Health workforce demand and supply across the European Union

BASYS

May 2022

Summary Report

© Copyright 2022. BASYS GmbH, All rights reserved. Reproduction or translation of this publication, in part or in full, with appropriate credit of the source is permitted.

Study financed by the European Institute of Health and Sustainable Development.

Authors

Markus Schneider

Thomas Krauss

Marian Craig

Aynur Köse

Uwe Hofmann

BASYS

Beratungsgesellschaft für angewandte Systemforschung mbH

Reisingerstraße 25

D-86159 Augsburg, Germany

EIHSD

European Institute of Health and Sustainable Development

Public Institution (NGO), Civil Registry Code – 305493062

Petro Vileišio g. 18 A. 301

10306 Vilnius, Lithuania

Preface

This summary report brings together data gathered by various European institutions and international organisations, about health workforce across the European Union. In a few cases the data have been supplemented by national studies. Despite presenting graphs for all 27 MS, the conclusions of this report build on a more detailed analysis of 20 country profiles. All indicators used in this report are standardized for the period 2007 – 2017, in order to depict the developments in a shared time frame.

The results of the report were discussed in an EIHSD workshop on 16-17 May 2022 in Augsburg under the title "Reconciling freedom of movement of labour with universal health coverage in the European Union" focusing on policy instruments available nationally and EU-wide to address health workforce shortage, and what data are needed to inform these policy instruments. Although the shortages in health and social care workforce are widely discussed there is an overview missing about the health workforce imbalances in EU27 across Member States. This report tries to close this gap.

Contents

1 Executive Summary 7
2 Imbalances of health workforce 12
2.1 Overall health workforce by sectors and professions 12
2.2 Growth of health workforce 16
2.3 Graduates 18
3 Health workforce markets, migration and working conditions 21
3.1 Migration of health workforce 21
3.2 Compensation of health workforce and income growth 24
3.3 Working hours 25
3.4 Capital intensity 26
3.5 Job vancany rate 27
4 EU27: convergence of health coverage and working conditions 28
4.1 Projection of potential workforce supply 28
4.2 Projection of health care demand 29
4.3 Health workforce shortages 30
5 Conclusions and Outlook 31
5.1 Standardised health workforce volume per population 31
5.2 Professional and spatial mismatches 33
5.3 Health workforce and health coverage 35
5.4 Organisation of health care provision 36
5.5 Data 37
5.6 Convergence and synchronisation 38
6 Annex: Methodology 40
6.1 Indicators 40
6.2 Data sources 41
6.3 Estimation of missing values 42
7 References 42
8 Glossary 44
9 Annex 46

Content of figures

Figure 1: Scoreboard of HWF summary indicators, LTSS Approach, migration negatively weighted 7
Figure 2: Scoreboard of HWF summary indicators, LTSS Approach, migration positively weighted 8
Figure 3: HWF density, SPPM Approach 9
Figure 4: Health workforce density per 100 inhabitants by sectors and professions in persons, 2017 ... 13
Figure 5: Map - Health services and social care workforce per 100 inhabitants, 2017 14
Figure 6: Map – Doctors and nurses / other professions per 100 inhabitants, 2017 15
Figure 7: Growth of health services and social care workforce in percent, 2007 - 2017 17
Figure 8: Growth of health workforce by professions in percent, 2007 - 2017 18
Figure 9: Health graduates* as % of doctors and nurses, 2017 19
Figure 10: Health graduates per 1,000 capita, 2017 19
Figure 11: Density of medical and nurse graduates per 1,000 inhabitants, 2017 20
Figure 12: Cumulative net migration, 2007 - 2017 21
Figure 13: Foreign trained doctors and nurses, 2017 22
Figure 14: Source and destination of migration of medical doctors, 2013-2019 23
Figure 15: Compensation of health workforce per hour, Q, 2017 24
Figure 16: Growth of compensation per employee, QA, 2007 - 2017. 24
Figure 17: Annual working hours per employed person in 1000, 2017 25
Figure 18: Growth of annual working hours per employed person, Q, 2007 - 2017 26
Figure 19: Capital intensity in 1,000 EUR, 2017 26
Figure 20: Growth of capital intensity in %, 2007 - 2017 27
Figure 21: Job vacancy rate, 2017 27
Figure 22: Growth of potential labour force in percent, 2019 - 2030 28
Figure 23: Additional health and long-term care expenditures as % of GDP, 2030 29
Figure 24: Growth of elderly population, 2020 - 2030 29
Figure 25: Projected demand for additional health workforce in 2030 in % of current workforce 30
Figure 26: Health workforce volume per capita in hours, Q 32
Figure 27: Health workforce volume matrix, Q 33
Figure 28: Health expenditure and health workforce volume, QA, 2017 35
Figure 29: Share of health workforce on total employment in percent, 2007 - 2017 36
Figure 30: Share of hospital staff on health workforce, 2007 - 2017 37
Figure 31: Coefficient of variation 2017 to 2007 38
Figure 32: Density of health services staff and social care staff per 100 inhabitants, 2017. 46
Figure 33: Density of health professions per 100 inhabitants, 2017. 47
Figure 34: Health services workforce as % of health workforce, 2017. 48
Figure 35: Draft HWF scorecard, LTSS approach, EU27 49
Figure 36: Draft dashboard, SPPM approach, 2007-2017 50

Abbreviations

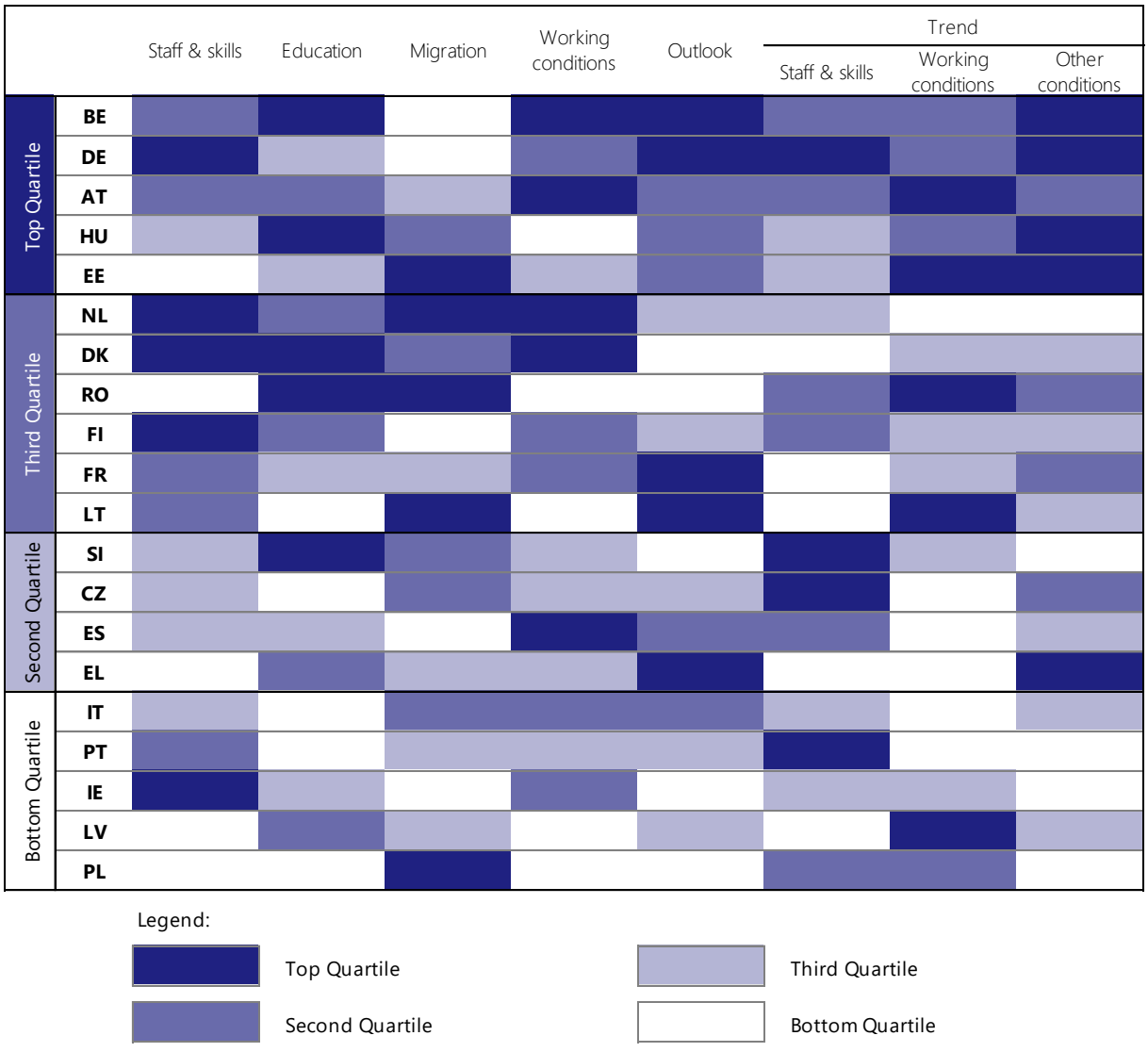
AR	Ageing Report
Cedefop	European Centre for the Development of Vocational Training
EC	European Commission
EPM	Employment Performance Monitoring
EU	European Union
EUR	Euro (currency)
EUROPOP	Eurostat demographic projections
Eurostat	European Statistical Office
GDP	Gross domestic product
GPs	General Practitioners
GSO	Good social outcome
GVA	Gross Value Added
ILO	International Labour Office
JVR	Job Vacancy Rate
JVS	Job Vacancy Statistics
LTSS	Long-Term Services and Supports
KSC	Key Social Challenge
MS	Member States
NACE	Statistical classification of economic activities
OECD	Organisation for Economic Co-operation and Development
PES	Public Employment Services
PPP	Purchasing Power Parity
Q	Health and Social Care (NACE 86-88)
QA	Health Services (NACE 86)
QB	Social Care (NACE 87-88)
RPD	Regulated Professions Database
SDG	Sustainable Development Goal
SPPM	Social Policy Performance Monitoring
WHO	World Health Organisation

1 Executive Summary

This report deals with imbalances in supply and demand of health workforce across the EU27 Member States, based on a set of indicators which are listed in the annex of this summary report. The aim is to give a description of health workforce imbalances, an overview of possible causes, and the expected future development of these imbalances. The report is supplemented by 20 country reports comparing a set of health workforce indicators with the EU average. Definitions and borderlines of health workforce are mainly governed by the framework of the European System of National Accounts because the System of Health Accounts has not yet implemented labour accounts.

Figure 1 shows the position of 20 MS with regard to indicators discussed in this report according to the five dimensions of staff and skills, education, migration, working conditions, and outlook. The values are grouped into four quartiles (top, second, third, fourth quartile) according to the Long-Term Services and Supports (LTSS) Methodology. Dark areas indicate the top quartile and better results. The composite scores shown in Figure 1 are derived by grouping the variables and giving each indicator the same weight (see Figure 35: Draft HWF scorecard, LTSS approach, EU27.

Figure 1: Scoreboard of HWF summary indicators, LTSS Approach, migration negatively weighted



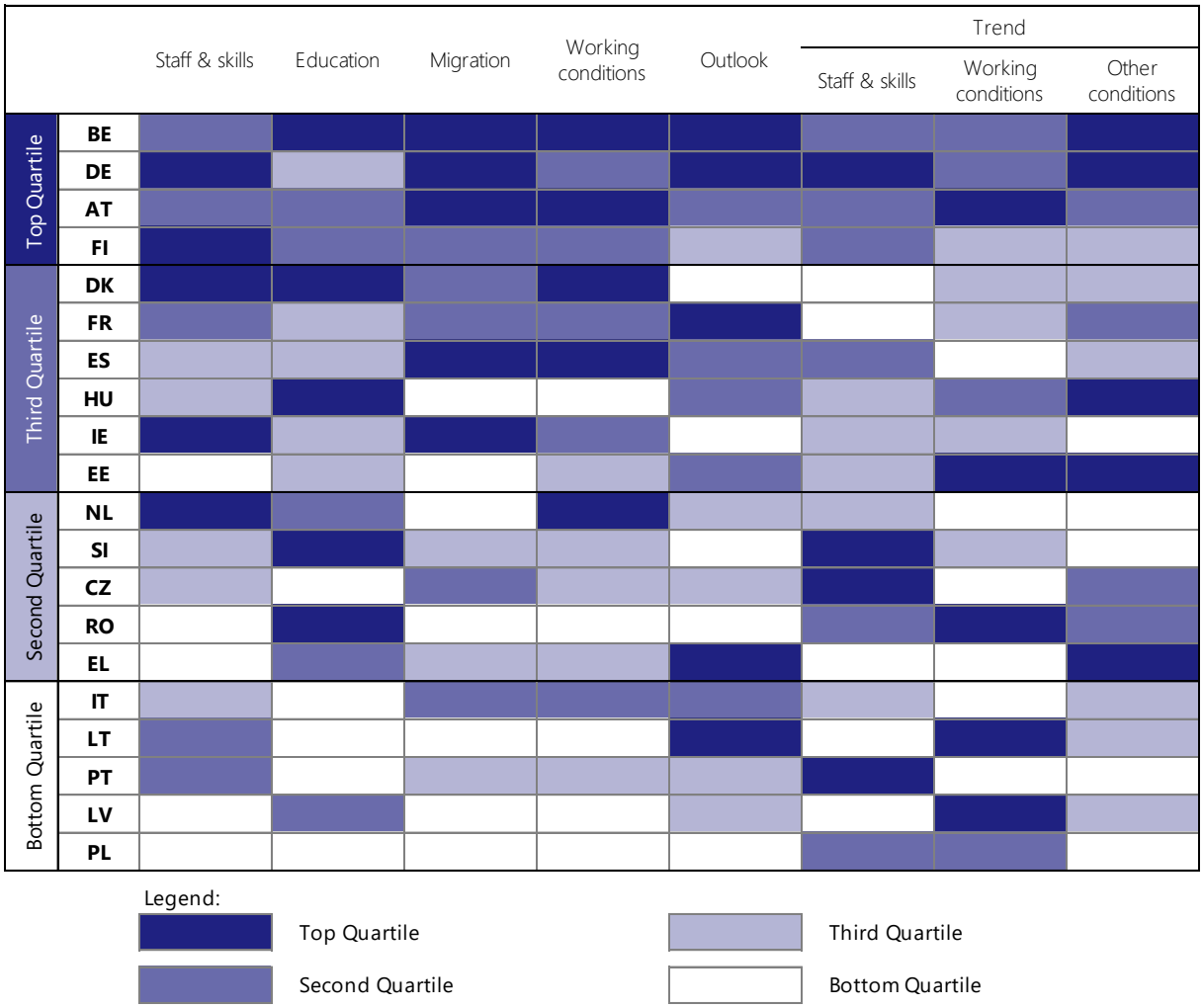
Source: BASYS based on Figure 35, 20 countries.

Because of missing values, Figure 1 does not show "trends" for all dimensions, only for staff and skills, working conditions, and other conditions, which include the subdimensions of workforce projection, ageing, and expected health expenditures as percent of GDP.

No country has dark blue fields in all eight columns shown in Figure 1. Only Belgium and Germany reach the top quartile in five columns with the highest rank. Austria reaches the highest ranks in the top quartile in two columns, Estonia and Hungary do so in the top quartile in three columns. The ranking in the top quartile depends on the total number of points the country reached. The maximum value is 24 equals 3x8. Belgium gets 18 points, Germany and Austria get each 17 points. Hungary and Estonia reach both 14 points.

In the second quartile, Romania, Denmark, and the Netherlands get each 13 points, followed by Finland, France, and Lithuania with 12 points each. In the third quartile fall Slovenia, Czechia, Spain, and Greece, with points between 12 and 11. In the bottom quartile are the countries Italy, Portugal, Ireland, Latvia, and Poland rated between 9 and 7 points.

Figure 2: Scoreboard of HWF summary indicators, LTSS Approach, migration positively weighted



Source: BASYS based on Figure 35, 20 countries.

The position of the country depends very much on the selected dimensions and the polarity of the indicators towards the objectives. For example, if the higher country' shares of foreign doctors and nurses are positively weighted Hungary and Estonia will lose their position in the top quartile (see Figure

2). A higher share of foreign-trained health professions from EU-MS means a greater integration of the EU health labour and education market while a lower share indicates a greater self-sustainability. The efficiency of health systems is another dimension not yet reflected in the scoring in Figure 1 and Figure 2). For example, Poland and Latvia managed to have one of the highest productivity growth rates in the period 2007 – 2017. Their position would therefore change in an expanded assessment framework.

The scoring and ranking methodology of the LTSS Scorecard provides one possible framework for summarizing and assessing the various imbalances of health workforce across MS. Another assessment framework already used by the European Commission (EC) is the Employment Performance Monitor (EPM) and the Social Policy Performance Monitor (SPPM). In contrast to the LTSS approach, both EC approaches make an explicit assessment, considering both the level and the change of the indicators as compared to the European average. Furthermore, instead of four bands, countries are classified into five bands (very high, high, medium, low, very low). For example, the indicator HWF density shows a Good Social Outcome (GSO) in only two countries, but in eight countries a Key Social Challenge (KSC) (see Figure 3).

Figure 3: HWF density, SPPM Approach

Source: BASYS based on Figure 36, 27 countries.

In the terminology of the EPM the KSCs are identified as Key Employment Challenges (KECs) and Good Labour Market outcomes (GLMOs) while using different cut-off points (European Commission 2021d).

Obviously, the assessment of the imbalances differs depending on their assessment framework, their measurement, and the comparative cut-off points to value them. A key question remains therefore, on how to measure cross-country imbalances in health workforce, and to use these measures to address health and employment policy.

Future population development, income growth, and public health and long-term care expenditures will have a strong impact on the development of supply and demand for health workforce. In light of the overall workforce projections, one can expect an increasing tension between supply and demand for health and social care professionals. Although the projections of the demand side are strongly influenced by non-demographic factors such as income growth, productivity gains, and national health spending priorities, all MS will face pressures to expand and reorganise their health systems. In the short term, migration flows from Ukraine might help to mitigate some of the health workforce shortages.

Chapter 2 summarizes imbalances of health workforce on the supply side across Member States, based on analysis of 11 indicators. The structure of workforce by both sectors and professions are presented. Furthermore, differences in the education of health professions are outlined. One result of this analysis is the huge difference in "other health professions" in Member States, beside the variation of doctors and nurses. Other health professions such as technicians, assistants, and administrative staff, form the largest group of health workers in European countries within the most developed health systems.

The changes of health workforce depicted in this section have shown, on average, a stronger growth in social care than in health services, and a stronger growth of nurses and other health professions than doctors. Imbalances on the supply side manifest themselves not only in the vast variation of density ratios of health professions per population, but also in the mix of health professions such as the nurse to doctor ratio. Imbalances across EU27 are the results of many factors on the supply and demand side. They are influenced by many factors, including, importantly, health system organisation, as well as on statistical definitions. Task shifting from physicians to nurses and other health professions, as a strategy to alleviate shortages, and improve quality and efficiency in the long run might temporarily contribute to these mismatches.

Efforts to educate nurses are very unevenly distributed across Member States. Countries in the centre of Europe are able to attract nurses from other countries, through better pay and working conditions. The increasing demand for health professionals requires additional investment in programmes of education and training.

Chapter 3 focuses on specific determinants which contribute to or mitigate the above-mentioned imbalances in health workforce, especially labour force growth, migration and working conditions. The chapter depicts developments of 9 indicators, which show that access to health services and social care has improved across countries, without, however, reducing existing imbalances. In general, countries with low health workforce densities have higher working times and vice versa: high workforce density involves a lower working time on average. The same holds for the relation between the wages of health workforce and workforce density.

Both national and international factors contribute to the imbalances across Europe. The national capabilities and organisation of different health systems, reveal different levels of health services and social care coverage. Obviously, these imbalances are partly related to unequal living conditions in Europe. However, the national design of the institutional framework of health systems, supported by the principle of subsidiarity, has created different structures of supply and demand for health workforce. As a consequence, in the period 2007 – 2017, some of the health workforce indicators have diverged, while some have converged across Europe.

The dynamic development of health care demand has pushed all MS to expand and reorganise their health systems since the economic and financial crises. Migration flows across MS have mitigated or aggravated this pressure.

Chapter 4 attempts to look into the future, projecting both the supply and demand of health workforce until 2030. The projections use assumptions of the Ageing Report 2021, which compiled several scenarios for population development, income growth, and public health and long-term care expenditures. As a consequence of the overall workforce projections, on the supply side one can expect an increasing tension in health workforce markets, in order to replace and engage health professionals. Productivity gains might play an essential remedy to reduce the workforce gaps. The results on the demand side are rather unclear, as non-demographic factors such as income growth, access regulations, and national health spending priorities can make significant differences.

Chapter 5 draws some preliminary conclusions and provides some roadmaps for convergence and divergence of health workforce across EU27. The WHO Global Strategy on Human Resources for Health: Workforce 2030 requires that all countries are making progress on health workforce registries to track health workforce stock, education, distribution, flows, demand, capacity, and remuneration, However, statistical offices have to date not agreed on a standardized health labour accounting system and assigned the resources needed to do this.

In 2017, based on national accounts data, 68.4 hours of health services and social care were provided on average per capita in the EU27. The maximum hours per capita are served in Sweden and the minimum hours in Bulgaria. Changes between 2007 and 2017 varied significantly; most notably Denmark and Latvia faced a fall in the number of health workforce hours per capita (-6.3 and -0.5 percent in 2017 compared with 2007), while Luxembourg and Portugal reported an increase by 26.5 and 21.5 percent. Many Member States have not been able to improve their health workforce volume per capita in line with the average growth rate of EU27. One precondition for the convergence of labour productivity in health care is the convergence of capital intensity. Some good news in this report is the higher growth rate of capital intensity in many EU countries in the East of Europe.

2 Imbalances of health workforce

This chapter deals with the imbalances of health workforce across EU27 MS at the supply side. Health workforce is one of the building blocks defined in the WHO health system framework. A sustainable, resilient, equitably distributed and accessible workforce is key to health service coverage and delivering highest attainable care standards. Sufficient health workforce is a precondition for the Sustainable Development Goal 3: Ensure healthy lives and promote well-being for all at all ages. Related to the SDG 3 the "EU is moreover investing in the health workforce which includes joint actions to support Member States to invest in health workforce planning and health workforce skills analysis" (EC 2016).

There are many imbalances within and across European health systems. The shortages of qualified health workes in European health systems are widely recognised. Despite actions to improve education and training capacities as well as health care planning the imbalances between supply and demand within and across Member States remain high. Remarkable are also the variations in the dynamic of health workforce in the diverse sectors of the European health systems. This chapter aims to give an overview on the crucial imbalances among MS, which occurred during the last decade.

Health workforce is a growing part of the labour force of the economy. In most countries, jobs in health services and social care have increased much more rapidly than in other sectors during the last decades. On average, employment in health services and social work increased by 41 percent or more than 6 million persons between 1997 and 2017 across EU27 countries, outpacing even the growth in the service sector, while employment in agriculture and industry continued to decline during that period.

At the same time, the health services and social care sector has also been more robust to cyclical downturns than other sectors. While total employment declined during the global economic crisis in 2008-09, employment in the health services and social care sector continued to grow in almost all EU27 countries. The same could be observed in the Covid-19. Pandemic.

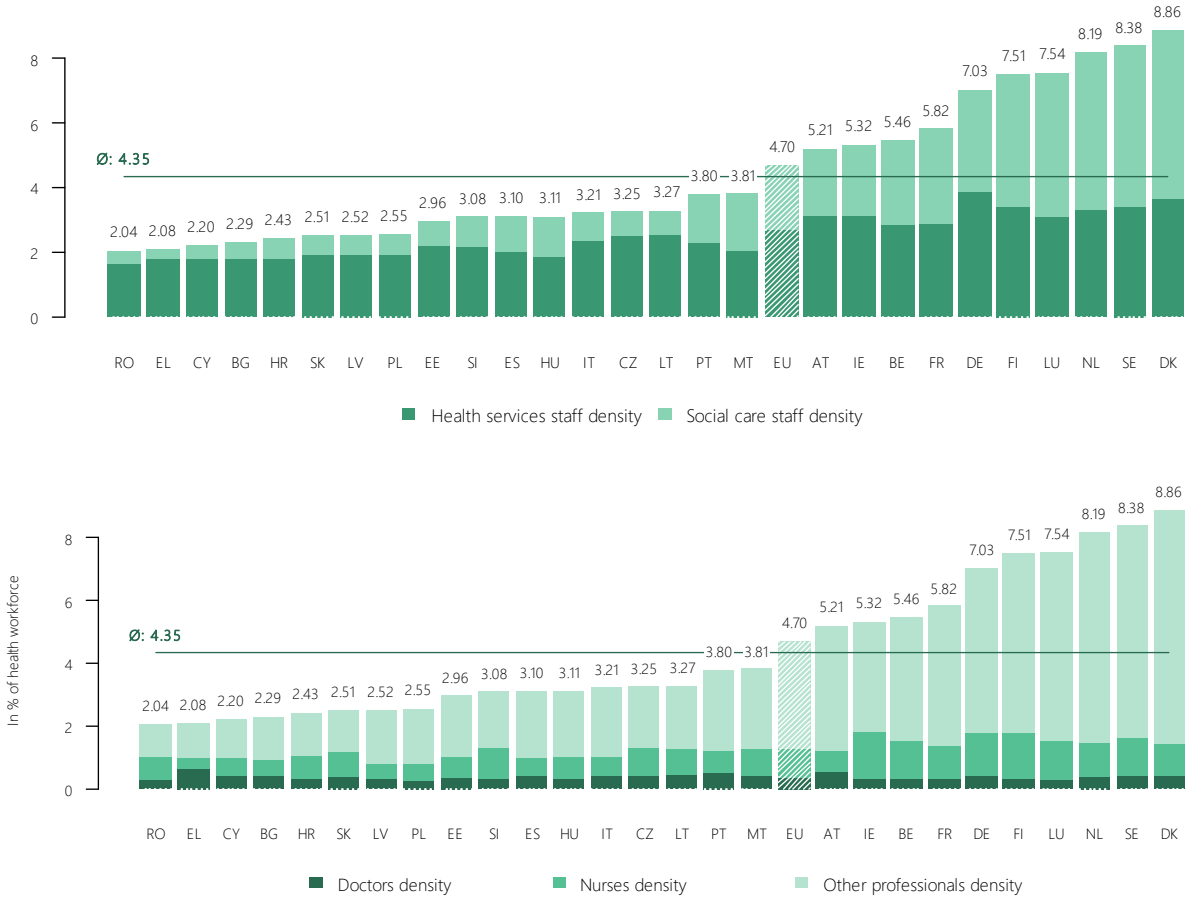
2.1 Overall health workforce by sectors and professions

Health workforce aims to protect and improve the health of their communities. In this report, the term health workforce ist limited to the boundaries used in the European statistical classification of economic activities (NACE) in gathering employment data. This allows to analyse health workforce as branch of the economy in comparison with other branches such as education or the whole economy across a set of variables such as staff density, capital endowment, income, health expenditures and job vacancy.

In this section, two perspectives of health workforce density are presented, the variation by sectors and the variation by professions. The first split correponds to the indicators G1, G2, G3 and the second split to the indicators S1, S2, S3 in the country reports.

Figure 4 depicts the variation of overall health workforce density (G1) across the Member States distinguishing between health services sector (G2) and social care sector (G3). The corresponding variation of overall health workforce density by health professions is presented in the lower graph of this figure. It shows the density of doctors (S1) together with the density of nurses (S2) and other health professions (S3). In both graphs the bars add up to the same totals for each country, showing a range between 8.86 health workers per 1,000 capita in Denmark and 2.04 in Romania. Obviously, the organisation of social care and the variation of other health professions determines this range of health workforce supply,

Figure 4: Health workforce density per 100 inhabitants by sectors and professions in persons, 2017



Source: BASYS based on Eurostat.

In all MS, the breakdown by professions shows the importance of "other health professions" as largest group of health workers.

Physicians (S1) are licensed to provide services to patients as consumers of healthcare. These services include giving advice, conducting medical examinations and making diagnoses; applying preventive medical methods; prescribing medication and treating diagnosed illnesses; giving specialised medical or surgical treatment. The structure of health workforce by skills is driven by an increasing specialisation of doctors but also other health professions.

Nurses (S2) are the largest group practising in health services and social care. Practising nursing professionals assume responsibility for the planning and management of patient care, including the supervision of other healthcare workers, working autonomously or in teams with medical doctors and others in the application of preventive, curative, and social care. Although nurses have traditionally provided care to patients under the guidance of a physician, they are increasingly permitted in many EU MS to practise independently as professionals. This however depends on their qualifications and level of training, with an growing proportion of nurses following university courses to degree level. The structure of nurses is also driven by the increasing specialisation in health care. The number of higher qualified nurses has increased continuously during the last decades.

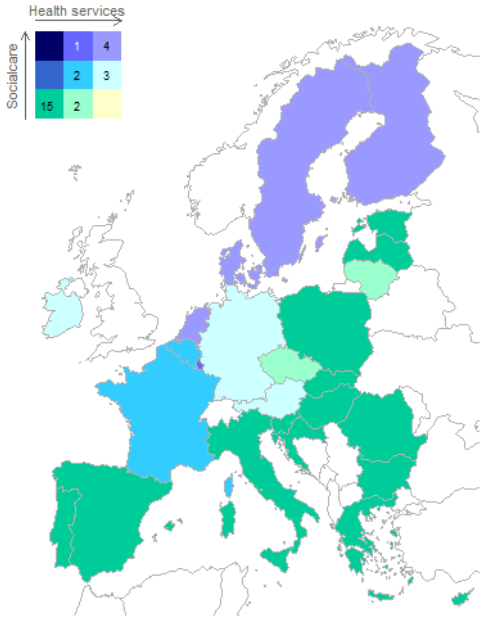
In most MS at the Eastern border of the EU the number of health nurses per 1000 inhabitants is below the EU average (8.9) which results in a lower nurse to doctor ratio than the EU average (2.4). The brain

drain of nurses might contribute to this imbalance but also insufficient training activities for nursing professions within some of the Eastern MS (see Figure 9).

Figure 5 visualizes the size of health services workforce and social care workforce across countries. Classifying both groups of workforces into high, medium, and low density results into nine combinations. From these nine combinations only six exist as presented in legend of Figure 5. The two fields "high" and "medium" social care workforce on the one hand and "low" health services workforce density on the other hand are not occupied. Also the field "high" health services workforce density but "low" social care workforce is not occupied.

Figure 5 shows a diagonal ditch between countries at the top right triangle and the countries at the bottom left triangle. The four countries at the top right triangle are Western European countries, mainly nordic countries (Denmark, Sweden, and Finland). While the 15 countries at the bottom left are mainly Eastern European countries. However, there are some outliers, for example, Czechia and Lithuania with a low density of social care workforce but medium density of health services workforce. Furthermore, the Southern European countries Portugal, Spain, Italy, Greece and Cyprus fall also in the category (low density of social care services and low density health services workforce).

Figure 5: Map - Health services and social care workforce per 100 inhabitants, 2017

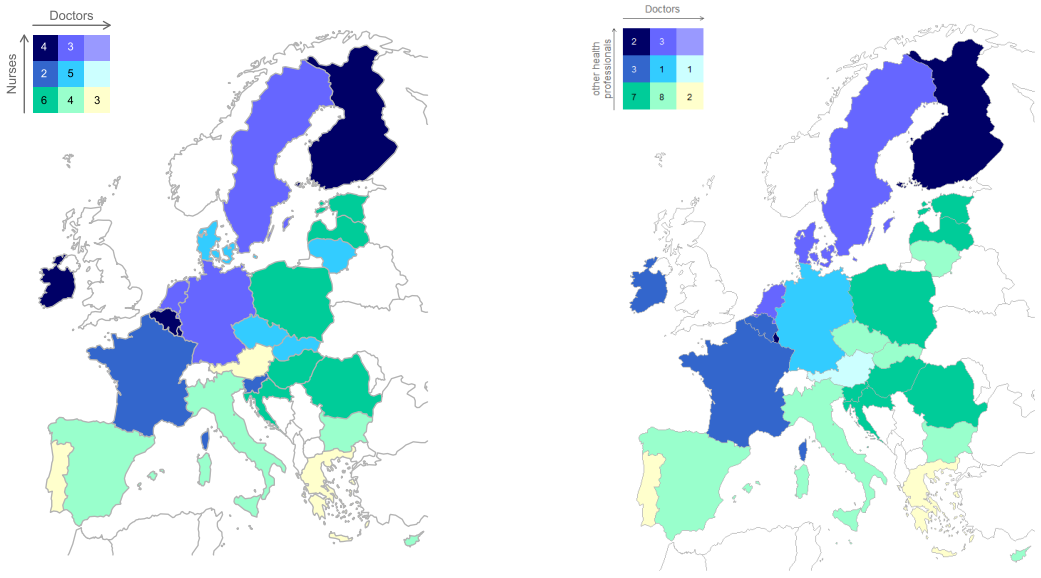


Source: BASYS based on Eurostat.

As already noted, there are no countries with either high social care workforce density and low health services workforce density or vice versa. This means, more staff in health servies goes in general hand in hand with more staff in social care.

The special position of Luxembourg might be explained by the high daily inflow of foreign labour. Not all health services staff might be gathered by statistics. In Ireland, public health expenditure decreased in the period 2009 -2014 following the financial crises. Whyte et al. 2020 report a reduction in staffing levels of general support and of nurses.

Figure 6: Map – Doctors and nurses / other professions per 100 inhabitants, 2017



Source: BASYS based on indicators S1 and S2, S3.

Portugal and Spain, in the lower left corner of Figure 5, devote a relatively high share of their GVA to health care but their level of health workers could not reach a level above that of Central and Eastern European countries. Hower, considering the professional breakdown both countries differ. As compared to Spain, Portugal employs a higher level of doctors (see Figure 6).

It sould be noted, that Finland and Luxembourg operate their health and social care system with relative low number of doctors but high number of nurses and other healthprofessions (see Figure 6).

There is currently a worldwide nursing shortage. Developed countries are facing a nursing staff shortage, awith nearly all of the countries relying on nurses from abroad to ease this situation. Nurses are the largest professional group of the healthcare workforce, and migration has affected both source and destination countries. Many countries have difficulty achieving a stable supply and demand of nurses because of the constantly changing health care employment needs and competition for recruitment of potential workers. In most EU MS, the share of foreign-trained nurses is below that of doctors. However, it is also increasing. To some extent the migration of nurses follows the general trend of labour force migration. The migration of nurses is here measured by the foreign-trained nurses.

In Portugal, only 2.5 percent of nurses have a foreign nationality, among them most with Spanish and Brasilian nationality (Ordem dos Enfermeiros 2021). The number of foreign-trained nurses is estimated based on the nationality of nurses in the Portugese professional register (see Ordem dos Enfermeiros 2021). At the Eastern periphery of the EU27 numbers of foreign trained nurses and doctors are even lower.

Besides medical and nursing professions, the healthcare workforce involves a wide variety of professions and occupations who provide some type of healthcare service. Other health professionals comprise medical technical professions, physiotherapists, assistants, administrative employees, and social professions.

2.2 Growth of health workforce

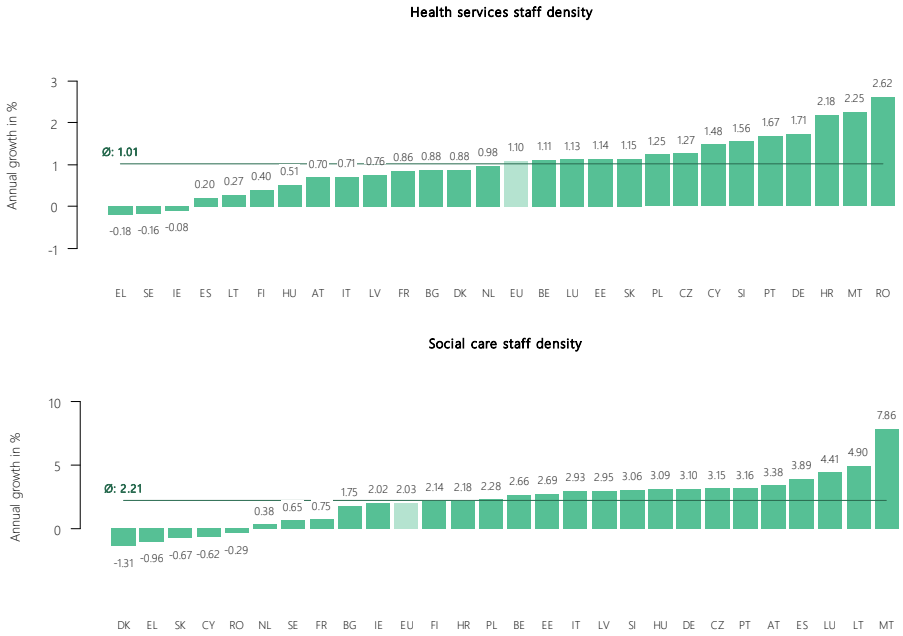
The growth of health workforce can be also decomposed by by sectors and professions. In the period 2007 – 2017, the total health workforce grew on average in the European Union from 17.7 million to 21.0 million persons. This means that in total 3.3 million new jobs were created in health services and social care within the EU. Not only because of historical reasons, but by geographic conditions, income, cultural preferences, and the institutional framework of the health system the size and structure of health workforce differ among MS.

In the health services sector, QA, the number of health workers per capita didn't increase in all EU Member States in the period 2007 - 2017. In Greece, Sweden, and Ireland, the density of employed health services workers slightly decreased as compared to situation before the economic and financial crises (see Figure 7). In Bulgaria and Lithuania, the annual rise was marginal with around 0.2 – 0.27 percent as compared to most of the EU countries. On average, the number of health services workers per 1 000 capita increased across EU27 countries from 24.0 in 2007 to 26.8 in 2017, an annual growth of 1.1 percent considering the population increase.

In social care, QB, the annual growth rate was even higher, reaching 2.03 percent for the EU as a whole (see Figure 7). After Malta (7.86), Lithuania (4.90), and Luxembourg (4.41), Spain (3.89) expanded strongly its social care workforce. On the other side, Denmark (-1.31), the country with the highest health workforce density, has reduced the workforce density in social care. In Greece (-0.98), one of the countries with the lowest health workforce densities, has also reduced social care, a sign of insufficient capabilities to guarantee access to care.

The different sectoral growth of health workforce during the period 2007 – 2017 was accompanied by shifts in the structure of professions. Following the economic and financial crises, Greece could not manage to sustain health care acces despite high numbers of health graduates. However, as in allmost all of the EU27 countries the number of doctors has increased continuously during the last decade. Overall, the absolute number of doctors increased by around 223 00 from about 1 445 000 in 2007 to 1 668 000 in 2017 across EU27 countries. Absolute the highest increase could be observed in Germany, where the number of doctors increased by araound 64 000 during this period. Only in Latvia, the number of doctors decreased (see Figure 8).

Figure 7: Growth of health services and social care workforce in percent, 2007 - 2017



Source: BASYS based on Eurostat.

Overall, the absolute number of nurses across EU27 countries increased by 632 000 from about 3 338 000 in 2007 to 3 970 000 in 2017. In six MS, the number of nurses decreased: Latvia, Poland, Slovakia, Lithuania, Bulgaria, and Estonia. Because the Greek population fall even faster than the number of nurses, the Greek nurse density grew slightly by 0.04 percent per annum considering the population development (see Figure 8). Therefore, the density of nurses per capita decreased only in six of the 27 MS.

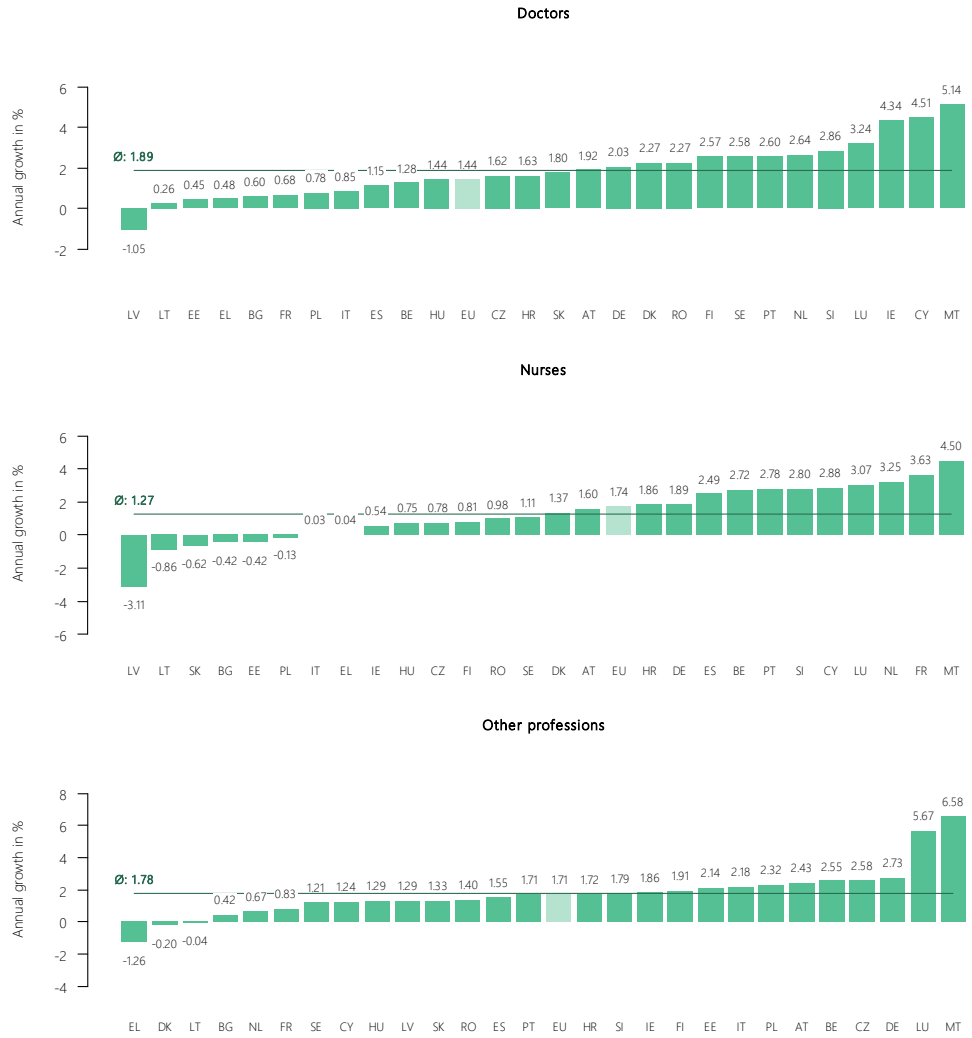
Apart from Malta (4.50), the strongest annual increase of nurses could be observed in France (3.63) (see Figure 8). From the total increase of 632 000 nurses, 213 000 nurses were employed by the French health system which means 1 of the 3 additional nurses in the period 2007 – 2017 were employed in France. The four countries France, Germany, Spain, and Netherlands contributed to more than 80 percent of the additional nurses.

On EU27 average, the annual growth of nurses was higher (1.74) than the growth of doctors (1.41). A higher annual growth rate holds also for the group of other health professions (1.71) (see Figure 8). In total, other health professions increased by 2.409 million persons from 12.921 in 2007 to 15.330 million persons in 2017. This means in absolute terms that other health professions increased about three times more than doctors and nurses together.

In only three countries of the EU, the number of other health professions fell during the period 2007 – 2017, in Denmark, Greece, and in Lithuania. However, the density of other health professions didn't decrease in Lithuania, because the Lithuanian population fell even faster than the number of other health professions.

Germany, Czechia, and Belgium could improve their density of other health professions mostly.

Figure 8: Growth of health workforce by professions in percent, 2007 - 2017



Source: BASYS based on Eurostat.

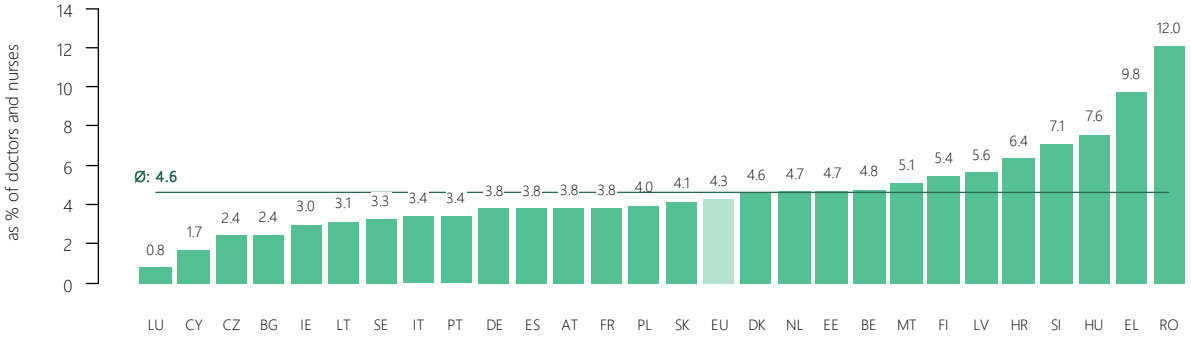
2.3 Graduates

Education and training is the most important measure keeping stability of the supply of health workers and adjust it to the incresing demand. MS have expanded both the training capacities of doctors as well as of other health professionals. The training of health care professionals is usually a shared responsibility of different organisations, such as professional associations, government bodies, medical universities and schools, and providers. Comprehensive information on the number of graduates in all health professions is not available.

Based on the distribution of overall health workforce density across Europe one would expect the lowest rates of health graduates in Romaina and Bulgaria. The following indicator E1, which depicts the ratio of graduates of both doctors and nurses to the stocks of doctors and nurses, gives an idea what share of the health workforce can be replaced in one year. The indicator shows the number of students who have graduated either from medical faculties and training institutions, i.e., who have completed basic medical education, or graduated from nursing schools in a given year (see Figure 9). The EU average of this indicator displays the weigthed average of health graduates as percent of active doctors and nurses,

which is 4.3, and unweigthed 4.6. This ratio corresponds to a working period of 21.7 years which seems to be sufficient to balance the exits from health workforce by retirement or other factors.

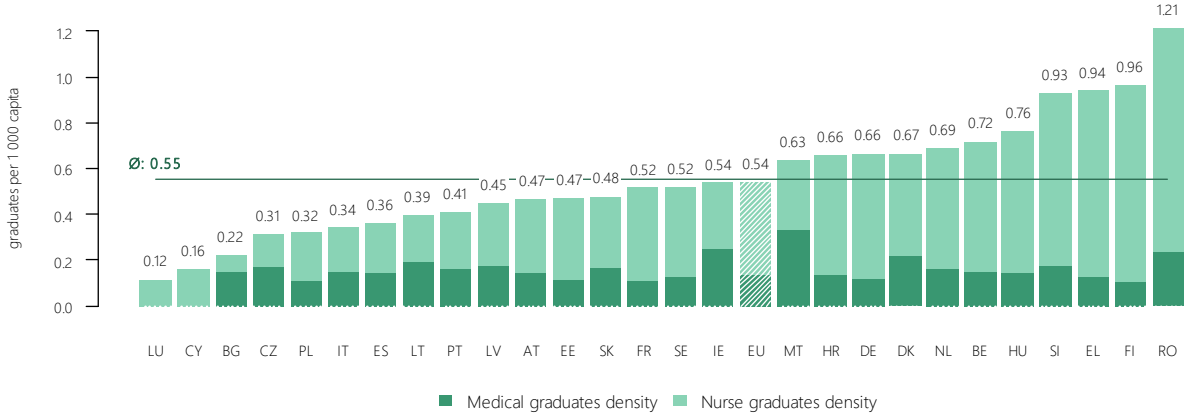
Figure 9: Health graduates* as % of doctors and nurses, 2017



* Health graduates are defined as medical graduates and nurse graduates.

Source: BASYS based on Eurostat, OECD, national statistics.

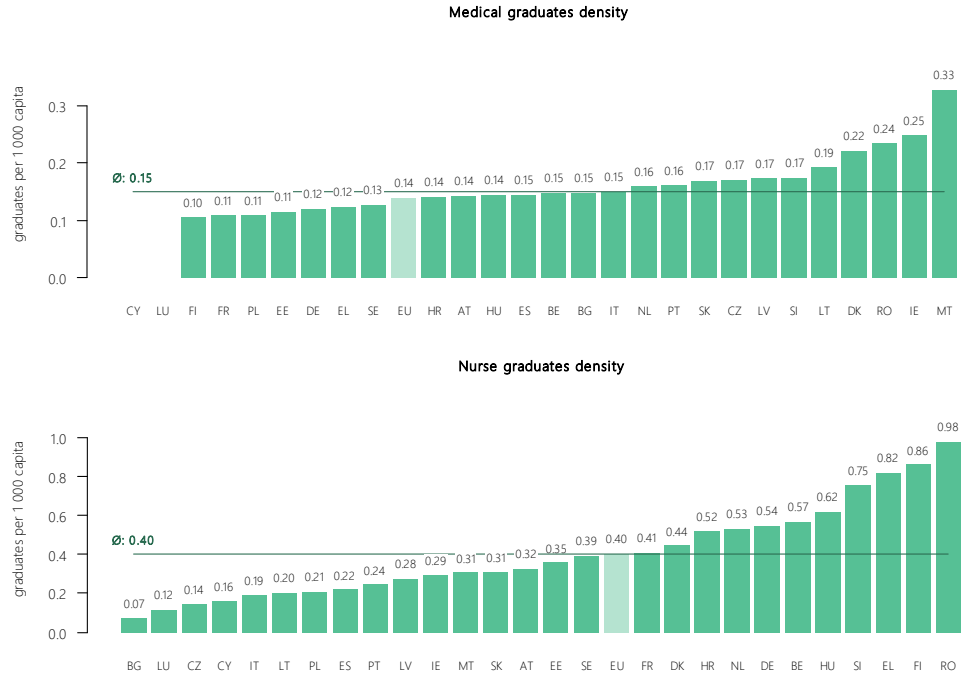
Figure 10: Health graduates per 1,000 capita, 2017



Surprisingly, Figure 9 shows the highest value of health graduates as percent of doctors and nurses in the case Romania (12.0), but as expected a low value in the case of Bulgaria (2.4). This very different efforts to educate health workforce are related mainly to the education of nurses (see Figure 10). Romania has specialised in the international training of nurses. In Romania, rougly one nurse graduated in 2017 per 1,000 capita, and 0.2 doctors per 1,000 capita, summing up to 1.2 health graduates per 1,000 capita.

The indicator E2 "Medical graduates" shows the number of students who have graduated in medicine from medical faculties or similar institutions, i.e., who have completed basic medical education in a given year. On average, 13.9 persons were graduating in EU27 per 100 000 inhabitants in the year 2017. The number of new medical graduates per population has increased in all EU27 countries during the last decade in response to concerns about current or future shortages of doctors, but with varying growth rates. Two-fold increases or more have occurred in several countries such as Portugal, Ireland and the Netherlands, while there has been a 50 percent increase in Italy and Spain (see OECD 2019).

Figure 11: Density of medical and nurse graduates per 1,000 inhabitants, 2017



Source: BASYS based on Eurostat, OECD, national statistics.

Nursing graduates (E3) refer to the number of students who have obtained a recognised qualification required to become a licensed or registered nurse. They include graduates from both higher level and lower-level nursing programmes. On average, 40 nurses are graduating in EU27 per 100,000 inhabitants. This means that on average more than twice nurses graduates per medical graduate. Figure 11 shows the shares of nurse graduates per capita across the Member States.

In 2017, the number of new nurse graduates ranged from fewer than 0,07 per 1,000 population in Bulgaria and 0,12 in Luxembourg to over 0.98 in Romania. In some countries, such as Latvia and Bulgaria, the low number is related to the low number of nurses working in the health system (see indicator "Nurses density", Figure 33).

In Luxembourg, the low number of nurse graduates is offset by a large number of students from Luxembourg who get their nursing degree in another country, as well as the capacity of Luxembourg to attract nurses from other countries through better pay and working conditions (see indicator "Remuneration of nurses"). In Italy, the number of nurse graduates increased fairly rapidly in the 2000s but has decreased since 2013. There was a sharp drop in the number of applicants to nursing education programmes in the years before the COVID-19 pandemy (see OECD 2021).

Workforce of pharmacies and sanitary shops, or of health insurance administration is not included in the boundary of this study.

Overall, the absolute number of nurse graduates across EU27 countries increased from about 133 000 in 2007 to 179 000 in 2017.

3 Health workforce markets, migration and working conditions

Having discussed the imbalances of health workforce across European health systems, this chapter deals with two factors which contribute to this imbalances across EU27 MS: migration and working conditions. The right of free movement of labour challenged the design of the common health workforce market and the health systems from the beginning of the European integration.

The high variation of health workforce density and economic resources among MS led expect unequal working conditions in the European Union. Income and working conditions are crucial for job satisfaction and retention. Disparities in levels of compensation of workforce across countries can act as a 'push' or 'pull' factor when it comes to health workforce migration.

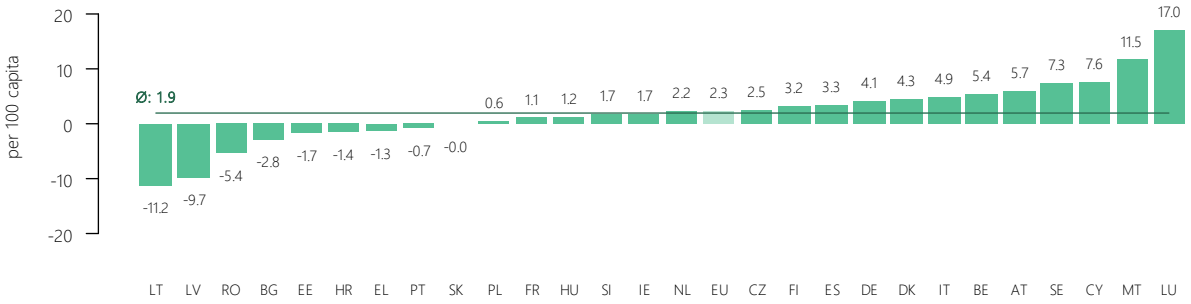
One important factor in the variation of income is the degree of professional organisation of the health workforce. Another factor is the availability of medical equipment. In the following we discuss first the migration of health workforce, then income gaps and finally investment in medical infrastructure and equipment.

3.1 Migration of health workforce

The international migration and mobility of health workers is increasing in volume and growing in its complexity. The migration of health workers affects all countries in one way or another. In some cases, health workers leave their home countries looking for better working conditions and career opportunities abroad.

One important indicator is the net migration which shows the difference between inflows and outflows. Figure 12 presents the cumulative net migration in the period 2007 – 2017 as percent of the population. At the level of the overall population it is measured as difference between the rate of actual growth of population and the natural growth.

Figure 12: Cumulative net migration, 2007 - 2017



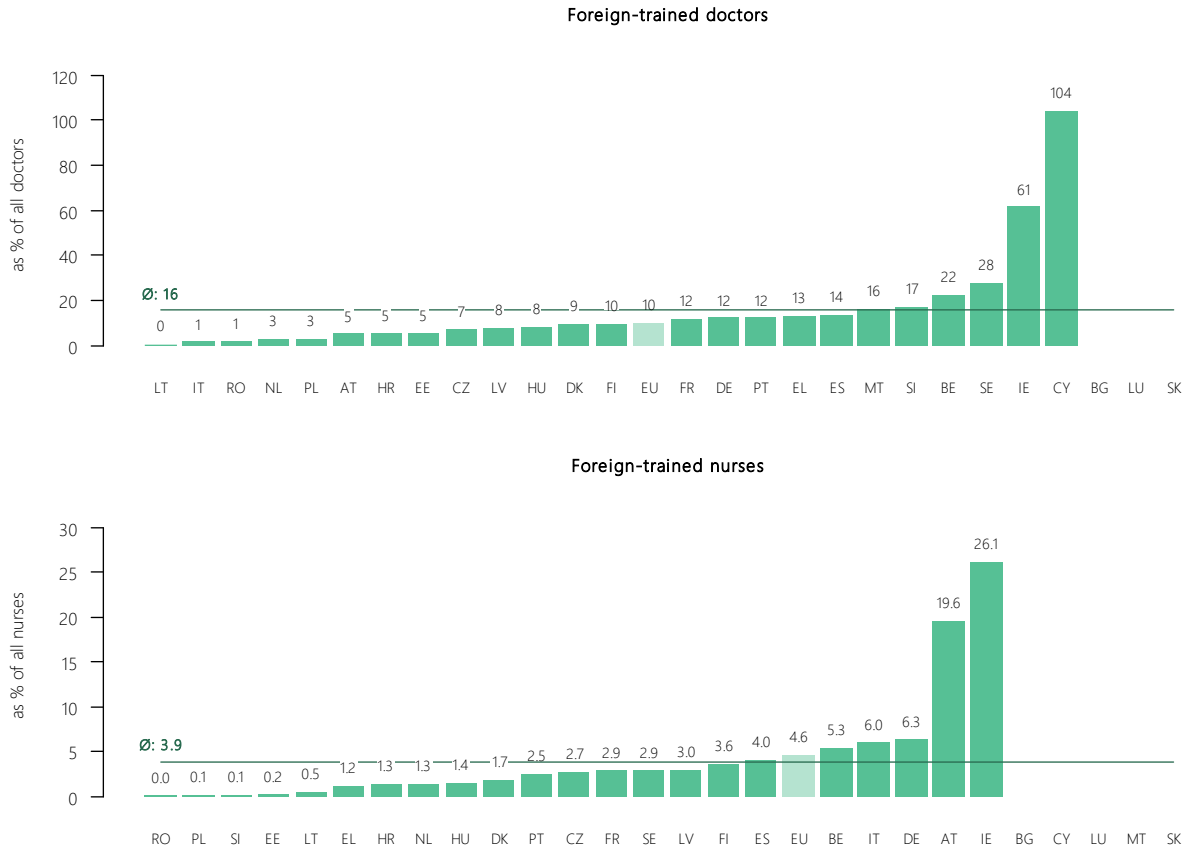
Source: BASYS based on Eurostat, OECD, national statistics.

Net migration contributed to a clear decline of the Lithuanian, Latvian, and Romanian population while it had a very strong growth impact on the population of Luxembourg, Malta, and Cyprus.

Figure 13 shows the shares of foreign-trained doctors and nurses across the Member States. In many EU-countries, foreign-trained doctors contribute significantly to the provision of health services. MS such

as Luxembourg and Cypros which do not have the capacities for own medical education rely completey on the inflow of doctors trained abroad. In a common European health care market medical education abroad is a natural right of the free movement of citizens. However, imbalances in the access to medical services and the ageing of the health workforce raise questions about role of migration. Therefore, the international migration of health care professionals has been recognized as a public health concern. In this context a series of 'push' and 'pull' factors have been identified as driving forces for migration of doctors. In most EU MS, the share of foreign-trained doctors has increased rapidly over the past decade. To some extent the migration of doctors follows the general trend of labour force migration. The immigration of doctors shows the inflows as percent of active doctors. A particular role plays education and training abroad.

Figure 13: Foreign trained doctors and nurses, 2017



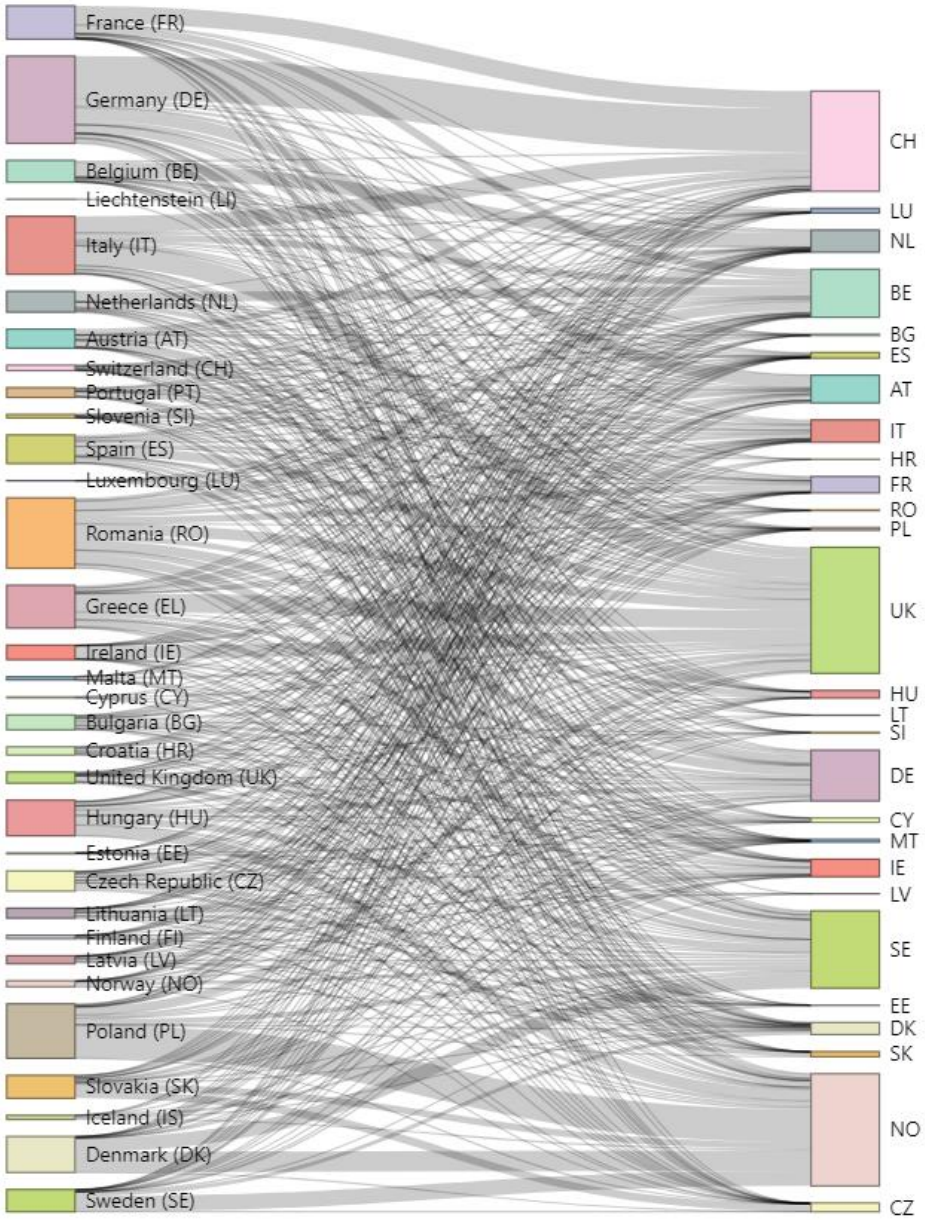
Source: BASYS based on Eurostat, OECD, national statistics.

In Lithuania, the share of foreign-trained doctors is 0.5 percent of active doctors working in health care. This share is far below the EU average (9.6 percent). In contrast, in Sweden 28 percent of active doctors received their education abroad.

In the case of nurses, Sweden's share of foreign-trained nurses is below the EU average (4.0 percent). Ireland and Austria have the highest shares of foreign trained nurses with 26.1 percent and 19.6 percent. Romania has the lowest number.

Following the WHO Global strategy on human resources for health for the year 2030, all countries should making progress towards halving their dependency on foreign-trained health professionals, implementing the WHO Global Code of Practice (WHO 2016a).

Figure 14: Source and destination of migration of medical doctors, 2013-2019



Source: BASYS based on RPD.

The Regulated Professions Database (RPD) registers inflows and outflows of medical doctors in European countries as shown in Figure 14. For example, the major outflows of medical doctors from Germany (country of qualification) are towards the receiving countries Switzerland, Austria, and United Kingdom (host country) with a share of 70.7 percent. In the opposite direction 6081 doctors migrated to Germany from 2013 to 2020. 42.4 percent of the immigrating doctors obtained their professional qualifications in Romania, Austria, and Hungary. The highest numbers of inflows of doctors were registered in countries outside the EU27 such as United Kingdom, Switzerland, and Norway. Among the EU27 countries Sweden, Germany, Belgium, and Austria observed the highest inflows.

The interpretation of the absolute numbers of RPD flows of doctors should, however, take other data into consideration because of incomplete data sets sent by countries, or registered.

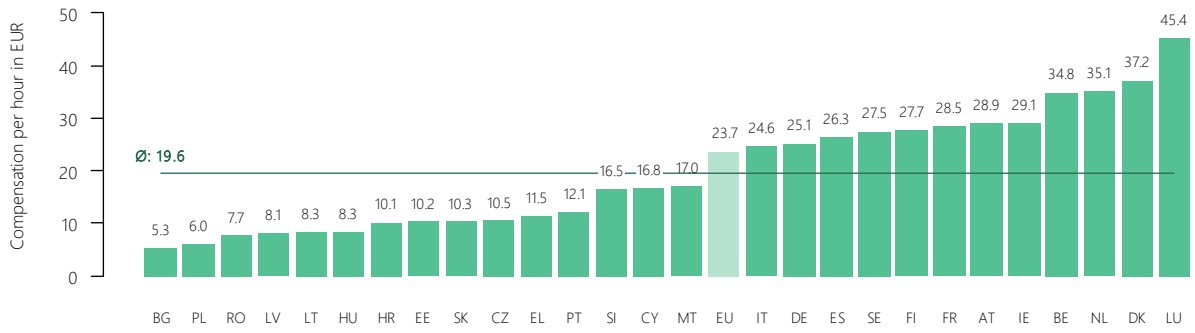
3.2 Compensation of health workforce and income growth

The attractiveness of the health care sector depends among others on the income that persons earn as compared to other sectors. Two indicators are presented below, the annual of compensation per hour and the relative compensation per hour. The latter indicator relates the values of the first indicator to the average income per hour of the economy.

The annual compensation of health workforce describes the average wage of employees. Most health workforce is working as employees. Differences in levels of compensation of workforce across countries can act as a 'push' or 'pull' factor when it comes to health workforce migration. The wage level for different types of health workforce has an impact on the financial attraction of health professions and the local attractiveness of the working place.

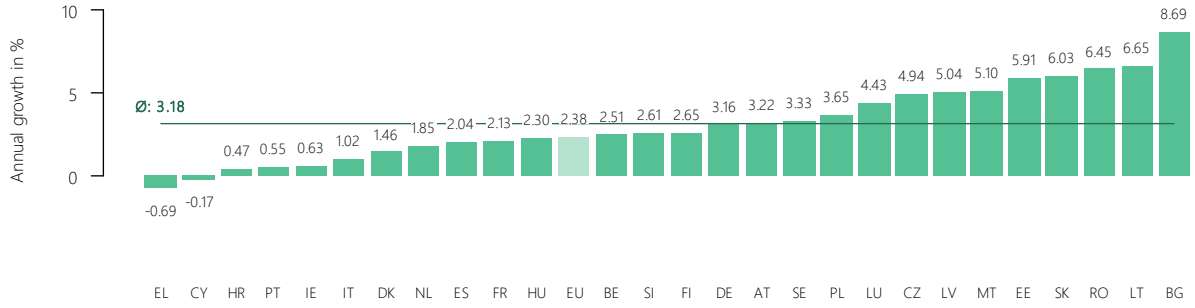
In EU27, the annual gross hourly wage in health services and social care was 23.7 EUR on average including all income taxes and social security contributions. In 2017, this wage was 104 percent of the overall wage level in EU27 of all industries. Figure 15 shows the levels of wage costs in health services and social care across the Member States.

Figure 15: Compensation of health workforce per hour, Q, 2017



Source: BASYS based on Eurostat, national statistics.

Figure 16: Growth of compensation per employee, QA, 2007 - 2017.



Source: BASYS based on indicator W.2 and Eurostat, national accounts.

In Luxembourg, the average annual gross hourly wage in health services and social care was by 45.4 EUR about twice the EU-average at 23.7 EUR, and nine times above the Bulgarian wage at 5.3 EUR per hour.

Figure 16 depicts the development the wage costs across the Member States. In the period 2007 - 2017, the EU 27 hourly wage in health services and social care grew by 2.4 percent per year. The arithmetic mean across the Member States was 3.2 percent. The changes include different inflation rates, which explains the high wage growth in Bulgaria.

Higher growth rates of wages in health services than in the economy as a whole might be driven by the relative scarcity of health professions. Further insights into the growth factors of income in health services and social care might be gained by splitting this indicator across professional groups.

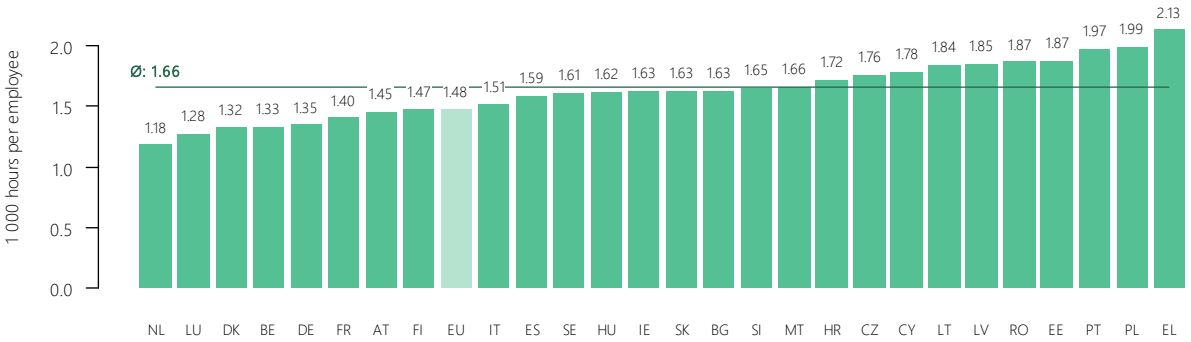
Convergence of income within European Member States can only be reached if wages in countries with lower income grow faster than in EU average. In fact, there is some indication of convergence in the period 2007 – 2017, because the 2017 coefficient of variation of the hourly wage of health workforce is below the 2007 coefficient.

3.3 Working hours

Working hours is one important indicator for working conditions. Working time is hugely important for the health sector because of the implications of long working hours for the health and safety of staff, patient safety, and the impact on work-life balance for the recruitment and retention of staff. Working conditions also include other factors than income which impacts output and satisfaction of health workforce.

In most EU countries, the annual working time of health workforce is below the national average of the whole employment. This can be explained by higher share of part-time workers in health services and social care. For explaining the differences in working conditions its is useful to compare the national working hours with the European average.

Figure 17: Annual working hours per employed person in 1000, 2017

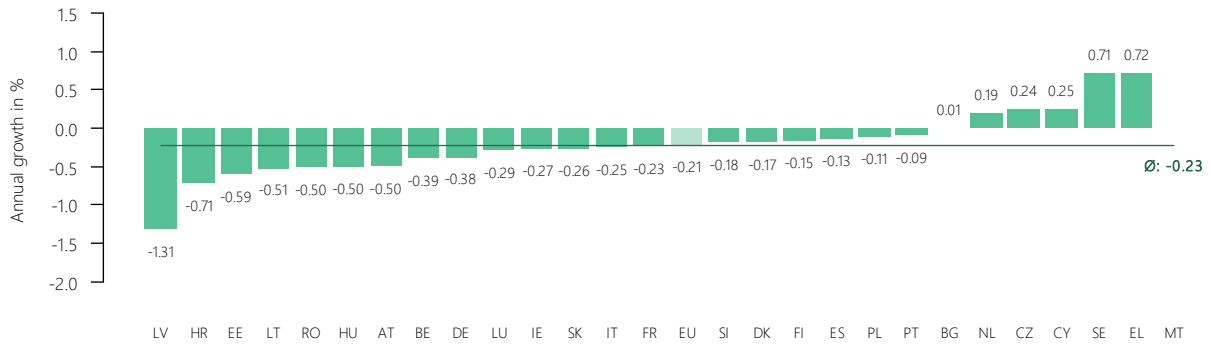


Source: BASYS based on indicator W.1 and Eurostat, national accounts.

Figure 17 shows the weighted and unweighted average of working time. Unweighted by population size health workforce worked on average 1,660 hours per year, weighted only 1,480 hours per year. In countries with high densities of health workforce such as Denmark, Netherlands, or Germany health professionals work relatively much less hours than professionals in countries with shortages of health workforce such as Greece, Poland or the Baltic States. Actual hours worked include regular working time (full-time, part-time and part-year workers), and exclude time not worked because of public holidays, annual paid leave, and temporary illness, disability, and maternity leave.

However, it is not possible to conclude that in general European countries with low health workforce densities were not able to reduce their working time. Most countries were following the long-term trend of decreasing working hours. Latvia had the highest annual decrease with -1.31 percent in the annual working hours per person in health services and social care (Q) compared with the EU (-0.21, arithmetic mean -0.23) in the period 2007 – 2017 (see Figure 18). Greece had the highest increase at 0.72 percent in the same period. But also in Sweden and the Netherlands working time increased on average.

Figure 18: Growth of annual working hours per employed person, Q, 2007 - 2017

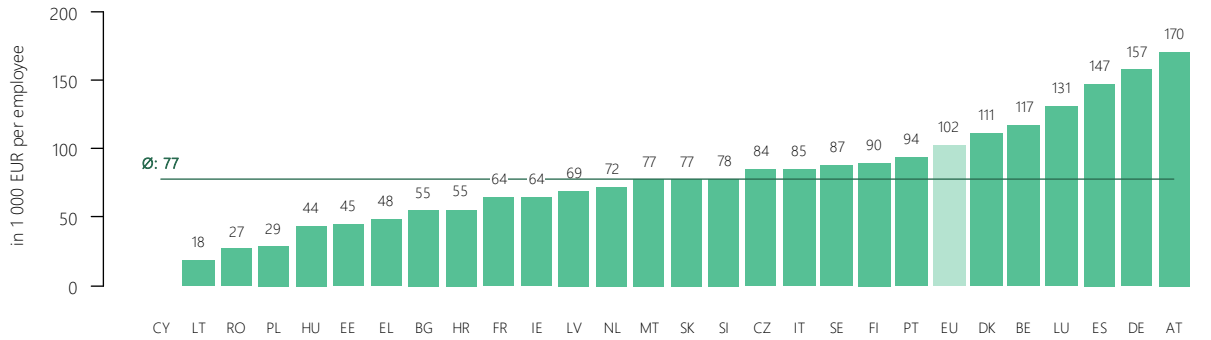


Source: BASYS based on indicator W.1 and Eurostat, national statistics.

3.4 Capital intensity

Knowing how much a health system is investing in hospitals, medical technology and other equipment is very relevant for policy making and analysis. Although health systems remain a highly labour-intensive sector, capital has been increasingly important as a factor of production of health services over recent decades. Capital intensity indicates the availability of appropriate health infrastructure, medical equipment, and intangible capital per health worker. Capital intensity is the main driver of labour productivity. Figure 19 presents the capital intensity in health services and social care in the year 2017 together. Because of incomplete reporting in national accounts a further split into types of capital such as equipment, buildings, and knowledge was not possible in this study.

Figure 19: Capital intensity in 1,000 EUR, 2017



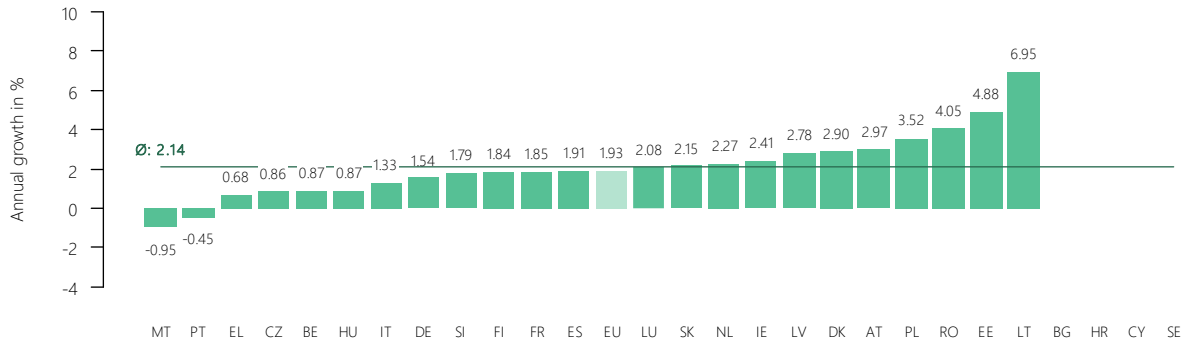
Source: BASYS based on indicator W.3, Eurostat, national accounts.

Figure 19 shows the capital intensity across the Member States. In 2017, Austria had the highest capital intensity in health services and social care (Q) with 170,156 EUR per employed person followed by Germany with 157,272 EUR as compared to 102,317 EUR in the European Union as a whole.

The lowest values of capital intensity are reported for Lithuania and Romania. No data are available for Sweden and Cyprus (in 2007, also for Bulgaria, Croatia, and Spain).

One of the good news of this report is the higher growth of capital intensity in several East European countries, e.g., Lithuania, Estonia, Romania, Poland, and Latvia.

Figure 20: Growth of capital intensity in %, 2007 - 2017

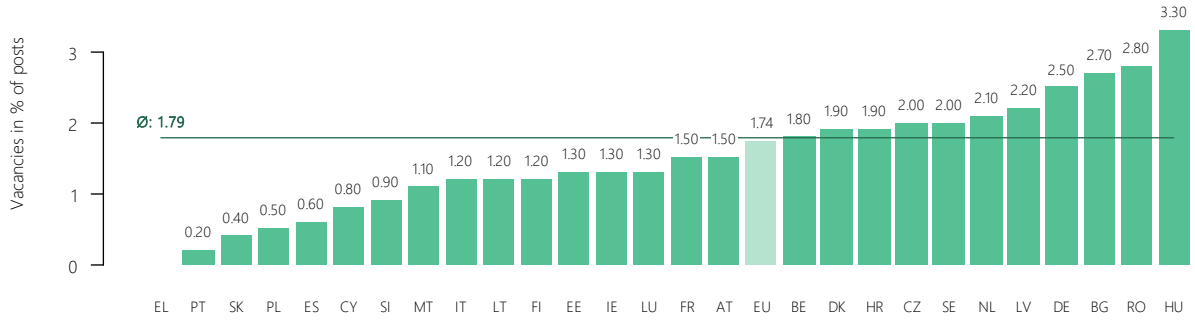


Source: BASYS based on indicator W.3, Eurostat, national accounts.

3.5 Job vancany rate

Job vacancies are defined as paid posts for which employers are taking steps and are prepared to take further steps to find suitable candidates from outside health care facilities. Job vacancies concern posts that are newly created, unoccupied, or about to become vacant. The indicator is used for assessing mismatches in labour markets and the analysis of the economic cycle. The relation of job vacancies to posts is termed the Job Vacancy Rate (JVR).

Figure 21: Job vacancy rate, 2017



Source: BASYS based on Eurostat, labour market statistics.

Figure 21 shows the levels of the JVR across the Member States. Highest Job Vacancy Rates in health services and social care are reported for Hungary, Romania, and Bulgaria. But also Germany, Netherlands,

and Sweden report rates above EU27 average despite high health workforce density. For this indicator not complete time series are available since 2007. Therefore, the growth rates are not presented.

4 EU27: convergence of health coverage and working conditions

As income grows countries shift spending towards health (Hall, Jones 2007). In the long run, all of the 27 MS have devoted a higher share of their income to health care (OECD 2020). Some Central and Eastern European member states with relatively low spending levels like Bulgaria, Romania, Latvia, Lithuania, and Estonia, had some of the highest growth rates in health spending in the last decade. Figure 8 compares the national growth rates of value added in the period 2007 – 2017 with the EU in the health care sector with the EU27 average.

Besides financial restrictions, many countries face supply restrictions of health workforce because of general labour force shortages either through population ageing or migration labour force. Both financial and supply constraints have been important on limiting health service activities and improving access. This is even more likely in the future.

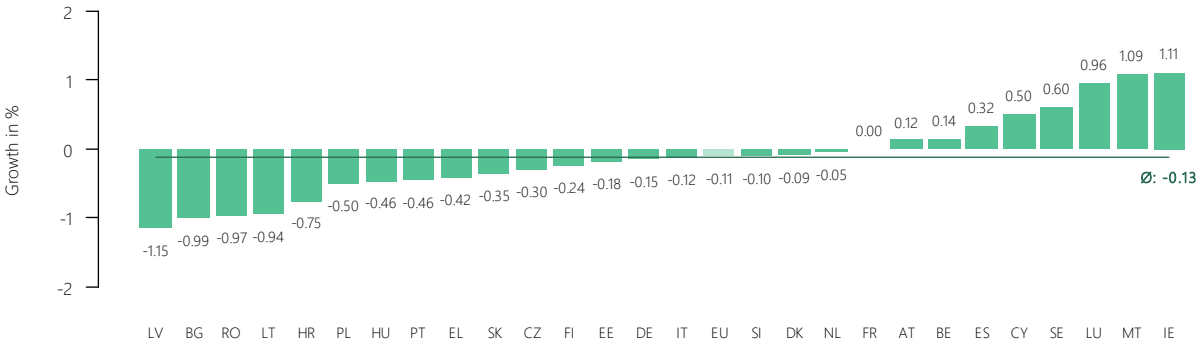
One of the challenges of this decade is to avoid further divergence among MS. Investments in health supply chains are crucial instruments that aim to improve access to healthcare. This can be attained only when health services appropriate to the health needs of the population are organised, delivered, and made available when and where needed.

4.1 Projection of potential workforce supply

On the supply side, the age structure of the existing workforce and the overall growth of labour force determine strongly the furture health workforce. In many MS, both factors will lead to a further shortage of doctors and other health professionals as in potential labour force will decline in most MS intil 2030. In EU27 as a whole, after an upward trend in the last decade labour force growth will stabilize until 2025 and slightly decline closer to 2030. The slow decline of the labour force in the medium term highlights the need for public intervention to encourage participation in the labour market (Cedefop 2018).

As Figure 22 depicts the development of the potential labour force between 2019 and 2030, after which only a third of MS can expect a growing labour force. Following the assumptions of Eurostat and of the Ageing Report 2021, the highest growth one can expect in Ireland, Malta and Luxembourg, the highest decline in Latvia, Bulgaria, Romania, and Lithuania.

Figure 22: Growth of potential labour force in percent, 2019 - 2030



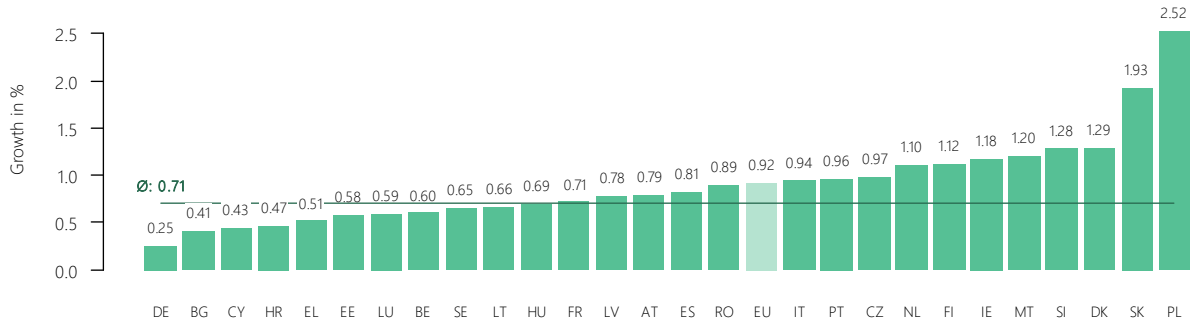
Source: BASYS based on AR 2021, EUROPOP.

4.2 Projection of health care demand

The demand for health workforce is driven by various factors including the medical progress and the increasing number of chronic patients. Therefore, the projected health care demand together with the growth of labour productivity determines the future demand for health workforce. Accurate forecasting of health service demand is beneficial for the reasonable healthcare resource planning and allocation.

The AR 2021 provides projections of public health and long-terms expenditures as % of GDP based on different scenarios. The ratios of the Reference Scenario of the Ageing Working Group are presented in Figure 23.

Figure 23: Additional health and long-term care expenditures as % of GDP, 2030

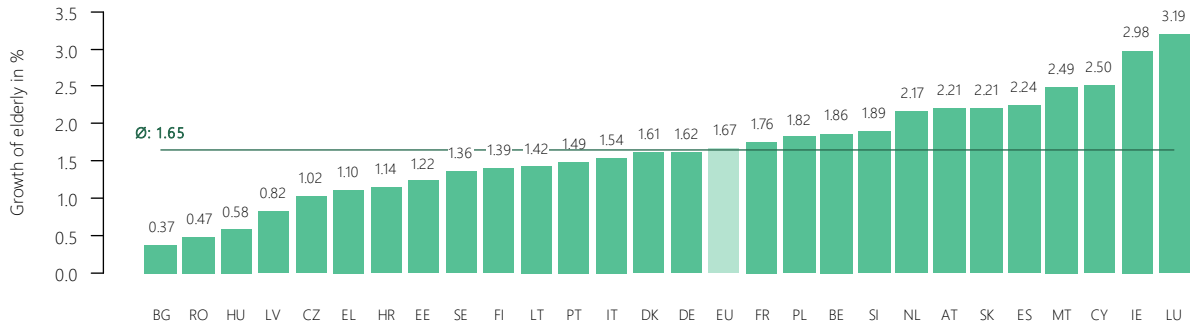


Source: BASYS based on AR 2021, Eurostat.

In this Referece Scenario Poland will face the the highest public expenditure increase as percent of GDP until the year 2030, Germany the lowest, both starting from very different levels in the year 2019.

Figure 24 shows the annual growth of the elderly population defined here as those aged 65 years and over. For Luxembourg and Ireland an annual growth of around 3 percent is expected. In contrast, Bulgaria and Romania will face only a very modest annual growth of the elderly population with rates below 0.5 percent. The elderly population of Poland, which expects the highest increase of health and long-term expenditure according to Figure 23, will grow by 1.8 percent just slightly above the EU average at 1.7 percent.

Figure 24: Growth of elderly population, 2020 - 2030



Source: BASYS based on Eurostat, EUROPOP.

The expected high increase of Polish health and long-term expenditures is therefore the result of additional factors such as the strong income growth which cannot be explained by the demographic change.

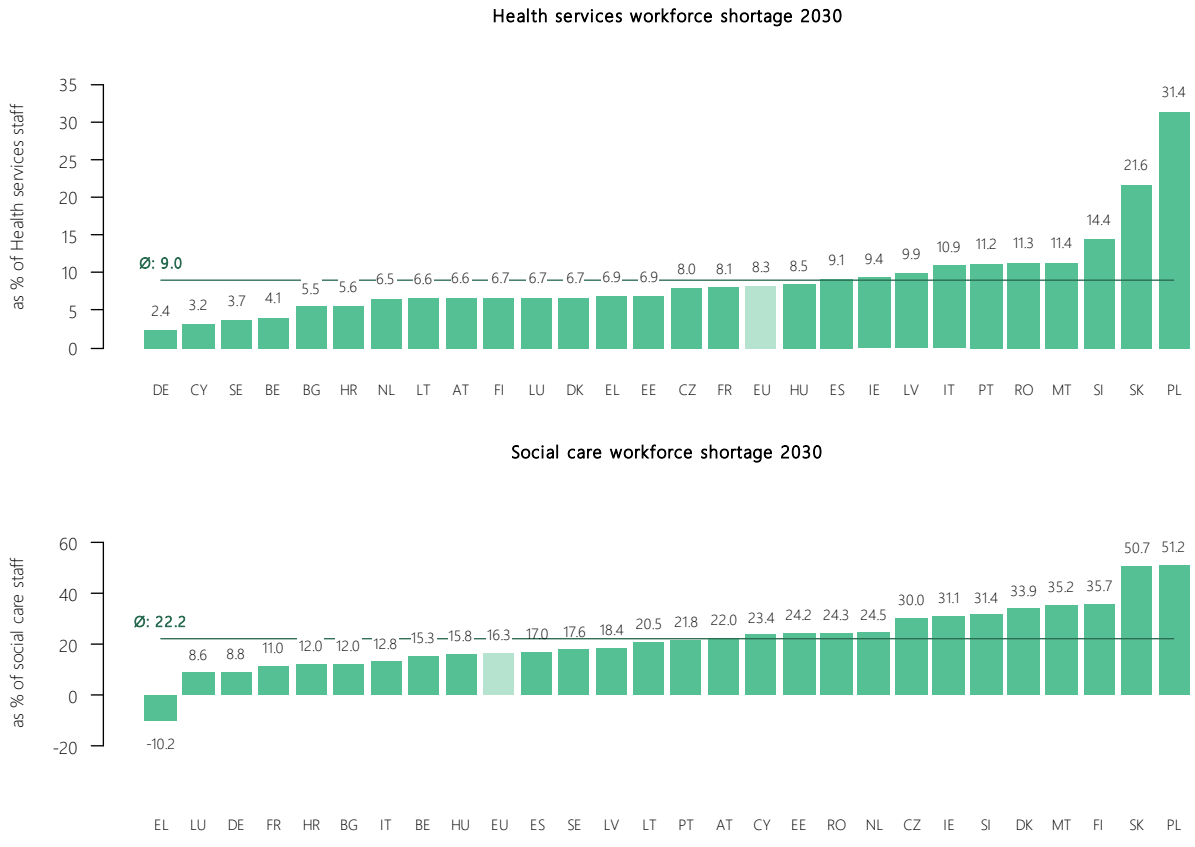
A key question when projecting health services and social care demand is the impact of increased longevity on health care utilisation and dependency rates. Based on the actual utilisation rates, the Ageing Report forecasts in the Reference Scenario a modest increase of health expenditures in relation to GDP in many Western countries and higher growth of long-term care by 2030.

4.3 Health workforce shortages

The general shortage of health workforce in Europe has affected unevenly the improvement of health services in Member States, and negatively influenced health care coverage, especially in rural areas and at the European borders. In countries with net-emigration (more people leaving a country than arriving) it is difficult to achieve self-sustainability of health workforce. Self-sustainability occurs when national production compensates the health worker loss caused by exits and adapts to the evolution of the population needs (WHO 2017a). Compiling self-sustainability requires stock and flow information such as the inflow of newly educated health workers and their impacts on the existing stock of active health workforce, now and in the future, and of the outflows from the health labour market.

Figure 25 depicts the estimated need for additional health workforce across the Member States.

Figure 25: Projected demand for additional health workforce in 2030 in % of current workforce



Source: BASYS based on AR 2021, Eurostat, national statistics.

In this summary report the indicator "health workforce shortages" gives an estimation of the "additional" health workforce needed in the year 2030 based on the assumption of the Ageing Report 2021 as percent of the current health workforce. In the case of health services, Figure 25 shows a particular high shortage of health services workforce in Poland, Slovakia, and Slovenia, but a low shortage for additional staff in Germany, Cyprus, and Sweden. In the case of social care, workforce shortages are on average twice as high than in health services. On average, the additional demand for labour in health services will be around 8 percent and 16 percent in social care in 2030. The estimates depend very much on the so-called Baumol effect, which means lower productivity growth in health services and social care as compared to the industrial production of goods and services.

In 2030, the projected additional demand for labour in health services – based on the assumptions that demand for health care will grow in line with the Ageing Report 2021 - will be the highest in Poland with 31.4 percent (EU: 8.3 percent) and 51.2 percent (EU: 16.3 percent) in social care.

The projected demand for additional health services and social care results in further demand for health professions, particularly in the need for long-term care professions.

The shortage of nurses has been made worse by the impact of the COVID-19 pandemic. Burnt out nurses are leaving employment or taking absence. If only an additional 4 percent of the global nursing workforce were to leave as a result of pandemic impact, then the increased global outflow of nurses would be more than one million (ICN 2022). For the EU27 this would mean around 100,000 nurses, not including assistants and other professionals.

Large differences in labour coefficients and part-time work prevail across countries. The skill-based forecast of the EC estimates the future EU employment growth in health and social care on average over the period 2020 – 2030 at 12.0 percent (Cedefop 2020), which is similar to the overall increase presented in Figure 25. Furthermore, one shoud keep in mind, that retirement from paid work is the most relevant driver of the outflow of the labour supply in the health services and social care sectors.

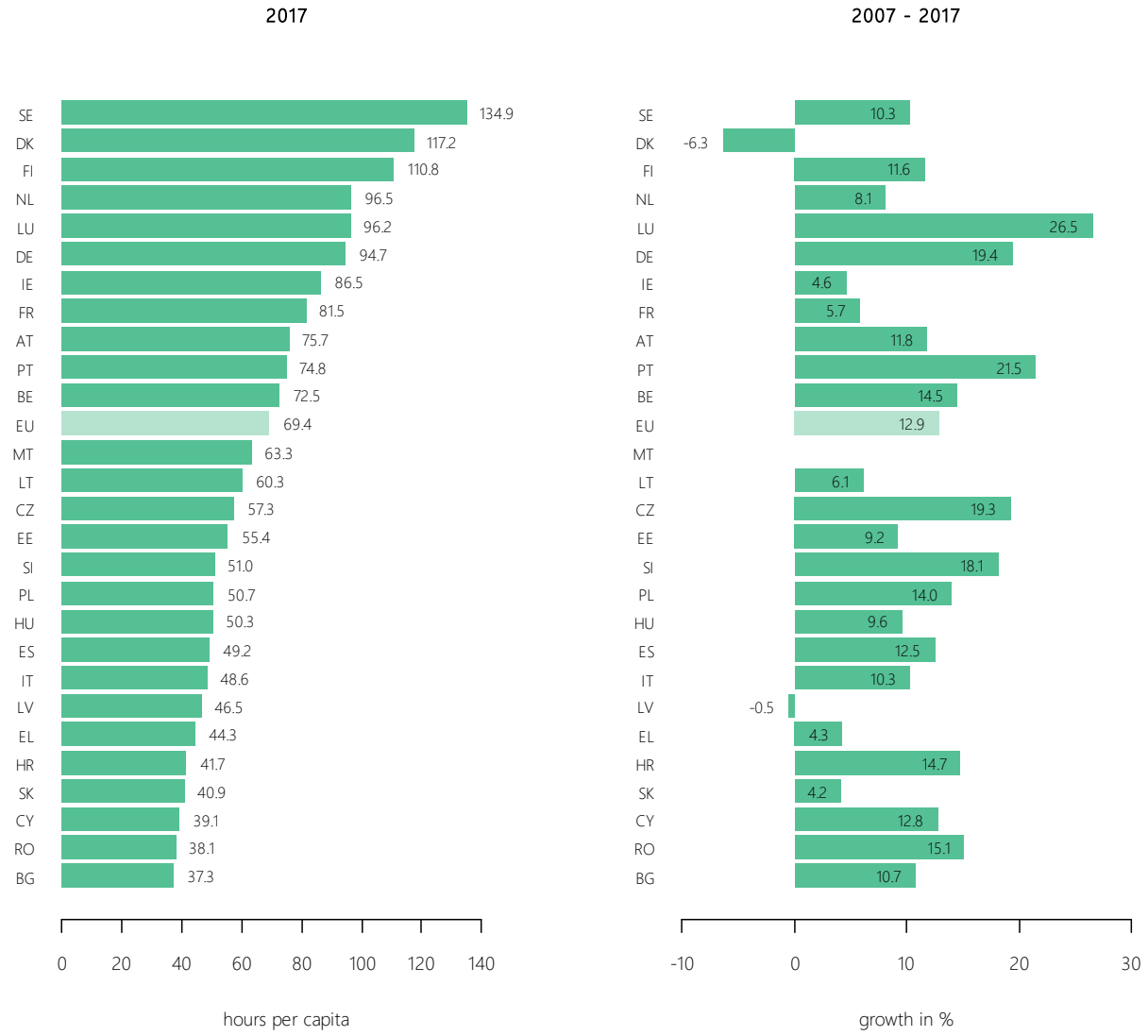
5 Conclusions and Outlook

The health workforce indicators presented in the above chapters show severe imbalances of access to health services and care within EU27. Many factors have contributed to these imbalances. To reduce these imbalances first and foremost a common understanding of the actual situation and the common European challenges in the coming years are necessary. Further integration within Europe through market forces should not harm health care access in the regions at the Eastern and southern border of the EU.

5.1 Standardised health workforce volume per population

The high variation of working time recommends reporting the actual availability of health workforce adjusted by working time either as full-time equivalents or in working hours. As national accounts express labour inputs both in persons and in working hours it is possible to describe the health workforce volume in working hours. Figure 26 depicts the level and the development of this volume indicator per capita across the Member States.

Figure 26: Health workforce volume per capita in hours, Q

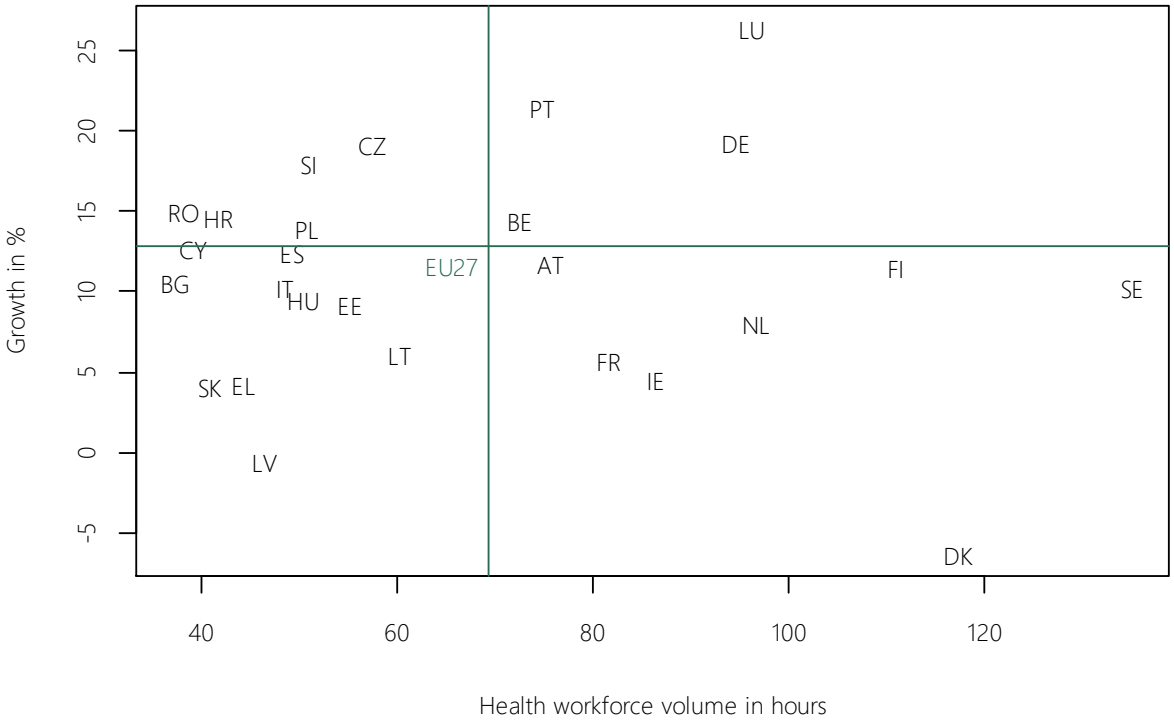


Source: BASYS based on Eurostat, national accounts statistics.

On average 68.4 hours of health services and social care were provided in EU27 as whole. The maximum hours per capita are served in Sweden and the minimum hours in Bulgaria. Changes between 2007 and 2017 varied significantly; most notably Denmark and Latvia faced a fall in the number of health workforce hours per capita (-6.3 and -0.5 percent in 2017 compared with 2007), while Luxembourg and Portugal reported an increase by 26.5 and 21.5 percent.

Figure 27 presents the development of health workforce volume and its level per capita again across the Member States showing whether a country could improve its position relative to the EU average. All countries in the bottom-left corner of Figure 27 could not improve their relative position, among them Latvia, Slovakia, Greece, Bulgaria, and Cyprus. Countries in the top left corner could improve their health workforce above the EU growth rate, however, their volume of health workforce was still below the EU average in 2017. Except Greece and Italy, all countries at the left side of Figure 27 are in Central and East Europe. The "stars" under the MS were Luxembourg, Germany, Portugal, and Belgium, because they performed "better" in level and growth of the health workforce volume per capita.

Figure 27: Health workforce volume matrix, Q



Source: BASYS based on Eurostat, national accounts statistics.

5.2 Professional and spatial mismatches

Besides the overall imbalances of health workforce between the MS there are further imbalances across different professions, skills, and education as well as within countries which extend the described EU imbalances. These further imbalances have been neither discussed in the country reports nor in this summary report. However, these professional and spatial variations within countries are also crucial, even dominate the national health workforce policy discussion.

Already in the late 2000s there were a lot of concerns about future shortages of health professionals arising from population ageing and the ageing of the medical workforce (OECD, 2008). In many countries, a main concern has been about growing shortages of general practitioners, particularly in rural and remote regions. The 2016 analysis of Cedefop studied health workforce shortage reported in labour market statistics. It did not list shortages for the following three countries: CZ, PL, and PT. All other MS included in the study reported shortages of some types of health professionals:

- Shortages of medical doctors were reported from following EU27 countries: BE, BG, CY, DE, EE, FI, FR, HR IE, LT, LV, NL, SI.
- Nursing and midwifery professionals BE, BG, DK, FI, IE, LT, NL, SK.
- Other health professionals BE, CY EE, FI, FR, IE, NL, SI.
- Personal care workers in health services BE, CY, DK, EE, HU, IT, NL, SI.

Table 1: Health workforce bottleneck occupations, 2016

	Shortage occupations								Surplus occupations							
PES*	Medical doctors	Nursing and midwifery professionals	Other health professionals	Paramedical practitioners	Medical and pharmaceutical technicians	Nursing and midwifery associate professionals	Other health associate professionals	Personal care workers in health services	Medical doctors	Nursing and midwifery professionals	Other health professionals	Paramedical practitioners	Medical and pharmaceutical technicians	Nursing and midwifery associate professionals	Other health associate professionals	Personal care workers in health services
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
BE Actiris		3	3			1							2		2	
BE Le Forem	3	2	2				1				2					4
BE VDAB		2						1								
BG	1	1														1
HR	1					1										
CY	3		1					1								
CZ																
DK		1						1								
EE	2		1		1	1	3	3		1						1
FI	2	1	2			1	1									
FR	1		9		1		2									
DE	8				3	5	1									
HU							2	2						1	1	
IE	1	1	1													
IT						1		2								
LV	1															
LT	1	1														
LU						1										
NL	2	1	2				2	1								2
PL											1					
PT																
SK		2						4								
SI	2		1			1		2								
Total **	28	15	22	0	5	12	12	17	0	1	3	0	2	1	3	8
Number of PES	13	10			3	8	7	9	0	1	2	0	1	1	2	4

* without Iceland, Norway, UK; ** number of mentions

Source: McGrath, Behan 2017, pp 52-54.

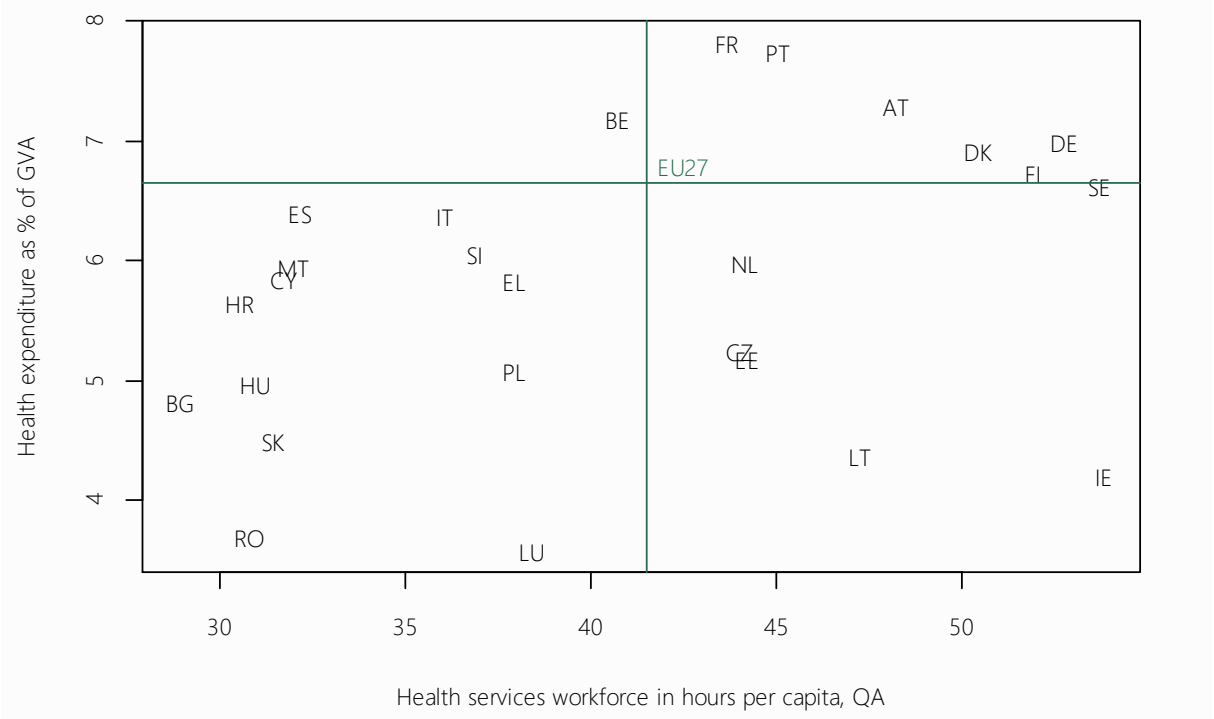
The Cedefop analysis 2016 states: "It is surprising that neither nurses nor midwives were included in either the professionals or associate professional's shortage lists. However, in the case of the latter, European employers did recruit an above average share of nurses and midwives from other countries in 2015, but this occupation was not classified as a shortage by either of the other two indicators, and consequently does not make the final list of shortages." (McGraft, Behan 2017). Both PES and LFS data identified shortages in nursing and midwifery associate professions only in the case of Germany (see McGraft, Behan 2017, Table 4.3.). Shortages of "other health associate professionals" were only reported for Germany and France, and shortages of "medical and "pharmaceutical technicians" were not at all reported. Surpluses of medical doctors and paramedical practitioners were not reported at all (see Table 1). PES reported surpluses only for personal care workers in health in BE, BG, DK, FR, NL.

Apparently, EURES shortage indicators show very uneven results across countries (McGrath, Behan 2017). Despite high number of health professionals' shortages some countries show high health workforce densities. Obviously, the demand for additional staff depends on the health system and the available resources devoted to health care. The needs-based approach tries to correct nationally reported data by an overall need standard (see WHO 2016). WHO defines the need of health workforce: the number of health workers required to attain the objectives of the health system.

5.3 Health workforce and health coverage

In general, higher health care demands require higher health care resources. As table 1 has shown national workforce shortages exists in most MS to some extent independently of the size of health workforce. They must not necessarily vanish in health systems with high expenditure shares. Figure 28 depicts the relation between health expenditures for health services and health services workforce per capita (QA) across the Member States.

Figure 28: Health expenditure and health workforce volume, QA, 2017



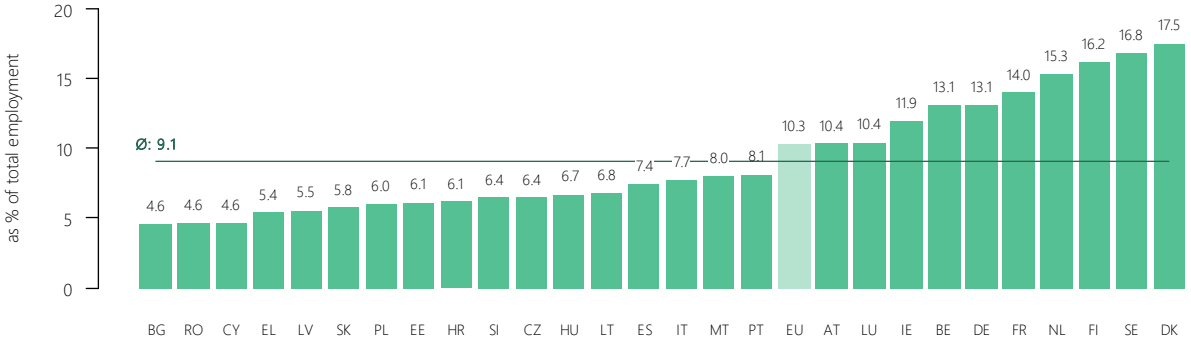
Source: BASYS based on Eurostat, SHA, SNA.

Obviously, there is a positive relation between health expenditures and health workforce volume per capita. However, countries have reached similar workforce levels with very different expenditure ratios as percent of GVA (see e.g., Portugal and Lithuania in Figure 28). These differences are to some extent the result of the economic structure (e.g., in Luxembourg and Ireland) and to some extent related to the organization of the health system which raises questions about the efficiency of health resources allocation.

5.4 Organisation of health care provision

Analyzing the health care workforce in the broader context of the overall workforce it is important to understand how the organistion of health care differs from other branches of the economy and how it is interconnected with other branches as well as informal care provided by housholds for family members and neighbours. This can help to get information for workforce development and policies, and actions related to the recruitment, retention, and ultimate exit of qualified health care workers. This is significant because governments must take strategic steps today to develop the health workforce of the future.

Figure 29: Share of health workforce on total employment in percent, 2007 - 2017



Source: BASYS based on Eurostat.

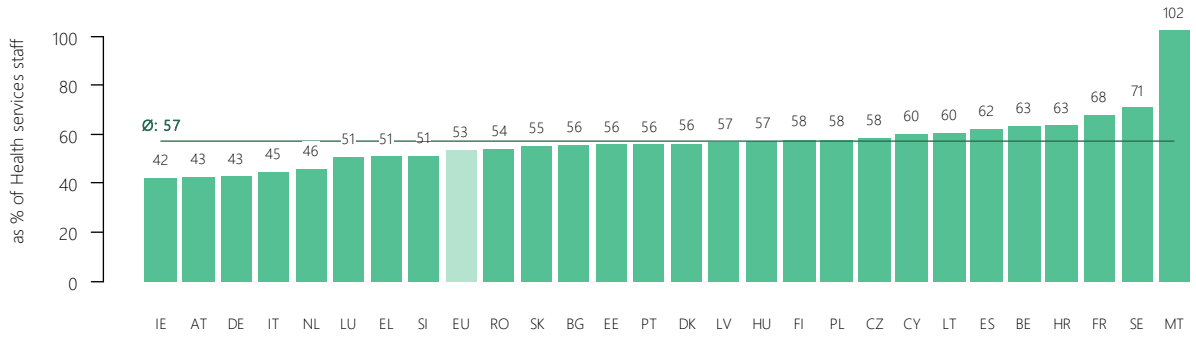
Figure 29 depicts the shares of health workforce on total employment across the Member States. Today, most jobs of the European economies are provided in health services and social care. Not surprisingly, the COVID-19 pandemic, supported the long-term trend to increase job postings in the health sector.

Health care is labour intensive in every system as compared to industrial production. Health services involve many professions to achieve high quality of care. They are oriented to people's needs to be effective. It is now widely recognized that human resources for health are a key qualification for attaining universal health coverage, and for achieveing Sustainable Development Goals.

Health worker employed in health services (QA) work in hospitals, medical practices of general practitioners, specialists, and dentists. Furthermore, practices of other professions are included.

All European health systems comprise a specialised set of different health services and social care providers. Employment in medical care (QA) includes hospitals, medical practices of general practitioners, specialists, and dentists. Furthermore, practices of other professions are included. Employment in social care (QB) covers nursing homes, homes for handicapped persons, and providers of home health care services.

Figure 30: Share of hospital staff on health workforce, 2007 - 2017



Source: BASYS based on Eurostat, OECD, national statistics.

Figure 30 shows the shares of hospital staff across the Member States. Hospitals are the backbone of specialised medical services and of the education of medical and nurse graduates. Most hospitals are in public ownership and hospital planning is under the responsibility of governmental institutions. University hospitals form the best equipped units and play a key role for health services innovations. The hospital workforce is large and diverse, covering many occupations. Hospital employees include medical officers (such as surgeons, anaesthetists and other specialists), nurses, diagnostic and allied health professionals (such as physiotherapists and occupational therapists), administrative and clerical staff, and domestic and other personal care staff.

Obviously, the high value of Malta is an outlier which might include professionals working in social care. The reasons behind the high Maltese ratio could not be clarified. Anyway, one should keep in mind that the reporting of hospital data uses diferent data sources and accounting units such as full-time equivalents and head counts.

5.5 Data

The Global Strategy on Human Resources for Health: Workforce 2030 (WHO 2016a) requires that all countries are making progress on health workforce registries to track health workforce stock, education, distribution, flows, demand, capacity, and remuneration (Milestone 5). From an European point of view, strengthening HWF data means to increase the availability, completeness, quality, and comparability of data.

A much less advanced approach was already proposed more than twenty years ago by the OECD (2000, Table 10: Total employment in health care industries). National statistical offices agreed that it would be feasible to create health labour accounts linked to the system of health expenditure accounts (SHA) (BASYS 2001, BASYS, HIVA, NIVEL 2004). However, statistical offices have to date not agreed on a standardized reporting health labour accounting system and assigned the resources needed to do this. Experience with the design and implementation of health expenditure accounts has underlined the importance of a common terminology in making international comparisons. For example, the skills and job content of nurses vary between countries, and, within countries, between different sectors of care. It is also necessary to be specific about levels of care. For example, the services included in primary care delivered by general medical practitioners and their teams vary between countries. However comparative data, including information on details of professional structures and on levels of care, would

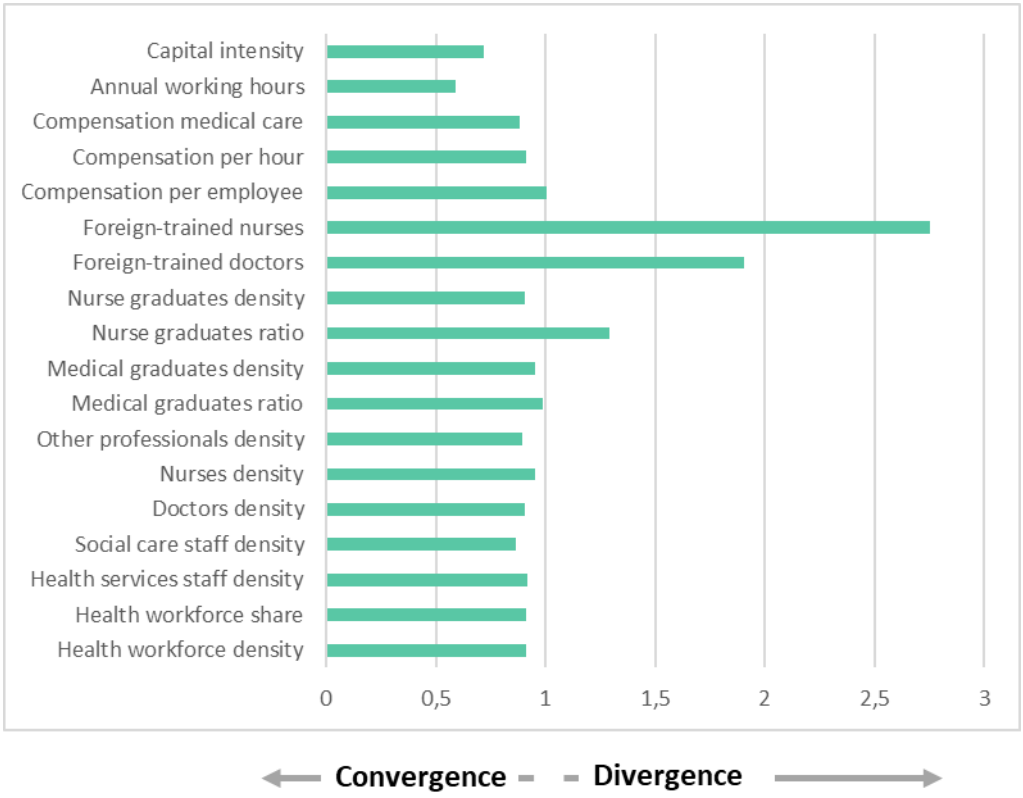
require standardized health labour accounts as proposed years ago and still not available. The country reports highlighted the potential and complexity of measuring current and projected levels of HWF, for specific health and social care sectors, and individual health professions. One particular challenge relates to self-employed workers, who account for a substantial proportion of the workforce.

5.6 Convergence and synchronisation

Presently, there are strong forces acting against an more even allocation of human resources of health systems of EU27 MS. These economic forces are based on the gravity principle geographical factors, economic structures, and are supported by organisational principles such as the subsidiarity principle in the institutional framework of the European legislation which restricts a common European health workforce policy. Subsidiarity has advantages and disadvantages. Small European countries rely stronger on cross-border cooperation in education and training, including cross-border mobility on a daily basis, and foreign-trained HWF (WHO 2022). But, subsidiarity allows system competition too, using different types of health systems oganisation and developing learning process in systems improvements.

Convergence requires to balance the centrifugal weights under conditions of different economic resources. Specific European institution have been created, e.g., such as the Structural Fund, the European Investment Bank, the European Stability and Growth Pact, and the European Health Emergency Preparedness and Response Authority (HERA) to master these forces and to contribute to a balanced development of European economic and social systems.

Figure 31: Coefficient of variation 2017 to 2007



Source: BASYS based on Eurostat, OECD, national statistics.

In the period 2007 – 2017, the coefficient of variation of the health workforce volume per capita decreased from 0.429 to 0.400 (= 0.932) , which means a small convergence towards more equal health care access (Figure 31). However, the so-called beta-coefficient is not significant for the given time-period (see Baro and Sala-i-Martin 2004). Further analysis might investigate in the determinants of health workforce convergence and the actual processes of health workforce mobility including the consequences of the Ukrainian war.

One crucial aspect of the further convergence of health workforce across Europe is the surveillance of the European health workforce markets. Like in the Stability and Growth Pact guidelines might be developed which support the co-ordination and synchronisation of education and traing of health workforce.

6 Annex: Methodology

The methodology used in this study on health workforce in EU27 builds on several studies on European health systems and on the measurement of health workforce (Schneider 1992, BASYS 1998, OECD 2000, Schneider 2002, BASYS, HIVA, NIVEL 2004, WHO 2009, WHO 2017, BASYS 2019, OECD 2021, Eurostat 2021). Definitions and borderlines of health workforce are mainly drawn by the framework of the European System of National Accounts as the System of Health Accounts have not yet implemented labour accounts.

6.1 Indicators

The 23 indicators used in the country reports are structured into 8 sections: health workforce, employers, skills, education, migration, income, working conditions, and outlook (see Table 2: Indicators of health workforce used in country reports. They were compiled for the period 2007 – 2017. This period was selected because of data availability and to avoid biases from the financial and economic crises 2008/2009. The update will focus on the years 2010 – 2020.

Indicators have to be clear, important, meaningful, and comparable between countries. The meaning of the present indicator list for the assessment is not always clear. For example, how to assess the share of foreign trained doctors? From the perspective of European integration, e.g., a higher share indicates a higher integration while from the perspective of sustainability, it rather indicates dependency from other countries. Therefore, in a first step the indicators should be clearly linked to the objectives. In Figure 35 we made an example which combines the 23 indicators into five dimensions based on Long-Term Social Services (LTSS) scorecard approach (see Reinhard S. et al. 2017). We use the term "scorecard" instead "dashboard" when we refer to the LTSS methodology. The term "dashboard" refers to the Social Policy Performance Monitor (SPPM) or Employment Performance Monitor (EPM) approach. Figure 36 refers to the SPPM approach.

The SPPM sets five performance bands based on the following standardised scores' intervals/thresholds:

a. (−0.7; +0.7) : the performance of an indicator is classified as around the EU average (0) for levels and constant (0) for changes;
b. (−0.7; −1.3 or + 0.7; +1.3) : the performance of an indicator is classified as better (+) / worse (-) than the EU average for levels, and registering a positive (+) / negative (-) development for changes, depending on the polarity of the indicator;
c. (< −1.3 or > +1.3) : the performance of an indicator is classified as significantly better (++) / significantly worse (- -) than the EU average for levels and registering a significantly positive (++) / significantly negative (- -) development for changes, always depending on the polarity of the indicator.

It's important to note that the identification of Key Social Challenges (KSCs) and Good Social Outcomes (GSOs) takes into account both levels and changes. To capture the relative position of Member States, for each indicator, levels and changes are converted to standard scores (also known as z-scores) to apply the same metric to all the indicators. Standardizing each of these indicators transforms them to the same metric – a mean (average value) of 0 and standard deviation (measure of spread) of 1. This is achieved by standardising raw values of both levels and changes by dividing the country-specific distance from European average through the standard deviation of each indicator. To classify Key Employment

Challenges (KECs) and Good Labour Market Outcomes (GLMOs) the EPM uses different cut-off points than the SPPM -1.0, - 0.5, 0, +0.5, 1.0; (European Commission 2021d).

Table 2: Indicators of health workforce used in country reports

No	Section	Indicator	Polarity*
G.1	Health workforce	Overall health workforce density	+
G.2	Health workforce	Employment share	+
G.3	Health workforce	Growth of health employment	+
D.1	Employers	Health workforce by providers	+
D.2	Employers	Health services workforce in hospitals	+
S.1	Skills	Medical doctors	+
S.2	Skills	Nurse professions	+
S.3	Skills	Other health professionals	+
E.1	Education	Graduates of health professions	+
E.2	Education	Medicals graduates	+
E.3	Education	Nurse graduates	+
M.1	Migration	Net-migration	+
M.2	Migration	Foreign trained doctors	-
M.3	Migration	Foreign-trained nurses	-
I.1	Income	Annual compensation of health workforce	+
I.2	Income	Compensation of health workforce per hour	+
I.3	Income	Annual growth of income	+
W.1	Working conditions	Working hours	-
W.2	Working conditions	Capital intensity	+
W.3	Working conditions	Job vacancies	-
O.1	Outlook	Workforce supply projection	+
O.2	Outlook	Health care demand projection	-
O.3	Outlook	Health workforce shortage	-

Source: BASYS.

6.2 Data sources

The data are taken from Eurostat's NewCronos database. Eurostat, the Statistical Office of the European Union collects these data from the respective statistical offices and publishes them annually in this database. National Accounts provide data for the indicators: G.1, G.2, G.3, D.1, I.1, I.2, I.3, W.1 and W.2. Hospital statistics provide data for D.2. Indicators for skills S.1, S.2, S.3 and education E.1, E.2, E.3 are derived from non-expenditure health care data. Health care staff: 'manpower' active in the health care sector is part of the non-expenditure health care data. The health workforce migration is also part of the non-expenditure health care data (M.1, M.2, M.3). The national institutions responsible for compiling job vacancy statistics send aggregated national statistics to Eurostat. This concerns the indicator W.3. The indicators Q1, Q.2, and Q3 are based on assumptions of the AR 2021 and calculated by BASYS.

6.3 Estimation of missing values

In few countries, time series for the following indicators were not complete at the level QA, QB: total hours worked (EE, LV), However, values at the level Q are available. In these cases, the values were updated and split using the changes of the sector. The interpretation was restricted to the level of the aggregated sector Q.

The data of the following seven MS were not proved: BG, HR, CY, LU, MT, SK, SE.

7 References

Barro, R. J., Sala-i-Martin, X. (2004). Economic Growth, 2nd ed., Cambridge MA, MIT Press.

BASYS (1998), Recent reforms in organisation, financing, and delivery of health care in Central and Eastern Europe in light of accession to the European Union, Conference May 24 – 26 1988, EC Phare Consensus Programme, Framework Contract, Brussels.

BASYS (2001), Human Resources of European Health Systems. Health Monitoring Program, Grant Agreement SI2.304558 (2000CVG3 – 510), Augsburg.

BASYS, HIVA, NIVEL (2004), HLA, Implementing the Concept of Health Care Manpower in Member States on a Prototype Basis, Reference of call for Proposal: 2002/S 170-136143, November 2004, Augsburg, Leuven, Utrecht, url: http://ec.europa.eu/health/ph_information/dissemination/hsis/human_5.pdf.
BASYS (2019), Developing indicators for monitoring long-term care systems, Study prepared for the Federal Ministry of Health of Germany, April 12, 2019, Augsburg.
Cedefop, Eurofound (2018). Skills forecast: trends and challenges to 2030. Luxembourg: Publications Office. Cedefop reference series; No 108. http://data.europa.eu/doi/10.2801/44921.

Cedefop (2020), Skillpanorama, https://skillspanorama.cedefop.europa.eu/,%20accessed 2020.12.21).

European Commission (2016), Key European action supporting the 2030 Agenda and the Sustainable Development Goals, Commission Staff Working Document, Strasbourg, 22.11.2016, SWD(2016) 390 final.

European Commission (2021a), EUROPOP, https://ec.europa.eu/eurostat/de/web/population-demography/population-projections/database.

European Commission (2021b), Regulated professions database, Professionals moving abroad https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?action=stat_overall&b_services=false.

European Commission (2021c), The 2021 Ageing Report, Economic & Budgetary, Projections for the EU Member States (2019-2070), Institutional Paper 148, May 2012, Brussels.

European Commission (2021d), Annexes to the proposal for a joint EmploymentrReport from the Commission and the Council, Brussels, 24.11.2021, COM(2021) 743 final.

Eurostat (2021), Labour market flow statistics in the EU, Health statistics explained. Luxembourg.

Eurostat (2022), NewCronos Database, https://ec.europa.eu/eurostat/data/database.

Hall, R., Jones, C. (2007), The value of life and the rise in health spending, Quarterly Journal of Economics, Vol. 122 (1): 39-72.

ICN - International Council of Nurses (2022), The Global Nursing Workforce and The Covid-19 Pandemic, Sustain and Retain in 2022 and Beyond, Geneva, www.icn.ch.

ILO (2020), Global Wage Report 2020-21, Wages and minimum wages in the time of COVID-19, Geneva.McGrath, J., Behan, J. (2017), A comparison of shortage and surplus occupations based on analyses of data from the European Public Employment European Commission (2017), Services and Labour Force Surveys, Social Europe, February 2017.

Migali, S., Natale, F., Tintori, G., Kalantaryan, S., Grubanov-Boskovic, S., Scipioni, M., Farinosi, F., Cattaneo, C., Benandi, B., Follador, M., Bidoglio, G., McMahon, S. and Barbas, T., International Migration Drivers, EUR 29333 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-92960-1 (main report online).

OECD (2000), A system of Health Accounts, OECD Publishing, Paris.

OECD (2008), The Looming Crisis in the Health Workforce: How Can OECD Countries Respond? OECD Publishing, Paris, https://doi.org/10.1787/9789264050440-en.

OECD (2019), Recent Trends in International Migration of Doctors, Nurses and Medical Students, OECD Publishing, Paris, https://doi.org/10.1787/5571ef48-en.

OECD (2020), Health at a glance, Europe, OECD Publishing, Paris.

OECD (2021), Health at a Glance 2021: OECD Indicators, OECD Publishing, Paris, https://doi.org/10.1787/ae3016b9-en.

OECD (2022), OECD.Stat online database, https://stats.oecd.org/.

Ordem dos Enfermeiros (2021), Estatística de Enfermeiros, Anuário Estatístico 2021.

Reinhard S. et al. (2017), Picking Up The Pace Of Change. Long-Term Services and Supports State Scorecard 2017 Edition A State Scorecard on Long-Term Services and Supports for Older Adults, People with Physical Disabilities, and Family Caregivers. AARP Public Policy Institute, 2017. url: www longtermscorecard.org.
Schneider M., et al. (1992), Health Care in the EC Member States, Health policy, Vol. 20/ 1+2, Special Issue.

Schneider M., et. al. (2002), Beschäftigungsunterschiede in ausgewählten Gesundheitssystemen der EU, Bericht an die Hans-Böckler-Stiftung, Augsburg.

Social Protection Committee (2018). 2018 SPC Annual Review of the Social Protection Performance Monitor (SPPM) and developments in social protection policies. Annex 1. Detailed review of developments in the social situation in the EU: SPPM dashboard results. Brussels: European Commission.

WHO (2009), Handbook on monitoring and evaluation of human resources for health: with special applications for low- and middle-income countries, edited by Dal Poz, M. R. et al., Geneva.

WHO (2010) The WHO Global Code of Practice on the International Recruitment of Health Personnel, WHA63.16, May 2010, http://www.who.int/hrh/migration/code/code_en.pdf

WHO (2016), Working for health and growth: investing in the health workforce, Report of the High-Level Commission on Health Employment and Economic Growth.

WHO (2016a), Global strategy on human resources for health: Workforce 2030, World Health Organization [online], available: http://apps.who.int/iris/bitstream/10665/250368/1/9789241 511131-eng.pdf [accessed 05/05/2022].

WHO (2017), National health workforce accounts: a handbook, Geneva, Licence: CC BY-NC-SA 3.0 IGO.

WHO (2022); Meeting of the Ad Hoc Working Group on Human Resources for Health in Small Countries in the European Region, Progress, action and next steps 27–28 January 2022 (in-person and online), Copenhagen: WHO Regional Office for Europe.

Whyte, R. et al. (2020), An analysis of trends in Irish public healthcare expenditure and staffing, Working Paper No. 660, May 2020, ESRI.

Zurn, P. Dal Poz, M., Stilwell, B., Adams, O. (2002), Imbalances in the health workforce, Briefing paper. March 2002, World Health Organization, Geneva.

8 Glossary

Capital intensity indicates the availability of medical equipment, construction, and knowledge capital. Capital intensity is compiled as fixed capital per employed persons.

Coefficient of variation is a normalised measure of dispersion of a probability distribution. It is defined as the ratio of the standard deviation to the mean.

Doctors (ISCO 3D = 221) including generalist medical practitioners and specialist medical practitioners; definition: medical doctors (physicians) study, diagnose, treat and prevent illness, disease, injury and other physical and mental impairments in humans through the application of the principles and procedures of modern medicine. They plan, supervise, and evaluate the implementation of care and treatment plans by other healthcare providers, and conduct medical education and research activities.

Employed persons are persons aged 15 years and over who, during the reference week performed work, even for just one hour a week, for pay, profit or family gain or who were not at work but had a job or business from which they were temporarily absent because of something like, illness, holiday, industrial dispute or education and training. (EU-LFS)

EU27: From 1 February 2020, the 27 European Union countries after the UK left the EU. The EU27 countries are Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Gross domestic product (GDP) is a basic measure of the overall size of a country's economy. As an aggregate measure of production, GDP is equal to the sum of the gross value added of all resident institutional units engaged in production, plus any taxes on products and minus any subsidies on products. Gross value added is the difference between output and intermediate consumption.

Health and Social Care (Q, NACE 86-88): This item "Human health and social work activities" includes the provision of health services (QA, NACE 86) and social work activities (QB, NACE 86-88).

Health associate professionals (ISCO 2D = 320) this includes: medical and pharmaceutical technicians, nursing and midwifery associate professionals, traditional and complementary medicine associate professionals, veterinary technicians and assistants, other health associate professionals.

Health Services (QA, NACE 86): This item "Human health services" includes activities of short- or long-term hospitals, general or specialty medical, surgical, psychiatric and substance abuse hospitals, sanatoria, mental hospital institutions, rehabilitation centres, and other human health institutions which have accommodation facilities, and which engage in providing diagnostic and medical treatment to inpatients with any of a wide variety of medical conditions.

Health professionals (ISCO 2D = 220): this includes: medical doctors, nursing and midwifery professionals, traditional and complementary medicine professionals, paramedical practitioners, veterinarians, other health professionals.

Health workers are all people engaged in actions whose primary intent is to enhance health.

Inactive persons are those classified neither as employed nor as unemployed. (EU-LFS).

Job Vacancy Rate (JVR): Job vacancies concern posts that are newly created, unoccupied, or about to become vacant. The indicator is used for assessing mismatches in labour markets and the analysis of the economic cycle. The relation of job vacancies to posts is termed the Job Vacancy Rate (JVR).

Key employment challenges (KEC): areas of low performance whose solution would make a strong difference with contribution to good labour market and social outcomes.

Labour force: is the active population and comprises all persons who are employed or unemployed (EU-LFS).

Medical and pharmaceutical technicians (ISCO 3D = 321): This includes diagnostic medical radiographer, medical radiation therapist, nuclear medicine technologist, sonographer, mammographer; technicians of blood-bank, of pathology and of medical laboratory; pharmacy assistant and pharmaceutical technician.

Medical doctors: This indicator shows the number of students who have graduated in medicine from medical faculties or similar institutions, i.e., who have completed basic medical education in a given year.

Medical graduates: This indicator shows the number of students who have graduated in medicine from medical faculties or similar institutions, i.e., who have completed basic medical education in a given year. (OECD)

Nurses including nursing and midwifery professionals; ISCO 3D = 222 and nursing and midwifery associate professionals; ISCO 3D = 322 whereas the distinctions between nursing and midwifery professionals and associate professionals should be made on the basis of the nature of the work performed in relation to the tasks specified in this definition and in the relevant unit group definitions. The qualifications held by individuals or that predominate in the country are not the main factor in making this distinction, as training arrangements for nurses and midwives vary widely between countries and have varied over time within countries.

Nursing graduates refer to the number of students who have obtained a recognised qualification required to become a licensed or registered nurse. They include graduates from both higher-level and lower-level nursing programmes.

Paramedical practitioners (ISCO 3D = 224): This includes clinical officer (paramedical), surgical technician, feldscher, primary care paramedic, advanced care paramedic professionals.

Personal care workers in health services (ISCO 3D = 532), including healthcare assistants, home-based personal care workers and personal care workers in health services not elsewhere classified.

Population: This item comprises the resident population representing the number of inhabitants of a given area on 31 December of the year in question. Usual residence means the place where a person normally spends the daily period of rest, regardless of temporary absences for purposes of recreation, holidays, visits to friends and relatives, business, medical treatment or religious pilgrimage.

Purchasing power standard, abbreviated as PPS, is an artificial currency unit. Theoretically, one PPS can buy the same amount of goods and services in each country. PPS are derived by dividing any economic aggregate of a country in national currency by its respective purchasing power parities.

Share of foreign-trained health professional is measured in terms of total stocks. The measurement of stocks may differ related to differences in the activity status of doctors and nurses.

Social Care (QB, NACE 87-88): This item includes QB, NACE *87 Residential care activities* and NACE *88 Social work activities without accommodation*. NACE 87 Residential care activities include the provision of residential care combined with either nursing, supervisory or other types of care as required by the residents. Facilities are a significant part of the production process and the care provided is a mix of health and social services with the health services being largely some level of nursing services. NACE 88 Social work activities without accommodation includes the provision of a variety of social assistance services directly to clients.

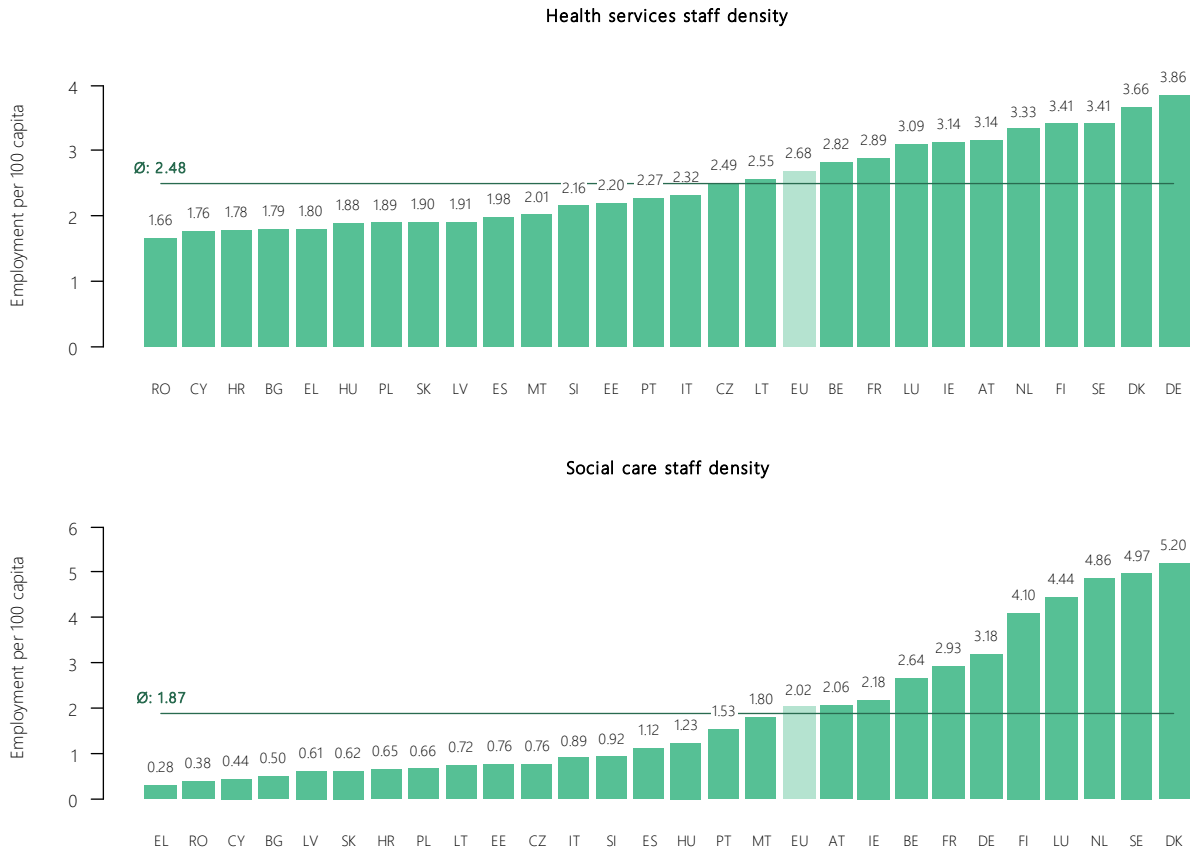
Statistical classification of economic activities (NACE) in the European Community is the classification of economic activities in the European Union (EU); the term NACE is derived from the French ***N****omenclature statistique des* ***a****ctivités économiques dans la* ***C****ommunauté* ***e****uropéenne*.

Unemployed persons are persons aged 15-74 who were without work during the reference week, but who are currently available for work and were either actively seeking work in the past four weeks or had already found a job to start within the next three months. (EU-LFS)

Value added at factor cost is the gross income from operating activities after adjusting for operating subsidies and indirect taxes.

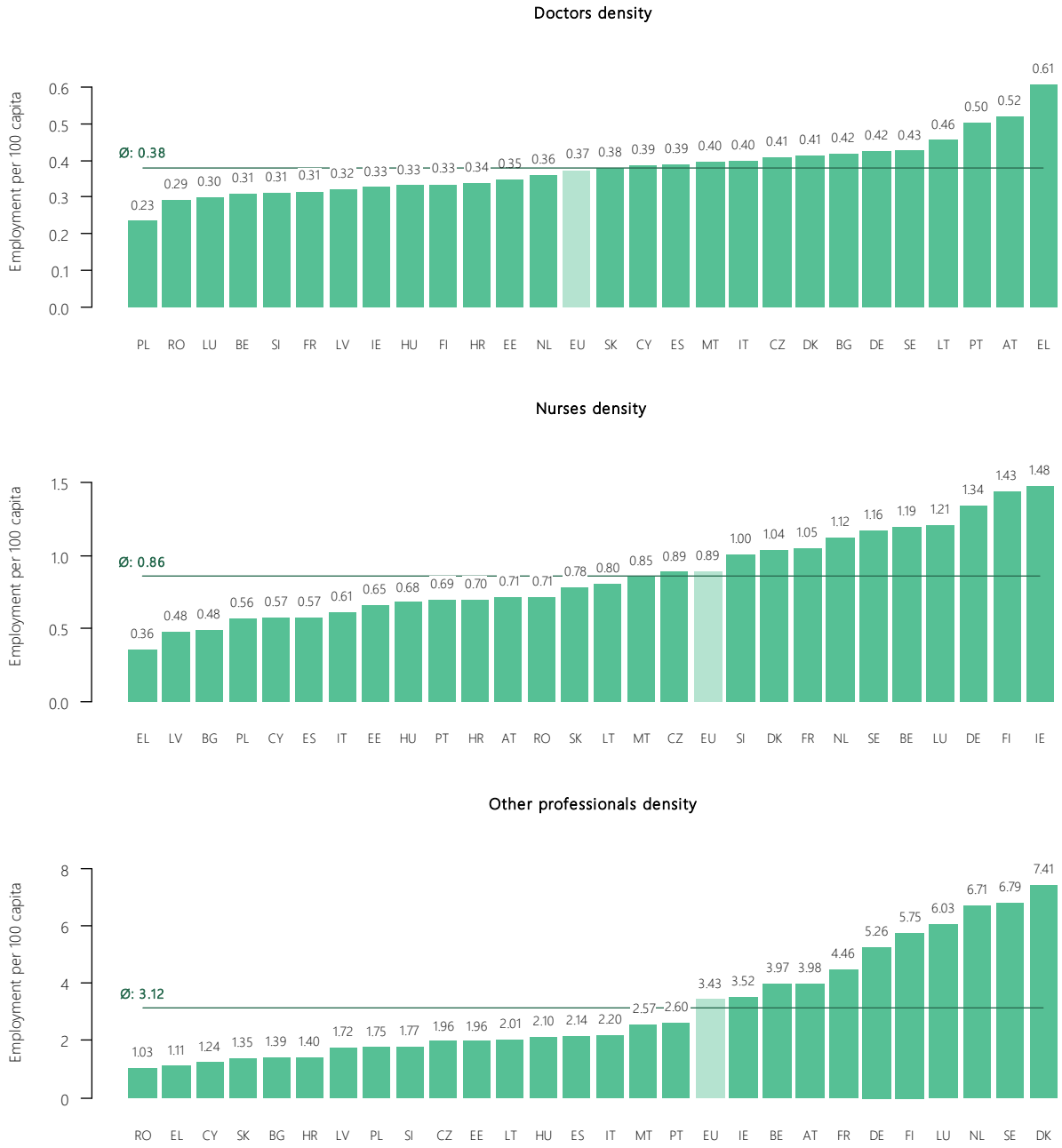
9 Annex

Figure 32: Density of health services staff and social care staff per 100 inhabitants, 2017.



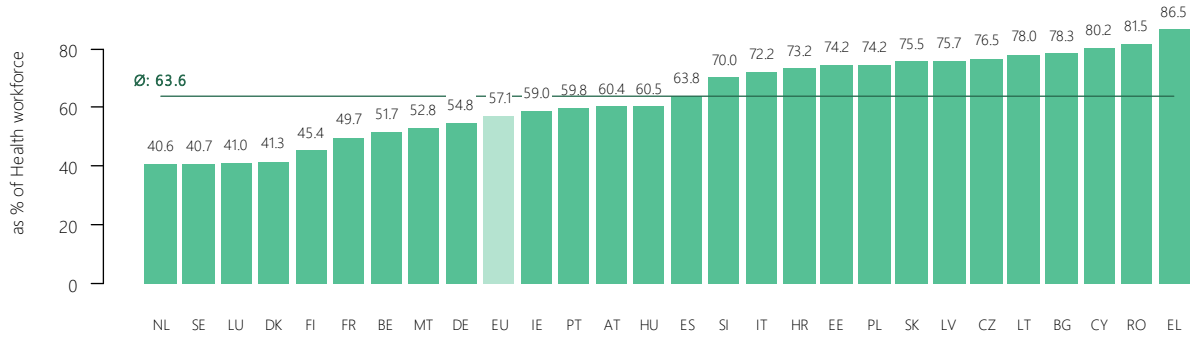
Source: Split of indicator G.1, BASYS based on Eurostat SNA.

Figure 33: Density of health professions per 100 inhabitants, 2017.



Source: Indicators S.1, S.2, S.3, BASYS based on Eurostat, OECD, SNA and non-health expenditure data.

Figure 34: Health services workforce as % of health workforce, 2017.



Source: Indicatos D.1, BASYS based on Eurostat, SNA.

Figure 35: Draft HWF scorecard, LTSS approach, EU27

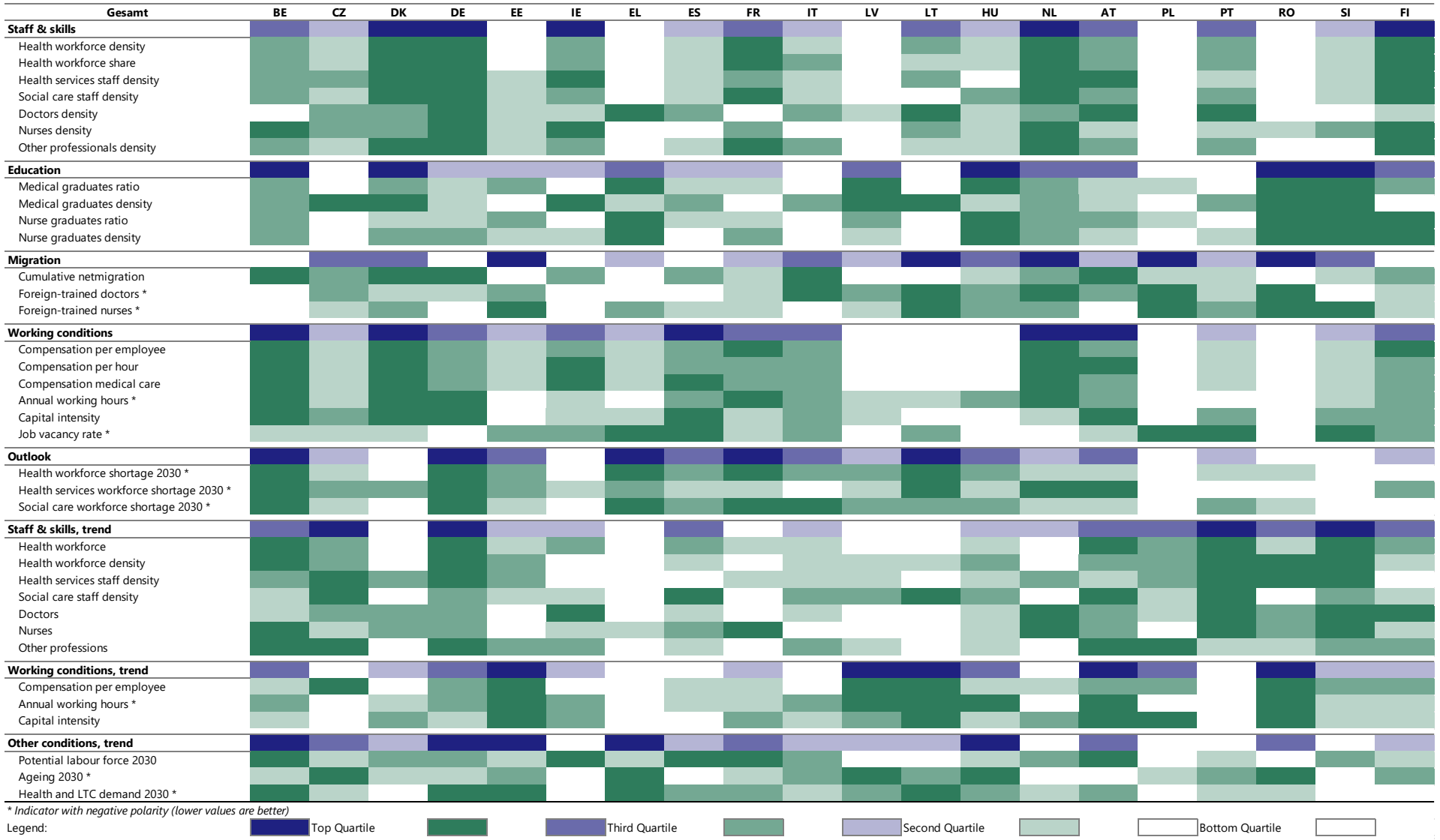


Figure 36: Draft dashboard, SPPM approach, 2007-2017

		BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	mean
Staff & skills	**Health workforce density**																												
	2017	5,46	2,29	3,25	8,86	7,03	2,96	5,32	2,08	3,1	5,82	2,43	3,21	2,2	2,52	3,27	7,54	3,11	3,81	8,19	5,21	2,55	3,8	2,04	3,08	2,51	7,51	8,38	4,4
	07/17	1,84	1,05	1,69	-0,47	2,34	1,53	0,73	-0,27	1,40	0,81	2,20	1,29	1,05	1,27	1,12	2,98	1,48	4,60	0,62	1,70	1,53	2,28	2,04	2,00	0,67	1,32	0,31	1,4
	Health workforce share																												
	2017	13,1	4,6	6,44	17,5	13,14	6,1	11,9	5,38	7,44	14	6,14	7,73	4,64	5,52	6,8	10,4	6,67	8,04	15,3	10,4	6	8,14	4,63	6,43	5,76	16,2	16,8	9,1
	07/17	1,74	0,82	1,46	0,05	1,59	1,39	1,60	0,89	2,58	0,96	2,42	1,65	1,75	1,85	0,39	2,53	0,19	2,48	0,64	1,31	0,85	2,57	2,35	2,09	-0,11	1,57	0,23	1,4
	Health services staff density																												
	2017	2,82	1,79	2,49	3,66	3,86	2,2	3,14	1,8	1,98	2,89	1,78	2,32	1,76	1,91	2,55	3,09	1,88	2,01	3,33	3,14	1,89	2,27	1,66	2,16	1,9	3,41	3,41	2,5
	07/17	1,11	0,86	1,29	0,88	1,74	1,17	-0,08	-0,16	0,22	0,86	2,21	0,72	1,49	0,79	0,27	1,13	0,53	2,26	1,00	0,69	1,25	1,69	2,64	1,58	1,17	0,41	-0,16	1,0
	Social care staff density																												
	2017	2,64	0,5	0,76	5,2	3,18	0,76	2,18	0,28	1,12	2,93	0,65	0,89	0,44	0,61	0,72	4,44	1,23	1,8	4,86	2,06	0,66	1,53	0,38	0,92	0,62	4,1	4,97	1,9
	07/17	2,69	1,80	3,14	-1,31	3,16	2,69	2,02	-0,94	3,94	0,76	2,18	2,96	-0,50	2,94	5,00	4,50	3,16	8,16	0,37	3,44	2,37	3,23	-0,22	3,07	-0,60	2,15	0,65	2,3
	Doctors density																												
	2017	0,31	0,42	0,41	0,41	0,42	0,35	0,33	0,61	0,39	0,31	0,34	0,4	0,39	0,32	0,46	0,3	0,33	0,4	0,36	0,52	0,23	0,5	0,29	0,31	0,38	0,33	0,43	0,4
	07/17	0,65	1,44	1,40	1,71	1,72	0,73	3,64	0,80	0,92	0,11	2,20	0,59	3,52	0,18	1,71	1,14	1,64	3,91	2,21	1,37	0,49	2,78	2,85	2,66	1,73	2,07	1,72	1,7
	Nurses density																												
	2017	1,19	0,48	0,89	1,04	1,34	0,65	1,48	0,36	0,57	1,05	0,7	0,61	0,57	0,48	0,8	1,21	0,68	0,85	1,12	0,71	0,56	0,69	0,71	1	0,78	1,43	1,16	0,9
	07/17	2,05	0,31	0,55	0,85	1,69	-0,29	-0,32	0,40	2,16	3,26	2,38	-0,22	1,73	-1,79	0,44	0,93	1,08	3,13	2,86	1,00	-0,27	2,98	1,58	2,57	-0,67	0,38	0,12	1,1
	Other professionals density																												
	2017	3,97	1,39	1,96	7,41	5,26	1,96	3,52	1,11	2,14	4,46	1,4	2,2	1,24	1,72	2,01	6,03	2,1	2,57	6,71	3,98	1,75	2,6	1,03	1,77	1,35	5,75	6,79	3,1
	07/17	1,90	1,21	2,38	-0,74	2,55	2,39	0,99	-1,00	1,29	0,37	2,19	1,89	0,12	2,58	1,28	3,56	1,59	5,31	0,22	1,87	2,28	1,97	2,04	1,58	1,23	1,52	0,26	1,6
Education	**Medical graduates ratio**																												
	2017	4,8	2,4	2,4	4,6	3,8	4,7	3,0	9,8	3,8	3,8	6,4	3,4	1,7	5,6	3,1	0,8	7,6	5,1	4,7	3,8	4,0	3,4	12,1	7,1	4,1	5,5	3,3	4,6
	07/17	4,1	11,1	-4,5	1,3	-0,4	-1,1	0,8	9,9	1,0	-0,5	17,1	1,4	-6,1	5,2	-0,2	-5,4	3,7	7,3	0,9	-2,2	1,4	-3,7	5,3	-2,8	17,0	4,7	17,1	3,1
	Medical graduates density																												
	2017	0,2	0,2	0,2	0,2	0,1	0,1	0,3	0,1	0,2	0,1	0,1	0,2	0,0	0,2	0,2	0,0	0,1	0,3	0,2	0,1	0,1	0,2	0,2	0,2	0,2	0,1	0,1	0,2
	07/17	8,1	9,7	4,7	3,3	0,2	3,4	4,2	-1,9	5,9	6,2	2,6	2,6	0,0	12,9	8,8	0,0	3,4	8,4	2,6	-2,2	5,1	5,1	6,2	10,3	5,5	3,7	2,5	4,5
	Nurse graduates ratio																												
	2017	4,8	1,4	1,6	4,3	4,1	5,4	2,0	22,8	3,8	3,9	7,4	3,1	2,8	5,8	2,5	1,0	9,2	3,6	4,7	4,5	3,7	3,5	13,7	7,5	4,0	6,0	3,4	5,2
	07/17	3,3	19,9	-9,2	1,0	-0,1	-1,9	-0,7	14,7	-1,0	-2,0	0,0	0,9	-5,5	2,8	-3,9	-5,3	4,3	11,0	1,1	-1,5	0,2	-6,1	6,1	-4,1	0,0	5,2	0,0	1,1
	Nurse graduates density																												
	2017	0,6	0,1	0,1	0,4	0,5	0,4	0,3	0,8	0,2	0,4	0,5	0,2	0,2	0,3	0,2	0,1	0,6	0,3	0,5	0,3	0,2	0,2	1,0	0,8	0,3	0,9	0,4	0,4
	07/17	5,4	20,5	-8,8	1,8	1,6	-2,3	-1,0	15,2	1,3	1,2	0,0	0,6	-3,8	1,1	-3,6	-4,1	5,4	14,7	4,0	-0,6	0,1	-3,4	7,8	-1,6	0,0	5,6	0,0	2,1

		BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	mean
Migration	**Cumulative netmigration**																												
	2017	5,4	-2,9	2,5	4,3	4,1	-1,7	1,7	-1,3	3,3	1,1	-1,4	4,9	7,6	-9,7	-11,2	17,0	1,2	11,5	2,2	5,7	0,6	-0,7	-5,4	1,7	0,0	3,2	7,3	1,9
	07/17	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Foreign-trained doctors *																												
	2017	22,2	x	7,1	9,2	11,9	5,2	61,3	12,8	13,7	11,9	5,2	1,4	103,7	7,7	0,5	x	8,0	16,0	2,7	4,8	2,8	12,0	1,5	17,0	x	9,5	28,0	15,7
	07/17	8,5	x	3,7	2,2	8,3	19,0	x	x	x	5,7	x	1,5	x	-1,5	x	x	-2,4	x	2,7	5,2	x	x	x	x	x	x	3,0	4,7
	Foreign-trained nurses *																												
	2017	5,3	x	2,7	1,8	6,3	0,2	26,1	1,2	4,0	2,9	1,3	6,0	x	3,0	0,5	x	1,4	x	1,3	19,6	0,1	2,5	0,0	0,1	x	3,6	2,9	3,9
	07/17	13,8	x	x	0,8	x	x	x	2,5	x	2,0	x	1,9	x	-1,2	x	x	x	x	-2,0	x	x	-4,4	x	x	x	x	1,1	1,6
Working conditions	**Compensation per employee**																												
	2017	46,7	5,6	12,2	61,9	31,4	13,1	40,2	12,9	32,7	44,1	12,0	26,9	18,1	9,9	9,7	88,7	11,3	27,6	48,2	34,1	8,3	19,7	8,8	19,8	10,9	45,6	54,8	28,0
	07/17	2,5	9,1	5,1	1,5	3,2	6,1	0,6	-0,7	2,1	2,2	0,5	1,0	-0,2	5,2	6,9	4,5	2,3	5,2	1,9	3,3	3,7	0,5	6,7	2,6	6,2	2,7	3,4	3,3
	Compensation per hour																												
	2017	34,8	5,3	10,5	37,2	25,1	10,2	29,1	11,5	26,4	28,6	10,1	24,7	16,8	8,1	8,3	45,4	8,3	17,0	35,1	28,9	6,0	12,1	7,7	16,5	10,3	27,8	27,5	19,6
	07/17	1,9	8,9	4,2	3,1	2,9	6,2	0,1	0,1	1,1	2,1	1,2	0,4	-0,1	5,9	6,0	2,0	1,8	4,0	2,2	2,8	3,5	0,0	7,9	2,3	7,2	1,8	2,2	3,0
	Compensation medical care																												
	2017	50,5	9,5	19,8	57,3	39,4	22,8	56,1	22,5	50,8	46,6	20,4	43,0	31,0	16,2	16,1	77,0	16,3	35,1	49,2	46,8	12,4	27,9	17,4	30,5	18,0	45,8	50,0	34,4
	07/17	1,9	10,1	5,1	3,2	2,6	6,1	-0,5	-0,6	1,9	1,9	0,2	0,4	0,3	4,9	6,5	2,8	2,2	4,9	2,2	2,6	3,3	-0,5	6,5	2,5	6,5	1,8	2,9	3,0
	Annual working hours *																												
	2017	1,3	1,6	1,8	1,3	1,4	1,9	1,6	2,1	1,6	1,4	1,7	1,5	1,8	1,9	1,8	1,3	1,6	1,7	1,2	1,5	2,0	2,0	1,9	1,7	1,6	1,5	1,6	1,7
	07/17	-0,4	0,0	0,2	-0,2	-0,4	-0,6	-0,2	0,7	-0,1	-0,2	-0,7	-0,3	0,2	-1,3	-0,5	-0,3	-0,5	x	0,2	-0,5	-0,1	-0,1	-0,5	-0,2	-0,2	-0,2	0,7	-0,2
	Capital intensity																												
	2017	116,6	54,7	84,5	110,6	157,3	44,9	64,3	48,5	146,7	63,7	55,2	84,7	0,0	68,6	18,4	130,5	43,9	77,1	71,7	170,2	28,5	93,5	26,6	77,7	77,2	89,7	87,1	77,5
	07/17	0,9	x	0,9	2,9	1,5	5,0	2,4	0,7	x	1,9	x	1,3	x	2,8	7,2	2,1	0,9	-0,9	2,3	3,0	3,6	-0,4	4,1	1,8	2,2	1,9	x	2,2
	Job vacancy rate *																												
	2017	1,8	2,7	2,0	1,9	2,5	1,3	1,3	0,0	0,6	1,5	1,9	1,2	0,8	2,2	1,2	1,3	3,3	1,1	2,1	1,5	0,5	0,2	2,8	0,9	0,4	1,2	2,0	1,8
	07/17	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Outlook	**Health workforce shortage 2030 ***																												
	2017	9,5	7,0	13,2	22,7	5,3	11,4	18,3	4,6	12,0	9,6	7,3	11,4	7,2	12,0	9,7	7,8	11,4	22,6	17,2	12,7	36,5	15,5	13,7	19,5	28,7	22,6	12,0	14,1
	07/17	-2,5	-0,3	-1,9	-0,1	-2,5	-1,3	-1,6	0,6	-1,7	-1,3	-1,7	-1,6	-2,1	0,0	0,2	-5,0	-1,2	-5,8	-1,1	-2,2	-1,6	-2,0	-1,4	-2,2	-0,7	-1,7	-1,3	-1,6
	Health services workforce shortage 2030 *																												
	2017	4,1	5,5	8,0	6,8	2,4	7,0	9,4	6,9	9,1	8,1	5,6	10,9	3,2	9,9	6,6	6,7	8,5	11,4	6,5	6,6	31,4	11,2	11,3	14,4	21,6	6,7	3,7	9,0
	07/17	-1,8	-0,1	-1,5	-1,4	-1,9	-0,9	-0,8	0,5	-0,5	-1,3	-1,7	-1,0	-2,6	0,5	1,1	-3,2	-0,2	-3,6	-1,4	-1,3	-1,3	-1,4	-2,0	-1,8	-1,2	-0,8	-0,8	-1,2
	Social care workforce shortage 2030 *																												
	2017	15,4	12,0	30,1	33,9	8,8	24,2	31,2	-10,2	17,0	11,0	12,0	12,8	23,4	18,4	20,5	8,6	15,8	35,2	24,5	22,0	51,2	21,8	24,3	31,4	50,7	35,7	17,7	22,2
	07/17	-3,3	-1,0	-3,3	0,8	-3,3	-2,5	-2,9	1,2	-4,1	-1,2	-1,7	-3,2	-0,5	-1,7	-3,5	-6,4	-2,8	-8,9	-0,8	-3,9	-2,3	-2,9	0,9	-3,2	0,6	-2,5	-1,6	-2,4

* Indicator with negative polarity (lower values are better)

Legend: Key Social Challenge Good Social Outcome

BASYS

A sustainable, resilient, equitably distributed and accessible workforce is key to improving health service coverage and delivering the highest attainable standard of health and well-being.

There are various definitions used for the health workforce but in the context of attaining the Sustainable Development Goals (SDGs) it is important to have a broad and inclusive perspective: "all people engaged in actions whose primary intent is to enhance health".

World Health Organization

This summary report presents imbalances in supply and demand for health workforce across the European Union. Additionally, 20 country reports compare deviations from the EU average.

The study was financed by the European Institute of Health and Sustainable Development (EIHSD).

© Copyright 2022. BASYS GmbH, All rights reserved. Reproduction or translation of this publication, in part or in full, with appropriate credit of the source is permitted.

BASYS
Beratungsgesellschaft für angewandte Systemforschung mbH

Reisingerstraße 25 - 86159 Augsburg
Telefon: +49 (821) 25794-0
basys@basys.de - www.basys.de