



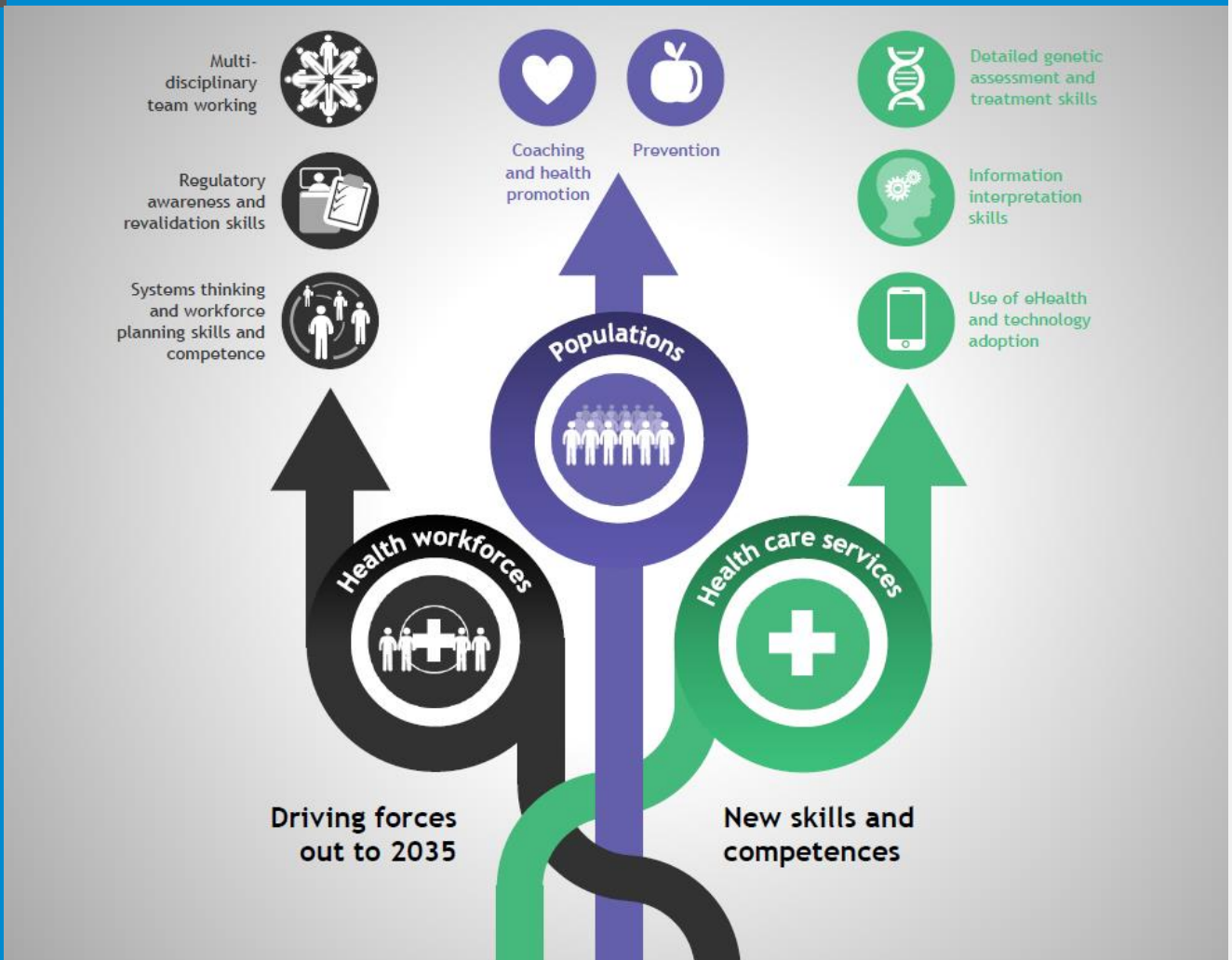
**CENTRE  
FOR  
WORKFORCE  
INTELLIGENCE**



Joint Action Health Workforce  
Planning and Forecasting

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# Future skills and competences of the health workforce in Europe



Funded by  
the Health Programme  
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**HORIZON  
SCANNING**

## Contents

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The Joint Action Health Workforce Planning and Forecasting .....	3
Contributors and acknowledgements .....	4
Executive summary .....	5
1. Horizon scanning for health workforce planning in the EU.....	10
2. Horizon scanning for future skills and competences .....	12
3. Conducting horizon scanning for the Joint Action .....	14
4. System map .....	17
5. Drivers of change - populations, health care services and health workforces .....	22
a) Populations .....	22
b) Health care services .....	31
c) Health workforces .....	35
6. Skills and competence implications .....	38
6.1 Populations .....	39
6.2 Health care services .....	41
6.3 Health care workforces.....	43
7. Discussion and conclusion .....	46
The future scope of workforce planning.....	46
Developing our understanding of health workforce activity .....	47
Education and training considerations .....	47
The future skills required in health workforce planning .....	48
Better understandings of potential futures .....	48
Conclusion and Recommendations .....	48
Annex 1: List of horizon scanning interviewees and interviewers .....	50
Annex 2: Qualitative analysis of system map .....	54
Annex 3: Skills and competence implications as shared by respondents .....	61
Annex 4: The WP6 team .....	67
Annex 5: Examples of applying horizon scanning to health workforce planning .....	70
Glossary .....	71
References.....	75

# The Joint Action Health Workforce Planning and Forecasting

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The Joint Action on Health Workforce Planning and Forecasting is a three-year programme running from April 2013 to June 2016, bringing together partners representing countries, regions, professional organisations and Universities from across Europe and beyond. It is supported by the European Commission in the framework of the European Action Plan for the Health Workforce, which highlights the risk of potential shortages of health professionals in the near future.

The main objective of the Joint Action Health Workforce Planning and Forecasting (JA EUHWF) is to provide a platform for collaboration and exchange between partners, to better prepare Europe's future health workforce. The Joint Action aims to improve the capacity for health workforce planning and forecasting, by supporting collaboration and exchange between Member States and by providing state of the art knowledge on quantitative and qualitative planning.

By participating in the Joint Action, competent national authorities and partners are expected to increase their knowledge, improve their planning tools and improve the effectiveness of workforce planning processes. The outcomes of the Joint Action should contribute to the development of ensuring sufficient health professional supply across Europe and contribute to minimising the gaps between population needs and health professionals equipped with the right skills.

This document contributes to achieving this aim by providing a qualitative description of the forces and factors driving change to the skills and competences of the health workforce. It aims to contribute to the development of assumptions and theoretical understandings used in workforce planning at a macro-level through the description of a systemic framework and the drivers of change acting on different parts of the system, as well as a consideration of the skills and competence implications.

Further improvements in workforce planning can be made by joining up our collective understanding and assumptions at different levels - as a minimum at the overall (macro-) level and for individual workforce planning questions - about how workforce systems are likely to adapt and evolve in the future.

This document has been approved by the Executive Board of the Joint Action on Health Workforce Planning & Forecasting on 14<sup>th</sup> April 2016.

## Contributors and acknowledgements

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The preparation of this deliverable was led by the Centre for Workforce Intelligence, in collaboration with the UK Department of Health.

As authors we are indebted to all of the Work Package 6 partners (the full list of names is given in Annex 4 due to the large numbers involved) for their engagement with, and input to, this deliverable. We have received a wide range of constructive input into this work throughout its development which we have endeavoured to reflect in the approach and process of producing this work with our partners, as well as in the final reports.

In particular we would like to acknowledge the contributions made in conducting and agreeing to participate in horizon scanning interviews (full list in Annex 2) and in developing the reports through commenting on earlier drafts. We are grateful for the comments received from Professor Jan de Maesenner, Victor Slenter, Dr Marieke Kroezen, Matthew Hamilton, Machteld Geysen, Nina Bernot, Dr Siôn Cave, Dr Paul De Raeve, Dr Melanie Boeckman, Pilar Carbajo, Baiju Khanchandani, Jamie Wilkinson, Michelle Audéoud, Diogo Fernandes da Silva, Sarada Das, Catherine Donnelly, Isabella Notarangelo, Pascale Steinberg, Anna Björg Aradóttir, Tina Jacob, Zuzana Matloňová, Alisa Puustinen, Marjukka Vallimies-Patomäki, Andrew Xuereb, Zoltan Aszalos, Paolo Michelutti, Rossanna Ugenti, Professor Todorko Kostadinova and Michel Van Hoegaerden. Our thanks to all for their constructive inputs which have helped to develop our thinking and the final reports.

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## Executive summary

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This report is a future-oriented scan (out to 2035) for drivers of change, their potential implications, distribution and an estimation of future needs for the skills and competences of the health workforce in the European Union. Below we describe what this work has found, what it provides and what we recommend.

### High level drivers of change for the future

- ▶ The work describes the variables and the relationships within workforce systems, highlighting the drivers of change occurring at the **population**, **health care service** and **health workforce** levels which have a range of skills implications.
- ▶ This research is useful for policy makers and workforce planners at the Member State and EU level when considering the future of health workforces and health systems.

We recommend that:

- 1. Member States, competent national authorities and partners are aware of the implications of these driving forces on the workforce** (including the skills implications). **We encourage that this information and knowledge is applied** in Member States' national specific contexts with the support of workforce planning expertise and knowledge as mapped within the EU Joint Action expert network.

### Methods and tools for horizon scanning and multi-professional projections

- ▶ The report shares the methods used to conduct horizon scanning and provides tools - such as a system map to understand the dynamic nature of future change.

We recommend that:

- 2. Member States investigate the development of qualitative and quantitative workforce planning methods as well as multi-professional projections** (within the context of individual member states) as part of understanding the implications to the workforce and skills. These investigations should effectively inform decision making by linking to appropriate policy decisions.

### A workforce research programme to model and investigate the health and care workforces of the EU

- ▶ There are many notable EU and global health and care initiatives (on technology, eHealth, active ageing, frailty, chronic disease including cancer), however there remains a need to better understand the workforce implications and the different futures we may face.
- ▶ Collaboratively developing our understanding of the questions health systems and workforce planning should address - future orientated considerations taking into account uncertainty and the level of the system that they relate to - is as important as the ability of future policy makers and workforce planners to answer them.

We recommend that:

3. the EU Commission and Member States consider the requirement, scope and timeframe of a further workforce research programme which builds on this horizon scanning. The next stage would be to simulate the effects of selected driving forces on workforce skills and competences as part of a systems dynamics modelling project at EU level where a range of challenging futures would be generated and quantified. This would to enhance our collective preparedness for the future as well as better understand areas of workforce mal-distribution, imbalance or risk.
4. the EU Commission and Member States are aware of the need to ensure that this programme of work should consider and investigate the health and care workforces of the EU. Our health and care systems are intertwined; as are our health and care pathways that patients and service users travel. Therefore a wider scoping of the issues potentially impacting on these workforces, with full engagement with the Commission, Member States, social partners, patient representatives and carers, is necessary to consider how our health and care systems need to respond to the future pressures and future challenges they face and how we may identify common solutions to our shared challenges.

▶ The high-level drivers of change out to 2035 described by this report are summarised below.

Populations	Health care services	Health workforce
<ul style="list-style-type: none"> <li>▶ Population structure</li> <li>▶ Long-term care and availability of informal carers</li> <li>▶ Types and distribution of health conditions</li> <li>▶ Multimorbidity</li> <li>▶ Health inequalities</li> <li>▶ Health literacy</li> <li>▶ Patient mobility</li> <li>▶ Patient empowerment</li> </ul>	<ul style="list-style-type: none"> <li>▶ Health care expenditures</li> <li>▶ Health IT and health services</li> <li>▶ Genomics and precision medicine</li> <li>▶ Location of care by setting</li> <li>▶ Roles and decision rights</li> <li>▶ Regulation</li> </ul>	<ul style="list-style-type: none"> <li>▶ Ageing health workforce</li> <li>▶ Multi-professional education and adaptation of competences</li> <li>▶ Health IT and health workforce</li> <li>▶ Skill mix</li> <li>▶ Health workforce mobility</li> </ul>

▶ As result of horizon scanning this work has identified increases in the following areas of skills and competence for the future as a result of these driving forces. Member states and stakeholder should take note and seek to better understand what it means for them in their respective health systems:

Populations	<ul style="list-style-type: none"> <li>▶ <b>Prevention</b> - the ability to ‘reduce the instance or incidence of ill health’ (CfWI, 2014a). The horizon scanning exercise demonstrated that improvements are expected in the understanding of the risk factors which affect the development of ill health in specific parts of the population and how behavioural and lifestyle factors can be influenced specifically for individuals. The health workforce may therefore have an increasingly targeted effect over the primary prevention of ill health.</li> <li>▶ <b>Coaching and enabling</b> - once people have contact with health workforces for conditions that involve levels of self-management then there is expected to be an increasing focus on joint planning around the person’s treatment goals. This type of ‘person-centred co-ordinated care (National Voices, 2013) involves further ‘engaging and empowering individuals’ (WHO, 2015) and the effective alignment of patient and system goals.</li> </ul>
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**Health care services**

- ▶ **Information interpretation skills** resulting from developments in eHealth may increasingly have wide ranging impacts on patients, the workforce and health systems (EFN, 2014).
- ▶ **Use of technology and its adoption as part of care delivery** from a physical and remote perspective such as eHealth, surgical robots and other enhancements amending clinical and non-clinical practices.
- ▶ An awareness of, and detailed **genetic assessment and treatment skills**, will be an important for the workforces involved in assessment, diagnosis and treatment. The scope of workforces may also expand to new genetic advisory and therapy health professionals as part of multi-disciplinary teams.

**Health workforce**

- ▶ **Multi and inter-disciplinary team working** that includes a range of ‘different professional groups, deliver[ing] higher quality patient care and implement[ing] more innovations in patient care’ (Borrill et al, 2013). This has the potential to reduce duplication of processes, increase the flow of information between workforce groups and reduce ‘therapeutic partition’ - boundaries between workforce groups which create additional appointments or transactions for the patient (Nancarrow, 2015).
- ▶ **Regulatory awareness and revalidation skills** - Health care professionals working in the EU face differing regulatory and re-certification systems as revalidation becomes more prevalent in Europe’s health systems.
- ▶ **Systems thinking and workforce planning skills and competence** will be areas of increased demand for the future. The interconnectedness of how health systems operate, their complexity and how they interact have implications for the achievement of equitable health outcomes (Adam, 2012).

- ▶ This work is also communicated as a series of briefings, with their relationship to this deliverable shown below:

**REPORT ON FUTURE SKILLS AND COMPETENCES**

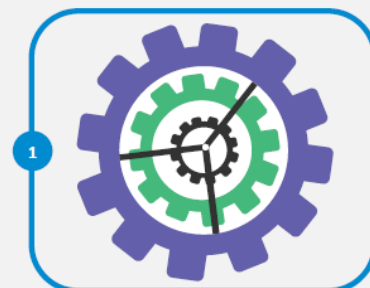
To simplify the complex system described in the report, drivers of change are considered in terms of one of three inter-related areas, where change in one area causes changes in the others.



**JA HWF POLICY BRIEFINGS**

These briefings summarise the information contained in the longer report for a wider audience.

- 1 **Horizon scanning and workforce futures**
- 2 **Populations**
- 3 **Health care services**
- 4 **Health workforces**



## Introduction

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Workforce planning in health care generates intelligence and information about what has happened, what is happening and what could happen in workforce systems. This information is typically displayed in supply and demand projections to inform decisions concerning the appropriate allocation of resources. These resourcing decisions are usually about the numbers of health workers that should begin training in order to ensure that there is a sufficient number to meet the health care needs of future populations.

The information that is produced by workforce planning (and the quality of that information) is of critical importance to health systems now and in the future. This is because decisions that are made in the near-term contribute to the production of the future workforce system and also the future health system, of which health workers are an essential part.

However, despite its importance to health systems, health workforce planning has been criticised for occurring ‘largely in isolation of, or separately from, matters relating to other aspects of health care policy and population health’ (Birch et al, 2007). It has also been criticised for its reliance on simple demographic utilisation models to inform demand projections (Tomblin Murphy et al, 2009; Birch et al, 2003; Scott et al, 2011). As an additional complication for international collaboration, the context dependence of models presents challenges when considering workforce planning across EU Member States (Kuhlmann et al, 2012).

To improve this position it is important to acknowledge that, if the models and conceptual frameworks we (as workforce planners) are using are not as reliable or as comprehensive as they can be, or we are using tools which aren’t appropriate, then we run the risk of locking ourselves in to future health workforce situations which are undesirable or unsustainable. Failing to update our approaches could result in mistakenly reproducing the current system and result in a future which could produce worse outcomes than would otherwise be expected for the health workforce, our health systems and our populations.

Collectively, and as a result of the risk of locking ourselves in to undesirable futures, there is a need to enhance the resilience and robustness of our plans to adapt in light of future developments. This report describes the macro-level relationships driving change and the context within which the skills and competences of the health workforce are located. It is clear from previous Joint Action work on the future-oriented methods in use in 2014 (Fellows and Edwards, 2014) that there are a limited number of Member States in the European Union who are conducting this type of macro-level and future consideration beyond individual workforce groups.

Therefore, health workforce planning in Europe requires changes in the way that the future is considered. Three of these changes are introduced here. The first change is to ensure that our collective ability to think across workforces is enhanced by qualitative and quantitative approaches and models which allow us to think at different levels of scale, from individual workforces to the overall national context, and beyond.

The second change in how we should consider the future concerns the relationship between workforce planning and uncertainty. Whilst elements of the future are uncertain, the task facing workforce planners is to better understand which uncertainties can be reduced by developing our knowledge of the relationships driving change. This includes the related issue of which uncertainties can’t presently be reduced by improvements in understanding. The more we understand these types of uncertainty, the greater our ability to reliably quantify, project and inform workforce planning decisions. Where



uncertainty can't be reduced, different techniques are required to effectively capture this in workforce planning processes (such as scenario approaches, as described in Fellows and Edwards, 2014).

The third change is in how our collective understanding of the future is developed and applied through future collaboration which, we argue, should build on this horizon scanning through modelling and scenario approaches which allow us to explore the risks and opportunities in workforce systems across a range of plausible futures.

To develop our knowledge of the drivers of change and the workforce system to which the skills and competences of health workforces belong, this report takes a systems thinking<sup>1</sup> approach to horizon scanning (CfWI, 2014b) and complements the other WP6 publications and toolkit. A central assumption of this horizon scanning approach is that it is necessary to understand both the dynamics of the system and the drivers which are causing change in the system. This helps to develop our knowledge and anticipation of future developments. Importantly, by considering the dynamics which affect multiple workforces through a qualitative discussion of skills and competences, we are building the foundational knowledge necessary to develop better models and processes in the future - ones which are capable of combining qualitative and quantitative methods, and so benefit from an in-depth understanding and numerical comparisons of scale and uncertainty.

The ability to understand complex adaptive systems such as the dynamics surrounding health workforces and health systems may always be limited by practical capacity (of data, resources or conceptual understanding). However, these limits should be compared against the risks of workforce planning and policy decisions which are not informed by future considerations, potential system failures and their associated consequences.

As health workforces are involved in a wide range of essential activities, such as preventing and treating ill-health and caring for populations, we argue that it is prudent to increase the 'futures literacy' (Miller, 2013) of workforce planners at multiple levels (particularly at workforce-specific levels and the macro or multiple-workforce level) to better understand the current system and its dynamics through techniques such as horizon scanning and simulation methods, to be better able to anticipate future developments, risks and appropriate interventions.

All health systems can be affected by shocks and stresses. To ensure that our health systems and workforce plans are resilient we should develop the understanding shared through this work to take into account a range of future scenarios and the possible impacts to populations, services and the workforce. This is where workforce planning can increase its value and contribution to health systems resilience now and for the future.



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<sup>1</sup> A holistic approach to thinking about and analysing a system, and how the elements in the system interrelate and influence each other (CfWI, 2014b).

# 1. Horizon scanning for health workforce planning in the EU

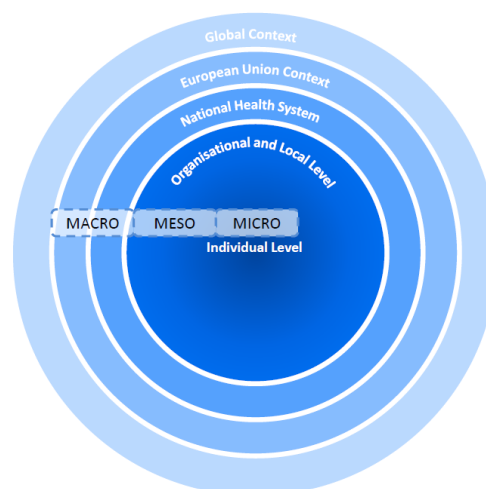
Horizon scanning in health workforce planning and forecasting is used to explore and describe the factors and forces, and their inter-relationships, in workforce systems. For the Joint Action on Health Workforce Planning and Forecasting the aim of this report, and the associated briefing reports, is to increase our collective knowledge of the factors and forces which may drive changes in the skills and competences required from health workforces over the next 20 years; and to consider the implications of these changes.

These driving forces and factors may have similar or divergent effects when considering health workforces in the different health systems in the European Union. To deal with this context-specificity appropriately, it is necessary to discuss the level of the analysis in this report.

There is diversity in the types of health system in the European Union (EU) (see, for example, Böhm et al, 2013) and Member States (MS) are responsible for the definition of their health policy, allocation of resources and delivery of health services, as expressed in Article 168 on the Treaty of the Functioning of the European Union (European Union, 2012). Accordingly, for reports aimed at increasing the collective knowledge of workforce planners and policy makers across Europe, the level of analysis is located primarily at the national level (recognising the limitations of the term ‘national’ as being relevant to each MS’s individual division of workforce planning responsibilities).

In section 4 of this report a system map is described which pertains to this national level and may be adapted for use within different health system types and specific contexts. Whilst that is the primary level of analysis one must also acknowledge the interconnectedness of different geographical (such as national and European levels) and conceptual levels (macro, meso and micro) when considering the dynamics of the system. Figure 1 visualises these different levels.

**Figure 1: The different levels of a health system**



Source: Adapted by the CfWI from Gilson, 2012

### Thinking across boundaries

Although figure 1 shows boundaries between the different geographical levels for clarity of visualisation, these boundaries are crossed by interactions, for example the national level interacts with the European and global levels. Interactions with the European level are demonstrated through the single market in medicines regulation and cross-border health care provision (UK Cabinet Office, 2013a). Most relevant for health workforces within the scope of this analysis is the portability of qualifications of medical doctors, dentists, registered nurses, midwives and pharmacists which ‘delineates the European Economic Area as the largest region in the world with « free » mobility for health professionals’ (Buchan et al, 2014).

In terms of interactions at the global level, there are also factors which transcend boundaries, including workforce mobility in a global market. The ability to consider interactions between these levels and potential future impacts of the forces and factors driving change to health workforces and their skills and competences is important. This knowledge increases our collective awareness and preparedness for the future from a workforce planning perspective. As this knowledge continues to develop it will be important to apply it to informed workforce planning decisions about the types and numbers of future skills required to maximise the positive effects that health workforces have on the health of national populations.

Our collective ability to understand future skills and competence requirements of the health workforce is also of broader significance. The health sector is expected to create additional employment, acting as a source of economic growth in the future (European Commission, 2012; 2013). It is therefore highly important to enhance and increase our awareness of risks within the system over a longer timescale than is usually considered, hence the focus on the longer-term, 20 year timescale. These risks may be, for example, financial, especially in a system where the ‘workforce accounts for the greatest proportion of recurrent health expenditure in most health settings’ (Nancarrow, 2015).

## 2. Horizon scanning for future skills and competences

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This report presents findings from a horizon scan out to 2035 for drivers of change that will affect the skills and competences of the future health workforce in the EU. Information was collected with reference to those workforces which are in scope of the Joint Action. Those workforces are: dentists, doctors, midwives, nurses and pharmacists.

An investigation of this breadth (multiple workforces across the EU) must be mindful of the explanatory (and opposing) problems of over- and under-determination, as described by Freeman and Frisina (2010). In under-determination, explanations are too broad and abstract to give a meaningful understanding of the system. In over-determination, the explanations are too narrow and focus on certain cases to the detriment of the overall picture.

In this report we are seeking to balance the problems of over- and under-determination through the creation of a national-level system map which incorporates health workforce skills and competences and provides a framework for understanding drivers of change. Relevant trend data and workforce research is also presented in section 5 to contextualise the system map and analysis.

Additionally, to enable a discussion of multiple workforces at this scale, an appropriate categorisation is required which allows a general discussion of health workforce activities and responsibilities which is not profession-specific, and this is where the concept of skills and competences is used.

### Skills and competences

The language of skills and competences is useful when considering multiple health workforces, and their potential activity in the future, because it allows a broad consideration of what will need to be done rather than trying to work forward from the existing division of roles and responsibilities.

To develop this approach, skills and competences are conceptualised in a generic framework (consistent with approaches in, for example, Cowan et al, 2005 and UEMS, 2011) where competences are a complex (and interacting) combination of skills, knowledge and personal attributes.

Building on this definition, the competence of individual health workforces may be described as the responsibility (sometimes legally-determined) to perform certain tasks, and skills may both refer to those specific tasks and the ability to perform those tasks to provide the maximum health benefits to patients and the public. Elsewhere, and for other purposes, different types of skills have been further classified and described. In « Knowledge and Skills Frameworks » skills are described by their specific components (see, for example, Gould et al, 2007), in relation to qualifications and their translation into other national settings via the European Qualifications Framework (EU Commission, 2008) and in workforce modelling skills have been described by their level and type to create demand projections for workforce time (CfWI, 2015a).

### Limits of the horizon scanning approach

The descriptive analysis in this horizon scanning project purposely does not address or categorise specific components of workforce activity for individual workforces or for skill types across workforces. These types of workforce investigations may relate to other levels of scale or other types of research

questions and involve different approaches (see, for example Bond *et al*, 2016 and Tsiachristas *et al*, 2015 for a description of the MUNROS project which considers professionals working on three care pathways). Also as a necessary clarification, whilst competence to perform tasks may shift between and within health workforces over the next 20 years questions as to which types of health worker will, in the future, be competent to perform certain skills are outside of the remit of this report.

Detailed or specific questions relating to current and future scopes of practice, task allocation and skill mix are more usually (see Nancarrow, 2015 and Nancarrow *et al*, 2012) determined at lower levels of resolution (such as the meso-level of health systems) where there is potential for in-depth consideration and context-specific negotiation of the future configurations and activities of health workforces. Changes such as these are more likely (and perhaps more appropriately) to emerge from within the actual system that they are from the type of conceptualisation (a necessary simplification) of the system discussed in this report. However, if we develop our shared understanding and quantification of future demand (recommendation 3), then we are likely to be in a better position to apply this analysis to future supply.

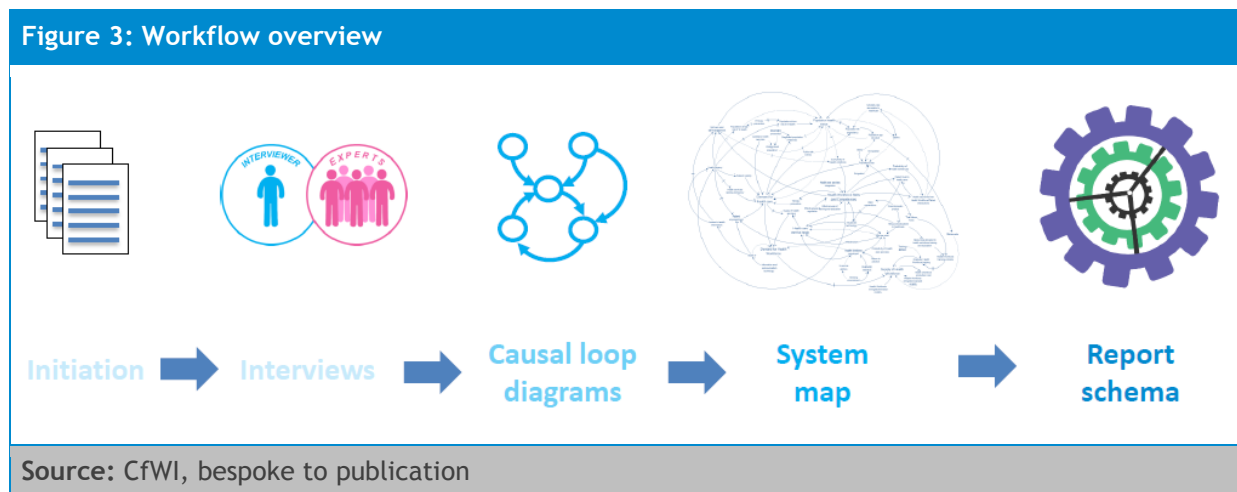
Throughout this horizon scanning report we are using the language of skills primarily. This is as skills is a commonly understood term which allows links to be made to the drivers of change and to considerations of what may need to be done by health workforces in the future in response to these drivers, whether that is in the development of new types of workforce planning research, new types of skills or in enhancing existing skills in response to developments in knowledge or treatments.

The approach is illustrative and descriptive rather than a comprehensive assessment with specific actions that apply equally across all MSs. The report and policy briefs illustrate the types of potential changes to skills and their distribution across the EU but cannot replace the need for individual MSs to conduct their own macro-level assessments, and it is for this reason that we are sharing the tools to conceptualise national-specific systems through this report and on the Joint Action website. Our hope is that through transparently sharing the approach and tools we enable an acceleration of future-oriented work in MSs that wish to apply horizon scanning and associated futures thinking.

### 3. Conducting horizon scanning for the Joint Action

Horizon scanning for the Joint Action on Health Workforce Planning and Forecasting has been conducted by a Work Package 6 (WP6) network<sup>2</sup> consisting of WP6 partners led by the Centre for Workforce Intelligence, in collaboration with the UK Department of Health.

The data collection and analysis to produce this report has followed five overall stages, as shown in figure 3. Appropriately for an investigation of a complex and dynamic system, these stages are iterative rather than strictly linear (as implied in the diagram) and reflect a responsive process which has involved regular checks with the WP6 network and the integration of reviews of documents and literature into the interpretation and analysis at all stages (Bradley et al, 2015; Davis, 2007).



Following an initial literature review, introductory sessions with JA partners on the goals of the horizon scanning and the methods to be employed in the project ('initiation' in figure 3), the WP6 network identified people with a range of knowledge and expertise on health workforces, health workforce planning and skills and competences from across Europe (the list of interviewees is presented in Annex 1). These people were then invited to take part in the horizon scanning exercise.

The horizon scanning exercise was conducted as a one-to-one semi-structured interview with a member of the WP6 network, and was based on the use of an interview guide and template for the recording of ideas and skills implications from the respondent.

Interviews were designed to extract as many relevant ideas from the participants using the focal question: 'Thinking up to the year 2035, what are the key driving forces that will influence the skills and competences required in the health workforce?'

A total of 56 interviews were conducted, with the interviewees coming from a range of expertise, professional backgrounds and regions in Europe, and 264 drivers were recorded in a common template

<sup>2</sup> On the use of networks in horizon scanning see Schultz, 2006.

for thematic analysis. As this common template was populated over time, the WP6 core team noted a repetition of concepts and the decision was made that saturation of information had been reached and the interview stage was closed.

The common template was then analysed inductively and seven overall themes were identified. The relationships between these seven themes were described as a series of causal loop diagrams, which visualised the main factors within the system and their connections.

These diagrams were presented to the WP6 network for their feedback on the relationships and factors which will drive changes to the skills and competences required in the future health workforce.

This feedback resulted in the development of one overall causal loop diagram (the system map) to represent the high-level factors involved in changes to health workforce skills and competences, an approach informed by systems thinking in health workforce planning (CfWI, 2014b). This system map may be re-drawn, applied and interpreted for different national specific contexts.

Variables in this diagram were categorised into three areas to describe the drivers of change which act on different parts of the system. These categorisations - populations, health services and health workforce (shown in figure 4) - were primarily chosen as a heuristic device to provide a necessary simplification of the complex system based on the groupings which are most generic across MSs and therefore most transferable in terms of the usefulness of this work as an output of the Joint Action.

The focus is, for example, on health services rather than health system type. These categorisations are to some extent nested, as the health workforce is conceptually located within health services that are supplied to and for populations, and where the health workforce is also part of the population, and so shares some of the population's characteristics.

Discussions were held with the WP6 network, using an adapted focus group methodology, to gain feedback on the conceptualisation and the main challenges under each of the categorisations.

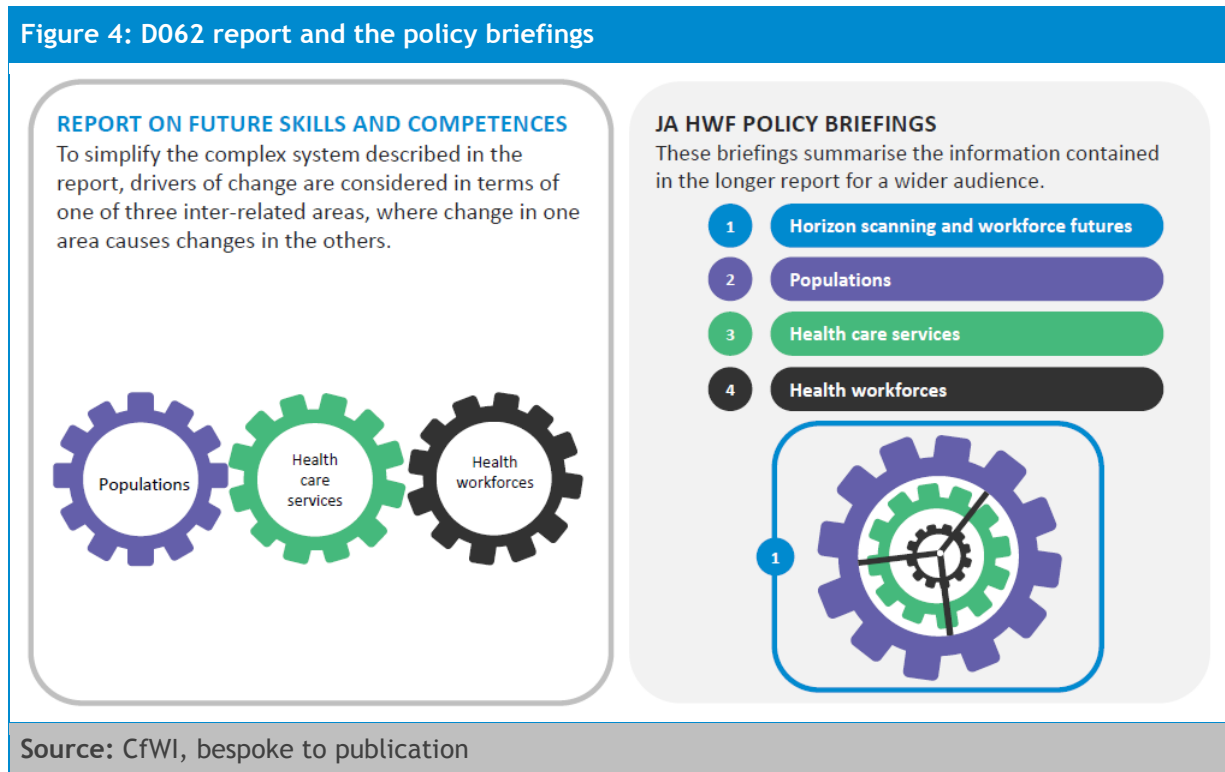
The drivers from the interviews and the skills and competence implications described by interviewees were then analysed further for impact and uncertainty as well as for 'weak signals' which are defined as 'imprecise early indications about impending impactful events' (Ansoff and McDonnell, 1990). The resulting analysis then grouped drivers into one of these three categorisations. This allowed for further desk research, reviews and interpretation which are presented in section 4 of this report alongside available data to 'triangulate' (O'Cathain et al, 2010) this information to provide a more complete picture of the factors affecting the future skills and competences required in the health workforce.

### Policy briefs

Whilst this longer report is aimed primarily at national-level workforce planners and those who are interested in understanding or carrying out horizon scanning or future-oriented workforce research at the European or global levels.

There are also policy and other audiences interested in the future of the health workforce and health systems. To reach these audiences, the work has been summarised as a series of policy briefings, as shown in figure 4.

**Figure 4: D062 report and the policy briefings**



### Limitations

The limitations of this horizon scanning approach reflect the type of research conducted and the nature of the system that we are investigating. As we are required to both understand the dynamics of the current system and the potential impacts across an uncertain future the limits are primarily related to the authors' ability to understand and communicate the level of complexity involved in workforce systems (for example, their non-linearity and potential for multiple valid yet different perspectives on the same phenomena).

This limitation may also be evident in our ability to process what the interviewees and WP6 network interviewers told us about the system and its dynamics. Additionally, the selection of interviews was based on recommendations from the WP6 network and snowball sampling, so our selection may be biased, for example towards 'expert' rather than 'maverick' views about the nature of the system and the scope of future changes.



## 4. System map

Systems thinking is used in workforce planning to describe and better understand the behaviour of complex systems, such as health care and health workforce systems (CfWI, 2014b). A systems thinking approach has been used in this report to develop a system map which provides the conceptual framework for the analysis in section 5, to discuss drivers of change to workforce skills and competences in the categories of populations, health services and health workforces.

The system map links the multiple factors driving change to the future skills and competences at the national (macro) level. The system map is generic and can be used and developed in national-specific contexts, where different factors may have stronger or weaker relationships depending on, for example, health system type.

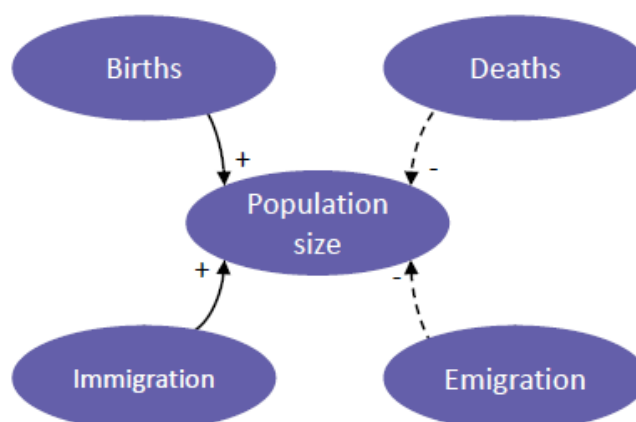
### How to read system maps

In the system map, positive causal relations are indicated by a positive (+) sign and negative causal relations are shown by a negative (-) sign and a dotted arrow. The use of the terms ‘positive’ and ‘negative’ do not indicate a normative judgement on the relationship and are solely a description of the direction.

In positive causal relations, the variable at the tail of the arrow produces a change in the same direction, or adds to the variable, at the head of the arrow. In negative causal relations the variable at the tail of the arrow produces a change in opposite direction, or subtracts from the variable, at the heads of the arrow (Kirkwood, 1998). The system map also contains double lines on bars (||) which indicate that there is a time delay in the relationship.

Figure 5 provides an example, showing four variables from the population section which have different effects on population size. ‘Births’ adds to ‘Population size’ and the change is in the same direction, so it is a positive causal relation. ‘Deaths’ subtracts from ‘Population size’ and, for example, a decrease in deaths results in an increase in population size (a change is produced in the opposite direction).

Figure 5: Causal loop diagram example



Source: CfWI, bespoke to publication

### An open, complex system

It is important to note that the system map shows an open system, in that it is connected to other types of systems which can affect what happens within it. For example, wider economic developments are likely to affect the resources allocated to health care; ‘information and communication technology’ which develops outside of health care may have an effect on health information technology. The points at which the system is open to effects from outside are important as they present sources of uncertainty for the way in which the system operates.

The system map is a generic structure which can be altered to be applicable for the specifics of each MS. As presented here with 60 variables it represents both a complicated picture and an incomplete representation of the actual dynamics of the workforce system. To get a handle on the system it is necessary to provide ways to simplify and explain it.

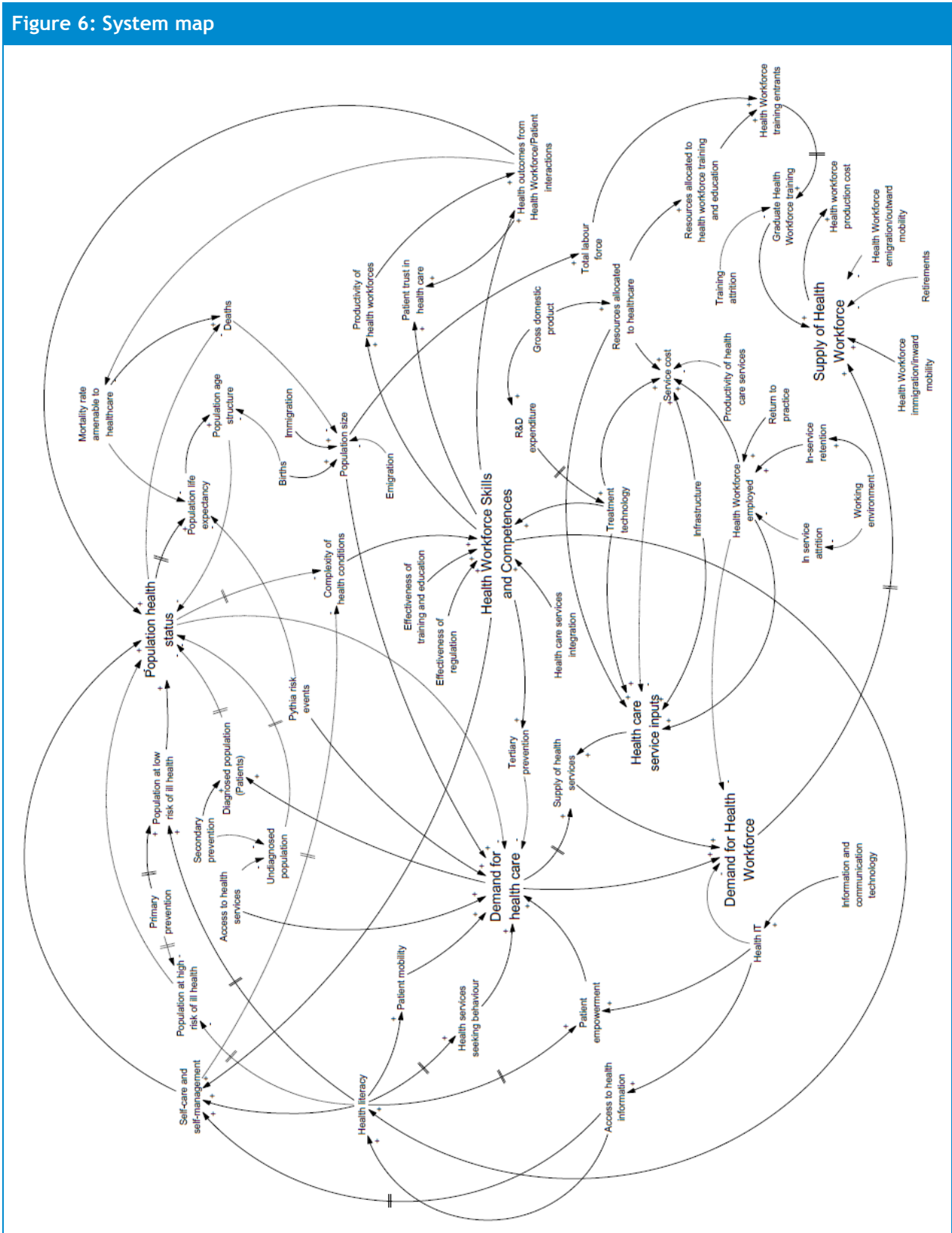
A definition of the terms in the system map is provided in Annex 2, as well as a Vester (2012) influence matrix analysis of the variables so that workforce planners can compare scoring of the system map in different contexts or use and adapt it as appropriate for their purposes.

The full system map (figure 6) demonstrates and displays the dynamic interactions between the system factors, and their inter-relationships, which will drive changes to the skills and competences required in future health workforces.

### Derived demand

An important concept which has informed the system map is approaching the demand for healthcare as a derived demand (McGuire et al, 1989). Further, ‘demand for health workers is derived from the demand for health care, in turn derived from the demand for health’ (McPake et al, 2014). The system map also shows how supply systems are linked to the demand for health care and health workers and these types of relationships are explained further in section 5.

Figure 6: System map



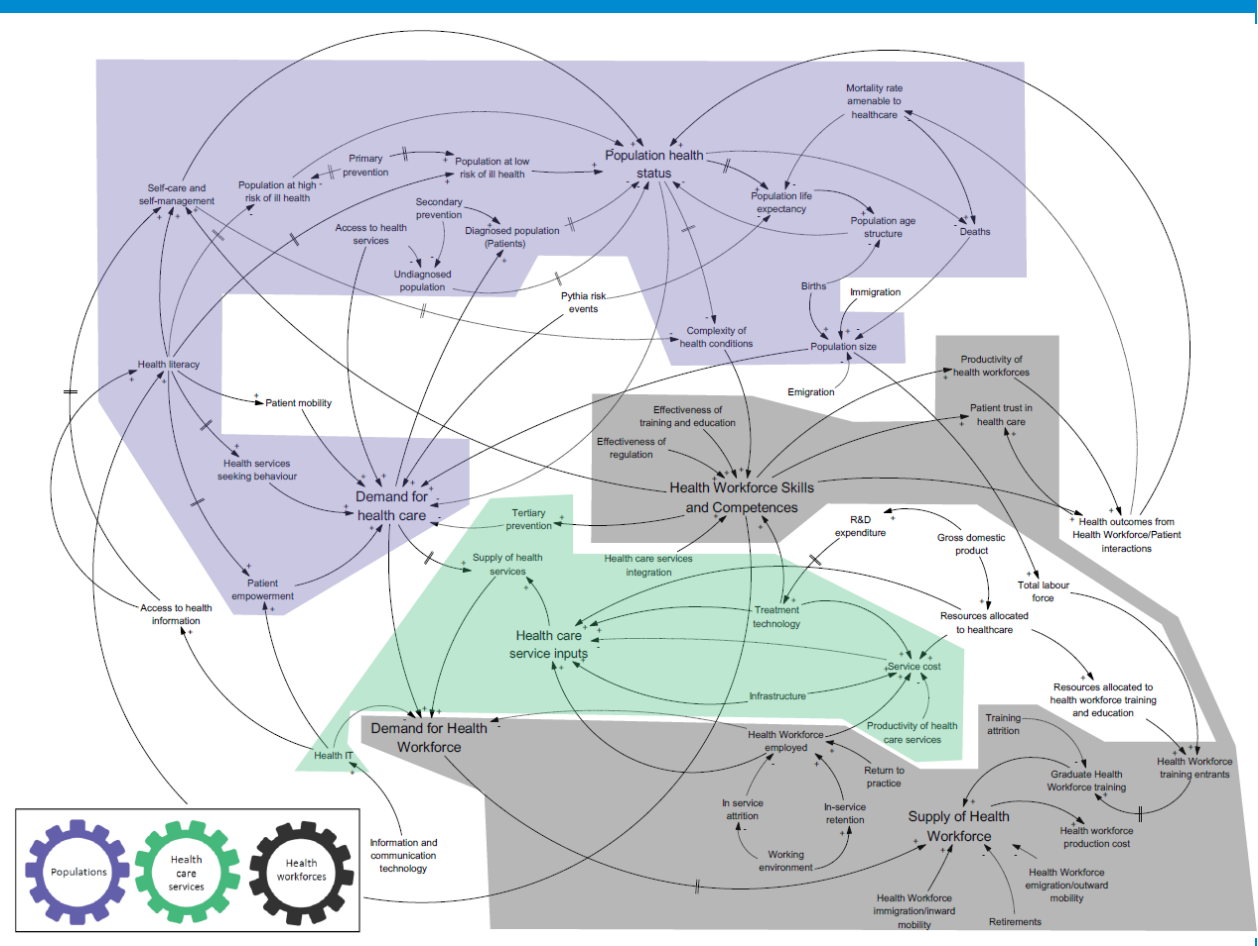
Source: CfWI, bespoke to publication

### Simplifying the complex system

To simplify the system map and to describe the known trends and potential directions of factors in the future it is necessary to divide the system into three sections - populations, health services and health workforces (figure 7). This categorisation is primarily employed as a heuristic device to provide a necessary simplification for the complex system being described. This heuristic conceptually locates the health workforce at a macro level within the specifics of their health services, themselves affected by factors and forces which will affect the required skills and competences, and within populations, of which they are also a part and which produce demands for health care services.

Some of the factors in the system map are external to the simplification heuristic, and these are shown by their lack of coverage in figure 7, where, for example, 'gross domestic product' lies outside of the system key classification.

**Figure 7: System map with key**



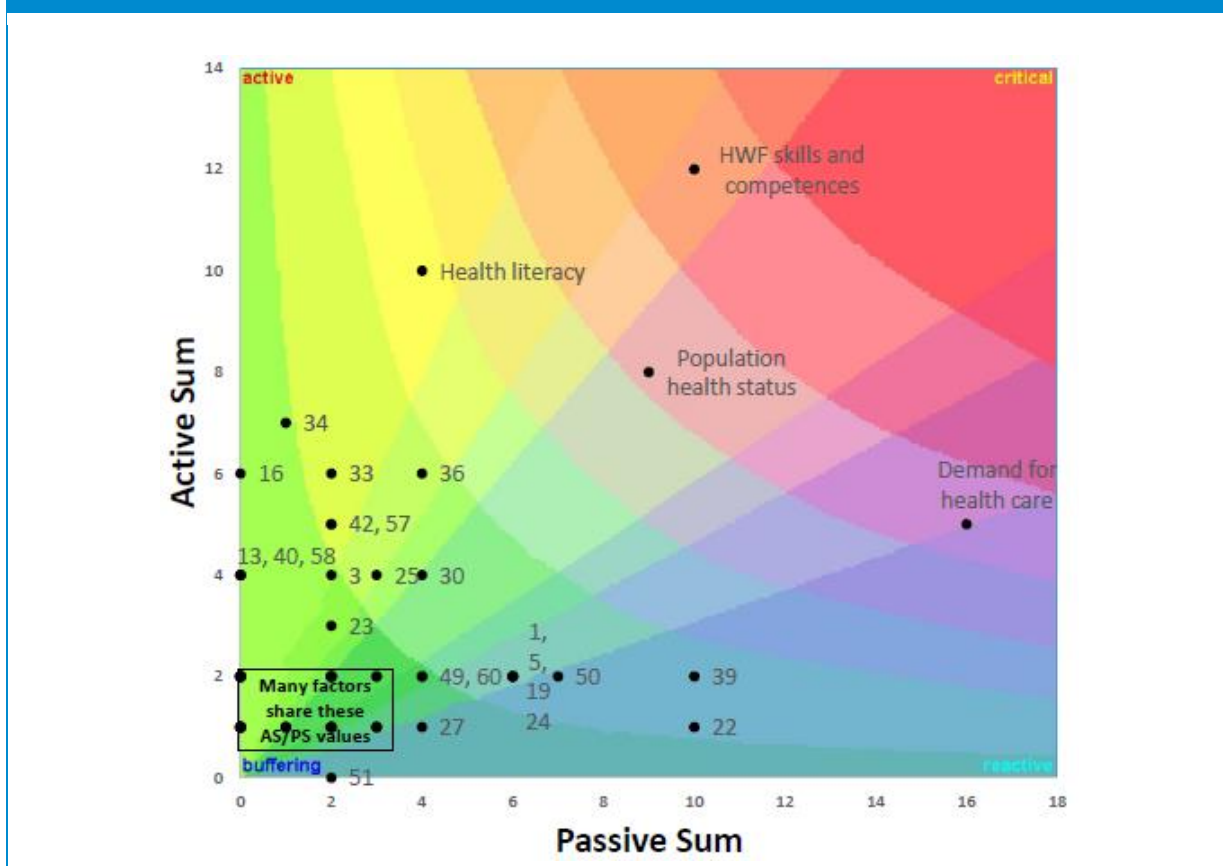
Source: CfWI, bespoke to publication

When considering the effects of future drivers in health workforce planning and forecasting, it is important to be able to understand and describe the relationships between demand and supply interactions. As this report describes a qualitative investigation, it is necessary to break down some of these factors into their components to describe their potential effects on skills and competences.

### Analysing the system map

The system map may be further analysed to build an understanding of the system’s characteristics. This has practical utility in assessing which variables have active effects on other variables and which variables are themselves affected by others. As shown in figure 8 and described in annex 2, the variables identified in the system map can be analysed and then further allocated in relation to one of four key roles - active, reactive, buffering and critical (Vester, 2012). The matrix displays the variable by influence and therefore their role in the system, showing that factors outside of current conceptions of workforce planning, such as ‘health literacy’, have important active effects.

**Figure 8: Influence matrix**



Source: CfWI, bespoke to publication with background from Vester, 2012

The next section breaks down the overall system map and its relationships into the three categories of populations, health services and health workforces in order to more fully explain the drivers of changes to skills and competences in these inter-related areas. Where there are limitations in what is known about the drivers of change, or there are gaps in knowledge about how these drivers relate to health workforces, we suggest the type of health workforce research which may address these areas of uncertainty.

## 5. Drivers of change - populations, health care services and health workforces

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From an overall macro-level perspective, the amount and type of skills and competences required in the future and their distribution in Member States depends on the confluence of multiple factors, as demonstrated in the system map shown in section 4. Distribution may refer to the location of skills and competences in different care sectors of a health system (primary, secondary and tertiary; and including the relationship of the health system to the social care system), between geographies or between individual or multiple health workforces.

To enhance health workforce planning and forecasting at the macro-level and to enable more accurate supply and demand projections it is necessary to be able to understand both how the drivers of change acting at the overall level relate to each other (as in the system map in section 4), their behaviour over time and also the likely future direction of these driving forces.

This section describes the drivers of change acting on populations, health care services and health workforces which contribute to the determination of future skills and competency requirements. European-wide data is used where it is available to provide examples of the type of information available at national levels to conduct this type of research. Where European-wide information is not available to inform on the relationship or the current direction of the drivers of change, information from specific MSs is used.

Due to the diversity of trends within national-level health systems, and of workforce planning systems, across the EU the descriptions and data used in this section may not immediately be transposed into all workforce planning systems. However, in our experience, they are a necessary part of the process to allow a systemic review of the future skills and competences required in the health workforce. Combined with national-specific analyses of trends, the relationships and data described in this section may be used as a starting point from which all MSs could adapt or apply to their own macro-level investigations.

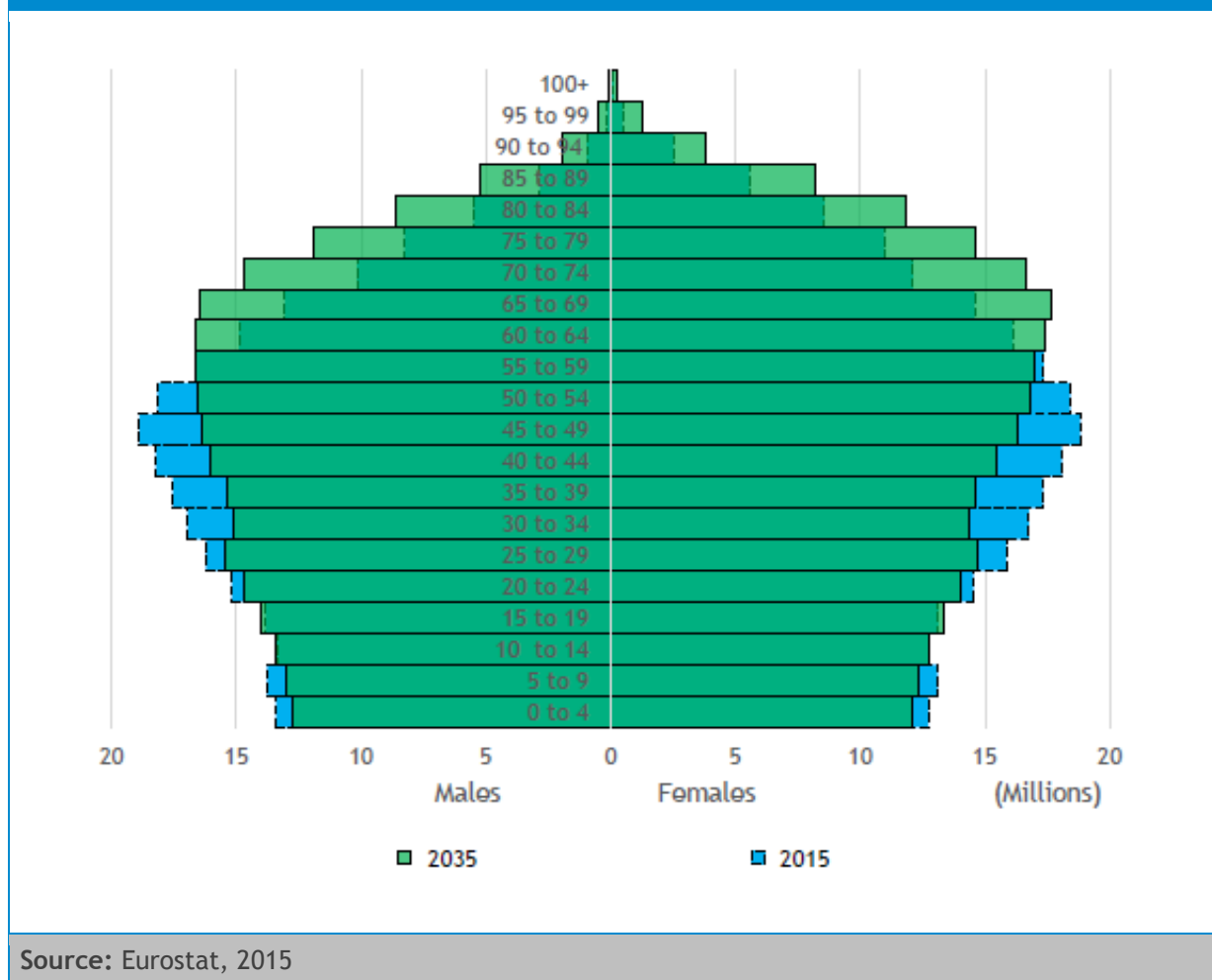
### a) Populations

#### Population structure

The age structure of the population in the European Union, as shown in figure 9, is projected to change from 2015 to 2035 so that it is increasingly weighted towards the older age bands. The overall growth of the total population from 2015 to 2035 is projected at 2.5%, with those aged 65 and over comprising 19% of the population in 2015 and 25% in 2035 (CfWI analysis of Eurostat, 2015).

The pyramid displays the EUROPOP2013 main scenario for the EU-28, which projects assumptions based on increasing life expectancy (at birth and age 65), fertility rates below the replacement rate (of 2.1) and net annual migration inflows of approximately 0.2% over the projection period (Eurostat, 2014a). At the level of individual MSs or regions, there are significant variations in terms of current population age structure (see, for example, Eurostat, 2014b) and also diversity in the projections of population growth and future age structure across these areas.

Figure 9: EU-28 population structure 2015 and 2035 by age and sex, main scenario



### Long-term care and informal carers

The change in population structure towards the older age bands may create greater demand for long-term care, or packages of care that are delivered by a mixture of health care and social care services (UCL European Institute, 2012). There may also be an associated pressure on families to provide care to their relatives, which is termed informal or unpaid care (Pickard, 2014). The extent of these types of demand is partially dependent on which theory of population ageing becomes more apparent in the future:

- ▶ Whether there is a compression of morbidity, where life expectancy remains high but there is a reduction in the number of unhealthy years of life.
- ▶ Alternatively, an expansion of morbidity, where there is an increase in life expectancy but those additional years are lived in ill-health
- ▶ Or, a dynamic equilibrium between these two futures, where increased survival is matched by better control of ill-health (Rechel et al, 2013).

Interestingly, retrospective research into health expectancies in England which looked at three health measures between 1991 and 2011 for over 65s in 3 geographical areas found an absolute compression of morbidity of cognitive impairment, a relative compression of morbidity of self-perceived health and a dynamic equilibrium of disability (Jagger et al, 2015). Workforce planning therefore needs to be mindful of both the appropriate selection and the workforce-specificity of the measure of health used in any demand projections and its past behaviour when considering future workforce effects.

In futures where the pressure to provide informal care outstrips the availability of family members, and where this is exacerbated by population structures and employment demands, there is the potential for knock-on effects on the demand for professional long-term care (i.e. an increase). This would then lead to an associated workforce supply question which concerns the numbers and the types of skills required depending on the health needs of future older population cohorts. Due to the uncertainty around this relationship understanding the relational aspect of informal care from a workforce planning perspective and its potential effects on the demand for long-term care workforces is a potential area of future workforce research.

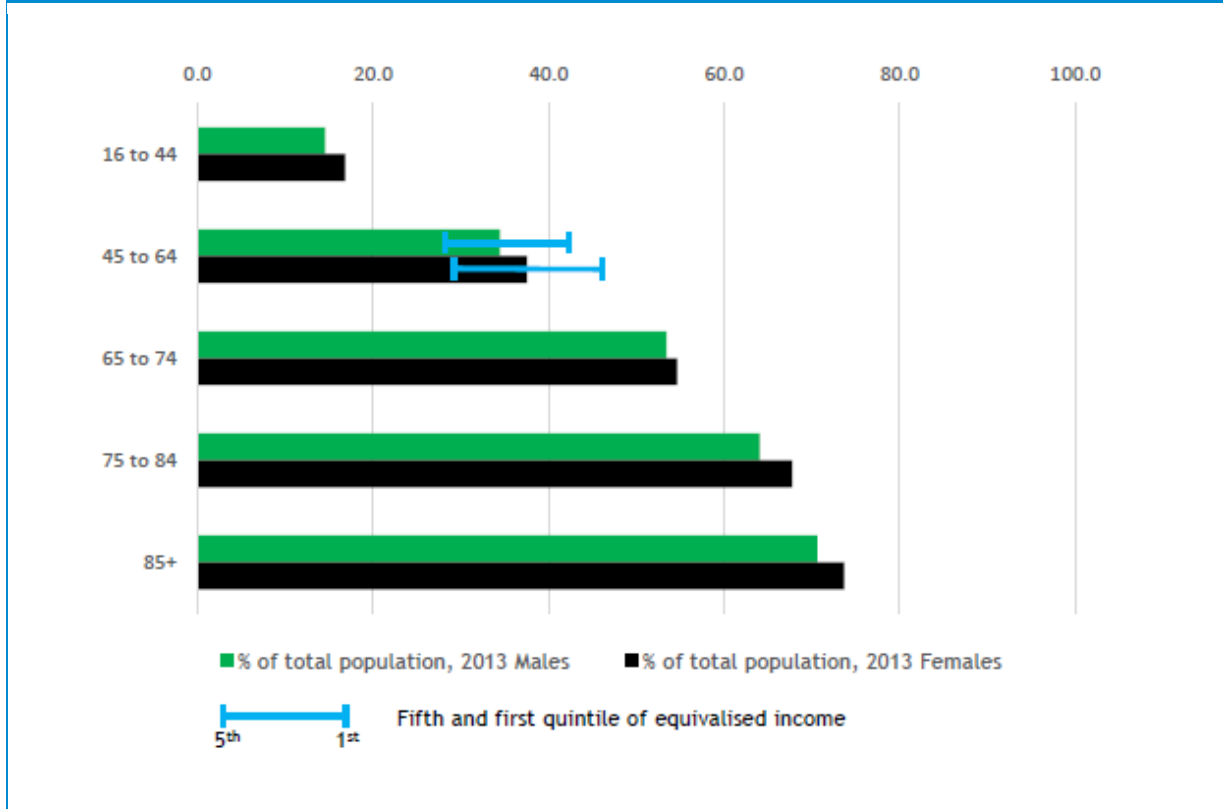
### Type of health conditions

Projections of the population structure by age and sex are also important indicators of future demand by reference to the level of morbidity and the types of health conditions that are currently prevalent in those higher age bands, and therefore the type of demand for health services which may be reasonably anticipated.

Self-assessed health is a useful measure to consider at the population level because it has been shown to have an association with the subsequent use of medical care (van Doorslaer et al, 2000). Figure 10 shows the self-assessed health in the EU-28, specifically the self-reported chronic morbidity in 2013 by age (Eurostat, 2015). Whilst there should be some caution in comparing this measure within and between countries due to cultural differences (Mladovsky et al, 2009), the graph highlights the relationship between the reporting of long-term conditions and age.



**Figure 10: Self-reported chronic morbidity in the EU-28 - people having a long standing illness or health problem, by age and sex, 2013**



Source: Eurostat, 2015

### Health inequalities

Figure 10 also illustrates, for the age bands 45-64, the distribution of this chronic morbidity by income at the EU-28 level. The fifth quintile, or the 20% of the population with the highest income, report less chronic morbidity (consistently across the age bands 16-74 in this dataset) than the first quintile, the 20% of the population with the lowest income (CfWI analysis of Eurostat, 2015). Income inequality has increased in most, but not all, OECD countries from the mid-1980's to the late 2000's, and earning inequalities are thought likely to continue to rise in the future (OECD, 2014).

The social determinants of health and the inequities in health between and within European countries have been described extensively (WHO, 2013) and are illustrated by the social gradient in disease and differences in life expectancy within and between countries (Marmot and Wilkinson, 2006).

From a horizon scanning for health workforce planning perspective, it is important to consider how these wider determinants of health may impact on the overall distribution of health within future populations. For example, in scenarios where powerful external drivers of change, such as global financial conditions, may have a worsening effect on health inequalities by their relative effects on those population groups likely to be worst affected in economic terms, and also on the relative effects on specific conditions such as mental health (Suhrcke and Stuckler, 2012).

Future workforce planning investigations may wish to quantify the relative size of effects such as these on the future skills and competences (the amount and type) required in the health workforce. Quantification is important as it can provide information on both the magnitude and the relative uncertainty of different future demand pressures. It is also instructive to note that health workforce planning is embedded within the planning of health systems and whilst it is a technical process it also reflects the political and social processes which determine the numbers, types and distribution of health workers in the system (Dreesch et al, 2005).

Longer-term thinking, and specifically supply and demand projections which can demonstrate the relative scale and uncertainty of future effects, can provide information on the timescales over which demand pressures may present themselves. This can help to better inform decisions on current skills and competence allocations and therefore nudge the behaviour and goals of the future system.

### Distribution of health conditions

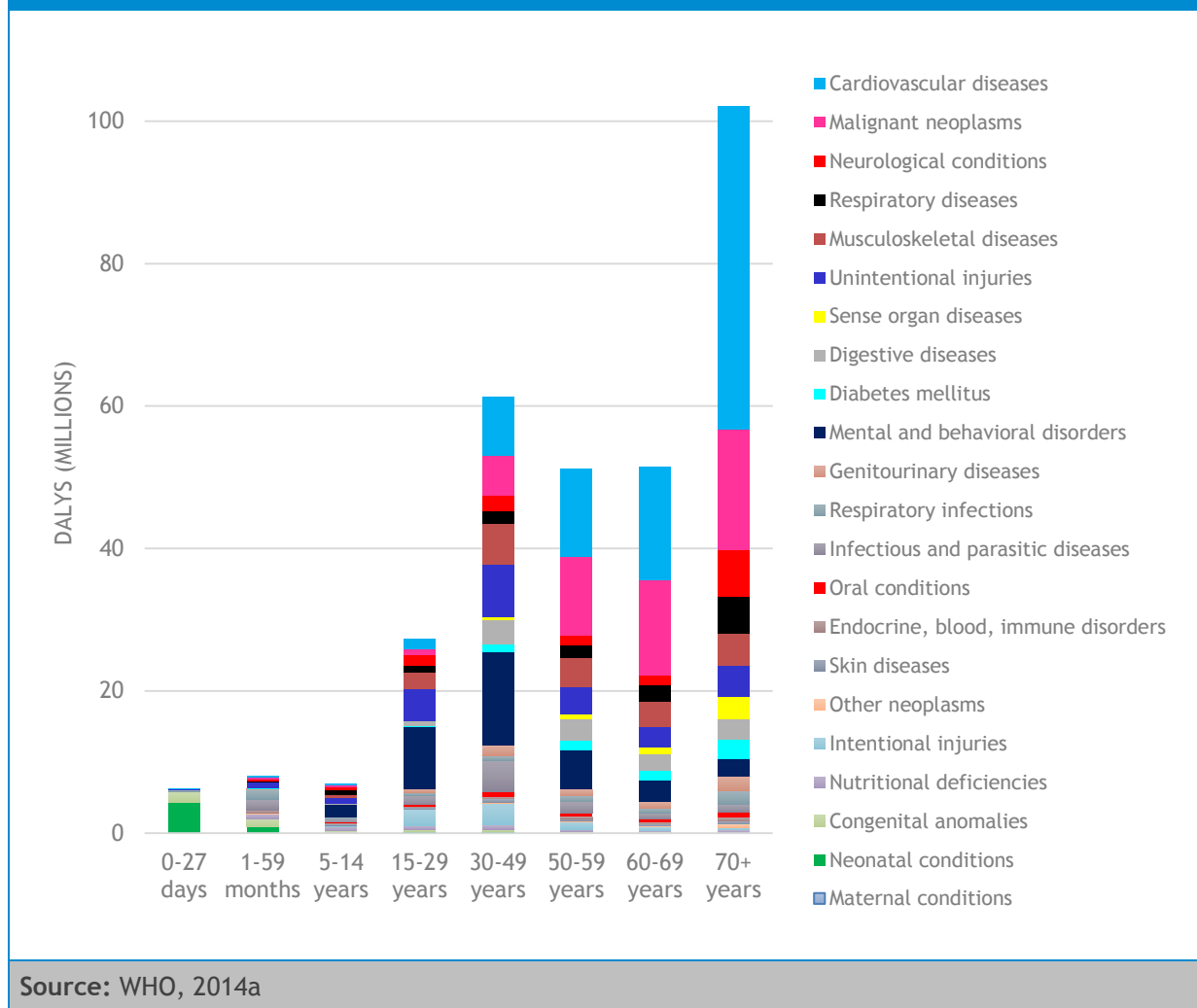
The future distribution of types and severity of health conditions and the associated effects on demand for health services are uncertain due to the large number of related factors involved in considering the multiple determinants on individual and population health status. At the macro-level there is a lack of directly comparable information that allows a single snapshot of the health of populations across Europe.

Measures such as self-reported health (as above) or functional status (Gray, 2005) may be appropriate, as may modelling macro-level sources of demand for workforce time overall (CfWI, 2015a). When considering longer-time periods, approaches which consider cohort or generational effects - and the extent of the difference of health outcomes as a result of different social and cultural behaviours between cohorts - may also be useful.

As a baseline for future population demand in 2035 for this report, we can consider the current distribution of health across age groups, and this can be visualised through disability-adjusted life years (DALYs), or years of healthy life lost. DALYs are the sum of years lost due to premature death and the years of life lived with any short- or long-term health loss, adjusted for severity (IHME, 2013).

It is also important to consider not only those disease burden areas that are most prevalent (such as non-communicable diseases) but also diseases as a result of an outbreak or public health emergency such as the recent Ebola Virus Disease (EVD) as seen in West Africa (WHO, 2015). These areas of health risk may present as weak signals or were considered wildcard events previously, nonetheless they require consideration as to their impact alongside the larger areas of burden. Figure 11 shows the age distribution of DALYs in the WHO European area by cause.

**Figure 11: Disability adjusted life years by cause for the WHO European region in 2012**



When divided into three high-level categories the majority of current disease burden shown in figure 11 is caused by non-communicable disease (81% of DALYs), with the remaining comprised of injuries (10%) and communicable, maternal, perinatal and nutritional conditions (9%) (CfWI analysis of WHO, 2014a).

Within these categories various conditions and diseases have changed significantly historically as well as expected to change further across the next 20 years, these include cardiovascular diseases, cancer, respiratory diseases, mental health, dementia and Alzheimer’s (Alzheimer’s Disease International, 2015; Eurostat, 2016; OECD, 2015; Torre et al, 2015)

Whilst the risk factors for causes of non-communicable diseases are well known; for DALYs in Europe these include dietary risks, high blood pressure, high-body mass index, physical inactivity and smoking (IHME, 2015); the age cohort effects of public health interventions on non-communicable disease and the relative health of generations are challenging to compare and project for the future.

This type of (epistemic or knowledge and understanding) uncertainty highlights the need for methods in workforce planning which can consider and quantify this uncertainty (such as scenarios and expert elicitation, see CfWI, 2015b). The FRESHER project - Foresight and Modelling for European Health

Policy and Regulation (FRESHER, 2016) - aims to provide quantitative estimates of non-communicable diseases in the EU. This information might well be useful for workforce system modelling efforts in the future in combination with other key data sources.

### Changes to the distribution of health conditions

Where there are known risk factors for health conditions, and relations between the wider determinants of health are known, it is possible to build projection models to consider changes in health (for example, Mahamoud et al, 2013).

However, there is also the possibility that new conditions or classifications of disease may emerge from sources such as increased knowledge of the causes of illness, patient empowerment or infectious diseases, which will alter what is required of health workforces.

Individual and collective patient empowerment may drive changes to disease profiles. For example, historically, the recognition of post-traumatic stress disorder, Alzheimer's disease and muscular dystrophy as 'legitimate diseases' has been attributed to patient movements (Angelmar and Berman, 2007).

There are also types of risks to individual and population health where the probability of occurrence is thought to be low and the extent of the impact is uncertain which are termed *Pythia* risks (Blackett, 2014).

An example of a *Pythia* risk is infectious disease as a global risk to health and these have the potential to impact on overall disease burden, particularly over short timescales and these are usually considered in terms of monitoring and emergency planning in the event of outbreaks.

Other factors which may influence the distribution of health conditions in the future include climate change and the impact on geographies of disease and heat events. The expected impacts of climate change include the potential for existing vector-borne diseases increasing their geographical range, as seen with the re-emergence of malaria in Greece (Medlock, 2015).

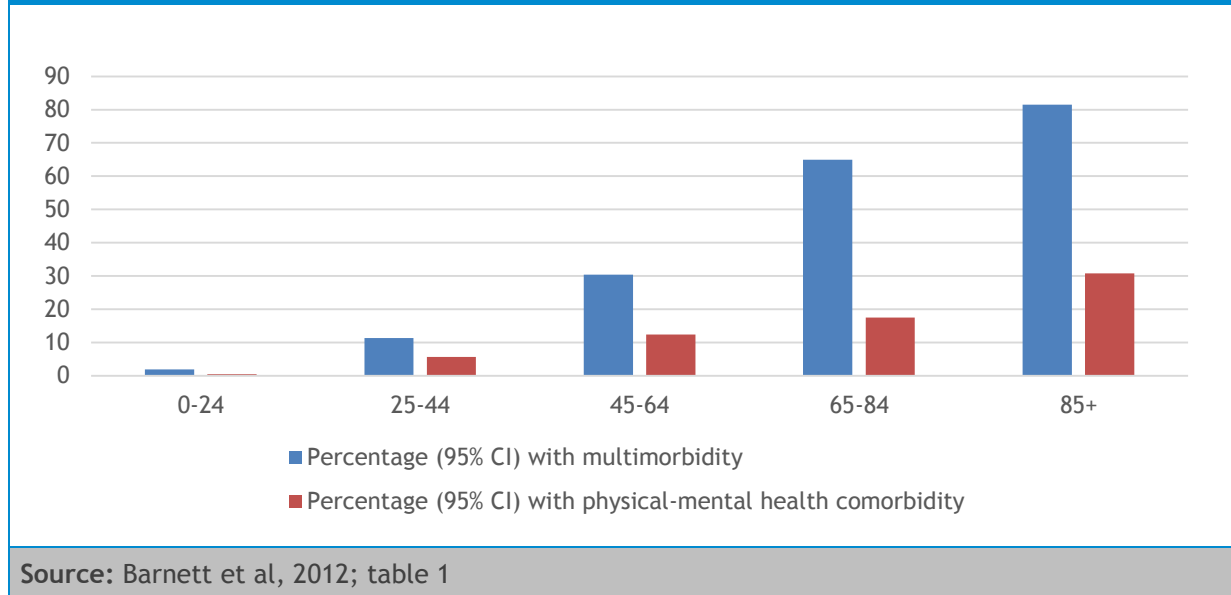
Increased frequency of heat waves, as heat events associated with climate change has increased in large parts of Europe (IPCC, 2013) and these may have effects on heat-related mortality (Vardoulakis and Heaviside, 2012).

### Multimorbidity

Multimorbidity, the presence of two or more long-term morbidities, present a population-level challenge to health services and health workforces and may act as a driver to changes in the single-disease framework of health care and health research (Barnett et al, 2012).

Data on the type of multimorbidity and the size of the populations affected are present at the health system level (for example, Barnett et al, 2012; van Oostrom et al, 2012) rather than the EU-level, and their results show, as illustrated in figure 12, increasing multimorbidity, and increasing physical-mental health comorbidity with age.

**Figure 12: Multimorbidity and physical-mental health comorbidity in 1.75m patients from 314 medical practices in Scotland, as of March 2007 and by age band**



### Health literacy

Levels of health literacy are key factors that influences the future demand for health care. Health literacy is a characteristic of populations and it involves people’s competence to access, understand, appraise and apply health-related information to their specific circumstances (Sorensen et al, 2012).

In the system map we have considered that the population is comprised of four broad groups: those at low-risk of ill-health, those at high-risk of ill-health, those with an undiagnosed condition and those who are a patient with diagnosed health condition(s). Health literacy is important because of its potential to alter people’s knowledge of risk factors in relation to illness, which may impact on their health-related behaviour and also on their health services seeking behaviour if they are at high risk of ill health or have an undiagnosed health condition.

Factors such as educational attainment, age, income and access to primary health care services are associated with health literacy (Davey et al, 2015). Health literacy also provides a way to describe the concept of unmet need from a workforce planning perspective. Unmet need may be due to system factors at the macro level, such as a health workforce shortage, the absence of a service to meet a health need, a treatment restriction or failure to qualify for eligibility criteria.

In this categorisation, there is also unmet need which is external to the health care system, for example where low levels of health literacy would produce unmet need based on people not accessing services due to a lack of ‘knowledge, motivation or competence’ (Sorensen et al, 2012) when they have a health need (classified as a high risk of ill health or an undiagnosed condition in the system map). This presents a high level of uncertainty for workforce projections due to the difficulty in assigning numerical values to quantify this type of unmet need.

### Patient mobility

The availability of information, and the ability to appraise and understand it is an important factor in health behaviour and health services seeking behaviour. In the EU, health services seeking behaviour is

not limited to state-borders and individual decision making may be broadly similar for national and international treatment, where stages of identifying a need and gathering information on treatment options (reflecting a high level of health literacy) may be used to inform whether to seek local or foreign treatment (Runnels and Carrera, 2012).

Current levels of patient mobility for planned health care, as recorded through reimbursements made under Directive 2011/24/EU, are low in volume (European Commission, 2015b). Current patient mobility most commonly includes dental care, cosmetic surgery, elective surgery and fertility treatment (Lunt *et al*, 2011). Although the numbers remain small, the major drivers in this type of patient mobility are thought to be the unavailability and quality of treatment (Frishhut and Levaggi, 2015). There is also the potential for patient mobility through temporary visitors abroad and long-term residents (such as retirees), whilst agreements also exist on cross-border treatment and outsourcing patients (Lunt *et al*, 2011). As the mobility of health professionals in the EU is greater than that of patients (Glinos, 2012), patient mobility therefore, at an aggregate level, would appear to have a low current impact on workforce projections, altering the case-mix only at low levels of scale, although there is uncertainty over future impacts.

### Patient empowerment

Developments in patient empowerment, where people gain greater control over the decisions affecting their health (WHO, 1998) has effects at all levels within a health system. At the macro level, empowered patients may increasingly determine the goals, standards and structure of health care (Angelmar and Berman, 2007) whilst at the micro level, empowered patients may increasingly act as self-determining agents with control over their own health care to achieve optimal well-being (EMPATHiE, 2014).

Having described some of the drivers and trends which on populations to influence the future skills and competence required in the health workforce we now turn to health care services and consider the factors acting there.

## b) Health care services

Once people interact with health services there is a recognised and global trend for people expecting more information about their treatment, higher standards of care, more involvement in decisions and access to the latest treatments (Economist Intelligence Unit, 2009). The competence and skills of future populations (influenced by factors such as health literacy) and those of the health workforce come into greater focus in interactions within health services, where the abilities of both parties to communicate optimally comes to the fore.

There are also other multiple and diverse drivers, some of which are described below, which act at the health service level to influence the future configuration of health services. The future of health services within a health system is important to consider from a health workforce planning perspective because it partly determines the context within which health workforces will operate and also considers the competing pressures on health systems.

Both of these are important to consider in terms of the future demand and supply of health workforces and the related and dependent question of what will be required of them. Whilst drivers determining the types and volume of demand which emerges from populations within health systems has been described above, this section engages with those factors outside of population demand which operate to influence the future of health care services.

### Health care expenditures

At the macro level, the trend in health care expenditure has been for it to increase in absolute terms and also relative to Gross National Product (GDP) in high- and middle-income countries (McGuire et al, 2012) - although the effects of the economic crisis may have altered that relationship, and at least in the short-term, for some MS's in the EU.

From a health workforce planning perspective it is useful to consider both the broader economic environment and how health care expenditure may develop in the future. It is also instructive to consider what the dynamics of rising expenditures implies about the system and the future of health workforce skills and competences.

Whilst demographic factors play a part within health care expenditures, they are more weakly associated than non-demographic factors (Dybczak and Przywara, 2010). On demographics, whilst health care costs do increase with age, following a spike in the first few years of life (Alemayehu and Warner, 2004) the largest impact on costs tends towards the final years. Indeed, proximity to death is considered a better predictor of health care costs than age (Gray, 2005) but as this shifts expenditure, rather than increasing it, the overall demographic impact may be low (McGuire et al, 2012).

For health workforce planners considering the future needs of populations and demand for health care, population health status may be a more useful indicator than either age or proximity to death. As noted by Gray (2005) 'at the population level, even crude measures of health status such as functional impairment and disability allow a much clearer insight into the factors explaining demand for health care.'

It is a non-demographic factor, specifically the impact of new health care technology, which is considered to be the main component of health expenditure growth historically (McGuire et al, 2012) and it is defined as 'as the drugs (pharmaceuticals and vaccines), medical equipment, health care procedures, supportive systems, and the administrative systems that can tie all these disparate elements together [OECD, 1998]' (Dybczak and Przywara, 2010).

## Technology and health care expenditures

Technology represents a large source of uncertainty regarding the types of treatments, and therefore the types of skills and competences that will be required in the future. Considering the relationship between technology and expenditure can also tell us about the potential longer-term direction of the system.

Technological developments may have different effects on health care expenditure dependent on the point at which they act on a state of ill-health. For example, it has been shown by reference to the distribution of health care costs (in a study of data from Dutch hospital discharge and mortality registers from 1998 to 2004) that pharmaceutical spending growth was higher amongst patients that could already be classified as intensive users of pharmaceuticals (de Meijer et al, 2012).

In considering the future effects of technology on health care and health workforces at the macro-level, it is unknown specifically where they may act on the overall distribution of health care costs, i.e. whether they may have a cost-reducing or cost-increasing effect. There is, however, a broad characterisation that the majority of technologies developed in the second half of the twenty-first century have extended life without reducing the overall burden of disease (Dybczak and Przywara, 2010).

However, when asked to consider the future through horizon scanning, the majority of our respondents were positive about the potential impact of new technologies over the next 20 years. These optimistic ideas included the potential for digitally mediated interactions to enhance health care delivery, how innovative treatments may reduce, or shift the overall disease burden and how technology may be used to enhance the way in which health workforces are planned and managed. We now look at some of those technological changes to consider the types of change that are in progress, and are expected to develop to 2035.

## Health information technology and health care services

Further developments in Information and Communication Technology (ICT) and adaptations and innovations over the next 20 years have the potential to change those aspects of health care services which can be digitally mediated, with potential effects on the location of where care is provided, such as an increase in asynchronous care - 'monitoring and delivering feedback via email, internet, cell phone, automated messaging systems, or other equipment without face-to-face contact' (Verhoeven et al, 2010).

At the European level, the development of a digital single market (European Commission, 2015a) and patients' rights in cross-border health care (Directive 2011/24/EU) combine around the flow of information contained in electronic health records. *The eHealth Action Plan 2012-2020* (European Commission, 2012) sets out commitments to move towards an interoperable eHealth system in Europe as well as the possible barriers to deployment such as start-up costs and regional differences in accessing ICT services or limited access in deprived areas of the population.

From a workforce planning and forecasting perspective it will be important to understand how these interoperable e-Health tools will alter consumer-provider communication and the extent that they will alter demand for health care and the associated 'e-skills' required from health workforces. As the 'e-skills' required from health workforces may change along with workflow and working methods (EFN, 2014) then workforce planning projections may need to consider scenarios where this affects productivity rates and therefore changes the demand for certain health workforce tasks (see, for example, Weiner et al, 2013).



## Genomics and precision medicine

The tailoring of treatments to the specific genetic cause of a disease or health condition in an individual patient, described as ‘precision medicine’ (Mirnezami et al, 2012), allows for advances in sequencing to be translated into corresponding advances in targeted diagnosis and therapy. The hoped-for outcomes include reductions of adverse events and the increased economic value of specific medicines (Weale and Clarke, 2012).

As an example, the 100,000 Genomes Project is running from 2015 to 2017 to sequence the whole genomes of 100,000 patients with cancer, rare disorders and infectious disease, and will link to records of the diagnosis, treatments and outcomes of those individuals (Genomics England, 2015).

Over the course of twenty years, and depending on the scale of the insights generated through sequencing and their uptake, there are potentially high impacts on health services and health outcomes achieved. Also, if there are corresponding developments in genetic prediction, the ability to describe the relative risks for individuals based on the sum of multiple genetic factors (Gibson et al, 2015), then there are also potentially high impacts to health care demand due to changes in when interventions are made to diseases.

## Health care system changes

Changes in the way that health care systems operate - for example on the types of care that are provided at primary, secondary and tertiary levels and the role of technology in facilitating movement between settings - will affect the future workforce requirements in each setting. Future scenarios in which combinations of the factors described above act to multiply their effects - such as an expansion of morbidity, a growth in multimorbidity and costs associated with intensive users of health care (or even where these factors act in the opposite directions) - may result in considerable changes to the way that health care systems are organised, delivered and funded.

Future workforce planning research may benefit from considering both the overall macro-level of supply and demand and also through research and implementation studies into the future care that will be provided within each health care setting (Ricketts and Fraher, 2013) and also how this meets different aspects of population needs. There may also be usefulness in future workforce planning research and models which are able to make links between determinants of population health and probabilities of health care service or workforce demand at the meso and macro level.

In terms of the education and training of health professionals, an independent review (*The shape of medical training: Securing the future of excellent patient care*) noted that future employers will want to recruit more broadly trained individuals to work across setting boundaries. These setting boundaries could be, for example, across hospital and community care, so that there will be an increased requirement to train for roles where there are identified changes in population needs or in service demand; or to train people in a way that is more adaptable and responsive to these changes (Greenaway, 2013).

Mismatches between the supply and demand of health services are expected to alter the way that services are provided and also the ‘roles and decision rights’ of health care workforces (Bohmer and Imison, 2013) and therefore this seems likely to change the respective roles within inter-professional health care teams. The challenge that new roles present to the regulatory framework and the associated relationship to patient safety is an emerging issue which will develop if there is an increased alteration to roles and decision rights:

‘The question of whether we should regulate physician associates raises a broader question about the place of uni-professional models of regulation in a health care environment that is increasingly about teams, multi-professionalism and systems’ (General Medical Council briefing paper, 2015).

Having considered drivers of change acting on health care services; related and specific drivers of change acting on health workforces are now discussed.

## c) Health workforces

The health workforce in the EU shares some of the characteristics of the population from which it is drawn, so a change in population structure towards the older age bands in the overall population may also present the challenge of an ageing health workforce. Over a 20-year time period the importance of supportive environments for older workers (European Commission, 2015c) comes to the fore. Considering that a large proportion of the workforce of 2035 are already within the system also highlights the requirement to invest in and update the skills and competences of the existing workforce to ensure continuing professional development and life-long learning.

Central to considerations of the future for both health care services and health workforces is the extent to which disruptive technologies (European Commission, 2015d), demand pressures or other factors cause substantial changes in the organisation of services and workforces and therefore the ways that they can be approached for workforce planning analysis. The theory of disruptive innovation, where new entrants challenge established businesses or services by targeting 'overlooked' or underserved segments of a market and then move this functionality into mainstream use (Christensen et al, 2015) provides one such example of potential shifts.

Large changes driven by technology, innovative approaches, regulatory changes or even paradigm shifts may be plausible in health care within a twenty year timeframe which would alter the way that supply and demand pressures could be met and the types of policy levers which would be available to workforce planners. A workforce example of the type of large shift which would result in changes to workforce planning analysis and projections are proposals towards multi-professional postsecondary education and the adaptation of competences to specific contexts as proposed by the Lancet Global Independent Commission on Education of Health Professionals for the 21<sup>st</sup> Century (2012).

Whilst small changes in the present, which can be identified through horizon scanning, may suggest large shifts in the future their overall outcome is difficult to assess using only qualitative approaches. This is due to the large number of stakeholders, individuals and negotiations between different sources of expertise (from multiple disciplines) which would be involved in the production of large-scale changes. Whilst future workforce research and scenario approaches may wish to quantitatively project plausible futures, here we consider the drivers of change which act at the level of health workforces which would have both potential large-scale and smaller-scale effects on the future of health workforces.

### Health information technology and health workforces

Developments in the interoperability of Electronic Health Records (EHRs) and the concept of 'learning health care systems' may also affect the way that health workforces access and engage in the production of research. As an example, in the 'green button' concept, EHRs would allow practice-based information to be used to answer specific questions about how patients with similar characteristics have responded to particular treatments and also as a point where the patient's EHR can then be used as a point of randomisation to generate evidence (Longhurst et al, 2014).

This approach, operationalised at the European level through the TRANSFoRm project (TRANSFoRm, 2015), is seen as particularly useful in circumstances where there is either an absence of evidence or lack of similarity between the individual patient and the inclusion criteria of randomized-control trials. At the health workforce level, telemedicine, remote care and the use of other types of clinical decision support may also impact on the negotiation of tasks between roles (Weiner et al, 2013) as well as a key concept of an adaptable and resilient workforce able to manage with these changes in the future.

Further to this, technological developments involving the role of computerisation may affect the wider labour market, where the comparative advantage of computers over humans for certain tasks may mean that jobs may be more or less susceptible to automation, depending on the level of social intelligence they use (Frey and Osborne, 2013).

Whilst health care roles are judged to be at a low risk of automation within this classification, developments may mean that there are certain aspects of health workforce roles which may be amenable to automation, depending on the scale and pace of technological growth in this area and the desirability of such changes. Health IT may impact on 'digital workflow, computerised knowledge management and decision support' meaning that tasks performed by health professionals are pushed more towards communication, guidance and support (Sochalski and Weiner, 2011).

### Skill mix

Changes in the tasks, and the division of tasks, that health workforces perform may be driven by a range of factors, or combinations of factors. For example health IT (as above) or strategic changes to provide a greater proportion of care for long-term conditions in primary care settings throughout the EU may alter the respective roles of health care professionals (Wismar et al, 2015).

Considerations of skill mix present a series of fundamental considerations for workforce planning and health systems in general. The general considerations include, importantly, the quality of care received by patients and the value of work provided by health workforces (Griffiths, 2012) as well as its cost effectiveness (e.g. Martin-Misener et al, 2015). Scopes of practice and the effective regulation of health workforces also plays an important part in 'ensuring that professionals are competent, sufficiently experienced and adhere to agreed standards of ethical practice' (WHO, 2015).

From a workforce planning perspective individual workforce projections should seek to incorporate likely changes in scopes of practice over time, whilst fully acknowledging the challenge that the detailed task negotiation that informs these changes may be best addressed outside of workforce projections. To deal with this complexity workforce planners should also be seeking to develop multiple workforce models with aligned assumptions. This approach may allow the development of more accurate models, for example that can adequately account for the reality that health care is commonly delivered in teams or around care pathways. There may also be fruitful research in linking macro-level workforce characteristics to health outcomes, though it is noted that assessing the outcomes achieved where workforces are highly correlated presents challenges due to linearity so that 'it is not possible to estimate the associations in a multivariable model simultaneously' (Griffiths, 2012). These types of improvements in workforce planning require both conceptual and methodological developments.

### Health workforce competition

The health sector is in competition with other sectors of national economies to attract and retain workers. Workforce planning projections may consider this national competition in projections or scenarios. There is also an additional international element which has specific elements for health workforces.

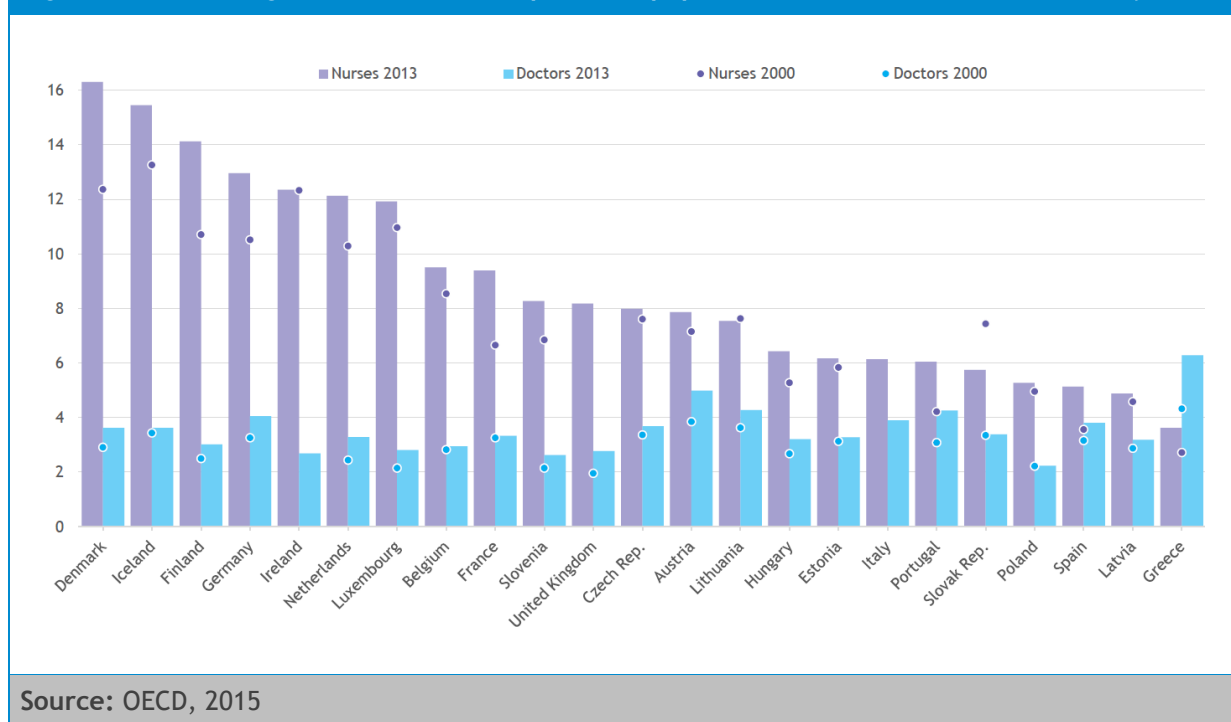
'Poor and rich countries both have workforce shortages, skill-mix imbalances, and maldistribution of professionals' (Lancet Global Independent Commission, 2012). These distributional issues may not be confined to national borders and they may be exacerbated by global competition for health workforces, for example where countries may rapidly scale up their health systems simultaneously. The dynamic nature of health professional mobility means that no countries may 'consider itself safe' with regard to its current position (Glinos et al, 2014). Global movement of health professionals also

presents a series of normative questions with regard to universal health coverage in the context of sustainable development goals (WHO, 2015).

Within countries, the distribution of health workforces to population health is also an issue, in the OECD for example, ‘the mismatch of physicians to population health is the most commonly named current human resource policy concern in the health sector’ (Ono et al, 2014).

Additionally, and to allow a consideration of the concept of ‘distribution’ of skills and competences, individual health workforces are not evenly distributed per population between Member States. Figure 13 displays this relationship for practising nurses and doctors, and how it has changed over (approximately) a thirteen-year period. This demonstrates the point that these workforces are located within national-specific systems and that the distribution of skills and competences may only be fully understood in relation to the overall mix of workforces and their relationships in each national system, where the dynamic processes acting on these workforces is best described.

**Figure 13: Practising nurses and doctors per 1000 population, 2000 and 2013 or nearest year<sup>3</sup>**



In summary, future workforce planning research to model the age profile of health workforces to account both for expected attrition and for dynamic international demands may be required to better anticipate spatial and skill distributions and their effects. Important in this context is also the relationship between staffing levels and work environments on the outcomes of care (RN4CAST Consortium, Aiken et al, 2012). It is in this respect that the numbers of health workforce available may be most clearly related to the skills and competences of health workforces, in that health workforce shortages may impair the ability of staff to carry out tasks to their appropriate skill level, potentially resulting in sub-optimal patient outcomes.

<sup>3</sup> Notes on data quoted from OECD (2015): Data refers to all doctors licensed to practice and for doctors and nurses includes those providing direct care to patients as well as those working elsewhere in the health sector; with data from Austria reflecting only nurses employed in hospitals.

## 6. Skills and competence implications

This part of the report considers the skills and competence implications and involves the classification of the specific parts of interviewees' responses that described changes to skills and competences.

The preceding sections have described the process by which a system map of the factors surrounding skills and competences were developed as a result of conducting and analysing interviews with experts identified by the WP6 horizon scanning network. Further analysis then allowed the description of this system, and the driving forces affecting the system, at the level of populations, health care services and health workforces as shown in Figure 14.

**Figure 14: The high-level drivers of change identified by horizon scanning**

Populations	Health care services	Health workforce
<ul style="list-style-type: none"> <li>▶ Population structure</li> <li>▶ Long-term care and availability of informal carers</li> <li>▶ Types and distribution of health conditions</li> <li>▶ Multimorbidity</li> <li>▶ Health inequalities</li> <li>▶ Health literacy</li> <li>▶ Patient mobility</li> <li>▶ Patient empowerment</li> </ul>	<ul style="list-style-type: none"> <li>▶ Health care expenditures</li> <li>▶ Health IT and health services</li> <li>▶ Genomics and precision medicine</li> <li>▶ Location of care by setting</li> <li>▶ Roles and decision rights</li> <li>▶ Regulation</li> </ul>	<ul style="list-style-type: none"> <li>▶ Ageing health workforce</li> <li>▶ Multi-professional education and adaptation of competences</li> <li>▶ Health IT and health workforce</li> <li>▶ Skill mix</li> <li>▶ Health workforce mobility</li> </ul>

Source: CfWI

The description of the driving forces and factors which may affect the future skills and competences required in the health workforce in the previous section is deliberately not prescriptive on the future direction of all of the factors - for example on which theory of population ageing will be dominant in individual or multiple EU MS's. It must also be noted that there may be greater certainty concerning the likely direction of some factors when compared to others in different contexts, and this may be similar or divergent depending on national or regional-specific circumstances.

A key issue in horizon scanning is how to process views of the future expressed by participants, and how to appropriately understand the difference between drivers of change and factors which are considered to be more certain in their direction than others (which can be termed 'in-the-pipeline' or expected changes). This issue extends into understanding the particular viewpoint of the participant and whether they are describing their individual idea about the future, they have a proposed solution to demand and supply challenges, or if the participant is describing a policy direction or ongoing change which is currently affecting the future direction of the system.

These interpretations are challenging to make accurately across the diversity of health system types and workforce configurations in the EU. The system map illustrated in section 4 of the report and the description of drivers in section 5 represent the WP6 team's overall interpretation and attempts to describe the system accurately in terms of what is known on future directions and how this relates to current conceptions of workforce planning.

To accompany these interpretations, the gathering of driving forces and factors the level of impact and uncertainty was also sought from participants. These perceptions and assessments offered by those taking part in horizon scanning can serve to be useful as part of further factor analysis as part of scenario generation (CfWI, 2014c).

As a result of the research undertaken a number of skills and competence implications have been identified. To illustrate these changes in skills, quotes from some of the interviewees are shared, the levels of impact and uncertainty perceived and some of the wider considerations are explored.

## 6.1 Populations

The key drivers at the EU-28 level include an ageing population with an increased life expectancy and expected increases in patient empowerment (Economist Intelligence Unit, 2009; EMPATHiE, 2014). Beyond this segmentation of the population into groups and appropriate measures are required to more fully understand changes in chronic morbidity (Eurostat, 2015), multimorbidity, health inequalities and shifts in the distribution of health conditions across Europe (Barnett et al, 2012; van Oostrom et al, 2012; WHO, 2013).

Increases in the following areas of skills were identified as part of horizon scanning:

- ▶ **Prevention** - ‘the ability to reduce the instance or incidence of ill health and social health’ (CfWI, 2014a). The horizon scanning exercise demonstrated that improvements are expected in the understanding of the risk factors which affect the development of ill health in specific parts of the population and how behavioural and lifestyle factors can be influenced specifically for individuals. The health workforce may therefore have an increasingly targeted effect over the primary prevention of ill health.
- ▶ **Coaching and enabling** - once people have contact with health workforces for conditions that involve levels of self-management then there is expected to be an increasing focus on joint planning around the person’s treatment goals. This type of ‘person-centred co-ordinated care (National Voices, 2013) involves further ‘engaging and empowering individuals’ (WHO, 2015) and the effective alignment of patient and system goals.

Respondents shared a range of skills implications, a selection of these are reproduced verbatim below:

### Quotes from horizon scanning interviewees

*“Nursing and caring skills... It is becoming clearer that we need more people and workforce who can understand dementia and long-term conditions when providing care.”*

*“Frailty will need to be used as a descriptor for the health and social care needs of the elderly population... Clinicians and practitioners will need to be able to use risk stratification techniques for the purpose of pre-emptively applying preventative interventions to at-risk patients. The ability to effectively manage and communicate with multiple stakeholders will be key to ensuring that patients receive joined up treatment.”*

*“Dentists need advanced skills in geriatric dentistry, pharmacology/general medicine, team working, professional co-operation.”*

*“Dealing with multimorbidity and changes in disease spectrum requires us to rethink qualification. Major skills needed: cooperation! This includes a rethinking of*

	<p><i>competences in the sense of “being allowed to do tasks” and being able to do tasks. Multiprofessional teams, soft skills, taking charge of learning processes are all skills that need to be taught as part of academic nursing education.”</i></p> <p><i>“The population demands are switched to a chronic model, where health professionals’ skills and competences have to be adapted to multi-organic pathologies... [with] further knowledge on disability and dependency strategies [and] strengthened self-care.”</i></p>
<p><b>Education and training considerations</b></p>	<ul style="list-style-type: none"> <li>▶ Broader general and specialist knowledge for all workforces in prevention and self-care for a range of chronic conditions in combination with each other.</li> <li>▶ Increased need for further knowledge and training in disability, dependency strategies and strengthening the overall prevention and self-care/self-management ability of the population.</li> <li>▶ Promotion of health and well-being through participatory approaches between patients and health professionals.</li> <li>▶ Critical aspects of multidisciplinary team working such as: leadership, communication, quality and innovation.</li> </ul>
<p><b>Workforce planning considerations</b></p>	<ul style="list-style-type: none"> <li>▶ Changes in existing workforce professions (supply increases or decreases) may not sufficiently match the future population health needs and demands. Competence and skill mix will need to be considered carefully so as to include a wider definition of workforce that includes the goals of patients, relatives, carers and other health and care workforces - such as allied health professionals and social workers.</li> <li>▶ This wider consideration of skills and competence will need to consider mapping supply and demand as well as quantification and projections for the future.</li> <li>▶ Implications of changing models of care (such as more ‘joined up’ or integrated care), care being located closer to people’s homes and revised primary care systems design will likely accelerate the need for areas of competence such as prevention, self-care, multidisciplinary team working and communication.</li> <li>▶ Matching the distribution of ageing populations and the required workforce will require a clearer understanding of demand at a more granular level. Simple population ratios and overall health consumption rates will not be sufficient. Other factors (such as geography, age band and cohort effects, wellbeing, disease profiles, economic and social aspects) must increasingly be considered in health workforce planning.</li> </ul>

**Size of impact<sup>4</sup>:**



*“The double impact of an ageing population and an ageing workforce in combination will be high impact.”*

*“Multimorbidity and a rural/urban divide in access to healthcare facilities and physicians are*

<sup>4</sup> Impact is a relative measure of the magnitude of the influence of a group of drivers on the skills and competences needed in the health workforce over the next 20 years.



*significant challenges ahead.”*

Level of uncertainty<sup>5</sup>



*“While demographic demand (ageing) is already influencing skills and competences, it is not clear what will be the effect of prevention - this will depend on policy and funding decisions of governments.”*

*“Increases in health promotion and holistic care are opportunities to increase personalisation which may reduce the impact of multimorbidity in the population.”*

## 6.2 Health care services

The drivers shaping health care services for the future include health care expenditures and technology effects (McGuire et al, 2012; Dybczak and Przywara, 2010), the effects of patient empowerment on system goals, Health IT and health services (European Commission, 2015a), Genomics and precision medicine (Mirnezami et al, 2012), changes to the location or type of care by setting (often termed ‘integration’) and potential changes to roles and decision rights (Bohmer and Imison, 2013) and regulation (GMC, 2015).

The future of health services and the direction of forces acting at this level is obviously important to consider from a health workforce planning perspective because it contributes to the context within which future health workforces will work.

Increases in the following areas of skills were identified as part of horizon scanning:

- ▶ **Information interpretation skills** resulting from developments in eHealth may increasingly have wide ranging impacts on patients, the workforce and health systems (EFN, 2014) in terms of the volume and quality of information that is available and the decisions that this informs.
- ▶ An awareness of, and detailed **genetic assessment and treatment skills**, will be an important for the workforces involved in assessment, diagnosis and treatment. The scope of workforces may also expand to new genetic advisory and therapy health professionals as part of multi-disciplinary teams.
- ▶ **Use of technology and its adoption as part of care delivery** from a physical and remote perspective such as eHealth, surgical robots and other enhancements amending clinical and non-clinical practices.

Respondents shared a range of skills implications, a selection of these are reproduced verbatim below:

Quotes from horizon scanning interviewees

*“Patients are becoming increasingly involved with health care leadership and expectations are growing - patients moving from passive recipients to active and shared-decision makers.”*

*“The competences to become a generalist and a coach instead of a healer can be developed in the next 6 to 10 years. The competence to estimate the degree of self-reliance and the resulting need of coaching in patients may take a bit longer, because*

<sup>5</sup> Uncertainty is a relative measure of the direction or trajectory of outcome of a group of drivers over the next 20 years.

	<p><i>there is no basic training in the medical curriculum from which to depart.”</i></p> <p><i>“Future use of IT: telemedicine; m-health; robots - need for constant agility of skills and competences to embrace new technologies. How does the speed of learning/education keep up with the potential speed of technologies?”</i></p> <p><i>“Technology: eHealth, mHealth; and for personalised medicine, e.g. Gene Research - there will be less asymmetry of information between the health worker and the patient. More knowledge of good and bad on-line sources of information [therefore must be] able to handle wider range of patients from less IT literate to highly IT literate and more informed. Until recently the health worker was the expert; patients relatively homogenised and in comparison less informed. The health worker will have a role more as an ‘advisor’ to guide patients to good sources of information.”</i></p> <p><i>“An increasing focus on mental health, addiction health services and gender-specific person-centred care will create a shift with specific focus on e.g. women’s care, e.g. new NICE guidelines on birth at home.”</i></p>
<p><b>Education and training considerations</b></p>	<ul style="list-style-type: none"> <li>▶ Certain health professionals will need education, training and awareness of risk stratification, personalised medicine and genomics techniques and their impact to their practice.</li> <li>▶ Awareness of and use of differing technologies will be needed for existing and new workforces in order to adapt to demands from patients. There may be a generational gap present in much of the workforce when using present technologies which may be apparent if rapid changes are introduced.</li> <li>▶ Educational models may face rapid change to respond to new requirements of a very different education and training consumer than the traditional institutions have been faced with before. More remote learning may be enabled by technology, skills development and interactivity. However it will be important not to lose the physical teaching and learning that provide good educational outcomes.</li> <li>▶ Curricula may require updating to cover the implications of increased remote contact with patients, and specific training in remote consultations and monitoring.</li> <li>▶ Decision making in health care (already a topic for CPD) will be increasingly complex with more data and information to hand. The existing and new workforce will need to learn how to apply new research, and for example learn how to follow new algorithms and protocols.</li> </ul>
<p><b>Workforce planning considerations</b></p>	<ul style="list-style-type: none"> <li>▶ Technology may help realise opportunities to improve productivity or manage expected increases in demand from the population. Workforce planning will need to assess the impact and outcomes of technology and likely changes in ways of working and the implications to supply and demand for health workforce. This will require eliciting future need, demand and supply in light of use of technology and its future impact to ways of working.</li> <li>▶ New technological skills may emerge at pace and there will be a requirement for planning where skills are needed, whether these are hybrid roles or reflect changes to professions. Workforce planning will continue to focus on the time taken to produce new areas of workforce supply and what policy actions are required for short, medium and long term provision.</li> </ul>

Size of impact:



*“A large impact to future working lives but also uncertain. How we access and interpret information will be very different, we have many more discoveries to make and the pace is rapid.”*

*‘eSkills are needed at this stage already as systems are integrating technology in daily practice, so the need to anticipate eSkills is more relevant now than what it would be in the future especially taking into account the younger the population and the more digital they are’.*

Level of uncertainty:



*“The development of technology is not straightforward. It is hard to know how it will develop. It will have significant impact but because it has multiple causes, the uncertainty is also increased. The collection and use of data in healthcare systems is a sensitive issue and can be an obstacle.”*

### 6.3 Health care workforces

The main drivers acting on this part of the system include an ageing health workforce, potential changes to education and training, health IT (Weiner et al, 2013; Frey and Osborne, 2013; Sochalski and Weiner, 2011), skill mix (Wismar et al, 2015; WHO, 2015) and competition for workforce (Glinos et al, 2014).

Increases in the following areas of skills were identified as part of horizon scanning:

- ▶ **Multi and inter-disciplinary team working** that includes a range of ‘different professional groups, deliver[ing] higher quality patient care and implement[ing] more innovations in patient care’ (Borrill et al, 2013). This has the potential to reduce duplication of processes, increase the flow of information between workforce groups and reduce ‘therapeutic partition’ - boundaries between workforce groups which create additional appointments or transactions for the patient (Nancarrow, 2015).
- ▶ **Regulatory awareness and revalidation skills** - Health care professionals working in the EU face differing CPD, regulatory and re-certification changes as revalidation becomes more prevalent in Europe’s health systems
- ▶ **Systems thinking and workforce planning skills and competence** will be areas of increased demand for the future. The interconnectedness of how health systems operate, their complexity and how they interact have implications for the achievement of equitable health outcomes (Adam, 2012).

Respondents shared a range of skills implications, a selection of these are reproduced verbatim below:

<p>Quotes from horizon scanning interviewees</p>	<p><i>“Demographic driven changes in the workforce - shrinking labour force in many countries, and if it is not shrinking then the workforce is ageing. The three recruitment pools that policy makers will need to access - untrained, coming from abroad and existing. The existing workforce will be the most important to plan for and utilise. Questions regarding the types of skills and competences are important to ask but more important is to ask and identify where they will come from in the future. The existing pool will be two thirds of available supply, matching this supply and the skills required in the future is an important area that must be examined and</i></p>
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	<p><i>a way forward to be defined. The main opportunity and potential to meet the wide ranging challenges are within the existing workforce in the system if we can adapt this workforce and plan flexibly.”</i></p> <p><i>“We are moving away from trying to design the perfect system and now trying to incorporate and allow for adaptation of the workforce capacity in a flexible way for the future - this will enable the workforce to be a resilient provision that is able to flex to complex needs of our population across increasingly varied geographies and modalities.”</i></p> <p><i>“Decreasing workforce pool in primary care (fewer entering into primary care training pathways), budgetary pressures, coupled with increasing demand, may force MSs to consider a re-evaluation of which roles can perform procedures, this will in turn determine the skill mix of the workforce.”</i></p> <p><i>“Should countries be trying to engineer more of the same? Or is it about other mid-level providers (physician assistants, nursing assistants)? ..A strong drive, politically led, [is required] towards a whole system approach to the regulation of patient safety, education standards, training competences.”</i></p> <p><i>“EU Freedom of movement issues - this has implications too and is driven by education, registration and licensing, proving competences - this will create an overarching macro framework for a pool of labour which is likely not sufficient to meet all countries’ needs and requirements in the future. Countries across the EU as well as globally will be competing for the same labour and this will see individual countries approaching this differently based on their own contexts, priorities and demands from their populations.”</i></p>
<p><b>Education and training considerations</b></p>	<ul style="list-style-type: none"> <li>▶ Increased pressure on the shoulders of professionals as a result of new expectations of healthcare fuelled by new developments in technology, ageing of the population and responding to these needs. We face further blurring of boundaries of work and personal life which challenge personal resilience and increases the risk of burnout. There is a need for increased availability of negotiation, adaptation and coping skills in the existing and new workforce.</li> <li>▶ Regulatory, legal indemnity and revalidation awareness may need to be part of the modern health professionals’ future training. The scope of practice, differences they will encounter as well as how they assessed and evaluated will be key areas of training and knowledge.</li> <li>▶ Any reappraisal of the health professionals’ roles within the context of multi-disciplinary teams and regulatory requirements will require education and training strategies to be carefully considered. Increased specialisation and shared skills are becoming more common e.g. doctors and nurse specialists or skilled community mental health nurses in general practice.</li> </ul>
<p><b>Workforce planning considerations</b></p>	<ul style="list-style-type: none"> <li>▶ Should member states be trying to engineer more of the same workforces to solve a changing future problem? Opportunities to examine skills and competence from a wider workforce might yield solutions to present and future imbalances. For examples doctors, nurses, physicians, nursing assistants, advanced practitioners, hybrid roles and other allied health professionals.</li> </ul>

- ▶ Just focusing on workforce numbers is unlikely to be sufficient. It will be important to understand how systems work and how they can be resilient to future shocks and stresses. It will be important to understand which workforce groups deliver which skills to meet demand, how much might this demand may change in future, where mismatches or imbalances of supply are and where the workforce pressures are that require different system or lower level actions.

**Size of impact:**



*“Security of supply for key workforces such as Nursing is a concern, generally in Northern and Western Europe where data and projections for the next 10 years are readily available. Potential for greater concern is where data is not available and shortages may occur with no warning and with considerable impact.”*

**Level of uncertainty:**



*“National self-determination and regulation of health professionals is increasingly difficult to maintain and uncertain with more workforces moving across boundaries on a daily basis.”*

## 7. Discussion and conclusion

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Workforce planning is limited or enhanced by the assumptions and understandings which lie beneath it. This report has aimed to develop those assumptions and understandings by providing a macro-level description of the system which contains health workforce skills and competences. From this we have described the key drivers of change and the implications for health workforce skills and competences and shared the methods and tools by which this type of analysis can be carried out at a national level.

Whilst there may be limitations in the direct applicability of the outputs from this report to all workforce planning systems in the EU, the methods and the approach are universal. Due to the diversity of trends within national-level health systems (and also of workforce planning systems) across the EU these drivers and skills implications may not immediately be transposed into all systems.

However, the methods and approach are a necessary part of the process which allow a systemic, multiple workforce approach to the future skills and competences required in the health workforce. Combined with national-specific analyses of trends, the relationships and data described in this report may be used as a starting point from which all MSs could adapt or apply to their own macro-level investigations on skills and competences and their distribution.

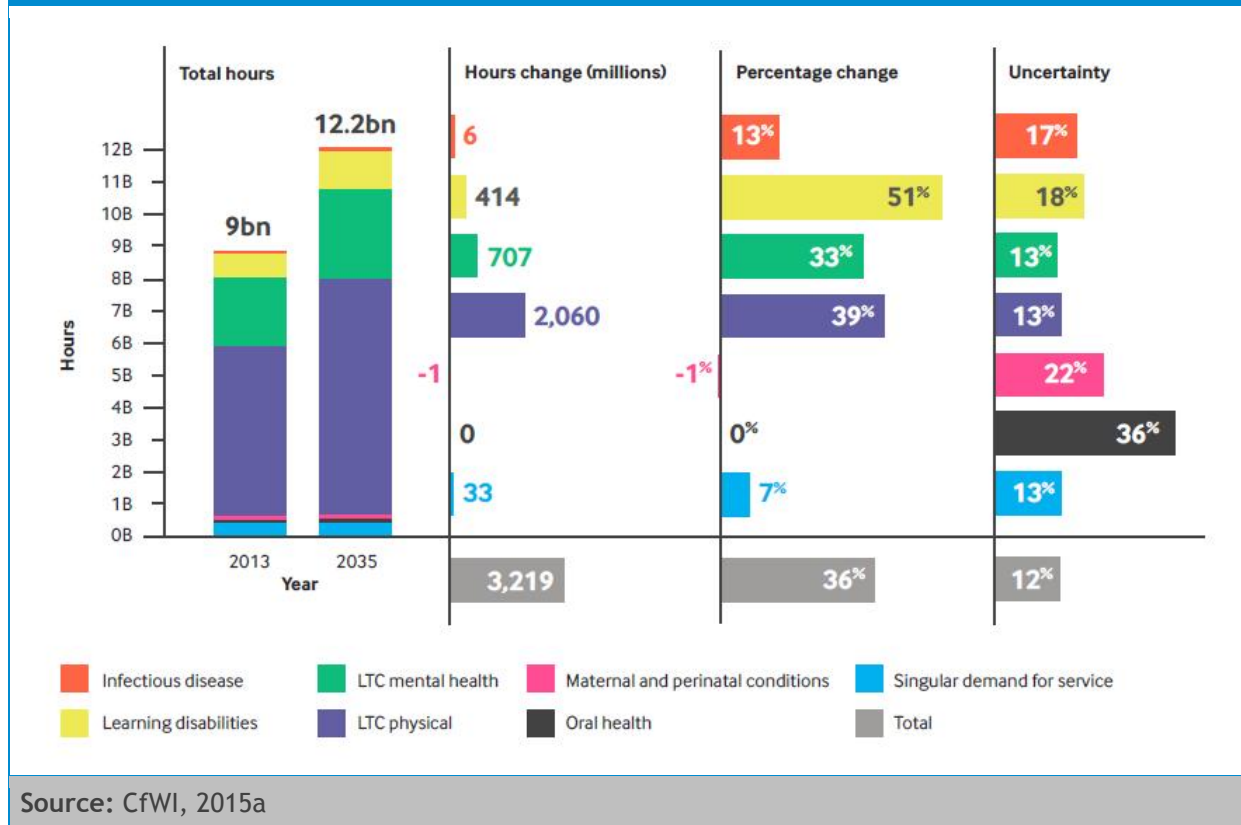
A further key concern for horizon scanning in workforce planning should be what has been missed in potential understanding of the future and crucially, the systemic risks which could be mitigated were our understandings better developed. The 'blind-spots' in our understanding of future uncertainty and whether they can be reduced present four areas for discussion.

### The future scope of workforce planning

In taking a systems thinking approach (CfWI, 2014b) and describing the health workforce system as a complex adaptive system, what are the types of responses which are available to decision-makers to address this complexity and are they within the range of options (see, for example, Chopra et al, 2008 for a review) typically associated with workforce planning?

Being able to quantitatively project large-scale demand pressures provides the benefits of understanding their relative size and uncertainty and also the timescale over which they unfold. The further development of models which can appropriately assess the effect of the multiple and dynamic factors acting in the overall workforce system may be justified and necessary, given the importance of the health sector to the health of populations and its contribution to economic activity. This has many potential benefits for the EU, its member states and the many health systems to scope and undertake such an analysis as a follow on stage to this work. This type of approach is demonstrated in figure 15, showing the demand sources for workforce time in England as part of the Horizon 2035 project.

**Figure 15: Total hours of workforce time in 2013 and 2035 by demand source under ‘reference future’ conditions, change in hours, percentage change and total (modelled) uncertainty, median projections and interim results**



### Developing our understanding of health workforce activity

Investigations into skills and competences face definitional challenges about how health workforce activity is understood at a macro-level and how it is categorised both within and between professions and MS's. Considering the future of health workforces and the division of responsibilities between inter-professional teams also creates a challenge for workforce planning. Future work at macro-levels needs to be able to anticipate likely developments whilst acknowledging that future workforce activity should not be solely determined within projections, as it is in itself a necessarily dynamic process.

### Education and training considerations

Respondents and this report have explored the skills and competence implications as a result of these key driving forces. Following on from that it is necessary to consider how education and training of the present and future workforce may be affected and need to change. Whilst synchronising education and training of the workforce with future workforce needs is highly challenging in healthcare, it is especially important considering the longer time lag compared to other labour markets.

There are very significant investments made in the health workforce and the efforts made to match service and care needs. Therefore it is essential that education and training institutions, providers and stakeholders are engaged and part of the conversation about how the future workforce can be best equipped and developed.

## The future skills required in health workforce planning

We can reasonably ask what are the required skills in horizon scanning within health workforce planning and believe that these are best described in terms of an ability to work across disciplines, as the dynamic nature of the interactions described in the system map indicate the need to bridge a number of subject areas and organisational responsibilities. This has been described elsewhere as boundary spanning (Williams, 2002). Doing this effectively, and bringing diverse forms of knowledge into structured ways to consider the future (as described in, for example, Fellows and Edwards, 2014) will be necessary. Considering the future in a systemic way, so that uncertainty and risk is reduced, will continue to depend both on the effective involvement of multiple experts from multiple disciplines and on continued transparency in the development of assumptions and models used in workforce planning.

## Better understandings of potential futures

Thinking from a horizon scanning for health workforce planning perspective, considering the future allows a realistic appraisal of where the current gaps in knowledge are. Focusing inwards on health workforces highlights potential considerations of the overall (macro-level) shape and size of health workforces in different health system contexts in the EU and in developing methods and approaches to make links to the understanding of health outcomes or other appropriate indicators.

As this work has focused on the macro-level to discuss skills and competences, further research to understand the future health workforce by health care setting (e.g. primary and secondary care), the associated drivers of change at those respective levels and their likely effects on skills and competences would provide insights into the future of health systems.

Looking outwards from workforce planning there is a need to better understand how the information provides links to policy outcomes and their wider systemic effects and to bridge concepts concerned with, at least, workforce planning and analysis of health policy.

Ultimately, our understanding of the future will always be limited by its intrinsic uncertainty. A key feature in workforce planning must continue to be the effective incorporation of plausible futures and our improved ability to consider a range of futures in our analysis and recommendations.

## Conclusion and Recommendations

In conclusion this report has outlined the descriptive and future-oriented scan of drivers of change and their potential implications on the skills and competences of the health workforce in the EU. It provides a system map which can be adapted for improving horizon scanning in national-specific contexts.

Through its use it is possible to describe the inter-relations between variables, presents an opportunity for each EU MS to build on this work by combining this qualitative understanding with quantitative modelling. These together can project the relative size and uncertainty of overall workforce demand and supply pressures.

This report describes our approach, methodology as well as links to sister publications describing how horizon scanning can be applied within different contexts or settings, within or outside the EU. Annex 5 provides a further overview of how horizon scanning techniques may be incorporated into health workforce planning alongside examples of outputs. The EU JA WP6 section of the website also provides the tools, approaches and templates for reuse. Finally, in addition to these materials the network of



experts provides access to those with deep practical experience who might advise and support others to use these workforce futures tools and approaches.

Overall it is clear that a complex mix of driving forces are shaping our future health systems and the workforce. Many of these driving forces are longer term in their impact (such as the ageing workforce and population changes) whereas rapid developments in technology and patient expectations can disrupt and challenge how the workforce is perceived, how they provide service and what the future demands of the workforce will be.

**Therefore we recommend that:**

- 1. Member States, competent national authorities and partners are aware of the implications of these driving forces on the workforce (including the skills implications). We encourage that this information and knowledge is applied in Member States' own national specific contexts with the support of workforce planning expertise and knowledge as mapped within the EU Joint Action expert network.**
- 2. Member States investigate the development of qualitative and quantitative workforce planning methods as well as multi-professional projections (within the context of individual member states) as part of understanding the implications to the workforce and skills. These investigations should effectively inform decision making by linking to appropriate policy decisions.**
- 3. the EU Commission and Member States consider the requirement, scope and timeframe of a further workforce research programme which builds on this horizon scanning. The next stage would be to simulate the effects of selected driving forces on workforce skills and competences as part of a systems dynamics modelling project at EU level where a range of challenging futures would be generated and quantified, to enhance our collective preparedness for the future as well as better understand areas of workforce mal-distribution, imbalance or risk.**
- 4. the EU Commission and Member States are aware of the need to ensure that this programme of work should consider and investigate the health and care workforces of the EU. Our health and care systems are intertwined; as are our health and care pathways that patients and service users travel. Therefore a wider scoping of the issues potentially impacting on these workforces, with full engagement with the Commission, Member States, social partners, patient representatives and carers, is necessary to consider how our health and care systems need to respond to the future pressures and future challenges they face and how we may identify common solutions to our shared challenges.**

# Annex 1: List of horizon scanning interviewees and interviewers

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## Horizon scanning interviewees

We are grateful to the following people who kindly agreed to be interviewed for this project, having been identified by the WP6 Horizon Scanning network for their particular expertise on aspects of the future skills and competences required in the health workforce in Europe. Please note that this report does not reflect the individual views of any of these interviewees and all errors of interpretation are the authors' own.

<a href="#">Dr. Alex Wyke</a>	CEO PatientView
<a href="#">Dr. Anna Lella</a>	President elect of the European Regional Organization (ERO) of the FDI World Dental Federation
<a href="#">Arnaud Senn</a>	DG EMPL, European Commission
<a href="#">Dr. Carlos Macaya</a>	President of Federation of Spanish Scientific and Medical Associations
<a href="#">Caroline Hager</a>	DG SANTE, European Commission
<a href="#">Cecilia Bergstrom</a>	Senior Research Assistant, Umeå University; GEP representative
<a href="#">Dr. David Somekh</a>	European Futures Forum Network Director
<a href="#">Prof. Dominique Declercq</a>	Chair of the School of Dentistry, KU Leuven
<a href="#">Edwin Maarseveen</a>	European Commission, DG SANTE
<a href="#">Dr. Fred Dijkers</a>	GP and Professor at Leiden University Medical Centre
<a href="#">Dr. Franz Ewals</a>	Mental Health Physician and Head Educational training ID Physician Erasmus MC (now retired)
<a href="#">Prof. Finn Borlum Kristensen</a>	Director, Centre for Evaluation and HTA, DACEHTA, National Board of Health of Denmark and Director of EUnetHTA
<a href="#">Prof. Frank Ulrich Montgomery</a>	Standing Committee of European Doctors (CPME) Treasurer, CPME Rapporteur, President of the German Medical Association
<a href="#">Prof. Frauke Müller</a>	Professor and Chair for Gerodontology and Removable Prosthodontics, University of Geneva Dental School and Secretary, European College of Gerodontology
<a href="#">Frédéric Destrebecq</a>	then Acting Chief Executive Officer, European Union of Medical Specialist

Gerard De Wild	Senior Medical Specialist for the Elderly
Dr. Gianfranco Prada	President of Associazione Dentisti Italiani
Prof. Gilles Dussault	Professor at the Institute of Hygiene and Tropical Medicine and Coordinator of the WHO Collaborating Centre on Health Workforce Policy and Planning.
Prof. H Annette Grewe	Programme director for Nursing, Education for Nursing and Health care Professionals, University of Applied Sciences, Fulda
Howard Catton	Head of Policy and International Affairs, Royal College of Nursing (RCN)
Irene Glinos	Researcher at the European Observatory on Health Systems and Policies
Jaakko Koivumäki	Labour market researcher, Finnish Dental Association
Jacques de Haller	CPME Vice-President, Past President of Swiss Medical Association
Prof. James Buchan	School of Health Sciences, Queen Margaret University
Jayne Dando	Head of Workforce Modernisation & Strategy, NHS Wales
Jérôme Boehm	Policy Officer, DG SANTE, European Commission
Dr Jim Campbell	Executive Director, Global Health Workforce Alliance and Director of the Health Workforce Department, World Health Organization.
John Chave	Secretary General, Pharmaceutical Group of the European Union
Karen Didovitch	Senior Employment Relations Adviser, RCN
Dr. Katrin Fjeldsted	CPME President
Prof. Klaus Stegmüller	Organisational and Institutional Conditions of Nursing Care, University of Applied Sciences, Fulda
Prof. Konstantinos Oulis	Dentist and Professor, Hellenic Dental Association; Chair of the CED Working Group Education and Professional Qualifications
Dr. Konstanty Radziwill	Immediate Past President of CPME
Dr. Lode Wigersma	Director of Policy, Advice and Documentation Royal Dutch Medical Association
Laura Frattari	Expert in Health Legislation, Legal Advisor of the Italian Chiropractors Association
Leon van Berkel	DG SANTE, European Commission

<a href="#">Marjan Kaljouw</a>	Director, Zorg Instituut Nederland
<a href="#">Dr. Marie Françoise Gondard</a>	Vice-President of Confédération Nationales des Syndicats Dentaires
<a href="#">Mervi Jokinen</a>	President of the European Midwives Association
<a href="#">Michael Schoenstein</a>	OECD
<a href="#">Dr. Michel Devriese</a>	Chairman of the Société de Médecine Dentaire
<a href="#">Prof. Michel Limme</a>	Institut de Dentisterie, Liege.
<a href="#">Dr. Michèle Aerden</a>	Dentist, Past President of FDI (World Dental Federation)
<a href="#">Orsi Nagy</a>	DG SANTE, European Commission
<a href="#">Paolo Roberti di Sarsina</a>	Expert for Non Conventional Medicine, High Council of Health, Ministry of Health, Italy
<a href="#">Pascal Garel</a>	Chief Executive, European Hospital and Health care Federation
<a href="#">Dr Paul De Raeve</a>	Secretary General. European Federation of Nurses Associations
<a href="#">Paul Giepmans</a>	Policy Analyst, European Health Management Association
<a href="#">Peter Dixon</a>	Chairman, Royal College of Chiropractors
<a href="#">Sascha Marschang</a>	Policy Manager for Health Systems, European Public Health Alliance
<a href="#">Prof. Stefan Greß</a>	Dean of School for Health Sciences and Nursing, University of Applied Sciences, Fulda.
<a href="#">Dr. Stefaan Hanson</a>	Co-founder of the Union of Flemish Dentists.
<a href="#">Tim Curry</a>	Assistant Head of the UK Nursing Department, RCN
<a href="#">Dr. Walter Mazzucco</a>	National President, Giovani Medici
<a href="#">Prof. Walter Sermeus</a>	Academic Centre for Nursing and Midwifery, KU Leuven
<a href="#">Dr. Wolfgang Doneus</a>	President of the Council of European Dentists

### WP6 Horizon scanning interviewers

Anne Meto	Belgian Federal Public Service of Health, Food Chain Safety and Environment
Baiju Khanchandani	Association of Italian Chiropractors
John Fellows	Centre for Workforce Intelligence
Matt Edwards	Centre for Workforce Intelligence
Dr. Melanie Boeckmann	University of Bremen
Michel Van Hoegaerden	Joint Action Health Workforce Planning & Forecasting
Nina Bernot	Council of European Dentists
Sara Roda	Council of European Dentists
Sarada Das	CPME
Victor Slenter	Capaciteitsorgaan

## Annex 2: Qualitative analysis of system map

### Description of system key factors

ID	Factor	Description
1	Self-care and self-management	People's competence to care for their general health and to manage health conditions.
2	Health literacy	People's competence to access, understand, appraise and apply health-related information to their specific circumstances (Sorensen et al, 2012).
3	Access to health information	The availability of information concerning health, health status and health conditions.
4	Information and Communication Technology	The general level of ICT available.
5	Patient empowerment	'A process to help people gain control, which includes people taking the initiative, solving problems, and taking decisions, and can be applied to different settings in health and social care, and self management [ENOPE 2012]' (European Commission, 2012)
6	Patient mobility	Health care sought outside of national borders.
7	Health services seeking behaviour	How populations interact with health systems, typically considered in terms of service utilization or illness response (MacKian, 2002).
8	Secondary prevention	The use of, for example, screening programmes, to identify people with undiagnosed health conditions.
9	Undiagnosed population	People within populations who would meet the diagnostic criteria or threshold for a health condition, but who have not been formally diagnosed.
10	Diagnosed population (patients)	Those people within populations who have a diagnosed health condition.
11	Primary prevention	Interventions which aim to reduce the incidence of ill-health through population health measures.
12	Population at low risk of ill health	People within populations who have a low combination of risk factors for the development of ill health.
13	Access to health services	The ability of individuals to access health services.
14	Demand for health care	A combination of multiple population, health care services and health workforce factors interact to produce the demand for health care.
15	Population at high risk of ill health	People within populations who have a high combination of risk factors for the development of ill health.

ID	Factor	Description
16	Pythia risk events	Risks to health which have a low probability of occurrence and where the extent of the impact is uncertain (Blackett, 2014).
17	Tertiary prevention	Interventions to minimize the impacts of recurrence in a known health condition, relates.
18	Supply of health services	A dynamic relationship between health care service inputs and the demand for health care.
19	Demand for health workforce	A combination of multiple population, health care services and health workforce factors interact to produce the demand for health workforce.
20	Population health status	'the health outcomes of a group of individuals, including the distribution of such outcomes within the group' (Kindig and Stoddart, 2003).
21	Effectiveness of regulation	'Ensuring that professionals are competent, sufficiently experienced and adhere to agreed standards of ethical practice' (WHO, 2015).
22	Health care service inputs	The combination of human resources, infrastructure and treatment technologies available within the funding environment.
23	Mortality rate amenable to health care	The rate of deaths considered avoidable due to medical intervention.
24	Population life expectancy	The average life expectancy in the population.
25	Population age structure	The age structure of the population, usually represented by age band.
26	Births	The number of births within the population in a defined time period.
27	Deaths	The number of deaths within the population in a defined time period.
28	Emigration	The number of entrants to the population in a defined time period.
29	Immigration	The number of exits from the population in a defined time period.
30	Population size	The total number of the population, at a defined time.
31	Health workforce skills and competencies	Competences are a complex combination of skills, knowledge and personal attributes, where the tasks performed by health workforces are informed by legally-determined responsibilities and regulations.
32	Effectiveness of training and education	The ability of training and education to produce highly skilled and competent health workforces in response to combinations of factors emerging from populations, health care services and health workforce.
33	Resources allocated to health care	The total resources allocated to health care, usually expressed as a percentage of GDP.

ID	Factor	Description
34	Treatment technology	'The drugs (pharmaceuticals and vaccines), medical equipment, health-care procedures, supportive systems, and the administrative systems that can tie all of these disparate elements together' (OECD, 1998).
35	Productivity of health workforces	The outputs produced by health workforces given the sum of the inputs.
36	Health outcomes from health workforce/patient interactions	The health outcomes achieved from the combination of skills and competences of health workforces and populations.
37	Total labour force	The total labour force in the population.
38	Resources allocated to health workforce training and education	Considered here as a subset of the factor 'resources allocated to health care'.
39	Service cost	A combination of multiple health care service inputs.
40	Infrastructure	The physical capital available to health care services.
41	Retirements	The number of exits from the total labour force in a defined time period.
42	Health workforce employed	The total number of health workforce employed at a defined time.
43	Productivity of health care services	The total outputs produced by health care services, given the sum of the inputs.
44	In-service attrition	The number of exits from the employed health workforce in a defined time period.
45	Training attrition	The number of exits from the health workforce in training, in a defined time period.
46	Graduate health workforce training	The number of graduates from health workforce training, in a defined time period.
47	Working environment	The quality of the working environment and relations.
48	In-service retention	The number of employed health workforce retained, for a defined time period.
49	Health workforce training entrants	The number of entrants to health workforce training programmes, for a defined time period.
50	Supply of health workforce	The result of combinations of factors concerning health workforce production, mobility and service retention/attrition.
51	Health workforce production cost	The cost of producing the supply of health workforce.
52	Return to practice	People re-joining the health workforce after a period of absence.



ID	Factor	Description
53	Health workforce immigration/inward mobility	Inward movement of individual health workers.
54	Health workforce emigration/outward mobility	Outward movement of individual health workers.
55	Complexity of health conditions	The severity of health conditions, or combinations of health conditions.
56	Health services integration	The degree of connectedness between organisations within a health system, or between levels of a health system (primary, secondary and tertiary).
57	Health IT	Health-related information and communication technologies (also termed eHealth, where the definition is: ‘the use of ICT in health products, services and processes combined with organizational change in health care systems and new skills, in order to improve health of citizens, efficiency and productivity in health care delivery, and the economic and social value of health. eHealth covers the interactions between patients and health-service providers, institution-to-institution transmission of data, or peer-to-peer communications between patients and/or health professionals’ (European Commission, 2012).
58	Gross domestic product	The total output of goods and services produced by an economy.
59	R&D expenditure	The total amount of expenditure on research and development within a country’s economy.
60	Patient trust in health care	A combination of factors and affected by the skills and competences of the health workforce and the outcomes achieved from health workforce/patient interactions.

### Influence matrix analysis

To focus attention on the critical aspects of the system map the key factors have been scored (by John Fellows at the CfWI), pair-wise, to allow a comparison of factors and their connections. They have been scored as follows (CfWI, 2014b; Vester, 2012):

- ▶ **0:** the effect is zero or negligible, or occurs after a long delay.
- ▶ **1:** A large change in A causes only a small change in B.
- ▶ **2:** A change in A causes a more or less equal change in B.
- ▶ **3:** A small change in A brings about a disproportionately large change in B.

The active sum (the sum of all of the influences of a single factor on all the other factors) and the passive sum (the sum of the influences of all factors on a single factor) have been scored in the matrix as follows.

ID	Factor	Active sum (AS)	Passive sum (PS)	Product (AS x PS)	Quotient (AS/PS)
1	Self-care and self-management	2	6	12	0.33
2	Health literacy	10	4	40	2.5
3	Access to health information	4	2	8	2
4	Information and Communication Technology	2	0	0	0
5	Patient empowerment	2	6	12	0.33
6	Patient mobility	1	1	1	1
7	Health services seeking behaviour	2	2	4	1
8	Secondary prevention	2	0	0	0
9	Undiagnosed population	1	3	3	0.33
10	Diagnosed population (patients)	1	2	2	0.5
11	Primary prevention	2	0	0	0
12	Population at low risk of ill health	1	3	3	0.33
13	Access to health services	4	0	0	0
14	Demand for health care	5	16	80	0.31
15	Population at high risk of ill health	1	2	2	0.5
16	Pythia risk events	6	0	0	0
17	Tertiary prevention	2	2	4	1
18	Supply of health services	2	3	6	0.67
19	Demand for health workforce	2	6	12	0.33
20	Population health status	8	9	72	0.89
21	Effectiveness of regulation	2	0	0	0
22	Health care service inputs	1	10	10	0.1
23	Mortality rate amenable to health care	3	2	6	1.5
24	Population life expectancy	2	6	12	0.33
25	Population age structure	4	3	12	1.33
26	Births	2	0	0	0
27	Deaths	1	4	4	0.25
28	Emigration	1	0	0	0

ID	Factor	Active sum (AS)	Passive sum (PS)	Product (AS x PS)	Quotient (AS/PS)
29	Immigration	1	0	0	0
30	Population size	4	4	16	1
31	Health workforce skills and competences	12	10	120	1.2
32	Effectiveness of training and education	2	0	0	0
33	Resources allocated to health care	6	2	12	3
34	Treatment technology	7	1	7	7
35	Productivity of health workforces	2	2	4	1
36	Health outcomes from health workforce/patient interactions	6	4	24	1.5
37	Total labour force	2	2	4	1
38	Resources allocated to health workforce training and education	2	2	4	1
39	Service cost	2	10	20	0.2
40	Infrastructure	4	0	0	0
41	Retirements	1	2	2	0.5
42	Health workforce employed	5	2	10	2.5
43	Productivity of health care services	1	0	0	0
44	In-service attrition	1	1	1	1
45	Training attrition	1	0	0	0
46	Graduate health workforce training	1	3	3	0.33
47	Working environment	2	0	0	0
48	In-service retention	1	1	1	1
49	Health workforce training entrants	2	4	8	0.5
50	Supply of health workforce	2	7	14	0.29
51	Health workforce production cost	0	2	0	0
52	Return to practice	1	0	0	0
53	Health workforce immigration/inward mobility	1	0	0	0
54	Health workforce	1	0	0	0

ID	Factor	Active sum (AS)	Passive sum (PS)	Product (AS x PS)	Quotient (AS/PS)
	emigration/outward mobility				
55	Complexity of health conditions	2	3	6	0.67
56	Health services integration	2	0	0	0
57	Health IT	5	2	10	2.5
58	Gross national product	4	0	0	0
59	R&D expenditure	1	2	2	0.5
60	Patient trust in health care	2	4	8	0.5

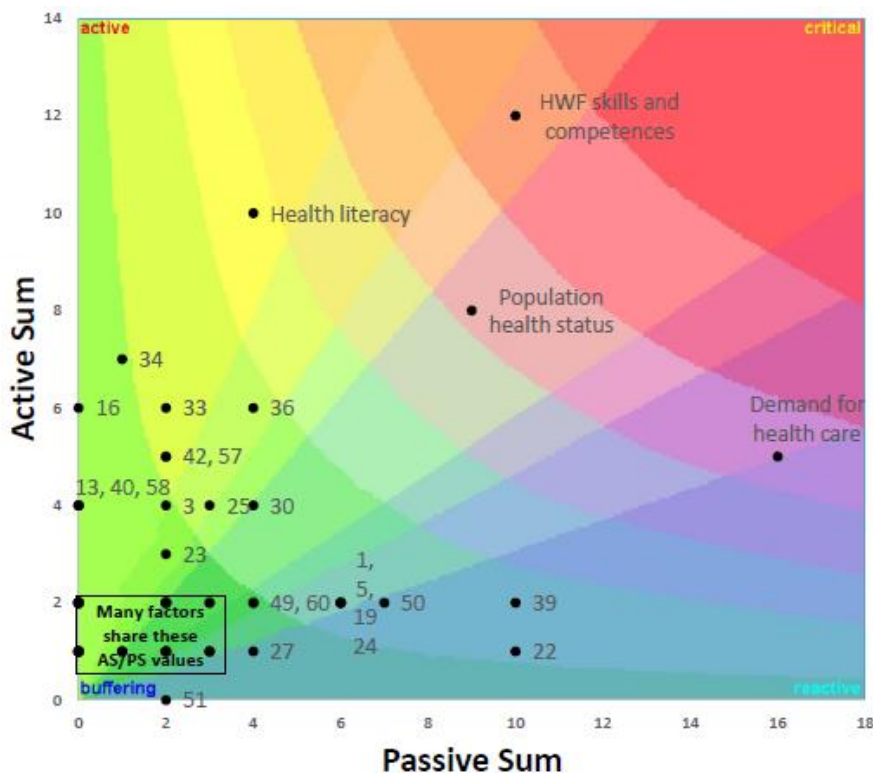
The influence matrix, shown below, indicates the positions of the factors by influence and their roles in the system.

Variables which have the largest direct influence on other factors within the system:

1. Health literacy and health workforce skills and competences.
2. Population health status.
3. Demand for health care, resources allocated to health care, treatment technology, health outcomes from health workforce/patient interactions, health workforce employed, health IT.

Variables which are largely influenced by other factors:

1. Demand for health care.
2. Population health status.
3. Supply of health workforce.
4. Health care service inputs, health workforce skills and competences, service cost.



## Annex 3: Skills and competence implications as shared by respondents

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Quotes to illustrate the skills and competence implications described by the interviewees have been chosen and are reproduced verbatim using their unique number of recording in the common template (for further information, see section 3 on the methods employed). As aforementioned, these individual views may be more prescriptive over the future direction of factors or the types of future actions or responses. They are presented here as individual ideas about the future to further explain the workforce system, and enrich the overall picture of possible workforce futures across the EU which we are beginning to describe in this report.

### Demographics, health and expectations

Respondents highlighted that ageing populations may shift the knowledge required in health workforces and the skills and competences required within workforces and shared between workforces; as well as the focus on risk-profiling and prevention:

*“Geriatric knowledge is being requested in all fields. In each department in a hospital, for instance, geriatric medicine specialists could be included in teams.”*

*“The medical specialist for the elderly can’t react to the patient solely as a medical specialist, he will have to add competences as a “care professional” in helping relatives, and sometimes other staff, to obtain the answers to their questions. Coaching, the new competence that has to be developed, is depending heavily on communication skills and does not comply with the image of the medical specialist in his white coat who doesn’t have more than 10 minutes to see a patient... [An educator] additionally coaches the nurses to expand their competences on all terrains. This needs the same communication skills as the medical specialist, it’s just another focus.”*

*“Dentists need advanced skills in geriatric dentistry, pharmacology/general medicine, team working, professional co-operation.”*

*“More education in geriatric dentistry or gerodontology in order to take into account the needs of the elderly.”*

*“The ageing population will drive the requirement for a greater number of GPs with skills in the areas of prevention and health lifestyle promotion... will affect the supply/demand mix of the services on offer... chronic disease management will become more prevalent.”*

*“Nursing and caring skills... It is becoming clearer that we need more people and workforce who can understand dementia and long-term conditions when providing care.”*

*“Frailty will need to be used as a descriptor for the health and social care needs of the elderly population... Clinicians and practitioners will need to be able to use risk stratification techniques for the purpose of pre-emptively applying preventative interventions to at-risk patients. The ability to effectively manage and communicate with multiple stakeholders will be key to ensuring that patients receive joined up treatment.”*

On the specific issues of multimorbidity and changes in the distribution of health conditions, respondents described the following skills and competence implications and also considered the issue of multimorbidity representing a challenge to single disease frameworks and directions of workforce specialisation:

*“Dealing with multimorbidity and changes in disease spectrum requires us to rethink qualification. Major skills needed: cooperation! This includes a rethinking of competences in the sense of “being allowed to do tasks” and being able to do tasks. Multiprofessional teams, soft skills, taking charge of learning processes are all skills that need to be taught as part of academic nursing education.”*

*“The population demands are switched to a chronic model, where health professionals’ skills and competences have to be adapted to multi-organic pathologies... [with] further knowledge on disability and dependency strategies [and] strengthened self-care.”*

*“Ageing, multimorbidity and the effects on competences - the client/patient has lost his patience with visiting a whole lot of specialists with contrary pharmaceutical advice, behavioural advice and treatments.”*

Interviewees highlighted the increasing focus on shared decision making as patients and the public become more informed through greater data transparency on performance of health care services and a greater ability to articulate their needs in the future:

*“Patient behaviours are changing - driven by changing expectations, technology availability and usage, attitude and generational differences. Information is more readily available, e.g. people enter hospital having looked at quality indicators and outcomes data. Them being more informed puts an increasing burden on providers and professionals to ensure they are communicating what they are doing and the reasons for that. There have been a number of initiatives for some staff groups such as doctors to help develop new and different skills in patient engagement, guiding, partnership, empowerment and communication.”*

*“Political economy of health - people will be more demanding of the type of care they will receive now and in the future - this will lead to an expansion of patient-tailored approaches, designed around demands for better access and quality... The growing middle classes, that are the focus of politicians, will drive many future changes as they articulate their needs for the future.”*

*“Patients are becoming increasingly involved with health care leadership and expectations are growing - patients moving from passive recipients to active and shared-decision makers.”*

*“Patient expectations and involvement... passive recipients to active with shared-decision making... [increasingly] co-production.”*

*“The competences to become a generalist and a coach instead of a healer can be developed in the next 6 to 10 years. The competence to estimate the degree of self-reliance and the resulting need of coaching in patients may take a bit longer, because there is no basic training in the medical curriculum from which to depart... Due to the steep increase of multimorbidity in the next 10 to 20 years, the patients will prefer physicians who can aid and coach them. No more superspecialists but generalists like the medical specialist for the elderly... the necessity to adjust to specialised colleagues and to delegate work to nurse specialists and physician assistants is a skill that is not yet promoted in medicine.”*

*“Up to this moment, the health care system is based on population needs seen from the angle of the professional workforce. Due to the ageing population the curing aspect of the professionals*

*work is more and more losing impact to the caring professions... the caring and the coaching role become more and more important. This means that the professional has to emphasise on what the client can do by himself and just bring solutions to the missing part. The skills needed are communication, coaching and personalising advice. The competences are more charting what somebody can do by himself and then coaching the client to obtain the other necessary activities.”*

Specifically on information technology, respondents described the skills and competences required when dealing directly with patients and also on handling the volume of information available to make decisions and how this is understood by patients, the public and health workforces:

*“Tailored medicine advice and support to the individual; advice to highly skilled colleagues; high quality video etc and real-time information with the patient in the room - this demands resources and particular skills for effective engagement with this ‘new’ consumer. People are becoming increasingly used to interacting with institutions on their terms.”*

*“E-health and consumer expectations - with increased application of technology there is a need to balance this with interpersonal skills and ongoing assessment. Driven by big data, physicians need to be aware and also good consumers of information to find the trustworthy sources, particularly if, as in the US, information is presented directly to individuals.”*

*“Technology: eHealth, mHealth; and for personalised medicine, e.g. Gene Research - there will be less asymmetry of information between the health worker and the patient. More knowledge of good and bad on-line sources of information [therefore must be] able to handle wider range of patients from less IT literate to highly IT literate and more informed. Until recently the health worker was the expert; patients relatively homogenised and in comparison less informed. The health worker will have a role more as an ‘advisor’ to guide patients to good sources of information.”*

### Health care and technology effects

Horizon scanning interviewees described how rapid changes in technology may present challenges to health workforce training and education that may affect which workforces carry out which skills and competences:

*“Telemedicine - certain roles being enhanced because, e.g. community-based practitioners with equipment support in service delivery models becoming more common. Pharmacist and GP as hub and spoke.”*

*“Future use of IT: telemedicine; m-health; robots - need for constant agility of skills and competences to embrace new technologies. How does the speed of learning/education keep up with the potential speed of technologies?”*

*“eHealth - professionals will have to possess flexible health care skills (or new roles may be needed) to allow them to enter and exit multiple teams as required. Additionally, professionals will have to be adept in utilising IT and technology so that big data can be leveraged. New roles may emerge such as a General Data Practitioner, which would overlap the multiple specialities and serve as an interface between the clinicians, providing support by aggregating large volumes of data on and across patients, and providing clinical recommendations based on these data sets. Further statistician roles or specific training of clinicians may also be required.”*

*“Interaction between health professionals, co-operation with other health professionals: doctors, nurses, pharmacists etc leads to integrated prevention. Dentists in the early detection of diseases*

*such as diabetes, CVD etc, vaccination programmes. Common courses with other health professionals would initiate better collaboration for the future.”*

*“More and more knowledge becomes virtual - contact your peer colleague in a different country - access to knowledge is immediate and removes the historic delay or barriers to accessing this knowledge... how does education and training of workforces keep up with unstoppable developments in ICT and communication whilst not forgetting the human contact element?”*

*“For pharmaceuticals - personalised medicine - basically says that half of the drugs are used less because of your genome... For other tech it is more obvious, e.g. robotics. Production of results - it will facilitate the decisions - giving more possibility to transfer competences from a higher level to a lower level. More in terms of skills of individual professions in terms of diagnostics. Protocol driven care.”*

*“The use of ICT related to update training/CPD/virtual education and the use of apps is hugely underinvested and underexploited. The e-health skills need therefore specific attention for the entire health workforce.”*

*“Tele-monitoring and eHealth - allows the appropriate allocation of the task list and consequently the shift of tasks to the appropriate skill level. For example, the migration of services such as repeat prescriptions towards ePrescription platforms - curriculum may require updating to cover the implications of increased remote contact with patients, and specific training in tele-monitoring.”*

*“Creation of novel products and technologies by industry/health care providers... and the increasing use of decision support tools. Big data within health care for the collection of patient/medical information, its subsequent analysis and then its application in the patient’s treatment.”*

Respondents also described potential shifts in the focus on particular conditions or location of care:

*“The impact is dependent on the environment of care; if there is an increased shift to home care, the workforce will need an increased ability to make clinical decisions by themselves. Additionally there will be a greater need for the coordination between roles across health and social care. There is a shortage of district nurses, who typically would fulfil this role.”*

*“An increasing focus on mental health, addiction health services and gender-specific person-centred care will create a shift with specific focus on e.g. women’s care, e.g. new NICE guidelines on birth at home.”*

*“Changes in health systems and financial budgetary changes with the differing responses... there is a spin-off in relation to this, there are long-standing professions that have changed considerably in the past and there will be changes in the future - but there is a hierarchy within professions that will protect their boundaries and this has the potential to limit change and improvement.”*

*“Greater emphasis on community care and increasingly moving towards provision in one’s own home. Clinicians ‘coach’ rather than teach. Community care will be increasingly prevalent through roles such as Health Visitors (UK) and Community Nurses (Netherlands). Focus on ‘wellbeing’ of the patient, driving an associated change in the skill mix. As more roles require autonomous working, the competences of staff will have to develop in order to accommodate this; communication, task allocation and technology competences will become increasingly important.”*



Interviewees described how future developments in research may also affect service delivery and what is or can be prioritised as a result of these developments:

*“Health technology assessment (HTA) outcomes research extends from process measures into areas such as patient involvement, adherence, daily lives.”*

*“HTA - Clinical data will increasingly be collected by the patient as opposed to in the individual clinical setting... Treatment will move towards self-care, personalised medicine and patients being brought in pre-emptively... The focus of the doctor will move toward how the large volumes of data can be amalgamated to create an accurate picture of the patients’ individual circumstances, and create treatment that is personalised. As patients will begin to be brought in pre-emptively, the skills mix will increasingly include preventative medicine. Patient-led treatment through self-care will require strong levels of treatment compliance. This might result in the number of roles that are dedicated to ensuring compliance increasing - this in turn may result in increasing levels of technology in this area increasing.”*

*“Evidence - currently evidence is weighted towards randomised control trials but Midwives deal with well women and babies and so a lot of the research into what works well is qualitative ... there may be an impact as we understand and are able to place people’s health in a wider context.”*

### Health workforce supply

Respondents described demographic, workforce training and education and flexibility challenges for short, medium and long term workforce planning in Europe:

*“Demographic driven changes in the workforce - shrinking labour force in many countries, and if it is not shrinking then the workforce is ageing. The three recruitment pools that policy makers will need to access - untrained, coming from abroad and existing. The existing workforce will be the most important to plan for and utilise. Questions regarding the types of skills and competences are important to ask but more important is to ask and identify where they will come from in the future. The existing pool will be two thirds of available supply, matching this supply and the skills required in the future is an important area that must be examined and a way forward to be defined. The main opportunity and potential to meet the wide ranging challenges are within the existing workforce in the system if we can adapt this workforce and plan flexibly.”*

*“We are moving away from trying to design the perfect system and now trying to incorporate and allow for adaptation of the workforce capacity in a flexible way for the future - this will enable the workforce to be a resilient provision that is able to flex to complex needs of our population across increasingly varied geographies and modalities.”*

*“Decreasing workforce pool in primary care (fewer entering into primary care training pathways), budgetary pressures, coupled with increasing demand, may force MSs to consider a re-evaluation of which roles can perform procedures, this will in turn determine the skill mix of the workforce.”*

Interviewees also described future changes and challenges to the strategic direction of workforce planning, including balancing workforce skills and competences between professions, and responses to changing patient and public expectations:

*“Should countries be trying to engineer more of the same? Or is it about other mid-level providers (physician assistants, nursing assistants)? ..A strong drive, politically led, [is required] towards a*

*whole system approach to the regulation of patient safety, education standards, training competences.”*

*“We have to recognise that certain types of payment systems and fee-based approaches will constrain some types of service change and new role delineations (new baskets of skills and competences).”*

*“The public’s perception of the skills and competences of the workforce compared to roles is changing - the public’s belief of whether a role has the right skills to treat the presentation is changing due to the increased number of roles within the workforce. This is also balanced by the legal authority, from a clinical perspective, for that given role to administer a treatment... The increased ability of a wider variety of roles to administer a given treatment may result in ‘competency protection’ (practitioners feeling their role as encroached upon).”*

*“Challenge to achieve positive long-term effects for patients whilst managing within economic constraints. Skills will be driven in different ways to now... to align with patient expectations, social aspects and workforce availability.”*

*“In terms of skills the workforces and professions that are specialising become potentially a niche of health care more and more as advances deepen this specialisation. The challenge emerges about how to keep an overview of health care services and manage this overall.”*

*“Task shifting - there is evidence that the move to nurses taking over tasks and responsibilities previously carried out by doctors has had significant benefits, i.e. nurse prescribing... when properly implemented task shifting is appropriate and cost effective.”*

Interviewees also described the connected nature of EU health workforces and potential for increased European and international competition for workforces in the future:

*“EU Freedom of movement issues - this has implications too and is driven by education, registration and licensing, proving competences - this will create an overarching macro framework for a pool of labour which is likely not sufficient to meet all countries’ needs and requirements in the future. Countries across the EU as well as globally will be competing for the same labour and this will see individual countries approaching this differently based on their own contexts, priorities and demands from their populations.”*

## Annex 4: The WP6 team

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## Annex 5: Examples of applying horizon scanning to health workforce planning

### Horizon scanning for multiple workforces

Horizon scanning allows us to broaden our current thinking and explore different ways of understanding the present. In combination with developments in our understanding about how factors and forces may affect future workforces horizon scanning can then be described in reports to share updates in knowledge and applied to workforce models.

Examples include the Big Picture Challenge series and the Horizon 2035 project.



### Horizon scanning for single workforces

In reviews of single workforces ideas about the future can be collected and reported and integrated into other aspects of workforce processes such as scenario building, workforce modelling and policy analysis (CfWI, 2015b).

Examples include the GP pilot study conducted with our colleagues in the Belgian Ministry of Health as part of the JA; and the horizon scanning, scenario generation and final report of the CfWI's strategic review of the future pharmacist workforce.



## Glossary

Term	Definition
<b>Affordability</b>	Keeping the costs of health care services within the threshold of what is considered sustainable by the population, national government and/or EU.
<b>Age groups</b>	A division of the population according to age, in a pre-determined range, used to distinguish differences among populations. Examples: 0-4; 5-9; 10-14; 60-64; 65+.
<b>Anticipation</b>	Thinking ahead of an occurrence in order to determine how to handle it, or how to stop it from happening.
<b>Big picture challenge</b>	A fundamental challenge that policy makers are facing across the (health care) system. Meeting a big picture challenge requires focused action at the highest level across the health, social care, education and employment sector.
<b>Circular mobility</b>	A form of migration that is managed in a way allowing some degree of legal mobility back and forth between two countries
<b>Cluster</b>	A set of system factors and driving forces, similar to each other and linked through cause and effect relationships, which describe a key focal issue of concern.
<b>Demand (of HWF)</b>	Number of health professionals required to fill in open vacancies. It should ideally be expressed both headcount and in full-time equivalent (FTE), depending on the forecasting purpose.
<b>Driver / Driving force</b>	A factor that causes or might cause changes, measurable movements or trends in the HWF of a health care system.
<b>Events</b>	Occurrences that can impact the health care system.
<b>Emigration (outflow)</b>	The act of leaving one's current country, in this context with the intention to practice a profession abroad.
<b>Factors</b>	A circumstance, fact or influence that contributes to a result. Factors are linked to each other through cause and effect relationships. A change to a factor often will influence one or more other factors in the system.
<b>Full-time equivalent (FTE)</b>	<p>Unit used to measure employed persons to make them comparable, as they work a different number of hours per week, in different sectors.</p> <p>The unit is obtained by comparing an employee's average number of hours worked to the average number of hours of a full-time worker of same kind. A full-time worker is therefore counted as one FTE, while a part-time worker gets a score in proportion to the hours he or she works or studies.</p> <p>For example, a part-time worker employed for 24 hours a week where full-time work consists of 48 hours, is counted as 0.5 FTE.</p>

<b>Health care production</b>	The output of health care services that can be produced from the given combination of human and non-human resources.
<b>Health professional</b>	Individuals working in the provision of health services, whether as individual practitioner or as an employee of a health institution or programme. Health professionals are often defined by law through their set of activities reserved under provision of an agreement based on education pre-requisites or equivalent.
<b>Health workforce</b>	The overarching term for the body of health professionals (trained and care workers directly involved in the delivery of care) working in a health care system.
<b>Horizon scanning</b>	A systematic examination of information to identify potential threats, risks, emerging issues and opportunities allowing for better preparedness.
<b>Imbalances (major)</b>	The uneven spread of the active health workforce across countries, regions or professions, resulting in underserved/overserved areas.
<b>Indicators (key planning)</b>	A quantitative or qualitative measure of a system that can be used to determine the degree of adherence to a certain standard or benchmark.
<b>Job retention</b>	The various practices and policies which enable health care professionals to choose to stay in their countries to practise for a longer period of time, or to stay in their practice, or even to keep working full time.
<b>Labour force</b>	The total number of people employed or seeking employment in a country or region.
<b>Megatrend</b>	A large, social, economic, political, environmental or technological change that is slow to form and difficult to stop. Once in place, megatrends influence a wide range of activities, processes and perceptions, both in government and in society, possibly for decades. For example, the ageing population megatrend is composed of trends in birth rate, death rate, quality of health care, lifestyle, etc.
<b>Migration (inflow)</b>	The act of (either temporarily or permanently) moving into a country, in this context in order to practice a profession.
<b>Minimum data set (MDS) for health workforce planning</b>	A widely agreed upon set of terms and definitions constituting a core of data acquired for reporting and assessing key aspects of health system delivery.
<b>Planning process</b>	A process of defining health workforce planning perspectives, based on needs assessment, identification of resources, establishing the priority of realistic and feasible goals, as well as on administrative measures planning to achieve these goals.
<b>Planning system</b>	Strategies that address the adequacy of the supply and distribution of the health care workforce in relation to policy objectives and the consequential demand for health labour force.
<b>Population</b>	A group of individuals that share one or more characteristics from which data can be gathered and analysed.



<b>Population health care needs</b>	The requirements necessary to achieve physical, cognitive, emotional, and social wellbeing, at the individual, family, community and population level of care and services.
<b>Professions (within JA scope only)</b>	The professional qualifications of physicians, nurses, midwives, pharmacists, and dentists, included in the Directive 2005/36/EC of the European Parliament and of the Council.
<b>Qualitative information</b>	Information collected using qualitative methodologies to identify and describe key factors in the health workforce system which are likely to affect the supply and demand of workforces.
<b>Qualitative methodologies</b>	Methods used to gather qualitative information on key factors which are likely to affect the supply and demand of health workforces through techniques such as interviews, document analysis, or focus groups. Includes methods to quantify uncertain parameters for forecasting models.
<b>Reliance on foreign health workforce</b>	The share of foreign (trained & born) health professionals within a country's health workforce in a given year, expressed as a percentage of the stock of the workforce.
<b>Retirement</b>	Period or life stage of a health care worker following termination of, and withdrawal from the health care system. It is expressed in the number of health care professionals retiring from the labour market.
<b>Scenario</b>	A description of a sequence of events, based on certain assumptions. Scenarios are used for estimating the likely effects of one or more factors, and are an integral part of situation analysis and long-term planning.
<b>Shortage</b>	The negative gap between supply and demand.
<b>Stakeholder</b>	Groups or individuals that have an interest in the organisation and delivery of health care, and who either deliver, sponsor, or benefit from health care.
<b>Stock (of HWF)</b>	Number of available practising and non- practicing health professionals in a country, recorded in a registry or database. It should ideally be expressed in headcount and in full-time equivalent (FTE).
<b>Supply (of HWF)</b>	Number of newly graduated health professionals available to fill in open vacancies. It can be expressed in headcount or in full-time equivalent (FTE).
<b>System</b>	A network of interdependent components that work together to try to accomplish the aim of rendering medical and other health services to individuals.
<b>Threat/opportunity</b>	A future event or system state which may occur due to changes in the system. The impact to the system may be viewed as detrimental (a threat) or beneficial (an opportunity); or a combination of both.
<b>Training</b>	The process by which a person acquires the necessary skills and competencies for delivering health care, possibly through post-graduate training programmes (in the framework of continuous professional development) in addition to graduate training programmes.
<b>Trend</b>	An emerging pattern of change, likely to impact a system.

<b>Universal coverage</b>	A health care system that provides effective, high quality and free of expense preventive, curative, rehabilitative and palliative health services to all citizens, regardless of socio-economic status, and without discrimination.
<b>Underserved areas</b>	A region or area that has a relative or absolute deficiency of medical personnel or health care resources. This deficiency could present itself in shortages of professionals/specialities/skills required to deliver health services.
<b>Variables</b>	A characteristic, number or quantity that can increase or decrease over time, or take various values in different situations.
<b>Weak signal</b>	Barely observable trends or events that indicate that an idea, threat or opportunity is going to arise. Sometimes referred to as early signals.
<b>“Wild card”</b>	A situation or event with a low probability of occurrence, but with a very high impact in a system. Sometimes they can be announced by a weak signal.
<b>Health care Workforce planning</b>	Strategies that address the adequacy of the supply and distribution of the health workforce, according to policy objectives and the consequential demand for health labour (National Public Health Partnership, 2002).
<b>Workforce forecasting</b>	Estimating the required health workforce to meet future health service requirements and the development of strategies to meet those requirements (Roberfroid et al, 2009; Stordeur and Leonard, 2010).

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