Neoplasms	Circulatory	Respiratory	Digestive	Childbirth Related	Injury & external causes
Poland	7.2	7.4	7.6	5.4	3.3	9.4
Slovakia	8.4	7.8	7.9	5.9	5.5	6.1
Hungary	5.3	7.1	5.7	5.5	4.2	5.6
Germany(2008)	10.1	10.2	8.7	7.2	4.7	9.0
Netherlands	7.3	6.7	7.0	6.0	3.3	6.5
Denmark(2007)	6.4	5.4	5.4	5.0	3.4	5.1
Italy	9.3	9.1	8.7	6.7	3.9	8.9
France	0.7	0.2	0.2	1.1	0.3	0.3
UK	8.6	10.2	7.7	6.2	2.4	8.2
Belgium (2008)	9.1	8.1	8.0	5.8	4.7	8.6

Source: Online data from Eurostat.

3. Comparatively population forecasts and variants of population changes

The coming years pose a great challenge to the development of European countries. Demographic change (population ageing) will be a major factor influencing crucial areas of human life. Changing demography is especially challenging for Poland and other new EU Member States, whose population has so far had a relatively young age structure. The high speed of ageing will be a shock for socio-economic policy in those countries.

Demographic change is mainly characterized by the increasing proportion of older people in the population. The older population (65+) is projected to increase its share in Polish and EU27 population by 2025 to 7.5 and 4.6 percentage points, respectively. Such a rapid growth will not yet include the oldest segment of the population (80+). Its share will increase approximately by 1 percentage point in comparison to the base year of projection – 2010 (ECFIN 2012).

Poland's working age population (15-64) will shrink by more than 7 percentage points. This figure is higher than the EU27 average, where the respective rate of decrease is projected to reach 4 percentage points.

Meanwhile, the proportion of children (0-14) in the Polish population will basically remain stable. This can be explained by a slight improvement in the fertility rate over the past decade[8]. The proportion of children in the EU population has also been relatively satisfactory over the last years. Therefore their share is projected to decrease only slightly – by 0.5 percentage points.

The predicted age structure of the Polish population presented above and the relatively low employment rate, which may improve only slightly, strongly impact the old-age dependency ratio, defined as the proportion of inactive population aged 65 and over to the active working age population. This indicator will reach almost 50%, approaching the European average, whilst the ratio

[8] The assumption of a higher fertility rate was taken from the European Comission based projections – Europop 2010.

for Poland is projected to be twice the average EU rate, 18 and 9 respectively. Comparable figures are expected for Slovakia and the Netherlands.

Table 12. Population age structure in selected EU countries

Country	0-14		15- 64 (67)		65+		80+	
	2010	2025	2010	2025	2010	2025	2010	2025
Poland	15.1	14.9	71.3	64.0	13.5	21.0	3.4	4.4
Slovakia	15.3	15.0	72.4	66.2	12.3	18.8	2.7	3.7
Hungary	14.7	13.9	68.6	64.8	16.7	21.3	4.0	5.4
Germany	13.4	12.6	66.0	63.4	20.6	25.3	5.1	8.0
Netherlands	17.5	16.1	67.0	61.9	15.4	22.0	4.0	5.6
Denmark	18.0	16.8	65.4	62.1	16.6	21.2	4.1	4.7
Italy	14.1	12.9	65.7	63.4	20.3	23.7	5.9	7.5
EU 27	15.6	15.1	67.0	62.9	17.4	22.0	4.7	6.2

Source: Country data from ECFIN 2012.

Table 13. Old-age dependency ratio; proportion of inactive population aged 65 and over to the working age (active) population aged 20-64

Country	2010	2025	2025-2010
Poland	31	49	18
Slovakia	29	44	15
Hungary	43	51	8
Germany	44	52	8
Netherlands	31	46	15
Denmark	35	45	10
Italy	53	57	4
EU 27	40	49	9

Source: Country data from ECFIN 2012.

Such high dynamics of the old-age dependency ratio will be a demanding challenge for the Polish socio-economic policy. The first policy response was to extend the period of labour market activity of the population, hence the 2012 decision to postpone and unify the statutory retirement age from the age of 60 to 65 for females and then from 65 to 67 years for both sexes. Other reactions have been to increase labour intensity. Although those policies have not yet been defined within specific policies, the term 'workfare state' (instead of 'welfare state') appears in numerous national development strategies (ŚSRK 2012).

ECFIN's projections indicate that the 'labour intensity scenario' entails higher expenditure growth in healthcare and education in comparison to other scenarios, for example 'pure demographic scenario'. These projections are called

EUROPOP2010, and were released in April 2011. **EUROPOP2010** covers the period 2010-2060 and all 27 EU Member States.

For the NEUJOBS population projections, two different variants have been formulated, the "**tough"** and the **"friendly",** using **EUROPOP2010** as a reference. The "friendly" and "tough" variants of demographic development differ in their assumptions concerning three main indicators: fertility, mortality, and migration.

In the **tough** variant of demographic development, challenges related to the working age population are high. Translated to the three demographic components of change (fertility, mortality and migration), fertility will be higher, life expectancies will be higher and migration will be lower. With regards to total population growth, the components work in opposite directions: higher fertility and life expectancies result in additional population growth, whereas a decrease in migration leads to lower population growth.

In the **friendly** variant developments work the other way around. Challenges related to the working age population are relatively mild. In order to reach this state, migration levels will be higher and both fertility and life expectancies will be lower. Here too, the components of change work in opposite directions of population growth: fertility and mortality now lead to less growth, whereas the higher migration levels result in higher population growth. Summing up, in the friendly option, fertility and life expectancy is lower than in the tough option, but the adopted level of migration is higher. As a result, challenges related to the working age population are relatively mild in the friendly variant and relatively high in the tough.

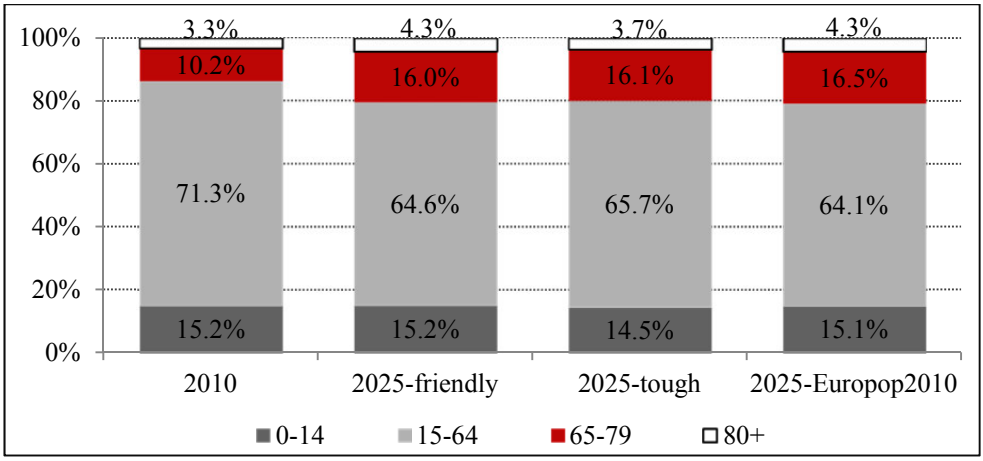
Table 14. Comparison of assumptions of demographic variants used

	Fertility		Life expectancy males		Life expectancy females		Net migration numbers (in thous.)	
	2010	2030	2010	2030	2010	2030	2010	2030
Europop	1.38	1.46	72.1	76.4	80.7	83.5	-1.2	3.2
Neujobs friendly		1.69		79.2		85.7		91.7
Neujobs tough		1.38		74.9		82.6		-85.3

Source: Own compilation based on ECFIN 2012, Neujobs D10.1.

In the graph below, the age structure of the future Polish population in the three variants of demographic development is compared: one based on the projection prepared by Eurostat experts in 2011 (Europop2010) and two based on the projections used in the NEUJOBS project - friendly and tough.

Figure 27. Average length of stay by age and sex



Source: NEUJOBS demographic variants, Eurostat.

The population structure change trends are similar in all three prognosis variants There are no significant changes in the share of children, but there is an important decrease in the working age population (15-64) and a considerable increase in the older population (65-79). The change in the share of the oldest part of population, 80+, is still small. The smaller decrease of the share of population 15-64 can be observed in the tough variant of the prognosis. At the same time, the highest decline in the number of people of working age can also be seen in this variant the strongest shrinkage of the size of total population in this option. These changes are respectively: 0.02% in the friendly, -5.17% in the tough and -0.12% in the Europop2010 variants.

4. Projections of demand and supply of medical care personnel in Poland

The following part of the study presents the results of the projections of demand for medical workers in the health care system in Poland. Projections were conducted based on two analyses: (i) the analysis of trends in demand for medical services, and (ii) the analysis of trends in supply of labour and employment, including employment in the total economy and employment in the health and social sectors, often referred to in the literature as sector Q (human health and social work). The base year of the presented projections is 2010 and the period of prognosis covers the years 2010-2025.

4.1. Projection of demand for health workforce

Projections of the demand for health workforce are based on the analysis of hospital and ambulatory care utilization trends. Two indicators are used when analysing hospital care utilization: average length of stay (ALOS) and the discharge ratio per 100 000 inhabitants. The information on the number of hospital personnel (physicians, nurses and midwives) comes from the Polish Ministry of Health (CSIOZ 2011). The data concerning the number of ambulatory visits comes from the Polish Central Statistical Office.

4.1.1. Main assumptions

The projections of the hospital care workforce were prepared under three different groups of assumptions concerning average length of stay (ALOS) and discharge ratios per 100 000 inhabitants, each of them using two variants of population development – friendly and tough (as described above). The different assumptions about changes in hospital care utilization and length

of stay result in three main scenarios. In the first one, constant values in the length of stay and the discharge ratios in the whole projection period are assumed (equal to the values of 2010). In the second scenario, the discharge ratios remain at a constant level, but the average length of stay is assumed to be changing. The annual change (mostly decreasing) is assumed to be the same as the annual change over the last 5 years. In the last scenario, changes in both indicators are assumed: the length of stay as in the previous case and the discharge ratios. The latter are assumed to be equal to half of the annual average changes over the last 5 years. This assumption is based on the expectations that the state of health of the population will be improving and that due to developments in medical technology, some cases which have been treated in hospitals so far can be shifted to ambulatory care.

By using the three different prognoses of population development, each main scenario also has three demography variants. The assumptions described above result in nine total specific projections of the hospital care workforce (Table below).

The first three projections (constant scenario) are "purely demographic". They show the projected changes in the workforce number, taking into account the impact of the population changes without the influence of any different factors.

The second subset of the three following projections (changes in length of stay scenario) take into consideration the demographic changes and the changes in the average length of stay in hospital as an additional factor.

In the last three projections (changes in length of stay and number of hospital days scenario) one more factor influencing the predicted workforce needs is added - the changes in the number of hospital days per 100,000 inhabitants in each age group.

Table 15. Characteristics of scenarios used in projections of hospital care workforce

Scenario	Variants of Population change	Average length of stay	Discharge ratio
I. Constant	Friendly	constant	constant
	Tough	constant	constant
	Europop2010	constant	constant
II. Changes in length of stay	Friendly	trend of change as in the last 5 years (yearly average)	constant
	Tough	trend of change as in the last 5 years (yearly average)	constant
	Europop2010	trend of change as in the last 5 years (yearly average)	constant

Scenario	Variants of Population change	Average length of stay	Discharge ratio
III. Changes in length of stay and number of discharges	Friendly	trend of change as in the last 5 years (yearly average)	trend of change as half of yearly average in the last 5 years
	Tough	trend of change as in the last 5 years (yearly average)	trend of change as half of yearly average in the last 5 years
	Europop2010	trend of change as in the last 5 years (yearly average)	trend of change as half of yearly average in the last 5 years

In the case of ambulatory care, the constant average annual number of visits per person in each age group was assumed. The projections were prepared for the same three different population variants as in the case of hospitals.

The calculations were made under the assumption of the patients to personnel equilibrium, which says that in order to treat a certain number of patients, the adequate number of personnel is needed. Thus, the same number of personnel as in the base year, calculated relative to the total number of in-patient days (the hospital care case) and to the number of visits (the ambulatory care case) was adopted for the whole projection period. In the case of the calculation of the number of midwives in hospital care, information based on two kinds of diagnosis[9] was used: *Pregnancy, childbirth and the puerperium* and *Certain conditions originating in the prenatal period*.

The growth rate of ALOS and the discharge ratio (Scenario III) was estimated based on changes in the values between the years 2005 and 2010. The appropriate data, broken down by sex, age, and diagnosis, were derived from the Eurostat data base.

[9] The midwives are the hospital personnel group involved in the treatment of special groups of diagnosis only, i.e. those related to pregnancy, childbirth and prenatal treatments. In the case of midwives projection, only the utilization related to these groups of problems was taken into account.

4.1.2. Changes in demand for health care activities in the years 2010-2025 according to scenario

Scenario I. Constant

The pure impact of demographic changes on the demand for health care can be observed in the constant scenario. It was assumed that the discharge ratio, the length of stay in hospital and the number of visits in ambulatory care are the same in each age group during the whole prognosis period. The only changes in the total value of these indicators are caused by changes in the size and age-structure of the population.

Table 16. Changes in hospital cases and total hospital days between 2010 and 2025 - constant utilisation rates

Indicators	2010	2025			Changes 2025/2010			Changes 2025/2010 in %		
		friendly	tough	Euro-pop 2010	friendly	tough	Euro-pop 2010	friendly	tough	Euro-pop 2010
Hospital cases (millions)	6.11	6.57	6.12	6.60	0.45	0.01	0.49	7.43%	0.16%	8.00%
Cases per 100 inhabitants	16.0	17.2	16.9	17.3	1.19	0.90	1.30	7.42%	5.62%	8.13%
Hospital days (millions)	46.6	51.2	47.9	51.6	4.64	1.36	5.06	9.96%	2.92%	10.86%
Average length of stay	7.6	7.8	7.8	7.8	0.18	0.21	0.20	2.35%	2.75%	2.65%
Share of women in cases (%)	55.8	52.3	53.4	51.6	-3.46	-2.36	-4.12	-6.21%	-4.24%	-7.39%
Share of women in hospital days (%)	52.0	47.6	48.5	46.9	-4.35	-3.54	-5.08	-8.36%	-6.80%	-9.78%
Share of elderly (70+) in cases (%)	22.5	28.8	27.7	29.7	6.26	5.18	7.15	27.80%	22.98%	31.72%
Share of elderly (70+) in hospital days (%)	24.8	31.0	29.7	31.8	6.17	4.87	7.00	24.89%	19.62%	28.23%

Source: Eurostat, NEUJOBS demographic variants, own calculations.

Population ageing and shrinking are the two main factors affecting the number of hospital cases and hospital days. These determinants have the opposite effects: the first causes an increase of in-patient care utilization and the second a decrease. In all of the population development variants (friendly, tough and Europop2010), an increase in the number of hospital cases and days is observed, but the scale of the increase is very different: from 0.16% change in the tough variant to an 8% change in Europop2010 for the hospital cases (respectively for the hospital days from 2.9% to 10.9%). There is also a difference in the average length of stay caused by the ageing of the population (more older people with longer stays), but these changes are nearly the same in all variants. The most significant increase occurs in the share of population that is aged 70+ in the hospital cases and hospital days, a change of more than 30%.

Table 17. Changes in ambulatory visits between 2010 and 2025 – constant scenario

Indicators	2010	2025			changes 2025/2010			changes 2025/2010 in %		
		friendly	tough	Europop 2010	friendly	tough	Europop 2010	friendly	tough	Europop 2010
Primary care										
Number of visits (millions)	152.23	161.46	151.98	162.01	9.23	-0.25	9.78	6.06%	-0.16%	6.43%
Share of females (%)	55.2	55.63%	56.07%	55.15%	0.43	0.86	-0.06	0.77%	1.56%	-0.10%
Share of elderly (70+) (%)	16.9	22.12%	21.35%	22.81%	5.13	4.36	5.82	30.22%	25.65%	34.23%
Ambulatory specialty care (ASC)										
Number of visits (millions)	95.59	100.39	95.27	95.59	4.80	-0.33	0.00	5.02%	-0.34%	0.00%
Share of females (%)	60.5	60.28	60.69	59.78	-0.29	0.11	-0.80	-0.49%	0.19%	-1.32%
Share of elderly (70+) (%)	15.9	21.06	20.21	21.71	5.07	4.22	5.72	31.72%	26.40%	35.77%
Dentistry										
Number of visits (millions)	31.23	29.97	28.58	29.87	-1.26	-2.65	-1.36	-4.04%	-8.49%	-4.36%
Share of females (%)	54.6	54.57	54.79	54.31	-0.07	0.15	-0.33	-0.13%	0.28%	-0.60%
Share of elderly (70+) (%)	5.29	7.67	7.34	7.99	2.38	2.05	2.70	45.08%	38.77%	51.07%

Source: 2011, NEUJOBS demographic variants, own calculations.

In ambulatory care, a different situation in the case of the friendly and tough variants can be seen. For primary and secondary (specialist) care, there are differences even in the direction of change – in the friendly variant the forecasted utilization increases, in the tough it decreases. For dentistry, all variants show a decreasing trend. As above, the biggest changes in demand for ambulatory specialty visits are expected in the case of older patients (70+).

Scenario II. Changes in length of stay

The presented results incorporate an assumption that the changes in length of stay reflect the historical changes of this indicator observed between the years 2005-2010. In nearly all age and gender groups (16 groups for females and 14 for males) the average hospital stay was shorter in 2010 than in 2005 and only in a few groups, the length of stay was increasing (2 groups for females and 4 for males). The annual rate of change was fluctuating, ranging from -12.8% to 9.2%, but on average the value was about -6% for males and -9% for females. Due to the further development of medical technologies and the growth of productive efficiency, the trends should not get worse but at least remain similar over the next few years.

Table 18. Changes in hospital cases and total hospital days between 2010 and 2025 – changes in length of stay

	2010	2025			Changes 2025/2010			Changes 2025/2010 in %		
		friendly	tough	Europop 2010	friendly	tough	Europop 2010	friendly	tough	Europop 2010
Hospital cases (millions)	6.1	6.6	6.1	6.6	0.45	0.01	0.49	7.43%	0.16%	8.00%
Cases per 100 inhabitants	16.0	17.2	16.9	17.3	1.19	0.90	1.30	7.42%	5.62%	8.13%
Hospital days (millions)	46.6	41.0	38.6	41.3	-5.53	-7.97	-5.27	-11.88%	-17.11%	-11.31%
Average length of stay (days)	7.6	6.2	6.3	6.3	-1.37	-1.31	-1.36	-17.98%	-17.24%	-17.88%
Share of women in cases, %	55.8	52.3	53.4	51.6	-3.46	-2.36	-4.12	-6.21%	-4.24%	-7.39%
Share of women in hospital days, %	52.0	44.8	45.3	44.2	-7.19	-6.66	-7.81	-13.83%	-12.81%	-15.01%
Share of elderly (70+) in cases, %	22.5	28.8	27.7	29.7	6.26	5.18	7.15	27.80%	22.98%	31.72%
Share of elderly (70+) in hospital days, %	24.8	24.9	23.8	25.7	0.13	-1.01	0.91	0.53%	-4.06%	3.66%

Source: 2011, NEUJOBS demographic variants, own calculations.

Given this assumption, the total number of hospital days will decline in all variants of demographic prognosis due to a reduction in the average length of stay by around 2 days.

As a result of the applied assumptions, the average length of stay is projected to decline by about 1.3 days in all variant. This will result in a decrease in the total number of hospital days – the difference between the years 2010 and 2025 can reach even 8 million days (in the tough variant). Unlike in the previous, constant scenario, the growth in the share of hospital days utilized by older people is not significant and in the tough variant even a decrease by 4% can be observed. The projection results concerning the number of hospital cases are the same as in the constant scenario, because we assumed no changes in hospital discharges.

Scenario III. Changes in length of stay and number of discharges

The last scenario assumes changes in the length of stay in hospitals as well as in the number of hospital cases. There is a tendency for the number of hospital cases to increase in general, but in recent years, the changes of this indicator were not very significant in Poland. More noticeable growth was observed only in the three distinguished age/gender groups of the data collection. In the rest of groups of the set, the increase was much lower. Even a small decrease in the number of hospital cases was observed – close to 10% of the 2010 total number of hospital cases - was observed in the five age/gender groups.

Table 19. Changes in hospital cases and total hospital days between 2010 and 2025 – changes in length of stay and utilization

Indicators	2010	2025			changes 2025/2010			changes 2025/2010 in %		
		friendly	tough	Euro-pop 2010	friendly	tough	Euro-pop 2010	friendly	tough	Europop 2010
Hospital cases (millions)	6.1	7.5	6.9	7.5	1.34	0.82	1.37	21.93%	13.41%	22.46%
Cases per 100 inhabitants	16.0	19.5	19.2	19.6	3.51	3.14	3.62	21.91%	19.60%	22.61%
Hospital days (millions)	46.6	45.6	42.8	45.8	-1.02	-3.81	-0.75	-2.18%	-8.19%	-1.60%
Average length of stay	7.6	6.1	6.2	6.1	-1.51	-1.45	-1.50	-19.78%	-19.05%	-19.65%
Share of women in cases (%)	55.8	55.9	57.2	55.2	0.10	1.41	-0.55	0.18%	2.52%	-0.99%

Indicators	2010	2025			changes 2025/2010			changes 2025/2010 in %		
		friendly	tough	Euro-pop 2010	friendly	tough	Euro-pop 2010	friendly	tough	Europop 2010
Share of women in hospital days (%)	52.0	48.9	49.6	48.3	-3.06	-2.37	-3.71	-5.89%	-4.56%	-7.14%
Share of elderly (70+) in cases (%)	22.5	28.9	27.9	29.8	6.41	5.34	7.29	28.45%	23.69%	32.33%
Share of elderly (70+) in hospital days (%)	24.8	25.6	24.4	26.4	0.78	-0.37	1.56	3.15%	-1.50%	6.28%

Source: Eurostat, NEUJOBS demographic variants, own calculations.

The assumption of an increase in hospital cases has the opposite effect on hospital utilization than changes in the length of stay. As a result, the projected number of hospital days still has a decreasing trend (in each population variant), but the rate of decline is much lower than in the second scenario (2%-8% decrease compared to 11% - 17%). Interestingly, the average length of stay projected for the year 2025 is slightly lower than in the second scenario. This is the effect of the growing number of hospital cases in the younger age groups, which are characterized by a lower average number of days spent in a hospital.

4.1.3. Projection of demand for health care workforce

Demand for medical personnel was counted on the basis of projected utilization expressed by the total number of hospital days and ambulatory visits. In the case of the hospital personnel projections, three possible factors of impact came under consideration: demographic changes, changes in the discharge ratios and changes in the length of stay in hospital. For ambulatory care, only one factor of possible impact was used, namely demographic one, because of a lack of proper historic data concerning utilization.

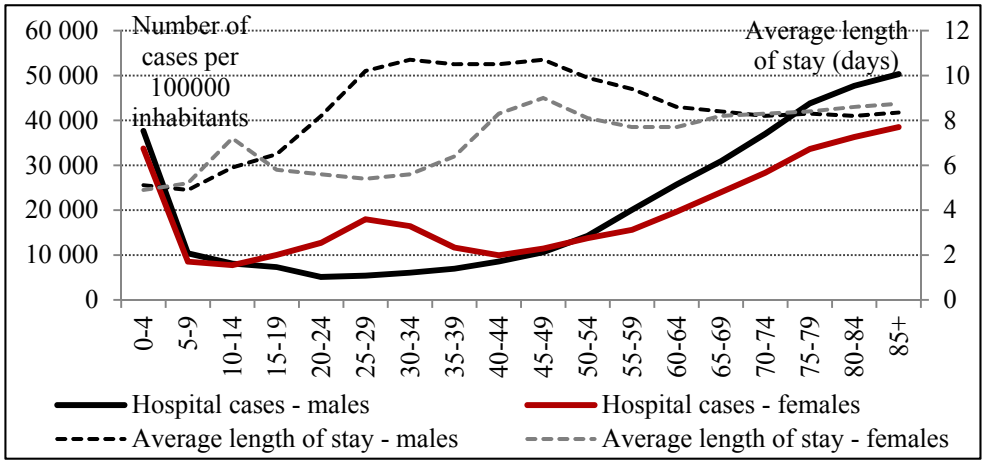
Scenario I. Constant

In the constant scenario (pure demographic impact), population changes were the only factor considered influencing demand for health personnel.

Projected demand for hospital personnel

Therefore, the key issues considered in this projections' scenario were variations in the number of hospital cases and length of stay by age group.

Figure 28. Number of hospital cases per 100 000 inhabitants and average length of stay by age group and sex in 2010



Source: Eurostat.

The graph above shows differences between hospital utilization indicators by age group and sex in the base year. The number of hospital cases, except for the youngest age group (0-4) and females in the childbirth period, is clearly associated with age; the older the person, the higher the discharge rate. A different situation can be observed in average length of stay. The longest hospital stays can be observed for men between 25 and 55 years of life. This can most likely be explained by the high incidence of cardio-vascular diseases and accidents in this age group. Women generally stay in hospitals for shorter periods of time than men, with the exception of two periods: first in childhood and youth and second in the old age. As we saw earlier, all prognoses indicate the group of older people will grow and the group of younger people will decrease. As a result, the projected demand for hospital personnel in 2025 is significantly higher than in 2010. The impact of the higher number of older people in need of more hospital care is not compensated by a reduction in the number of hospital days in the smaller, younger cohort. The only exception in the tendency of growing demand for medical professions are midwives as their work is serving younger, adult women.

Table 20. Changes in demand for hospital care personnel between 2010 and 2025

		Physicians	Nurses	Midwives	Dentists
2010		69 032	124 840	16 585	615
2025	friendly	75 909	137 276	13 420	676
	tough	71 045	128 480	12 320	633
	Europop 2010	76 528	138 396	13 024	682
changes 2025/2010	friendly	6 877	12 436	-3 165	61
	tough	2 013	3 640	-4 265	18
	Europop 2010	7 496	13 556	-3 561	67
changes 2025/2010 in %	friendly	9.96%	9.96%	-19.08%	9.96%
	tough	2.92%	2.92%	-25.72%	2.92%
	Europop 2010	10.86%	10.86%	-21.47%	10.86%

Notes. (1) Because of the adoption of a uniform methodology, the projected changes between 2010 and 2025 are the same for physicians, nurses and dentists, (2) constant utilization rates.
Source: Eurostat, NEUJOBS demographic variants, own calculations.

The prognosis of demand for hospital medical professions in 2025 reveals major differences between demographic variants. The biggest growth in the number of personnel is projected in the Europop2010 variant (10.9%) and it is only 1 percentage point lower in the friendly variant. In the tough variant, because of the forecasted decrease in the population size, the growth of hospital utilization is much lower, so the projected demand for physicians, nurses and dentists is only about 3% higher than in the base year. The number of midwives needed is foreseen to be even 25% lower (tough variant), which means over 4 thousand more employees than in the base year.

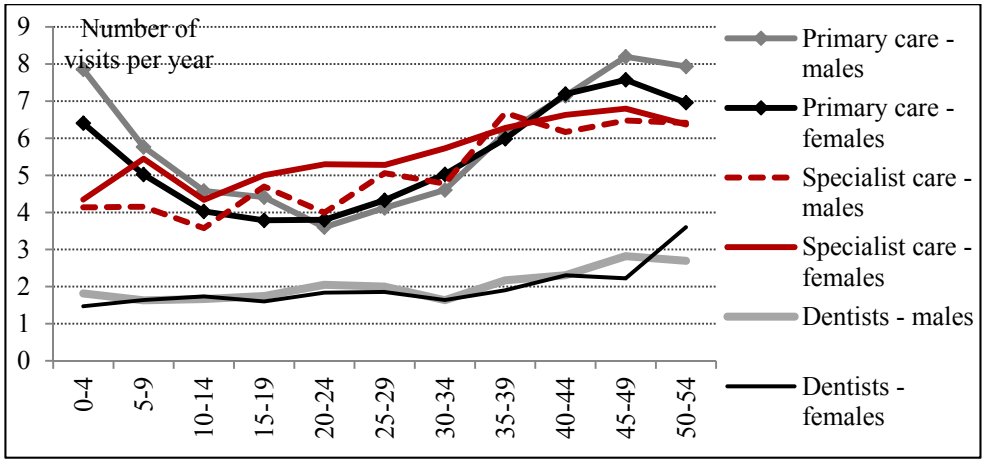
Projected demand for medical personnel in ambulatory care

An analysis of the utilization of ambulatory care during the life cycle based on information from 2010 indicated typical (classic) regularity. Changes are directly proportional to age; the older the person, the higher the number of ambulatory visits. The evident exception is the group of youngest children (0-4) using primary care services. At this age, ambulatory visits are mainly for monitoring health status and prevention. At this age, children also often suffer from different childhood diseases. The graph below (see Figure 29) presents the utilization of ambulatory care based on one indicator: the average annual number of ambulatory visits per person.

The prognosis of demand for medical professions in ambulatory health care indicates some interesting points. The results are not so unequivocal as in hospital care. In the case of the tough variant, even decreasing demand for the workforce is observed. The projected demand for dentists is lower in all three variants of population change because of smaller differences between utilization

in different age groups. As a result, the ageing of the population does not cause an increase in the utilization that is big enough to outweigh a decrease caused by the shrinking population in younger ages (see table 21).

Figure 29. Average number of visits by age group per year in ambulatory care in 2010



Source: GUS 2011, CSIOZ 2011.

Table 21. Changes in demand for ambulatory care personnel between 2010 and 2025 – constant utilization rates

		Primary care doctors	Specialists	Dentists
2010		21 169	59 545	16 546
2025	friendly	22 453	62 533	15 878
	tough	21 135	59 342	15 142
	Europop 2010	22 529	62 787	15 824
changes 2025/2010	friendly	1 284	2 988	-668
	tough	-34	-203	-1 404
	Europop 2010	1 360	3 242	-722
changes 2025/2010 in %	friendly	6.07%	5.02%	-4.04%
	tough	-0.16%	-0.34%	-8.49%
	Europop 2010	6.42%	5.44%	-4.36%

Source: GUS 2011, CSIOZ 2011, NEUJOBS demographic variants, own calculations.

The projected increase in the demand for physicians (except dentists) in the friendly and Europop 2010 variants is a little higher in the primary care (1 percentage point). The results show that the ambulatory care could need over 4 thousand physicians more.

Scenario II. Changes in length of hospital stay

The second scenario of demand for the medical workforce takes into account the changes in the average length of hospital stay. Because the general tendency is towards shorter lengths of stay over time, the results are definitely different than in the constant scenario.

Table 22. Changes in demand for hospital care personnel between 2010 and 2025 under the influence of changes in average length of stay

		Physicians	Nurses	Midwives	Dentists
2010		69 032	124 840	16 585	615
2025	friendly	60 832	110 011	8 785	542
	tough	57 223	103 485	8 101	510
	Europop 2010	61 222	110 717	8 534	545
changes 2025/2010	friendly	-8 200	-14 829	-7 800	-73
	tough	-11 809	-21 355	-8 484	-105
	Europop 2010	-7 810	-14 123	-8 051	-70
changes 2025/2010 in %	friendly	-11.88%	-11.88%	-47.03%	-11.88%
	tough	-17.11%	-17.11%	-51.15%	-17.11%
	Europop 2010	-11.31%	-11.31%	-48.54%	-11.31%

Source: Eurostat. NEUJOBS demographic variants own calculations.

In all variants that take into account the trend of declining ALOS, the projected total number of medical personnel is lower in 2025 than in 2010. In the case of nurses, this decrease reaches as much as 21 thousand in the tough variant and over 14 thousand in the remaining variants (respectively for physicians: 11.8 thous. in the tough, 8.2 in the friendly and 7.8 in Europop2010). The forecasted decrease in demand for midwives is approximately 50%.

Scenario III. Changes in length of stay and number of discharges

The last scenario of demand for medical workforce takes into account two main factors: changes in average length of hospital stay and the number of hospital cases. Thus the impact of decreasing length of stay is mitigated by the impact of the growing number of hospital cases. As a result, the projected demand for health personnel in hospitals is still declining, but the scale of this decrease is definitely smaller than in the scenario with only the impact of ALOS.

As in the two previous scenarios (impact of population changes and changes in ALOS), the biggest decrease in demand is observed for midwives. However, in this scenario, the decrease in demand does not exceed -18%, while in the previous scenarios it accounted for about 50%.

Table 23. Changes in demand for hospital care personnel between 2010 and 2025 – changes in average length of stay and number of cases

		Physicians	Nurses	Midwives	Dentists
2010		69 032	124 840	16 585	615
2025	friendly	67 525	122 115	15 022	602
	tough	63 378	114 615	13 614	565
	Europop 2010	67 925	122 838	14 539	605
changes 2025/2010	friendly	-1 507	-2 725	-1 563	-13
	tough	-5 654	-10 225	-2 971	-50
	Europop 2010	-1 107	-2 002	-2 046	-10
changes 2025/2010 in %	friendly	-2.18%	-2.18%	-9.43%	-2.18%
	tough	-8.19%	-8.19%	-17.91%	-8.19%
	Europop 2010	-1.60%	-1.60%	-12.34%	-1.60%

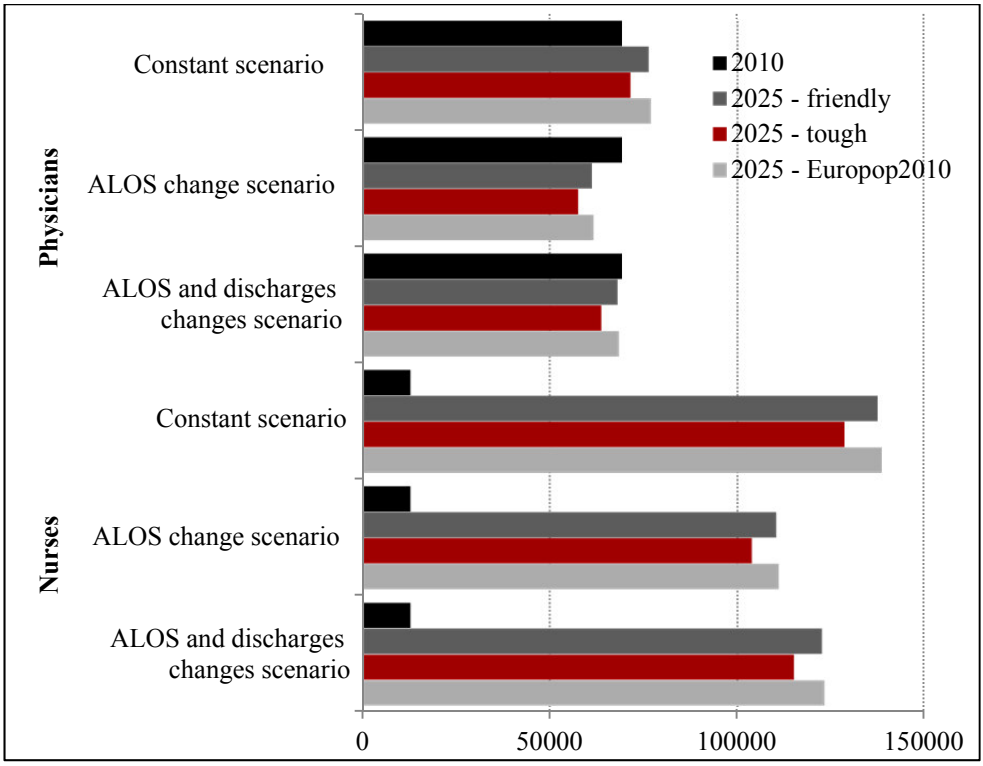
Source: Eurostat. NEUJOBS demographic variants own calculations.

4.1.4. Comparison of demand-side prognosis of health care workforce based on different scenarios

Each of the above presented scenarios: (i) pure population changes, (ii) decreasing ALOS and (iii) changes in hospital discharges takes into consideration a different group of factors influencing the demand for health care workforce. It can be said that the scenarios built up on each other – each scenario, when compared to the previous one, takes into account the next, additional factor. It is a step by step analysis. The scenario including the pure impact of demographic factors results in the highest level of projected demand (see Figure 30). Taking the second additional factor, the length of stay in hospitals, into consideration causes a significant decrease in the examined demand. Adding the third factor, changes in the number of hospital cases, is the cause of obtaining the results at the medium level.

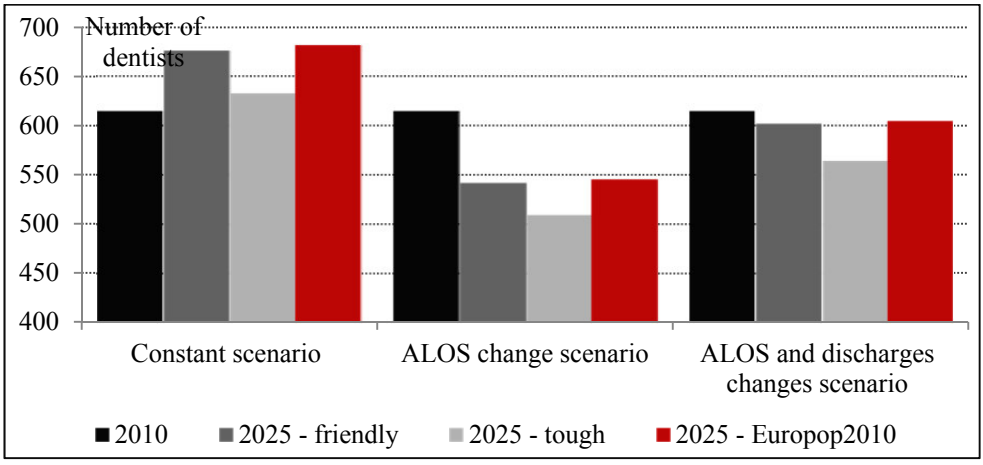
The prognoses of the demand for physicians, nurses and dentists show the same trends, as they are based on the same assumptions and the same changes in length of stay and number of cases. The results obtained using the friendly and Europop2010 demographic variants are very similar for each kind of personnel while the tough demographic variant definitely provides different, much lower results. Only the pure-demographic scenario forecasts the increasing number of needed hospital workforce, even in the tough variant.

Figure 30. The projection of the demand for physicians and nurses



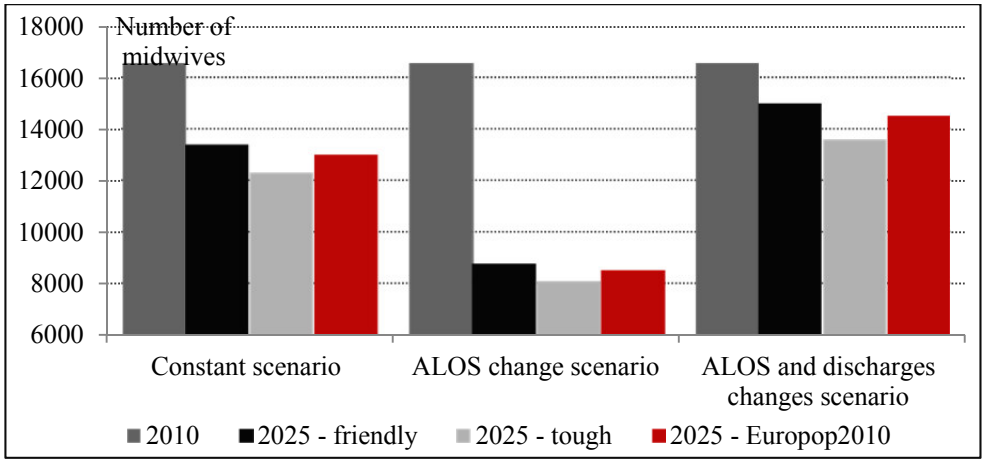
Source: Eurostat. NEUJOBS demographic variants own calculations.

Figure 31. The projection of demand for dentists



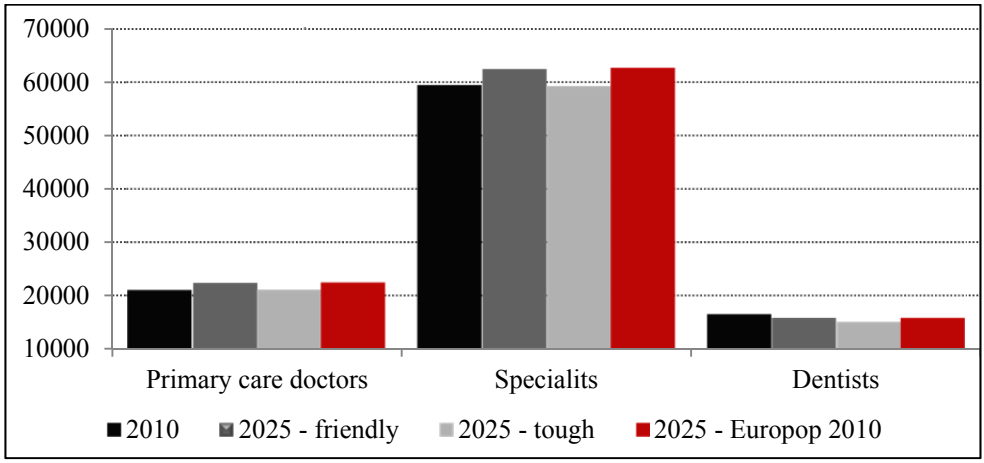
Source: Eurostat. NEUJOBS demographic variants own calculations.

Figure 32. Projections of demand for midwives



Source: Eurostat. NEUJOBS demographic variants own calculations.

Figure 33. Projection of demand for medical personnel in ambulatory health care



Source: GUS 2011, CSIOZ 2011, NEUJOBS demographic variants, own calculations.

The prognoses of the demand for midwives are based on the same assumptions that were applied for the other analysed medical professions, but only two groups of medical interventions are included: (i) pregnancy, childbirth and the puerperium (000-O99) and (ii) certain conditions originating in the perinatal period (P00-P96). These are used adequately for different patterns of utilization of care by women. As a result, the projected demand for midwives indicated a different future tendency; in each scenario the necessary level of midwife employment is decreasing.

Contrary to the prognosis of demand for the rest of the medical personnel, for midwives, differences between different scenarios are specific; the highest (but still negative) level of necessary employment is projected using a common assumption concerning demography, length of hospital stay and number of case changes.

4.2. Projection of workforce supply for health and social sectors

4.2.1. Main assumptions

The starting point of the projections for workforce supply for the health and social sectors is the estimate of the future workforce in the country. Similar to the projections of the demand side, in the projections of workforce supply two variants of population development are used – friendly and tough - and the projection period covers 15 years, with 2010 as the base year. The advantage of using this population prognosis is that it covers a wide age group (15-74), reflecting the actual employment trends in the health sector, and three educational levels of employees. The application of similar scenarios on both the demand and supply sides of the projection also ensures internal coherency as both projections are based on the same base-year population data[10].

The projection of the workforce supply for the health and social sectors used a top-down approach (Schulz 2013 based on Helmrich and Zika 2010). This method is based on the identification of the share of health care workforce in total employment and the observation of past trends with the underlying factors. The health sector workforce was calculated using two indicators (values): the size of total employment as well as employment in human health and social work (called Q sector). Projections of the future labour force in Poland are made under two demographic variants and two scenarios of activity rate development. In the first one, constant activity rates in the future are foreseen, while in the second

[10] Alternatively, one could use the demographic variant called Nemesis, prepared in the Neujobs WP9. While this demographic model perceives the health sector in the wide context of industry changes, it is not as specific with respect to the Q sector as the model presented in the current study. The Neujobs WP9 projection does not provide information concerning employment in the sub-sectors Q87 and Q88 separately. It also does not provide sex and age-specific employment data. Finally, the model prepared does not reflect the latest demographic changes and trends applied in the Neujobs demographic projections used.

one (called dynamic), activities are foreseen to change following the pattern observed in the last ten years in Poland.

So, in the first employment scenario, an assumption was made that employment rates by age and gender groups are constant in the entire forecasted period. This means that the main factors taken into account in the analysis are demographic changes in the size and structure of the population. These projections also take into account educational levels (primary and lower, lower secondary (levels 0-2), upper secondary and post-secondary non-tertiary education (levels 3 and 4) and the first and the second stage of tertiary education (levels 5 and 6). The employment rates used were adjusted to educational level, age, and gender and then merged with demographic projections.

Table 24. Assumptions used for labour market development scenarios

Scenario	Variants of population changes	Labour market activity rates
I. Constant	friendly	constant
	tough	constant
II. Dynamic	friendly	changes following the pattern of the last 10 years
	tough	changes following the pattern of the last 10 years

The main part of the prognosis concerns the workforce in sector Q (health care and social work) and its sub-sectors: Q86 (Human health), Q87 (Residential care activities) and Q88 (Social work activities without accommodation). The main assumption is that the share of workers employed in each sub-sector in relation to total employment is constant. This means that an assumption of the absence of any differences in the total employment structure was adopted. This assumption was made separately for each 5-year age and gender group. Detailed information on the share of workers in each sub-section (Q86, Q87, Q88) and age and gender specific data was based on the calculations from the annual Labour Force Survey data (year 2010). An attempt to adjust the prognosis for occupational structure was made; however, the results indicated a very small share of medical staff (only 13.2% of the total number of those employed in sub-section Q86; 12,1% in section Q87 and 9% in section Q88). Such results would need further confirmation with data from other sources. Since such data are not available, it was decided not to use these very initial results in the presented analysis.

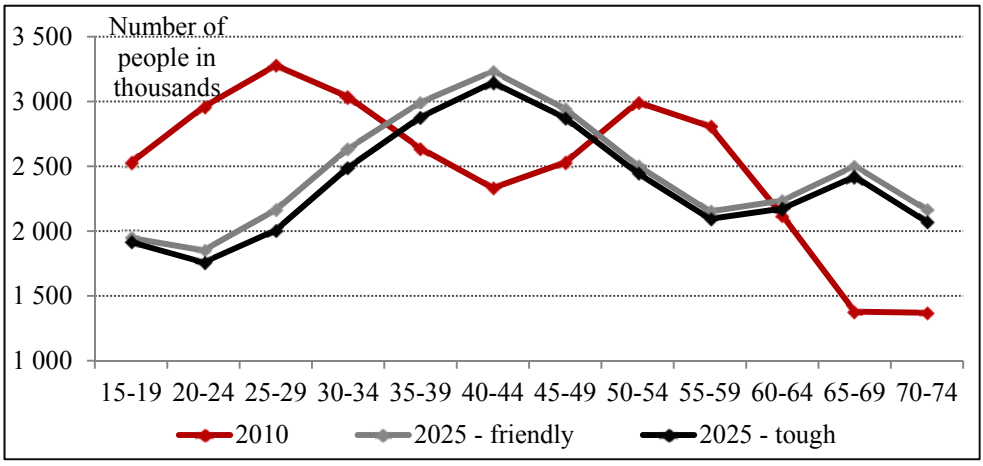
4.2.2. Projection of employment in the health care sector in Poland

The projection of employment in the human health and social work sector was made in three consecutive steps. The starting point was the projection of the working age population. This was followed by projections of the labour force and total employment and, finally, employment in the human health and social work sectors.

Prognosis of working age population

The prognoses of the labour market activity of the population and employment, including employment in the human health and social work sectors, are based on the LFS data. The data shows that the number of employees in Sector Q at the age of 70 and over was equal to about 7 thousand in 2010. That means that labour market activity in this sector is higher than the statutory retirement age.[11] Reflecting this pattern, the prognosis takes into account the actual period of labour market activity of the population covering the 15-74 age group.

Figure 34. Development of population aged 15-74 in the years 2010-2025



Source: NEUJOBS demographic variants.

The total number of people aged 15-74, according to both demographic variants, will be decreasing by the year 2025: by 2.2% in the friendly scenario

[11] The current retirement age in Poland is 60 for women and 65 for men. According to the legal regulations introduced in 2012, these limits will be gradually increased to 67, equally for women (by 2040) and men (by 2025).

and 5.7% in the tough one. The decrease in the number of people in this age group will be accompanied by a change in the age structure over time. The largest age group (20-29) will move to the 40-44 age group. This group will probably still be very active on the labour market. A similar situation is observed in the second largest group which is now 50-59. This group will slowly enter retirement and will be characterized by a very low labour market activity by 2025. Finally, the size of the youngest group of people active in the labour market (15-34) will decrease, even up to 30% in the tough variant of population changes.

Future development of labour force and employment

The projection shows a decreasing number of people active on the labour market caused by disadvantageous changes in the age structure of the Polish population: older workers leaving the labour market and a low inflow of young people into the labour market. The table below presents the results of the prognosis of the labour force for the year 2025 using two scenarios: constant (assuming the same level of activity rate in each age/gender group as in 2010) and changing (assuming an annual change of activity rate in each group equal to the average change over the last ten years). The total labour force in Poland amounted to 18.1 million in 2010. In the "friendly" demographic scenario, the total number of people active on the labour market will decrease by about 2.5% if labour market activity rates are assumed to remain constant and by about 3.4% if labour market activity rates are assumed to follow the pattern of the last decade, compared to 2010. The latter is due to the fact that the trend of decreasing activity rate was observed in many age groups in Poland over the last ten years. As a result, the second scenario is a more pessimistic one. In the "tough" demographic variant, the total number of labour market active people will decrease even more substantially: by about 7% if labour market activity rates are assumed to remain constant and by almost 8% if they reflect the trends of the last decade.

Table 25. Development of labour force in Poland

	2010	**2025**		**changes 2025/2010**		**changes 2025/2010 in %**	
		friendly	**tough**	**friendly**	**tough**	**friendly**	**tough**
	constant activity rates						
Labour force (millions)	18.09	17.63	16.82	-0.46	-1.27	-2.54%	-7.01%
males	9.92	9.52	9.08	-0.4	-0.84	-4.03%	-8.46%
females	8.17	8.11	7.74	-0.06	-0.43	-0.73%	-5.25%
Share of females (%)	45.16	46.00	46.02	0.84	0.86	1.86%	1.89%
Share of 55+ (%)	11.19	11.24	11.42	0.05	0.23	0.40%	2.02%
males	12.67	12.69	12.82	0.02	0.15	0.16%	1.16%

	2010	2025		changes 2025/2010		changes 2025/2010 in %	
		friendly	tough	friendly	tough	friendly	tough
females	9.40	9.53	9.78	0.13	0.38	1.43%	4.04%
Share of educated (%):							
low	8.12	4.19	5.73	-3.93	-2.38	-48.41%	-29.37%
medium	65.70	55.25	57.64	-10.46	-8.07	-15.92%	-12.28%
high	26.18	40.57	36.63	14.39	10.45	54.95%	39.93%
	changing activity rates						
Labour force (millions)	18.09	17.48	16.65	-0.61	-1.44	-3.39%	-7.97%
males	9.92	9.66	9.2	-0.26	-0.72	-2.59%	-7.21%
females	8.17	7.81	7.44	-0.36	-0.73	-4.35%	-8.90%
Share of females (%)	45.16	46.00	46.02	0.84	0.86	1.86%	1.89%
Share of 55+ (%)	11.19	11.63	11.85	0.44	0.65	3.90%	5.82%
males	12.67	13.84	14.03	1.17	1.36	9.22%	10.71%
females	9.40	8.90	9.15	-0.5	-0.25	-5.33%	-2.69%
Share of educated (%):							
low	8.12	3.68	5.02	-4.43	-3.1	-54.64%	-38.14%
medium	65.70	56.01	58.46	-9.7	-7.25	-14.76%	-11.03%
high	26.18	40.31	36.52	14.13	10.35	53.98%	39.52%

Source: Eurostat. NEUJOBS demographic variants own calculations.

Table 26. Development of employment in Poland

	2010	2025		changes 2025/2010		changes 2025/2010 in %	
		friendly	tough	friendly	tough	friendly	tough
Employment (millions)	16.32	16.27	15.47	-0.05	-0.85	-0.32%	-5.22%
males	8.98	8.78	8.34	-0.2	-0.64	-2.22%	-7.10%
females	7.34	7.49	7.13	0.15	-0.21	1.99%	-2.91%
Share of females (%)	44.97	46.01	46.06	1.04	1.09	2.32%	2.43%
Share of 55+ (%)	11.58	11.48	11.71	-0.1	0.13	-0.85%	1.08%
males	13.02	12.91	13.09	-0.11	0.07	-0.84%	0.53%
females	9.82	9.81	10.09	-0.01	0.27	-0.13%	2.72%
Share of (%):							
low educated	7.38	3.75	5.10	-3.63	-2.28	-49.16%	-30.93%
medium educated	65.08	53.95	56.48	-11.13	-8.61	-17.10%	-13.22%
high educated	27.53	42.29	38.42	14.76	10.89	53.60%	39.55%

Source: Eurostat. NEUJOBS demographic variants own calculations.

An important change will be observed in the structure of the labour force by education level – in the next 15 years, the group with high levels of education

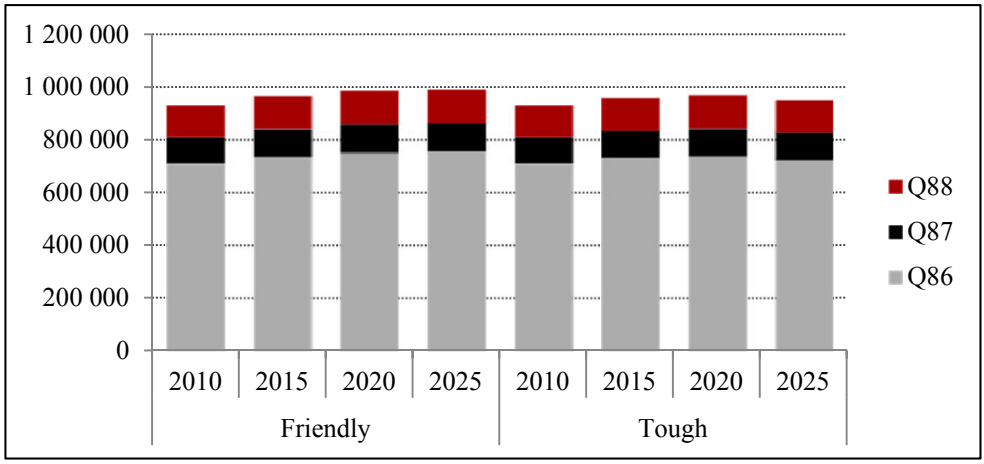
will strengthen in the labour market (and grow by at least 10 percentage points) and the size of groups with low and medium education levels will decrease. However, the biggest group of employees will still be medium-educated workers.

According to the prognosis using the "friendly" demographic variant, the change in the number of workers will be nearly the same in 2015 as in 2010 (only -0.32% of change). In the "tough" scenario, a larger decrease is foreseen, amounting to 5.22% (see Table 26). As in the case of labour force, a significant difference can be observed in the structure by education: even about 40% of workers will have a high level of education.

Future development of employment in Q sector

Total employment in the Q sector – human health and social work – was more than 932.5 thousand workers in 2010, constituting 5.7% of total employment. Projections of the future development of the human health and social work workforce show an increase of employment in absolute and relative terms, although the dynamics of this increase vary between the two scenarios applied.

Figure 35. Projection of employment in Q sector



Source: Eurostat, own calculation based on LFS data, NEUJOBS demographic variants.

Differences in projections of the size of the workforce in the Q sector between two variants of demographic changes are very small. In the friendly variant, a small increase of employment is foreseen, constituting almost 6.1% of total employment in 2025. In the tough variant of population change, a growth in employment is projected until 2020 and then a slight decrease, especially in the human health section. Despite this small decrease, the overall trend is rising and the share of employment in the health sector is foreseen to constitute 6.15%

of total employment in 2025. Differences between variants are attributable to the two variants of demographic changes.

According to the projections, an increase in employment in the health and social sectors will take place despite the decrease in total employment. The largest share of employment is foreseen in the human health subsector, followed by social work and residential care. Additionally, a specific feature of employment development in the analysed sectors is that the participation of females in the workforce is very high. Nurses, midwives and personal caretakers are mostly women.

Table 27. Changes in employment in Q-sector between 2010 and 2025

Indicators	2010	2025		changes 2025/2010		changes 2025/2010 in %	
		friendly	tough	friendly	tough	friendly	Tough
Employment - total (millions)	16.32	16.27	15.47	-0.05	-0.85	-0.32%	-5.22%
Employment in Q-sector							
Number of workers (thousands)	932.5	992.25	951.08	59.75	18.58	6.41%	1.99%
As a share of total employment (%)	5.71	6.10%	6.15	0.39	0.43	6.75%	7.61%
Share of females (%)	81.89	82.70	82.76	0.81	0.87	0.99%	1.06%
Share of 55+ workers (%)	24.99	27.32	27.81	2.32	2.82	9.30%	11.30%
Employment in Q86 sector (Human health)							
Number of workers (thousands)	711.5	758.09	726.92	46.59	15.42	6.55%	2.17%
As a share of employment in Q-sector (%)	76.30	76.40	76.43	0.1	0.13	0.13%	0.17%
Share of females (%)	80.46	81.38	81.46	0.92	1	1.14%	1.24%
Share of 55+ workers (%)	25.45	28.19	28.69	2.74	3.24	10.78%	12.74%
Employment in Q87 sector (Residential care activities)							
Number of workers (thousands)	100.7	107.5	102.97	6.8	2.27	6.75%	2.26%
As a share of employment in Q-sector (%)	10.80	10.83	10.83	0.03	0.03	0.32%	0.26%
Share of females (%)	81.63	82.07	82.12	0.45	0.49	0.55%	0.60%
Share of 55+ workers (%)	23.84	24.15	24.58	0.31	0.74	1.30%	3.12%
Employment in Q88 sector (Social work activities without accommodation)							
Number of workers (thousands)	120.3	107.5	121.18	-12.8	0.88	-10.64%	0.74%

Indicators	2010	2025		changes 2025/2010		changes 2025/2010 in %	
		friendly	tough	friendly	tough	friendly	Tough
As a share of employment in Q-sector (%)	12.90	10.83	12.74	-2.07	-0.16	-16.02%	-1.23%
Share of females (%)	90.52	91.08	91.10	0.56	0.58	0.61%	0.64%
Share of 55+ workers (%)	23.24	24.75	25.28	1.51	2.04	6.51%	8.79%

Source: Eurostat, own calculation based on LFS data, NEUJOBS demographic variants.

It is worth noting that already in the base year (2010), the proportion of older workers (55+) in the Q sector is quite large, accounting for one fourth of employment in each subsection. Due to demographic changes, the share of older workers is foreseen to increase in the future, especially in the human health and social work subsections. As a result, two phenomena could be observed as the demand for care and the supply of work will be driven by age. There will be an increase in the proportion of elderly patients on the one hand and elderly medical staff and caretakers on the other hand.

4.3. Comparison of projections of medical personnel from the supply and demand approach

The gap in supply and demand of medical personnel cannot be estimated based simply on the above presented projection as they need to refer to the same type and scope of information. As it was mentioned, available sources of information differentiate in the range of statistical information covered, and so are above projections: the demand projections is made based on the information of employed medical personnel by the main work position while supply projections based on data of work positions covered by employment of medical personnel. So, it takes into account so called double employment. Thus, the results had to be corrected with an estimated "dual employment" indicator. This indicator was calculated as a ratio of the number of the employed in the health care system as a medical personnel to the number of medical work positions in tertiary, secondary and primary health care, allowing for downsizing the number of foreseen work positions to the number of employed physicians by the main (primary) work position. It was assumed that this feature of the health care system in Poland, where many doctors work in more than one institution will not change over the next decade.

Following the adjustment of the range of the projections, the estimation of the gap in supply and demand for professional medical personnel was performed, using two demographic variants (friendly and tough) and – when demand for care is concerned - the baseline (constant) scenario, taking into account pure demographic changes.

The supply of professional medical care was estimated for all the main medical professions: physicians, dentists, pharmacists, nurses, midwives, medical analysts, physiotherapists and medical rescuers. Statistical information on the size of employment in each of the listed professions was taken from the presented above administrative data. Medical staff employed in the long-term care sectors was excluded from the analysis. At the same time, the analysis included technical medical personnel in the health care sector. Projections of the supply of the medical professionals were made taking into account the share of each of the professions in relation to the Q86 (human health) sector employment.

Table 28. The gap in supply and demand for care in the health sector

	Friendly				Tough			
	2010	**2015**	**2020**	**2025**	**2010**	**2015**	**2020**	**2025**
Physicians	0	1 333	1 248	-710	0	1 393	1 896	831
Dentists	0	596	1 020	1 243	0	575	1 002	1 263
Pharmacists	0	263	168	-250	0	255	264	18
Medical analysts	0	42	27	-40	0	40	42	3
Nurses	0	1 835	545	-4 791	0	2 046	2 294	-897
Midwifes	0	848	2 538	4 195	0	891	2 818	4 628
Physiotherapists with higher education	0	-31	-115	-220	0	-33	-105	-195
Medical rescuers	0	109	70	-104	0	106	110	7
TOTAL	**0**	**4 994**	**5 502**	**-677**	**0**	**5 274**	**8 319**	**5 658**
Technical medical personnel	**0**	**304**	**0**	**-744**	**0**	**286**	**128**	**-367**
TOTAL higher and technical medical personnel	**0**	**5 298**	**5 501**	**-1 421**	**0**	**5 560**	**8 447**	**5 291**

Source: Own calculation.

The comparison of gaps shows deficit of medical personnel in the friendly variant in 2025. The deficit concerns nurses, physicians and technical medical personnel especially. In the tough variant, the deficits conserns mainly nurses and – to a lesser extent – physiotherapists and technical medical personnel, while it is not recorded for other medical professions.

5. Conclusions

The general result of the presented projections of demand for the health care workforce seems trivial at first sight. Changes in the structure of the population will lead to an increase in the elderly people and a decrease in the share of youth and adults. This will further lead to an increase in the use of ambulatory, specialist and hospital care. Such an effect could lessen with shrinking population size.

Analysis of the foreseen workforce gap presents a slight modification of this effect, using two main demographic variants of performed projections. In the friendly variant, with higher fertility rate, shortage of in every medical profession is observed in the last year of the projection period. In the tough variant, when more radical demographic changes are assumed, there is no shortage in the total number of medical personnel due to the fact that health needs are lower as a result of rapid population shrinkage and a change in population structure. The only exception is a shortage in nurses and – to a lesser exten – physiotherapists and technical medical personnel.

The shortage in nursing personnel constitutes the main risk factor for the effectiveness (in terms of health outcomes) functioning of health care in the future. Results of the European Project RN4CAST[12] indicate how big this risk can be. Results of one of the analysis show a significant correlation between the number of nurses employed in hospitals and patients' mortality.

More in-depth analyses and projections, taking into account additional variables and scenarios, show a more differentiated picture, enabling the formulation of recommendations for health policy. The main results show that:

- When the prognosis of the health workforce demand in each of the three variants of demographic development (pure demographic, friendly and tough) takes into account "efficiency" indicators such as ALOS and hospital discharges, the demand for the health workforce is foreseen to be slightly lower than demographic changes would indicate. However, a further improvement of efficiency indicators is highly unlikely. The dynamics of efficiency improvements in Poland have been very high in recent years due to the introduction of reforms aimed at streamlining

[12] Forecasting nursing. Planning human resources in nursing – http://www.rn4cast.eu/en/index.php.

the management of health care units. It can be foreseen that the dynamics of improvement in efficiency indicators used in the projections will be lower in the coming years, especially when the older population is concerned. The projection of demand for different groups of medical professionals clearly shows that in every group of medical staff, the observed increase is high (11% growth) except for midwives in the constant scenario for Europop2010, where a decline in demand is observed (even over 20%). The most significant decline in the demand for midwives (as much as a 50% of decrease) appears in the tough population variant due to the highest fertility decrease accompanied by efficiency changes in ALOS. Generally, the projected changes in a structure of considered professional groups are very slight. In the whole prognosis period, nurses represent 60-61% of the hospital workforce and physicians about 33%. In ambulatory care, the share of dentists is projected to be slightly less (1.3 percentage point) than in 2010, while a very slight increase in the share of primary care doctors and specialists is foreseen.

- When the prognosis of the health workforce demand in the variants of demographic development above take into account the supply side, namely employment trends in the total economy as well as in the human health and social work sectors (Q sector), the projected number of workers in the Q-sector increases between 2010 and 2025 by 6.4% in the friendly variant and 2.0% in the tough variant. As regards the structure of the supply of workforce in the Q sector, results indicate firstly, a higher share of qualified labour force in the Q sector (the projected share of better educated members of the workforce is high in general). Secondly, the results indicate a significant increase in the proportion of elderly (55+) employees among the medical staff and caretakers in the future. This presents an important challenge for the development of the education of medical and social workers, which should be made a priority, unlike in recent years.

Literature

Boulhol H., Sowa A., Golinowska S., Sicari P. (2012), Improving the health-care system in Poland. OECD Working Paper No 957 http://search.oecd.org/officialdocuments/displaydocumentpdf/ ?cote=ECO/WKP(2012)34&docLanguage=En

CSIOZ (Center for Information Systems in Healthcare), Statistical Bulletins of the Ministry of Health 2001-2012 (Biuletyny Statystyczne Ministerstwa Zdrowia 2001 - 2012) http://www.csioz.gov.pl/publikacja.php?id=6

Domagała A. (2004), Wpływ reformy ochrony zdrowia na zmiany w strukturze i warunkach zatrudnienia kadr medycznych [Impact of the health reform on changes in employment structure and labour conditions of medical workforce]. PHD Thesis, Wydział Nauk o Zdrowiu, UJ Collegium Medicum, Krakow.

EU (2008), Green Paper on the European Workforce for Health, COM(2008) 725, Brussels.

EU (2012), Employment and Social Situation. Special Supplement on Health and Social Services, Quarterly Review, December 2012.

EU (2012), EU level Collaboration on Forecasting Health Workforce Needs, Workforce Planning and Health. Workforce Trends – A Feasibility Study. Matrix Insight.

ECFIN (2012), The Aging Report. Economic and budgetary projections for the 27 EU Member States (2010-2060), in: European Economy No 2/2012.

Golinowska S., Sowa A. (2010), Działania samorządów lokalnych w opiece i integracji niesamodzielnych osób starszych [Local governments' action in care and integration of dependent elderly], raport Instytutu Pracy i Spraw Socjalnych na zlecenie Ministerstwo Pracy i Polityki Społecznej, Warszawa.

Golinowska S., Tambor M. (2012), Out of pocket payment on health in Poland. Size, tendency and willingness to pay, Policy Paper, ASSPRO 2007, Maastricht.

Golinowska S. et al. (2012), Równowaga finansowa oraz efektywność w polskim systemie ochrony zdrowia. Problemy i wyzwania [Fiscal equlibrium and efficiency in the Polish health system. Problems and challenges] VESALIUS, Kraków.

Griffin Ch., Golinowska S., Kocot E. (2010), Main drivers of health expenditures in Poland; analysis and projections, memo WB Office in Warsaw.

GUS (2011), Zdrowie i ochrona zdrowia w 2010 r. [Health and health care in 2010], Warsaw.

Matrix Inside (2012), EU-level cooperation of forecasting health workforce needs, workforce planning and health workforce trends – a feasibility study, http://ec.europa.eu/health/workforce/docs/health_workforce_study_2012_report_en.pdf.

MZ [Ministry of Health] (2004), Raport - Zielona Księga finansowania ochrony zdrowia w Polsce [Green book on financing health care in Poland], Warszawa.

Mladovsky P. and Leone T. (2010), Specialist human resources for health in Europe: are we ready? The Health Policy Bulletin of the European Observatory on Health Systems and Policies, vol. 12 No 2.

Golinowska S. et al. (2009), Finansowanie ochrony zdrowia w Polsce. Zielona Księga II [Financing of health care in Poland. Green book], Uniwersyteckie Wydawnictwo Medyczne Vesalius, Kraków.

Grodzicki T. (2012), Stan zdrowia osób starszych w Polsce [Health status of the elderly in Poland] (wyniki badania POLSENIOR).

Mossakowska M., Więcek A. i Błędowski P. (red.) (2012), PO:SENIOR: Aspekty medyczne, psychologiczne, socjologiczne i ekonomiczne starzenia się ludzi w Polsce [Medical, psychological, sociological end economic aspects of aging in Poland], Termedia Wydawnictwa Medyczne i Specjalistyczne.

NFZ; data on-line.

OECD (2011), Health at a Glance 2011. OECD Indicators.

OECD (2012), Health at a Glance: Europe 2012, Paris.

MRR [Ministry of Regional Development] (2012), Średniookresowa Strategia Rozwoju Kraju [Midterm strategy for country's development], Warszawa.

Schulz E. (2013), Impact of ageing on curative health care workforce. Country report for Germany, NEUJOBS WP12 paper.

Wojtyniak A, Goryński P. (red.) (2008 & 2012), Sytuacja zdrowotna ludności Polski [Health status of the Polish population], NIZ – PZH, Warszawa.