THE WORLD MEDICINES SITUATION 2011

PHARMACEUTICAL HUMAN RESOURCES

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World Health Organization

GENEVA 2012
SUMMARY

- Pharmacy workforce shortages constitute a major capacity limitation to the provision of pharmaceutical services and access to medicines.

- Pharmacy workforce demand is likely to increase in the future. Pharmacy human resources are required to enable functionality of all aspects of the pharmaceutical sector and medicines use process, including research and development, manufacturing, distribution, procurement, regulation, supply, pharmacovigilance, rational use and adherence.

- There is a linear relationship between the size of the pharmacy workforce and medicines consumption, which is correlated to economic development. Wealthier countries tend to consume more medicines per capita and have more pharmacists per capita to manage pharmaceuticals.

- Pharmacy workforce planning should be considered when developing medicines policies and pharmaceutical services and integrated into broader human resources for health strategic plans.

- Interventions are required to build pharmacy education capacity to meet needs and improve workforce retention and distribution, develop comprehensive national human resource strategic plans and strengthen human resource information systems to inform planning.
1.1 INTRODUCTION

In 2006, WHO estimated a global shortage of 4.3 million health workers (1). Improving human resources for health has become a priority issue, especially for the 57 “crisis countries”1 that currently lack an adequate workforce to provide basic health services (1). Yet despite increasing demand for health services, investment in human resources, particularly in the public sector, has stagnated or declined over recent decades (1,2). Recruitment freezes due to budget constraints in many countries, but particularly those in sub-Saharan Africa, have meant that employment conditions and workforce levels may be worse now than they were 30 years ago in many low-income countries. After nurses and doctors, pharmacists represent the third largest single health-care professional group. Pharmaceutical human resources include all cadres that provide pharmaceutical services, such as pharmacists, pharmacy technicians, assistants and aids, among others. In many countries, shortages of pharmaceutical staff are often more pronounced than those of other health workers and are increasingly recognized as a barrier to the delivery of pharmaceutical services and access to medicines (3).

The issue of pharmaceutical human resources cannot be disengaged from that of pharmaceutical service provision. Pharmacy workforce planning and development should be linked to specific aspects of pharmaceutical service delivery. Available literature describes the impact of pharmacists on improving health outcomes, preventing hospital admissions, reducing medicines-related adverse events, ensuring the rational use of medicines and increasing access to medicines (4–13). Several studies have correlated clinical pharmacist staffing in hospitals with reduced mortality (14,15).

This chapter focuses on the pharmaceutical workforce, and describes current trends in its size and distribution, its relationship with medicines consumption, the links between pharmaceutical services and workforce planning, and the interventions required to address the current shortages. Issues relating to other health workforce cadres, such as physicians, nurses and community health workers, are outside the scope of this chapter but are described in depth in the literature. However, there are various commonalities (e.g. issues of poor workforce planning, shortages, high turnover etc.), as well as some key differences, between the pharmaceutical workforce and other cadres, which are important to note. They include the greater diversity of the labour market for pharmaceutical cadres, and lower workforce supply due to relatively fewer pre-service training institutions.

Until 2006, very little work had been done to examine the international pharmaceutical human resources situation, with policy and labour market analysis limited to select high-income countries. The recent work of the International Pharmaceutical Federation (FIP) sought to address this information gap, with the first Global Pharmacy Workforce Report published in 2006, and updates published in 2009 and 2012 (16,17,18). The 2009 and 2012 reports include country case studies that describe strategies to address priority human resource issues. Surveys from the 2009 Global Pharmacy Workforce Report form the basis of the analysis described in this chapter.

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1 Defined as countries with fewer than 2.5 health workers (physicians, nurses and midwives) per 1000 population.
1.2 PRESENT SITUATION: WORLDWIDE SHORTAGES IN THE PHARMACY WORKFORCE

1.2.1 The composition of the pharmaceutical workforce

The pharmaceutical workforce is primarily responsible for the delivery of pharmaceutical services and is usually described as comprising three cadre levels:

- pharmacists
- pharmaceutical technicians and assistants
- pharmacy aids.

In some countries, other health cadres and the informal sector (unregulated private sector) providers also offer pharmaceutical services. Pharmaceutical scientists, who are responsible for conducting research and adopting regulatory and strategic roles in pharmaceutical industries, academia and regulatory agencies, represent a relatively small component of the global pharmaceutical workforce.

In practice, pharmaceutical cadre titles and scopes of practice for each cadre vary significantly and not all levels exist in every country. Nevertheless, most countries classify their workforce into high-, mid- and low-level cadres in a manner that is consistent with the classification of other health-care cadres and accords with the three categories listed above, which are in the International Labour Organization (ILO) International Standard Classification of Occupations (19). Box 1.1 provides a more detailed description of each level.

1.2.2 The global pharmacy workforce

Despite growing demand for information to facilitate health workforce planning, there is very little published data on the status of the global pharmacy workforce (16). In recent years, a handful of countries, such as Australia, Canada, the UK and the USA, have embarked on projects and programmes to redress this gap, greatly raising the profile of the issues and the need to integrate pharmacy workforce planning into broader health workforce planning.

The only source of comparable country data and statistics on numbers of pharmacists and pharmacy technicians, their employment sector, education and regulation remains that produced by FIP, which to date has conducted 3 pharmacy workforce surveys, in 2005, 2009 and 2012 (16,17,18).

The 2009 FIP Global Pharmacy Workforce Report, at the time of this Chapter’s development, provided a comprehensive analysis of the pharmaceutical workforce. The chapter draws heavily from this evidence base, a compilation of survey responses from 56 participating countries, representing all world regions and income levels. Findings from the 2012 report support the same conclusions and recommendations as the 2009 report. The FIP report also examines the relationship between the pharmaceutical workforce and medicines consumption, in a bid to identify key challenges that may affect the delivery of pharmaceutical services in the future (17).

Size and distribution of the pharmacy workforce

There is a serious imbalance in the distribution of the pharmacy workforce worldwide. Human resources in sub-Saharan Africa in particular are grossly inadequate, despite the region shouldering 25% of the global disease burden. The density of pharmacists varies greatly between the countries surveyed. The lowest density was recorded in Chad (0.04 pharmacists per 10 000 population), the highest in Malta (18.88 pharmacists per 10 000 population).
Countries with the highest densities of pharmacists tended to have the highest densities of pharmacies. The correlation between the density of pharmacies and pharmacists is shown in Figure 1.1. Outliers can be seen where there are substantially more pharmacies than pharmacists (i.e. Nepal, Pakistan, Viet Nam) flagging the issue of appropriate supervision of pharmaceutical services.

The 2009 FIP survey sought information on both the total number of pharmacists and the number of actively practising pharmacists, in recognition of the fact that the former may not be a true reflection of the size of the active workforce. It should be noted that not all countries made the distinction when reporting their data. Although over half of the participating countries had a high proportion of active pharmacists (i.e. over 80% were actively practising), a handful of countries had a significant proportion of non-practising pharmacists in their workforce. In three countries the proportion of active pharmacists was below 60%, and in one case, Nepal, this proportion was just 46%. This finding may have significant implications for workforce planning.
**Composition of the pharmacy workforce**

Among the countries for which data are available, there is a large variation in composition of the pharmacy workforce, in terms of the skills mix. Several countries, such as Brazil, Japan and the Republic of Korea, do not have any pharmacy technicians or equivalent mid-level cadres (Figure 1.2). Elsewhere, pharmacy technicians or mid-level equivalents are an important part of the pharmaceutical workforce. In Pakistan, for example, pharmacy technicians account for nearly 75% of the workforce (Figure 1.2). The density of pharmacy technicians (number per 10,000 population) ranges from 0.005 in Chad to 9.4 in Turkey.

Analysis of the 2009 survey data also revealed marked variations in the gender mix of the pharmacy workforce, with the proportion of females varying from as high as 80% in the Czech Republic to only 20% in Uganda. In recent years, many countries have experienced a gradual feminization of their pharmaceutical workforce, a trend that has been attributed, at least in part, to the changing role of pharmacists (see Section 1.3). There has been a move away from a purely distributive function towards a more patient-focused, caring role for pharmacists and pharmacy technicians, a shift that is likely to make the occupation more appealing to women. The greater flexibility for part-time work is also likely to be a contributory factor to this pattern (17).

The 2009 FIP survey confirmed that the majority of pharmacies operate within the retail community pharmacy sector, with only a relatively small percentage located in hospitals (up to 10%). It is not surprising therefore that the majority of the pharmacy workforce is
FIGURE 1.2
Relative contribution of pharmacists and pharmacy technicians to the pharmaceutical workforce in 26 selected countries (%)

Source: FIP 2009 (17).

FIGURE 1.3
Pharmacist distribution by employment area by WHO region (%)

Source: 2009 FIP 2009 (17).
Note: error bars represent 1 standard deviation from the mean.
employed by the retail community pharmacy sector; on average, 58% of all pharmacists work in retail community pharmacies, 12% in hospitals, 12% in industry, 4% in research and academia, and 4% in regulation. Relative to these averages, fewer pharmacists are employed by the pharmaceutical industry in African countries (less than 5%), whereas in the South-East Asian region the pharmaceutical industry employs up to 55% of the pharmacist workforce. The pharmaceutical industry is a predominant employer in South-East Asia given the larger scale of pharmaceutical manufacturing and wholesaling companies compared with other regions (17).

1.2.3 Pharmacy workforce and medicines consumption

This section explores the relationship between the pharmacy workforce and the consumption of medicines by volume. Previous analyses of this type have relied on/used medicines expenditure as a measure of consumption (see the Chapters on Consumption and Expenditure). The use of medicines consumption measured by volume, in the form of standard units (each standard unit being equivalent to a single dose) as the comparator offers a number of advantages, not least a more accurate understanding of actual medicines use and of trends in medicines use between countries. However, there are certain caveats. For example, volume units may not always be equivalent between countries, data are incomplete for some countries and consumption may not reflect actual medicine taking.

The positive correlation between the Gross National Income (GNI) of countries and medicines consumption per capita provides context to this analysis, as both medicines consumption and human resources can be seen as a function of the economic status of countries. The positive correlation between the Gross National Income (GNI) of countries and medicines consumption per capita provides context to this analysis, as both medicines consumption and human resources can be seen as a function of the economic status of countries (Figures 1.4 and 1.5).

Figure 1.5 shows the positive correlation between medicines consumption and density of pharmacists, indicating that countries with the highest levels of medicines consumption also have higher pharmacist densities per 10 000 population. This indicates that the relationship between the pharmacist workforce and population is dynamic rather than static in nature, and is associated with the level of medicines consumption per capita. A fixed recommended global ratio of workforce to population would not be appropriate given the variations in per capita medicines consumption. The latter can in some cases be incorrectly used as a proxy indicator of workload. Medicines consumption per capita, and thus the volume of medicines to be managed through the pharmaceutical system and associated workload varies between countries. Furthermore, workforce models used to provide pharmaceutical services are hugely diverse and thus it would not be appropriate to set standard generic pharmacist or pharmacy assistant to population ratios. However, national ratios informed by national data and context may be of value.

Jordan and Kuwait appear to be unique given their relatively lower levels of medicines consumption yet high workforce density. Australia and Canada have 30% higher medicines consumption than the USA, though all countries have similar workforce densities. Japan has the highest level of medicines consumption and the highest pharmacist workforce density, almost double that of Australia, England/Scotland/Wales and Canada.

As countries move up the economic status ladder, they are likely to require a larger pharmacist workforce, due to the increased demand for medicines and associated pharmaceutical services. This demand may manifest as a consequence of the increased purchasing power of the population, and very possibly also as a consequence of an ageing population and increased chronic disease burden. This in turn is likely to further exacerbate the problem of workforce shortages.
FIGURE 1.4

Medicines consumption (units) per 10,000 population by Gross National Income per capita in 66 countries

Gross national income (GNI) adjusted for purchasing power parity (PPP) in US$.

FIGURE 1.5

Medicines consumption and pharmacist density per 10,000 population based on a survey in 30 countries

Source: FIP 2009 (17), and IMS Health statistics 2008.
1.3 RECENT CHANGES IN THE PHARMACY WORKFORCE

1.3.1 Size of the workforce

It is generally recognized that in some countries the pharmacy workforce is stretched and unable to provide basic pharmaceutical services (17). Global health initiatives have stumbled across capacity constraints in the roll out of HIV/AIDS, TB and malaria services, and point to the necessity of investment in workforce development (21).

Broadly speaking, two strategies are available to countries to expand their pharmacy workforce:

- **Increase domestic workforce supply** (through measures such as increasing exposure to undergraduates in hospital pharmacy, encouraging rural students to study pharmacy, supporting ‘re-entry’ into practice);
- **Active foreign pharmacist recruitment** (through bilateral agreements, sponsorship for immigration and licensure processes, casual, temporary and permanent contracts).

**Pharmacy education**

The balance of evidence, albeit somewhat limited, suggests that recent years have indeed witnessed a steady growth in the size of the pharmacy workforce in response to increasing demand for services (22). This has been accompanied by a parallel rise in pharmacy education that has increased domestic workforce supply.

Many countries have successfully increased their pharmacy workforce over recent years through measures to scale up pharmacy education (see Box 1.2). This is reflected in the rapid growth in the number of students and training institutions in many countries, including several sub-Saharan African countries (17). There has also been a tendency for pre-service pharmacy education to increase in duration (from four to five or six years at tertiary education level). A growing number of low- and middle-income countries (LMIC) have established formal continuing education programmes and systems for on-going professional development.

**Foreign recruitment**

Elsewhere, active foreign recruitment is still a major strategy, typically among some wealthier countries such as Australia, Canada, Kuwait, Qatar, Namibia, New Zealand, Singapore, Saudi Arabia and the United Arab Emirates. Such an approach does not lead to self-sufficiency and inevitably will have an impact on the workforce situation in source countries. High levels of demand for academics internationally may also increase attrition rates in source countries; the USA alone has an estimated need for 1200 additional academics over the next 10 years and active foreign recruitment continues to be a key recruitment strategy (23).

Pharmacist migration between less- and more-developed countries has been highlighted as a major concern, with an increase in mobility observed over 1995–2005. Over this period, there has been an increase in the number of foreign pharmacist registrations in Canada (Figure 1.10) and Australia (Figure 1.11) (16). However, in recent years a decline in migration of pharmacists outside of the European Union has been observed in the UK due to the implementation of new immigration and professional recognition policies, and significant expansion of domestic workforce supply.
While there has been limited systematic examination of the demand-side factors influencing the increase in the need for pharmacists in countries, the themes identified in an analysis of the pharmacist labour market in the UK over the past five years may be applicable in other middle- and high-income country contexts. The three main demand-side drivers stimulating the increased need for human resources in the UK have been identified as:

- health-care expansion with more services tailored to an ageing population and growth in therapies for previously untreatable conditions;
- changes in the organization of pharmaceutical services including a wider range of services and longer hours of service;
- professional quality assurance to satisfy patient safety imperatives (28).

In Ghana, there has been a 40% increase in the pharmacist workforce overall and an 80% increase in the number of public sector pharmacists over the period 2001–2005 (16). This increase is attributed to the expansion in pharmacy student numbers at the school of pharmacy. However, workforce levels have since stabilized and have not increased significantly beyond the level in 2005 due to workforce exit (attrition) matching workforce entry. Two new schools of pharmacy have been recently established in Ghana, which has doubled the annual pharmacy student intake from 120 to 240.

In Kenya, public sector vacancies were mostly filled by 2008 with an increase in the public sector pharmacy workforce by 40% from 2005 (17). Between 2002 and 2008, the pharmacist workforce increased by 50% from 1866 to 2775 and the pharmacy technologist workforce increased by 66% from 1399 (2002) to 2324 (2009). Much of this growth is due to the expansion of pharmacist (one to three schools) and pharmacy technologist (one to 18 colleges) education over the last five years.

Over the last 10 years, the pharmacist workforce in Sudan has more than doubled to 5890 (24). Twenty students formed the first graduating cohort in 1968, now there are 13 pharmacy schools graduating around 900 pharmacists per year.

Five new schools of pharmacy opened in Viet Nam in provincial areas, with significant Government investment in pharmacy education to scale up pharmaceutical human resources (25). With a target density of 1 pharmacist per 10 000 population, schools of pharmacy have been set higher quotas for training, such that most institutions more than doubled their output in 2009 (2130 graduates) compared with 2007 (817 graduates). As in a number of other countries, Viet Nam has instituted new pharmaceutical policies and legislation over the past 10 years, such as the Drug Law and Good Pharmacy Practice. These sought to accompany capacity increases with improvements in the quality of pharmaceutical services.

Mid-level cadre expansion has taken place in several countries, following the development and expansion of training programmes. Examples include pharmacy assistants in Namibia, pharmaceutical technologists in Kenya and pharmacy assistants and technicians in South Africa (16,17,26). Kenya has also recently established degree programmes that enable pharmacy technologists to further train as pharmacists (17). The professional body of pharmacists (AQFU) in Uruguay implemented the first formal system of training for pharmaceutical assistants in 1994.

The reduction of hospital pharmacy vacancy rates in Australia between 2001 and 2003 may be partly due to the expansion of pharmacy education. One Australian state that had a four-fold increase in the number of pharmacist graduates observed a reduction in vacancies from 23% to 2% over this period (27).
1.3.2 Other emerging workforce trends/patterns

Recent years have seen a move away from a purely distributive function towards a more patient-focused, caring role for pharmacists and pharmacy technicians. Pharmacy education reform has been observed in many countries, with a shift in the focus of pharmaceutical services towards pharmaceutical care roles. In Uruguay, for example, pharmacy education recently underwent a major reform to reorient the curriculum from a traditional industrial content towards a health-care focus (29).

Expansion in the scope of practice of pharmacists to encompass roles such as medicines use review, health promotion, public health and prescribing was also observed, as well as that of mid-level cadres, such as pharmacy technicians, into dispensing, compounding and management roles (24).
The feminization of the workforce and associated rise in part-time employment has been observed in many countries, which raises the importance of gender sensitive human resource policies and planning (24).

Inequitable distribution of the workforce within (rural versus urban) and between countries has continued to manifest in many instances (24). Little progress has been made in the recruitment and deployment of the workforce in rural areas. In Uganda, it was estimated that public sector pharmacist availability in 2005 was only 30% of what was required, a shortage compounded by the significant distribution imbalance where three quarters of the population is only served by 10% of the pharmacist workforce (16). In 2005 in Ghana, around 60% of the pharmacist workforce in the public hospital sector were in regions that only serve a third of the population (16).

In South Africa, pharmacists from rural areas were more likely to work in rural areas and public sector hospitals than those from urban areas (30). Pharmacy students from rural areas were also found to be more likely to practice in a rural area with 70% of graduates in one rural pharmacy school in Australia commencing their career in rural or remote areas (31). Final year medical and nursing students in Ethiopia that were from richer families and with lesser motivation to serve the poor were less likely to work in rural areas (32).

Generally, an ageing population with higher levels of medicines consumption; the retirement of the ‘baby boomer’ generation; and growing feminization of the workforce with a tendency for women to work fewer hours; have in recent years affected workload and workforce levels and will continue to do so in the future (16,17).

1.3.3 Pharmacy human resource development strategies

This section describes, in more detail, some of the strategies for human resource development that have been employed in different countries to increase their workforce supply and improve recruitment and retention of trained pharmacy staff.

Expanding workforce supply through pharmacy education and training

Pharmacy education is expanding rapidly worldwide to address workforce shortages (17). In sub-Saharan Africa, countries have shown growth in the number of students and training institutions. However, the shortage of academic capacity within the region threatens to curtail this growth and destabilize existing institutions, which not only lack human resources but also lack a conducive physical infrastructure and core educational resources. The Global Pharmacy Education Taskforce (see Box 1.3) was launched in 2008 with the aim of catalysing actions to develop pharmacy education, particularly in countries with the greatest workforce shortages (33-35,7,39,41).

In many settings, capacity building is necessary in order to maintain and develop workforce competencies and so improve performance across the sector. Although short courses have been funded and delivered by international organizations to address skills gaps in certain areas, for instance in the delivery of antiretroviral therapy (ART) and supply chain management, it has been recognized that sustainability in medicines supply can only be achieved by developing local in-country capacity (36). “Training the trainers” is often an effective strategy, particularly if conducted within the framework of a wider support network of pharmacists working across the community in collaboration with academia. Workplace-based learning programmes offer more practical modalities for training and competency development over traditional courses necessitating study leave.
The need for competency-based workforce development applies to all roles, from researchers (Box 1.4) to district pharmacists (Box 1.5). A strong pharmaceutical science background is also necessary in order for pharmacists to undertake roles in pharmaceutical regulation, manufacturing, quality assurance and policy.

According to a recent European analysis, gaps in education and training are currently one of the key bottlenecks in the pharmaceutical R&D process (38,39). Areas in which skills shortages were considered to be especially acute include risk assessment/management, pharmacology, statistics, pharmaceutical medicine, imaging, bioinformatics and holistic systems approaches. Today’s globalized and highly specialized field of pharmaceutical science places ever increasing demands on its workforce, requiring researchers to operate in a multidisciplinary, complex environment and interact with a wide variety of partners from different backgrounds. A growing multiplicity of scientific disciplines is involved in pharmaceutical R&D, from mathematicians for building pharmacokinetic and pharmacodynamic models right through to clinical practitioners. This makes integrated approaches in education and training (see Box 1.4) even more important and also indicates a clear need for generic skills such as communication, management and team work (40).

Improving workforce retention

Retention of the workforce, particularly in the public sector and in rural areas is a major concern. While some studies, such as a small study of pharmacists in Sudan, have found that the majority of public sector respondents planned to leave for the private sector, predominately for economic reasons, non-economic factors are important such as the lack of recognition in the public sector cited in this particular study (42). Factors beyond economic reasons were also identified in a nine-country survey that found that pharmacists who plan to migrate long term (i.e. for more than 2 years) tend to have more negative attitudes towards the professional and sociopolitical environment of their home country and more positive attitudes towards the perceptions of opportunities abroad (43).
Some countries describe particular challenges in retaining the recently qualified workforce, such as a paper from Australia that found that pharmacists in Australia with two to five years of hospital experience were least represented in the workforce, possibly due to the lack of retention strategies targeted to newly-qualified pharmacists (27). One state in Australia improved the retention of younger pharmacists by increasing the pay scale of pharmacists at all levels (27).

However, as mentioned above, available literature suggests that remuneration is not the only factor for retention, with other factors such as workforce levels and competency, management support for pharmacy practice, professional development opportunities and access to further training cited as incentives to stay (48). Almost 80% of private sector pharmacists in a study in Sudan had considered moving into the public sector due to the perception of greater job satisfaction (42).

Organizational climate, culture and conditions of work are also important determinants of retention. Half of the USA pharmacists who intended to stay in their positions indicated flexible schedules as a key factor with the most common reasons for retention including good salary and relationships with colleagues (49). Similar reasons were given by pharmacy
Roles and competencies of district pharmacists: case study from Cape Town, South Africa

Author: Hazel Bradley, University of Western Cape, South Africa

In 1994, South Africa’s first democratic government introduced major health reforms, favouring a shift towards a primary health-care approach based on a district health system. This shift had implications for human resource development as district pharmacists were appointed to manage district-wide pharmaceutical services. While the new role of district pharmacist provided pharmacists with opportunities to be part of the primary health-care team, it also proved challenging and somewhat frustrating, with a lack of clarity of roles and gaps in skills and capacity to deliver services. In response to this, research was initiated to identify roles and competencies of district pharmacists in Cape Town, an urban metropolitan city in South Africa with a population of about 3.8 million.

During 2008, consultations with eight opinion leaders, from Cape Town and two other provinces in South Africa, triangulated with the published and grey literature, identified the following key roles for district pharmacists:

- Planning, management, coordination and monitoring of:
  - medicines (selection; supply, distribution and storage; rational prescribing and use)
  - pharmacy human resources (management and development)
  - pharmaceutical budget;
- advice and support on professional, legal and technical aspects of pharmaceuticals to: health managers, health workers, health programmes, nongovernmental organizations (NGOs), private providers and consumers;
- participation in quality assurance and clinical governance of pharmaceutical services;
- participation in research activities related to medicines and pharmaceuticals services.

The competencies identified to perform these roles were classified into four competency clusters:

- management competencies (planning; organizing, leadership, financial, human resources);
- health system/public health competencies (health systems, health programmes, information systems);
- professional pharmacy practice competencies (legal and regulatory pharmaceutical care, technical pharmaceutical skills);
- personal and interpersonal competencies (problem solving, time management, relationship building, networking, teamwork, communication, adaptability, assertiveness, computer literacy).

This information could assist South Africa, and countries with similar health systems, to elucidate the roles of district pharmacists in delivering pharmaceutical services and to identify the training and development needs of pharmacists to perform these functions optimally.
The following strategies have been used by countries to improve pharmaceutical workforce retention:

- **financial incentives**: remuneration, bonuses, allowances, housing, pay parity with other sectors/comparable cadres;
- **non-financial incentives**: professional development, mentoring, support network, career structure, recognition, performance appraisal and feedback, access to information, advocacy;
- **conditions of work**: flexible hours, rotations, shared-staffing, staff support, workload, work environment.

Studies suggest that all strategies influence retention and may be most effective when used in combination (48,52–54).

**Addressing rural workforce shortages**

The negative perception of rural pharmacy practice and rural lifestyle has been identified as a barrier to the recruitment and retention of pharmacy staff in developed and developing countries alike (see also Section 1.3.2). To counteract this perception, further opportunities for exposure of students to the potential benefits of rural practice is recommended (55). Pharmacists working in rural areas of Australia have reported experiencing enhanced job satisfaction, despite negative perceptions, due to community linkages with patients, inter-professional relationships and undertaking extended roles (55).

Australia has instigated a successful rural pharmacy programme, targeting recruitment of pharmacists to rural areas (scholarships, allowance), retention of pharmacists (emergency locum service, continuing education allowance) and expansion of access to pharmaceutical services in rural communities and hospitals (pharmacy start-up allowance, rural pharmacist and assistant scholarships) (54). This approach seeks to address the economic, professional, educational and family disincentives (Table 1.1).

<table>
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<tr>
<th>Examples of strategies</th>
<th>Disincentive addressed</th>
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Source: FIP 2009 (54).

A review of interventions to improve the density of the health workforce in rural and remote areas found supportive evidence for selection and education strategies but limited evidence of long-term benefit of more coercive strategies (e.g. mandatory service) despite their short-term benefits (56). Sharing pharmacist posts between rural hospitals is another way of maintaining a level of service in cases of national workforce shortages, though this may...
be impractical in very remote and widely dispersed rural areas (57). In Sudan, significant urban–rural distribution imbalances persist, despite growing unemployment levels among trained pharmacists. This has been attributed to the lack of available positions despite the need (24). More generally, the lack of career opportunities for family members and schools for children may also be a major barrier to recruitment and retention in rural areas.

**Automating dispensing**

Automating dispensing may improve the efficiency, quality and safety of care and is a strategy that has been used in some countries to good effect. For instance, centralized automated dispensing has been used in Cape Town, South Africa, to minimize the workload associated with dispensing chronic care medicines in selected townships (58,59). However, it has been argued that a critical level of workforce is needed to manage such technologies and that the technologies themselves cannot supplant the need for a trained pharmacy workforce, only enhance the performance of the pharmacy services (60). Moreover, the capital and maintenance costs of such technologies are likely to be significant. A comparative study of pre- and post-implementation of a robotic prescription-filling system in a hospital pharmacy in the USA indicated that although overall prescription-filling times were reduced, use of the robotic system necessitated a greater proportion of pharmacy technician time, implying that effects on skill mix would need to be taken into account (61).

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**BOX 1.6**

**Formalizing informal sector providers**

*Author: Ogori Taylor, WHO Country Office Nigeria*

In order to bridge the gap resulting from an inadequate number of pharmacists and pharmacy technicians, some countries authorize informal providers to supply pharmaceutical services. In some regions, particularly in sub-Saharan Africa, the informal sector is often the main supplier of medicines, with informal providers far outnumbering the formally-recognized pharmaceutical cadres. The poor and remote rural populations in particular rely heavily on informal drug sellers for primary care due to their accessibility, responsiveness to customer needs, convenient opening times, and favourable credit facilities (62–67).

The informal sector providers comprise a heterogeneous group, ranging from trained nurses to those with no formal schooling or training (1,68–71). They typically sell medicines in grocery stores, or from kiosks, commercial vehicles or market stalls. Authorized sellers are usually required to obtain annual permits to sell over-the-counter (OTC) medicines in their original packaging from the manufacturer. In many countries, however, a significant proportion of the informal sector providers are unauthorized, operating beyond the law and selling “prescription-only” medicines dispensed from bulk packages (72–74).

In many cases, the health information provided by informal sellers may be inaccurate or misleading (71,75–79). The medicine management skills of some are deficient as they store and handle medicines under poor conditions (66,72,73,80) and label medicines inadequately (66,71). Sometimes they have been found to sell substandard or even counterfeit medicines (73,81–84).

Acceptance of these informal medicine sellers in the provision of medicines has been controversial. Proponents argue for the opportunities their numbers, geographical spread, and acceptance by poor populations offer in improving access to management of common illnesses (85–88). Opponents believe that they encourage the misuse of medicines with the development of resistance to antimicrobials among other problems (89).
Recent years have seen various attempts to improve the knowledge, skills and
competencies of providers in the informal sector in order to enhance the quality and safety
of pharmaceutical services they offer. However, interventions based on capacity building,
demand generation and quality assurance/accreditation are generally considered to be
unsustainable as they are either donor- or research-driven (74, 85–88, 90, 91). Licensing
requirements are deemed to be unable to assure the quality of services and utility of the
medicine sellers (69).

Although attempts to introduce a degree of regulatory control in the informal sector have
so far been largely unsuccessful, the reality is that informal providers cannot be ignored
and strategies to formalize their contribution need to be devised. One way to achieve this
is to require providers to undergo pharmacy technician or assistant training and so formally
incorporate them into the pharmacy workforce. Other options include defining required
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**1.4 FUTURE CHALLENGES AND PRIORITIES**

The global demand for pharmacy human resources is likely to increase in the future as
countries improve their economic status and consumers gain greater purchasing power,
resulting in higher levels of medicines consumption and increasing demand for more labour
intensive pharmaceutical services to support rational use of medicines and adherence. Thus
workforce shortages and distribution imbalances are likely to persist unless policy action is
taken to implement strategies to develop the workforce.

Current trends in sub-Saharan African countries are of particular concern. Here the low
density of both pharmacies and pharmacy workforce constitutes a barrier to access to
medicines, particularly in rural areas. Investment is urgently needed in order to strengthen
both pharmacy education capacity and retention levels, ideally within a strategic pharma-
aceutical human resource framework.

Few countries have attempted to project future national workforce needs and even fewer
have national pharmacy workforce strategic plans. Many countries express a growing need
for pharmacists, although the composition of this need varies depending on the specificities
of the national labour markets and pharmaceutical service needs. The UK estimates that
it will require 38% more pharmacists by 2013, with the greatest need in retail community
pharmacy and academia (92). In contrast to the projections for the USA, the requirement
for pharmacists in tertiary care (i.e. the National Health Service) was projected to be met by
future workforce supply trends, indicating greater self-sufficiency in generating domestic
workforce supply for pharmacists in tertiary care than in the USA (28).

A 2002 conference suggested that the absolute pharmacist workforce in the USA needed to
increase by 75%, from 240 000 by 2020 (93). Although it was considered that fewer pharma-
cists would be required for dispensing, as many as five times as many pharmacists (relative
to 2001 levels) would be required to provide cognitive services in primary, secondary and
tertiary care (94). However, only modest increases would be required for tertiary care if
the workforce was focused towards provision of core pharmaceutical services with proven
impacts on health outcomes, such as in-service education, drug information, adverse drug
reaction management, drug protocol management, medical rounds and admission drug
histories (95). The growing prevalence of chronic diseases, which often necessitates increas-
ing medicines consumption, more complex therapies, monitoring and management, may
also factor into the growing demand for human resources; a trend of particular significance
in LMICs.
There is a need to connect the human resources and the pharmaceutical services development agendas through the development of national pharmaceutical human resource policies that are integrated into broader human resources for health plans (see Figure 1.8).

**Pharmacy workforce planning**

In planning pharmaceutical service development, corresponding attention to the relevant dimensions of workforce planning is necessary. The development mechanism should be context-specific but should take into account these common considerations. A conceptual framework for pharmacy workforce planning and development describes three dimensions that are linked to specific aspects of pharmaceutical service delivery (Figure 1.8) (96). The service level, the technical level at which services are provided, is determined by workforce competency. The service coverage (hours, facilities) is linked to the workforce size and distribution. The service scope (range of specialized services) is dependent on workforce capacity (skill mix, supervision, working environment).

The goal of equitable provision of pharmaceutical services (and thus access to medicines) cannot be pursued without redressing the significant pharmaceutical human resource challenges that manifest in most countries. Appropriately distributed adequate numbers of pharmaceutical human resources with the necessary mix of competencies are vital to the functionality of any pharmaceutical system.

Demand-side drivers (e.g. growing medicines consumption and expanding pharmaceutical sector markets) have promoted an increase in the pharmaceutical human resource requirements in many countries. This is particularly significant in low-income countries where the capacity to increase workforce supply is the most limited yet medicine consumption (and thus pharmaceutical service need) is likely to increase in the future. The result will be an inadequate response to labour market needs in the pharmaceutical sector unless deliberate investments into pharmaceutical human resource planning and development are made.

Key stakeholders in the workforce planning process include government departments (ministries of health, education, and finance), training institutions, professional and regulatory bodies, consumer groups and employers (private and public sector). A coordinated and cohesive approach with clearly defined roles for each stakeholder is necessary to the long-term success of any pharmaceutical workforce policy. The incentives and barriers for the
Workforce competency (service level) to ensure the performance of a workforce in providing services at every competency level

- Competency frameworks define and describe the required knowledge, attitudes, values and behaviours and delineate levels of competence associated with a core set of pharmaceutical services. These can be used in planning curriculum and scopes of practice for each cadre and at a human resource management level to guide continuing education and performance assessment.
- Pharmacy education should be needs-based and oriented to support the development of required competencies, should be assessed and reviewed on a regular basis.
- The development of a clear career pathway should be linked to different levels of competency with the possibility of progression between levels aids in motivating performance and retention.
- Performance management is an important mechanism for ensuring professional quality assurance and the appropriate translation of competencies into daily practice. The development of policies for performance management and guidance for performance appraisals are key to ensure equity, transparency and fairness.

Workforce size and distribution (service coverage) to provide adequate human capacity to support equitable access to pharmaceutical services

- Adequate and sustainable financing over the mid to long term (5–10 years) to support adequate training infrastructure, the extension of payroll and institute measures to improve retention. The commitment of ministries of finance is key. Dependence on donor funds to support salaries should be avoided unless mid- to long-term commitments can be assured.
- Workforce supply may be increased by scaling up the domestic production of human resources or introducing policies to attract foreign workers (often not sustainable). National human resource policies should avoid dependence on foreign workers where possible, particularly those from countries with existing workforce shortages. Expansion in enrolments in training institutions should be phased with the level of training capacity. Establishment or expansion of private sector training institutions, including investment to expand post-graduate education for lecturers and teacher training, (e.g. work-place based or distance education, resource sharing with other training institutions or research facilities). The rate of expansion should take into account the labour market dynamics and absorption of new graduates.
- Pharmaceutical human resource needs have not been well defined outside urban areas. A rural recruitment strategy should be developed which provides a package of incentives to attract the workforce into under-served areas avoiding lengthy and bureaucratic recruitment processes. One example is the use of an external agency to expedite recruitment.
- Retention strategies, which include a package of both financial and non-financial incentives, including performance management strategies, and flexible workforce policies that are gender sensitive, can have an impact on improving retention. Attrition should be examined through local research in order to inform an effective retention policy.

Workforce capacity (service scope) to ensure appropriate workforce capacity to provide the required scope of services

- The skill mix of pharmaceutical human resources should be appropriate to needs to optimize performance. A competency framework to aid planning and effective supervisory systems can both help in redressing skill mix imbalances.
- The working environment should be conducive to the provision of safe and quality pharmaceutical services. Basic infrastructure and equipment may also be required in order to adequately provide a service (e.g. chemotherapy, compounding and anticoagulant therapy). Good Pharmacy Practice policies may provide guidelines for basic requirements including support and supervision, and risk and environment assessment, given the potential impact of errors on patient safety.
participation of each stakeholder in the policy process should be analysed in each country context in order to identify suitable strategies for implementation.

Several policy considerations are briefly described here under each dimension of human resource development (Box 1.6). These provide an introduction to policy considerations that should be taken into account in the development of a national human resources policy and plan.

### Evidence-based human resource planning

Several countries have embarked on or are in the process of developing an evidence base (workforce situational analysis, workforce studies) to inform national pharmacy human resource planning (17). Great Britain (England, Scotland and Wales) has completed a series of workforce census studies and has developed an evidence-based pharmacy workforce model to project future needs (28). Canada recently undertook comprehensive studies of the pharmacy technician and pharmacist workforce and is developing a national pharmacy human resource information system (97).

Human resources information systems are important not only for strategic planning purposes but also for service development in terms of human resource management and for the purposes of understanding the distribution of human capacity to deliver pharmaceutical services. The starting point for the development of a human resources policy should be a reliable and recent situational analysis of pharmaceutical human resources within a country. Ideally, the analysis would include an assessment of domestic training capacity and an evaluation of human resource management. In addition, any initiative to strengthen pharmaceutical human resources should be supported by human resource information systems, which provide a means of monitoring the development of trends and of assessing progress, and are invaluable for informing future planning.

Pilot assessments of pharmaceutical human resources were conducted in 2009 by WHO in the African Region (e.g. Nigeria, Ghana, Sudan and the United Republic of Tanzania), with a view to informing pharmaceutical human resource strategic plans. Generic tools for situational analysis have been developed by WHO and were published in July 2011 ([http://www.who.int/medicines/areas/coordinatio](http://www.who.int/medicines/areas/coordinatio/hrp_tool.pdf)) (20).

To date, research in the area of pharmaceutical human resources development has been limited and further empirical efforts are required to examine and evaluate the success of strategies implemented across different contexts. In order to identify key issues, workforce modelling to project future requirements should take into account data on supply and attrition, and identify key demand- and supply-side issues.

In conclusion, pharmacy workforce supply, recruitment and equitable deployment and retention remain serious challenges to pharmaceutical systems development in any context. Interventions to address these challenges should focus on building pharmacy education capacity, improving workforce retention and distribution, developing comprehensive national human resource strategic plans (that are gender sensitive) and strengthening human resource information systems to inform planning.
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ABBREVIATIONS

AIDS Acquired immunodeficiency syndrome
ART Antiretroviral therapy
EMRA European Medicines Research Academy
FIP International Pharmaceutical Federation
GNI Gross National Income
HIV human acquired immunodeficiency syndrome
ILO International Labour Organization
LMIC Low- and middle-income countries
NGO Nongovernmental organization
PPP Purchasing power parity
R&D Research and development
TB Tuberculosis
UNESCO United Nations Education, Scientific and Cultural Organization
WHO World Health Organization