POLICY BRIEF - PRE-PUBLICATION VERSION

TITLE: Health workforce needs, demand and shortages to 2030: an overview of forecasted trends in the global health labour market.

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Title: Health workforce needs, demand and shortages to 2030: an overview of forecasted trends in the global health labour market

Authors and contributors:

This policy briefing was conceptualized and coordinated by Giorgio Cometto (Global Health Workforce Alliance, WHO), under the oversight of James Campbell (Director Health Workforce and Executive Director, Global Health Workforce Alliance, WHO).

The briefing incorporates four components that have been developed separately in collaboration with other partners and institutions.

1. Health workforce requirements for universal health coverage and the Sustainable Development Goals - Background paper to the Global Strategy on Human Resources for Health: Workforce 2030 (commissioned and coordinated by WHO):

Richard Scheffler, *a Giorgio Cometto, *b Kate Tulenko, c Tim Bruckner, a Jenny Liu, a Julia Brasileiro, c James Campbell b

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Eric Keuffel, d Alexander Preker, e Barbara Stilwell, b Rebecca Bailey b contributed to some components of the analysis of needs-based shortages;

David Evans, f Akiko Maeda, b Tomoko Ono, h Octavian Bivol, l Gabriele Fontana, l Gilles Dussault, l Remco Van de Pas, k Angelica Sousa, b Amani Siyam, b Karin Stenberg, b Tessa Edejer, b Xenia Scheil-Adlung l were part of the advisory group that provided strategic direction and peer-review to the analysis of needs-based shortages.

Melanie Cowan, b Leanne Riley, b Gretchen Stevens, b Daniel Hogan b availed health service coverage used in the analysis.

2. Global Health Workforce Labor Market Projections for 2030 (commissioned and coordinated by the World Bank):

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g World Bank
h JICA
i UNICEF
j IHMT, Portugal
k ITM, Belgium
l ILO
3. **Future Human Resources for Health Supply and Requirements in High-Income OECD Countries** (commissioned and coordinated by WHO):

Gail Tomblin Murphy,Stephen Birch, Adrian MacKenzie, Janet Rigby and Annette Elliott Rose helped obtain necessary data for analyses in high-income countries

4. **Definition and measurement of the health workforce** (contributed by ILO):

David Hunter

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Executive summary

The issue.
A health workforce of adequate size and skills is critical to the attainment of any population health goal. However, countries at all levels of socioeconomic development face, to varying degrees, difficulties in the education and training, deployment, retention, and performance of their health workforce.

Findings.
Based on literature review and estimation modelling, the growing demand for health workers is forecasted to add an estimated 40 million health sector jobs to the global economy by 2030 in 165 countries with sufficient data to develop projections. The employment and economic growth potential of the health economy is even greater than this projection, presenting opportunities which benefit youth and women in particular.

Most of these jobs, however, will be in upper-middle and high-income countries, with demand fuelled by rising incomes and ageing populations.

At the same time, if current trends continue, global imbalances and mismatches between health workforce needs and supply capacity will persist. Modelled estimates point to the unmet need for over 18 million additional health workers by 2030 vis-a-vis the health workforce requirements to meet Sustainable Development Goals and universal health coverage targets; the gaps are concentrated in low- and lower middle-income countries.

Challenges.
In some countries, the chronic under-investment in education and training of health workers results in shortages; this is compounded by maldistribution.

Further, severe inefficiencies characterize health workforce spending, including service organization models that place excessive reliance on specialists delivering curative care in tertiary settings—a combination which is often neither cost-effective nor responsive to population needs. Weaknesses in transparency and accountability, such as ghost workers, artificially inflate health sector wage bills with no benefit to population health.

Health workforce policy reforms are often challenged by special interests, such as over-restrictive access to the health professions, or by macro-economic policies that result in under-investment in health systems.

Policy options.
In many high-income and upper-middle countries, supply of health workers remains constrained in spite of growing demand. In these settings, relaxing barriers to entry into health training and health professions may be required together with increasing education capacity and output and other measures to increase supply, while continuing to enforce standards of care and implement policies that protect the public from risk of harm.
In low-income and some lower middle-income countries both demand and supply will continue to fall short of population health needs. In these contexts, it is necessary that investments – from both the public and private sectors – in health worker education be accompanied by an expansion of the fiscal space to support the creation and filling of funded positions in the health sector and the health economy. Most of the funding should come from domestic resources; however several low-income countries and other settings affected by complex humanitarian emergencies will require international development assistance for a few more decades.

Health workforce strategies should ensure that the expansion of the health resources envelope leads to cost-effective resource allocation. An important strategy to inform resource allocation will be to more fully understand the health needs of populations in order to design care delivery models and capacities that are both effective and efficient. Specifically, there is a need to prioritize primary health care teams with a diverse and sustainable skill mix, harnessing the potential of community-based and mid-level health workers to extend service provision to poor and marginalized populations.

Evidence base.

This briefing is based on analyses conducted by WHO and the World Bank using the best available evidence. Variability in completeness and quality of data required making extensive use of assumptions, imputation and modelling techniques. Caution is therefore warranted in interpreting the findings. There is a need to strengthen HRH data and evidence worldwide.
Key messages

1. Health workers are critical to achieving health and other development objectives in the SDGs, together with strategies to make health care more accessible – for example through social health protection coverage. Not only is investing in the health workforce one of the best buys in public health, it can also create quality employment opportunities for both health professionals and a wider range of workers, potentially expanding economic returns particularly for women and youth.

2. On current trends, however, the global health labour market is moving towards a deepening mismatch between requirements for, supply of and demand for health workers. Around 40 million new jobs will be created in the health sector by 2030; most of them however will be in upper-middle and high-income countries. The growing demand in these contexts is likely to outpace supply capacity, contributing to increasing wage rates and international mobility of health personnel.

3. Conversely, in some contexts, the supply will continue to fall below the growth in need: the aggregate needs-based shortage may exceed 18 million health workers by 2030, with the gap largely concentrated in low- and lower middle-income countries.

4. A paradigm shift is thus needed, moving:
   4.1. towards greater public sector intervention and international support, informed by strengthened HRH evidence, to redress the market failures of under-supply of and constrained demand for health workers in low-income countries;
   4.2. away from seeing health workers as a consumption expenditure requiring containment, and towards recognizing health workforce investment as a strategy that can also spur socioeconomic development through the creation of employment opportunities, particularly for women;
   4.3. towards dramatic improvements in efficiency, through more efficient strategies to educate, deploy and manage a health workforce with a skills mix geared to primary health care.
Introduction

5. Health systems can only function with health workers; improving health service coverage and health outcomes depends on their availability, accessibility, and capacity to deliver quality services. Further, building an adequate health workforce can be a highly cost-effective public health strategy. For instance, investing in midwifery education and deploying graduates for community-based service delivery could yield a 16-fold return on investment in terms of lives saved and cost of caesarean sections avoided—a “best buy” in primary health care. Social returns on investments in health workers can be maximized if their services are affordable and thus financially accessible for those in need. This can only be ensured if social health protection schemes and systems are in place that provide for such access.

6. At the same time, investing in the health workforce is increasingly recognized as an opportunity to create qualified employment opportunities, in particular for women, that further spurs economic growth and productivity. Emerging economies are simultaneously undergoing an economic transition that will increase their health resource envelope and a demographic transition that will see hundreds of millions of potential new entrants into the labour force. The confluence of these factors creates an unprecedented opportunity to design and implement health workforce strategies that address the gaps in equitable and effective coverage many health systems, while also unlocking economic growth potential. Taken together, these factors are expected to contribute to a convergence in health and development outcomes within a generation.

7. Indeed, many analyses point to the health economy - and those products, services and activities related to healthcare and care for the dependent, disabled and elderly - as a driver of economic growth. There is also evidence that health sector employment remains stable or even grows during economic downturns, contributing to the resilience of national economies. In determining the potential for the health economy to contribute to job creation and economic growth, it is however, important to have a more precise understanding of the “health workforce”.

8. The International Labour Organization adopts a model of the health workforce that: a) recognizes all workers in or contributing to the health sector based on the concept of economic activity; b) separately identifies specialized workers in health specific occupations or with training in a health field; and c) takes into account the contributions of volunteer and family carers. The ILO approach provides a basis for the development of internationally comparable statistics which can inform national and international health labour market analyses (box 1).

9. The available information is most complete for salaried and trained health workers employed in the public sector; data can be more limited for health workers employed in the private, not-for-profit or defence sectors, the self-employed, and
health workers with a public health, health management, administrative or support roles. Despite the existence of international measurement frameworks and classification systems, the quality and quantity of information on the health workforce remains limited for many countries, and particularly for those facing the most severe health workforce challenges. In these contexts, there is a pressing need to improve statistical and administrative data capacities, and infrastructure for improved health workforce evidence.

The WHO 2006 World Health Report defined health workers as ‘all people engaged in actions whose primary intent is to enhance health’. For the purposes of health workforce planning, it is necessary to understand the types of jobs needed to provide health care, and the requisite skills and training for those jobs. This necessitates a focus on occupations that require specific skills in the provision of health care and that are in severe shortage in many countries. To understand the full impact of investment in the health sector on employment and economic growth, however, we also need to take into consideration the wider group of workers employed in the health sector and in those industries that support it, as well as those providing unpaid or informal care.

Existing frameworks for the operational measurement of health workers employed within and outside the health sector distinguish three categories of workers relevant for health workforce analysis and planning:

a. those with health training and working in the health industry;

b. those with training in a non-health field (or with no formal training) and working in the health industry;

c. those with health training who are either working in a non-health care related industry, or who are currently unemployed or not active in the labour market.

Categories A and C together form the trained (skilled) health workforce (active or inactive) workforce, available in a given country or region, while A and B represent the workforce employed in the health industry. The sum of the three elements A, B and C provides the total potential health workforce available. A fourth category, D, encapsulates all others, that is, those workers without training for a health occupation and not working in the health industry.

The International Standard Classification of Education (ISCED), International Standard Classification of Occupations (ISCO) and the International Standard Industrial Classifications (ISIC) guide the categorization according to, respectively, fields of education and training, the occupations, and the industries in which they work.

The current version of the International Standard Classification of Occupations (ISCO-08) provides a framework for the comparability of occupational information compiled according to the various classification systems used in different national and regional contexts. It includes both aggregate and detailed categories for specialized health occupations, including:

- “Health professionals” (well-trained workers in jobs that normally require a
university degree for competent performance, such as doctors, nurses, midwives, dentists, pharmacists);  
• "Health associate professionals" (requiring skills at tertiary educational level but not equivalent to a university degree, such as associate nurses, medical and pharmaceutical technicians, traditional practitioners that do not require formal training); and  
• “Personal care workers in health services” (which includes health care assistants and home-based personal care workers).

The strength of this framework is that it allows the compilation of internationally comparable data on people with health-specific training, workers in health occupations, and the total number of workers employed in the health industry. A limitation, however, is that the strong focus and better data availability on trained workers in formal employment tends to overlook and underestimate the role of many of those who contribute to the health sector as informal workers, regardless of training or remuneration. In addition, it does not fully take into consideration workers in non-health sectors that contribute to the health sector, such as those involved in the pharmaceutical sector, in transportation services or in the construction of medical facilities. These groups, included under the ISCO groupings in categories other than health workers, would also need to be quantified and monitored to assess the overall employment impact of the health sector.

Most of the existing data available on the health workforce, however, are restricted to workers in paid employment and in many cases only to those formally employed in health services. Data are also more frequently complete for health professionals than for other groups.

Box 1: what is the health workforce? (Source: ILO)

10. To develop medium-term forecasts for trends in needs, supply and market-based demand for the health workforce (box 2), and based on data availability, analyses typically focus on health workers with health training working in the health industry. The analysis presented here also adopted this approach. Growth in the employment of trained health workers, however, will likely to be accompanied by growth in the employment of other types of health workers (e.g. health sector management and support workers) and of workers in other sectors linked to health (e.g., pharmaceutical and medical devices industries). Therefore, estimates for workers with health training represent only a subset of the total affected workforce, and likely substantially underestimate the economic growth and job creation potential of the health economy at large.

11. Estimates recently produced by the ILO and presented in Policy brief No 17 suggest that the size of the total health workforce, and of workers employed in the broader health economy, could be significantly larger than previously estimated. Estimation of the more limited health workforce who have a clinical qualification is also a challenging task, as data from various sources differ in terms of the definitions used,
and the scope and completeness of the data. The ILO estimates are based on data sources that differ from those used by WHO and are higher than the WHO estimates. Further, the ILO estimates include categories of workers that are not defined by WHO as health workers, therefore the results are not directly comparable. Every effort is being made to improve the quality and comparability of estimates by both organizations. The differences show the range of the size of the total health workforce depending on choices about which groups to include. They do not impact the estimation of significant needs–based shortages presented below.

<table>
<thead>
<tr>
<th>Box 2: operational definitions of health workforce needs, supply and demand.</th>
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</table>

**Need:** the number of health workers required to attain the objectives of the health system. There are various approaches to calculating this number – for example this is sometimes estimated based on a threshold of minimum availability of health workers to address priority population health issues, or in relation to the specific service delivery profile and requirements of a health system.

**Supply:** the number of health workers that are available in a country. Future supply can be estimated taking into account a variety of parameters, including education capacity, attrition and retention.

**Demand:** the number of health workers that the health system (both public and private) can support in terms of funded positions or economic demand for services. Demand correlates with the economic capacity of a country, with higher level of resource availability resulting in greater demand for health services and thus for health workers to provide them.

**Methods**

12. The methodological approach used to estimate and forecast needs-based shortages of health workers was guided by the overarching goal of addressing population health needs to make progress towards universal health coverage (UHC). Policy actions and investment decisions should focus on redressing failures in health labour markets, including easing supply constraints, to equitably meet population health care needs. To this end, three main analyses were conducted: a) estimation of the projected supply, needs, and needs-based shortages of health workers to 2030, with a special emphasis on countries falling below a minimum threshold of health worker availability; b) projection of labour market demand for health workers to 2030, taking into account economic growth trends and other relevant parameters; c) simulation of trends in the supply of health workers vis-a-vis requirements in high-income OECD countries. In high-income countries, the demand for health workers by far exceeds any need-based thresholds, which may attract health workers from other countries and has important implications for global health workforce mobility patterns.

13. **Identifying needs-based shortages of health workers.** Key population health indicators were selected to measure the projected health needs of populations
based upon the health targets in the SDGs: family planning, antenatal care coverage, skilled birth attendance, DTP3 immunization, tobacco smoking, potable water, sanitation, antiretroviral therapy, tuberculosis treatment, cataract surgery, diabetes, and hypertension treatment. These indicators had been previously identified as tracers for UHC in joint WHO-World Bank research\textsuperscript{13} and their relative importance to the composite index of HRH availability was calculated on the basis of the proportional contribution to the global burden of disease (GBD) that each service is targeted toward. A minimum threshold of health workers required to achieve health targets in the SDGs was then calculated. Building on previous approaches for estimating minimum thresholds of health worker availability (box 2), a number of health workers estimated to be needed to achieve of the median level of attainment (25\%) for a composite index comprised of the 12 selected indicators above, weighted according to GBD, was derived through regression analysis. The resulting ‘SDG index threshold’ of 4.45 doctors, nurses and midwives per 1 000 population (figure 1) was identified as the minimum density representing the need for health workers. It should be noted that if a different level in the sdg12 attainment score were chosen (i.e., 25th and 75th percentile instead of the median value), the threshold would vary widely, from 0.31 to 35.1 doctors, nurses and midwives per 1 000 population. This broad range illustrates the sensitivity of the SDG index to different thresholds of attainment.

14. This SDG index threshold advances previous methods by empirically linking health worker density to coverage of a broader range of health services based on UHC and SDGs. However, similarly to its predecessors, it should not be used as a benchmark for planning at national levels as it does not account for important heterogeneity across countries (i.e. baseline conditions, epidemiology, demography, finances, health system needs, optimal workforce composition and skills mix) that should be examined on an individual basis when planning the workforce needed to meet the SDGs by 2030. Further, it is also important that use of the SDG index threshold does not result in an exclusive focus on physicians and nurses/midwives, thereby underinvesting in other cadres. Current and future needs-based shortages in countries falling below this threshold were estimated after taking projected trends in the supply of health workers into account.
The 2006 World Health Report identified a minimum health worker density of 2.3 skilled health workers (physicians and nurses/midwives) per 1,000 population, which was considered generally necessary to attain high coverage (80%) of skilled birth attendance. For nearly ten years, the 2.3 worker per 1,000 threshold has galvanized support and enabled policy makers and advocates to push for goals and countries to measure their progress. However, this threshold has its limitations in the SDGs era: it is based on a single health service (assisted deliveries) that is provided episodically, and its focus is on maternal and newborn health, whereas the SDGs agenda refers to a broader range of services, including non-communicable diseases.

To reflect the broader nature of universal health coverage, ILO has developed an alternative method to identify a minimum threshold of health worker availability, rooted in an approach that identifies vulnerable countries in terms of their social protection systems and outcomes. Based on this approach, reflected in the World Social Security Statistics 2010/2011 and in a background paper for The World Health Report 2010, the threshold, termed as a ‘staff access deficit indicator’, identified a minimum workforce availability of 3.4 skilled health workers per 1,000 population. This value has subsequently been updated to 4.1 per 1,000. The ILO approach, while linked more explicitly to the policy ambition of universal health coverage in the context of broader social protection, does not have a direct empirical link with health service coverage.

Other similar thresholds exist. For instance, a value of 5.9 skilled health professionals (midwives, nurses and physicians) per 1,000 population was identified as the workforce requirements for the Ending Preventable Maternal Deaths initiative, which entails reducing global maternal deaths to 50 per 100 000 live births by 2035.
Box 2: prior thresholds for health worker needs.

15. **Projecting global demand for health workers.** The demand for health workers (physicians, nurses/midwives, and other health workers) was estimated based on a model using per capita GDP, per capita out-of-pocket health expenditures, and population age 65+. In this approach, demand is therefore more a function of economic capacity than population needs. Demand for nurses/midwives was calculated assuming a ratio of 2.5 to one physician (the average value in OECD countries). Estimates could only be developed for 165 countries and territories with sufficient data on the economic variables required to model demand.

16. **Health worker employment in high-income OECD countries.** The supply of and demand for health workers in high-income OECD countries vastly exceeds – now and in the future – the needs-based thresholds described earlier. Considering the potential impact on the global health labour market of demand-based shortages in high-income countries, we developed a model to produce estimates of possible scenarios of health labour market trends in these contexts. The model is based on a population needs-based approach that determines HRH requirements in relation to health system objectives and health services requirements. A stock-and-flow approach was used to simulate future HRH supply in terms of headcounts, adjusting current HRH stocks according to expected flows in (e.g. new graduates) and out (e.g. due to retirement) of each country’s stock. These were then adjusted according to levels of participation (providing direct patient care) and activity (proportion of full time hours spent providing direct patient care) for different types of HRH cadres.
Findings

17. Table 1 displays the forecasted numbers and percentage growth of health workers by income group and WHO region in 2013 and 2030, assuming that recent trends in training and employing health workers will stay the same. According to the latest available data in 2013, the global health workforce was over 43 million, including 9.8 million physicians, 20.7 million nurses/midwives, and approximately 13 million other health workers. The global nurse/midwife to physician ratio was 2.1 : 1. Based on current trends and under the assumptions made in the model, the supply of health workers is estimated to grow substantially (55%) leading to an aggregate of 67.3 million health workers by 2030, comprised of approximately 13.8 million physicians, 32.3 million nurses/midwives and 21.2 million other health workers.18

Table 1: Supply of health workers (in millions), 2013 (WHO Global Health Observatory) and 2030 (forecast)

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2030</th>
<th>2030 - 2013 change</th>
<th>Total worker % change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physicians</td>
<td>Nurses/Midwives</td>
<td>Other Cadres</td>
<td>Total</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>3.7</td>
<td>9.1</td>
<td>4.8</td>
<td>17.6</td>
</tr>
<tr>
<td>Upper-middle</td>
<td>3.9</td>
<td>6.6</td>
<td>4.3</td>
<td>14.7</td>
</tr>
<tr>
<td>Lower-middle</td>
<td>2.0</td>
<td>4.5</td>
<td>3.6</td>
<td>10.0</td>
</tr>
<tr>
<td>Low</td>
<td>0.2</td>
<td>0.5</td>
<td>0.4</td>
<td>1.1</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Africa</td>
<td>0.2</td>
<td>1.0</td>
<td>0.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Americas</td>
<td>2.0</td>
<td>4.7</td>
<td>2.6</td>
<td>9.4</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>0.8</td>
<td>1.3</td>
<td>1.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Europe</td>
<td>2.9</td>
<td>6.2</td>
<td>3.6</td>
<td>12.7</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>1.1</td>
<td>2.9</td>
<td>2.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>2.7</td>
<td>4.6</td>
<td>3.0</td>
<td>10.3</td>
</tr>
<tr>
<td>World</td>
<td>9.8</td>
<td>20.7</td>
<td>13.0</td>
<td>43.5</td>
</tr>
</tbody>
</table>
1Refers to the seven other broad categories of the health workforce as defined by the WHO Global Health Workforce Statistics Database, i.e. dentistry personnel, pharmaceutical personnel, laboratory health workers, environment and public health workers, community and traditional health workers, health management and support workers, and other health workers. A multiplier for “all other cadres” was developed based on the values of countries with available data. NB: absolute values are expressed in millions, rounded to the nearest 100,000. Totals may not precisely add up due to rounding.

18. Table 2 shows the needs-based shortages of health workers in 2013 and 2030 in countries below the SDG index threshold. Globally, there are more than enough health workers to meet the SDG index threshold, but due to the uneven distribution of health workers, there are countries in all income groups with needs-based shortages, including the majority of low- and lower-middle-income countries. “Surpluses” in countries above the threshold were not computed towards the accumulation of totals. Globally, the need-based shortage of health workers in 2013 was estimated to be about 17.4 million, of which almost 2.6 million were doctors, over 9 million were nurses and midwives, and the remainder other health worker cadres. While the largest absolute shortage is in South-East Asia (6.9 million) due to the large populations of countries in this region, the largest relative shortage (i.e. after taking into account population size) occurs in the African region (4.2 million). The global needs-based shortage of health-care workers is projected to still exceed 14 million in 2030 (a decline of only 17%). Hence, current trends of health worker production and employment will not have sufficient impact on reducing the needs-based shortage of health-care workers by 2030, particularly in the Africa region, where the needs-based shortage is actually forecasted to worsen, while it will remain broadly stable in the Eastern Mediterranean region.

Table 2: Estimates of health worker needs-based shortages (in millions) in countries below the SDG index threshold by region, 2013 and 2030

<table>
<thead>
<tr>
<th>Income group</th>
<th>2013 Physicians</th>
<th>2013 Nurses/midwives</th>
<th>2013 Other cadres</th>
<th>2013 Total</th>
<th>2030 Physicians</th>
<th>2030 Nurses/midwives</th>
<th>2030 Other cadres</th>
<th>2030 Total</th>
<th>Total Worker % change</th>
</tr>
</thead>
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<tr>
<td>High</td>
<td>0.0</td>
<td>0.1</td>
<td>0.0</td>
<td>0.1</td>
<td>0.0</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Upper-middle</td>
<td>0.1</td>
<td>2.6</td>
<td>0.9</td>
<td>3.7</td>
<td>0.2</td>
<td>1.4</td>
<td>0.2</td>
<td>1.8</td>
<td>-50%</td>
</tr>
<tr>
<td>Lower-middle</td>
<td>1.6</td>
<td>4.3</td>
<td>3.2</td>
<td>9.1</td>
<td>1.2</td>
<td>3.2</td>
<td>2.2</td>
<td>6.6</td>
<td>-28%</td>
</tr>
<tr>
<td>Low</td>
<td>0.8</td>
<td>2.0</td>
<td>1.7</td>
<td>4.6</td>
<td>1.0</td>
<td>2.9</td>
<td>2.1</td>
<td>6.1</td>
<td>33%</td>
</tr>
</tbody>
</table>

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<tr>
<th>WHO Region</th>
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<th>0.0</th>
<th>0.0</th>
<th>0.0</th>
<th>0.0</th>
<th>0.0</th>
<th>0.0</th>
<th>0.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>0.9</td>
<td>1.8</td>
<td>1.5</td>
<td>4.2</td>
<td>1.1</td>
<td>2.8</td>
<td>2.2</td>
<td>6.1</td>
</tr>
<tr>
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<td>7.6</td>
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</table>

NB: all values are expressed in millions, rounded to the nearest 100,000. Totals may not precisely add up due to rounding.

19. Table 3 shows that, by 2030, there will be a global aggregate demand for some 80 million health workers (in the 165 countries and territories with sufficient data to produce demand estimates), with the potential for the creation of approximately 40 million additional jobs (above the current estimated stock of 43.5 million in 210 WHO Member States and territories – see table 1). The additional jobs, however, will not necessarily be created in the regions and income groups where they are most needed to address SDG population targets. In the African region and in low-income countries, a modest growth in the capacity to employ workers will lead to a shortage in labour market based on economic demand, but both demand and supply will fall short of population needs. The figures in table 3 are not directly comparable to those of the preceding tables 1 and 2, as they refer to a different number of countries and territories (165 instead of 210).

Table 3: Estimates of labour market demand (in millions) for health workers in 2013 and 2030 (165 countries)

<table>
<thead>
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<th>WB Income group</th>
<th>2013 (165 countries)</th>
<th>2030 (165 countries)</th>
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<td><strong>80.2</strong></td>
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With regards to high-income OECD countries, our simulations indicate that, on current trends, most countries, while having a higher availability of health workers than the SDG index threshold, could face shortfalls of one or more types of HRH by 2030 in relation to their specific health service delivery profiles. In contrast, some high-income OECD countries may experience surpluses. Simulations sum to aggregate shortfalls against service requirements of about 750,000 physicians, 1.1 million nurses and 50,000 midwives across the 31 included countries for 2030. These estimates are however highly sensitive to even modest changes in the assumed future values of different planning parameters, including population growth, population health status, average levels of service provision, HRH productivity, and the training, participation, retention, and activity of HRH: scenario sensitivity analysis shows that by 2030 the shortfall compared to service requirements could be in excess of 4 million health workers (1.2 million physicians, 3.2 million nurses and over 70,000 midwives). 

**Discussion**

The estimates described in the preceding sections were developed on the basis of the best evidence and data available to WHO, which was nevertheless characterized by variability in both completeness and quality. Assumptions had to be made to overcome challenges relating to missing data; extensive use was made of modelling and imputation techniques, which are described in greater detail in the full analyses. Caution is therefore warranted in interpreting the findings: the results of these simulations should not be interpreted as predictions of what will happen; instead they are meant to show the directions in which the HRH situation is projected to be heading if current trends continue, and to identify the policy levers to influence these trends.

**Challenges**

Investment in the health workforce is lower than is often assumed (on average 33.6% of total government expenditure on health in countries with available data), hindering the sustainability of health systems. The chronic under-investment in education and training of health workers in some countries and the mismatch between education strategies and health systems and population needs result in needs-based shortages. Considering jointly the needs-based shortages of over 14 million health workers in countries currently below the threshold of 4.45 physicians, nurses and midwives per 1,000 population, and the shortfall against service requirements in high-income OECD countries (possibly in excess of 4 million), the aggregate projected global deficit of health workers against needs (defined differently in different contexts) could exceed 18 million (range: 16-19) by 2030.
These challenges are compounded by difficulties in deploying health workers to rural, remote and underserved areas.

23. Globally, 20 to 40% of all health spending is wasted,\textsuperscript{21} with health workforce inefficiencies responsible for a substantial proportion. For example, service organization models that place excessive reliance on specialists delivering curative care in tertiary settings are neither cost-effective nor responsive to population needs. In addition, weaknesses in transparency and accountability can lead to inappropriate use of resources, such as ghost workers artificially inflating health sector wage bills.\textsuperscript{22}

24. Policy reforms towards a more efficient and equitable allocation of resources are often challenged by special interests, such as protecting over-restrictive access to health professional education, or by well-intentioned but misguided macro-economic policies that, while aiming at promoting economic stability, can result in under-investment in health systems\textsuperscript{23} and in lost opportunities for job creation, economic growth and improved health outcomes.

Lessons learned

25. Past efforts in health workforce development have yielded significant results; examples abound of countries that, by addressing their health workforce challenges, have improved health outcomes.\textsuperscript{24,25} In reviewing past efforts in implementing national, regional and global strategies and frameworks, the key challenge is to mobilize political will and financial resources for the health system and its critical HRH component in the longer term.\textsuperscript{26,27}

26. Market forces in the health sector do not necessarily and automatically lead towards desirable health outcomes; health labour markets are an example of the potentials for market failure in the pursuit of social goals. Based on current trends, by 2030 the world would face a substantial and widening mismatch between health workers need, supply, and demand – tables 1 to 3. Evidence also indicates that private sector investment in health worker education and employment tends to cluster around the most remunerative professions and those marketable at the global level, rather than the primary health care workforce, which is most needed and effective in improving equity in access to essential health care services.\textsuperscript{28} It is therefore critical that public sector policies and investments directly address health labour market failures, better aligning supply of and demand for health workers to population health needs, and prioritize investment in the cadres that have the skills and competencies to meet the identified needs.

27. Past efforts on the health workforce have also revealed the limitations of approaches simplistically focused on scaling up health workers without taking into account health labour market realities. For instance, several low-income countries experience under-employment of doctors and nurses, yet they simultaneously invest substantial public funds in producing more, worsening underemployment and
reducing the efficiency of government expenditures. Conversely, effective strategies need to be targeted to the specific realities and conditions of the health labour market and to improving the productivity of the existing health workforce. These strategies should be accompanied by the establishment of social protection schemes to make health care affordable to the population, which can boost health system demand for health workers.

Policy options

28. In many high-income and upper-middle countries, economic growth and demographic trends will drive demand for health care for ageing populations and additional services. In many of these contexts, however, the supply of health workers will remain constrained—a mismatch that could raise the cost of health workers, fuel broader cost escalation in the health sector, and stimulate health worker mobility across borders. In these settings, relaxing barriers to entry into health training and health professions may be required, together with increasing both public sector and private sector investment in health education geared to a more efficient and responsive skills mix. Quality standards should be maintained and harmonized across public and private health education institutions and reinforced with effective regulatory mechanisms to protect the public from harm.

29. In low-income and some lower middle-income countries, on the other hand, both demand and supply will continue to fall short of population needs. In these contexts much-needed investments – from both the public and private sectors – in health worker education should be accompanied by an expansion of the fiscal space to create and fill funded positions in the health sector. Most funding should come from domestic resources. However several low-income countries and other settings affected by complex humanitarian emergencies will still require international development assistance for a few more decades.

30. Health workforce strategies should ensure that the expanded health resources envelope leads to cost-effective resource allocation. An important strategy to inform resource allocation will be to fully understand the health needs of populations in order to design care delivery models that are both effective and efficient. Specifically, deploying inter-professional primary care teams of health workers with broad-based skills should be prioritized to avoid the pitfalls and cost-escalation of overreliance on specialist and tertiary care. This requires adopting a diverse and sustainable skill mix, and harnessing the potential of community-based and mid-level health workers to extend service provision to poor and marginalized populations. In many settings, developing a national policy to integrate community-based health workers in the health system can enable these cadres to benefit from adequate system support and to operate more effectively within integrated primary care teams.
Implementation considerations

31. Technical and management capacities are needed to translate political will and decisions into effective implementation; just as capable clinicians and health professionals are needed, so are capable professional health managers, planners and policy-makers. All countries should have an HRH unit or department, reporting to a senior level within the Ministry of Health, with the capacity, responsibility and accountability for a standard set of core functions of HRH policy, advocacy, analysis, planning and governance, data management and reporting.\(^{34}\) Crucially, this capacity needs to be available at the appropriate administrative level: in federal countries, or those with a decentralized health workforce administration, competency, human capital and institutional mechanisms for the core functions described above should be built at the subnational and local levels.

32. Better HRH data and evidence are required as a critical enabler to enhance advocacy, planning, policy-making, governance and accountability at sub-national, national and global levels. All countries should invest in analytical capacity for HRH and health system data. This should be based on policies and guidelines for standardization and interoperability of available and appropriate HRH data, such as those given in the WHO Minimum Data Set\(^{35}\) to establish and implement national health workforce accounts.

33. In parallel with country actions, there are also opportunities to strengthen and streamline global HRH governance. For example, global health initiatives should establish mechanisms to ensure that all grants and loans include an assessment of health workforce implications. Their programmes should contribute to HRH capacity-building efforts at institutional, organizational and individual levels. The recruitment of general service staff by disease-specific programmes weakens health systems, and should be avoided through integration of disease-specific programmes into primary health care strategies and pre-service education. Emphasis should be given to increasing sustainable investment and support for HRH, including both capital and recurrent costs. The implementation of global normative and policy instruments, such as the WHO Global Code of Practice on the International Recruitment of Health Personnel\(^{36}\) and of the emerging Global Strategy on HRH: Workforce 2030, should be reinforced and accelerated.
Declaration of interest, funding sources

We declare that we have no conflict of interests. Funding for the analyses summarized in this policy briefing was provided by WHO (estimating needs-based shortages in countries below the SDG index threshold; modelling supply trends in relation to requirements in high-income OECD countries) and the World Bank (forecasting demand of health workers to 2030).
Annex 1: overview methodology to identify needs-based shortages of health workers.

The full methods and results of this analysis will be published in a forthcoming background paper to the Global Strategy on HRH: Workforce 2030. The following is a brief overview of the methods adopted.

To estimate each country’s current stock of health workers, we retrieved health workforce figures from the WHO Global Health Observatory, which was updated in 2014 and therefore reflects to a large extent data referring to 2013. Yearly workforce density (i.e. per 1000 population) data were obtained for 210 countries and territories. For each country, we calculated the population density of physicians and nurses/midwives for the most recent year (since 2008) for which there was data and adjusted the number to the 2013 populations of these countries. For countries with missing data on health workers (i.e., no values since 2008), we imputed numbers of physicians and nurses/midwives based on the median density of physicians and nurses/midwives for each of the four World Bank designated income groups.

The supply of physicians and nurses/midwives was projected to 2030 based on historical data on the increase in physician and nurse/midwives densities in each country. To forecast supply, a linear growth rate model was adopted, which assumes that the historical growth rate of physicians and nurses/midwives per capita for each country will continue into the future at the same rate each year.

Data points that represented obvious outliers due to misreporting were removed and replaced with missing data. Missing data points for physicians and nurses/midwives per 1000 population between any two real data points were linearly interpolated. The following equations were then estimated for each country from time $t = \{1990, \ldots, 2013\}$:

(Eq 1)  \[ \text{Physicians per 1000 population}_t = \alpha_0 + \alpha_1 \times \text{year}_t + \epsilon_t \]

(Eq 2)  \[ \text{Nurses/midwives per 1000 population}_t = \beta_0 + \beta_1 \times \text{year}_t + \epsilon_t \]

where $\epsilon_t$ is the random disturbance term and $\alpha_0$, $\beta_0$, $\alpha_1$ and $\beta_1$ are unknown parameters, with the last two parameters representing the linear growth rates to be estimated from the model.

The following rules were applied to predict future (2014 – 2030) values of worker densities:

- Where at least two data points were available, the estimated linear trend was extended into the future until 2030 using the estimated coefficients for $\alpha$ and $\beta$.
- If the estimated linear growth was found to be too large or too small, the country’s growth rate was replaced with aggregate medians, and then the median growth rate was applied to the last available observation for that country (i.e. most recent year).
- For physicians: If a given country’s linear growth rate was larger or smaller than 1 standard deviation from the mean growth rate for all countries, the median growth rate of a comparable group of countries was substituted.
- For nurses/midwives: for nurses, there was large over-dispersion of the linear growth rate distribution. Consequently, if a country’s linear growth rate was larger than 80% or smaller than 20% of the growth rate distribution, then the median growth rate of a comparable group of countries was substituted.
- For both physicians and nurse/midwives: If the predicted density in 2030 resulted in a negative number, these country’s growth rate was also replaced with the corresponding median aggregate value in a comparable group of countries.
- If there was just one point for a country (and thus linear growth rate could not be estimated), the same median substitution for the growth rate as described above was applied.
- When no observations were available before 2013 (i.e. no empirical data at all for both physicians and nurses/midwives), neither the physician nor nurse/midwives supply was projected. Instead, the mean 2030 predicted supply density across a comparable group of countries was substituted.
References


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