

Postprint Version	1.0
Journal website	<a href="http://www.healthpolicyjrn.com/article/S0168-8510(17)30341-X/fulltext">http://www.healthpolicyjrn.com/article/S0168-8510(17)30341-X/fulltext</a>
Pubmed link	<a href="https://www.ncbi.nlm.nih.gov/pubmed/29241846">https://www.ncbi.nlm.nih.gov/pubmed/29241846</a>
DOI	10.1016/j.healthpol.2017.12.002

This is a NIVEL certified Post Print, more info at <http://www.nivel.eu>

# The Joint Action on Health Workforce Planning and Forecasting: Results of a European programme to improve health workforce policies

MARIEKE KROEZEN<sup>A,\*</sup>, MICHEL VAN HOEGAERDEN<sup>A,B</sup>, RONALD BATENBURG<sup>C</sup>

A KU Leuven Institute for Healthcare Policy (LIGB), University of Leuven, Kapucijnenvoer 35 blok d – bus 7001, 3000 Leuven, Belgium

B Federal Public Service Health, Food Chain Safety and Environment (Belgium), Eurostation II, 40/10, 1060 Brussels, Belgium

C Netherlands Institute for Health Services Research (NIVEL), PO Box 1568, 3500 BN Utrecht, The Netherlands

## ABSTRACT

Health workforce (HWF) planning and forecasting is faced with a number of challenges, most notably a lack of consistent terminology, a lack of data, limited model-, demand-based- and future-based planning, and limited inter-country collaboration. The Joint Action on Health Workforce Planning and Forecasting (JAHWF, 2013–2016) aimed to move forward on the HWF planning process and support countries in tackling the key challenges facing the HWF and HWF planning. This paper synthesizes and discusses the results of the JAHWF. It is shown that the JAHWF has provided important steps towards improved HWF planning and forecasting across Europe, among others through the creation of a minimum data set for HWF planning and the ‘Handbook on Health Workforce Planning Methodologies across EU countries’. At the same time, the context-sensitivity of HWF planning was repeatedly noticeable in the application of the tools through pilot- and feasibility studies. Further investments should be made by all actors involved to support and stimulate countries in their HWF efforts, among others by implementing the tools developed by the JAHWF in diverse national and regional contexts. Simultaneously, investments should be made in evaluation to build a more robust evidence base for HWF planning methods.

## INTRODUCTION

Health workforces are crucial for the sustainability of health systems as there can be no health without a workforce [1]. Yet many European countries are faced with health

workforce shortages. It is estimated that by 2020 there will be a shortfall of one million health workers in Europe [2,3], although it should be noted that this number is somewhat out-dated and the underlying calculations are subject to debate [4]. Expected shortages are particularly critical for certain health professions and specialisations, including nursing, elderly care and general practice. In addition, almost all European countries are faced with geographical maldistributions of health professionals, mostly expressed by an undersupply in rural and sparsely populated areas and oversupply in some urban areas [2,5,6]. The shortage of health workers is compounded by the fact that their skills, competencies and expectations are often not optimally suited to meet changing population health needs [7,8]. Moreover, health reforms, taking place in many countries, also change the legal and institutional context of health professions. Given these challenges, human resource planning in the health sector, or health workforce planning, emerges as a key tool to address them [9].

### **1.1. Health workforce planning**

Health workforce planning is concerned with ensuring that the right number of people, with the right skills, are at the right place at the right time to deliver the right services to those in need of them [10]. The main aim of planning is to achieve an optimal balance of demand and supply of health workers in both the short and long term [11]. To achieve this aim, forecasting is an important part of the planning process. Yet despite its importance, there is no agreed definition or single accepted approach to forecasting health workforce requirements [12]. In this paper, we understand forecasting as a scientific based and policy driven methodology. Forecasting workforces requires multiple steps: to predict several alternative futures, decide which is most probable or desirable, and then plan for that selected future by factoring in particular forces, such as political climate and resources [13]. It is important to stress that forecasts are not projections. A projection takes current conditions, develops scenarios by 'educated guesses' about possible future changes, and looks at the implications of those changes. In contrast, forecasting explicitly aims to define what the future will hold and requires theory and hypothesis about the mechanisms behind these potential futures [14].

### **1.2. Aim of this paper**

The aim of this paper is to synthesize and discuss the results of an EU initiative – the Joint Action on Health Workforce Planning & Forecasting – set up to support and stimulate country efforts in health workforce development. The paper in particular focuses on five key findings of the JAHWF, related to the most severe current challenges in HWF planning, i.e. planning terminology, data availability, model-based planning, future-based planning and collaboration.

### **1.3. Challenges in health workforce planning**

In a time of budget restraints, workforce shortages and changing health care needs, health workforce planning is more important than ever, but at the same time it is getting increasingly complicated [10,11]. The main difficulties facing health workforce planning and forecasting are of methodological as well as strategic nature, and are summarized below:

#### *1.3.1. Lack of consistent terminology*

To make an accurate calculation of the stock and flow of health workforces, systematic and consistent definitions are required. Definitions enable data and information collected from different sources (e.g. from public and private sector, professional registries, labour force surveys, etc.) to become comparable and to be used consistently in models and calculations. Currently, within and between countries, there is severe inconsistency and heterogeneity in the definitions that are being used for health professions and the general terminology surrounding health labour market indicators [10,15]. For example, there may be differences in health professionals' status; some numbers may refer to 'practising professionals' (i.e. professionals that provide a service directly to the public), while others may refer to the 'professionally active' (i.e. professionals that completed an education as a prerequisite for the job). A prerequisite to feed and interpret health workforce models and forecasting is to have uniform definitions of both the units of analysis and the factors or parameters that are included in the models.

### *1.3.2. Lack of data*

Recent data on the number of active health care workers and their distribution in the health system are a key requirement for health workforce planning [11]. Yet these information systems are lacking in numerous countries, representing one of the main obstacles to effective health workforce planning [9,10,16]. For example, in many European countries data on number of health workers and trainees, their specialisation, their geographical spread, age, gender and country of provenance are not or partly available, difficult to gather or not registered. A specific challenge for health workforce planning is the lack of data on cross-border and cross-sectoral mobility of health professionals; to quantify where health workers go, how long they stay away and whether they come back or not [17,18]. Accurate data about the migration of health workforces is not available in many European countries. A deficit which is compounded by the fact that there is no single definition of health professional mobility in place [10]. One way to cope with the lack of data on health workforces, as a first step, is to mobilize data collection and analysis on a limited number of indicators that are available, comparable and measurable using standard data sources. There is, however, no guideline or agreement on what these 'minimum data requirements' for health workforce planning should look like [10].

### *1.3.3. Limited model and demand-based health workforce planning*

Currently, there appear to be few countries that engage in model based health workforce planning [19]. In some countries where national health workforce planning institutions are in place, quantitative tools or models are used to develop projections and/or forecasts of the required future workforce [10]. In general, three approaches can be discerned in these types of health workforce planning models [10,11]:

- The supply-based approach, which focuses on balancing health workforce inflow (e.g. graduates, immigrant health workers), outflow (e.g. health workers who emigrate or retire) and the activity rates of the currently active health workers (measured in either headcounts or FTE).
- The demand-based approach, which focuses on the current and future demand for health services (estimated from the population composition, demography, and health service utilization), and therefrom

the required capacity of health workers. • The needs-based approach, which extends the demand-based approach by additionally considering epidemiological and social-cultural factors. Looking at the evidence that is available, the large majority of European countries that engages in model based workforce planning takes a supply-based approach and does not take into account the actual health needs of the population. Only a minority of countries incorporates a demands-based or needs-based approach in their model [10]. Also, many countries have a partial or ‘silo’ approach of planning separate health professions and ignoring relationships between health professions [20]. This limits the accuracy of planning models and restricts their potential impact. It has been noted that more sophisticated and integrated models of workforce planning that cut across different professional groups and take into account more factors, such as skill mix and working practices, seem to offer a better prospect of contributing to the sustainability of health systems. Finally, it can be concluded that very few health workforce planning models are or have been empirically evaluated, limiting the possibilities for assessment of the quality and impact of the various models on health workforces and health system performance [11]. There are various reasons why so few countries engage in model-based and demand-based health workforce planning. One reason is that it is difficult to incorporate the variables that determine the future supply and demand of workers, mainly due to the earlier mentioned lack of reliable data on these variables [11]. Apart from the methodological challenges, there are also strategic issues that need to be tackled for planning models to be initiated and implemented. This includes ensuring that the required capacity and skills for health workforce planning are sufficiently trained and available within institutions or departments in charge of workforce planning [10].

#### *1.3.4. Limited future-based planning and use of qualitative methods*

While planning the required numbers and types of health professionals to sustain the current distribution is a challenge, estimating the required skills and competences of the HWF for the future is an even greater challenge. Comprehensive health workforce modelling and forecasting is complex and fraught with pitfalls [21]. Currently, no country matches and forecasts the needs, demand and supply of its health workers in a manner that can be referred to as “best practice” [8]. European countries are investing in better estimates to model their current and future health workforce requirements. Needs-based models are extended, for example, with information on trends in risk factors and the incidence/prevalence of different diseases to improve estimates of future care needs and the required health workforce [11]. This is often based on qualitative data collection through interviews and workshops with national experts in these areas [22]. Yet complex and challenging methodological and technical problems remain. Again, it should be noted that the current state of most country databases is generally inadequate to allow for a reliable analysis of the available and required qualitative and quantitative health workforce capacity [8]. Hence, needs-based models are inherently limited and/or need to draw on expectations with high uncertainties and normative judgments, for example about what type and level of care is really required [11].

#### *1.3.5. Limited international collaboration in health workforce planning*

Finally, while some countries take into account the health labourmarket situation of their neighboring countries, or explore regionalborder policies, the possibilities for countries to collaborate arelargely underutilized. There is scope for increased collaborationand exchange of good practice in HWF planning between Europeancountries, increasing the possibilities to support the developmentof national HWF policies for the future [15].

#### **1.4. The Joint Action on Health Workforce Planning & Forecasting**

In order to support EU Member States to tackle the key chal-lenges facing the health workforce and health workforce planning,the European Commission funded a feasibility study on EU levelcollaboration on health workforce needs [10,23]. Based on the out-comes of the feasibility study, the Commission decided to fund aJoint Action on Health Workforce Planning & Forecasting (JAHWF)under the Health Programme (2008–2013). Coordinated by theBelgian Ministry of Health, the three year programme of work(2013–2016) involved 30 associated partners and 62 collabora-tive partners, representing countries and stakeholder groups fromacross Europe [24]. The focus of the JAHWF was restricted to doc-tors, nurses, pharmacists, dentists and midwives for two reasons.First, where planning models are available, they usually focus onone or more of these five professions. Second, these are the five pro-fessions with automatic recognition under Directive 2005/36/EC,making them especially relevant where mobility issues are con-cerned, and hence for health workforce planning.The general objective of the Joint Action on Health WorkforcePlanning & Forecasting was to create a platform for collaborationand exchange between Member States, to move forward on theplanning process and to prepare the future of the health work-force within Europe. More specifically, the JAHWF formulated thefollowing eight objectives:1. Better understanding of terminology2. Better monitoring of the HWF by access to timely data3. Updated information on mobility and migration trends in the EU4. Guidelines on quantitative and qualitative HWF planningmethodology5. Increased quantitative and qualitative planning capacity6. Estimation of future skills and competencies needed in thehealth workforce7. A platform of cooperation to find possible solutions on theexpected shortage of HWF8. A higher impact of HWF planning and forecasts on policy deci-sion makingThe JAHWF was structured in work packages (WPs) [25], whichare further elaborated upon in Appendix 1 in the supplementarymaterial.

## **2. METHODS**

The JAHWF adopted a multi-disciplinary theoretical and empiri-cal approach to map, study and improve health workforce planningin Europe. A variety of quantitative and qualitative methodswere used, including literature reviews, survey research, semi-structured interviews and focus group discussions. Additionally,workshops were organized, bringing together a variety of Europeanand global experts to critically examine and jointly discuss healthworkforce planning and particular challenges. Workshop responseswere analysed qualitatively and incorporated in the final results.Specific initiatives of the JAHWF consisted of two pilot studies inItaly and Portugal to test and apply some of the JAHWF outputs(the ‘Handbook on Health Workforce Planning Methodologies acrossEU countries’ and the minimum data set). It was studied if theywere effective in improving existing (national) HWF planning sys-tems and what adaptations were necessary. Also, two feasibilitystudies – one in two German states and one jointly in Romaniaand

Moldova – explored the opportunities of implementing new planning methodologies across regions and countries. Another pilot project in Belgium studied the incorporation of qualitative methods in the HWF planning process. It is based on this material gathered during the Joint Action that key findings on planning terminology, data availability, model-based planning, future-based planning and collaboration have been extracted. A full methodology description and overview of produced outputs can be found in Appendix 1 in the supplementary material.

### 3. RESULTS

#### 3.1. National and international terminology used in health workforce planning

The JAHWF compared the terminology used in HWF planning, both at national and international level, and found considerable gaps and inconsistencies in the terms and definitions that are used. At international level, the OECD/Eurostat/WHO-Europe Joint Questionnaire on Non-Monetary Health Care Statistics aims to serve as a harmonised tool for international reporting on the health workforce, aimed at providing internationally comparable data [26]. Yet when comparing the data supplied by EU Member States to the Joint Questionnaire, considerable discrepancies were found in the definitions and interpretations of some of the key Joint Questionnaire terminology. Table 1 summarizes the main inconsistencies identified by the JAHWF, broken down by type of professions, activity status and activity amount. Hence, the JAHWF concluded that there are considerable differences between countries in some of the key definitions and interpretation of factors used in HWF planning. This is confirmed by the fact that national definitions are not always identical to the definitions used in the Joint Questionnaire [27]. It was found that these differences can often be traced back to the country-specific features of indicators. In the case of federal states or countries with regional based HWF planning, even more difficulties can occur due to differences in terminology used between regions, and/or between the regional and national systems.

[TABLE 1]

#### 3.2. A minimum data set for health workforce planning

The JAHWF identified a number of recurrent challenges among EU Member States related to data, data sources and methodology. First and foremost, a consistent lack of data was reported. Other common challenges identified were related to a lack or misuse of planning models and methods, poor data quality and the absence of qualitative data. The JAHWF developed a minimum data set (MDS) – a limited and essential number of indicators, which are generally comparable and should be measured regularly with the use of standard data sources – in order to help improve the data availability for health workforce planning. The scope of the MDS was defined as follows: • To recognize the major imbalances in the HWF; • To analyse these imbalances; and • To identify possible solutions. The MDS contains a total of seven indicators, five on the supply side – labour force, training, retirement, migration (outflow) and migration (inflow) – and two on the demand side – population and health consumption, all to be calculated through eight categories of data. Table 2 shows the MDS and data availability across 11 EU Member States (BE, DE, ES, FI,

GR, HU, IT, NL, PL, PT, SK) and Iceland, each cell containing the number of countries that reported having these data available. It becomes clear from Table 2 that most of the twelve countries have basic data related to the HWF labour force available, although not specified in FTE (a more complex measure) and the country of professional's first qualification. For other indicators, data availability is lower and for the migration indicators, especially the outflow of the health workforce, data turn out to be scarcely available. To test the MDS on its practical feasibility, the JAHWF conducted two pilot studies (Italy and Portugal) and feasibility studies (Germany and Romania/Moldova). It was shown that the MDS was sometimes partially used or used with some adaptations. For example in Italy data on specialisation was not available as doctors are planned as one single professional category. In Portugal, data on professional activity status was added to distinguish the 'professionally active' stock from the 'licensed to practice' stock. Yet overall, the MDS developed by the JAHWF was considered useful by the pilot and feasibility countries for making simple projections.

### **3.3. Key elements of the health workforce planning process**

While having a minimum data set in place is a prerequisite to enable HWF planning, data availability alone does not necessarily lead to successful planning processes. After all, challenges facing HWF planning are not merely methodological of nature, but also strategic. To shed light on the planning process, the 'Handbook on Health Workforce Planning Methodologies across EU countries' [28] identifies five key elements to be included by every planning system: goals, a forecasting model, data, link to policy actions and organisation. Table 3 describes each element in more detail. The JAHWF pilot studies and feasibility studies showed that these five elements are indeed key and useful to start or improve HWF planning processes. Still, it was noted that especially goal setting and links to policy actions are hardly feasible within a limited timeframe. Yet added value was demonstrated in creating synergies between various bodies and stakeholders to reach goals, while developing a variety of strategies seemed to increase the chances of policy actions being turned into sustainable programmes for a sustainable future health workforce. Another important finding was that some dimensions in forecasting models are better forecasted at local level (e.g. population needs), while others at national (inflows from education) and international level (mobility flows). Finally, the importance of organising a HWF planning process was emphasised, especially the establishment of a project team with a sufficient number of capable staff with various skills.

### **3.4. Use of qualitative methods in health workforce planning**

In view of the underuse of qualitative data in HWF planning, the JAHWF has developed guidelines on methods that can be used to include qualitative data in planning processes. It should be noted that qualitative methods can be used on their own, but are preferably applied alongside quantitative measures to ensure an integrated approach to HWF planning. A survey by the JAHFW among 7 EU Member States (BE, DE, ES, FI, HU, NL, UK) and Norway showed that qualitative methods are already being used, to some extent, to determine how contingent and exogenous factors or changes may influence the supply and demand of health workers. It was mentioned by survey respondents that without qualitative input, HWF forecasting would only be based on observable historical data, i.e. "planning for yesterday". Another respondent stated that qualitative data are essential "to generate or

validate values used in modelling assumptions where robust quantitative data is not available'. A continuum of qualitative methods were listed by the JAHWF ranging from informal (inter-views) to more structured (Delphi exercise). However, no hierarchy of approach can be implied. The six methods are:

- Stakeholder identification and analysis: ensures that all relevant people are identified and brought into the HWF planning process, to contribute to the relevance of outputs, transparency of decision-making and developing a shared vision of the HWF.
- Literature review: considers the evidence that is available, and examines previous research and thinking on a topic.
- Interview: identifies trends, factors and policies that may affect future health workforces.
- Survey: gathers information from a large group of respondents.
- Scenario: describes imaginative, plausible and challenging ways that the future might unfold.
- Delphi exercise: obtains expert consensus on a variable, parameter or factor that is needed in the calculation for subsequent workforce modelling stages.

#### [TABLE 2]

The JAHWF pilot study in Belgium used some of these qualitative methods, most notably the Delphi exercise, to improve the Belgian general practitioner workforce planning process. It was found that the use of the Delphi method improved the GP forecasting model inputs and outputs by helping to quantify a range of variables. Therefore, this method will be structurally integrated in the Belgian HWF planning approach. While the Belgian experiences were positive, it was noted that the use and selection of any method should be dependent on the situation and context of the study they are being used in. Also, some level of expertise is required in applying the qualitative methods.

### **3.5. Collaboration among European countries in health workforce planning**

The JAHWF significantly improved collaboration between European countries in terms of HWF planning and related processes. The JAHWF workshops and conferences proved to be a fruitful knowledge transfer mechanism, as they allowed country representatives and stakeholders with similar problems to come together and work on specific issues. Further workshops have been organized based on the JAHWF model, for example a Policy Dialogue on the HWF was organized in Brussels in May 2017, bringing together various Member States at the invitation of Belgium. Also, countries involved in the JAHWF have helped Italy in its deployment of planning models in most Italian regions, which have now been successfully implemented. Collaboration remains further intact through the European expert network on the HWF, which is currently in development. Also, international agencies such as the WHO have structurally embedded JAHWF results, for example in the development of the National Health Workforce Accounts [29].

## **4. DISCUSSION**

The aim of this paper was to synthesize and discuss the results of the Joint Action on Health Workforce Planning & Forecasting in light of the current challenges in health workforce planning and forecasting, i.e. planning terminology, data availability,

model-based planning and future-based planning and collaboration. From the overview presented, it becomes clear that the JAHWF has addressed and provided guidance on these challenges, with the creation of the minimum data set and 'Handbook on Health Workforce Planning Methodologies across EU countries' as the two most tangible results.

**[TABLE 3]**

Moreover, by taking not only a theoretical but also an empirical approach, through the pilot- and feasibility studies, the JAHWF was able to show that the challenges facing HWF planning and forecasting across Europe are substantial but not insurmountable. In doing so, the JAHWF has provided important steps towards improved HWF planning and forecasting across Europe. Looking at the future, the JAHWF has laid a solid foundation for the next steps in HWF planning and forecasting by providing the basic tools and insights to start a planning process. At the same time, as is often the case in HWF planning and forecasting [11], no formal evaluation of these tools has taken place and the positive results from the pilot- and feasibility studies can only be considered indications of effectiveness in solving HWF related problems. Moreover, the context-sensitivity of HWF planning was repeatedly noticeable in the application of the tools, sometimes even limiting their potential impact. In this sense, the JAHWF has drawn attention to the fact that HWF planning and forecasting are mostly a national and local affair and there is not one HWF planning model or methodological approach which is applicable across all settings. This context-sensitivity is confirmed by the fact that many of the differences found in HWF terminology originate from the country-specific nature of indicators. This justifies their use in current format national or even regional level. As was also noted by Ono et al. [11], proper HWF planning needs to go below the national level. A clear national or regional system for terminology, complemented with accurate data, therefore plays a more important role for HWF planning than internationally comparable definitions. Furthermore, the JAHWF showed that national and local context not only influence the terminology used and the goals of a planning process, but also the choice and (full) use of HWF planning methods and tools. This conclusion is supported by earlier studies [5,30] on the different dimensions and determinants of HWF planning. Batenburg [30] concluded that HWF planning is context sensitive and that the level of model-based planning is strongly related to a country's type of health labour market or health system. Hence, the idea of a 'golden standard' in HWF planning models and methodological approaches is neither desirable nor feasible. HWF planning tools should have the flexibility to be adjusted to national and local needs and country characteristics, especially in the current climate of cutbacks and health system reforms [31]. The JAHWF has provided planning tools at a basic level that allow doing this. Yet so far, how to improve HWF planning in a context-sensitive manner is little investigated [30]. Experiments with the tools developed by the JAHWF, such as the minimum data set, in diverse national contexts may provide more insight into this area. Another interesting avenue for further exploration is the use of country learning clusters in HWF planning and forecasting. To improve context-sensitivity in HWF planning, it may be beneficial to cluster countries – e.g. based on health care system or primary care strength – that are expected to learn from each other because they share the same conditions and starting position for HWF planning [30].

## 5. CONCLUSIONS

When considering the challenges facing health workforce planning, the contribution of the Joint Action on Health Workforce Planning and Forecasting can be observed mostly in creating awareness and activating countries to consider the more basic planning elements (e.g. by providing a minimum data set). The prediction and evaluation of HWF planning, which are more complex and context dependent elements, appear to be a long way off for many countries. Yet through its pilot and feasibility studies, the JAHWF has shown that even though the challenges facing HWF planning and forecasting across Europe are substantial, they are not insurmountable. Further investments should be made by all actors involved to support and stimulate countries in their HWF efforts, among others by implementing the tools developed by the JAHWF, such as the minimum data set and Handbook, in diverse national and regional contexts. Simultaneously, investments should be made in evaluation, staff capacity and expertise to build a more robust evidence base surrounding HWF planning methods, especially in the face of growing evidence that HWF planning adds value and should be stimulated in general [11].

6. Conflict of interest statement  
None of the authors has any potential conflict of interest related to this manuscript.

Acknowledgements  
The Joint Action on European Health Workforce Planning and Forecasting was co-funded by the EU Public Health Programme 2008–2013 (grant agreement no 20122201). The content of this article represents the views of the contractor and is its sole responsibility; it can in no way be taken to reflect the views of the European Commission and/or Chafea or any other body of the European Union. The European Commission and/or Chafea do not guarantee the accuracy of the data included in this article, nor do they accept responsibility for any use made by third parties thereof. The funding source had no involvement in the conduct of the study, but approved of the decision to submit this article for publication. The authors wish to thank all associated and collaborating partners of the Joint Action on Health Workforce Planning and Forecasting for their contributions to the project, without which this article would not have been possible.

### Appendix 1 Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.healthpol.2017.12.002>.

## REFERENCES

- [1] Campbell J, Dussault G, Buchan J, Pozo-Martin F, Pozo-Martin M, Leone C, et al. *Universal Truth: No Health without a Workforce*. Geneva: World Health Organization; 2013.
- [2] European Commission. *Commission Staff Working Document on an Action Plan for the EU Health Workforce*. Strasbourg: European Commission; 2012.
- [3] Wismar M, Maier CB, Glinos IA, Bremner JGD, Figueras J. *Health Professional Mobility and Health Systems in Europe: an Introduction*; 2011.
- [4] Kuhlmann E, Batenburg R, Groenewegen P, Larsen C. Bringing a European perspective to the health human resources debate: a scoping study. *Health Policy* 2013;110(1):6–13.
- [5] Kroezen M, Dussault G, Craveiro I, Dieleman M, Jansen C, Buchan J, et al. Recruitment and retention of health professionals across Europe: a literature review and multiple case study research. *Health Policy* 2015;119(12):1517–28.
- [6] Buchan J, Twigg D, Dussault G, Duffield C, Stone P. Policies to sustain the nursing workforce: an international perspective. *International Nursing Review* 2015;62(2):162–70.
- [7] Sarkis N, Mwanri L. The role of information technology in strengthening human resources for health: the case of the Pacific open learning health network. *Health Education* 2013;114(1):67–79.

- [8] Dussault G, Buchan J, Sermeus W, Padaiga Z. World Health Organization Copenhagen: Assessing Future Health Workforce Needs; 2010.
- [9] Dubois C, Rechel B, Introduction McKee M. Critical challenges facing the healthcare workforce in Europe2. In: Dubois C-A, Rechel B, McKee M, editors. *The health care workforce in Europe: learning from experience*. London: European Observatory on Health Systems and Policies; 2006. p. 1–18.
- [10] Matrix Insight Eu Level Collaboration on Forecasting Health Workforce Needs, Workforce Planning and Health Workforce Trends—a Feasibility Study; 2012. Available at: [http://ec.europa.eu/health/workforce/docs/healthworkforce\\_study\\_2012\\_report\\_en.pdf](http://ec.europa.eu/health/workforce/docs/healthworkforce_study_2012_report_en.pdf) (Accessed 31-05-2016).
- [11] Ono T, Lafortune G, Schoenstein M. *Health Workforce Planning in Oecd Countries*; 2013.
- [12] Roberfroid D, Leonard C, Stordeur S. Physician supply forecast: better than peering in a crystal ball? *Human Resources for Health* 2009;7(1):1.
- [13] Faherty VE. Using forecasting models to plan for social work education in the next century. *Journal of Social Work Education* 1997;33(2):403–11.
- [14] Kirch DG, Henderson MK, Dill MJ. Physician workforce projections in an era of health care reform. *Annual Review of Medicine* 2012;63:435–45.
- [15] Sermeus W, Bruyneel L. *Investing in Europe's Health Workforce of Tomorrow: Scope for Innovation and Collaboration: Summary Report of the Three Policy Dialogues*. European Observatory on Health Systems and Policies; 2010.
- [16] Rechel B, Dubois C-A, McKee M. *The Health Care Workforce in Europe: Learning from Experience*. World Health Organization; 2006.
- [17] Wismar M, Maier CB, Glinos IA, Dussault G, Figueras J. *Health professional mobility and health systems: Evidence from 17 countries*. Copenhagen: WHO Regional Office for Europe; 2011.
- [18] Communities CotE. *Green Paper on the European Workforce for Health*. Brussels: Commission of the European Communities; 2008.
- [19] Batenburg R. Health workforce governance and integration: the fit between planning and system. *The European Journal of Public Health* 2014;24(suppl2):19, cku164.
- [20] Bloor K, Maynard A, Hall J, Ulmann P, Farhauer O, Lindgren B. *Planning human resources in health care: towards an economic approach: an international comparative review*. Canadian Health Services Research Foundation = Fondation canadienne de la recherche sur les Services de santé; 2003.
- [21] Politzer RM, Hardwick KS, Cultice JM, Bazell C. Eliminating primary care health professional shortage areas: the impact of Title VII generalist physician education. *The Journal of Rural Health* 1999;15(1):11–20.
- [22] Batenburg R, Lee I, Wiegers T, Velden L. *De arbeidsmarkt voor verloskundigen in 2012 en 2022/2027: een capaciteitsraming op basis van beleidsrijke scenario's*; 2013.
- [23] European Commission. *Improving Workforce Planning and Forecasting*; 2016. Available at: [http://ec.europa.eu/health/workforce/policy/planning/index\\_en.htm](http://ec.europa.eu/health/workforce/policy/planning/index_en.htm), (Accessed 13.07.2016).
- [24] JAHWF. *Introductory Information to the Joint Action*; 2016. Available at: <http://healthworkforce.eu/introductory-information-to-the-joint-action/> (Accessed 31-05-2016).
- [25] JAHWF. *Joint Action Health Workforce Planning and Forecasting Leaflet*; 2014. Available at: [http://ec.europa.eu/health/workforce/docs/ev\\_20140602\\_leaflet\\_en.pdf](http://ec.europa.eu/health/workforce/docs/ev_20140602_leaflet_en.pdf) (Accessed 31-05-2016).
- [26] OECD/Eurostat/WHO-Europe. *Guidelines for Completing the OECD/EUROSTAT/WHO-Europe Questionnaire 2015*; 2015.
- [27] Girasek E, Kovács E, Aszalós Z, Eke E, Ragány K, Kovács R, et al. Headcount and FTE data in the European health workforce monitoring and planning process. *Human Resources for Health* 2016;14(1):1.
- [28] JAHWF. In: Malgieri A, Michuletti P, Van Hoegaerden M, editors. *Handbook on Health Workforce Planning Methodologies Across EU countries*. Bratislava: Ministry of Health of the Slovak Republic; 2015.

- [29] WHO. National Health Workforce accounts –A Handbook – Draft for Con-sultation; 2016. Available at: [http://www.who.int/hrh/documents/brief\\_nhwahandbook/en/](http://www.who.int/hrh/documents/brief_nhwahandbook/en/) (Accessed 27.06.2017).
- [30] Batenburg R. Health workforce planning in Europe: creating learning countryclusters. *Health Policy* 2015;119(12):1537–44.
- [31] Maresso A, Mladovsky P, Thomson S, Sagan A, Karanikolos M, Richardson E, et al. Economic crisis, health systems and health in Europe. In: Country Experiences WHO Europe, European Observatory of Health Systems; 2015.

## TABLES

**Table 1**

Comparison Joint Questionnaire (JQ) and EU national HWF terminology by the JAHWF.

Dimension	Inconsistencies at international level
Profession	For professional nurses, associate professional nurses and midwives, there is a significant gap between the ISCO codes used in the JQ and nationally applied definitions and classifications. E.g. the JQ definition of professional nurses and associate professional nurses describes differences in job content and competence, while qualifications are not mentioned. In several countries though, including Finland, Germany, Ireland and the Netherlands, the boundary between the two groups is drawn by qualifications.
Activity status	The three JQ activity status categories (practising, professionally active, licensed to practice) are often not comparable to national and local legal concepts and practices. E.g. in Hungary a health professional has to fulfil the requirements of CPD83 in order to obtain the licence to practice status and thus get into the Operational Registry. The licence has to be renewed every 5 years. In Belgium, the proof of at least two occasions of reimbursement by the NIHDI (National Institute for Health and Disability Insurance) is the criterion to enter the practising MD category.
Activity amount	There are significant differences across EU countries in the measurement of full-time equivalent (FTE). E.g. in Finland, FTE is defined as 1.0 for full-time workers and 0.6 for part-time workers, while in Spain FTE for men is 0.9 times male headcount, and FTE for women is 0.8 times female headcount.

**Table 2**  
Availability of data to cover the minimum data set for HWF planning in 11 EU Member States<sup>a</sup> and Iceland.

<i>Data to calculate the indicator:</i>	Supply indicators <sup>b</sup>					Demand indicators <sup>c</sup>	
	Labour force	Training	Retirement	Migration (inflow)	Migration (outflow)	Population	Health consumption
Profession	12	10	9	8	4	N/A	N/A
Age	12	5	7	5	2	11	8
Head count	12	10	10	7	4	11	8
FTE	7	N/A	N/A	N/A	N/A	N/A	N/A
Geographical area	11	6	7	5	2	9	7
Specialisation	11	8	6	6	2	N/A	N/A
Country of 1st qualification	6	3	3	5	2	N/A	N/A
Gender	10	N/A	N/A	N/A	N/A	N/A	N/A

<sup>a</sup> Belgium, Finland, Germany, Greece, Hungary, Italy, the Netherlands, Poland, Portugal, Slovakia and Spain. The table aggregates results on data for doctors, nurses, pharmacists, dentists and midwives per country. However, most often data are only available for physicians.

<sup>b</sup> *Labour force*: the number of health workers currently producing healthcare (practising); *Training*: the number of health professionals (headcount) that complete education (basic or specialist) per year; *Retirement*: forecast of the number of professionals (headcount and full time equivalent) that will retire each year; *Migration (inflow)*: forecast of the number of licensed and recognised health professionals (headcount) that may enter the country, calculated using average flow numbers in recent years; *Migration (outflow)*: forecast of number of practising professionals (headcount) that may leave the country, calculated using the average flow numbers in recent years.

<sup>c</sup> *Population*: number of current inhabitants, by age group; *Health consumption*: the total health consumption in year x, by age group.

**Table 3**  
Five key elements of the health workforce planning process<sup>a</sup>.

Element	Content
<i>Goals</i>	Setting objectives, communication of the goals, timeframe, etc.
<i>Forecasting model</i>	Mathematical forecasting model, quantitative and qualitative methods, scenario analysis, projection period, frequency of updating, migration flows, segmentation of future estimations, integration between/within professional groups, feedback effects between demand and supply, interaction with other goals, assessment of the outputs, etc.
<i>Data</i>	Aim of data collection, individual/aggregate data, unique/multiple sources, comprehensive information, updated database, etc.
<i>Link to policy actions</i>	How the planning process is connected with the actions that will achieve what has been planned, monitoring and controlling, etc.
<i>Organisation</i>	Workflow, decentralization of planning responsibilities, stakeholder involvement, role of the stakeholders, communication, staff members, etc.

<sup>a</sup> According to the JAHWF 'Handbook on Health Workforce Planning Methodologies across EU countries'.