Health workforce shortage in the EU27 in the light of accounting systems

Prepared for the European Institute of Health Sustainable Development (EIHSD)

D R A F T

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Abbreviations

AWG	Ageing Working Group
DALYs	Disability adjusted life years
DTP3	3 doses of diphtheria-tetanus-pertussis vaccine
ECS	European Company Survey
EHIS	European Health Interview Survey
EIHSD	European Institute of Health Sustainable Development
EQLS	European Quality of Life Survey
ESPN	European Social Policy Network
EURES	European network of employment services
EU-SILC	European Survey of Income and Living Conditions
FTE	Full-Time-Equivalent
GBD	Global Burden of Disease
HEDIC	Health Expenditures by Diseases and Conditions
HP	Health Care Provider
HSC	Health and Social Care
HSPA	Health System Performance Assessment
HWF	Health workforce
IAB	Institut für Arbeitsmarkt und Berufsforschung
ICHA	International Classification of Health Accounts
ILO	International Labour Organisation
ISCED	International Standard Classification of Education and Educational Attainment
ISCO	International Standard Classification of Occupations
ISG	Indicator Sub-Group (SPC)
JAF	Joint Assessment Framework
LFS	Labour Force Survey
LTC	Long-term care
NACE	Statistical classification of economic activities
NCOs	National Coordination Offices
OECD	Organisation for Economic Co-operation and Development
OMC	Open Method of Coordination
PES	Public Employment Services
Q	Health and Social Care (NACE 86-88)
QA	Health Care (NACE 86)
QB	Social Care (NACE 87-88)
RPG	Regulated Professions Database
SAM	Social Accounting Matrix
SDGs	Sustainable Development Goals
SHA	System of Health Accounts
SNA	System of National Accounts
SPC	Social Protection Committee
WHO	World Health Organisation

Abstract

Enduring health workforce (HWF) shortages are symptoms of many European health systems. But what are the underlying causes and possible remedies to overcome them. Reporting labour shortages by the National Coordination Offices (NCOs) presents sector and skill specific imbalances of health workforce across Member States (MS). Surveys and health labour accounts give further insights into these imbalances. The paper discusses various indicators used to measure health workforce shortage. It proposes to link the various approaches to be able to analyse the reasons for this organisational weakness of health systems. Labour market data must be combined with health accounts and education data to reach an overall assessment of health workforce shortage within the EU. Interrelated it will also discuss the issue of health workforce migration and "brain drain" from South and Eastern European Countries to North and Western European Countries.

1. Introduction and background

An adequate and accessible health workforce is fundamental to an integrated and effective health system and for the provision of health services (WHO 2010). As advocated by the WHO Global Code of Practice on the International Recruitment of Health Personnel, all Member States should strive to create a self-sustainable health workforce and work towards establishing effective health workforce planning, education and training, and retention strategies that will reduce their need to actively recruit migrant health personnel.

Basic monitoring of geographical shortage through measures of density and with the employment dynamic as a perspective requires both description of the active health workforce stock and the health labour market flows. What is the baseline distribution of health workers across Member States to account for assessing the difference in accessing health care? Establishing an evaluation of this distribution is a starter to evaluate further the influence of social, financial and organisational determinants on health worker decisions to be a candidate for, stay in, or leave a job in underserved areas – and hence to increase population access to health workers in these areas.

In Europe, determining labour shortage has been widely discussed and is e.g., regularly reported to the European Commission by the National Coordination Offices (NCOs). However, the various factors behind the obvious imbalances in health workforce like gaps in training capacities are not observed with the same consistency across Member States and commonly discussed at European

level. The epidemiological factors determining the need of health care might be largely the same across Europe. However, the demand for health workers derived from health care demand varies in reality in the order one to two because of differences in capabilities and willingness-to-pay, national designs of the health systems.

This paper provides an overview on the current situation and aims to support the European Institute of Health Sustainable Development (EIHSD) in elevating health workforce shortages in Europe by:

1. providing an analysis of the health workforce shortages in the EU,
2. developing a methodology to assess healthcare workforce shortages in Europe, and
3. assessing the push and pull factors leading to migration of labour force in the source and destination countries.

Thus, this work aims to contribute to the development of a common pan-European methodology to assess the health workforce shortage and finally to the preparation of political, social, economic, legal, demographic, educational, infrastructural, and administrative instruments for a necessary solution and the resulting policy steps (EHISD 2020: Terms of Reference).

2. Measuring health workforce shortage

During the last decades, the European Commission and Member States of the European Union, and international organisations have developed a set of indicators to monitor human resources in health, to measure health workforce shortages (European Commission 2020, WHO 2017, OECD 2016), to improve health workforce planning, and to adjust the organisational framework. Additionally, data sources have been expanded and harmonized as employer-surveys, public employment statistics, and the labour force survey (Eurostat 2020a).

However, comprehensive labour accounts are not yet implemented which gather workforce data together with information on health needs and overall resources allocation of different types of health professionals. There are accounting approaches in this direction but being incomplete. The National Health Workforce Accounts Handbook developed under the direction of the WHO aims to support the implementation of the Global Strategy on Human Resources for Health: Workforce 2030. The methodology shall help to monitor the progress toward important dimensions as self-sustainability and universal health coverage (WHO 2017a, WHO 2009).

Self-sustainability occurs when national production of new health workers compensates the health worker loss caused by exits and adapts to the evolution of the population needs (WHO 2017a). Modelling self-sustainability requires stock and flow information as the impact of newly educated health workers on the existing stock of active health workforce, now and in the future, and of outflows from the health labour market. Also, any gap between emigration and immigration puts self-sustainability in perspective.

Sufficient health workforce is prerequisite to reach universal health coverage. HWF of adequate size and skill mix, as well as required teachers and trainers, is critical to the attainment of any population health goal. Therefore, from a health policy perspective, health workforce shortage needs to be systematically measured which takes objectives of the health systems into account.

Non-monetary and monetary data are needed. The System of Health Accounts (SHA) has developed a functional classification of health care activities to delineate the boundaries of health systems from an international perspective. One of the criteria applied focuses on medical content of the activities such as qualified medical or health care knowledge and skills are needed in carrying out health care activities (OECD, Eurostat, WHO 2011, p. 57). Thus, medical trained persons and their assistant workers form the main part of health workforce. But many non-medical professions contribute to the functions of the health system as IT-specialists and administrative clerks. Shortage of health workforce might therefore be not only a problem of scarce medical professions but also of other skills.

The current approaches to measure health workforce shortages focus mainly on the labour market of medical professions. In the following, we will discuss firstly this approach of the “labour market offices”. In a second step we present “health system approaches” for international comparisons.

2.1 The vacancy - unemployment space

Labour accounts using “persons” and “jobs” as basic accounting units. Each job represents the link between an employed person and a filled job. Filled jobs and job vacancies sum up to total job[1]s. Each employed person has a main job and may have secondary jobs. Employed persons and unemployed persons together are defined as labour force. Together with the information of volume

[1] Eurostat defines a job vacancy as a paid post that is newly created, unoccupied, or about to become vacant.

and the payments of work labour accounts allows to derive several indicators such as the density of health professions, the number of graduates, working time, earnings and labour costs, unemployed professions and vacancies. Both stock and flow data are used to describe the situation.

The *number of employed* indicates the realized demand (number of employed persons or working hours), the extent to which labour force providers (employees, self-employed) have found work. But it doesn't show the unrealized demand for labour, namely the jobs that could not (yet) be filled (vacancies). Realized and unrealized demand for health jobs form together the total demand for health jobs, the demand for health workforce.

Correspondingly, the unrealized supply is expressed by the number of unemployed persons. Employed and unemployed persons together form the supply of labour, and in the case of health care, the supply of health workforce. For comparative reasons, usually, unemployed persons are expressed as share of the labour force[2], the *unemployed rate*. Analogous to the unemployment rate, a *vacancy rate* can be formed which expresses the share of the demand for labour that cannot be realized at a certain point in time.

One important distinction is between labour shortage and skill shortage:

- *Skilled health workforce shortages* occur in the interplay between the supply and demand for specific skills. A shortage or bottleneck occurs when the supply cannot meet the demand. The demand for skilled workers with a certain qualification is greater than the corresponding supply of skilled workers. Shortages or bottlenecks can be macroeconomic or partial, i. e. by occupation, industry, or region. Usually, several indicators are used to identify labour shortages (IAB 2007).
- *Labour shortages* might occur where there are enough skilled persons, however, an insufficient number of them is willing to take up employment in the occupation in question.

Labour shortages exist if employers seek to fill posts at the going rate of pay but cannot find people to fill them. Economically, this is usually expressed as the negative gap between the supply of labour and the demand for labour. However, in practice there is no universal key figure for measuring shortages or bottlenecks in the skilled workforce. In practice, several indicators are used (see Table 2).

[2] The potential supply includes furthermore the number of persons who are able to participate in the labour market, but didn't.

For health policy, business, and society, it is necessary to have an objective assessment of how the skilled labour situation is professionally and regionally. This is where the bottleneck analysis comes in. It shows which professions are currently experiencing staffing difficulties and what the supply is like.

However, a stock of vacant jobs (or its increase) must not in itself indicate an (increasing) labour shortage[3]. They are initially only a snapshot of the ongoing creation and filling of *vacancies*. Vacancies might be filled immediately or later. Vacant jobs that are to be filled immediately are also referred to as vacancies. Correspondingly, a distinction is made between current periods and vacancy periods for registered jobs. While the term duration also includes the time in which the job was not yet vacant, the vacancy time only includes the time between the desired date and the effective date of filling. For the bottleneck analysis, the *vacancy period* is decisive, because it alone indicates that job opportunities are not being used and thus value added is being lost.

Labour market tightness and matching efficiency (Beveridge model)

In addition to the three indicators - unemployment rate, the vacancy rate, and the vacancy period, - two further indicators have been established in the bottleneck analysis: The vacancy-unemployment-ratio and the job-related unemployment rate.

- The *vacancy-unemployment ratio* is calculated by comparing the average number of vacancies in a particular job with the average number of jobseekers in that occupation.
- The *skill-related unemployment rate* is calculated by relating the registered unemployed in an occupational category to the labour force in that occupational category.

The ***vacancy-unemployment ratio*** indicator measures the *labour market tightness.* The number of vacant posts per each unemployed person shows the possibilities to recruit labour. Labour market tightness arise by the adjustment time needed to find new market equilibrium. The adjustment processes may last for a long time because of high adjustment costs (see Arrow, Capron 1959).

Labour shortages can occur in the short and medium term as well as in the long term due to various causes. Possible short- and medium-term causes are, for example, an economic upswing, long

[3] Health workforce employed and unemployed health workers, and open post are stocks measured at a given time. The same holds for students, trainees, and retirees.

training periods, a lack of transparency on the labour market and the associated lack of matching of supply and demand. Long-term causes include demographic developments, furthermore inadequacies and deficits in the education system.

Search and matching theory states that vacancies and unemployed form matches or hirings. The *matching efficiency* reflects the market's ability to match individuals to jobs. The matching efficiency includes the *mismatch problem* and structural factors. A structural inefficiency arises on the labour market when persistent unemployment meets simultaneously vacancies that cannot be filled. The existence of matching inefficiency can be explained by quality deficiencies in the labour supply, a lack of transparency in the labour market and associated information uncertainties as well as lack of mobility and motivation.[4]

Inflows and outflows

Considering the long-term dynamics of the health workforce, inflows and outflows need to be observed including the number and structure of graduates and the retirees, and the number of health workers immigrating or leaving the countries. In this context, a further indicator used to identify shortages is the

- *ratio of foreign trained professions* as percentage of employed health professionals. A high number of employed foreign nationals in the occupation indicates shortages as lack of education capacities. This is true of a range of occupations which are known to suffer from skill deficits, such as doctors and nurses.

Flow statistics aim to shed light on the dynamics of supply and demand between cyclical and structural factors (Blanchard, Diamond 1989). Much of the movement into and out of employment is from out of the labour force, many workers move from one job to another without experiencing unemployment. By integrating flow statistics one get a much richer picture about the dynamics and differences of health workforce across countries (Eurostat 2021).

Cedefop skills forecast estimates the total job openings by occupational group as the sum of net employment change and replacement needs. Net employment change refers to new jobs created due to the expansion of the employment in that sector or occupation. Replacement needs arise as the workforce leaves the occupation due to retirement or career changes. Replacement needs,

[4] Eurostat compiles two skills mismatch indicators: (1) Over-qualification rate (vertical skills mismatch), (2) Job mismatch by field of education (horizontal skills mismatch) (Eurostat 2019).

generally, provide more job opportunities than new jobs, meaning that significant job opportunities arise even in occupations declining in size (e.g. midwives) (Cedefop 2020a, Cedefop 2019).

2.2 The needs, demand and supply space

Needs-based measurement of health workforce shortages goes beyond the analysis of demand and supply defined in labour accounts. It starts with the measurement of health needs of the population. We define "need" as "demand" corrected by "unmet need". The latter variable can be positive, e.g., in the case of unmet need, but also negative in the case of inappropriate utilisation of health care services.

Measuring health needs across European MS must be comprehensive and consistent. It is crucial to be clear about the definition of unmet health need and the difference between need and supply. Wright et al. 1998 have defined health needs assessment as systematic method of identifying unmet health and healthcare needs. It involves epidemiological, qualitative, and comparative methods to describe health problems of a population. "Need" in health care is commonly defined as the ability to benefit while "demand" is what patients ask for.

Effectiveness and quality play a great role in the measurement of need of interventions. There will be no benefit from an intervention that is not effective or if there are no resources available. Therefore, needs assessment must balance clinical, epidemiological, social and economic considerations.

Health targets

Identifying needs-based health workforce WHO measures health needs of populations based upon the health targets in the Sustainable Development Goals (SDGs). The 12 selected tracer indicators in the SDG index were family planning, antenatal care coverage, skilled birth attendance, DTP3 immunization, tobacco smoking, potable water, sanitation, antiretroviral therapy, tuberculosis treatment, cataract surgery, diabetes, and hypertension treatment (Cometto et al. 2016). This method uses as a goal the number of health workers estimated to be needed to achieve 80% coverage for each of the 12 SDG tracer indicators (see Table 3). The Output variable used Disability Adjusted Live Years (DALYs) derived from the Global Burden of Disease Study.

Table 3 gives an overview on the derived weights for each of the tracers. Hence, the model is based on a population needs-based approach that determines minimum health workforce requirements in relation to health services requirements for health system objectives (WHO 2016).

For Europe as a whole, the WHO Study compiles only a small health workforce shortage of 3% in the year 2013 and it even expects that the shortage will be reduced by 2030. The current and forecasted health worker shortages based on needs identified through the SDG index threshold are greatest in the lower income regions with the greatest burden of preventable disease and the fewest resources (see also GBD Study 2017). Critical assumptions in this approach are not only the selection and weight of tracers (see Table 3) but also the estimate of labour coefficients which link DALYs and health workforce.

Access to affordable health care includes a spatial dimension. Country averages might be accompanied by geographical inequalities. Even in countries with a high health workforce density remote areas might exist. Geographical disparities in the availability of healthcare services within countries are related to all levels, primary, secondary and tertiary care. The 2018 Social Protection report, has identified in 17 MS an access challenge because of availability of healthcare professionals and their geographical distribution (Social Protection Committee 2018).

The Social Protection Committee Indicators Sub-Group (ISG) has adopted a broad common methodological framework for the development of the portfolio of EU health indicators. The ISG selected the social OMC objectives of equal access, high-quality health care, and financial sustainability to be monitored by Joint Assessment Framework (JAF) Health. The JAF methodology is a combination of a first-step screening of country specific challenges based on quantitative information and a second-step in-depth qualitative analysis to contextualise findings coming from hard data (European Commission 2015). The quantitative information includes the number of health professionals (physicians and nurses/midwives) per 100,000 inhabitants[5].

Labour coefficients

Estimating need or demand for health workforce as function of outcomes and output specifies labour coefficients either global or of certain professions. Ideally, the estimates should be specific to conditions and differentiate between skills. Labour coefficients are the inverse of productivity

[5] The JAF methodology proposes to use, where possible, the weighted EU average as the mean. More formally, the standardisation formula is expressed as: Individual Score for each indicator = [(Indicator – EU average)/Standard deviation] *10.

rates. Over time productivity rates increase while labour coefficients decrease. To estimate these coefficients specific assumptions are necessary. It is important to communicate these assumptions and to monitor continuously the health workforce situation keeping stakeholders informed of the progress and changes in order to adjust and intervene with corrective actions (Maligheri et al. 2015).

In the period 2007-2017, labour productivity converged across EU27. Despite increasing knowledge about the underlying factors of productivity growth in health care this needs further analysis and compilations from the health accounting point of view.

Overall productivity of health systems closely relate to their structures. The influence of health systems on the need of resources is widely discussed. For example, for some health conditions, timely and adequate management, treatment and interventions delivered in the outpatient setting could potentially avoid the need for hospitalization. The measurement of efficient health services delivery including prevention is insofar part of the measurement of health care need (Sundmacher et al. 2015, WHO Europe 2016, BASYS 2019). Examples of potential inefficiencies relate to: i) suboptimal mix between private and public funding; ii) mismatch of staff skills; iii) suboptimal provision of primary health care services; iv) unnecessary use of specialist and hospital care; v) too few day-case surgeries and missing concentration of hospital services; vi) deficiencies in general governance of health systems and lack of managerial skills; vii) insufficient data collection, IT use, and health technology assessment to improve decision-making processes; and, viii) inadequate access to more effective health promotion and disease prevention (Medeiros, Schwierz 2015).

Norms

The measurement of health-related needs of workforce embraces many norms (BASYS 2019):

- Boundaries of the workforce activities within the health system (e.g., alternative healer, social care),
- Role and services of medical specialists (e.g., curricula, borderlines between specialists),
- Minimum standards / capacities (e.g., minimum surgery capacities),
- Definition of quality of services, protocols, and operational structure,
- Time standards (e.g., working time, FTEs, maternity leave),

- Norms for regional accessibility (access time, distribution of workforce, emergency standards, etc.), and
- Communication standards (e.g., referral, consilium, data sets, interfaces).

For international comparisons it is necessary to build the measurement system of shortages on certain accounting principles like comprehensive and consistency in line with rules of the national accounting systems. The "condition matrix" of disease accounts may provide a starting point because it uses the standards of SHA 2011. Developed in the Health expenditure and disease accounts (HEDIC) the condition matrix offers a tool to assess the allocation of resources across providers (Eurostat 2016).

The resource devoted to health workforce are in all countries the most dominant expenditure items. Other factors are materials and services used, consumption of fixed capital, and expenditures on other inputs (See SHA 2011: Classification of Factors of Health Care Provision).

The disease-based approach of HEDIC like the GBD approach allows to describe health needs across conditions and by this both to derive a global figure of health workforce needed and related to specific health conditions (See SHA 2011: Health Spending by Beneficiary Characteristics).

Skills and conditions

One crucial tool to map skill-related supply, demand, and need are skill matrices. To compare shortages across countries it is necessary to apply country-independent classifications. NCOs use ISCO, ISCED, and NACE to report labour market indicators.

In health care, vacancy rates by skills are usually reported by employers and collected in administrative data. They can be linked with employment data at industry level based on NACE. The provider classification (ICHA-HP) of the System of Health Accounts (SHA) is closely linked to NACE (OECD, Eurostat, WHO 2011, Annex A). In the German Health Labour Account (Gesundheitspersonalrechnung) time series of matrices are available which offers an insight into the types of skills employed across all types of health care providers. The matrices are compiled by linking administrative data with LFS data, and with health accounts data. The medical technological progress together with the demographic change demands for new medical skills and

making others obsolete. The change of the structures of the skill matrix gives an impressive insight into the development of various skills across providers.[6]

2.3 Integration of labour accounts and health accounts

The German Health Labour Account is an attempt to integrate employment statistics and health expenditure accounts. A broader approach is recommended in the Manual of SNA. It proposes a Social Accounting Matrix (SAM) showing the level and composition of employment and unemployment. It implies that the matrix presents not only the supply and use of various products, but also the supply and use of various categories of labour services (SNA 2008). The System of Health Accounts (SHA) aims to set up just such a framework for accounting of transactions and resources of health systems.

The key question remains how to link the various information for comparative figures of health workforce shortage. To solve this puzzle, apparently, health conditions, skills of health workforce, and labour coefficients must be linked to the health care provision processes already measured by SHA.

2.4 Indirect measurement of health workforce shortage

Health workforce shortage affects the access to care and the quality of health care services. Therefore, health workforce shortage might be indirectly measured via access and quality indicators. The Health System Performance Assessment (HSPA) indicator set includes some indicators which can be used for this purpose. In a study of the European Social Policy Network (ESPN) inequalities in the overall supply of healthcare and the supply gaps of human resources across MS were analysed (Baeten et al. 2018). Such indicators are the percentage of residents reporting difficulties in accessing medical care for reasons related to the accessibility of health systems: waiting time, travelling distance, and cost sharing.

Equality in terms of access is a supply side measure. It requires that all individuals in need have the same opportunity to use the health service, e.g. the same possibility to reach a health care

[6] The consideration of skills in the estimation of productivity growth requires also information about the wages of the different skills (see OECD 2003, Annex 1). The growth rate of total factor input using the Törnquist index is a weighted average of the growth rates of the different inputs whereas weights correspond to the current price share in the cost of for each factor.

facility. Distance measured by mapping car and public transport travel times and distances to healthcare facilities indicates the *potential* accessibility. In contrast, equality of treatment arises from the interaction of supply and demand. Distances measured using actual utilisation data indicates rather the *revealed distance*.

Neither health professionals nor population are uniformly distributed. Despite national standards, availability of health care services and their quality will vary regionally. Access to health care depends, not only upon the supply of resources in a community, but also upon the supply of such resources in neighbouring communities (Luo, Wang 2003). Often gravity models are used to weigh utilisation in relation to distances from the centre. The idea of the gravity-based method is that a nearby physician is more accessible than a remote one and it discounts a physician's availability by a gravity-based potential. Parameters about travel times, waiting times, fatal events etc. might be included into the model. Modelling regional patient flows requires information about where population lives, the location of providers by specialty and spatial particularities of the geography of a country such as transport routes (Fülöp et al. 2011).

Article 16 (Healthcare) of the European Pillar of Social Rights defines the right of everyone to timely access to affordable, preventive and curative care of good quality. However, there are no common definitions used in the EU to measure spatial availability.

The indicator "Self-reported unmet needs for medical care" monitored by EU-SILC has several limitations to measure unmet medical needs[7]. Self-reported unmet needs for medical care due to travel distance and waiting time suffer from cultural bias and capturing small area variations when compared across countries. EU-SILC data suggest that levels of unmet need attributable to travel distance are low in most Member States, at under 1% in all except Croatia. In about half of EU Member States reported rates were 1 in 1000 or less. However, as noted above, this indicator has many limitations and it is possible that the sampling strategy tends to exclude those in most need (European Commission 2016).

[7] Surveys typically use questions that seek to elicit self-reported unmet need, with a focus on quantifying instances in which people are not able to obtain the health (or dental) services they need because they face barriers to access. This is achieved by asking respondents whether they were unable to obtain care or treatment when they believed it to be medically necessary (European Commission 2016).

Furthermore, it is important to consider groups not captured (well) by population surveys, such as the homeless or people with very low incomes; these groups can find access to healthcare the most challenging, but they are often overlooked (Eurofund 2019).

3. Push and pull factors leading to health workforce migration

Both factors at the supply and demand side contribute to labour shortages. Unemployment, poor working conditions, lack of opportunities for advancement, may compel people to leave their country in search of better economic opportunities. In contrast to these push factors, pull factors such as higher wages, facilities, better working conditions and amenities attract migrants from "source" countries to move to "destination" countries.

3.1 Demography

The Ageing Report 2018 splits the factors which determine public health and long-term care expenditure. These are dependent on several factors which affect demand and supply of LTC services. The main factors include:

- the future relative numbers of elderly people, reflecting changes in the population projections;
- the dependency status of the population;
- the model of LTC provision (organisation and financing of the system, which shape the mix between formal, paid care and informal care), and
- the availability of human resources;
- the rate of economic growth as well as the progress in medical science and the development and use of new technologies.

(see Ageing Report 2018 Box II.1.3. and p.138 as well as the methodological assumptions European Commission 2017).

Demographic trends contribute by decreasing labour force entries of young adults to supply restrictions. New medical procedures such as robot-based surgery may require new specific qualification profiles leading to scarcity of specific skills.

On the other side, ageing increases the demand for health care and health workforce. Ageing drives demand for specialized skills on how to care chronic illness and long-term care, such as COPD and dementia.

Supply push

Population growth largely determines the growth of the supply of labour force. If the employment rates remain constant, the growth of the labour force potential directly follows the population trend. It is thus also obvious that the three determinants of population development, births, migration, and mortality, have a direct impact on the potential labour force. In addition to the demographic development of those already employed by age and sex, the potential labour supply will be determined to a large extent by the intake, the number of students and trainees entering the workforce. The future development of this figure depends on factors such as the number of study and training places at schools and universities, the development of university entrance qualifications, and the attractiveness of the relevant professional profiles.

Specific supply-push factors are those cause health workers to leave their home countries such as poor working conditions. Better job opportunities and higher wages serve as pull factors, while the unavailability of job opportunities is a push factor.

Demand pull

Population growth and population patterns largely determine the growth of the demand for health care and by this for health workers, too. Insofar growing health care demands drive national and international recruitment. Budgetary projection of the Ageing Working Group (AWG) provides regular long-term forecasts of the demand of health and long-term care. The comparison focuses on sustainability and budgetary challenges of the health systems.

The Ageing Report splits the factors which determine public expenditure on HC and LTC (European Commission 2017). These are dependent on several factors which affect demand and supply of LTC services. The main factors include:

- the future relative numbers of elderly people, reflecting changes in the population projections;
- the dependency status of the population;

- the model of LTC provision (organisation and financing of the system, which shape the mix between formal, paid care and informal care);
- the availability of human resources; and
- the rate of economic growth as well as the progress in medical science and the development and use of new technologies.

Specific demand-pull factors are the working and living conditions in the destination countries that health workers motivate to migrate as higher salaries as compared to the home countries or opportunities for medical training.

3.2 Freedom of movement and brain drain

The term "brain drain" refers to the migration of "human capital", mainly in the sense of the migration of highly educated individuals from less to more prosperous countries (Beine et al 2009). Brain drain of health workforce within the EU could imply that the intra-EU immigration of highly qualified health workers results in a growing skilled labour shortage in source countries.

The freedom of movement of EU workers is a fundamental policy chapter of the EU acquis, regulated by Article 45 of the Treaty on the functioning of the European Union, so that no special work permit is necessary for workers from another EU Member State, who in principle can also count on reciprocal recognition of professional qualifications. For the most part, mutual recognition of the professional nursing qualifications acquired in the EU Member States is guaranteed.

In health care, migration is a global phenomenon. Uneven economic development, and differences in living standards between socio-economic groups are among the most important reasons responsible for migration.

Despite the relevance of non-economic factors, it is evident that migration is primarily motivated by economic factors. Thus, most migrants (apart from forced and subsequent migrants) are searching for better economic opportunities. Income disparities across and within MS will also contribute to migration of health workers in future. On the other side, prices and wages are heavily regulated in the health sector. This poses the risk of rationing in the labour market if, as a result, wages cannot respond sufficiently to changes in supply and demand. Areas with a particularly pronounced need for and shortage of skilled labour are therefore likely to include areas of the

health care system with pronounced price regulation, including the hospital services, care for the elderly and primary and secondary outpatient health care (Augurzky, Kolodziej 2018).

3.3 Technology

Technological progress is a major factor in explaining changes in health care expenditures, and, consequently, health workforce patterns. It has increased the demand for higher-skilled health professions, leading to higher returns to education for these health professions, and producing a skill-bias movement in health care employment (Schumacher 2002; McPake et al. 2015).

Also, the medical-technical progress has an influence on morbidity and demographics due to the expanded range of services and the increase in life expectancy and so on the demand of health care workers. *Labour productivity*, the quantity of output produced using a given level of labour, is largely driven by medical knowledge and work organisation. Growth accounting allows to decompose the various factors that push productivity (Schneider, Karmann, Braesecke 2014). It is important to note that some innovations enhance the demand for health care and by this the demand for labour contributing directly to the shortage of health workforce. Such innovations are mostly classified as product innovations, which involve significant changes in the capabilities of goods or services. Both entirely new goods and services and significant improvements to existing products are included (OECD, Eurostat 2005).

3.4 Financing compensation of health workforce and cost of training

Productivity growth supports the financing of health workers. Their compensation forms the largest post in nearly all health care budgets. Looking at the variation of wages of health professions across EU27 one might ask how different wages drive labour migration.

If there are countries with surplus and others with shortages, international migration of health professional can provide efficiency gains both at the EU and at the country levels. Furthermore, if the cost of training is at least partly funded by the individual, the social loss to source countries due to emigration is minimised. In this context, international migration of health workers could provide an opportunity for both the source and the destination country, as a well as for the migrants themselves. However, there are doubts about the sustainability of this option as the demand for health care in the high-income regions might faster grow than the income among will countries converge.

Producing a medical graduate comes at considerable expense for the public (Campbell 2015). Attracting medical graduates might therefore an interesting option for public policy and in the long run negatively impact social cohesion.

4. Data

Measuring labour shortages by labour accounts and health accounts involve comprehensive statistical tools and the combination of various statistics. The databases of the OECD, the European Observatory, the WHO, the OECD, the World Bank, the European Committee of the Regions, the Social and Economic Committee and the European Commission provide presently comparative information on a number of indicators for the national and to some extent on the regional health workforce.

For the indicators presented in this report, mainly Eurostat data is used which is harmonized with the data of other international organisations. The analysis focusses on the workforce of the health care sector on the one hand and long-term care on the other hand as well as the supply and demand for health professions.

Administrative data and registers

Article 30 of the regulation of the European network of employment services (EURES) requests that each Member State shall particularly collect and analyse gender-disaggregated information on (a) labour shortages and labour surpluses on national and sectoral labour markets, paying particular attention to the most vulnerable groups in the labour market and the regions most affected by unemployment; (b) EURES activities at national and, where appropriate, cross-border level.[8]

Data on vacancies and job flows have a relatively short time span and, there are limited micro data available for a more granular analysis of the labour market. Vacancy data shows significant cross-country heterogeneity in the coverage of vacancies within small firms.

[8] Since its launch in 1994, EURES has been a network for cooperation between the Commission and the PES to provide information, advice and recruitment or placement for the benefit of workers and employers, as well as any citizen of the Union wishing to benefit from the principle of the free movement of workers, through its human network and via online service tools available on the European job mobility portal (EURES portal).

Flow statistics augment the analysis of the net changes in stocks of unemployment, employment and inactivity[9]. Estimates are derived from the EU-LFS (Eurostat 2021).

The data on foreign-trained doctors and nurses collected by the annual OECD/Eurostat/WHO-Europe Joint Questionnaire comes mainly from professional registries managed either by a professional organisation (e.g., a National Medical or Nursing Council) or by a government agency, although some countries have used other data sources.

Socio-economic surveys

The LFS provides both data on employment and unemployment of health workers by socioeconomic characteristics. Because of sample size general socio-economic surveys such as LFS can only provide a limited assessment of an EU-brain drain of specific professions such as doctors (Teney 2017).

Concerning the demand of health care services, the European health interview survey (EHIS) and the EU Statistics on Income and Living Conditions (EU-SILC) monitor unmet need for certain conditions, which is part of the EU Sustainable Development Goals (SDG) indicator set (Eurostat 2020b).

The European Quality of Life Survey (EQLS) provides information about utilisation and quality of services across Member States (Eurofound 2019). However, it does so neither for all types of access problems, nor for all types of healthcare. The EQLS asks people whether they – or someone in their household – used various types of healthcare in the 12 months preceding the interview. The types of healthcare included are general practitioner (GP) services, family doctor or health centre services, emergency healthcare, and other hospital or medical specialist services. A further source focusing on people's view is the Eurobarometer.

Company surveys

Employers can give information about the persons having a job, the hours of work, their compensation, and the vacant posts (vacancies). Data from company surveys on economic and employment trends in the individual economic sectors is helpful to forecast the potential demand for skilled workers among other things. The advantage of these surveys provides comparative

[9] Eurostat calculates 3x3 labour status transition matrices (employed, unemployed, and inactive) for the age group 15-74, by sex and for individual countries.

figures across professions and types of companies. Company-based surveys typically involve collecting individual employer's experience in hiring workers with specific skills in particular occupations. In this approach, a high degree of recruitment difficulty is often associated with a shortage.

There are European-wide employers' surveys as the Eurofund Company Survey (ECS), but which unfortunately not include health care (Eurofound and Cedefop 2020).

5. Results

The level of health workforce in a country and how its changes over time is dependent on a wide range of demographic, social and economic factors, as well as the financing arrangements and organisational structure of the health system itself. Presently, we do not have a complete and consistent dataset to compare "system-based workforce shortages" with "labour market shortages" of health workforce. Therefore, the following results will only show a few snapshots presenting a fragmented picture of shortage indicators from the various accounting tools. A systematic analysis requires more comprehensive analysis of micro and macro data.

5.1 Shortages reported in health labour markets

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 Codefop 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[10]:

- 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.

[10] Non-EU Countries are not presented here.

- 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.

The Codefop 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.

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

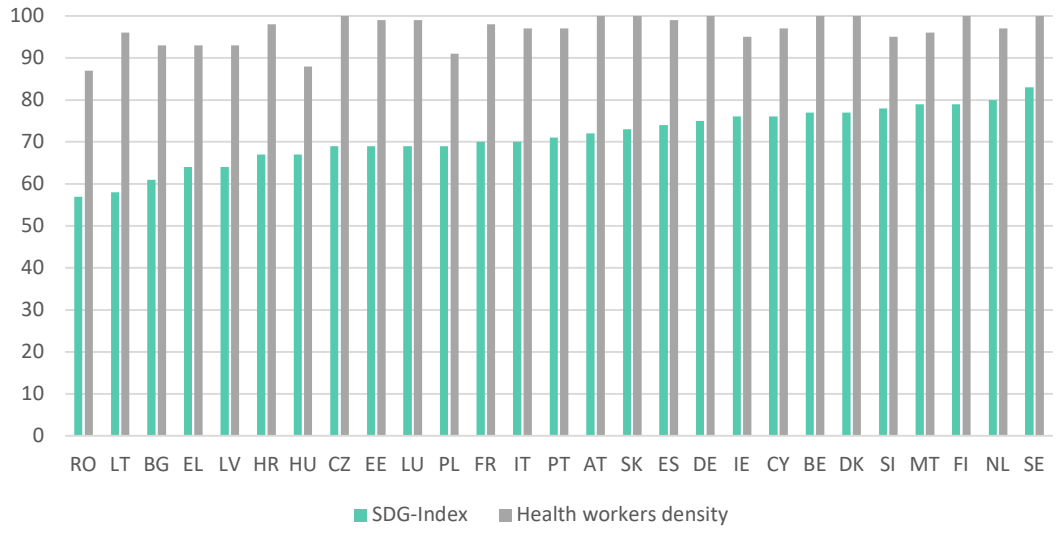
* without Iceland, Norway, UK; ** number of mentions

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

5.2 Needs-based health workforce shortages

Figure 1 shows results of the needs-based approach for the overall SDG-Index and for the Indicator 3.c.1 Health worker density (Physician, nurses and midwives, and pharmacists per 1000 population) across EU27. The data is published by the GBD Study 2017. In future GBD aims to collate more recent occupational data and to refine health worker cadre mapping.

Figure 1: SDG-Index and Health workers density 2017, EU27



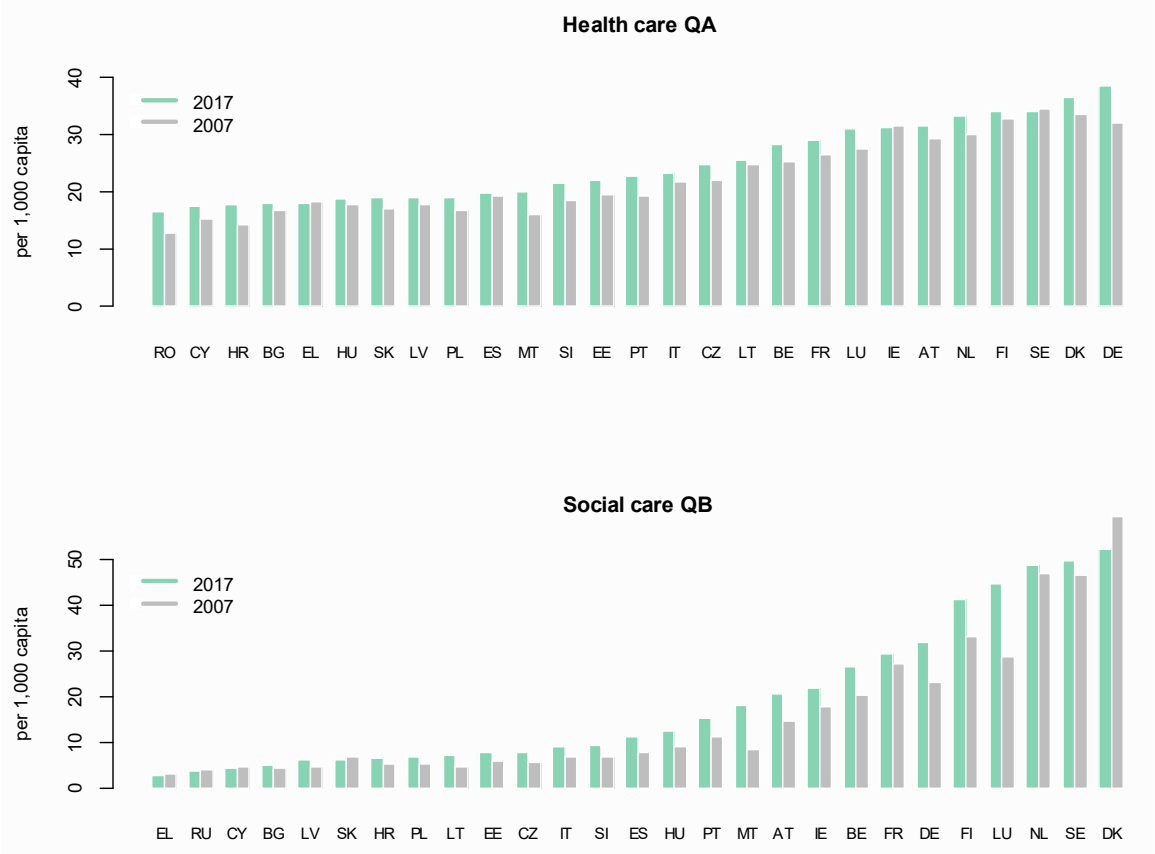
Source: GBD Study 2017 Collaborators: table 1.

The SDG-Index comprises 41 of 52 health related SDG indicators.

5.3 Health care demand and density of health professionals

There is a wide variation in the density of health professional across EU Member States countries (Figure 2, QA). In 2017, Germany had the highest number of health workers with 38.6 per 1,000 population. The Nordic countries Denmark, Sweden, and Finland also had a high number of health workers per population, and most Western EU countries had above the EU average). Germany and Denmark employ almost twice as much health workforce as Romania, Cyprus, Croatia, Bulgaria, Greece, and Hungary with the lowest value for Romania 16.6 persons per 1,000 inhabitants.

Figure 2: Health workforce, QA and QB, 2017 and 2007



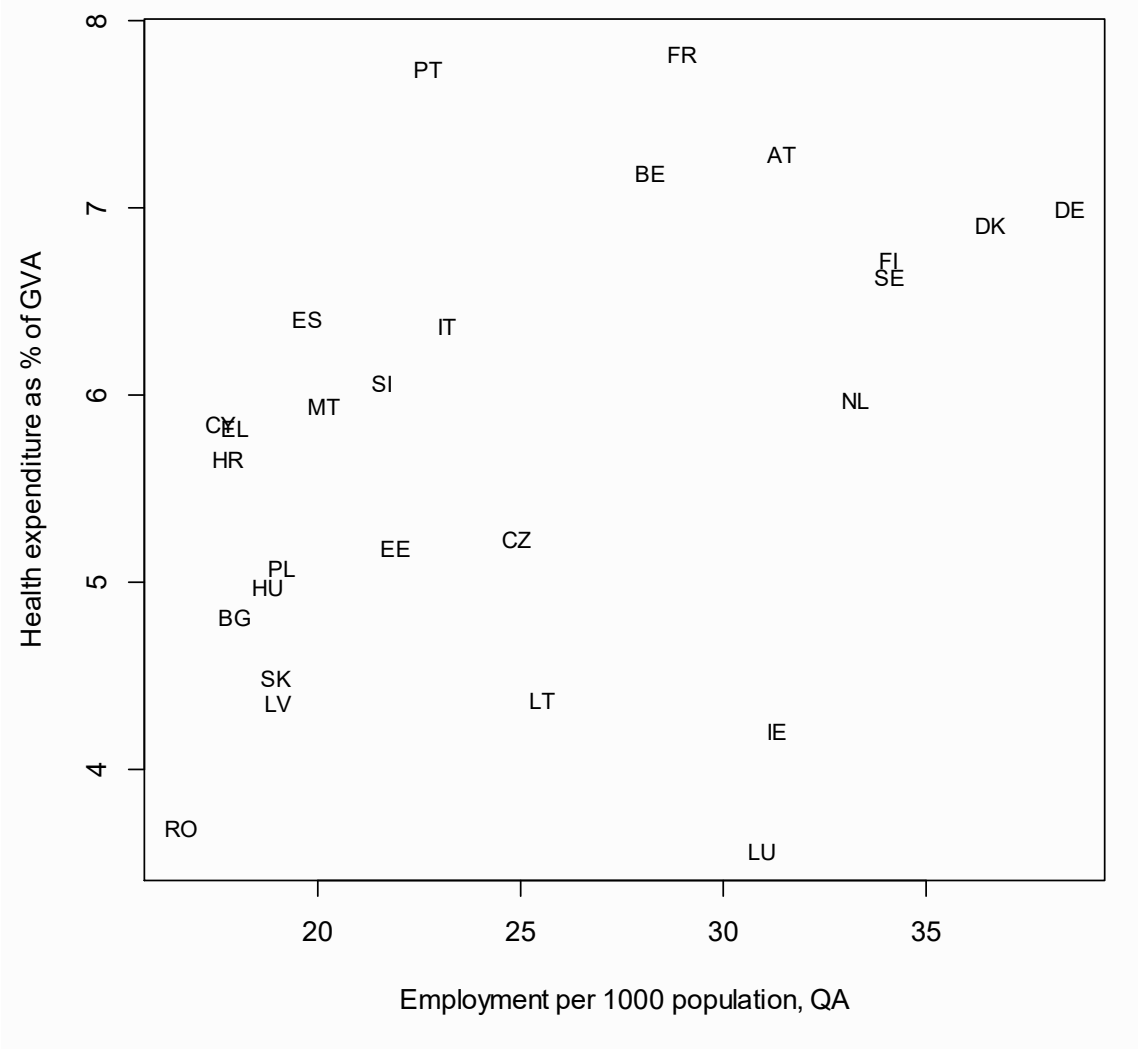
Source: Eurostat, compiled by BASYS.

On the lower side of the spectrum, one can find mostly Central and Eastern European countries with health workers per capita below the EU average. (Figure 2, QA).

The uneven distribution of health workers is also evident for medical professions. In 2018, there were approximately 1.7 million practicing physicians in the EU-27. The highest overall numbers of practicing physicians were recorded in Germany (357 000, equivalent to 21.1% of the EU-27 total), followed at some distance by Italy (240 000), France (212 000) and Spain (188 000). Together, these four Member States accounted for close to three fifths (58.8%) of the total number of practicing physicians in the EU-27. The next highest number of practicing physicians was in Poland, 90 000 (2017 data), equivalent to 5.3 % of the EU-27 total.

In general, higher health care demands require higher health care resources. As table 1 exhibits health workforce shortages exists in most MS and must not necessarily vanish in health systems with high expenditure shares.

Figure 3: Health expenditure and health workforce, QA, 2017



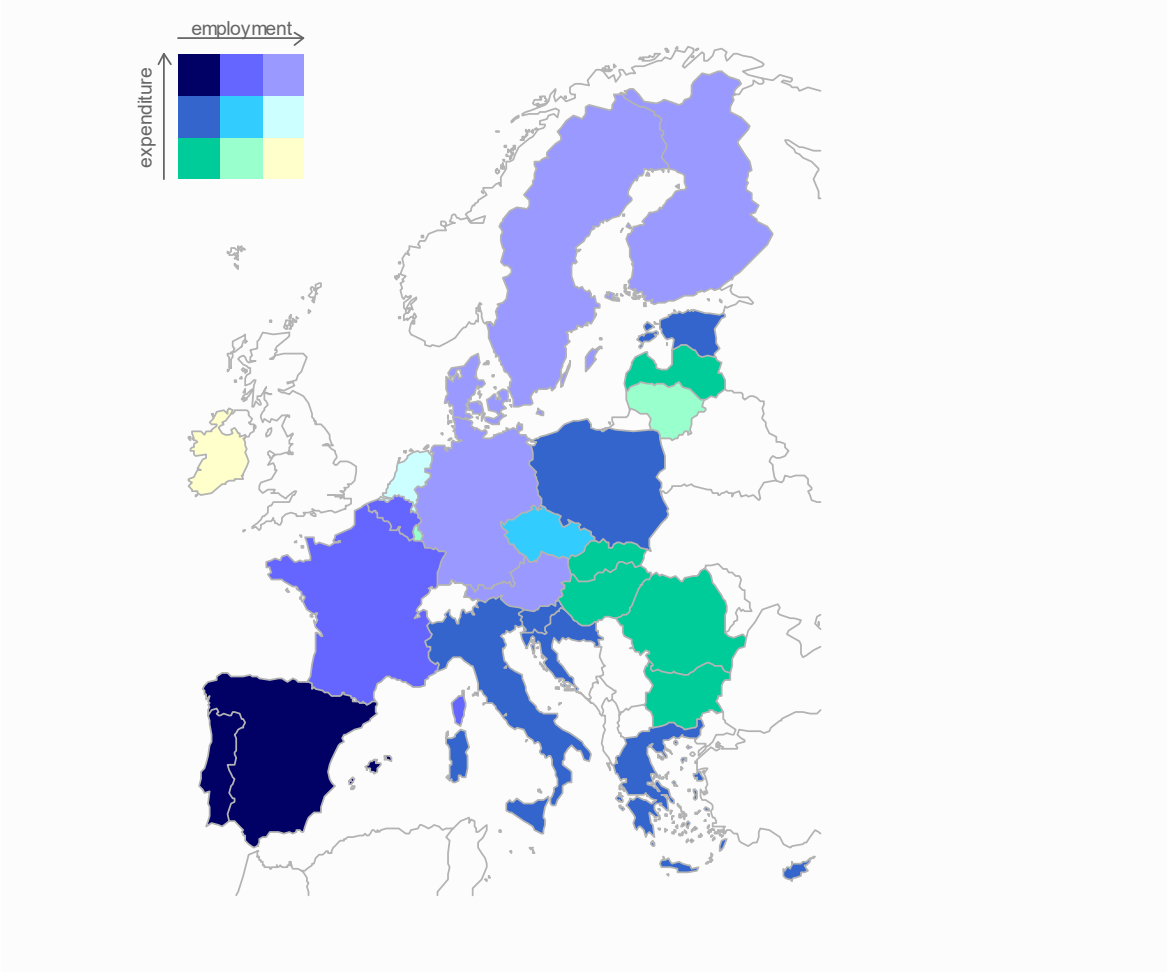
Source: Eurostat, SHA, SNA, compiled by BASYS.

Figure 3 shows a diagonal ditch between countries at the top right triangle and the countries at the bottom left triangle. All countries at the top right triangle are West European countries. While the countries at the bottom left are South and East European countries. However, there are some outliers, for example, Ireland and Luxemburg with low health expenditure share, but high workforce density, on the other side Spain and Portugal, with low health workforce density but high expenditures.

Luxembourg can be explained by high GVA and the high daily inflow of foreign labour. In Ireland, public health expenditure decreased in the period 2009 -2014 following the financial crises. Whyte et al. report a reduction in staffing levels of general support and of nurses (Whyte et al 2020).

Portugal and Spain, in the upper left corner of Figure 3, 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.

Figure 4: Map Health expenditure and health workforce, QA, 2017



Source: Compiled by BASYS based on SHA, SNA.

In the health care 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 workers slightly decreased as compared to situation before the economic and financial crises. The rise in Bulgaria and Lithuania was marginal with 2% as compared to most of the EU countries. On average, the number of health workers per 1 000 population increased across EU27

countries from 24.0 in 2007 to 26.8 in 2017, a growth of 12% considering the population increase (see Figure 5).

Figure 5: Growth of health workforce density, 2017 - 2007

Source: Eurostat, SNA, compiled by BASYS.

Impressive is not only the level, but also the growth of health care staff in some countries. In Germany, despite the economic and financial crises in 2008/2009, the health care sector QA grew by 556,000 persons as compared to the year 2007. What are the reasons that Germany has managed to attract a growing number of non-German EU health workers, especially medical doctors, and nurses?

The social care sector (QB) created even more jobs than health care (QA) in the period 2007-2017. Together both sectors developed 3.3 million additional jobs. This means around three quarter (73%) of all new jobs of the economy were formed in HSC in this period. But there is a very unequal distribution of income growth and job gains. The imbalances and the distortions of health sector growth among EU-MS as result of regulation, markets, historic developments, and attitudes

as well as the demand for health jobs in high-income EU-MS works like a vacuum-cleaner in the health labour market of MS with lower income.

5.4 Foreign trained health workforce

In 2017, the share of foreign-trained doctors ranged from 100% in Luxembourg to more than 30% in Ireland to less than 3% or less in Estonia, the Slovak Republic, the Netherlands, Poland, and Italy. In Luxembourg, all doctors are foreign-trained, in the absence of a medical school in the country. The very high proportion of foreign-trained doctors in Ireland reflects the international reputation of medical schools and their efforts to attract foreign students.

In general, the share of foreign-trained nurses is much lower than that of foreign-trained doctors. However, given that the overall number of nurses is usually much greater than the number of doctors, the absolute number of foreign-trained nurses tends to be greater than for doctors.

Trends in health workers' mobility are shaped by economic differences and health system developments in sending and receiving countries. Important pull factors are an increasing demand for health workers, as well as higher salaries and better working conditions. The report on labour mobility prepared for the European Parliament states: "The automatic recognition procedure, which is available for professions where the minimum training requirements are harmonised at EU level, works well. Stakeholders agree that this system has facilitated mobility of health professionals (doctors and nurses)." (Adamis-Czasar et al 2019). Most MS took actions to increase the number of students in medical and nursing education programs in response to concerns about current or projected shortages. Since 2007 OECD monitors trends in the migration of health workers. Both growing numbers of domestically trained doctors and nurses and growing numbers of foreign-trained doctors and nurses have contributed to the rise in the number of doctors and nurses (OECD 2019).

The trends in labour mobility suggest that the number of active EU27 movers and of those working in the health sector has increased continually since 2008 when looking at the development of stocks. Decisions on recognition of qualifications also show a continuous increase between 2012 and 2016 in general, with a particularly strong increase during that time for nurses (Adamis-Czasar et al 2019). Germany is the main country of destination for labour mobility. Other countries with large stocks of movers include France, Austria, Spain, and Italy.

The main countries of origin of mobile *health professionals* and *health associate professionals* are Romania, Poland, and Italy. For *personal care workers*, Romania is the most important country of origin, constituting 48 % of all mobile personal care workers. The rate of personal care workers working in another country is also high for Poland and Lithuania (Adamis-Czasar et al 2019).

The proportion of health workers born abroad is higher than the proportion trained abroad, reflecting the fact that destination countries provide education and training to migrants who may have moved at an early age with their families or moved to pursue their university education (OECD 2019). The overall trend for nurses is like that of doctors. The number of foreign-born nurses increased by 20% between 2010/11 and 2015/16 while the overall increase in nurses was about 10%, so the share of foreign-born nurses increased by an average of 1.5 percentage points to 16.2%

However, it is important to bear in mind that not all of the foreign-trained doctors and nurses are foreigners: a large and growing number of foreign-trained doctors and nurses in some countries (e.g., Sweden) are people born in the country who went to obtain a first medical degree abroad before coming back. In these cases, it is not appropriate to refer to this phenomenon as a "brain drain" as these students usually pay the full cost of their education while studying abroad. Obviously, the interactions of health workforce markets and markets of health education and training are rather complex as exemplarily highlighted in the following cases:

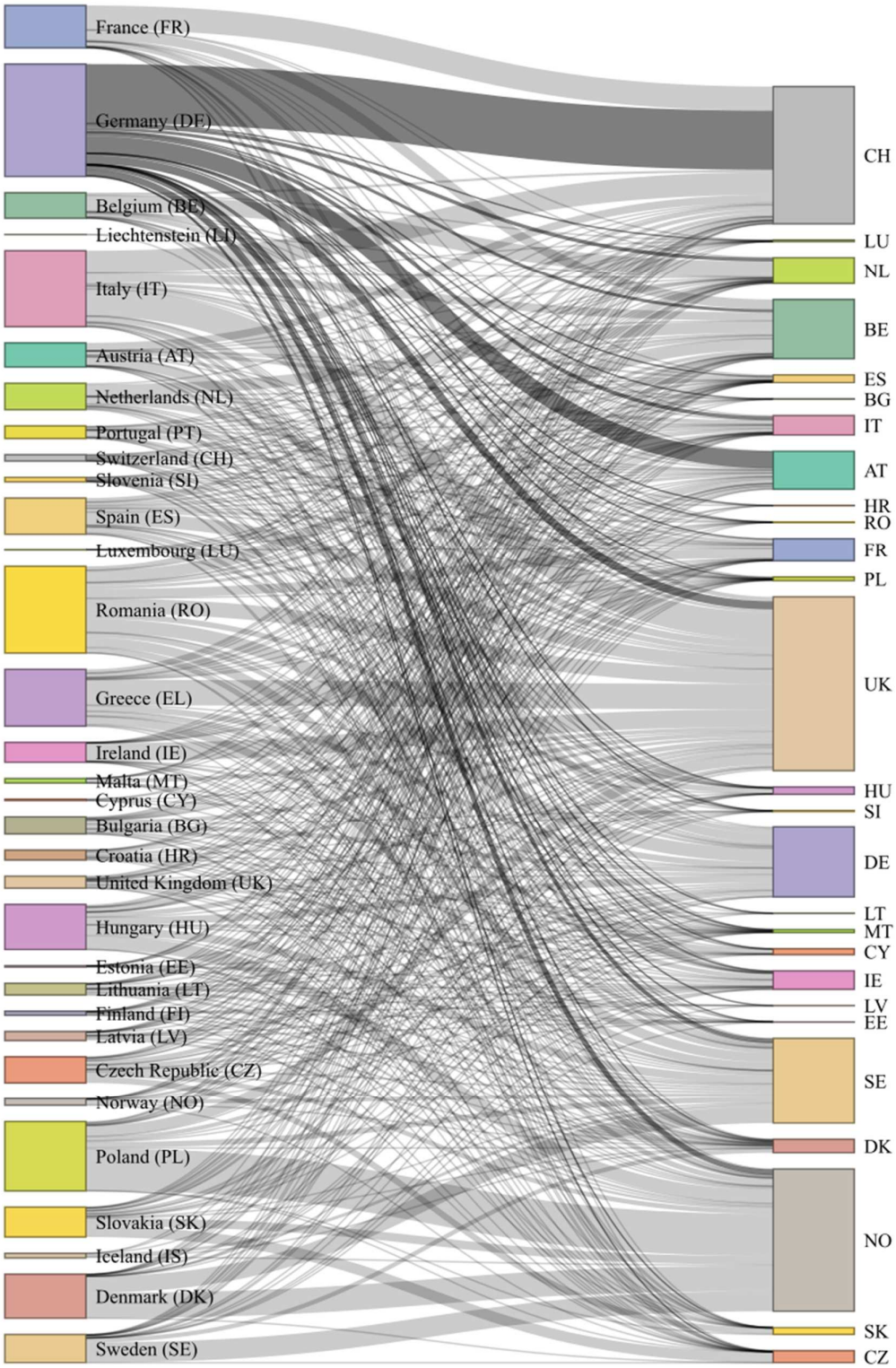
- The Irish paradox: Ireland is heavily dependent on the recruitment of foreign-trained doctors despite providing education to a very large number of Irish and international students (Heffron, Socha-Dietrich 2019). In Ireland, the proportion of foreign-trained doctors has risen substantially from 13% of all registered doctors in 2000 to 33% in 2010 and to 42% in 2016. Students and stakeholders interviewed by the OECD felt that the medical education and training in Ireland was of a high standard and that the reputation for the quality of education was a major attraction for students from overseas. There was also a general confidence that degrees from Irish medical schools would be widely recognised and would enable the entry into internships and residency programmes in foreign students' home countries or in third countries around the world. In addition, the fact that the courses are given in English helps in attracting students from other English-speaking countries. At the same time, Irish medical schools have put much greater effort into marketing abroad in the last decade to attract more students (Heffron, Socha-Dietrich 2019).

- The Romanian paradox: Romania devote less of its GDP than other EU countries to health care. The employment density is also very low (see figures 3 and 4). But, Romania provides the international medical labour market with much-needed medical graduates and, in turn, receives additional funding to spend on its medical education system. Although Romania has become increasingly attractive for international medical students, owing to poor working conditions and relatively low salaries, the country's health system is not attractive as a workplace, and most international medical graduates leave after obtaining their first degree. Decisions on how many domestic and international students are admitted to the different medical schools in Romania are based solely on their training capacity, without much (if any) consideration given to the current and future health needs of the population (Ungureanu, Socha-Dietrich 2019).

Countries with health workforce shortage like Germany, attracting and matching skilled migrants to hospitals and nursing homes, that suffer from shortages intend to stabilize the health system and by this to stimulate economic growth and prosperity. Especially the policy initiatives focused on recognition of foreign qualifications are well received and achieve a positive impact all over Germany (European Commission 2018).

Our analysis of the RPG database shows on the other side major outflows of medical doctors from Germany (country of qualification) toward United Kingdom, Switzerland, Sweden, and Belgium (host country) (see Figure 6).

Figure 6: Source and destination of migration of medical doctors, 2013-2019.



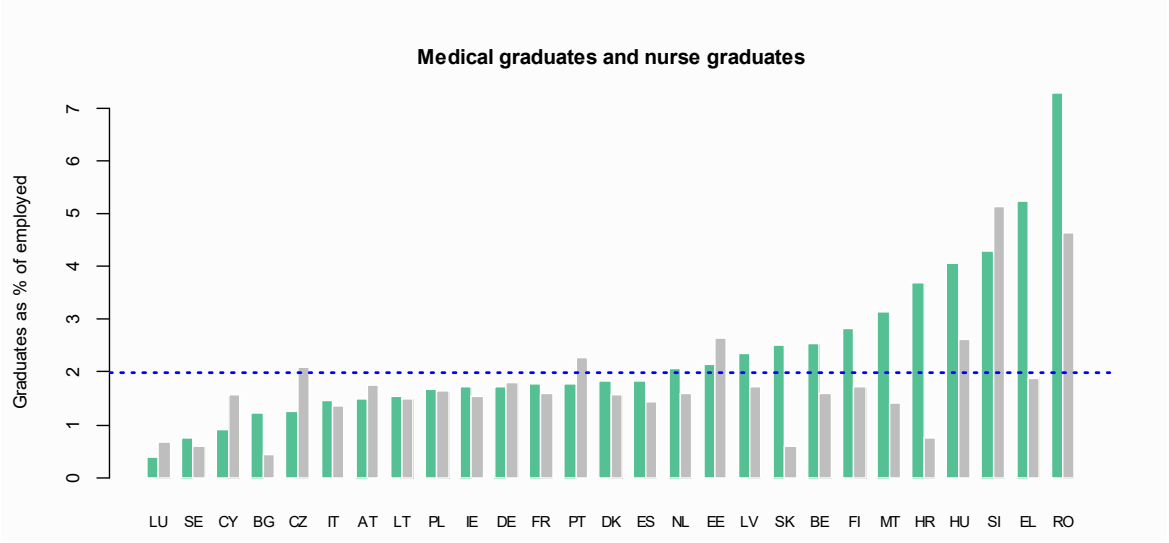
Source: RPG, compiled by BASYS.

The mobility of health professionals goes far beyond the flows within the EU27 (Schultz, Rijks 2014). Both in EU27, EFTA countries, and in countries like Canada, Japan, and the United States the demand for health workforce soars because of ageing societies. In the United States, the sheer size of its medical workforce challenges not only the country itself but also Europe and the world as a whole. Most developed countries are receiving country of health workers, and data suggests that demand for health workers is likely to increase further.

Graduates

The relation of graduates to the active health workforce describes the capability of the health system to secure sufficient inflows of health workers from the own country (see Figure 7).

Figure 7: Graduates as % of health workforce, QA, 2017 and 2007



Source: Compilation based on Eurostat, OECD.

The growth of the number of doctors in most of the EU27 countries is driven predominantly by a rise in the number of domestic medical graduates. This rise reflects decisions taken a few years earlier to raise the number of students admitted to medical universities in response to concerns about current or possible future shortages of doctors. In some countries like Poland, as well as other central, and eastern European countries, the strong increase in recent years reflects the growing number of international medical students and graduates. Polish medical schools, for example, offer medical studies in English, and 25% of all medical students are foreigners (OECD 2019).

Graduates with high grades are more likely to migrate after graduation, and migration rates are higher for Ph.D. holders than for graduates. The study also shows interesting patterns amongst graduates in terms of area of study. Those holding degrees in experimental and technical sciences have a higher propensity to migrate as compared to graduates with a degree in health sciences, and a significantly higher propensity than graduates in social sciences. This is likely to be linked to the level of demand in the (domestic and foreign) labour market for the respective skills.

In Germany, for example, there was a transnational cooperation project for nursing vocational and educational training institutions between Poland and Germany, intended to address the shortage of skilled workers in the sector of care for the elderly. The vocational and educational training institutes in both countries developed curricula together and exchanged personnel and students.

On the other hand, countries that experienced high outflows of health professionals have adopted measures to retain their own qualified workers. In Italy, for example, reforms in nursing education programmes and the skill-mix changes implemented within the health workforce have aimed to enhance the attractiveness of these professions for the domestic workforce. Romania, on the other hand, has reportedly not yet implemented a human resources strategy in the health sector, but has instead made efforts to retain medical doctors by continuously increasing wages in recent years (OECD 2019).

5.5 Summary

The existing data on health workforce shortage in EU27 shows mixed results depending on the approach used. Presently, no integrated approach is applied to give a complete overview on the stocks and flows of the health workforce including education and training in the light of health care needs.

The data above confirms the fact that strong economies, with economic growth and employment opportunities, are attractive to EU movers. Skilled, and particularly high skilled movers are playing an increasing role in the labour markets of the EU, although their share of the employed population overall remains low (European Commission 2018).

6. Discussion

6.1 European disparities

In the international comparisons one should keep in mind that labour market indicators derived from national accounting tools are relative to national conditions. As a result shortages might be opaque. Furthermore, the role and impact of health professionals' migration should be looked at within the context of broad workforce policies (OECD 2008, 2019).

Furthermore, it should be noted that a consideration only in heads, i.e., in persons, is not sufficient, as not all health professionals work full-time. Rather, the analysis must also take the hours of work into account, often expressed in full-time equivalents (FTEs). The labour demand, expressed in FTEs, is a more accurate defined indicator of the volume of work than the number of persons and reflects the actual labour required.

The measurement of future health workforce needs is in the centre of workforce planning which requires both supply and demand projections. The European Centre for the Development of Vocational Training (Cedefop) provides forecasts on both the supply and demand for labour and skills in selected sectors in MS (see Cedefop country reports).

The skill-based forecast of Cedefop estimates the future employment growth in health and social care average over the period 2020 - 2030 at 12%. The minimum is -14.4% for Lithuania, while the maximum is 47.4% for Romania. Together with Romania, on the lead is also Greece (Skillpanorama 2020).

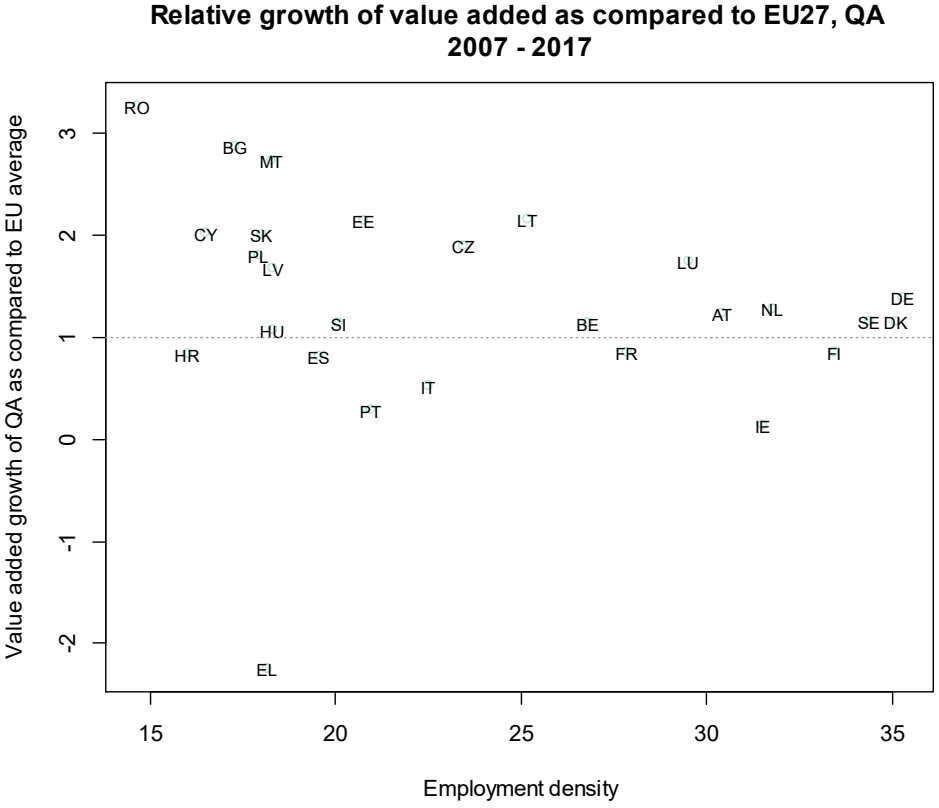
If the development of skills is differentiated according to qualification levels, the path towards a knowledge society or more knowledge-based occupations becomes particularly clear. Labour demand continues to shift towards more highly qualified workers. While the demand for persons without a vocational qualification or with an apprenticeship is slightly declining or stagnating across all occupations, e. g. in Germany, the demand for workers with a university degree is noticeably increasing in almost all health professions (Prognos AG 2015).

6.2 Relative income growth

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.

Figure 8: Gross value added growth in Health Care (QA)



Source: Compiled based on Eurostat, SNA.

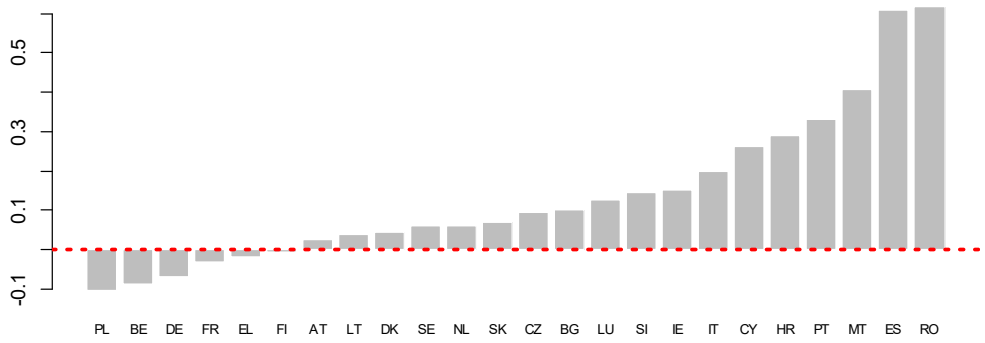
Figure 8 visibly indicates relatively higher growth rates in Eastern European countries as compared to Western European countries as well as relative higher growth in countries with low health workforce density as compared to countries with high density. An outlier is Greece which faced strong cuts in the health sector after the economic and financial crises 2008/2009 (Schneider et al. 2013).

In the period 2007-2017, the highest income growth can be observed in Northern and Western EU-MS. The unequal income opportunities provide strong incentives for emigration of health professions and other professions from low-income EU-MS. There are also unequal capacities and productivities providing opportunities for improvements of income growth and investments.

Wages may go ahead of productivity in countries with low unemployment and labour shortages, they may lag behind productivity in countries in which excess unemployment needs to be absorbed. It is interesting to see that health workers in countries with high density of health workforce as Germany and France as well as with shortage of health professionals and assistants couldn't realize higher compensation gains than the economy as whole (Figure 9). However, in most countries, wage growth in health care was faster than overall wage growth.

In Romania and Spain, wages in health care substantially outpaced general wage growth in second half of the period 2007 - 2017 after growing at the same pace for the previous four years.

Figure 9: Relative compensation growth in Health Care (QA)



Source: Compiled based on Eurostat, SNA.

6.3 Governance and institutional structure

Regulations have considerable impact on health workers ability to migrate. Health and social services are the most highly regulated activities. Almost all professions need some kind of prior authorisation to access and exercise their profession.

Mechanisms to coordinate the intersectoral health workforce agenda, health workforce planning, and provider specific models for assessing health care staffing needs are key to align with the education and training of health workforce and assess health-care staffing needs.

One argument for a shortage analysis is that it identifies occupations where there may be a potential for matching surpluses with shortages across Member States. As such, this type of analyses can form the basis for the beginning of a dialogue between PES for their mutual benefit.

The success of such cooperation will depend on several factors, in particular the appropriateness of the data sources used to identify surplus occupations (McGraft, Benham 2017).

In order to manage their workforce, Member States may adopt measures to retain their own workers or to attract workers from other countries. This is especially evident in the health sector, where demographic (ageing population) and socioeconomic (e.g., decrease of home care carried out by female family members) factors have led to labour shortages (increased demand which cannot be met by available labour force) on the one hand, and to an oversupply of qualified workers on the other (e.g. due to reduced public spending on the health system and thus vacancies in this sector). Policy initiatives may encourage or reduce mobility, depending on the larger goal. Policy initiatives that aim to increase mobility may, at the same time, foster the harmonisation and recognition of qualifications.

Differences in the norms used to plan capacities of health workforce in MS affect the allocation of financial resources, especially public resources too. Presently, it is unclear how health workforces' shortages distribute over skills because of different norms applied across countries.

7. Outlook

Growing interdependency among health labour markets calls for further integration of accounting systems between employment services, health care, and outcomes measurement, including flows of informal care across regions. The System of Health Accounts needs additional accounts to capture the dynamics of labour markets at the demand and supply side including education and training.

Furthermore, regional disparities of health workforce needs to be addressed. There are significant differences between countries in terms of travelling time to the next health care provider. Geographical information system (GIS) techniques, by mapping care and place of living, can identify critical areas with high public transport travel times and distances to health-care facilities across Europe.

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Table 2: Indicators used in European countries to measure labour shortage

Indicator	**Data Sources**
Ratio of job seekers to vacancies	LFS; PES
Time to fill vacancies	PES
Work permits	PES
% of filled vacancies compared to average	PES
Employment growth vs. education output	PES
Employers' views	ECS
Others	Occupational barometer

LFS – Labour Force Survey. PES - Public Employment Services.

Source: McGrath 2019.

Table 3: Conversion of DALYs to SDG weights

No	SDG Tracer Indicator	DALYS (1000)	Analytic weigth
1	Tobacco smoking	112 141.60	0.12
2	Tuberculosis	43 612.70	0.05
3	Family planning	85 575.98	0.10
4	Skilled birth attendance	85 575.98	0.10
5	Antenatal care	85 575.98	0.10
6	Antiretroviral therapy	91 897.40	0.10
7	DTP3 immunization	12 017.70	0.01
8	Potable water	67 009.52	0.07
9	Sanitation	67 009.52	0.07
10	Cataract	16 328.90	0.02
11	Diabetes	41 368.45	0.21
12	Hypertension	191 461.30	0.05
	Sum of DALYs within SDG	899 575.1	100.0

Source: WHO 2016.

Table 4: Determinants of health workforce shortages

Determinants	**Labour Supply**	**Labour demand**
Demography	(-) Less new entries by demographic changes	(+) Higher utilisation of health care by demographic changes
Migration	(-) Regional immobility, Lack of immigration	(+) High product demand (business cycle)
Technology	(-) New medical technologies requiring specific skills	(+) Innovation activities requiring new qualified personnel
Training	(-) Inappropriate training capacities	Lack of further education measures
Skills	Over-, under-qualification of staff	Qualification-related mismatch because of structural change
Family, social environment	(-) Family/work conflicts	
Income	(-) Low income as compared to destination country	(-) High labour cost
Financing	(-) Too small public investment in education system	(-) High recruiting costs

Source: derived from Kettner A. 2012.

9. Glossary

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.

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

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.

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.

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.

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.