Counting health workers: definitions, data, methods and global results

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Background

Health services depend critically on the size, skills, and commitment of the health workforce. Yet, in many countries relevant information on health workers remain far from adequate limiting the capacity of governments to monitor access to adequately trained and motivated health workers in their respective jurisdictions. Many countries are now experiencing demographic and epidemiological transitions; these affect the demand for health service providers in these countries. Health sector reforms, globalization of the health labour market as well as new medical technologies and new models of care add extra dimension to this already expanding world-wide need for health workers. Accurate and timely information is therefore vital as stakeholders strive to assess the impact of these changes on the workforce and formulate and implement responsive strategies.

Owing to the critical importance of the health workforce, the World Health Organization (WHO) decided to dedicate its annual flagship report, the *World health report*, to the health workforce in 2006. To provide the information needed for the report and also address the international community's growing need for improved data, in 2005 the WHO Department of Human Resources for Health undertook intensive efforts to gain access to available data on health workers in all 192 Member States. This resulted in a more comprehensive and up-to-date global database on health workers than was previously available.

Counting the health work force has, however, several challenges [Dubois & Mckee 2006: 59-78; Diallo et al., 2003]. For one thing, the data had to be assembled from a variety of sources for which the quality of information, the manner of collection and the criteria for coding and categorizing are highly variable. In addition, there are differences in definitions between countries not only regarding health workers in general but also on specific health occupations. This background paper first describes the approaches followed in assembling the global database as well as some preliminary analysis of the content of the source data. We then proceed to briefly examine the broad picture – including number and characteristics – of health workers worldwide. In the final part of the paper, some useful strategies for improving health workforce statistics are highlighted.

Who are the health workers?

Reckoning the size and determining the characteristics of health workers require precise definition. While this has taken many forms in the past, depending on the task at hand, we define health workers as *all people engaged in the promotion, protection or improvement of the health of the population* [Adams et al., 2003: 276; Diallo et al., 2003]. This is consistent with the WHO definition of health systems as comprising all activities with the primary goal of improving health. Strictly speaking, this means that family members looking after the sick and other unpaid caregivers and volunteers who contribute to the improvement of health should also be counted as part of the health workforce, but these are not considered here or in the global database–not only for lack of information, but also because of the difficulty it poses with regard to establishing the boundaries of what constitutes a health system.

Even then, the definition of a health action for classifying paid workers is not straightforward. Consider a gardener employed by a hospital: the gardener's own actions do not directly improve health, although the actions of the employer – the hospital – do. Then take the case of a nurse employed by a manufacturing company to care for its employees: the actions of the nurse improve health, although the actions of the employer do not. A classification system that considers the actions of the individual alone, or those of the employer alone, cannot place them both in the health workforce.

In addition, the role of health workers varies across countries and their professions often have a different national history, culture and codes of practice. This means that any cross-national attempt to determine the size and core characteristics of the health workforce requires some level of harmonization of the available information. This can be facilitated in part by the use of the International Standard Classification of Occupations (ISCO), which provides a coherent framework for categorizing occupations and type and level of training according to shared characteristics [Diallo et al., 2003; Hoffman 2003].

Under ISCO, occupations are essentially organized according to two dimensions: skill level and skill specialization [Hoffman, 2003]. The former refers to the complexities of skills required for the job—but not necessarily the way the skills were acquired. On the other hand, skill specialization is related more to areas of knowledge required, such as subject matter, services produced or equipment used. This system of classification enables occupational titles to be pulled into a hierarchical four-digit system, which can be aggregated to progressively broader groups. However, for health occupations to be properly identified, the occupation data need to be coded to a degree of detail that minimally corresponds to the three-digit level; a four-digit system is needed to distinguish practitioner specializations.

Table 1. Example of a three-digit ISCO-88 system for the health industry, South African Census 2001

Core occupations	Type	ISCO code
Panel A: ISCO groups of health service providers		
Health professionals (except nursing)	Professionals	222
Nursing and midwifery professionals	Professionals	223
Modern health associate professionals (except nursing)	Associates	322
Nursing and midwifery associate professionals	Associates	323
Traditional medicine practitioners and faith healers	Associates	324
Panel B: Examples of other occupations involved in the health industry		
Computing professionals	Professionals	213
Social science and related professionals	Professionals	244
Administrative associate professionals	Associates	343
Secretaries and keyboard operating clerks	Clerks	411
Painters, building structure cleaners and related trades workers	Craft and related trades workers	714

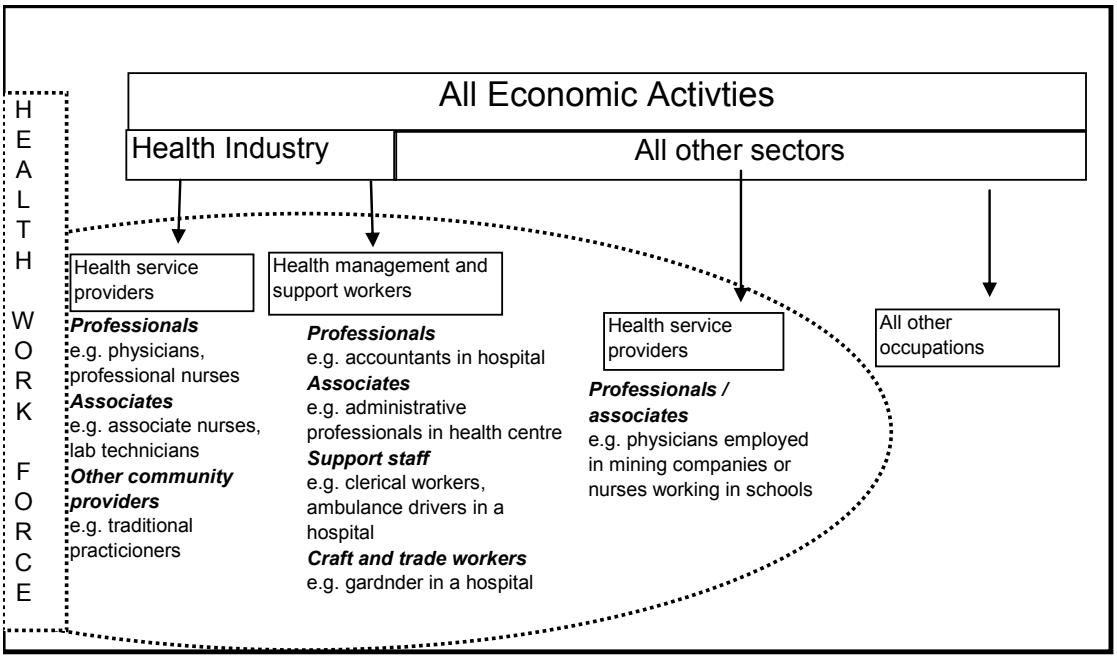
Panel A in Table 1 shows the health-specific occupational classification used in the South African census of 2001, which is typical of many countries using a three-digit ISCO coding system. Cambodia, the Philippines and Viet Nam are among the countries that have used similar three-digit classification systems in the 2000 round of censuses [United Nations 2006a]. Annex I presents the standard four-digit ISCO-88, while an example of a more elaborate classification of health service providers, exemplified by the Australian and New Zealand Standard Occupational Classification system, is presented in Annex II [International Labour Organization (ILO), 2006a and Australian Bureau of Statistics (ABS), 2006].

Apart from health service providers, there are many non-health trained workers in health industries, such as managers, computing professionals, trades people, clerical and service workers, who provide managerial and infrastructure support, as well as welfare professionals

for whom there is some overlap with health workers. Capturing these groups require consideration of all 10 major ISCO-88 groups and a cross-tabulation with industry of employment as applies to the International Standard Industrial Classification of all Economic Activities (ISIC) (UN 2006b). Panel B of Table 1provide examples of the various types of these workers included in the South African census.

This system of counting, therefore, allows us to distinguish between two types of health workers: health service providers and health management and support workers. The former includes professional and associate professionals as well as other less qualified health cadres engaged in the delivery of health services – whether personal or non-personal – while the latter are people who help the health system function but do not provide health services directly to the population. Box 1 summarizes this framework.

Box 1. Health work force classification



The global health workforce database: Sources and limitations

In assembling the global database, we begun by identifying potential data sources for each of the 192 Member States. Although none of the member states had a single and comprehensive database that provides information on all issues related to the health workforce, aspects of the size, distribution and selected characteristics of health workers in these countries can be determined from a range of readily available data sources. These include household and labour surveys, population and housing censuses, administrative records, health establishment censuses and/or facility surveys [Moore et al., 2005; Diallo et al., 2003].

- **Administrative records** (such as registers of professional associations and regulatory bodies and records of ministries of health, education and immigration) yield information on the number of health workers and their age, sex and skill mix . Administrative data have the advantage of generally being collected continuously. These records may not be exhaustive, however; they may also provide no data on income and on support and management staff in the health sector. In addition, as the purpose is administrative rather than statistical, the data often do not follow standard classification systems; they are irregularly processed and less widely disseminated for public use. The United Kingdom

General Medical Council (GMC) directory of medical practitioners and the Singapore Medical Council's (SMC) registration records are some examples of professional association databases [GMC, 2006; SMC, 2006].

- E**stablishment census/surveys** generally provide information on the number, age, sex and skill mix of health workers as well as of support and management staff. Such surveys, where they exist, tend to be made at regular intervals and to provide information on productivity. On the other hand, they may suffer from omission of some establishments and types of health workers, particularly those working outside of health facilities and the unemployed; they also tend to double-count those with dual employment Eckert et al., 2002; IBGE, 2002].
- **Labour force or other household surveys** provide information on the number of health professionals and associates as well as support and management staff engaged in the health sector and their age, sex and skill mix, as well as on employers of health workers, employment status and income. The International Labour Organization (ILO) identifies more than 130 countries where labour force surveys exist [ILO 2006b]. Such surveys are useful for detailed labour force analysis as long as the classification system used for the occupation is detailed enough to distinguish the various cadres of health care workers. Estimates based on such surveys may, however, suffer from sampling error. They have also limited use for sub-national analysis.
- **National population and housing censuses** provide information on the number of health professionals and associates as well as support and management staff engaged in the health sector and their age, sex and skill mix; on employers of health workers; geographical distribution; internal and international migration; unemployment; and income. A census is a useful tool for sub-national analysis, but it is conducted only every five or 10 years and takes a long time to process, which limits its capacity to provide timely information for decision-making. The United Nations Statistics Division [United Nations 2006] identifies 160 countries that have conducted a census once and 31 countries that have conducted a census twice during the 2000 round of censuses (1995–2004), although—as will be described shortly—only a dozen countries had occupation data with sufficient precision.

Figure 1 maps the sources of the health workforce data for each of the 192 WHO Member States.

Generally, when data were available from more than one source, we opted for the census as a first choice because it gives an inclusive picture, providing information on both health service providers and health management and support workers. However, there were not many censuses conducted on or after 2000 and based on a 4-digit ISCO system. As can be seen from Figure 1, only 12 countries had data that were recent and sufficiently detailed.

For a further three countries, the data used were from representative labour force or household surveys, collected as part of the Luxembourg Income (or Employment) Study (LIS/LES) [LIS 2006]. These surveys had detailed occupational categories as those found in census data; they are also based on the ISCO classification system or mapped to correspond to ISCO codes, which is useful for cross-national comparison. Other surveys available from LIS/LES did not have sufficiently detailed occupational classifications to distinguish the various health care cadres.

Figure 1. Sources of the global health workforce database

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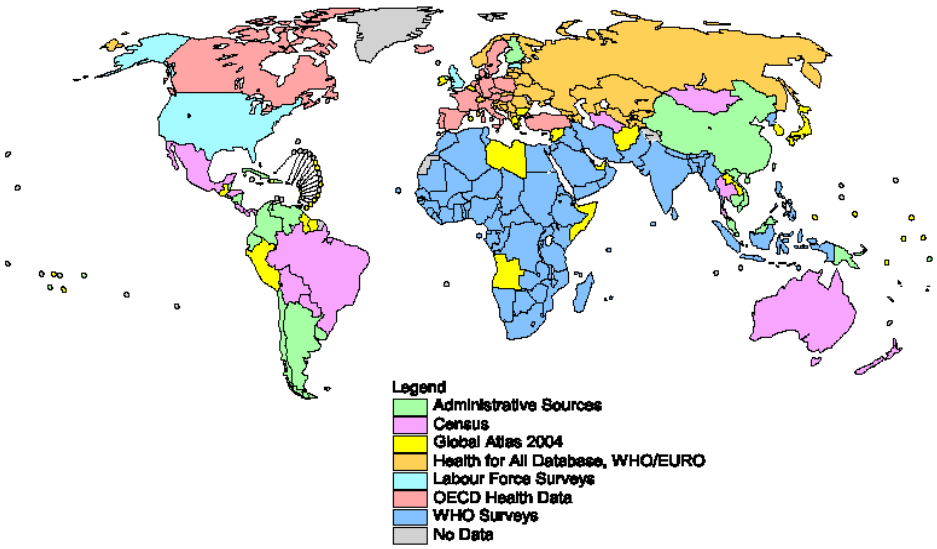


This map is an approximation of actual country borders.

WHO, 2005

For all countries in the WHO African Region (AFRO) (except Angola), 10 countries in South-East Asia (SEARO) and 14 countries in the Eastern Mediterranean Region (EMRO), the data were obtained from a special survey developed by WHO and executed through its regional and country offices. The WHO survey had two components, comprising modules for collecting data on health workers and on health training institutions. The health workforce instrument enabled us to collect, wherever available, information on the numbers and distribution of health workers according to such characteristics as gender, age profile, geographical distribution, sector of employment, citizenship status and level of unemployment. Classification mapping documents were also provided to help countries map national classifications of health workers to international classification systems, while maintaining some country-specific classifications for selected types of occupations. However, it should be noted that the exercise did not amount to collecting new data that were not previously available in these countries, but rather sought to compile existing data through a common framework.

For the remaining countries, data were obtained from miscellaneous sources: reports of the departments of health, lists maintained by public service commissions, the OECD health data, the European Health for All database or the previous version of WHO`s global database on the health workforce.

It is important to highlight the caveats around the new database. First, as mentioned earlier, the database does not include family members and other unpaid caregivers of sick people or volunteers who provide crucial services, primarily because current databases and measurement methods do not capture the contributions or roles of these people. In addition, no information is captured in the database on people who work for a part of their time to improve health, such as social workers working with mentally ill patients. We have also chosen not to include workers in other types of occupations who contribute in vital ways to improving population health, if their main function lies elsewhere. This category includes, for instance, police officers who

enforce seat-belt laws. Further details on the contents of the database are discussed in the following section.

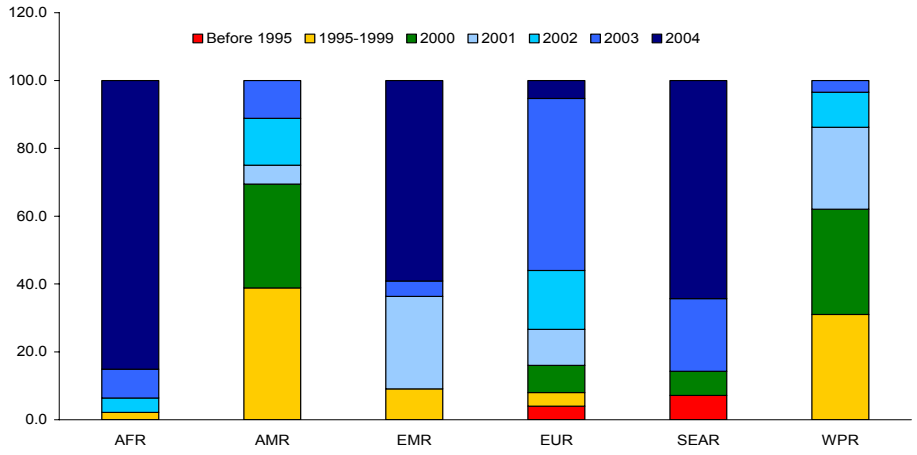
The global health workforce database: contents and features

To appreciate the potential of the global database for further analysis as well as identify areas that need future improvement, it is important that users are familiar with the features and contents of the database. Table 2 provides information on number of sources consulted in each of the 192 Member States to build the global health workforce database. This clearly shows the fragmented nature of the database. For most countries, the information was assembled from multiple sources for which the quality of information, the manner of collection and the criteria for coding and categorizing may vary. For example, for 18 of the 46 countries in Africa and for almost half of the countries in Europe (EURO) the data were drawn from two or more sources. In addition, even in instances where data were taken from the same type of source, for a significant number of countries the information does not always refer to the same period. For instance, we found that for about 31% of the countries in EURO, 18% in SEARO and some 10% in EMRO, the data were from more than one period.

Table 2. Sources of health workforce data for the 192 Member States by WHO regions

	Number of sources used to construct health workforce profile										
	1	2	3	4	5	6	7	8	9	10+	Total
AFRO	28	5	3	1	0	2	3	1	1	2	46
AMRO	35	0	0	0	0	0	0	0	0	0	35
EMRO	17	3	0	0	1	0	0	0	0	0	21
EURO	26	25	1	0	0	0	0	0	0	0	52
SEARO	8	0	0	0	1	1	1	0	0	0	11
WPRO	22	5	0	0	0	0	0	0	0	0	27
	136	38	4	1	2	3	4	1	1	2	192

Figure 2. Reference year of health workforce data by WHO regions



WHO: 2005

Although the information for a significant number of countries is of recent origin, for as many as 106 countries, the data apply to conditions in or before 2002 and of these the data for 33 countries refer to conditions prior to 2000 (see Figure 2). This brings both analytical and

conceptual challenges, particularly when one attempts to combine occupation-specific information for individual countries or compare the same result across countries.

Table 3 provides information on the number of health occupations captured in the database. Overall, this shows that in some 35% of the countries the database provides 16 or more occupational categories. The data from the Africa region are relatively more detailed – in 38 of the 46 countries the information includes 16 or more occupations. At the other extreme, only five out of the 27 countries in the Western Pacific region (WPRO) have information on six or more occupations.

As different sources of data provide different levels of dis-aggregation, it is important to note that the differences reported here may not necessarily reflect the absence of detailed data in these countries; it could simply reflect the differences in the sources of data obtained for these countries. For instance, as noted earlier, the information for most countries in the Africa region were obtained through a specialized survey that had a common framework of data collection and enjoyed significant assistance from WHO headquarters and the regional office; this may have assisted the collection of a more detailed occupational data in this region. This also applies to the Eastern Mediterranean and South-East Asian regions, where a similar measurement strategy was employed.

Table 3. Occupation categories captured in health workforce database for the 192 Member States by WHO regions

	WHO regions						Total
	AFRO	AMRO	EMRO	EURO	SEARO	WPRO	
Less than 6	1	27	9	47	0	22	106
6 to 15	7	2	0	3	2	2	16
16 to 30	28	6	10	2	6	2	54
31 to 45	5	0	1	0	2	1	9
46 to 60	3	0	0	0	1	0	4
61 or above	2	0	1	0	0	0	3
	46	35	21	52	11	27	192

Table 4. Availability of information on selected characteristics of the health workforce

	Number
Panel A: Countries with data on number of:	
Physicians	192
Nurses	191
Midwives	108
Dentists	188
Pharmacists	161
Laboratory Workers	73
Environment & Public Health Workers	70
Community Health Workers	40
Other Health Workers	84
Health Management and Support Staff	76
Panel B: Countries with data on *:	
Age distribution of health workers	65
Gender distribution of health workers	98
Geographical distribution of health workers	55
Public-private distribution of health workers	61
Unemployment	11
Total number of countries	192

Note: *Represents number of countries for which information is available for at least one occupation.

To provide a global overview of the health workforce without losing details that come with aggregation, we grouped the occupation titles in the database into 10 major categories: physicians, nurses, midwives, dentists, pharmacists, lab workers, environmental and public health, community health workers, other health workers and management and support staff. Annex III lists the occupations aggregated under each of these categories, while Table 4 provides information on data availability on the 10 occupations. Also shown in Table 4 is the availability of information on health workforce characteristics in Member States. This reveals that almost all countries have data on numbers of physicians, and a significant number also have information on dentists, pharmacists and midwives. On the other hand, only 76 of the 192 countries included in the database have data on health management and support staff.

There is also wide variation in the level of detail available from the database. Few countries have information on geographical, gender and sectoral distributions of health workers, as well as on public–private distributions and skill wastage (or unemployment). The absence of this information greatly hampers the formulation and implementation of relevant policies.

The 10 categories chosen for aggregate output represent a major improvement over the previously available global database on health workers, which had only five occupational titles. In fact, for some of these occupational titles, the current database allows even further disaggregation so that users will be able to distinguish health professionals separately from their associate counterparts and also identify some specific occupations – such as traditional birth attendants, clinical officers and medical assistants – that are vital to health systems in low-income countries. However, this does not apply to some occupations such as nursing and midwifery. In many countries the two typologies – nurses and midwives – are sometimes not easily distinguished, as they often have similar training; some countries do not even differentiate the cadres by specific names. For this reason, the data on nursing and midwifery should be treated with care, while further analyses of the database may consider combining the information for these two occupations.

The size, distribution and characteristics of the global health workforce: some results

Based on analysis of the new database, we estimate there to be a total of 59.2 million health workers (see Table 5). These are health service providers working in health and non-health industries, plus management and support staff working in the health industry. It is estimated that there are 39.5 million health service providers and more than 19.5 million health management and support workers. This gives roughly one management and support staff member for every two health service providers. The proportion is lowest in the Africa region (about 206 management and support staff members for every 1000 health providers) and highest in the Western Pacific region (about 745 for every 1000). The mix in the Eastern Mediterranean and South-East Asia is fairly comparable: both regions have roughly one management and support staff member for every 2.1 to 2.2 health providers.

Table 5. Estimated number of health workers by WHO regions, 2004

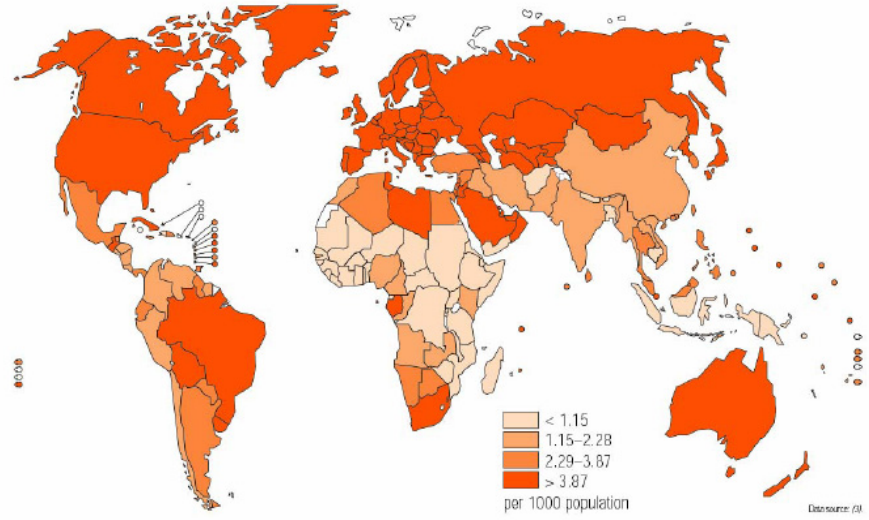
	WHO Regions						
	AFRO	AMRO	EMRO	EURO	SEARO	WPRO	All region
Health service providers	1.36	1.58	4.73	7.81	11.5	12.46	39.44
Health management and support staff	0.28	0.52	2.3	2.26	5.09	9.28	19.73
Total health workfroce	1.64	2.1	7.03	10.07	16.59	21.74	59.17
Management and support staff per 1000 health service providers	205.9	329.1	486.3	289.4	441.1	744.8	500.4

It is important to indicate here that the figures contained in the table need cautious treatment for at least two reasons. First, as the information for most countries is from non-census sources, health service providers working in non-health sectors and those engaged in the private sector are likely to be undercounted, because non-census sources often are less complete in providing information on these workers. Second, as few countries had information on health management and support workers, the number for countries without the relevant data had been estimated based on regional average with complete data; these estimates may not represent the actual situation of individual countries.

Figure 3 presents the density of three types of health service providers – doctors, nurses and midwives – across the 192 Member States. The density of health personnel, typically measured as the ratio of health workers to total population, expressed per 1000 inhabitants, is a simple yet highly informative measure of access to health service providers. Its simplicity arises from the manner of its calculation as well as its conceptual clarity; it also requires limited and often readily available data. However, as an indicator it also has some limitations of which users must be aware. For instance, just like other crude indicators, it does not take into account of population composition nor the influence this has on health seeking behaviour and service need.

The density estimates presented in Figure 3 show clear distributional imbalances: 29 of the 46 countries in the Africa region have fewer than 12 health care providers per 10 000 inhabitants, and only 4 – Gambia, Mauritius, Seychelles and South Africa – have 39 or more health providers per 10 000 inhabitants. The low density of health workers across Africa reflects Africa's inability to produce and retain enough individuals and the ready opportunities abroad, as well as the lack of incentives to remain in the region.

Figure 3. Density of health care providers (doctors, nurses and midwives)



This map is an approximation of actual country borders.

Further inequalities in the global distribution of health workers are illustrated in Figure 4, which provides the global burden of disease on the vertical axis and the percentage of the global health workforce on the horizontal axis. The size of the dots represents total health expenditure. The Region of the Americas, which includes Canada and the United States, contains 10 % of the global burden of disease; yet almost 37 % of the world's health workers live there and more than 50 % of the world's financial resources for health are spent there. Europe has a similarly disproportionate share of the world's human and financial resources for health.

In contrast, the Africa region bears more than 24% of the global burden of disease but has access to only 3% of the world's health workers and less than 1% of the world's financial resources, even when loans and grants from abroad are included. The Eastern Mediterranean region, which has 9% of the disease burden, has only 3.5% of the health workers and 1% of the world's financial resources. South-East Asia has the largest share of the world's burden, owing to its population, but only 12% of the health workforce and just over 1% of the financial resources. The Western Pacific region has more balanced distribution, with 18% of the global burden and 17% of the world's human resources for health, although there are major differences between countries in the region.

Figure 4. Health worker distribution by level of health expenditure and burden of disease, WHO regions

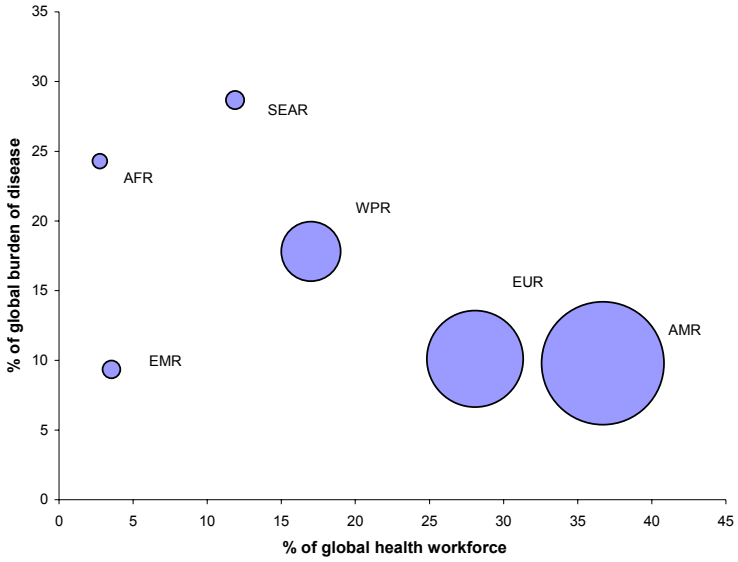
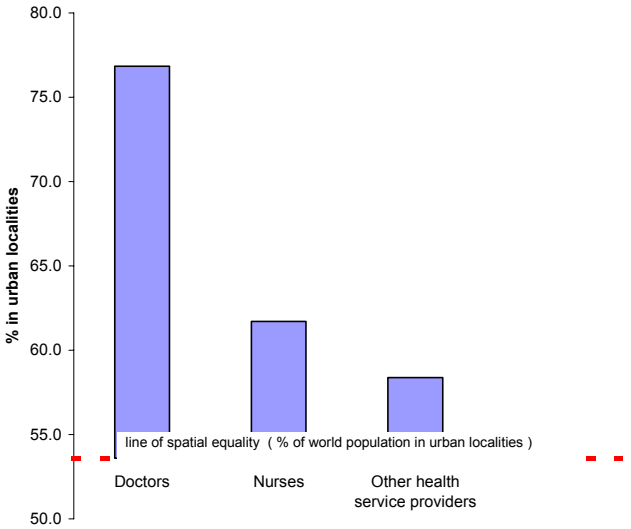


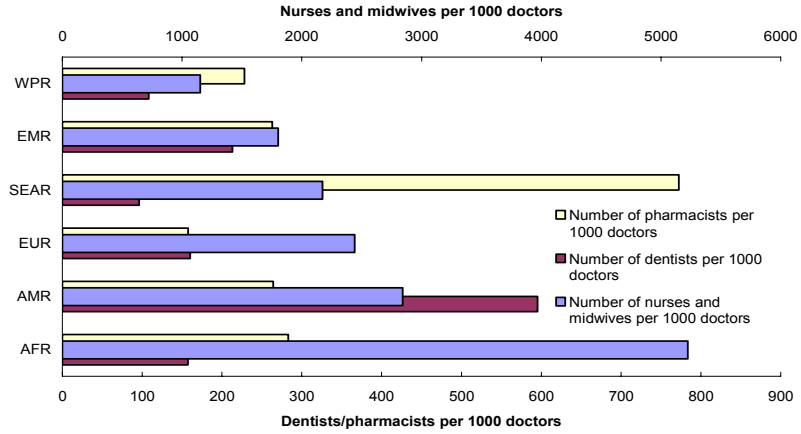
Figure 6. Rural–urban distribution of health service providers in selected WHO Member States



Within regions and countries, access to health workers is also unequal. This is particularly the case for doctors, as shown in Figure 5, where the dashed line shows that while fewer than 55% of all people live in urban areas, more than 75% of doctors, more than 60% of nurses and more than 58% of other health workers also live in urban areas.

Workers are not just individuals but are integral parts of functioning health teams in which each member contributes different skills and performs different tasks. There are no global standards on skill-mix applicable to all countries or institutional settings and it is a commonplace for countries to demonstrate diversity in the skill mix of health workers. Figure 5 shows the average mix of nurses, physicians, dentists and pharmacists in each of the WHO regions.

Figure 5. Skill mix of service providers: WHO Member States



WHO 2005

Figure 6. Gender, age and sectoral distribution

WHO 2005

Countries in the African region typically have higher nurse/physician ratios, while the ratio is lowest n WPRO, where there are as many doctors as there are nurses and midwives. As can be seen in Figure 5, there are more than five nurses and midwives for every doctor in the African region, and this ratio is between 2.5 and 3 in the Americas and Europe and less than 2.5 in the remaining regions. The relative availability of dentists is also particularly low in African and South-East Asian regions, while it is highest in the Americas. On the other hand, the relative availability of pharmacists is fairly comparable across regions, except in Europe and South-East Asia, where the ratios are respectively below and above the average for other regions.

Figure 6 shows further characteristics of doctors in countries where relevant data on age, sex and sectoral distributions are available. The data shows that more than 70% of doctors are males and the public sector is the major employer of these workers. The age distribution data indicate that the number of doctors entering the profession is slightly lower than those approaching retirement age, suggesting a possible diminution in the size of this workforce over time.

Concluding remarks

The current effort to compile a global database of health workers has yielded some new features. First, the database now includes information on more occupations than was previously available. For instance, the previous Global Atlas reported on only five professions: doctors, nurses, midwives, dentists and pharmacists. This is now extended to include additional health professionals engaged in promoting and preserving health, as well as management and support staff working in the health sector, providing a more complete picture of the global health workforce than hitherto available. Second, the database now captures less-fragmented and more recent and accurate data. The WHO survey conducted in three regions – Africa, the Eastern Mediterranean and South-East Asia – and the attempt to obtain more census data have contributed to the improvement in the quality of the present database.

However, given the dynamic nature of health service provision and the health labour market itself, continuous investment is needed to collect and update the global dataset. More must be done to minimize the fragmented nature of the database and to gather information on such basic characteristics as age, sex and geographical distribution of health workers, as these data could provide valuable information for workforce planning and decision-making. These efforts can be greatly assisted by the development of a common framework or tools for counting health workers and measuring indicators of productivity, skill wastage and mobility of health workers. Other potential methods should also be explored and considered, to continuously monitor the health workforce by keeping track of the production, retention and turnover of health workers at facility, local and national levels. Health workforce surveillance and health establishment censuses are some examples of such alternative measurement strategies. More work is also needed to understand the impact of health workers on health outcome in different settings or programs.

Further work is also needed to improve the classification of health workers. The International Labour Organization's 1988 revision of the ISCO classification system (ISCO-88) pools occupational titles into a hierarchical groups, representing a value set with respect to the type of work performed or to be performed, in terms of skills and tasks. However, considering the degree of generalization needed, neither the existing classification system nor the expected revised version are expected to capture the complexity and dynamics of the health labour market. Therefore, WHO should assess the possibility of eventually developing a "supplemental" international classification, after consulting countries and different interested parties.

Databases on health workforce are worth maintaining only if they are used to generate information and evidence that support policy decisions. The use of key health workforce

indicators is vital in this respect as they facilitate the conversion of data into information and evidence. However, there are few agreed-upon core indicators that are simple to implement and comprehensive enough to allow comparability and capture issues of interest to a wide range of stakeholders.

New tools, indicators and classification systems require competent staff with the capacity to use these instruments and collect, compile and analyse health workforce data. Because countries with the greatest need to strengthen their health workforce information often do not have the necessary staff, beyond developing these indicators and methodologies the development of capacity at country level is also equally crucial and needs equal attention.

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Annex I. International Standard Classification of Occupation-88: Health occupations captured at two-digits, three digits and four-digits level

Occupational titles	ISCO codes		
	2 digits	3 digits	4 digits
Life-sciences and health professionals	**22**		
Health professionals (except nursing)		**222**	
Medical doctors			2221
Dentists			2222
Pharmacists			2224
Health professionals (except nursing) not elsewhere classified			2229
Nursing and Midwifery professionals		**222**	
Nursing and Midwifery professionals			2230
Life-sciences and health associate professionals	**32**		
Modern health professionals (except nursing)		**322**	
Medical assistants			3221
Sanitarians			3222
Dieticians and nutritionists			3223
Optometrists and Opticians			3224
Dental assistants			3225
Physiotherapists and related associate professionals			3226
Pharmactual assistants			3227
Modern health professionals (except nursing) not elsewhere classified			3229
Nursing and Midwifery associate professionals		**323**	
Nursing associate professionals			3231
Midwifery associate professionals			3232
Traditional medicine practitioners and faith healers		**324**	
Traditional medicine practitioners			3241
Faith healers			3242
Additional health workers			
Psychologists			2445
Medical equipment operators			3133
Optical and electronic equipment operators not elsewhere classified			3139
Safety, health and quality inspectors			3152
Life sciences technicians			3211
Institution-based personal care workers			5132
Home-based personal care workers			5133
Personal-care workers not elsewhere classified			5139

Annex II. Health occupation classification according to Australian and New Zealand Standard Occupational Classification: An example of extended health occupation classification system

Occupational titles	ISCO codes		
	3 digits	4 digits	5 digits
Medical Practitioners	**231**		
Generalist Medical Practitioners		**2311**	
Generalist Medical Practitioners			2311-11
Medical Practitioner in training			2311-81
Specialist medical practitioners		**2312**	
Anaesthetist			2312-11
Dermatologist			2312-13
Emergency Medicine Specialist			2312-15
Obstetrician and Gynaecologist			2312-17
Ophthalmologist			2312-19
Paediatrician			2312-21
Pathologist			2312-23
Specialist Physician			2312-25
Psychiatrist			2312-27
Radiologist			2312-29
Surgeon			2312-31
Specialist Medical Practitioners not elsewhere classified			2312-79
Nursing professionals	**232**		
Nurse managers		**2321**	
Nurse Manager			2321-11
Nurse educators and researchers		**2322**	
Nurse Educator			2322-11
Nurse Researcher			2322-13
Registered Nurses		**2323**	
Registered Nurse			2323-11
Registered Midwives		**2324**	
Registered Midwife			2324-11
Registered Mental Health Nurses		**2325**	
Registered Mental Health Nurse			2325-11
Registered Developmental disability Nurses		**2326**	
Registered Developmental disability Nurse			2326-11
Miscellaneous Health Professionals	**238**		
Dental Practitioners		**2381**	
Dentists			2381-11
Dental Specialist			2381-13

Pharmacists	**2382**
Hospital Pharmacist	2382-11
Industrial Pharmacist	2381-13
Retail Pharmacist	2381-15
Occupational Therapists	**2383**
Occupational therapist	2383-11
Optometrists	**2384**
Optometrist	2384-11
Physiotherapists	**2385**
Physiotherapist	2385-11
Speech Pathologists	**2386**
Speech Pathologists	2386-11
Chiropractors and Osteopaths	**2387**
Chiropractor	2387-11
Osteopath	2387-13
Podiatrists	**2388**
Podiatrist	2388-11
Medical Imaging Professionals	**2391**
Medical Diagnostic Radiographer	2391-11
Radiation Therapist	2391-13
Nuclear Medicine Technologist	2391-15
Sonographer	2391-17
Dietitians	**2393**
Dietitian	2393-11
Natural Therapy Professionals	**2394**
Naturopath	2394-11
Acupuncturist	2394-13
Natural Therapy Professionals not elsewhere classified	2394-17
Other Health Professionals	**2399**
Audiologist	2399-11
Orthoptist	2399-13
Orthotist	2399-15
Health Professionals not elsewhere classified	2399-17
Counsellors	**2513**
Drug and Alcohol counsellor	2513-13
Psychologists	**2514**
Clinical Psychologist	2514-11
Occupational and Environmental Health Professionals	**2543**
Occupational Health and Safety Officer	2543-11
Environmental Health Officer	2543-13

Medical and Science Technical Officers	**311**	
Medical technical officers	**3111**	
Medical Laboratory Technical Officer		3111-11
Medical Technical Officers not elsewhere classified		3111-79
Enrolled Nurses	**341**	
Enrolled Nurses	**3411**	
Enrolled Nurse		3411-11
Additional health workers		
Medical Scientist		2115-11
Ambulance Officers and Paramedics	**3491**	
Ambulance Officer		3491-11
Intensive Care Ambulance Paramedic		3491-13
Dental Associate Professionals	**3492**	
Dental Therapist		3492-11
Dental Hygienist		3492-13
Dental Technician		3492-15
Massage Therapists	**3494**	
Massage Therapist		3494-11
Safety Inspectors	**3992**	
Safety Inspector		3992-11
Personal Care and Nursing Assistants	**6314**	
Personal Care Assistants		6314-11
Nursing Assistant		6314-13
Dental Assistants	**6391**	
Dental Assistant		6391-11
Dental Assistants	**6391**	
Dental Assistant		6391-11

Annex III: Health occupations mapped into the ten categories used in the WHR 2006

Annex III is available in Excel at the following address:
http://www.who.int/entity/hrh/documents/Annex_III.xls