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Health workforce planning in Europe: Creating learning country clusters

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HIGHLIGHTS

•Comparing countries on health workforce planning requires innovative metrics and methods.
•Assessing health workforce planning should be based on multiple dimensions and determinants.
•Grouping health workforce planning conditions by countries stimulates cross-country learning.
•Countries with NHS and strong primary care have higher levels of workforce planning.
•Unbalanced cross-border mobility and large labour markets show higher workforce planning levels.

ABSTRACT

In this article, the different dimensions and determinants of health workforce planning (HWF) are investigated to improve context-sensitivity and mutual learning among groups of countries with similar HWF characteristics. A novel approach to scoring countries according to their HFW characteristics and type of planning is introduced using data collected in 2012 by a large European Union project involving 35 European countries (the 'Matrix Study' [8]). HWF planning is measured in terms of three major dimensions: (1) data infrastructure to monitor the capacities and dynamics of health workforces, (2) the institutions involved in defining and implementing labour market regulations, and (3) the availability of models to estimate supply–demand gaps and to forecast imbalances. The result shows that the three dimensions of HWF planning are weakly interrelated, indicating that countries invest in HWF in different ways. Determinant analysis shows that countries with larger health labour markets, National Healthcare Service (NHS), mobility, and strong primary health care score higher on HWF planning dimensions than others. Consequently, the results suggest that clustering countries with similar conditions in terms of HWF planning is a way forward towards mutual and contextual learning.

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1. Introduction

In Europe and in many other countries, achieving and sustaining a sufficient and skilled health workforce to cope with increasing complex health care needs is on high on the policy agenda [1], [2], [3] and [4]. A prominent example is the Action Plan for the European Union (EU) Health Workforce, initiated as part of the EU's Communication 'To
wards a job-rich recovery' [3]. Within the Action Plan, an important policy statement is the Framework of Actions on the recruitment and retention of health professionals, later followed by the launch of the Joint Action on Health Workforce Planning and Forecasting which aims to bring countries to share and learn from each other's practices in health workforce (HWF) planning [5]. The goal of the Joint Action is summarized on its website as: '(…) the consolidation of a permanent network for HWF planning and forecasting (…)', and: 'This will support the EU and the member states to have a better prepared European HWF in a better prepared educational and health system, better prepared for the future challenges'. [5]

From 2014 onwards, the Joint Action is carried by 30 associated partners representing national ministries, research bodies and stakeholders from 14 different European countries, and is supported by more than 30 collaborating partners. As of 2015, it can already be seen that the Joint Action has created significant awareness that HWF planning is important and requires specific investment. At the same time, large differences appear between countries in terms of their need to develop HWF planning. This drives the quite fundamental question of if and how the results of the Joint Action will (or should) be turned into a European common approach or at least provide guidelines. Sharing and exchanging between counties is a key to the success of European programmes but, at the same time, proposing a gold standard for HWF planning can conflict with meeting the specific needs at the national level [6] and [7]. The aim of this article is to contribute to the understanding of this dilemma and challenge, i.e. to offer a balance between the cross-national exchanges and learning objectives of the Joint Action, and the acknowledgment of variations in HWF planning needs among European countries. While a number of studies and the Joint Action itself have provided many insights and the data needed to compare countries, the attempts to understand the variation in HWF planning needs in Europe are limited. A first omission in the current research is knowledge about the actual drivers and barriers to HWF planning. While there are many suggestions of explanation, none of these have been tested or validated by an analysis of cross-national data and country comparison. Doing so, can provide insights in the extent to which drivers or barriers relate to which type of HWF planning. A second gap that this paper aims to fill is to explore how cross-national variations in HWF planning within specific clustering of countries can be derived to improve learning and exchange between countries. This can overcome limitations in a common strategy to identify best practices (or 'gold standards') to subsequently benchmark countries against best practices or EU-averages. At present, how to cluster countries by their common conditions to achieve common goals, i.e. how to improve HWF planning in a context-sensitive manner is little investigated. For both goals it is important to approach HWF planning as a concept or typology, consisting of different ways to do HWF planning, hence as a multidimensional concept.

This article is structured as follows. Based on country data collected in 2012 on HWF planning and forecasting in European countries [8], we first develop a set of

metrics to score countries on the different dimensions of HWF planning. Then we analyse how cross-national variations in HWF planning dimensions are related to a number of country characteristics that are assumed to be drivers and barriers in terms of HWF planning. Based on these results, we finally create country learning clusters, i.e. groups of countries that are expected to learn from each other because they share the same conditions and starting position for HWF planning. In the concluding section we will reflect on the challenge of how to improve HWF planning in Europe in terms of the exchange and learning objectives of the Joint Action, while simultaneously acknowledging the variations in HWF planning needs among European countries.

2. Methods

The main source article of country data is the Matrix Insight study conducted in 2011/2012 [8]. Commissioned by the European Commission, Matrix Insight collected data from 34 European countries on the level and type of HWF planning by surveying country informants. In addition, country information about health labour market developments and policies were retrieved from different international statistical sources and studies. Descriptive and association analyses are executed at the level of individual countries. Since the number of observations for the analyses is limited (34 countries or less), variables (i.e. country score distributions) are checked for normality before correlations and group comparison measures are applied.

3. A multidimensional Measurement of HWF Planning in European Countries

The country data collected and presented by the Matrix Study in 2012 were used and combined to develop three related metrics that we conceptualize as three dimensions of HWF planning.

The first dimension or metric concerns the data infrastructure that is available in a country with regard to HWF planning. We use three types of indicators which can be used to construct an ordinal scale consisting of:

•the number of institutions that collect and provide the data necessary for monitoring and planning the health labour market (Ministry of Health, Ministry of Education, other public institutions, universities, professional associations, health/social security insurers and service providers). We assume that the more institutions are involved, the more extended and richer the data available on which to base HWF planning.

•the number of health occupations covered by the HWF data available (physicians, nurses, midwives, dentists, pharmacists, physiotherapists). We assume that the more occupations are covered, the more extensive is HWF planning.

•the number of variables available to determine and specify the human resources in stock (headcount, age, gender, geographical distribution, active workforce, working fulltime/part-time, education/qualifications, specialization, inflow, outflow). As with the previous indicators, it is assumed that the more variables are available, the more extensive is HWF planning.

The country scores on the three indicators were normalized, i.e. adjusted for the different score and counting ranges (0–7, 0–6, and 0–11) and then summed (resulting range: 0.00–24.00). This sum score was subsequently transformed into a 5-point scale (range: 0.00–4.00) to align this operationalization with the two other dimensions of HWF planning that are described below.

The second dimension concerns the institutions that a country has in place and that are engaged in HWF planning. From the country tables presented in the Matrix report, we selected three aspects:
•if a workforce planning mechanism is in place, and if so:
•if it is structured nationally, regionally or both,
•if the main workforce planning institution has an advisory or a prescriptive mandate.
From these elements, we calculated one country score in five cumulative levels [0–4] as follows:
•level 0: no workforce planning institution in place,
•level 1: a national or regional organization is in place, and the main institution has an advisory mandate,
•level 2: both a national and regional organization is in place, and the main institution has an advisory mandate,
•level 3: a national or regional organization is in place, and the main institution has a prescriptive mandate,
•level 4: both a national and regional organizations are in place, and the main institution has a prescriptive mandate.
The third and last dimension concerns the application of models for HWF planning in each country. From the country information collected, we coded the level of model-based workforce planning for each country in terms of five cumulative levels [0–4] as:
•level 0: no model in place or use,
•level 1: no specific model in place or use but some (local) projects, programmes or local models for monitoring and policy support are in place,
•level 2: a specific HWF model is in place, that monitors and projects the supply side of the workforce only,
•level 3: a specific HWF model is in place, that monitors and projects the supply of the workforce and the demand in terms of demographic factors (demand-based planning),
•level 4: a specific HWF model is in place that monitors and projects the supply side of the workforce and demand in terms of demographic and non-demographic factors (need-based planning model).
Table 1 presents the results of the three dimensions and HWF metrics. Countries are sorted by their total average score, calculated as the sum of the three HWF planning dimensions. Five countries are presented separately and in italics: Portugal, Greece, Macedonia (FYROM), Montenegro and Turkey. As there was no data available on their level of data infrastructure and institutionalized HWF planning, no average score was calculated.

[TABLE 1]
The analysis of the distribution of the country scores show that Finland and Norway are the two frontrunners that have an average score of 3.8 and 3.2, respectively. They are followed by the majority of countries that have an average score of between 2.6 and 1.6. The countries that have the lowest average scores (an average of less than 1) are Luxembourg, Poland, Cyprus and Slovakia. While the average score of European countries on the three HWF dimensions are quite close (1.44–1.89), the standard deviations are more divergent (0.55–1.41). Countries differ most in their level in terms of model-based HWF planning and less in their data infrastructure.

Excluding the five countries at the lowest part of Table 1, we subsequently analysed the interrelationships between the three dimensions for the remaining 29 European countries. Spearman's rank order correlations are computed, as two of the three variables do not meet the data normality test according to Q–Q plot inspection and the Kolmogorov–Smirnov and Shapiro–Wilk tests ($p < 0.05$). As might be expected, the Spearman rank correlation analysis shows that data infrastructure score is strongly and significantly related with model-based HWF planning score ($\rho = +0.53$; $p < 0.05$). Both dimensions, however, weakly correlate with the level of institutionalized HWF planning ($\rho = +0.00$ and $\rho = +0.06$; $p > 0.05$). This indicates that institutionalized HWF planning (having regional and national institutions in place, with a prescriptive or advisory mandate) is a different domain that does not relate with the availability of data and models for HWF planning. For instance, the Netherlands, Lithuania and the United Kingdom (UK) have high scores on model-based HWF planning, but low scores on institutionalized HWF planning. For Bulgaria, Rumania, the Czech Republic, Lichtenstein and Latvia it is the other way around.

In the next step, we relate the cross-national variations in the three dimensions of HWF planning to country characteristics that are assumed to be drivers or barriers for HWF planning.

4. Relating Cross-National Variation in HWF Planning to Country Characteristics

Expectations or assumptions about what drives the level of a country's HWF planning can be distinguished in terms of two global sets of factors. The first concerns the labour market situation, indicated by imbalances in terms of shortage or oversupply at national level or in specific regions or sectors. The imbalanced inflows and outflows of health care workers is also an indicator of labour market problems that will drive HWF planning as hypothesized by the Matrix model [9] and [10]. The second set of factors concerns the general policy approach in a country with regard to regulating the health labour market. This will be related to the type of health care system, the proportion of public and private health care funding and the role of government versus market mechanisms that govern the health care sector [11] and [12].

Most probably other forces will also drive HWF planning, but at this point we have to acknowledge the limitations of reliable and comparative country data from secondary sources.

4.1. Do countries differ in terms of HWF planning as result of their labour market situation?

To answer this first question, four types of indicators are selected relating to pressures and imbalances of a country's health labour market situation. This selection is limited to the country data from the Matrix report, and some additional sources.

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First, we identify and sort countries by their health expenditures as a percentage of the country's gross domestic product, and the proportion of the active workforce employed in the health care sector. Both reflect the importance of the health care sector as part of a countries' economy, and the level of labour market problems policy makers are potentially confronted with. The larger the size of the health workforce and the larger the level of health care expenditure, the more resources are

potentially needed to regulate them. Consequently, we expect that these two indicators are positively correlated with the different dimensions of HWF planning.

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Second, for each country, we calculated the fluctuation of the number of health graduates per 100,000 inhabitants over the period 2002–2010 for doctors, nurses, midwives and pharmacists. The expectation is that the larger this fluctuation, the faster the need for HWF planning has grown to avoid or cope with the undesirable consequences of such fluctuations [13], [14] and [15]. Unfortunately, no information is available if countries already had HWF planning in place before 2012 (i.e. between 2002 and 2010). Hence, we cannot additionally determine if HWF was actually successful in reducing labour market fluctuations, which is a highly relevant analysis to address the question what type of HWF planning is 'best' for which country in which period. We come back to this issue in the conclusion section.

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A third factor relevant for planning is the mobility of health professionals. The most recent research project on this subject, the PROMeTHEUS study executed[9] and [10] shows that mobility numbers are scarce and hard to obtain. For some countries, the inflow figures of foreign nurses, doctors and dentists are available, but there is no specific indicator that enables a full comparison between all European countries on mobility of health professionals. As a proxy, we combined several tables, figures and overviews from the PROMeTHEUS report [9; p. 40–41] and constructed three clusters or categories of countries:

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The first category consists of seven countries that are dealing with '…relatively intense and roughly balanced two-way flows' or 'reciprocal flows': Austria, Germany, France, Belgium, Netherlands, Finland and Sweden;

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The second category consists of five countries that experience 'one-way inflows': Italy, the United Kingdom, Ireland, Spain, Estonia (in the report, also Austria, Germany and Finland are classified in this category, but we decided to allocate them to the first category only);

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The third category consists of five countries as typical 'source countries': Slovenia, Slovakia, Hungary, Romania and Poland (in the report, Italy and Estonia are also mentioned, but we decided to allocate them to the second category only).

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For the 17 countries allocated to the three categories, we specifically expect that countries that deal with a one-way inflow or outflow of healthcare workers (category 2) will have the strongest drive to deploy HWF planning and hence will have higher scores on the HWF planning dimensions.

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The fourth labour market factor concerns the outflow of the health workforce due to retirement. As both the population and the health workforce are ageing in most European countries, the age of retirement has become an important element of labour market policy and planning. Low effective retirement ages will lead to high future outflows and to a need to plan replacements for the greying workforce. From the Matrix study, the best data on retirement ages are on medical doctors. Another indicator is the difference between the official and effective retirement age. The

higher this difference, the stronger the trigger to anticipate the need for workforce replacements, as apparently the outflow takes place earlier than what is 'officially' expected.
The expected relationship between the labour market factors and the different levels of HWF planning are tested by calculating Spearman's rank order correlations. The relationship between HWF planning and the three cross-border mobility categories that have been distinguished, is analysed by comparison of means. Association tests are not executed for this part due to the limited (and partly) overlapping number of observations (i.e. countries) per category. Table 2 presents the results.

[TABLE 2]
Table 2 The Spearman's rank correlations in Table 2 are of different sizes. While many point in the expected direction, they do not show clear and consistent patterns. Four correlations have a p-value lower than 0.05 with all concerning a country's level of model-based HWF planning. Model-based HWF planning is, as expected, (1) positively related to the proportion of a country's gross domestic product (GDP) spent on health care, (2) positively related to the proportion of the workforce employed in health care, and (3) negatively related to fluctuations in nurse graduate density over the period 2002–2008. Contrary to the expectations, however, is the significant positive correlation between model-based HWF planning and the effective retirement age of female doctors. Table 2clearly shows that countries with one-way out-flow mobility pattern have the lowest scores in terms of all HWF planning dimensions (0.40, 1.59 and 1.75). Countries that have balanced inflows and outflows have the highest scores on two out of three levels (2.10 and 2.57), with the second category having in-between scores for all HWF planning dimensions. Testing the three group differences can be performed using a nonparametric k-independent sample test (Kruskal Wallis), but should be interpreted with care due to the very small number of observations (i.e. countries) per category. It can be concluded that the three country group averages significantly different
(χ^2 = 8.49,df = 2, p[asymptotic significance]=.01) only on the model-based dimension of HWF planning. This matches with the results of the (Spearman's rank) correlation analysis.

4.2. Do countries differ in HWF planning in terms of their health care system?

The second category of factors expected to relate with HWF planning concerns the country's health system. First, we draw on a basic typology: the distinction between a National Health Service (NHS; 'Beveridge') system and a Social Security ('Bismarkian') based health care system [16]. It can be expected that in NHS countries, HWF planning is part of central health care governance, and hence strongly developed. In a social security health care system that is based on premiums from salaried employees, government influence is more at a distance. Health care providers and insurers are responsible for most of the operational and tactical policy health system decisions. This implies that a central labour market policy and HWF planning are less well-developed in this type of system. In countries, in which health care is partly- or fully-funded by private insurance, it is expected that HWF planning is absent or only marginally organized, as market forces are assumed to correct imbalances between demand and supply.

We build upon the classification developed by Van der Zee and Kroneman [16] who allocated European countries into one of the groups, taking the system that these countries have had since 1987. European countries with a NHS system are Denmark, Finland, Ireland, Greece, Italy, Norway, Portugal, Spain, Sweden and the United Kingdom. A large group of European countries have a social security health care system and/or mainly public finance system: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Estonia, France, Germany, Hungary, Iceland, Latvia, Lithuania, Luxembourg, Netherlands, Romania and Slovakia. A third group of countries, Cyprus, Malta, Poland and Slovenia, have a mixed or private insurance-based health care system.

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Secondly, the strength and position of primary care is considered as a relevant element of the health care system in relation to health care planning. A strong primary care system requires dedicated planning of optimal access to health care providers, and consequently this capacity needs to be optimally available 'at the right time and right place'. In particular, the optimal planning of general practitioners or family doctors can be considered as a cornerstone of a strong primary care system, because they are the main gatekeepers and coordinators. Gringos et al. [17]published a classification of countries according to their strength in terms of primary care: weak, medium and strong. This classification is based on a large number of indicators that cover the primary care structure (governance, economic conditions and workforce development) and the primary care service-delivery process (accessibility, comprehensiveness, continuity and coordination). The countries' scores were allocated using national and international literature, government publications, statistical databases and experts' consultations.

The expectations that a country's type of health care system and its strength in terms of primary care are related to the levels of HWF planning are tested by group comparison and are presented in Table 3.

[TABLE 3]

Table 3 The results in Table 3 concur, as countries with a NHS system and countries with a strong primary care system, consistently have higher scores on most of the dimensions of HWF planning. This supports the expectations that central control of a health system as well as a strong primary care system implies extended HWF planning. Countries with a private, or mixed private–social security-based system consistently have the lowest HWF planning scores on all dimensions. Countries with a social security insurance-based health system have a score in between. The strength of the primary care 'scale' also appears to relate to HWF planning in the expected direction. Except for the level of institutionalized HWF planning, Table 3 shows that the stronger a country's primary care, the higher its scores on HWF planning. The differences between the three health system groups are only significant for the level of model-based HWF planning ($\chi^2 = 7.29$, df = 2, p[asymptotic significance] = 0.03), and the 'overall' score based on the average level of the three HWF planning dimensions ($\chi^2 = 6.93$, df = 2, p[asymptotic significance] = 0.03). The differences between the three primary care strength groups are significant on both the level of model-based HWF planning ($\chi^2 = 9.24$, df = 2, p[asymptotic significance] = 0.01), and the level of data infrastructure for HWF planning ($\chi^2 = 7.08$,df = 2, p[asymptotic significance] = 0.03).

Finally, we explored the interrelation between a country's health system and primary care strength. The majority of NHS system countries also have a medium or strong primary care, and countries with a private or mixed insurance-based system mostly have weak primary care. As can be expected, countries that have a NHS system and strong primary care (Denmark, Finland, the UK and Spain) have among the highest scores on all levels of HWF planning. In contrast, countries that have a weak primary care and a private or mixed insurance-based system (Cyprus, Malta), or have a weak primary care and a social security insurance-based system (Austria, Bulgaria, Hungary, Iceland, Luxembourg and Slovakia) have among the lowest scores on levels of HWF planning.

5. Country Learning Clusters for Health Workforce Planning

Our results suggest that the application of models and the required data infrastructure is a specific area in which countries can make most progress, and hence have large opportunities to learn from each other. This supports the design of Joint Action in terms of Health Workforce Planning and Forecasting [5], in which planning and forecasting data and models are the subject of two prominent Work Packages. Our next suggestion is to improve mutual cross-country learning through clustering countries by health care system, primary care strength, and balance in the mobility of health care workers. As these country characteristics are indeed related to the level of model-based HWF planning, countries can be grouped according to a similar 'baseline situation'. This avoids the fact that some countries experience very large deviations between good practice countries and their own starting position. Learning from good practice is not effective if this gap is too wide, and only small steps towards improvement are realistic as is the case with the development of (model-based) HWF planning.

Using the data and metrics developed previously, Table 4 combines the categorization based on three characteristics: (1) countries' health care system, (2) primary care strength and (3) balance in mobility with regard to health care workers. It should be noted that a relatively large group of 29 countries needed to be allocated to the cross-border mobility category of 'not scored'.

[Table 4]

Table 4 The table shows a number of cells that contain two or more countries that are identical in terms of their scores with regard to the three selected conditions for HWF planning. To initiate 'small-scale learning', these countries are the candidates to form country learning clusters and to start exchanging their HWF planning experiences and exploring perceived barriers. These learning clusters or country groups can be enlarged in different ways, based on Table 4. For instance, it would make sense to cluster all countries that have a social security insurance-based health care system, and those with private or mixed insurance-based health care systems. Another option would be to group countries that have unbalanced cross border mobility (either inflow or outflow directed). Within these clusters, countries will partly have similar, but also different levels of model-based HWF planning, depending on the HWF planning dimension. This will be beneficial for the learning curve that countries can ride.

6. Conclusion

We created metrics to compare European countries on three different dimensions of HWF planning. The results show that cross-national variation is the largest on the level by which model-based HWF planning is applied. Country scores on this dimension are positively related with the level data infrastructure for HWF planning is in place, but weakly related with the number of institutions for HWF planning in a country. In addition, it is shown that HWF planning is context sensitive or situational. The level of model-based HWF planning is strongly related to a country's type of health labour market and health system. This result supports the idea that countries can improve or redirect their HWF planning by comparing themselves with countries that have a similar health labour market and health system.

The policy implication of these results is that European programmes to support and stimulate countries in their HWF efforts should be designed to shape a learning climate that is based on a situational approach. This does not imply that good practices in HWF planning should not need to be defined or studied. Monitoring and evaluating the level that countries have in their HWF planning remains highly important, in the face of evidence that HWF planning adds value and should be stimulated in general [18]. In a similar vein, it will remain a challenge to find what type and level of HWF planning is most feasible and most effective for which country, at whatever the stage of their HWF planning learning [19] and [20]. This challenge goes beyond the basic belief that ‘more HWF planning is better’, but also beyond the approach that countries have their unique type or constellation of HWF planning policy, which implies that the added value of mutual learning is limited or even obsolete. European health workforce policy should balance between developing ‘top-down’ approaches in terms of best practices, golden standards and maturity models on the one hand, and defining the relevant conditions to realize the appropriate level of HWF planning for a country on the other hand, to ensure that in a ‘bottom-up’ approach, cross-national variation is acknowledged.

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TABLES

Table 1
Country scores on three dimensions of HWF planning (5-point scale [0–4]; scores based on data and measurements from the Matrix Report 2012).

Country	Level of data-infrastructure for HWF planning A	Level of institutionalized HWF planning B	Level of model-based HWF planning C	Average score (A,B,C)
Finland	3.07	4	4	3.79
Norway	2.89	2	4	3.19
Lithuania	2.33	1	4	2.67
United Kingdom	2.33	1	4	2.67
Belgium	2.15	2	3	2.57
Germany	1.59	3	3	2.55
Netherlands	1.96	1	4	2.48
Republic of Ireland	1.41	3	3	2.45
Slovenia	2.70	2	1	2.35
Czech Republic	1.96	3	1	2.23
Latvia	1.96	3	1	2.23
Spain	1.96	2	2	2.23
Bulgaria	1.41	4	1	2.20
Denmark	2.15	1	2	2.07
Austria	2.15	2	1	2.07
Sweden	1.59	2	2	2.05
Italy	1.96	2	1	1.98
Malta	1.96	1	2	1.98
Croatia	2.33	2	0	1.92
Hungary	2.33	1	1	1.92
France	2.15	1	1	1.82
Estonia	1.59	1	2	1.80
Liechtenstein	1.41	3	0	1.70
Romania	1.41	3	0	1.70
Iceland	1.78	1	1	1.64
Luxembourg	1.41	0	0	0.95
Poland	0.85	0	0	0.90
Cyprus	1.22	0	0	0.86
Slovakia	0.67	1	0	0.83
Portugal			*1*	
Greece			*0*	
Macedonia (FYROM)			*0*	
Montenegro			*0*	
Turkey			*0*	
Average	1.89	1.86	1.44	1.78
Standard deviation	0.55	1.08	1.41	0.75
N	29	28	34	29

Table 2
Levels of HWF planning, correlated with several health labour market characteristics, and compared among three categories of labour market mobility.

	Range (min–max)	N	Level of HWF planning, dimension: Data-infra-structure (A)	Institu-tionali-zation(B)	Model-based planning (C)
Health (labour) market conditions			*Correlations*[*]		
• Proportion of GDP spend on health care	4.7–11.1	28	0.31	0.13	0.39
• Proportion of workforce employed in health	3.4–8.4	28	0.29	−0.08	0.48
• Fluctuation in MD graduates per 100,000 population (2002–2008)	0.4–3.3	26	0.03	−0.15	−0.05
• Fluctuation in nurse graduates per 100,000 population (2002–2008)	0.4–16.8	26	−0.22	−0.29	−0.32
• Average effective retirement age male doctors	55.4–69.7	28	0.03	−0.18	0.32
• Average effective retirement age female doctors	55.6–65.4	28	0.15	−0.16	0.57
• Difference effective and official retirement age male doctors	−7.7–+3.2	28	0.05	−0.30	0.14
• Difference effective and official retirement age female doctors	−7.0–+2.4	28	0.13	0.04	0.18
Workforce cross-border mobility			*Mean group comparison*[**]		
• Countries dealing with balanced two-way or reciprocal flows[a]		7	2.10	2.14	2.57
• Countries dealing with one-way inflows[b]		5	1.85	1.80	2.40
• Countries mentioned as source countries, one-way outflow[c]		5	1.59	1.75	0.40

[a] Austria, Germany, France, Belgium, Netherlands, Finland, Sweden.
[b] Italy, United Kingdom, Ireland, Spain, Estonia.
[c] Slovenia, Slovakia, Hungary, Romania, Poland.
[*] Spearman's rank order correlation is underscored if significant ($p < 0.05$).
[**] Compared group averages are underscored if the Kruskal Wallis test is significant ($p < 0.05$).

Table 3
Levels of HWF planning compared by type of health care system and strength of primary care.

	N	Level of HWF planning, dimension: Data-infrastructure (A)	Institutio-nalization (B)	Model-based planning (C)
Type of health care system		Mean group comparison[*]		
• National Health Service (NHS)	8	2.18	2.13	2.75
• Social security insurance based	16	1.82	1.81	1.44
• Private or mixed insurance based	4	1.69	1.00	0.75
Type of health care system		Mean group comparison[*]		
• Weak	9	1.59	1.44	1.00
• Medium	9	1.82	2.38	1.44
• Strong	9	2.25	1.67	2.89

[*] Compared group averages are underscored if the Kruskal Wallis test is significant ($p < 0.05$).

Table 4
Learning clusters: countries by type of health care system, strength of primary care and balance in cross-border mobility.

		Type of health care system		
		National Health Service (NHS)	Social security insurance based	Private or mixed insurance based
Strength of primary care	*Cross border mobility balance*			
• Weak	• Balanced flows		AT	
	• Unbalanced inflows	IE		
	• Unbalanced outflows		HU,SK	PL
	• Not scored		BG,IS,LU	CY,MT
• Medium	• Balanced flows	SE	DE,FR	
	• Unbalanced inflows	IT		
	• Unbalanced outflows		RO	
	• Not scored	NO	CZ,LV	SI
• Strong	• Balanced flows	FI	BE,NL	
	• Unbalanced inflows	ES,UK	EE	
	• Unbalanced outflows			
	• Not scored	DK	LT	

Country abbreviations: Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Hungary (HU), Iceland (IS), Italy (IT), Latvia(LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherlands (NL), Norway (NO), Poland (PL), Republic of Ireland (IE), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), United Kingdom (UK). Croatia is omitted because of a missing score on primary care strength, Liechtenstein because of a missing score on primary care strength and health system.