2009 FIP Global Pharmacy

Work-force report

Colophon

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This report together with the questionnaire and data from the 2009 FIP Global Pharmacy Workforce Survey are available for electronic download from: www.fip.org/hr

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Contents

Foreword

The International Pharmaceutical Federation is pleased to present the 2009 Global Pharmacy Workforce Report. This report expands on the findings of the first 2006 report to examine the workforce situation in more countries, describe significant trends which continue to face workforce development and identify pertinent challenges which must be addressed in order to ensure the equitable access and appropriate use of safe, effective and quality medicines as well as pharmaceutical services. This report also draws on the country experiences relating to workforce development in seven countries to explore the challenges and strategies employed to address these and their outcomes.

This report was only possible with the support of over 100 contributors across 56 countries from pharmacy professional and regulatory bodies, schools of pharmacy, research centres, agencies and pharmaceutical service providers who generously gave their time to obtain data and shared their experiences in pharmacy workforce development. I would like to express FIP's sincere gratitude to these contributors.

The consequences of under-investment in building pharmaceutical human resource capacity, particularly in health workforce crisis countries, are ill afforded and there is increasing consensus that the failure to address severe workforce shortages has the potential to undermine attempts to improve access to and rational use of medicines.

With this report, FIP urges Member Organisations and important stakeholders such as Ministries of Health, Ministries of Education and training institutions, to seek collaborative and coordinated mechanisms to plan comprehensively and implement pharmacy workforce development. We hope that this report will serve as a valuable evidence based instrument to stimulate further research, discussion and policy action.

Kamal K Midha C.M., Ph.D., D.Sc
President
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Part 1: Key messages

- Healthcare facilities cannot operate without medicines. The availability of both medicines and a pharmacy workforce in adequate numbers with appropriate competencies is crucial to ensuring a well functioning pharmaceutical system.

- There is a general trend towards pharmaceutical care and patient focused roles for pharmacists which have spurred reforms in pharmacy education and practice. Changing roles have also driven an increase in pharmacy workforce demand.

- The capacity to provide pharmaceutical services in each country is dependent upon having an assured competent workforce and a similarly integrated academic workforce to train sufficient numbers of new pharmacists and other support staff at both basic and enhanced levels.

- Fifty-seven countries, 36 of which are in sub-Saharan Africa, have a health workforce crisis. The human resources for health crisis is a threat to the delivery of health services and the attainment of the Millennium Development Goals.

- Many countries continue to experience shortages of pharmacists and marked urban-rural distribution imbalances despite general increases in pharmacy workforce levels over time.

- Pharmacy workforce density varies considerably between countries and is associated with economic development. African countries have both low densities of pharmacists and pharmacies.

- Pharmacy technicians form an important component of the pharmacy workforce, comprising up to 75% of the pharmacy workforce in some countries. The development of the pharmacy technician workforce and roles may serve as an important strategy to support the changing roles of pharmacists.

- Ensuring mechanisms for assured practitioner competence (and ultimately performance) is now a key goal for pharmacy education policy. Systems and Continuing Professional Development (CPD) support should be oriented to enable competence-based lifelong development for all practitioners

- Pharmacy workforce planning should aim towards self-sufficiency and be integrated into broader health workforce planning. They should encompass all cadres providing pharmaceutical services and be aligned to local needs. The planning process should be informed by reliable workforce data, evidence on factors and issues affecting the workforce and comprehensive workforce modelling.

- Strategic partnerships between stakeholders such as Ministry of Health, Ministry of Education, training institutions, professional bodies, regional and international organisations, amongst others, have been shown to be valuable in enabling progress in pharmacy workforce planning and development, regulation, and reform in education and practice.

Part 2. Introduction

Authors

Claire Anderson, Marion Schaefer, Rebecca Buckle Nordor, Janet Cooper, Craig Pedersen, Pharmacy Workforce Working Group, Board of Pharmacy Practice, FIP.

Summary

- Many countries worldwide experience a shortage of pharmacists and distribution imbalances within countries.
- There is a need for comprehensive pharmacy workforce development modelled on local needs and circumstances.
- To support growth in the establishment of pharmacy practice and its aspiration for increased patient focused care, workforce needs and other trends (increasing number of prescriptions, increasing trend of part-time work, etc) will need to be factored into workforce and pharmaceutical service development plans.

Reports of shortages of the health workforce had surfaced in the 1970s but it was not until the following decade, and in particular the publishing of The World Health Report in 2006 that health workforce issues gained sufficient momentum to merit widespread investigation and international action to bring about changes.[1] This report was a major driving force for expansion of the international health workforce in order to meet the health related Millennium Development Goals.

Pharmacists represent the third largest healthcare professional group in the world after nurses and doctors. The Global Health Workforce Alliance was established to accelerate progress towards these goals by identifying and implementing solutions to the shortages.[2] The international shortage of healthcare professionals exists in different severities and has different root causes dependent on the particular health profession and the country of origin. However, due to the increasing overlap of professional roles and collaborative working it is essential that countries work with all health professionals when developing workforce plans. The healthcare priorities differ between countries and a universal health system or workforce model would invariably not provide the required healthcare efficiently to all those that need it. For pharmacy the degree of shortage and the subsequent impact on pharmacy services depends on the roles that the pharmacy workforce (pharmacists and pharmacy technicians) play in each country. These vary from largely distributive functions to patient care roles where a greater workforce density is required. Although in many countries pharmacists are aspiring to greater caring roles.

The World Health Report 2006 calls for action on a wide range of human resources issues, including higher training output, better employment practices and the management of migration. It states that there are three main factors at work; the number of health workers, the distribution of health workers and wider policies.[1]

Until recently there has been very little workforce research or policy analysis about pharmacy and lack of data has probably led to oversight of pharmacy in health workforce planning. Recent work in Australia, Canada, Great Britain and the USA and the 2006 FIP Global Pharmacy Workforce and Migration report has added to our understanding of the issues.[3-8]

WHO advocates for a 'working life span' approach to systematically developing strategies to develop the health workforce.[1] The WHO states that there is a need for comprehensive policies that support pre-service education and performance as well as managing attrition. In many countries worldwide there is a shortage of pharmacists and inequity in the distribution of the workforce within countries.

Figure 1 indicates the inequalities in the distribution of the pharmacy workforce worldwide highlighting the countries particularly affected by workforce shortages, particularly in sub-Saharan Africa. In this cartogram, the country size is representative of the country's share of the global pharmacy workforce, i.e., countries that have a smaller share of the pharmacy workforce have a smaller geographical representation and vice versa.[9]

Figure 1. Geographical representation of the share of the world's pharmacy workforce (pharmacists, technicians, assistants.[9]

Quality of health workers in general is a determinant of the health status of a population. Health system resources including medicines will be wasted and misused if not managed by adequately trained and motivated health workers. Furthermore pharmacists, like other health workers are often concentrated in urban settings whereas rural and remote settings lack basic health care. Additionally there is distribution in favour of the private sector as compared to the public sector which accelerates inequity within the health system particularly in developing countries. Furthermore the burden of HIV/AIDS has had a major effect on the health workforce, many of whom have contracted it and on the workload in developing countries.

The size of the workforce depends on a number of issues, including the number in the labour market of working age, the participation rate of those who are working, and the availability of those no longer working but who may return to pharmacy employment. It is also important to examine the health and retirement age of pharmacists.[8] Other priorities may include identifying the levels, causes and implications of turnover among different cohorts of pharmacists; the adequacy and suitability of undergraduate training; examining the job satisfaction levels, career aspirations, motivations of pharmacists and pharmacists' commitment to their job, career, organisations and to the pharmacy profession; and ensuring ethical recruitment.

There is a need to develop models for comprehensive pharmacy workforce referring to local need and circumstances based on the number of practitioners needed and skills required to provide services. The numbers of professionals are not distributed to meet local and regional needs. The developed economies appear to be very attractive for health professionals to work in, because of high professional satisfaction and high incomes. This leads to migration from developing to developed economies. However even in developed economies there is often a shortage of pharmacists and allied staff, for example. Survey results show that the majority of the USA's population live in areas that report at least a moderately high difficulty in filling vacant pharmacy positions. About 10% of pharmacy positions in Canada were

vacant in the year 2000. There are concerns that the excess demand for pharmacists is undermining the slow progress and development of clinical pharmacy. Rural areas in Canada, Australia and New Zealand find it difficult to recruit younger pharmacists and are served by pharmacists who are looking to retire in the next ten years.

The current developments in pharmacy practice, its diversification as well as its aspiration for increased patient orientation will have an impact on the pharmacy workforce. Further aspects include the structure of the pharmacy workforce in various practice and administrative settings and a differentiating approach with regard to the international arena and different structural and legal conditions in developed and developing countries. Furthermore aspects such as increases in the volume of prescriptions; growth of population over the age of retirement; increased use of technology in the medicines supply process, such as electronic transfer of prescriptions, robotic-aided dispensing and automated stock control, the advancement of biotechnology and personalised medicine; changing business models for example the corporatisation of community pharmacy in Europe and the US, greater administrative requirements for handling third-party payments; changing roles of pharmacists; changing career patterns of pharmacists; the growing proportion of women in the profession who are less likely to work full time for their whole career span; changes in attitudes of generation X and generation Y compared to previous generations, and the global economic climate will all affect the pharmacy workforce.

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Part 3. Global pharmacy workforce description

Author

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Summary

- The 2009 FIP Global Pharmacy Workforce Survey (English, French, Spanish) and data for 56 countries are available for download from www.fip.org/hr.
- Pharmacy workforce density varies considerably between countries and is associated with economic development.
- African countries have both low densities of pharmacists and pharmacies, indicating limited access points to facilities providing access to medicines and skilled human resources to manage these. Several countries have many times more pharmacies than pharmacists, flagging the issue of appropriate supervision of pharmaceutical services.
- The proportion of the workforce that is actively practicing may be as low as 55%. Human resource information systems should be able to determine the proportion of the workforce that is active in order to inform workforce planning.
- Pharmacy technicians form an important component of the pharmacy workforce in many countries, comprising up to 75% of the pharmacy workforce. Several countries do not have any pharmacy technicians.
- The majority of pharmacists are employed in community retail pharmacy, followed by hospital, industry, research and academia and regulation. The distribution across sectors varies between countries though regional trends can be observed.

3.1 Introduction and methods

The 2009 FIP Global Pharmacy Workforce Survey was conducted between September 2008 and April 2009. FIP Member Organisations, respondents to the 2005 FIP Global Pharmacy Workforce Survey together with other contacts for professional bodies, regulatory bodies and universities were approached to provide data. The questionnaire was developed in collaboration with the FIP Collaborating Centre, School of Pharmacy, University of London and the FIP Board of Pharmacy Practice Working Group on Pharmacy Workforce. The questionnaire sought data relating to pharmacy education, workforce and relevant regulations for both pharmacists and pharmacy technicians. The questionnaire was administered online in English, French and Spanish. The dataset was cleaned and checked with respondents before being prepared in spreadsheet and SPSS for analysis. The questionnaires and data files are available for download from www.fip.org/hr.

A total of 56 countries responded to the questionnaire, an increase on 34 respondent countries in 2005 (Table 1). These 56 countries represent approximately half of the world's population. There was an increase in the number of countries responding from some regions with an increase in Africa from 5 to 10, Eastern Mediterranean region from 2 to 7, and Americas from 4 to 10 between 2005 and 2009. This may be due in part to the questionnaire being available in other languages for the first time. Findings should be interpreted with care as they are not necessarily representative of all countries, however significant trends and associations can be observed in the dataset.

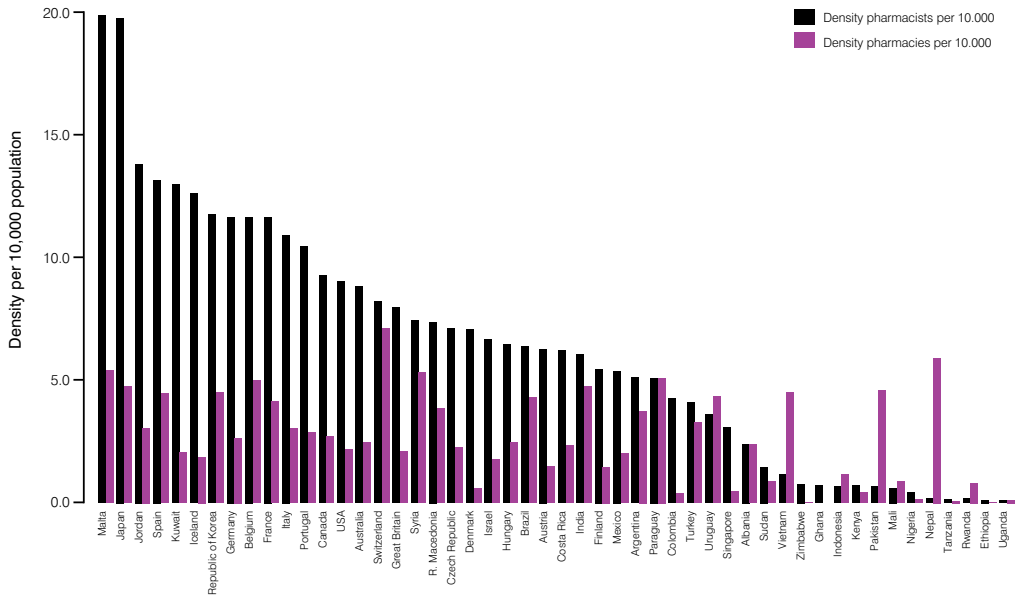
Table 1. Respondent countries (56)

WHO Region	Countries
Africa *(10)*	Ethiopia, Ghana, Kenya, Mali, Nigeria, Rwanda, Tanzania, Chad, Uganda, Zimbabwe
Eastern Mediterranen *(7)*	Egypt, Iraq, Jordan, Kuwait, Pakistan, Sudan, Syria
Europe *(21)*	Albania, Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Iceland, Israel, Italy, Malta, Portugal, Republic of Macedonia, Serbia, Spain, Switzerland, Turkey
Pan- America *(10)*	Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Mexico, Paraguay, Uruguay, USA
South East Asia *(3)*	India, Indonesia, Nepal
Western Pacific *(5)*	Australia, Japan, Republic of Korea, Singapore, Vietnam

3.2 Global overview: Workforce and pharmacy density

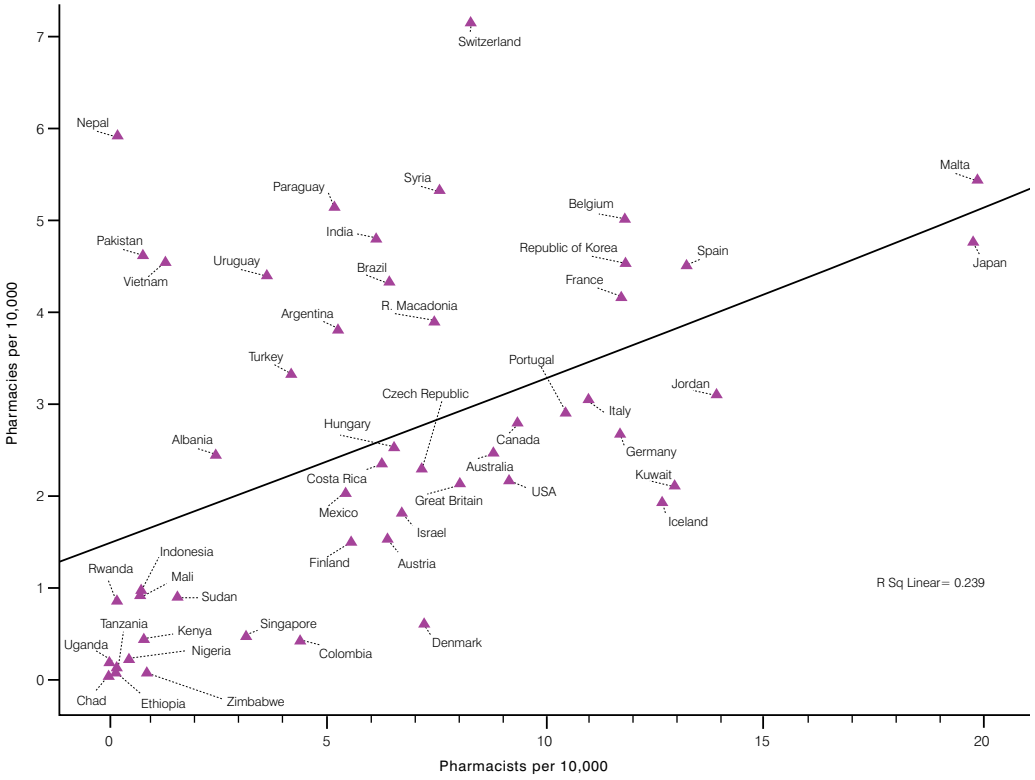
The density of pharmacists per 10,000 population varies greatly between countries ranging from 0.04 (Chad) to 18.88 (Malta). Figure 1 presents the density of pharmacists (total) and pharmacies (total including community, hospital, etc) per 10,000 population. In most countries, there is a greater density of pharmacists than pharmacies. Several countries have many times more pharmacies than pharmacists (Uruguay, Vietnam, Pakistan, Nepal, Rwanda), flagging the issue of appropriate supervision of pharmaceutical services.

Figure 1. Density of pharmacists and pharmacies per 10,000 population (50 countries)



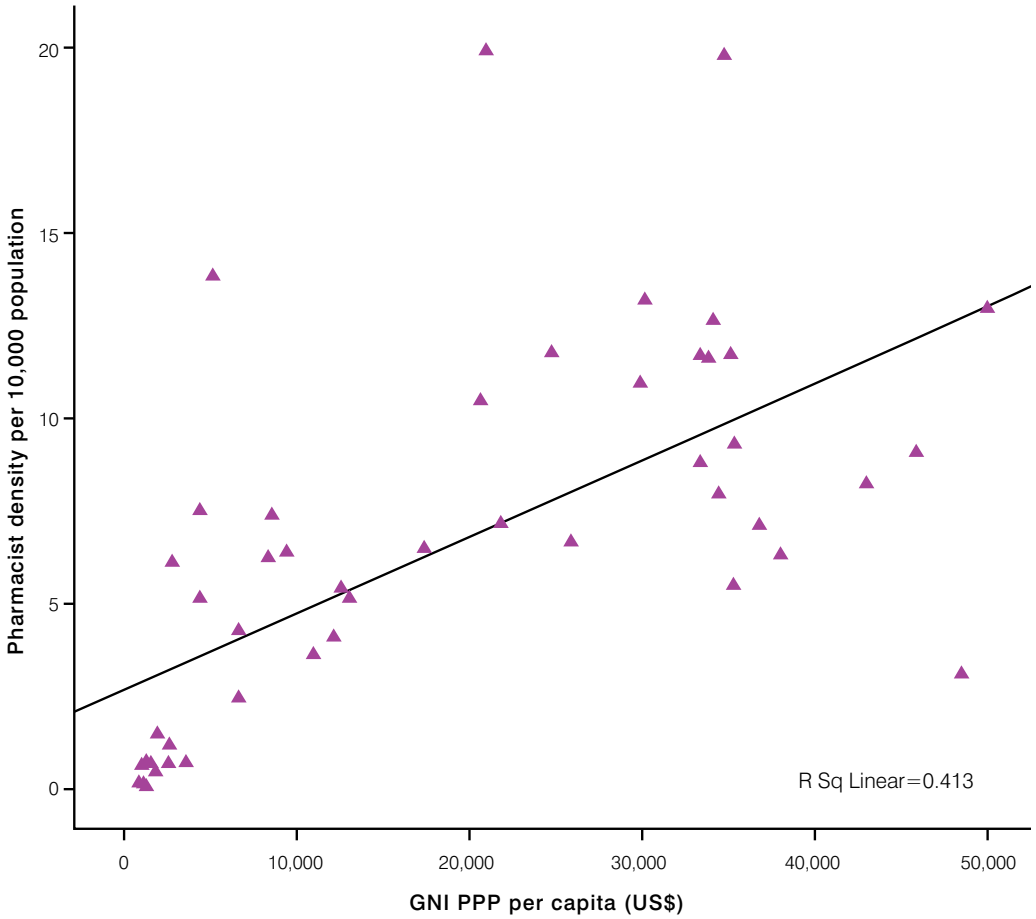
There is a positive relationship between the density of pharmacies (facilities that dispense medicines) and pharmacists (Figure 2). Countries with higher densities of pharmacists also tend to have higher densities of pharmacies ($R^2 = 0.239$, $p < 0.001$). The majority of pharmacies are in the retail community pharmacy sector with up to 10% of pharmacies in hospitals. African countries are observed to lack both pharmacies and pharmacists, which has implications for access to medicines given the inadequate availability (and likely inequitable distribution) of access points and skilled workforce.

Figure 2. Pharmacist and pharmacy density per 10,000 population (50 countries)



There is also a relationship between the economic status of a country (Gross National Income) and pharmacist density ($R^2 = 0.413$, $p < 0.001$). This implies that human resource development is a function of economic development.

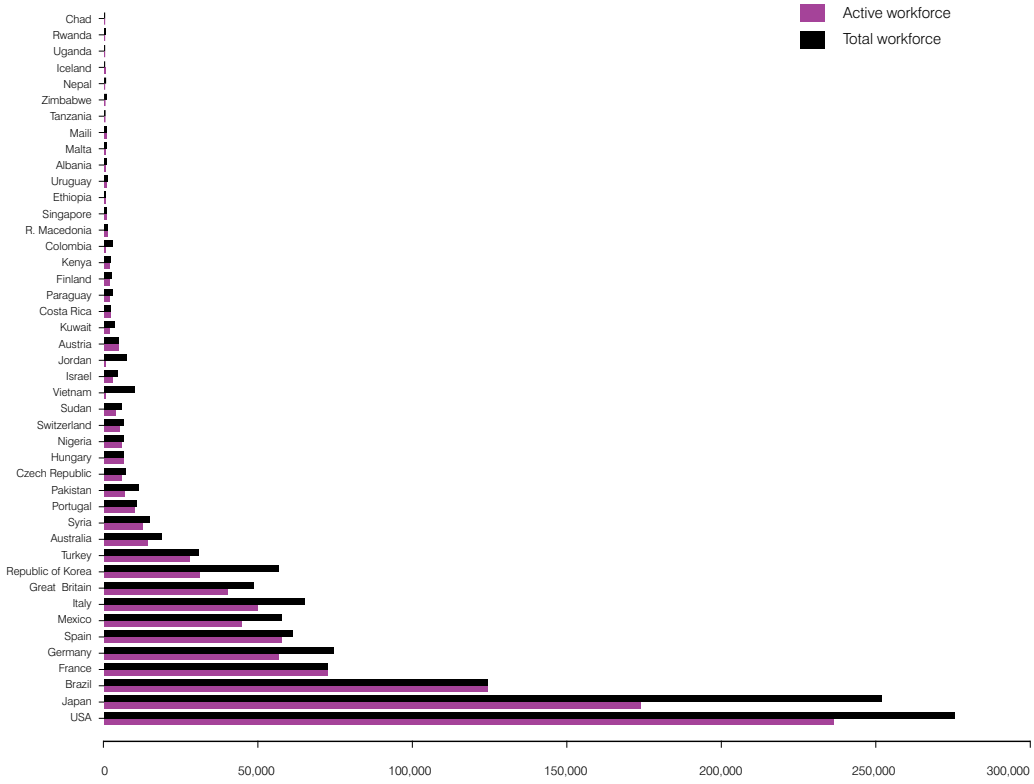
Figure 3. Pharmacist density per 10,000 population by GNI (50 countries)



GNI data source: World Bank 2007. GNI adjusted for purchasing power parity(PPP) in US$.

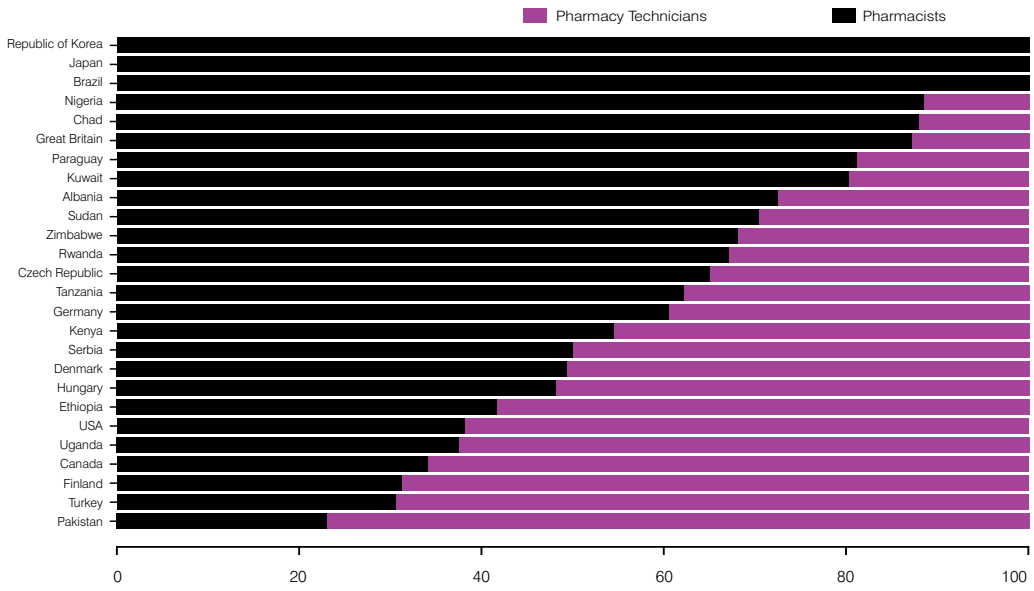
Total pharmacist figures may not be representative of the active workforce. Data was also sought on the number of pharmacists in active practice. The total number of pharmacists and actively practicing pharmacists (where available) in each country is described in Figure 4. The proportion of pharmacists that are actively practicing may be as low as 55% (Republic of Korea) which has significant implications for workforce planning, though many countries were unable to identify the active workforce.

Figure 4. Total and active pharmacist workforce by country (44 countries)



The density of pharmacy technicians per 10,000 population ranged from 0.005 (Chad) to 9.4 (Turkey). Several countries such as Brazil, Republic of Korea and Japan do not have pharmacy technicians or equivalent mid-level cadres. Pharmacy technicians comprise up to 75% of the pharmacy workforce in Pakistan. Figure 5 depicts the pharmacy workforce composition (skill mix).

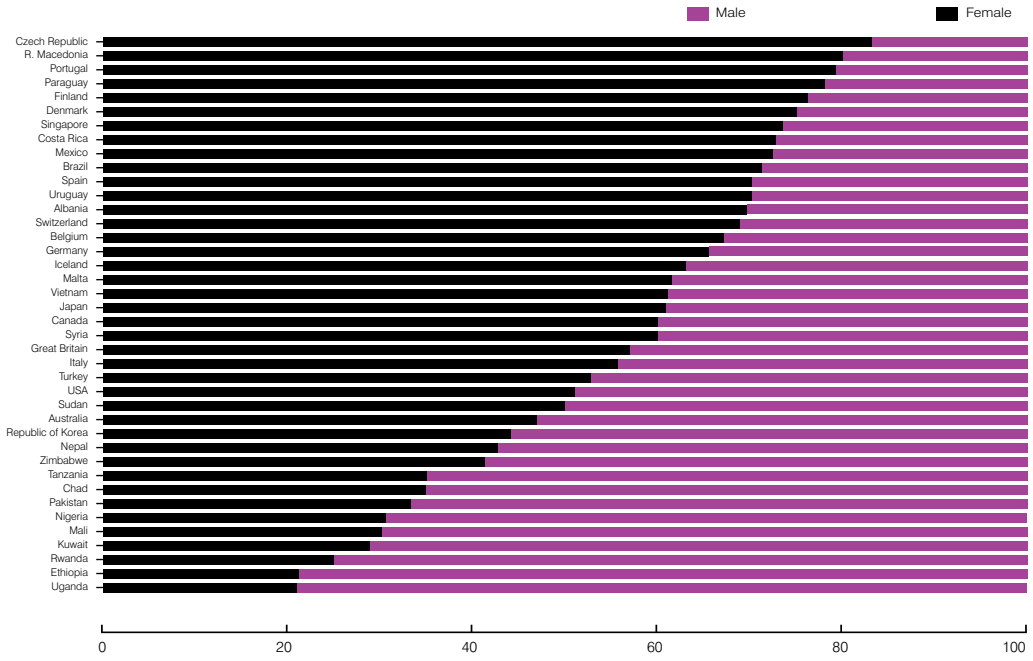
Figure 5. Pharmacy workforce composition (%) by country (26 countries)



3.3 Pharmacist gender distribution

There is a feminisation of the pharmacist workforce in many countries, potentially due to changing roles which appeal to females (greater emphasis on pharmaceutical care) and greater flexibility for part time work. The proportion of the total pharmacist workforce that is female varies from 20% to 80% between countries (Figure 6). Almost 80% of the pharmacist workforce is female in the Czech Republic whilst only 20% of the workforce is female in Uganda.

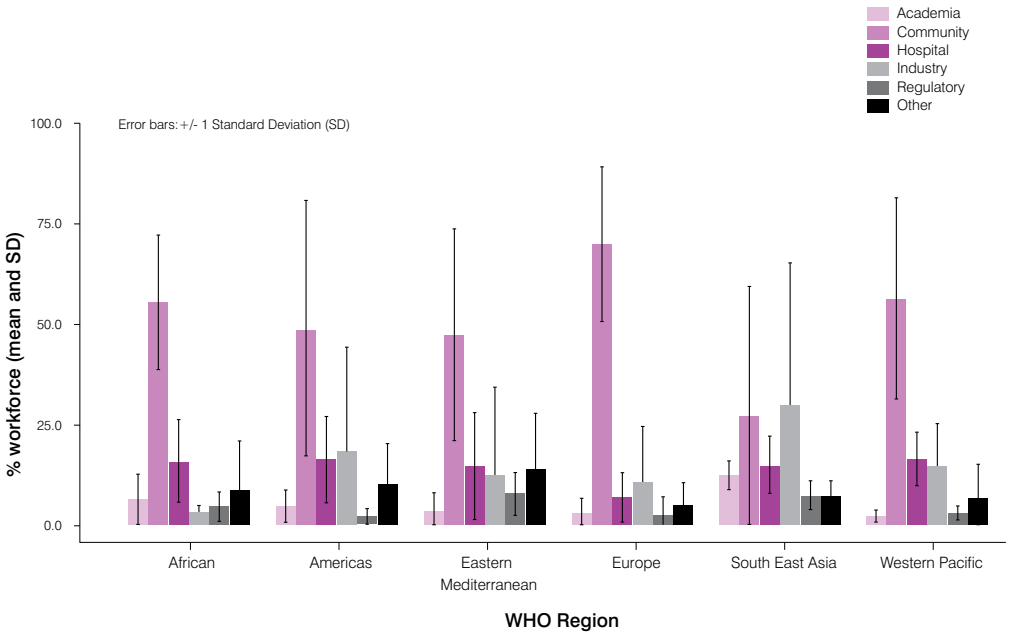
Figure 6. Pharmacist gender distribution (%) by country (40 countries)



3.4 Pharmacist employment distribution

On average, 58% of pharmacists were found to work in retail community pharmacy, 12% in hospital, 12% in industry, 4% in research and academia and 4% in regulation. The African region has less than 5% of its workforce employed in the pharmaceutical industry, in contrast to the South East Asian region where the pharmaceutical industry employs up to 55% of the pharmacist workforce (Figure 7).There is significant variation between countries within each region as denoted by the error bars in Figure 7.

Figure 7. Pharmacist distribution (%) by employment area (45 countries)



Part 4. Pharmacy education

Authors

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Summary

- FIP, WHO and UNESCO have established a global Pharmacy Education Taskforce, an initiative with which to synergise concerted efforts for a systematic analysis and policy planning approach for the global pharmacy workforce.
- The capacity to provide pharmaceutical services in each country is dependent upon having an assured competent workforce and a similarly integrated academic workforce to train sufficient numbers of new pharmacists and other support staff at both basic and enhanced levels.
- There remains variance in the scope and range of pharmacy education quality assurance systems. Work is underway to provide adaptable guidelines and advocacy of systems to improve quality assurance and accreditation of pre-service education.
- Ensuring mechanisms for assured practitioner competence (and ultimately performance) is now a key goal for pharmacy education policy. Systems and Continuing Professional Development (CPD) support should be oriented to enable competence-based lifelong development for all practitioners.

4.1 Background

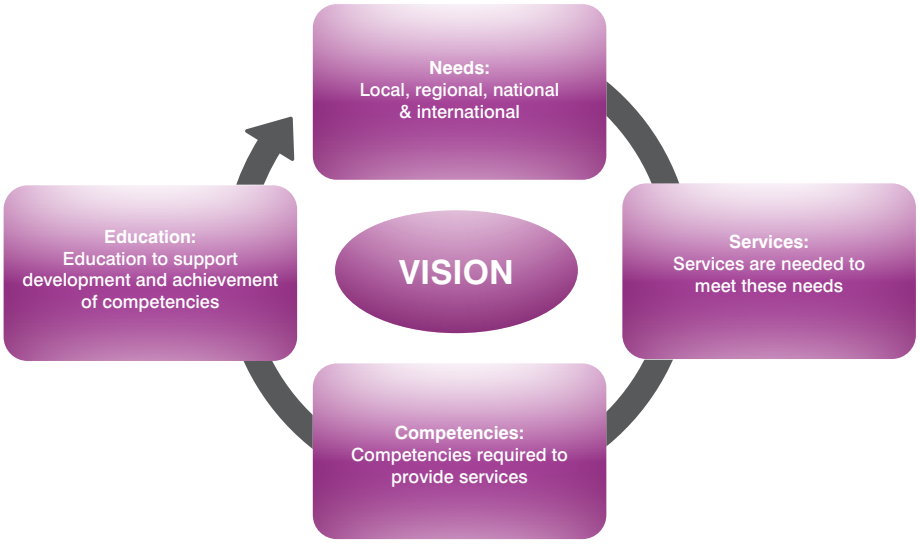
Pharmacists' roles are evolving from that of compounder and dispenser of medicines to that of medicines expert within a multidisciplinary health care team.[1-4] A coordinated and multifaceted effort to advance workforce planning, training and education is needed in order to prepare an adequate number of well-trained pharmacists for such roles.

When using the term pharmacy education, it is to be understood that this refers to the educational design and capacity to develop the workforce for a diversity of settings (e.g. community, hospital, research and development, academia) across varying levels of service provision and competence (e.g. technical support staff, pharmacists and pharmaceutical scientists) and scope of education (e.g. undergraduate, postgraduate, life-long learning). This multi-dimensional conceptualization embodies a systematic approach to education development that enables and supports a sustainable expert healthcare workforce to effectively improve health.

It has been previously argued that the global problems facing the pharmacy workforce are those of capacity, sustainability and the development of modern, needs-based education [5, 6]. In this respect,

pharmacy is no different from other health care professions, such as medicine and nursing. The global workforce needs to be competent, adaptable and oriented to a medicines-centered, patient-focused approach towards education, development and professional practice. Centered on the tenets of needs-based education, FIP convened the Global Pharmacy Education Taskforce in partnership with the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Health Organization (WHO).[5,6]

Figure 1: Pharmacy Education Action Plan 2008-2010



The purpose of the Taskforce is to oversee the implementation of the Global Pharmacy Education Taskforce Action Plan 2008-2010.[7] The Action Plan is oriented towards identifying locally-determined needs and services and using those to facilitate comprehensive education development and achievement of competencies, which are required to meet the local services (See Diagram 1). The Action Plan was developed and refined during two global pharmacy education consultations convened by FIP. [6,8] The domains for action prioritised in the Action Plan relate specifically to developing a pharmacy education vision and framework, preparing the pharmacy workforce, and quality assurance for these efforts. From these domains, three project teams have been created to support the areas of (1) vision and competency, (2) academic and institutional capacity, and (3) quality assurance. The leadership for these project teams comes from the Taskforce, which serves as the coordination, analysis and dissemination hub. It includes both a core of key stakeholders and a dynamic shell of collaborators most attuned to the needs of their regions.

4.2 Pharmacy education capacity and training institution distribution

It is a truism to suggest that countries require appropriately-resourced academic institutions in order to produce appropriately-trained, nascent health care professionals to join the domestic workforce. Further, the capacity to provide pharmaceutical services in each country is dependent upon having an assured competent workforce and a similarly integrated academic workforce to train sufficient numbers of new pharmacists and other support staff at both basic and enhanced levels.

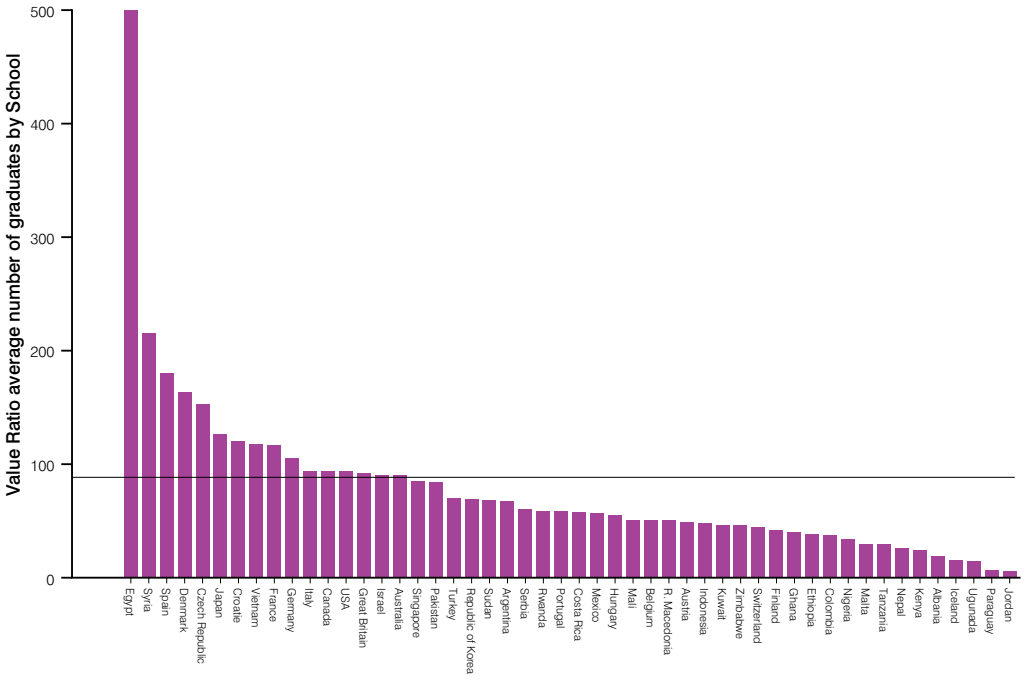
Gathering good quality workforce data on academic/faculty capacity is essential if development strategies to meet local, regional or global needs are to be formulated. Increased research and review of strategies to build academic workforce capacity is warranted; more recently, FIP has conducted Global Pharmacy Workforce Surveys since 2005 (GPWS) as a first step towards making useful capacity data accessible for policy makers and planners.

The education-related data from this survey provides some headline observations. A total of 56 country level responses were obtained; negative correlations were observed with density of pharmacist per capita population and proportion of the workforce in academia ($r = -0.43$, $p = 0.046$). Conversely, positive associations are present with entry into community pharmacy careers ($r = 0.338$, $p = 0.033$). Although this may not be a surprising finding within the 56 countries surveyed, it does highlight the need for academic capacity building strategies to be taken seriously. Those countries with fewer pharmacists per head of population are the ones who are least likely to have pre-service education and training capacity.

Four countries from the survey produced more than 8,000 graduates in total each year (Brazil, Japan, Egypt and USA). Three countries had more than 100 Schools of pharmacy (India >500; Brazil 306; USA 113). Figure 2 shows a ratio plot of graduates (pipeline) to schools of pharmacy, against the sample average.

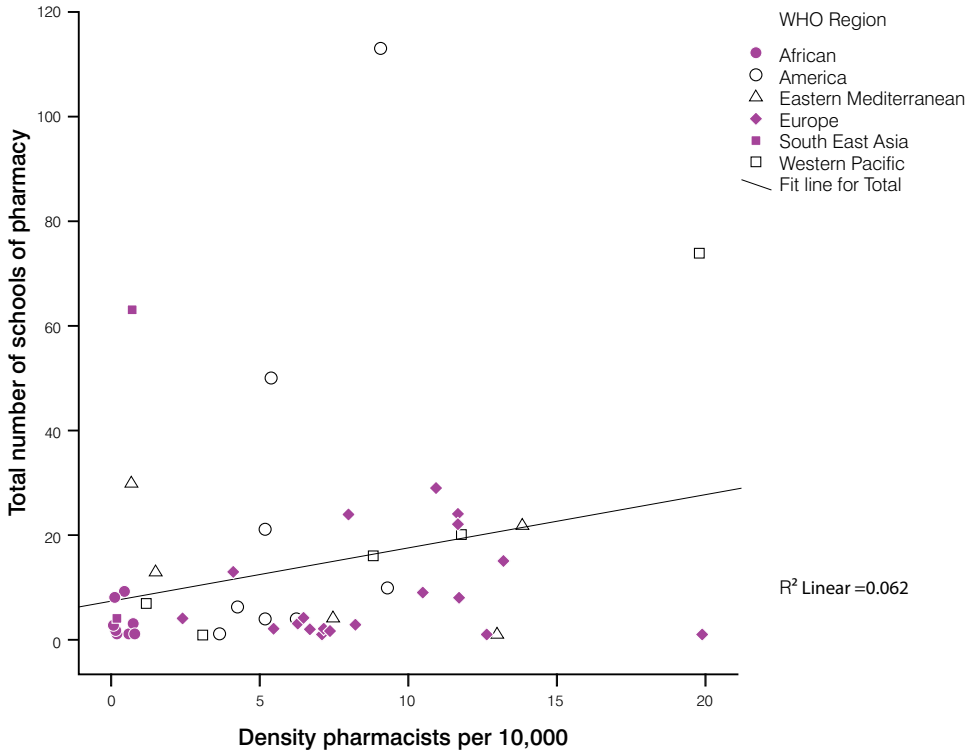
When accounting for outliers, there is a weak but significant association with the number of schools and pharmacist density in countries ($R^2 = 0.062$, $p = 0.008$; Figure 3). In Figure 3, note that most African countries are at the extreme left and below the regression line. The majority of European countries are also below the regression line.

Figure 2. Ratio of graduates to schools of pharmacy (average per country)



The reference line is the sample mean (88 graduates per School of Pharmacy); n=50 cases.

Figure 3. Schools of pharmacy and pharmacist density



Country level analysis removing outliers Indonesia, Brazil, USA, India; n=40 complete cases.

One key barrier to academic faculty workforce retention and quality needs-based education, particularly in developing countries, is poor physical institutional infrastructure where basic facilities as well as learning and teaching resources may be insufficient or non-existent. The Taskforce will lead the development of recommendations for academic workforce capacity and institutional infrastructure development and investigate via country case studies.

4.3 Quality assurance

While virtually all countries have established systems for oversight and quality assurance (QA) of education in general, fewer countries have QA systems specific to pharmacy education that are well-developed. In some countries, such systems are emerging; in others, they are non-existent or, at best, rely on internal (institutional) QA processes. Data from the GPWS suggests that 6 countries (13% of sample) did not have any schools accredited, around 22% have less than half of their pharmacy schools accredited, and 64% have their full national compliment under a national accreditation system. Ideally, countries should have their own national QA system and standards for pharmacy education that reflect contemporary and emerging pharmacy practice and education, and meet the specific needs of the country.

In September 2008, Version 1.0 of the Global Framework for Quality Assurance of Pharmacy Education was finalised, formally adopted by FIP, and officially launched at the Third Global Pharmacy Education Consultation in Basel, Switzerland.[9] The framework is posted on Taskforce's website at www.fip.org/education. The framework provides the context for QA of pharmacy education; presents a framework for a national QA system, primarily in terms of structure and process; and offers quality criteria for pharmacy education.

The framework is intended to be a foundation that can be adapted and built upon to suit national needs, systems, and conditions; it focuses more on the elements that need to be included and how these elements are applied in principle rather than being too specific or prescriptive. The framework does not advocate for any one overall model or QA system but comments on different approaches that exist and outlines some emerging trends.

An initial stage of the country case studies were launched in August 2008 with a mission in the Republic of Ghana supported by WHO. A major focus of this initial stage was an examination of the potential relevance of the framework for advancing quality assurance of pharmacy education in Ghana through detailed stakeholder analysis. Content validity of the framework was evaluated by the Department of Pharmacy at the University of Zambia, and the Faculty of Pharmacy at the Kwame Nkrumah University of Science and Technology in Ghana. In summary, there was an overwhelming acceptance of the concept by policy makers, regulators, educators and practitioners who emphasized the need for broader stakeholder involvement in developing QA systems.

Validation of the Global Framework commenced in June 2009; the process involved an assessment of the various components and quality criteria set out in the Framework. Four stakeholders from 24 participating countries – representing the perspectives of pharmacy practice, academia, pharmacy practice regulation and quality assurance or accreditation of pharmacy education – participated in a survey to examine the validity and applicability of each component of the Framework. The sections of the survey instrument included areas such as: the philosophy and purpose of quality assurance; the structure, policies and procedures of a national quality assurance system; and quality criteria for the outcomes, structure and processes of a pharmacy school and its professional degree program. Results from the validation process are to be presented at the FIP Congress in September 2009 and will be used to inform further revision of the framework.

The Quality Assurance domain is also collaborating with WHO to develop an instrument that institutions can use for self-assessment and quality improvement of their academic program in pharmacy. The self-assessment instrument uses the quality criteria of Global Framework and will be tested and validated in several countries prior to final adoption.

4.4 Competency development

There is no question that health care systems and patients require practitioners to possess relevant and contemporary skills and expertise. Workforce regulation should be aimed at maintaining the competence of health care professionals. Coupled with pragmatic Continuing Professional Development (CPD) policies, the importance of periodic performance appraisals is a powerful reinforcement of accountability for pharmaceutical care provision. These drivers for competence, together with an increasingly well-informed and sceptical public opinion, make clear the need for an educational strategy that will develop individuals who are 'fit for purpose'.

Competence can be defined as an ability based on work or job outputs.[10] A 'competency' pertains to an underlying characteristic of an individual and, for a health care professional, should be related in some way to effective performance. Statements can be derived that describe the behaviours that would be observed when the individual demonstrates competency. A 'competency framework' is the term given to the complete compilation of clusters, competencies (with or without levels) and behavioural indicators. The competency cluster is a collection of closely related competencies, showing the highest elements

and behavioural indicators as the most detailed elements, and it remains a common layout for a competency framework.[11] If the objective is to provide a developmental, or educational support for the practitioner, then these frameworks may also be described as developmental frameworks. The purposes of competency frameworks are diverse. Some look for descriptions of a hierarchy based on diverse competency thresholds, whereas others are more determining in nature and aim to promote competencies over time.[12]

Table 1. Competence, competency, performance, effectiveness [13]

Competency	Single item of knowledge, skill or professional value
Competence	Full repertoire of competencies
Performance	Reference to observable behaviour. What an individual actually does, as opposed to what they can do
Effectiveness	Effect of performance on a recipient

The vision and competency project team is charged with developing an "educational roadmap" to guide efforts in and mechanisms for pharmacy education. Countries, particularly those marginalised by the human resources for health crisis, can use this evidence to develop their workforce and to track the results of their efforts. This domain of work will examine the existing competency frameworks and use of these before initiating a consultative and evidence-based process to develop a broad competency framework for the pharmacy workforce. As part of this process, the relationship between culture of competency (and any perceptions therein) will be explored.

Clearly, no one particular competency model will meet the needs of all parties, but identifying the core tenets that support all pharmaceutical services along the continuum from research to public health allows for a grounded foundation and framework with flexibility for adaptation according to context.

In recent years, a large number of European countries have established ways of pharmaceutical competence through indirect assurance by legal frameworks of compulsory CPD: for example, Portugal (in 2001), France (in 2002) and UK (in 2009). Table 2 shows the extent that practice frameworks have been introduced – although these are not necessarily developmental or performance related competencies; a greater proportion comprise functional task lists or task expectations, rather than competencies per se.

Table 2: Sample response (n=52): Does your country have a competency framework for pharmacists?

Sample Response	Number of countries
No	19
Yes	20
In development	13

Table 3: Description of "competency" framework in countries with frameworks

Description	Frequency	Country examples
Professional development design or functional task list	5	Kenya; Vietnam; Australia; Canada; France
Academic, developmental or educational design	5	Nigeria; Israel; USA; Korea; Egypt
Regulatory intention only	7	Switzerland; Brazil; India; Argentina; Italy; Spain; Austria
Framework in development	5	UK; Zimbabwe; Pakistan; Serbia; Costa Rica

Some countries have taken greater steps towards recognizable competency frameworks, including robust methods for revalidation such as maintaining a learning portfolio, self reporting of evidence and different ways of CPD. Australia, British Columbia in Canada and New Zealand (Pharmaceutical Society of Australia 2003; College of Pharmacists of British Columbia 2006 and Pharmacy Council of New Zealand 2006) use self assessment against defined competence standards linked with revalidation and re-licensing. In the UK, Australia, Singapore and Croatia pharmacists in acute and chronic care settings are using evidence-based developmental tools (see www.codeg.org). There is a growing body of evidence to suggest that frameworks that use a competency approach are being used by pharmacists as a way of operationalising otherwise vague concepts of CPD and CPD policy.[14-16]. To our knowledge, the only developmental framework for pharmacy technicians is located in the UK (see www.codeg.org).

International initiatives indicate a need for clearly defined standards of practice if useful continuing pharmacy education and training is to assure competence. However, the real challenge lies in the assessment of performance when completing tasks, that is, competence in practice.

To achieve a high quality global infrastructure for pharmacy, the educational system should be mapped to the required competencies of pharmacists to provide the relevant pharmaceutical services for meeting the health needs in any given country context. While no one national model may be appropriate for all systems, there are significant global health, labour and market drivers which suggest that a competency-based approach is sensible and sustainable for workforce development. There is a need to develop approaches to learning which explicitly specify the outcome in terms of competencies that can be taught, learned and assessed.[17-21]

A session organised by the Taskforce at the 15th International Social Pharmacy Workshop (ISPW) held in Queenstown, New Zealand, in July 2008, explored the feasibility and cultural and professional barriers in adopting a common global competency framework. The outcomes indicated a growing interest in competency development across different settings. Seeking a global generic common framework adaptable to the needs of the countries was positively identified as a way forward. The need for a global competency framework was recognised among the participants but questions remained about how this should be achieved. Reviewing existing frameworks (internal and external to pharmacy) and developing a broad, simple framework with functional areas that could be adapted to local situations were suggested as next steps.

4.5 Linking workforce development into workforce planning

Measuring the performance at various levels from general through to advanced should be the cornerstone of workforce regulation. But this cannot happen without recognising that competence is part of the developmental roadmap towards assuring safe and high quality performance in individuals. There is an emergent need to clarify career paths and to define educational goals through competency-based educational approaches. The time for a global approach to competence has arrived.

A needs-based education strategy is called for which would provide opportunity for education systems to best assess the needs of its community and then develop (or adapt) the supporting educational system in order to produce a workforce relevant to needs. Healthcare demands are diverse and complex, often varying widely within and between regions. Although broad and general frameworks may be beneficial at the macro level, a 'one-size-fits-all' system does not offer the authenticity needed for buy-in and sustainability at the domestic level.

4.6 Recommendations and next steps

One strategic approach that has been adopted by the Taskforce has been to form a partnership with UNESCO, with the aim of using the available experience of a global agency and coupling this directly to the pharmacy higher education sector across regions. The designated Global Pharmacy Education Development Network UNITWIN platform will act as a conduit for developing consensus and facilitating the spread of best practice and educational development world-wide.

The UNITWIN Network will establish a resource base and collaborative forum for exchange, research and capacity building dedicated to tackling challenges of academic capacity, quality assurance of educational systems and workforce competency. This is the first time that a formal global network has been established for pharmacy education under the stewardship of the professional body and UN agencies.

- The Taskforce should focus on efforts to advocate and facilitate design and support tools for pharmacy education that are needs-based in their approach. This should importantly include post-registration education in addition to pre-service.
- Education strategies need to be flexible for the pre-existing and future needs of the community in order to optimise effectiveness. This further supports the importance of the adoption of a vision and action plan for global pharmacy that is founded in local, regional, national and international needs for health care.
- The Taskforce recommends, and will work towards, establishing a global forum for policy makers and educational planners in order to provide a mechanism for global reform and development.
- The Taskforce will establish a global network for education, under the advocacy of the FIP-WHO-UNESCO partnership that will facilitate action and advancement of education as a needs-based commitment to improving pharmaceutical health care.

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Part 5. Pharmacy workforce planning and development – country case studies

This part presents seven country case studies on pharmacy workforce development from Australia, Canada, Great Britain, Kenya, Sudan, Uruguay and Vietnam. Each has been sourced from a different region to describe a unique set of pharmacy workforce challenges and issues. The case studies provide an overview of strategies employed to address workforce challenges, associated outcomes and lessons learnt.

5.1 Country case study: Australia

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Summary

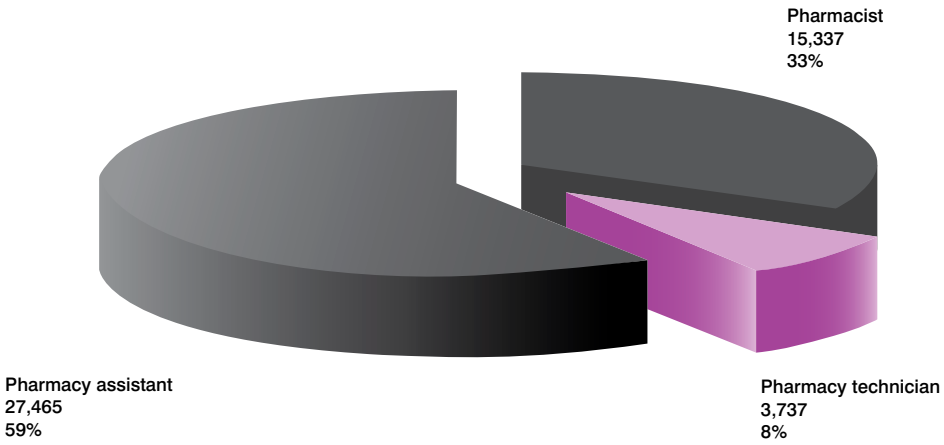
- Pharmacists play a valuable role in maintaining the health of all Australians and are the most accessible health care service.
- There are a number of factors that are likely to impact on the future pharmacy workforce in Australia including increased participation in primary health care services by pharmacists, increased numbers of pharmacy schools, ageing population, feminisation of the workforce, burden of chronic disease, information technology advances, increasing role for pharmacy technicians, ageing workforce, shortages in rural and remote Australia and discrepancies between Indigenous and Non-Indigenous Health.
- There are key workforce challenges posed particularly in rural and remote Australia and there are marked variations in the supply of pharmacists between major cities and rural areas.
- Australia has a comprehensive suite of Rural Pharmacy Programs aimed at addressing workforce issues in rural and remote communities.
- There is supporting evidence for the success of the Rural Pharmacy Programs.
- The Pharmacy Guild of Australia in collaboration with other key stakeholders are continuing to research issues, develop solutions and seek funding to implement and maintain successful programs to ensure quality health outcomes are delivered to all Australians.

5.1.1 Background

Pharmacists play a valuable role in maintaining the health of all Australians, particularly in rural and remote areas. As the most accessible health care service, it is estimated that on average each person in Australia visits a community pharmacy 14 times per year.[1]

The 2006 Population Census data showed that there were 46,539 in the Australian pharmacy workforce. The occupational classifications that this is broken down into are pharmacists (33%), pharmacy dispensary technicians (8%) and pharmacy assistants (59%).[2] Figure 1 shows a breakdown of the Australian pharmacy workforce by occupational classification (cadre).

Figure 1. Breakdown of Australian pharmacy workforce by cadre (2006)



Source: 2006 Australian Population Census

Pharmacy assistants are often the first point of contact for a consumer as they enter a pharmacy, and are often required to provide advice on health-related issues, referring where appropriate to the pharmacist for more in-depth counselling or advice. Whilst there are no mandatory qualifications, a certificate course in Community Pharmacy is generally undertaken. However, all pharmacy assistants must attend a seminar/short course on pharmacist and pharmacy-only medicines.

Pharmacy technicians assist the pharmacist to provide quality pharmaceutical services by performing some of the routine technical tasks associated with dispensing. To undertake this role, technicians are encouraged to complete a certificate course in Community Pharmacy or a specific short course.

Pharmacists undertake either a four-year full-time undergraduate degree or a two year full-time post-graduate degree at University plus an additional one year as a pharmacy intern prior to registration. The services provided by Australian pharmacists include a traditional range of clinical services in the area of medicines-related care such as:

- Dispensing prescription only medicines with appropriate counselling
- Supply of Pharmacy Only Medicines and Pharmacist Only medicines with appropriate counselling
- Home Medicines Review program services
- Provision of dose administration aids to patients who require or request the service including elderly, chronically ill and disabled consumers, both in the community and residential facilities
- Ensuring the quality use of medicines through advice and counselling of consumers and carers
- Provision of triage services for a range of community health concerns, frequently referring patients to General Practitioners or other health professionals.

In addition, pharmacists now have the opportunity to take on additional roles in primary health and preventative care through a range of professional services (some of which receive funding from the Australian Government) including medication-related care programs and primary care programs.

Box 1. Pharmacist professional health services

Medication-Related Care Programs:

- Hypertension management
- Dose administration aids
- Patient medication profile
- Medication management reviews
- Home medicines reviews
- Illicit drug diversion programs such as Project Stop
- Dispensing Methadone

Primary Care Programs:

- Wound management
- Needle and syringe supply
- Health promotion and illness prevention
- Asthma management
- Diabetes management
- Continence management
- Falls prevention
- Infant care programs
- Smoking cessation
- Weight management programs

A study of the supply and demand of pharmacists from 2000 to 2010 showed that there was expected to be a workforce shortfall of around 3,000 pharmacists by 2010.[3] There is currently a research project underway to forecast the workforce growth to the year 2025. Although the project may not forecast the future exactly, the report will provide an understanding of the issues and will assist policy development to ensure a workforce that meets the needs of the Australian community.

Some of the factors identified that are likely to contribute to the future pharmacy workforce planning in Australia include: [4]

- The increased number of pharmacy schools in Australia and an increase in the number of undergraduate and postgraduate degrees leading to a registrable qualification. Over the past eight years the number of schools has increased from six to 16;
- The increasing feminisation of the workforce. The female workforce has increased from 47.6% in 1996 to 56% in 2006;
- The increasing role of pharmacy technicians and the use of technology;
- Shortages of hospital pharmacists;
- Rates of workforce attrition;
- Increasing rate of participation in primary health care services by pharmacists (eg. Home Medicines Reviews, Asthma and Diabetes Management Programs, Medication Compliance Programs etc);
- Ageing population and increasing burden of chronic disease and hence increasing demand for pharmaceutical and health care services;
- Ongoing discrepancies between Indigenous and non-Indigenous health; and
- Shortage of pharmacists in rural and remote Australia.

Previous workforce studies have concentrated solely on the supply and demand of pharmacists. The current workforce study Pharmacy Workforce Planning is taking a more holistic view of the pharmacy workforce by including pharmacy technicians and pharmacy assistants. It is unclear at present whether there is a shortage or oversupply of these non-pharmacist roles. However, it is hoped that this project will inform workforce planning in these areas and it is due for completion at the end of 2009.

As discussed above there are a number of factors that are likely to impact on the future pharmacy workforce in Australia. Of particular importance due to the geographical distribution of Australia's population, is the access to pharmacy services in rural and remote Australia. This case study will focus specifically on the key issues and strategies that have been undertaken over the past decade to address the pharmacist workforce shortages in rural and remote Australia.

5.1.2 Key issues

Throughout much of rural and remote Australia there is a shortage of health care providers, high turnover in the health workforce, and problems in gaining access to services.

The Australian Institute of Health and Welfare (AIHW) identified that pharmacists are less prevalent in rural and remote areas than in major cities. Furthermore, it has been identified that pharmacists in rural and remote areas are on average older and work longer hours than those in major cities and inner regional areas.[5]

A study of the supply and demand of pharmacists from 2000 to 2010 identified that there were marked variations in the supply of pharmacists between major cities and rural areas.[6]

The AIHW reported that the ratio of pharmacists to population in remote areas was 0.35 to 0.40 the ratio in major cities (based on numbers of pharmacists per 100,000 population and on main location of work). The distribution of pharmacists by location type is broken down in Table 1.

Table 1. Distribution of pharmacists by location type

Location	Total
Major city	11,333
Inner regional areas	2,479
Outer regional areas	979
Remote/very remote areas	147
Unknown	733
Total	**15,673**

Source: 2006 ABS population census data

There is evidence that the shortage in rural and remote areas will continue beyond 2010 since the demand for pharmacy services is likely to increase in the future. With the ageing of the population, and a greater propensity for chronic disease with advancing age, it is expected that the number of prescriptions dispensed will rise. Coupled with this is the expanding role of community pharmacy within the primary health care model.

In comparison to individuals living in major cities or regional areas, those who live in rural and remote areas of Australia have lower life expectancy and higher rates of mortality, morbidity and hospitalisation.

Australian pharmacists also play a critical role in ensuring access to and quality use of medicines in remote Aboriginal communities. Aboriginal and Torres Strait Islander people have by far the worst health outcomes and the clearest inequity in health care provision of any identifiable group in the Australian population. The life expectancy of Aboriginal and Torres Strait Islander people is around 17 years lower than that of the Australian population.

Aboriginal and Torres Strait Islander people are comparatively low users of medical services and pharmaceuticals. For the mainstream Australian Government schemes of Medicare and the Pharmaceutical Benefits Scheme (PBS), Medicare benefits paid per Indigenous person were estimated to be 45% of the non–Indigenous average, and the PBS expenditure was estimated at 51% of the non-Indigenous average.[7]

Recruiting and retaining adequate numbers of health professionals is not isolated to the pharmacy profession, and it is a continuing issue for rural, regional and remote communities (NRHA Conference, May 2009).

There is existing evidence to support that there are key predictors to make rural practice more likely for a health professional. Research shows that students who have a rural background are twice as likely to return to a rural area upon graduation compared to metropolitan students.[8] Furthermore, there is a wealth of evidence demonstrating that exposing students to positive rural health practice is an effective strategy for increasing the recruitment and retention of health professionals in rural areas.[9,10]

The Australian Government and the Australian pharmacy community have a commitment to ensure that there is a network of accessible and viable community pharmacies throughout Australia, particularly in rural and remote areas. A number of rural pharmacy initiatives are funded by the Australian Government under the Fourth Community Pharmacy Agreement (and managed by the Pharmacy Guild of Australia) to maintain and improve access to community pharmacy services for people in rural and remote areas.

5.1.3 Strategies used and lessons learnt

As discussed above there are a number of issues that impact on the workforce and rural health service delivery in rural and remote Australia, and in general there is a shortage of pharmacists practising in these areas. This has resulted in the implementation of a number of innovative strategies over the past decade aimed at recruiting and retaining pharmacists in rural areas. These strategies are collectively known as the Rural Pharmacy Programs.

The conceptual framework for the Rural Pharmacy Programs is based on the known factors that may contribute to the decision to practice in a rural or remote location. There is evidence to support that the key factors that make rural practice more likely include rural origin, positive rural experiences,

economical considerations, and educational factors. It is thought that a combination of incentives to address these factors rather than a single intervention has the probability to be more successful, and there may be considerable overlap between the factors that lead to a pharmacist starting practice in a rural area (recruitment) and the decision to stay for a period of time (retention).[11]

Australia's suite of Rural Pharmacy Programs has been recognised as the most comprehensive rural pharmacy program internationally.[12] A summary of the Rural Pharmacy programs by key strategy and the disincentive that it addresses is provided in Table 2.

Table 2. Rural Pharmacy Programs by key strategy and disincentive addressed

Strategies	Type of disincentive addressed			
	Economic	Professional	Educational	Family
Recruitment of pharmacists to rural areas				
Undergraduate Scholarship Scheme	✓		✓	
Placement (Internship) Allowance	✓		✓	
Pharmacist Academics positions at University Departments of Rural Health		✓	✓	
Administrative Support to Pharmacy Schools			✓	
Rural Pharmacy Promotion Campaign			✓	
Rural Pharmacist Pre-registration Incentive Allowance	✓	✓		
Retention of pharmacists in rural areas				
Emergency Locum Service	✓	✓		✓
Continuing Pharmacy Education (CPE) Allowance	✓	✓	✓	
Rural Pharmacy Newsletter		✓		
Access to community pharmacies and pharmacy services				
Rural Pharmacy Maintenance Allowance	✓			
Start Up Allowance	✓			
Succession Allowance	✓			
Section 100 Pharmacy Support Allowance	✓	✓		
Indigenous Pharmacy Scholarship Scheme	✓		✓	
Rural Commissioned Research Projects		✓	✓	
Small Project Funding Scheme		✓	✓	
Quality Use of Medicines Maximised for Indigenous Peoples	✓			
Indigenous Pharmacy Assistant Traineeship Scheme	✓		✓	

The strategies summarised above were developed in collaboration with key pharmacy stakeholder groups and are funded by the Australian Government via the Community Pharmacy Agreement and managed primarily by the Pharmacy Guild of Australia. Since 1990, the Commonwealth Government and the Pharmacy Guild have entered into Community Pharmacy Agreements which set out the remuneration that pharmacists will receive for dispensing PBS medicines and the arrangements regulating the location of pharmacies approved to supply PBS medicines. Over time these Agreements have increased in scope to provide for professional pharmacy programs and services.

Under the Fourth Community Pharmacy Agreement, the Rural Pharmacy Programs have been allocated a total budget of $110 million AUD over a period of five years. There is some evidence to support that the programs that address economic disincentives have been particularly successful in addressing the strategies that relate to the retention of pharmacists and access to pharmacy services. For example, the most significant amount of funding (approximately 60% of total budget) is dedicated to the Rural Pharmacy Maintenance Allowance. This Allowance provides payments to pharmacies in rural and remote areas based on their remoteness and number of PBS items dispensed. For some of these pharmacies, the payment is the difference between maintaining a viable pharmacy business and possible pharmacy closure. To this extent, the allowance contributes to an increase in pharmacy services for communities located in rural areas. Similarly, the Emergency Locum Service that provides access to locums in emergency situations in rural areas allows for a continuity of pharmacy services in communities where the pharmacy may otherwise close.

The current suite of programs evolved from a number of earlier programs, the earliest of which commenced in 1999 as a three year pilot program with funding of $500,000 AUD. The programs were significantly expanded through the Third Community Pharmacy Agreement under the Australian Government's Regional Health Strategy for $74 million over five years from 2000 to 2005. A further increase to $111 million up to 2010 was secured under the Fourth Community Pharmacy Agreement.

There have been a number of lessons learnt in the past decade due in part to the 'evolutionary' nature of the programs. Prior to 2005, a number of the programs operated as separate initiatives rather than as a suite of programs with common objectives and outcomes. As a result, the programs were viewed by some stakeholders as being quite fragmented and aimed at different program directions.

To generate a consensus direction post 2005, a number of planning meetings and workshops were held with key stakeholders to inform a primary set of objectives as well as implementation priorities to guide the program from 2005 to 2010. The objectives that were redefined as a result of the planning meetings were:

- To increase the number of pharmacists in rural and remote practice through enhancing the attractions of rural practice and by offering appropriate incentives;
- To increase the length of stay of pharmacists in rural and remote practice by removing or reducing disincentives to practice;
- To develop innovative solutions to overcome the barriers to the delivery of pharmacy services in rural and remote communities.

Articulating the objectives in this way has allowed the Program initiatives to be developed in a more targeted manner.

Over the past decade we have learnt that for the Program to remain relevant it needs to be an ever evolving and dynamic program. Further refinement and development to the Program post-2010 will need to be made in light of new health policy reforms, information technology developments and workforce variations.

It is recognised that in addition to the strategies under the Rural Pharmacy Programs, new ways of providing access to pharmacy services in rural and remote areas should be identified where full-time or even part-time face-to-face services are not viable. Initial work has been undertaken to look at the relationships between community pharmacies and local hospitals, services provided at a distance and centralisation of health services at a regional level. For example, there have been some local level projects investigating the role of tele-pharmacy models in remote areas that have shown some promising results. These projects may form the basis of a template for designing future service delivery models in rural and remote areas.

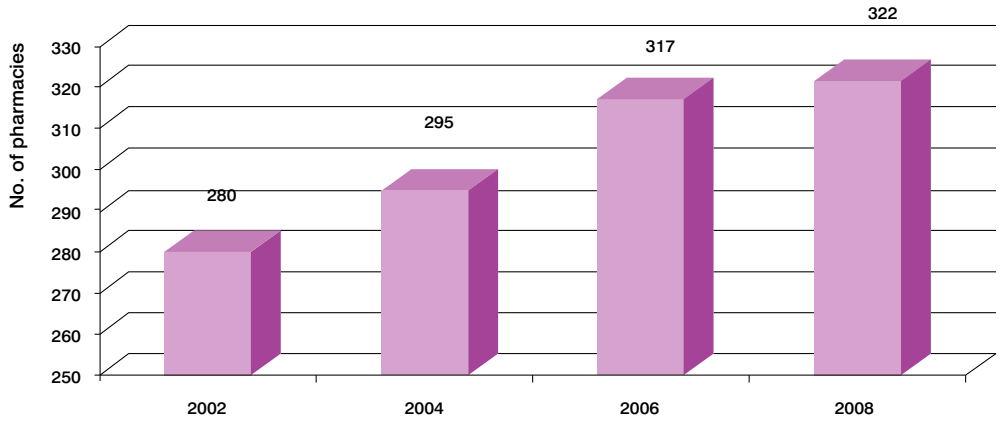
A comprehensive Rural and Indigenous Pharmacy Programs Review that takes into account the challenges posed by the rural and Indigenous context is scheduled to be completed

by December 2009. In addition to the Rural Pharmacy Programs, the Review will look at other models of service delivery for pharmacy in rural remote communities and inform options for future programs beyond 2010.

5.1.4 Outcomes and conclusion

The support provided under the Rural Pharmacy Programs has enabled the delivery of the only expanding health service in rural and remote Australia. Since the inception of the programs there has been a steady increase in the number of pharmacies in rural and remote Australia (as shown in Figure 2 below). While an increase in the number of pharmacies by approximately 13% over a period of six years may seem modest, when compared to the overall growth of pharmacies within Australia for the same period (1.6%), this is significant (based on Guild Digest Data).

Figure 2. Number of pharmacies in rural and remote Australia



Data source: Guild Digest Data

Supporting evidence for the success of the Rural Pharmacy Programs can be derived from the outcomes of an independent evaluation which was completed in early 2005. The outcomes of the evaluation supported the continuation of the Programs and found that the programs were widely seen as important by consumers, and were highly valued by rural and remote pharmacists. Furthermore the evaluation found the programs were conceptually sound. The conceptual correctness of the programs was tested against the stated objectives, the current literature, qualitative research and comparable programs.[13]

The 2005 evaluation proposed a list of specific recommendations to each individual program element that were taken into consideration during the planning of programs that were implemented from 2005 onwards.

As discussed above, a further review of the Rural Pharmacy Programs is scheduled to commence in 2009. It is envisaged that the review will build on the experience of the previous evaluation which identified what needed to change and will focus on the information that is needed to support the change.

The Pharmacy Guild of Australia in collaboration with other key stakeholders are continuing to research issues, develop solutions and seek funding to implement and maintain successful programs. Further details of individual program initiatives can be found at http://www.guild.org.au/rural.

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5.2 Country case study: Canada

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Summary

- The greatest human resources (HR) challenge in Canadian pharmacy also represents its greatest opportunity. The pharmacist's role in the delivery of health care is evolving from one focused primarily on dispensing medications to one emphasizing the provision of patient-centred, outcomes-focused care.
- Concurrently, the role of the pharmacy technician is advancing to support the changing role of the pharmacist.
- Canada's pharmacy workforce challenges can be best served by a comprehensive strategic action plan that manages the evolution of the pharmacist's role and aligns with the pharmacy service and pharmaceutical care needs of Canadians.
- The research findings and evidence-based recommendations from the Moving Forward: Pharmacy Human Resources for the Future initiative provide a strong base to support ongoing pharmacy workforce planning.[1]
- The Blueprint for Pharmacy initiative is the pharmacy sector's ongoing process to better align the profession with the health care needs of Canadians, and to achieve the Vision for Pharmacy: "Optimal drug therapy outcomes for Canadians through patient-centred care."[2]
- This case study presents examples of some of the initiatives that are collaboratively achieving the Vision for Pharmacy, by addressing some of Canada's pressing pharmacy HR challenges and building on the evidence gathered by the Moving Forward initiative.

5.2.1 Background

Canada's pharmacy workforce includes licensed pharmacists and unregulated pharmacy technicians. Canada has approximately 30,000 pharmacists in its provinces and territories, and likely more than double that number of pharmacy technicians.[3,4] Seventy-two percent of Canada's pharmacists work in community pharmacies; while 16% work in hospitals. The remainder works in academia, government, industry, health clinics or other settings.[3] There are more female pharmacists than males. The average age of pharmacists in Canada ranges across provinces from 37.3 to 44.6 years.[5] The current minimum education requirement for entry-to-practice is the Baccalaureate degree in pharmacy (four years in length plus a prerequisite of one additional year of pre-pharmacy education). Canada has ten schools of pharmacy which reported a total of 1,036 students in their fourth and final year of study in 2008-2009.[6]

Pharmacy practice in Canada has evolved throughout the years to include specialized medicines distribution services, medicines information, clinical pharmacy services and pharmaceutical care within collaborative and interdisciplinary teams.

5.2.2 Health Human Resource Challenges in Canada

One of the most urgent issues facing Canada's health system today is the appropriate management of health human resources (HHR), ensuring that the right health care providers with the right skills are available in the right place at the right time. Following the federal, provincial and territorial (FPT) governments' First Ministers' Accord on Health Care Renewal in 2003, substantial resources have been committed to support health care renewal initiatives across Canada.[7] As stated by the Health Council of Canada, "without an appropriate health human resources strategy, all other health care renewal efforts would fail."[8]

Canada has universal, publicly-funded health care, delivered and regulated at the provincial and territorial level. Coverage of prescription drugs and pharmacy services are, however, a mix of public and private funding. Traditionally, HHR planning efforts have focused on the supply of, and demand for, health care providers whose services are paid for by the public purse – primarily physicians and nurses.[9,10] The contribution made by other providers whose services are delivered, in part or in whole by the private sector, is now being recognized. Canadian FPT governments have specifically identified seven health professionals, including pharmacists, as high priority for HHR planning.[11] This focus led to federal government funding of Moving Forward: Pharmacy Human Resources for the Future, a wide ranging pharmacy HR research and con-

sultation initiative recently completed by the Canadian Pharmacists Association (CPhA) as well as a national pharmacist database.

The 2007 Framework for Collaborative Pan-Canadian HHR Planning lays out a national approach for health care stakeholders to mobilize their efforts and resources to support better HHR planning.[12] It is recognized that a coordinated HHR strategy should take a needs-based planning approach to HHR: one that anticipates the current and emerging population health needs of Canadians and considers health system design.[13]

5.2.3 Key issues

Pharmacy workforce planning

Pharmacy workforce planning decisions must be based on firm evidence. However, data on even the basic supply and demand of pharmacists and pharmacy technicians has been lacking. As the role of the pharmacist in the delivery of health care continues to evolve, efforts to predict Canada's future pharmacy HR requirements will depend on a broader understanding of the population's needs for pharmacy services, and how these needs can be met through new models of pharmacy practice.

An evolving pharmacy workforce

Canada's health care system is moving towards a preferred future where health promotion, disease prevention, and chronic disease management will be the cornerstones of health care, which will be delivered collaboratively by inter-professional teams. Pharmacists, as medicines experts and Canada's most accessible health care professionals, are critical components of these teams. Canada is making a great deal of progress in facilitating the participation of pharmacists in team-based health care, thereby improving the safe and effective use of medicines.[14]

All provinces in Canada are exploring scope of practice and other legislative changes that will allow pharmacists to better focus on management of medication therapy. In 2007, the province of Alberta implemented the broadest scope of pharmacist practice in Canada by granting authority to prescribe independently and inject drugs.[15] Other Canadian provinces have followed, most recently the province of Ontario which announced legislation in 2009 that will allow pharmacists to administer drugs; extend, adapt or adjust prescriptions; and order laboratory tests for the purpose of medication monitoring and management.[16]

Recruiting and retaining the pharmacy workforce

Both hospital and community pharmacy employers continue to report difficulties in recruiting pharmacists. To develop strategies for recruiting and retaining pharmacists in a competitive marketplace, the health care sector is examining the factors that affect health workers' satisfaction and influence their workplace behaviour.

The Moving Forward initiative identified many workplace factors which bring pharmacists satisfaction. Activities which increase their level of direct patient care and allow them to employ the full scope of their expertise are most often cited.[17] Canada's pharmacy students fully expect to be compensated in a manner reflecting the amount of patient care and cognitive services provided.[18] Evidence also suggests that pharmacy technicians derive satisfaction from advanced tasks.[19] Additional research is needed to determine links between elements of satisfaction and pharmacists' and pharmacy technicians' career decisions. This information will help the pharmacy employers create attractive practice environments and allow pharmacists and pharmacy technicians to be deployed where they can contribute the most to patients' health outcomes.

As more collaborative models of health care delivery evolve, the need for pharmacists and pharmacy technicians with the specific skills and expertise for expanded practice will also increase. The challenge is to identify, attract and select the candidates with the requisite skills, all within a competitive pharmacy workforce market.

Recruitment and retention are inexorably linked with compensation. In the community setting, the issue of appropriate compensation to pharmacies for the provision of pharmacy services (both dispensing and professional services) is an issue of debate. Many studies have demonstrated that pharmacies are not adequately compensated for dispensing medication, yet some governments are reducing the professional allowances available to pharmacies, which have been historically used by pharmacies to subsidize their dispensing services in spite of compensation gaps.[20-22] New models of compensation are being introduced or pilot-tested and evaluated in different jurisdictions.

International pharmacy graduates

An integral part of Canada's HHR strategy is reducing barriers to practise for internationally educated health professionals. At the same time, Canada should work towards becoming more self-sufficient in meeting its health care workforce needs.

An international pharmacy graduate (IPG) is someone who earned his or her undergraduate pharmacy degree in a country other than Canada or the United States. IPGs account for a substantial and growing percentage of the pharmacy workforce. In Ontario alone, 44% of all newly licensed pharmacists are IPGs, while 29% of all licensed pharmacists are IPGs.[23] For many IPGs, there can be a large gap between their pharmacy experience and training and the expected standards of practice in Canada.[24] The current evolution of the pharmacist's role in Canada also adds another layer of complexity.

5.2.4 Strategies

Increasing the pharmacy human resources planning evidence base

The Moving Forward initiative produced over ten technical research reports and a final report of 36 evidence-based recommendations for pharmacy workforce development.[25] Moving Forward also concluded that the key to addressing Canada's pharmacy human resource challenges lies in creating a clear vision and a cohesive plan for changing pharmacy practice to better align with the needs of patients and the health care system. These reports can be accessed at www.pharmacyhr.ca.

Establishment of a national pharmacist database

The identification of pharmacists as a priority health profession led to the development of a national pharmacist database (PDB) by the Canadian Institute for Health Information (CIHI). The PDB collects information provided by the provincial and territorial pharmacy regulatory authorities, and includes workforce demographics such as numbers of practicing pharmacists, practice setting, education, age and gender. The PDB marks the first standardized collection of pharmacist workforce information in Canada, and represents a major achievement in pharmacy human resource planning. In December 2008, CIHI released its second annual PDB report.[26]

Creating innovative pharmacist roles as a recruitment strategy

Many government initiatives have supported the integration of pharmacists into collaborative health care teams. A multi-site demonstration project known as IMPACT (Integrating Family Medicine and Pharmacy to Advance Primary Care Therapeutics) is a landmark project that provided clear evidence of the benefits of a pharmacist on a primary care team.[27] Capitalizing on the novel opportunities offered by innovative workforce roles is a potential recruitment strategy. By carefully tailoring a recruitment strategy highlighting the unique opportunities associated with a primary care role, the IMPACT project was able to quickly attract a wide pool of candidates and ultimately hire the qualified candidates they were seeking.[28]

Pharmacists also participate in team-based care through primary care services within community pharmacies, specialty ambulatory clinics, medication assessment programs, or consultant team roles.[29] Two key projects demonstrating the impacts of some of primary care roles for pharmacists include the integration of 49 pharmacists into primary care networks in Alberta, and a new program under the Saskatchewan Ministry of Health integrating pharmacists into primary health centres.[30,31]

New models of compensation

In order to address compensation gaps, some certain provincial governments are now introducing pilot compensation mechanisms for the provision of professional pharmacy services. These include the new MedsCheck program in Ontario, a seniors' Medication Review Service in Nova Scotia, a remuneration program in British Columbia tied to prescribing, and potential payment models in Alberta.[32-35]

Application of information and communication technology to improve collaborative practice

Advances in information and communication technology support the increased integration of pharmacists into health care teams. These technologies encompass software applications, hardware, and communications tools used in distributive and medication management services.[36] Canada Health Infoway is leading the development of pan-Canadian interoperable electronic health records in partnership with FPT governments to facilitate improved health information access and collaborative care.[37]

Provincial drug information systems (DIS) or networks will enable authorized health care providers to view a patient's complete drug profile online, prescribe electronically and receive notification of drug interactions. These systems will help to reduce prescription errors and adverse drug events, improve clinical decision-making, and result in fewer clarification call-backs to prescribers, thus resulting in improved safety and effectiveness of services and performance of health care providers.[38] Canada's first provincial Drug Information System was rolled out in Prince Edward Island in 2009.[39] Lessons learned from the evaluation of this exercise will inform the implementation of DIS in other jurisdictions.

Advancing the roles of pharmacy technicians

Advancing the role of the pharmacy technician is also a valid strategy for mitigating the effects of pharmacist shortages and supporting expanded roles for pharmacists. Many pharmacy technicians are beginning to carry out some of the tasks traditionally in the exclusive domain of the pharmacist, particularly in the technical aspects of medicines distribution. Canada now has accreditation standards for pharmacy technician education programs, approved entry-to-practice competencies for pharmacy technicians, and many provinces have put in place the requirements to allow for the registration and regulation of pharmacy technicians.[40,41]

Improving the integration of international pharmacy graduates

Understanding and raising awareness of the issues and challenges surrounding the integration of IPGs into Canadian pharmacy practice is an important strategy.[42] The Moving Forward initiative specifically researches these issues and proposed eight specific recommendations to better integrate IPGs, including ensuring they are prepared for the formal processes and examinations they must undergo for licensure to practise and also supporting their continued professional practice after licensure.[43]

Developing a blueprint for pharmacy

Canada believes that fostering an environment that will enable pharmacists and pharmacy technicians to practise in expanded roles requires a clear vision and a cohesive plan for managing change within the pharmacy profession. The Blueprint for Pharmacy is a collaborative, pan-Canadian initiative led by the CPhA designed to move pharmacy practice forward. The Moving Forward initiative provided critical evidence to inform the specifics of the Blueprint for Pharmacy's Implementation Plan, and its 36 final recommendations are very closely aligned with the actions in the Blueprint.

In June 2008, the Task Force on Blueprint for Pharmacy released the Vision for Pharmacy – a document describing a landscape where pharmacists and pharmacy technicians work to the fullest extent of their skills and knowledge to better achieve optimal drug therapy outcomes for Canadians through patient-centred care. In April 2009, the Task Force released the Implementation Plan for achieving this Vision, which identifies the essential steps, priorities, timelines, and leaders for carrying out the work.[44]

5.2.5 Outcomes

- Canada now has an annual report from the CIHI PDB, allowing comparisons over time on the supply and demographic trends of pharmacists in Canada.
- Several provinces are establishing formal primary care positions for pharmacists. For example, due to the success of the IMPACT project in Ontario, more than half of the province's 150 Family Health Teams have now hired a pharmacist.[45]
- Physicians are becoming more accepting of pharmacists as critical team members.[46] In a recent survey, family physicians themselves report collaborating more with pharmacists than with any other health care professional, with over 70% reporting some form of regular collaboration.[47]
- New compensation models for pharmacy services are being evaluated. While the general consensus is these models are a step in the right direction, there is strong feeling from the community pharmacy sector that offsetting compensation for dispensing by compensation for other services is not a sustainable business strategy, and may discourage the provision of collaborative health care services.[48]
- An Evaluation of Canada's first provincial Drug Information System has been completed, examining the impact on pharmacy workflow. Lessons learned are now being shared across jurisdictions.
- The Pharmacy Examining Board of Canada has developed a national entry-to-practice Qualifying Examination for the assessment and certification of the competence of pharmacy technicians.[49] The province of Ontario is a forerunner in advancing the role of pharmacy technicians,

with the Ontario College of Pharmacists ready to begin regulating pharmacy technicians as a distinct health profession by 2010.[50]

- All sectors of pharmacy in Canada have endorsed the common Vision for Pharmacy by agreeing to work collaboratively with other pharmacy stakeholders to achieve the Vision.[51] As the examples in this case study have shown, pharmacy leaders are now beginning to carry out the activities outlined in the Implementation Plan. The Vision for Pharmacy document and the Blueprint for Pharmacy Implementation Plan are available at www.pharmacists.ca/blueprint

5.2.6 Conclusion

The greatest human resources challenge in Canadian pharmacy also represents its greatest opportunity. The pharmacist's role in the delivery of health care is evolving from one focused primarily on dispensing medications to one emphasizing the provision of patient-centred, outcomes-focused care. Canada's pharmacy workforce challenges can be best served by a comprehensive strategic action plan that manages the evolution of the role of the pharmacy workforce in the delivery of care and leads to an alignment with the pharmacy service and pharmaceutical care needs of the Canadian population. As expanded roles for pharmacists and technicians become better integrated into Canada's health delivery system, Canada becomes better positioned to more accurately plan for the supply, education, deployment, recruitment, and retention of its pharmacy workforce.

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5.3 Country case study: Great Britain

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Summary

The demand for pharmacy services in Great Britain is steadily increasing. To determine the ability to meet this demand, a pharmacy workforce model was developed. This case study reports some key findings placing particular emphasis on supply side issues. Findings indicate that the British pharmacy workforce appears to be fairly stable and fulfilled, and there seems to be a reasonable "fit" between pharmacists' aspirations and what their organisations have delivered. However there are risks in the following areas:

- Risks to pharmacists' well-being
- Risks to supply
- Risks to retention
- Risks to patient safety and service quality

Collectively, these risks have serious implications for workforce planning.

5.3.1 Background

Pharmacy is changing rapidly and so too are the demands on the profession, arising from for instance, the growing proportion of elderly patients, the use of robotics in the supply process, and the changing legal and regulatory requirements placed on pharmacists. The pharmacy workforce is also changing with a growing number of female pharmacists and the increasing importance pharmacists are placing on achieving a work-life balance. Developing workforce planning in this dynamic context is not straightforward; strategic planning for the healthcare professions has been a serious problem for over twenty years.

Great Britain is composed of England, which is organised into ten health regions; and Wales and Scotland, both of which have devolved administrations. Planners have traditionally made projections about future needs by looking at past supply trends. This approach may be adequate when there is a stable environment, but in the current, rapidly-changing work setting, it gives potentially erroneous results.

Following a number of high profile problems in planning the healthcare workforce, including pharmacists, the British government is addressing how it prepares its workforce projections in England by strengthening:

- the underlying workforce research and statistics;
- workforce planning methodology;
- model-building for both supply and demand sides;
- forecasting techniques; and
- the employer engagement process.[1-5]

The more rigorous workforce planning approach described here is based on a detailed study of the pharmacy workforce undertaken at King's College, London. A prototype pharmacy workforce model was built in 2004-05 based on research into British pharmacists' attitudes and commitment to their careers, their organisations and the profession.[6] See Figure 1 for the pharmacy workforce careers model and Figure 2 for the supply-side metrics and flows model.

Figure 1. The pharmacy workforce careers model

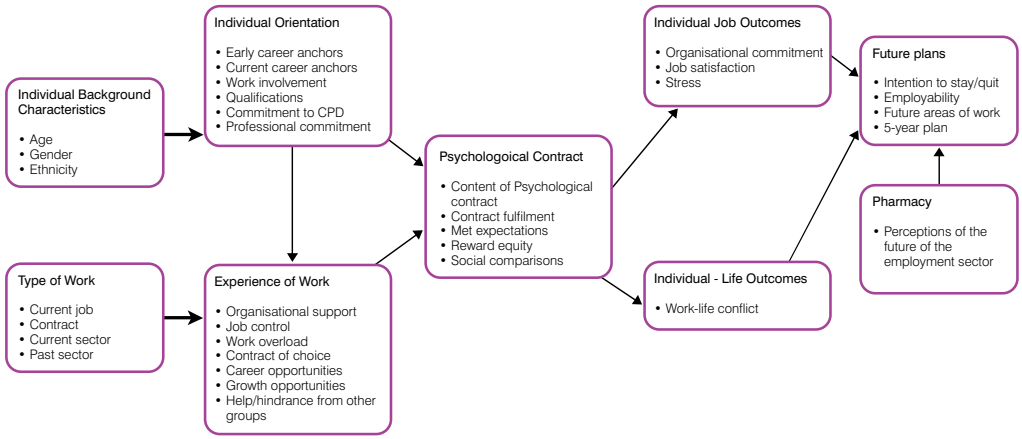
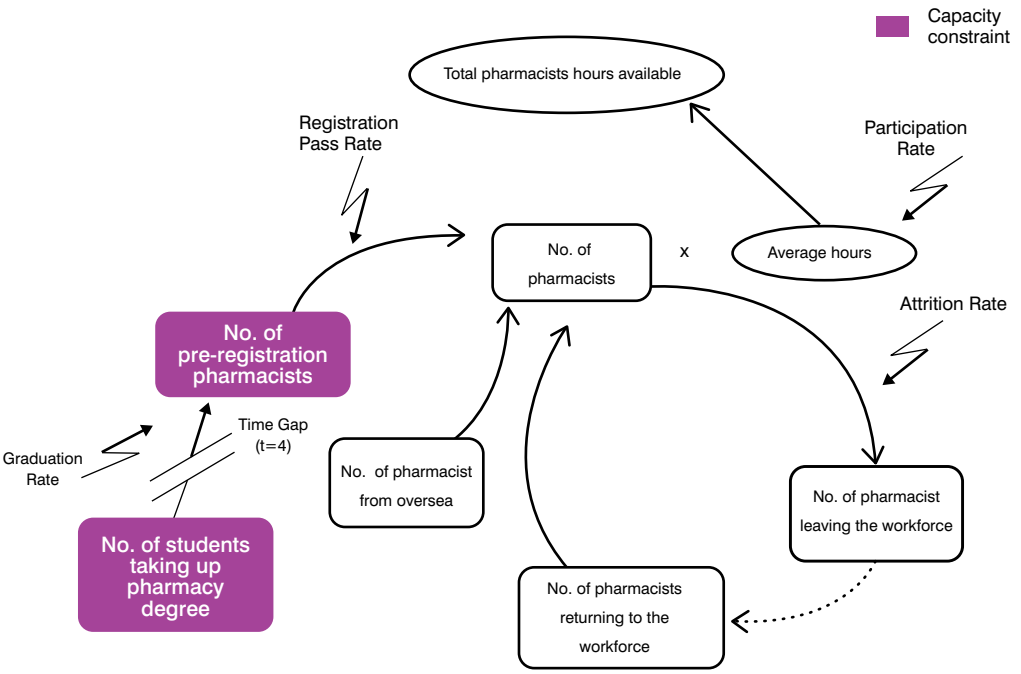


Figure 2. Pharmacist workforce planning model – supply side flows

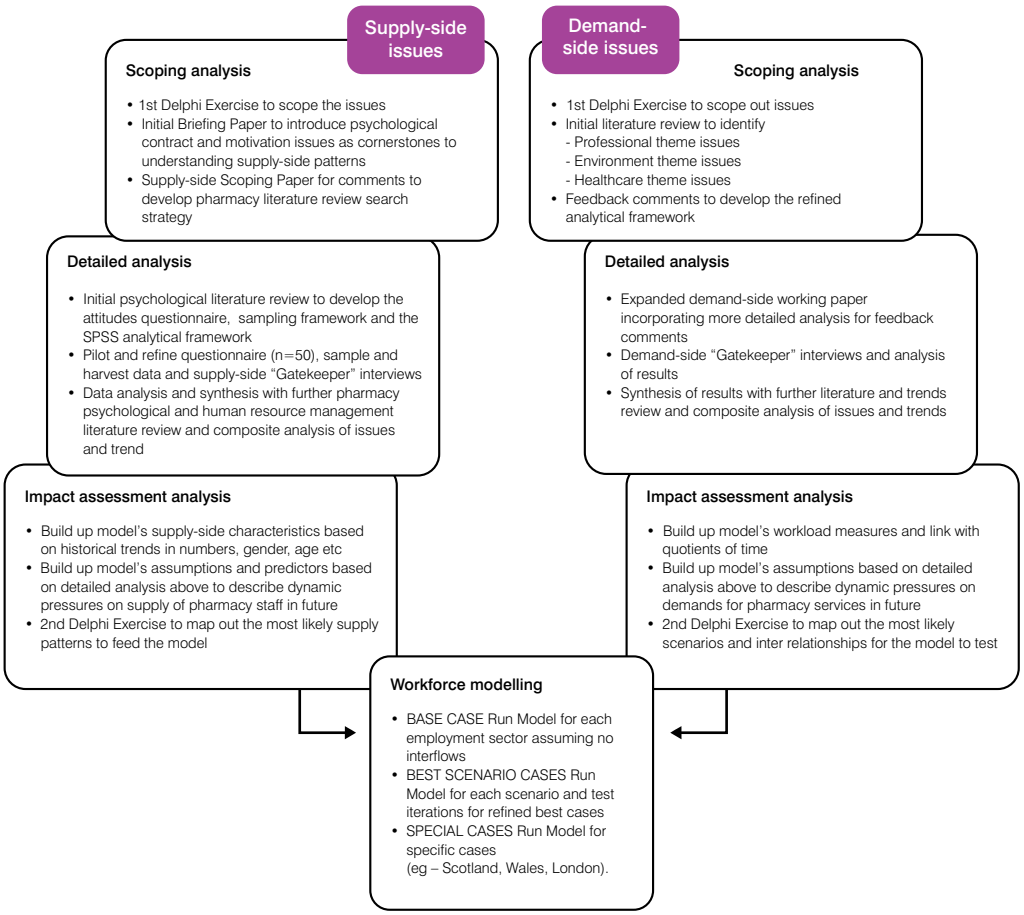


A complementary demand-side model was built to examine the underlying trends for pharmacy work in the five major employment sectors:

- Community pharmacy ranging from the big High Street corporate chains and major supermarkets to the small local business groups and single-handed pharmacy businesses;
- Hospital pharmacy including acute, mental health and child care services;
- Primary care pharmacy which provides some specialist community-based services facilitating the hospital and community care transition;
- Industrial pharmacy which includes drug research and development and their registration and sales and marketing; and
- Academic pharmacy which provides the underpinning education and training of the professional workforce.

A summary of the research programme's main work streams to build the pharmacy workforce model and modelling parameters is given in Figure 3.

Figure 3. The analytical roadmap to build the workforce planning model



The research findings and details of the model and modelling are set out in the report Future Pharmacy Workforce Requirements: Workforce Modelling and Policy Recommendations [6] and a series of articles highlighting some of the key strategic workforce issues for pharmacy are published in The Pharmaceutical Journal.[7-12]

This case study presents a synopsis of these publications and focuses on the key issues and challenges affecting the pharmacy workforce for the future.

5.3.2 Key issues and challenges affecting the pharmacy workforce

A core source of information for building the supply side model was a survey of a stratified random sample of a large cross-section of the pharmacy workforce.[6] The survey was a 16 page postal questionnaire. It was developed following a pilot study which was used to validate existing scales in this context and also to develop new scales. Two thousand and eighteen responses (56% response rate) were achieved. There was oversampling of the academic and industry sectors due to their relatively small numbers. This was complemented by a parallel survey of 605 (45% response rate) pharmacy technicians.

Pharmacists' career aspirations

Building on research on other occupations, three core aspirations or "career anchors" were identified for pharmacists. In order of importance these were: being part of a helping profession, the importance of achieving a work-life balance and having a sense of control.

Regression analysis reveals women gave greater priority to being part of a helping profession and men give greater priority to having control. Ethnic minority pharmacists gave greater priority than white pharmacists to being part of a helping profession and also to having control. Regression analysis also revealed that younger pharmacists gave higher priority than older workers to being part of a helping profession and much higher priority to achieving work-life balance.

Pharmacists' perceptions of psychological contract fulfilment

The psychological contract, a two-way exchange of perceived promises and obligations between organisation and employee, is an important concept in explaining employee behaviour. Analysis of pharmacists' perceptions of how well their employers kept the promises, made as part of their psychological contract, showed that employers provided a safe working environment and a reasonably secure and challenging job. The promises least likely to be kept were: flexibility in matching demands of non-work roles with work; improving future employment prospects; and help in dealing with problems encountered outside work. Fulfilment of the psychological contract matters because it is associated with greater job satisfaction, lower stress and lower work-life conflict, as well as with higher commitment to the organisation and less likelihood of leaving it.[13]

Pharmacists, control and work overload

Most pharmacists feel in control but overloaded; analysis showed that some bring the workload upon themselves, possibly as a result of their high involvement in their jobs. The sector of employment is important: those working in large retail chains reported much lower levels of control while those working in hospitals also reported lower control than most other sectors. Women reported more overload than men and those from ethnic minorities reported less. Those working in hospitals were particularly likely to report high levels of overload.

Pharmacists and future prospects

Future prospects included career and growth opportunities and employability. A high proportion of pharmacists said their jobs provide opportunities for growth and help them to feel confident that they are employable and could easily find another job.

Younger and female pharmacists perceived better career opportunities as well as those with higher commitment to the profession. Those with longer tenure and locums tended to perceive fewer career opportunities. Growth opportunities were rated as better by pharmacists in the academic sector and in primary care as well as those with more than one job. In contrast, pharmacists from non-white ethnic groups and those working in community sector chain organisations were more likely to report fewer opportunities for growth. Older pharmacists and those with longer job tenure tended to feel somewhat less employable compared with pharmacists who work in independents and chains.

Pharmacists and met expectations

Many pharmacists reported some disappointment with pharmacy work and this in part reflects unmet expectations. However the survey evidence suggests there is some "fit" between career priorities and current work; for example, those

who value control are more likely to be working as independent community pharmacists and those who value work-life balance are more likely to be working fewer hours. Those who feel in control in their jobs and who see good future opportunities are more likely to say their expectations have been met. However, the regression analysis suggests that most young pharmacists, the future core of the profession, believed that the profession did not meet the expectations they held at the start of their careers. So too do those who reported overload in their jobs and longer work hours.

Pharmacists' job satisfaction

Most pharmacists (70%) were satisfied with their jobs. Regression analysis revealed that older pharmacists were generally more satisfied than their younger counterparts even after taking into account differences in salary, status etc. Analysis showed that those who gave particular priority to being part of a helping profession were more satisfied and those who gave priority to achieving a work-life balance tend to be less satisfied. Not surprisingly, those reporting higher control, good career and growth opportunities, strong professional commitment and those whose psychological contract had been met reported high job satisfaction.

Job demands, stress and work-life conflict

Stress and work-life conflict are important issues for pharmacists. Sixty-two percent of pharmacists agreed that their job was stressful. Most high stress can be attributed to the demands of the job. Therefore stress is much greater among those who report high levels of work overload, those who work long hours and those who feel that the job has not met their expectations. It is also higher among those who feel less employable and those who give priority to being part of a helping profession. One reason for this last finding is that individuals highly committed to helping people through their job may be more likely to accept too much work and to work long hours. The demands in the job are also the main source of work-life conflict. Other factors affecting work-life conflict include breach of the psychological contract, unmet expectations in the job and not being on employment contract of choice. We might conclude therefore it is not who you are as a pharmacist but what you do as a pharmacist that is most important in determining satisfaction, stress and work-life conflict.

Pharmacists' commitment

Commitment to the organisation is associated with lower labour turnover.[14] Pharmacists reported quite high levels of commitment to their organisation, though this is significantly influenced by sectors with academic pharmacists more committed to their employer than those working in other sectors. In addition to sector, a fulfilled psychological contract, met expectations and being on an employment contract of choice were all important in fostering organisation commitment.

Professional commitment is also important with a large proportion (80%) strongly committed to the values and ideals of the profession. Seventy-one percent said that being a pharmacist was an important part of who they are. Eighty-six percent had participated in some form of continuing professional development, typically attending conferences and workshops in the previous year.

Pharmacists and career choice regret

Pharmacy was the first career choice for 78% of pharmacists but only 52% would still choose pharmacy given their time again. Broadly, we classified the pharmacists into four groups:

1) The content pharmacists. Pharmacy was their first choice and with hindsight they would not change that choice. (43%)
2) The converted pharmacists. For them pharmacy was not their first choice but they would choose it again. (9%)
3) The disillusioned pharmacists. Pharmacy was their first choice but would not choose it again (36%).
4) The discontented pharmacists. Pharmacy was not their first choice and they would not choose pharmacy again. (12%)

Our analysis showed that the youngest group of pharmacists – the under 30s – fall disproportionately into the "content" group. This result may relate to lack of experience. The proportion of contented pharmacists dropped slightly among pharmacists in their 30s and 40s. A higher proportion of ethnic minority pharmacists fell into the "disillusioned" and "discontented" categories; the same applies to men as opposed to women. These results indicate where the workforce risks may arise.

Pharmacists' intentions to stay or go

A section of the survey addressed the intended mobility of pharmacists and through these questions we were able to assess whether there is likely to be an exodus of dissatisfied and regretful pharmacists in the future. We found:

1) Those who said they were most likely to stay in the same job were older, highly committed to their present organisation and on their contract of choice; so too were those who reported high work overload, possibly due to their high involvement. Those who can see good career prospects are more likely to move.
2) Those who said they were likely to stay with their current organisation worked more often in community pharmacy corporate chains, in hospitals and in academia as compared with 'other' sectors. There is a tendency for men and for ethnic minority pharmacists to be somewhat more likely to move.
3) Relatively few pharmacists said they expect to change sector in the next five years, especially if pharmacy was their first career choice or they were highly committed to their current organisation. Interestingly, those who report high levels of work overload also did not want to change sector, possibly because of high job involvement or high commitment to their organisation.
4) Pharmacists most likely to want to leave the profession altogether were those for whom pharmacy was not their first career choice. There was some suggestion that those reporting high levels of work-life conflict were also likely to want to leave pharmacy. However, those reporting high levels of work overload are less likely to want to leave the profession, suggesting it is something other than overload that is contributing to issues around work-life conflict. In addition, as part of the survey, we asked pharmacists to identify from a list of business and professional practice development factors those that might encourage them to stay within or leave pharmacy. We identified as the top two positive forces for staying in pharmacy the enhancement of the role of the pharmacist including pharmacist prescribing and the use of electronic patient records. The top two negative forces reducing pharmacists' willingness to stay in the profession were the widening of access to pharmacy services and medicines through alternative mechanisms for the distribution of drugs through mail order and e-pharmacy and the relaxation of control of entry regulations for the large supermarkets.

These findings suggest that while there is likely to be plenty of job change and some movement across organisations, there is no likelihood of a major move out of pharmacy as a whole.

Pharmacists' working hours

As an alternative to movement out of the profession or between jobs, pharmacists might seek to minimise their involvement by reducing their working hours. The survey results confirmed that many pharmacists work significantly more than their contracted hours and expressed a desire in the future to work shorter hours, to move to part-time and to have career breaks. Specifically looking at the next five years, 45% hope to work fewer hours while only 15% intend to increase their hours; 68% of women and 38% of men indicated they hope to work part-time and 28% of women and 18% of men hoped to have a career break in the next five years.

5.3.3 Developing the pharmacy workforce model

The original research was conducted in 2003-2004 and the model built in 2004-2005. The projections are therefore nearly five years old. The Royal Pharmaceutical Society of Great Britain has commissioned an update and, thus far, a new survey has been conducted which will be analysed and reported on in the late summer of 2009. The pharmacy workforce model and modelling parameters are also being updated and revised projections will be reported on at the same time. This work will include a review of the accuracy of the original projections with a view to understanding how to improve the methodology for building workforce models, modelling parameters, and identifying strategic workforce risks.

Amongst the pharmacists surveyed, there is clearly some career disappointment and concern about work overload and work-life conflict which, coupled with an inclination towards reducing hours, will be exacerbated by the increasing percentage of women entering the profession.[1] Whilst the likelihood of movement out of the profession altogether is low, there is evidence of reduced input. Unless it is addressed, this reduction signals increasing work overload and stress among pharmacists with potential risks to patient safety.[15]

A close examination of the demands for pharmacy services also reported in "Future Pharmacy Workforce Requirements; Workforce Modelling and Policy Recommendations" in 2005 shows that in 2002-03, pharmacists were employed in the following areas:

- Community pharmacy – approximately 66% of registered pharmacists were deployed in 12,206 registered pharmacies, of which about 46% were independently owned and small chain businesses (<5 outlets) and 54% were small/medium/large chain and supermarket businesses (>5 outlets);
- NHS hospital and primary care pharmacy – approximately 24% of registered pharmacists of which about 18% were employed in NHS hospitals and 6% in primary care organisations;
- Pharmaceutical Industry and its supplier and support agencies – approximately 5.5% of registered pharmacists;
- Schools of Pharmacy – approximately 2.2% of registered pharmacists.

Research reveals that there are broadly three complementary themes which have driven, and are driving, an increase in the demand for pharmacy services, pharmacists' time, and ultimately for the number of pharmacists (Box 1). This analysis allowed us to build the pharmacy demand-side model which, when taken together with the supply-side analysis outlined above, allowed us to make projections about whether there would be a shortage of pharmacists in the next ten years.

Box 1. Demand side drivers for pharmacy services and pharmacists

1) The "Healthcare Expansion" theme consisting of the growing underlying demands for more services that are required to support an ageing population; government funding policies for the NHS and universities; and the development of gene technology and novel treatments and delivery systems to treat previously untreatable or low prognostic conditions.
2) The "Organisation of Pharmacy Provision" theme consisting of the changing working and technological environment e.g. the range of services available and the opening hours in the retail sector; and the expectations for safer and novel treatments that can be brought to the market more quickly than in the past.
3) The "Professional Quality Assurance" theme consisting of extending the legal and regulatory imperatives to improve patient safety; and extending the role of pharmacists through the new contracts.

Based on our analysis of likely developments (Table 1) we can anticipate a shortage of pharmacists for the community pharmacy workforce in the big commercial chains and supermarket businesses and in the academic workforce. In NHS hospitals the balance has been influenced in particular by a modest shift from primary care and investments in technology that will help to meet the higher demand.

Table 1. Ten-year projections of pharmacist supply and demand

Sector	Projected supply* (WTE)	Projected demand (WTE)	Projected 10 year shortage/excess
Community			
Big chains/multiples (5>)	14,411	33,670	-57%
Independents/small chains(<5)	16,812	14,974	+12%
NHS Hospitals	8,935	8,975	In balance
Primary Care Organisations	3,410	3,132	+9%
Pharmaceutical Industry	1,636	1,068	+53%
Schools of Pharmacy	388	525	-26%
Total	**45,592**	**62,344**	**-27%**

Note: The model's base year is set on 2003 data so the 10 year projections give estimates to 2013.

•Based on average contracted hours of 33 hours per week. WTE = whole time equivalent.

5.3.4 Summary of the key risks in the pharmacy workforce

The pharmacy workforce at the time of this research appears to be reasonably stable and fulfilled, and there appears to be a reasonable "fit" between pharmacists' aspirations and what their organisations have delivered. Looking to the future, the potential risks in the pharmacy workforce are in the following areas:

1) *Risks to retention*

   There is some indication that among pharmacists that intention to quit the profession is often not translated into actually leaving. Nevertheless there will be a steady stream of retirements and a risk of loss among younger pharmacists disillusioned or discontented with their careers.

2) *Risks to pharmacists' well-being*

   Many pharmacists report a heavy workload, long hours and stress plus a strong desire to reduce hours. Set against this, recent changes in work organisation and quality assurance are increasing demands on time. This risks increasing stress, reducing job satisfaction and commitment, and enhancing pressure to reduce hours.

3) *Risks to supply*

   Pressure for shorter hours among existing pharmacists reduced supply. New Schools of Pharmacy are increasing throughput but this risks constraint by a shortage of academics since younger pharmacists are rarely interested in pursuing an academic career and it is more difficult for mature pharmacists to enter academic careers. The main implication of this is a lack of teachers in the Schools of Pharmacy to train the future cohorts of pharmacists, damaging future supply.

4) *Risks to patient safety and service quality*

   The excessive work overload and stress faced by pharmacists combined with an extension of roles through the new pharmacy contract and a desire to reduce working hours create pressures that increase the risk to patient safety and service quality

Therefore, the risks within the pharmacy workforce are that the two key sectors which require more pharmacists in the future will not be able to satisfy their needs. This will compromise the government's ability to deliver effective medicines management and patient care. Current action to address these gaps includes opening a number of new Schools of Pharmacy across Great Britain as well as scholarships to encourage young pharmacists into the academic sector.

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5.4 Country case study: Kenya

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Summary

- In the last two decades, Kenya has put in place strategies to strengthen the pharmacy workforce through government policies aimed at increased training; improvement of distribution; creating an enabling working environment; recognition; financial and nonfinancial incentives; and strengthening regulation.
- The majority of the pharmacy workforce is locally trained and there are now three schools of pharmacy and eighteen colleges offering pharmaceutical technology diplomas.
- There has been an increase in the number of pharmacists from 1,866 in 2002 to 2,775 in 2008, while pharmaceutical technologists have increased from 1,399 in 2002 to 2,324 in 2009, an increase of 48% and 66%, respectively.
- The majority of the workforce is in the community pharmacy sector. In the public sector, personnel have increased from 433 in 2005 to 609 in 2008, an increase of 40%.
- Growth of personnel in the public sector, rural-urban distribution and regulation of the community sector still remain challenges.

This country case study describes policy reform and other strategies that have led to strengthening of the pharmacy workforce in Kenya.

5.4.1 Background

History

Training of pharmaceutical personnel along with other disciplines of health began in 1926 at what is currently the Kenya Medical Training College (KMTC). The college started training compounders, then dispensers and later pharmacy assistants. In 1968, the government started a three-year diploma in pharmaceutical technology at KMTC. Over the last five years, the regulatory authority, the Pharmacy and Poisons Board (PPB), has accredited 17 more institutions to offer diplomas. Since its inception in 1974, the School of Pharmacy of the University of Nairobi has been the only institution training pharmacists in Kenya. In 2009, one more public and one private university started offering degrees in pharmacy.

Workforce description and services

Out of the 2,775 pharmacists who are in the country, 2,063 had been registered to practice by April 2009. The total number of technologists by April 2009 was 2,324.[1] Most of the pharmacy workforce is distributed amongst the 1,700 registered community pharmacies and 212 wholesale outlets. A 2003 national household survey showed that 5.6 to 24.6% of the Kenyan public use retail pharmacy outlets for outpatient healthcare.[2]

In the last ten years the role of the pharmacist has been shifting more towards patient care as a result of the introduction of clinical pharmacy both at undergraduate and postgraduate levels. Kenya is the largest manufacturer of pharmaceutical products in the Common Market for Eastern and Southern Africa (COMESA), supplying 50% of the region's market through 45 manufacturing industries. The pharmaceutical industry employs few pharmacists.[3]

Other pharmaceutical personnel are employed in organizations such as the Kenya Medical Supply Agency (KEMSA); non-governmental organisations; the Pharmacy and Poisons Board; and the WHO pre-qualified National Quality Control Laboratory. A number of pharmacists with specializations are employed in academia and in public research institutions and those with Master's degrees in public health work in policy development.

5.4.2 Key issues, challenges and strategies

Workforce supply

Both the public and private health sectors are consistently understaffed and shortages are particularly acute amongst pharmacy and laboratory departments. This is due to government economic constraints as well as policies which were advocated by the International Monetary Fund (IMF) to freeze public sector employment.[4] It has been estimated that for the country to meet its health-related Millennium Development Goals (MDGs), the pharmacy workforce needs to grow by 28% annually between 2010 and 2015.[5] Kenya has about eight pharmacists for every 100,000 people.[1] This is a

significant improvement from 1998 when the ratio was less than 1: 100 000.[6]

Over the period from 1978 to 2000, the University of Nairobi produced about 25 graduates every year. This number doubled by 2005 and rose to about 80 in 2008. In addition, about 40 Kenyan pharmacists trained outside of the country apply for registration each year, half of whom are successful. In 2009, Kenyatta University (public) and Mount Kenya University (private) started offering degrees in pharmacy. Their first graduates will be registered in 2014 and it is expected that by 2020 the national pharmacy workforce will be growing steadily and significantly. Universities that wish to establish undergraduate training programs are currently constrained by insufficient pool of trainers with higher degrees in pharmacy, but this will soon change because University of Nairobi has Master's and doctoral degrees in various pharmacy specializations.

The massive growth in training of pharmaceutical technologists has been two-fold. Firstly, due to the introduction of privately sponsored students in the nine public institutions, admission is not restricted to government sponsorship. Secondly, many institutions which had been offering diplomas in other fields have now introduced pharmaceutical technology, thus taking advantage of existing infrastructure and using graduate pharmacists as their trainers.

The growth of institutions offering pharmacy degrees and diplomas is partly due to the general demand for tertiary education in Kenya as well as the fact that pharmacy is one of the well-paying professions. The numbers trained at these institutions is determined by the capacity of the institutions and not by the demand for professionals.

Development in education has largely been as a result of efforts within institutions and not as a result of national planning.

Workforce distribution and retention

Although the public sector comprises 58% of the health facilities in Kenya, there is a significant public-private distribution imbalance of pharmaceutical personnel.[7] In 2008, there were 382 pharmacists and 227 pharmaceutical technologists employed in the public sector, representing 14% of the workforce.[1] Health workforce distribution, including that of pharmacy personnel, is heavily skewed toward urban areas. [5,8,9] In the private sector, the quality of health services was lower in rural and poor urban neighbourhoods compared to the more affluent urban areas.[10]

Until the late 1990s, most public hospitals were unable to retain pharmacists due to poor salaries.[11] Most of the staffing reforms in the public sector can be attributed to the Kenya Health Policy Framework, which includes strategies to improve distribution of health personnel; promote service delivery and workers' morale; improve training, supervision and ethical practice.[12] Despite considerable improvement in the retention of staff in the health public sector, a human resource mapping exercise carried out in 2004 found that staffing levels in public hospitals did not meet the MoH staffing norms.[11] In addition, every year about twenty pharmacists apply to migrate and practice abroad especially to Australia, Canada, USA and the UK. The PPB estimated that there were 190 pharmacists who had migrated abroad in the ten years prior to 2006.[13]

Workforce planning

The Central Bureau of Statistics has no information on pharmaceutical workforce planning in the private sector.[14,15] A comprehensive planning mechanism for pharmaceutical personnel in the public sector has been guided by the Kenya Health Policy Framework. This policy was implemented through the National Health Sector Strategic Plans.[16,17] Some of the proposals that had been raised during the formulation of the Kenya National Drug Policy were not implemented in the Kenya National Drug Policy Implementation Plan.[18,19] These recommendations included: training progression of technologists to pharmacists; post-graduate pharmacy training; improvement of the scheme of service; identification of pre-service and in-service training needs. Nonetheless, some of them have been achieved, largely as a result of the independent efforts. The KNDP is currently under review and it has been renamed the Kenya National Pharmaceutical Policy. It proposes a human resource development plan to improve the supply, skills mix and retention of personnel.[7]

Education capacity

Most employers are satisfied with the skills of graduates in community, hospital and manufacturing industry sectors. However, some think that more emphasis should be given to clinical pharmacy, drug supply chain management and industrial specialization. Curricula have undergone various

changes. The KMTC introduced drug supply management in its diploma training and also for practising pharmaceutical technologists. At the School of Pharmacy, University of Nairobi, clinical pharmacy and pharmacy management, amongst others, were introduced in the undergraduate program. The school also offers Master's degrees in pharmaceutical analysis, clinical pharmacy and pharmacognosy and complementary medicine, as well as doctoral degrees. More Master's degrees in the fields of pharmacology and industrial pharmacy will be launched this year. One private firm offers short courses in Good Manufacturing Practices and has trained 1,500 personnel since 2003.

The pharmacist is viewed as an accessible healthcare provider and this has created a huge demand for education at diploma, degree and post-graduate levels. However, there is need for more active engagement between education institutions and the private and public pharmaceutical sector to make curricula more relevant to existing needs.

Regulation and Practice

Effective regulation of medicines, pharmaceutical workforce, pharmaceutical services and premises has been hampered in part due to lack of human resources and capacity within the PPB. Strategies to strengthen the PPB were first initiated through the KNDP in 1994.[18] It was developed by participants from various government ministries, universities, research institutions and professional institutions, among others and it was supported by WHO, Department for International Development (UK) and the government of The Netherlands. The aim was to strengthen the Pharmacy Department of the Ministry of Health, which serves the public sector, and to reform the PPB in order to strengthen drug legislation and regulation of the profession. A review of the KNDP Implementation Plan showed that there was lack of clarity of the role of PPB, inefficiency, inadequate representation of stakeholders in the PPB, lack of an organizational structure and scheme of service, understaffing and lack of statutory powers to enforce a code of ethics.[19] As a result, strategies were laid out to establish and/or strengthen registration of personnel and drugs, pharmaceutical inspectorate, drug information, licensing of pharmaceutical premises and the training and assessment committee. Other strategies included developing an organizational structure, standard operating procedures, terms of service and job descriptions and recruitment. Since then, the above-named units have been set up and more staff have been employed and trained in areas such as drug regulatory affairs and pharmacovigilance. Legal services have been facilitated through the recruitment of a lawyer. In addition, the PPB has acquired better premises and facilities.

Involvement of a wide range of stakeholders in the formulation of the strategic plan, the support of development partners, engagement of legal experts and a reasonable revenue base have been enabling factors in strengthening the PPB. However, although the operations of PPB have been considerably strengthened, it still has insufficient human capacity to handle illegal and unethical activities.[20,21] These include the manufacture and importation of substandard and counterfeit medicines, supply of medicines to unauthorized persons and operation of establishments by unauthorized persons.[22] It is estimated that about two-thirds of pharmacy retail outlets need to be shut down for operating without a license.[21]

The Commission for Higher Education is responsible for registration of universities and the courses they offer. However, for recognition and hence the registration of the graduates, the universities must be accredited by the PPB. Likewise, only PTs from accredited colleges are enrolled by the PPB. Lack of autonomy from the ministry and inadequate representation of the private sector in the PPB still remain as setbacks. The Pharmacy and Poisons Act and Public Health Act are currently under review to deal with some of these issues.

The Pharmaceutical Society of Kenya (PSK) has contributed to improved practice standards through advocacy in the media and training activities. Continuous professional development (CPD) programs were first suggested in 1998 and implemented in 2006 by the PSK.[6] This initiative has been successful because it is a requirement for renewal of the annual practice license from the PPB. Adoption of green cross as a symbol of ethical practice was started in 1998 but this initiative failed due to lack of adequate publicity.[23]

5.4.3 Outcomes

Due to the implementation of various independent strategies, progress has been made to expand the training of pharmacists and pharmaceutical technologists and strengthen the pharmacy workforce. Outcomes of particular note include:

- Expansion to three schools of pharmacy and 18 colleges training pharmaceutical technologists.
- Increase in the number of pharmacists from 1866 in 2002 to 2,775 in 2008, while pharmaceutical technologists have increased from 1,399 in 2002 to 2,324 in 2009.[24,1]
- Increase in public sector pharmaceutical personnel from 433 in 2005 to 609 in 2008.[1]
- Improved skills mix and the role of pharmacists is now more oriented to patient care.[25,26]
- Improved policies and terms of service in the public sector have led to higher retention.
- Improved role, structure and human resources for the regulatory authority.
- Enhanced contribution of professional bodies to the enforcement of better practice.

5.4.4 Conclusion

Kenya has made significant progress in pharmacy education, distribution, retention and regulation. Growth of the workforce in the public sector, rural-urban distribution and regulation of the community sector still need improvement. The following recommendations should be considered in the strategies to improve the workforce:

- There is need to plan for further increase of pharmacy workforce supply and improved retention, especially in the public sector;
- Workforce supply requires a central coordinated planning effort, involving stakeholders in both the public and private sector.
- The training institutions have to be involved in the workforce planning process in order to successfully meet the supply needs;
- Training should be designed to meet sector needs and have a more patient care approach;
- Pharmacists with higher degrees and academic competencies are required for development of more pharmacy schools;
- For purposes of planning, information systems need to gather data on gender, age, practice area, geographical distribution, personnel migration, and non-practicing personnel;
- Autonomy of the regulatory body from the ministry is key to the delivery of effective regulation;
- Professional associations have an important role in enforcing and improving pharmacy practice.

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5.5 Country case study: Sudan

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Summary

- In Sudan, many challenges are facing the development of an effective pharmaceutical workforce; despite the increase in the number of pharmacists and other pharmaceutical cadres. The development of employment in the pharmaceutical sector (service provision and industry) has not kept pace with the increase in the number of graduates, resulting in growing unemployment. Consequently, the density of pharmacist to population is still low, especially in remote and rural areas;
- Strategies to address these challenges have included expansion of education capacity, increasing employment opportunities and expansion of the private sector;
- More pharmacists are employed in the public sector to improve coverage in rural and remote areas due to the institution of compulsory national service and the provision of post-graduate study opportunities;
- Curriculum in most pharmacy faculties has been revised to encompass a broader pharmacy practice focus, especially clinical pharmacy and pharmaceutical care;
- There has been an increase in the number of pharmacist graduates, improvements in access to medicines and an expansion in the roles of the private sector in the provision of quality and more comprehensive pharmaceutical services.

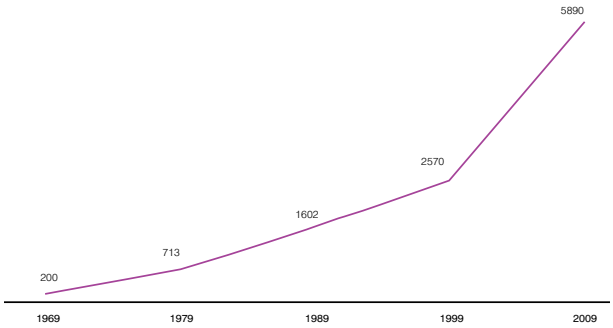
5.5.1 Background

Sudan is the largest country in Africa with an area of 2.5 million square kilometres and a total population of 39.15 million.[1] The total GDP in 2008 for the country was around USD $89 Billion, while the per capita income was USD $2,335.[2] Sudan follows a federal system with 25 states, 15 in north and 10 in south.

Pharmacy education at the university level began in 1963 with the establishment of the faculty of pharmacy at the University of Khartoum to train pharmacists (Bachelor of pharmacy degree). It started with 20 graduates in 1968. Now there are 13 faculties of pharmacy graduating around 900 pharmacists per year [3], leading to the rapid increase in the numbers of pharmacist graduates and postgraduates and subsequent oversupply of pharmacists relation to employment opportunities in the Sudanese labour market.

Pharmacists are regulated by the Sudan Medical Council (SMC) while pharmacy assistants are regulated by the Federal Ministry of Health (FMOH). The SMC is the national body that regulates the practice of pharmacists, doctors and dentists.[4] A total of 5,890 pharmacists were permanently registered with the SMC in 2009.[3] Figure 1 illustrates the growth in number of pharmacists from 1960.

Figure 1. Total number of pharmacists in Sudan 1969-2009



Pharmacy workforce distribution is skewed towards the urban areas in Sudan (Figure 3). The density of pharmacists varies significantly from 0.05 per 10,000 population in West Darfur to 5.5 in Khartoum.[5]

The training of pharmacy assistants started in 1974 and the total number of graduates in Sudan increased to 2,488 in 2007.[5] They work in hospitals and community pharmacies to dispense prescriptions under the supervision of pharmacists. They also work in health centres without the supervision of pharmacists but under the supervision of other health professionals.

A new school that graduates pharmacy technicians was established recently in Ribat University in Khartoum. A three year curriculum was approved by the University itself although this cadre has not yet been defined in any policy or

legislation. There is no clear vision for the role of this cadre in pharmacy practice and no clear demarcation with pharmacy assistants.

Practice Regulations

The SMC is responsible for issuing temporary practice licenses to pharmacist interns and permanent practice licenses for pharmacists working across all pharmacy sectors including the pharmaceutical industry.[4] Those working at universities are not obligated to register to this council. The temporary practice license mandates 15 months of employment in a public health institution upon graduation – one as an internship and the other as compulsory national service. At present, there is no system for revalidation of professional licensure. To maintain licensure, all personnel should adhere to legal and professional rules of conduct.[6]

Distribution of the workforce

In 2007, 26% of the pharmacy workforce worked in the public sector while 74% worked at the private sector.[3] Only 3.4% of pharmacists worked in higher education institutions as academic staff. The same reports showed that 45% of those working in the public sector, worked in hospitals and 25% work in medical supplies (Figure 2). Seventy-five percent of the private pharmacist workforce worked in community pharmacies and 19% in the private pharmaceutical wholesalers (importation and/or distribution of medical supplies).

Figure 2. Distribution of the pharmacist workforce in the public sector

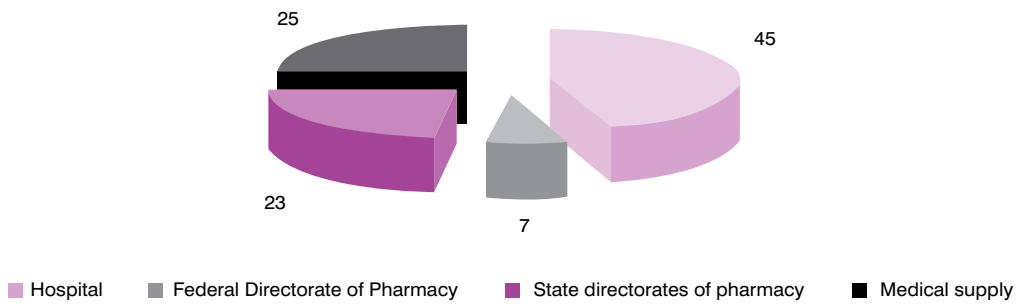
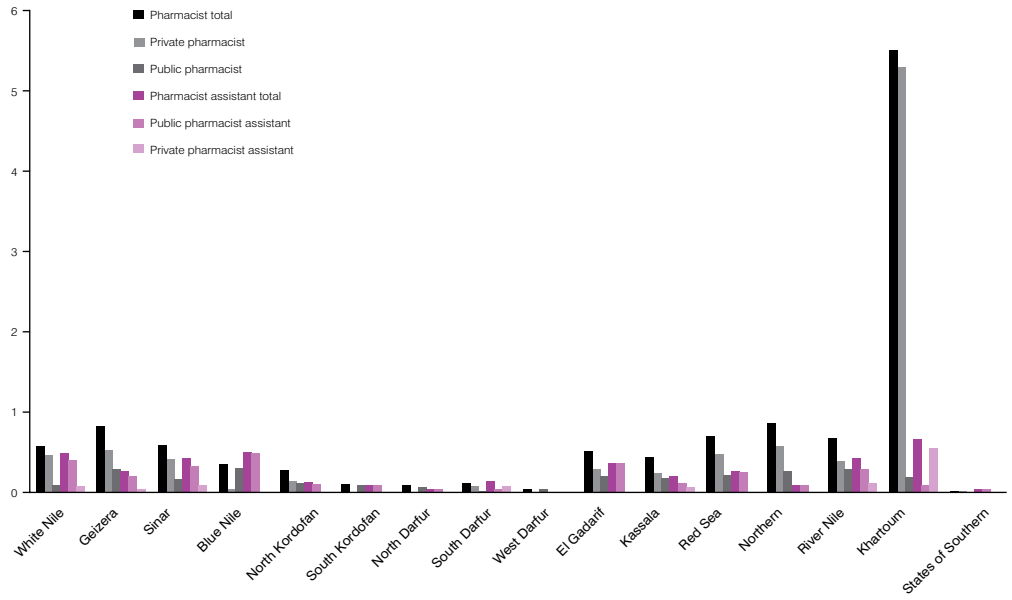


Figure 3 compares the density of pharmacists and pharmacy assistants in each state.[3] It illustrates the concentration of the private sector workforce in urban areas. Sixty percent of the total pharmacy workforce is employed in the private sector in Khartoum state alone, representing 80% of the private sector pharmacist workforce. Public sector pharmacists are more equitably distributed than those in the private sector and several states have few or no pharmacists, such as the States of Southern Sudan. The pharmacy assistant workforce is more equitably distributed.

Figure 3. Density of pharmacists and pharmacy assistants per 10,000 population in Sudan (2009)



Source: State Directorates of Pharmacy, 2009

5.5.2 Key issues

Inadequate workforce planning

Higher education policy makers do not set policies that balance the output of graduates and the actual quantitative workforce needs. Although the number of faculties of pharmacy and pharmacists are both increasing, employment in the different pharmaceutical sectors have not developed proportionally to accommodate the increase in the number of graduates, despite the needs for skilled workforce. The supply system in the south is still under development and depends largely on services provided by Non Governmental Organizations that hardly ever employ pharmacists. The pharmaceutical industry in Sudan is small and offers few employment opportunities to pharmacists.

Additionally, the number of jobs in the public sector is limited and is difficult to increase due to fiscal constraints and resistance by physicians who hold decision-making power in the health system. Most of the available jobs are concentrated in urban areas, however the percentage of deficit in number of public sector pharmacists was estimated by FMOH in 2005 to be around 60 % in rural areas.[7]

It is clear from the recent experience that the number of the unemployed pharmacists is increasing and salaries are decreasing. For example, over the last three years, salaries have decreased by 28% in some private pharmaceutical wholesalers and by more than 30% in many private pharmacies (personal communication with private companies and pharmacies). Salaries in the public sector are not attractive for pharmacists as many prefer to work in the private sector. Human resource information systems are still not well established especially at the state level, which makes workforce monitoring and planning difficult.

Inequitable workforce distribution

The pharmacy workforce is inequitably distributed with a significant concentration of health care and other services (particularly in the private sector), in the major cities in Sudan. This results in a limited

number of pharmacists who are willing to work in rural areas. Most pharmacist graduates are female (55%) and originate from the major urban centres of Sudan.[3] There are some social and cultural barriers which hinder female pharmacists from working in rural areas and difficult places due to family traditions and lack of suitable living conditions.

Education

There is significant variation in the pharmacist degree curriculum from one university to another; while some are following recent models that focus on patient care, others are sticking to the classic pharmaceutical science oriented models. This leads to differences in the knowledge and competencies of graduates that are not appropriately recognized in the recruitment system. Additionally, the lack of regulation that obliges pharmacists to participate in Continuing Professional Development (CPD) programmes limits the maintenance of professional competency. Continuous education programmes are still very limited and no nationwide programme is available.

Lack of development in pharmacist roles

There is inefficient utilization of pharmacists with specialist competencies; for example, many pharmacists are specialized in clinical pharmacy but only two hospitals have started to implement clinical pharmacy services (partly due to resistance from physicians). However, there are two types of higher education: academic and professional. The first type is organized by universities which award masters and PhD degrees, while the other is organized by the Sudan Medical Specialization Board (SMSB) that awards membership and fellowships in pharmacy practice. The SMSB is planning to offer more pharmacy specialization opportunities in areas such as quality control and clinical pharmacy. These subjects are lacking in the undergraduate curriculum of many universities. In addition, the fact that there is no clear governmental vision to recruit specialist pharmacists resulted in state of lack of incentives for pharmacists to obtain post-graduate degrees. Only 160 specialist pharmacists were registered with the Sudan Medical Council by 2008 (excluding academic staff).

Human resource management and motivation

Promotion through the ranks of the public sector is time dependent and there is a lack of practice standards and performance management. Pharmacists are not obliged to develop themselves professionally. The concept of quality management systems is new to the health system and few institutions have adopted such an approach. In the private sector, newly qualified and experienced pharmacists occupy the same posts and may receive similar salaries which may be a source of demotivation and attrition.

5.5.3 Strategies

In the last 20 years Sudan adopted two public sector reform strategies to improve standards in different fields, particularly health. It was started by the ten year strategy from 1992-2002 and then the 25 year strategy for 2005-29.[8] The following key strategic objectives were set for FMOH general health human resources development:

- Developing effective policy for human resources based on situation analysis and taking into account the surrounding changes and health policies. This should be compiled in plans that ensure balance between need and supply.
- Developing of community-based training, with structured continuing education programmes.
- Redistributing the health workforce to counter imbalances and development of retention policies to combat rural-urban and international migration.
- Setting of appropriate regulations and rules for employment and ethics.
- Reform of curricula to provide graduates with contemporary skills, improve critical thinking and their ability to seek new information.

A number of strategies were set and implemented by different governmental pharmaceutical institutions to improve pharmacy education, pharmaceutical regulation and services. [9.10]

Strengthening public sector pharmaceutical systems

Creation of the decentralized federal system in the country in 1994 led to the delegation of powers to the states and consequently the authorities became nearer to the people. This opened up more administrative and service provision jobs that improved the service at health facilities. Pharmacy directorates were strengthened with the addition of more staff and extra functions were added to their mandate.

The adoption of user fees (cost recovery) in health system occurred in 1991 due to political and economic constraints. The budget collected is used to purchase medical stocks,

improve physical infrastructure of premises and improve health workforce levels. These changes, due to additional resources obtained through user fees, also attracted pharmacists to work in the Central Medical Supplies Public Corporation (CMS) and other health institutions. It made jobs more available for pharmacists and pharmacy assistants.

The number of pharmacist posts at CMS increased from 11 in 1990 to 86 in 2008. In addition, creation of the CMS revolving drug funds (RDF) in the 15 northern states and three southern states resulted in the employment of 172 pharmacists, 436 pharmacy assistants and 98 storekeepers by 2008.[11] In addition, these developments promoted the concept of drug supply management and provided local and international training opportunities for staff in pharmacy practice. It also significantly improved the availability of medicines in the states and optimized the drug supply chain.

Creation of the Federal Board of Pharmacy and Poisons to act as a regulatory authority was a key milestone in pharmacy in Sudan. It employs many pharmacists and engages many pharmacists in decision making. [12]

The introduction of the National Health Insurance System (NHIS) in 1994 contributed to improvements in the availability of medicines in hospitals and health centres. It covers about 30% of the target population.[5] This made public sector employment more desirable to pharmacists. The NHIS has its own supply system which is managed by a number of pharmacists; 122 pharmacists are working in the NHIS (personal communication with NHIS). Additionally, it has a special focus on training for the rational use of medicines and pharmacoeconomics.

Private sector growth

The registration of generic medicines was permitted from 1990 due to a change in leadership of the registration committee to pharmacists. Prior to that, registration committees were headed by physicians who restricted registration to branded medicines despite the existence of a generic registration policy. This change stimulated an increase in the number of private companies and many young pharmacists found a way to establish their own businesses. The number of registered pharmaceutical products increased and prices dropped significantly, even from multinational sources. In Khartoum state, the number of private companies increased from 50 in 2002 to 406 in 2008.

Public sector recruitment and retention

The implementation of a public service policy which necessitated recent pharmacist graduates to spend one year in government health institutions led to an increase in the number of pharmacists in the public sector, particularly in rural areas, and consequently improved the number of pharmacists entering the public sector.

Governmental institutions are increasingly open to employing pharmacists although the salaries offered in the public sector are less than the private sector. However the public sector has instituted retention systems to create incentives such as opportunities for post-graduate studies to minimize attrition and disparities between public and private sector employment conditions.

Success factors

Factors that enabled the success of these strategies included:

- The political will to enforce strategies;
- Economic development that sustained an average of 8% growth in GDP over the last 5 years;
- The increase in the role of the private sector in education: seven of the 13 pharmacy faculties training pharmacists are private;
- The increase in the numbers of pharmacists enabled better distribution of the workforce across the public health system. All senior pharmacist posts are now filled in the public sector. Expertise in pharmaceutical departments has improved which has enhanced the management and effectiveness of institutions such as the Central Medical Supplies that is now under the leadership of pharmacists;
- The cost recovery system (user fees) provides more resources to replenish and build medicines stocks, and develop and retain human resources;
- The budget allocated for providing medicines free of charge to patients in casualty departments, undergoing operations and with some chronic diseases was increased from about 8 million (US$) in 2001 to 75 million (US$) in 2008. It covers most of emergency medicines, in addition to medicines for treating cancer, haemophilia, end stage renal disease, transplant patients and blood bank services and has enabled greater access to medicines to the public.

5.5.4 Outcomes

- There has been a substantial increase in the number of pharmacists graduating from Sudanese universities. By 2008, graduates from Sudanese universities comprised 80% of the total number of graduated pharmacists;
- Due to implementation of internship and national service, pharmacists gain a better understanding of the public health system and are thus more likely to apply for permanent jobs in the public sector;
- Pharmacists in the public sector are becoming more engaged in policy making, planning and monitoring of pharmaceutical services, leading to improved planning and service delivery (personal communication with the Sudan Medical Council);
- The number of pharmacists working in the regulatory sector increased. Directorates of pharmacy were established in each state;
- The pharmaceutical services in different fields were also expanded and many states with no pharmacists at all are now provided with reasonable numbers.[12.13]
- The private sector expanded as a result of the increase in the number of graduates. This also led to the improvement of the delivery of pharmaceutical services. Table 1 shows the significant increase in number of private pharmaceutical wholesalers and private pharmacies over the last six years (personal communication with directorates of pharmacy at state levels and Pharmaceutical Union).

Table 1. Private pharmaceutical sector expansion 2003 – 2008

Type of facility	2003	2005	2008
Private pharmaceutical wholesalers	129	287	406
Community pharmacies	1274	1422	2306
Pharmaceutical industries	12	22	22

- Accessibility to essential medicines in different public health institutions throughout the country improved significantly. Both the 2008 RDF report at CMS and directorate of pharmacy/FMOH report showed that more than 90% of hospitals at states were covered by the RDF services.[13.14] The same FMOH report indicated that availability of essential medicines was 92 % in these health facilities. [13]

5.5.5 Recommendations

The 2005 – 2029 (25 year) strategy for pharmaceutical services development has planned the following actions: [9]

- Curriculum review in all faculties of pharmacy to cope with the new trends in pharmacy practice.
- Development of a Continuing Professional Development programme;
- Establishment of an accreditation system to assess faculties of pharmacy against standards and improve quality assurance;
- Development of coordination between Ministry of Higher Education and Ministry of Health to determine appropriate workforce supply levels that respond to labour market needs;
- Improvement of remuneration of pharmacists and pharmacy assistants in public and private sectors.

Other recommended strategies resulting from discussion with policy makers are:

- Developing a strategic plan to build the pharmaceutical system and improve access to medicines in south Sudan;
- Addressing workforce distribution imbalances to ensure more equitable distribution across states and sectors;
- Establishing re-validation systems for pharmacists to maintain and develop professional competency;
- Investing financial resources to increase the number of pharmacists with postgraduate qualifications in different fields for pharmacy practice especially in administrative and regulatory issues as well as in patient care;
- Increasing the number of qualified staff in universities;
- Developing a code for good pharmacy practice;
- Reaching the adequate number of pharmacists in relation to population at all states as stated in the FMOH strategy (one pharmacist/ 10,000 population);
- Encourage the local pharmaceutical industry to employ pharmacists by giving more concessions for industry such as lowering taxes and fees.

5.5.6 Conclusion

The number of pharmacists has increased by 130% over the last 20 years as result of government policies in expanding higher education capacity. The public sector employs 23% of the workforce.

However, pharmaceutical services are more concentrated in urban areas leading to inequity in the geographical distribution of the pharmacy workforce. Secondly, the public sector posts were not increased concurrently to accommodate the increase in the number of graduates, despite prevailing needs.

Recommendations include the need for the higher education sector to review policies to manage the oversupply of pharmacy graduates as well as curriculum. The FMOH should develop a national CPD programme for the pharmacy profession. Furthermore, the government needs to review the distribution of the workforce to address imbalances.

The information system and statistics are not well established, though this report constitutes a baseline. Therefore considerable effort is needed to improve human resource information systems throughout Sudan.

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5.6 Country case study: Uruguay

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Summary

- The Asociación de Química y Farmacia del Uruguay (AQFU), led a modernization process in pharmacy practice and pharmaceutical education
- A pharmacist taskforce played a key role in this process, transforming the pharmacy curricula's focus from product to patient.
- Changes targeted education reform, international collaboration and implementation of Good Pharmacy Practice (GPP).
- For these purposes, close cooperation of the national pharmacist association with University, Ministry of Health and Pan American Health Organization (PAHO) was established.
- Pharmacy Practice Standards were approved and projects regarding pharmaceutical care and GPP implementation have been launched, first at the national level and now in association with Paraguay.
- The visibility of pharmacists among stakeholders has increased.

The process of GPP implementation, which included conferences, seminars, post-graduate education, training courses and improving daily pharmacist practice is ongoing. This case study will describe the challenges and outcomes and also further actions to develop the pharmacy workforce.

5.6.1 Background and challenges

Uruguay is a small country located in the south-eastern part of South America. It is divided in 19 administrative regions, including the capital. It has a population of 3,400,000 inhabitants, mostly of European origin. Half of the population is concentrated in the capital city, Montevideo. In the last 50 years there has been an important international migratory tendency due to political and economical reasons. It is now estimated that half a million Uruguayans live abroad.[1]

Uruguay is placed in the 46th position of the human development index (2007). Adult literacy is at 96%; the average life expectancy is 76 years, one of the highest in the Americas.[2] Services such as telecommunications, electricity and drinking water are available throughout the country.[3]

Health system

Uruguay provides health coverage to all of its inhabitants through public hospitals and Social Care Institutions. The health system is based on intergenerational solidarity, accessed through the payment of a monthly fee. Workers have access to assistance in these institutions for themselves and their children through Social Security. In January 2008, the Integrated National Health System introduced a major reform to emphasize integrity, service coordination and strengthen primary health care, amongst other principles. New goals and indicators were introduced by the Ministry of Health. Hospital and community pharmacies are the mainstay of medicines providers to the public There are 1200 community pharmacies and 70 hospitals, half of which are in Montevideo.[4, 5]

Regulatory framework

The Ministry of Public Health is responsible for the regulation of medicines, therapeutic devices, medicinal foods and. Any citizen, with the exception of doctors and dentists, can own a pharmacy. Each pharmacy must have a pharmacist as Technical Director, although it is not necessary for this Technical Director to be present or have a fixed time load. [6,7]

The regulation and control of pharmacist and pharmacist assistant education is performed by the Central Directive Board of the Universidad de la República (UdelaR) and the Ministry of Education and Culture.

Prior to 2005, there were minimal requirements for professional activities of pharmacists and pharmacist assistants. There were no legislated codes, standards or policies to govern pharmacy practice and the professional conduct of pharmacists (such as an ethical code of practice).

The Association of Chemistry and Pharmacy of Uruguay (AQFU)

In Uruguay, the membership of health workers in professional associations is not compulsory and their aim is to promote professional development. The Association of Chemistry and Pharmacy of Uruguay (Asociación de Química y Farmacia del Uruguay [AQFU]), which includes 80% of pharmacists in its membership, has played a key role in the development of qualified pharmaceutical human resources. AWFU has served as a facilitator in the progression and integration of new trends and methodologies in pharmacy sciences and practice in Uruguay such as specializations in quality assurance for industrial pharmacy, clinical pharmacy and pharmaceutical care.

Good Pharmacy Practice

In the year 2000, the Ministries of Health of the MERCOSUR (Southern Common Market), Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela reached an agreement to implement Good Pharmacy Practices (GPP) across the region. However, pharmacies of the signatory countries, such as Uruguay, still do not adhere to the WHO guidelines for GPP.

Pharmacy education

At present there is only one school of pharmacy, the Faculty of Chemistry of the Universidad de la República, which trains pharmacists by awarding the Pharmaceutical Chemist's degree. In the 20th century, the curriculum was geared towards preparing pharmacists for mainly industrial roles, oriented to work in the pharmaceutical and food industries. This focus produced a deficit in qualified pharmaceutical human resources in health care.

Until 1994, there were no continuing education courses or post-graduate degrees for professional specialization. The sole avenue for continuing education for pharmacists was courses given by professional associations like AQFU or courses in other countries.

Patient follow-up as well as medicines information services have become relevant to the health team, the patient and their family. This change generates and pushes modifications in the structures of the pharmaceutical services, resulting in the integration of pharmacists in a health care team that has to be multidisciplinary. A needs-based education, which takes into account scientific, social and practical knowledge is needed in order to be able to fulfil this role and adequately prepare pharmacists with competencies to perform throughout their career.

Pharmacist assistants

Before 1990, there were no courses for pharmacist assistants of appropriate academic quality. There were some short courses given by the Ministry of Health and the Uruguayan Pharmacy Centre (the Chamber of pharmacy owners of Montevideo). In most of cases, vendors that worked for more than five years in a pharmacy obtained the level of "idóneo" (technician suitable for pharmacy) through a letter of competence given by the Technical Director of the Pharmacy.[8] That situation had lead to significant variations in the competencies of pharmacist assistants.

5.6.2 Strategies used and lessons learned

The status of pharmacy practice in 1990 was inadequate and there was an urgent need for change. Pharmacists were the driving force for this change by coordinating actions with different stakeholders (professional association, consulting organs at the University, Ministry of Health, International Organizations like Pan-American Health Organization, FIP, etc) to reform practice to meet contemporary needs.[9-13] The changes were focused on education development, but also international pharmacy collaboration, and implementation of GPP.

Implementing Good Pharmacy Practice

The 1993 Tokyo Declaration provided the reference framework for us to be able to define where we were and where we had to go. The formation of networks and collaboration between stakeholders within Uruguay and the Pan-American Region were key to enabling dialogue, building consensus and fostering progress in GPP implementation.[9] In that same year, the first South American Pharmaceutical Federation Congress took place in Montevideo. This facilitated the establishment of a relevant pharmacist network within the South American region. By this time, pharmacists also began to organize themselves into professional groups according to fields of work and consequently started the annual Hospital Pharmacy Meetings (1994),and then the biannual Community Pharmacy Meetings (1998).[14] The Academic Conferences of the Hospital Pharmacy Diploma arose from the combined

efforts of the Hospital Pharmacy Specialist Diploma and AQFU (2006).[15,16] These conferences have become a high-level platforms where best practices and other relevant subject are shared.

In 2005, AQFU submitted a Project of Good Practices in Community Pharmacy to the FIP Foundation for Education and Research. The project, called "The patient in the focus," was approved. It allowed AQFU to work together with the authorities of the Ministry of Public Health, the Pan-American Health Organization and the University for the first time. The National Technical Group (GTN), a work coordinator group, was created by a decree of the Ministry of Public Health.[17] Between 2005 and 2007 the GTN, with the support of the FIP Foundation, developed this pilot project of implementation of GPP in 3 strategic areas: regulation, education and pharmacy practice. [18-22]

AQFU, along with the Pharmaceutical Chemists Association of Paraguay (Asociación de Química y Farmacia de Paraguay [AQFP]), proposed a new project on Good Practices to be developed in the Hospital and Community settings in 2008. The American Association of Health-System Pharmacists (ASHP), the Portuguese Association of Hospital Pharmacists (Asocación de Farmacias del Portugal), and Spanish pharmacists association (Consejo Oficial de Farmacéuticos de España) also gave their support to this project. This project on GPP development will be implemented in phases; the first phase consists of a national survey to measure our current situation.

The survey consists of two components, community and hospital pharmacy, and has been validated in both countries. In Uruguay it will be conducted on a representative sample of the country, taking demographic distribution into account. The survey results will allow for the identification of specific issues that need specific training in order to implement GPP framework. The training will be focused on pharmacists, expecting that they can motivate pharmacist assistants and pharmacy owners.[23]

A delegation from Paraguay, ASHP and the Brazilian National pharmacist organization participated in the 6th Academic Conferences of the Hospital Pharmacy Diploma on 31 July 2009. Survey data and information on the impact of GPP in different countries were presented. In the following phase, national seminars will be developed on the issues where the need for greater training was detected (planned for September-October 2009). Then, at the 15th Conference of Hospital Pharmacy, which will be held in November 2009, representatives from AQFU and AQFP will hold a joint symposium on the education of pharmaceutical human resources. A follow up phase will monitor indicators that will allow for an evaluation the impact of these interventions.

Pharmacy education reform

The current pharmacist degree curricula, approved in the year 2000 after 13 years of discussions within the faculty, is a great sign of contemporary pharmacy education development that will support pharmacists for diverse professional directions. [24,25] The objective of the five year degree program is to prepare pharmacists to be a health service provider and an expert in medicines.

At this moment, the needs of the graduates converged with the vision of a small group of professors who were motivated by the impact of the pharmaceutical services on health system and patient outcomes. These professors, in turn, having studied in reference centres abroad, started developing actions to establish links between the University, hospital and community pharmacies, communities and other settings where pharmacist played a role.

The key features of the current curriculum are:

- The subjects are organised by field of knowledge;
- 20% of the education is comprised of elective subjects. These subjects allow specialization. For example, students that prefer pharmacy practice may choose Public Health or Pharmaceutical Care, or choose only industrial subjects depending on their desired profile of competencies;
- 12% of the education consists of compulsory pharmacy practice;
- There is a link between the theoretical and practical contents with students having greater independence in their learning. For example, students interested in paediatric pharmacy practice, can choose electives subjects closely related with that and also the compulsory practices can be coordinate in paediatric services.

Continuing education

In 1994, the University established the "Permanent Education" (continuing education system) in the Faculty of Chemistry, and within this framework, up to date courses were introduced.[26,27] These courses have enabled the professional growth of the graduates. Pharmacists have supported

this initiative by enabling the incorporation of hospital and community pharmacies as pharmacy practice centres accredited by the University.

Pharmacist assistant training

From 1994, AQFU has taken up the challenge of training pharmacist assistants, for whom a formal education program had not previously existed.[28] Each year AQFU offers a one year course for pharmacist assistants. The previous two courses were coordinated with the Association of Pharmacies of the Countryside (Chamber of the owners of the Pharmacies that are not in Montevideo).[29]

5.6.3 Outcomes

Significant progress has been made in addressing each of the four priority issues relating to pharmacy workforce development in Uruguay. In using a combination of strategies such as building networks and collaboration between stakeholders, instituting reforms in regulation, practice and education and building capacity for training of pharmacy workforce, outcomes such as improvements in pharmacy workforce levels and practice standards were achieved.

Good Pharmacy Practice

Through the GPP activities between 2005-2007 it was possible to:

- Establish national standards for dispensing, rational use of medicines, pharmaceutical care and ethics in pharmacy practice;[30-34]
- Introduce new subjects in the pharmacist curriculum such as public health, pharmaceutical care and social pharmacy;[35]
- Support a number of community pharmacies to develop their own projects of Good Pharmacy Practice in their specific setting; and
- Organize two drug policy seminars, which allowed an unprecedented visibility of the pharmacists from all stakeholders related to medicines and the health system.

Pharmacy education reform

The education reform helped to reduce the student attrition rate (close to 70% in the previous curriculum, and approximately 50% now) and the average length of the degree (now six to seven years in contrast with eight years previously). The changes in the curricula led to an influx of highly qualified pharmacists trained as health professionals into the job market. Now there are more pharmacists working in pharmacies, particularly hospital pharmacies. The profile of professionals that join pharmaceutical industries also has changed. The new professionals are better qualified in quality assurance but are less specialised in chemical analysis. This is a drawback of the curricula reforms.

Continuing education

In 2003, pharmacists in the Uruguayan branch of Ibero-Latine American Organization of Pharmacists (OFIL) put forth the need for a post-graduate education for the hospital field. The diversification and specificity of responsibility within this area exceeded the scope of the existing courses. In 2004 the Hospital Pharmacy Specialization Diploma (DEFH) was founded. Each year, the Faculty of Chemistry approves the diploma's calendar of courses, with the participation of national and visiting professors. To complete the diploma, the pharmacist must complete three internships in fields of his/her interest in accredited services, with qualified tutors (Associate Professors).

Pharmacist assistant training

In 2009 there were 350 students. These training courses have already been implemented in 15 of the 19 administrative regions of Uruguay (Figure 1). As 2003 was the first year for course implementation outside Montevideo, there was an important previously unmet demand which led to spike in student numbers (Figure 2).

Figure 1. Regions where the AQFU pharmacist assistant course is offered

Figure 2. Number of students enrolled in pharmacist assistant courses 1994 – 2009

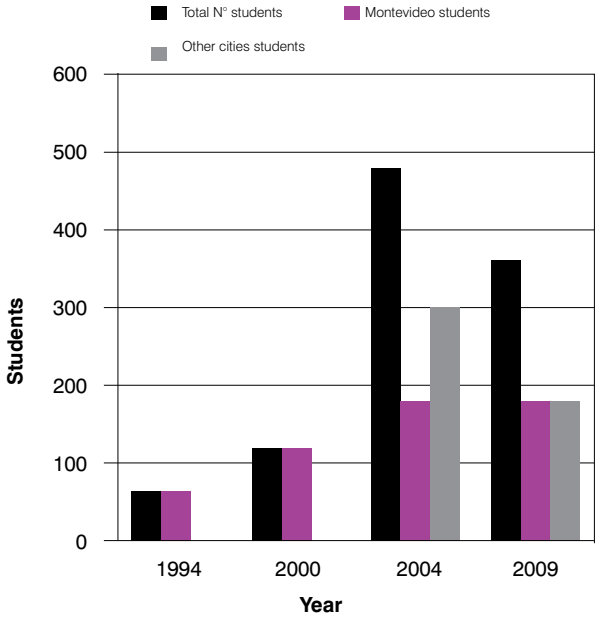

Figure 3. Pharmacist assistants from 2008 course in Tacuarembo.

In 2003, the authorities of the Ministry of Public Health acknowledged the academic value of the course managed by AQFU and gave it official recognition by decree.[36] These courses are offered in partnership with the University, which validate the academic level and review the examinations. The practical lessons of the course are given in the Faculty of Chemistry facilities. As the result of this partnership, the Pharmacist Assistant Certificate given by AQFU is jointly issued by both the President of AQFU and the Dean of Faculty of Chemistry (UDELAR).

5.6.4 Conclusion

Paraguay and Uruguay have been working in agreement with the statements that emerged from the Global Conference on the Future of Hospital Pharmacy (Basel, Switzerland, August 2008), which serve as a new reference tool for the introduction of pharmaceutical services complying with the principles of GPP.

At the same time, all our present efforts are also orientated towards the medicines-patient relationship and the patient as the most important actor in the health system.[37-40] There is great hope that the new GPP project could also play a key role in introducing GPP in hospital and community settings.

The professional association, AQFU, has played a critical role in partnership with the Ministry of Public Health, the University, hospital and community pharmacies and other stakeholders to coordinate, support and lead pharmacy workforce development to meet patient needs. Change will only be possible if there are competent pharmacists that are committed to playing their role in the health care of the population.

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5.7 Country case study: Vietnam

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Summary

- Pharmacy workforce development has only taken place over the last two decades after 30 years of conflict.
- To overcome the shortage of pharmacists in the mountainous and rural areas, the Government has implemented strategies to improve the training and salaries of pharmacists and technicians.
- Five pharmacy schools were newly opened in the provinces. The transition from a state-controlled central planning system to a market economy has stimulated pharmaceutical workforce development through expansion of the private sector.
- Government investment in pharmacy education has increased significantly over recent years.

5.7.1 Background

Pharmacy practice and regulation

For many years the Government and Ministry of Health (MOH) have tried to guarantee the supply of good quality medicines at affordable prices. Now there is one pharmacy outlet for every 2,000 people and medicines are available in every corner of the country, even in rural areas. Expanding the pharmacy workforce has been a key strategy to improve access to medicines. Efforts have been underway within the pharmaceutical sector to improve practice standards, quality of care and regulation.

The total number of pharmacists in Vietnam in 2007 was 9,807.[1] But in practice, the total number of pharmacists and technicians may be higher, because this does not include pharmacists working in sectors such as the military, police and the Ministry of Agriculture. For many years pharmacists were mainly employed in the pharmaceutical industry and wholesalers, adopting quality control and distribution and pharmaceutical care roles such as in the private sector (community pharmacy) had not been developed. Legislative systems, supply chain management and pharmacy education have developed and grown over the last two decades.

Before 1975 all pharmacies and pharmaceutical factories in North Vietnam belonged to the State. After liberation and unification of the country from 1975 to 1987, only 22 state pharmaceutical manufacturers and three wholesale companies were responsible for the entire production and supply of medicines for the whole country. With the process of privatisation, the government cannot hold more than 51% ownership of companies. Statistics from the Drug Administration indicate that there were around 800 pharmaceutical distributing companies and 39,016 pharmacy outlets (pharmacies, desks, kiosks) in 2008. Only pharmacists can own pharmacies after completing five years of practice or two years of practice if they intend to open a pharmacy in a rural area. For smaller outlets, pharmaceutical technicians can receive a licence after two years of practice.

Policies and legislature such as the National Drug Policy (1996), Good Manufacturing Practice (1997), Drug Law (2005) and Good Pharmacy Practice (2007) were instituted to address issues of rational use of medicines, good practices, and pharmaceutical care for the first time. Vietnam also became member of ASEAN (Association of Southeast Asian Nations), World Trade Organisation and other international organisations. A key priority of the government is to meet global practice standards and implement the ASEAN agreement for harmonisation of services and service providers (eg – education).

Historical context

There was limited local health workforce development before 1945. The first Medical school was established in 1902 and a pharmacy faculty in this institute was set up in 1914. But from 1914 to 1917 only four pharmacists were trained and passed the examination in France. It was only after 1934 when the Paris Medical Institute sent one professor to Vietnam to lead an examination council that Vietnam was granted the right to teach and issue qualifications for physicians and pharmacists.

During the war (1946-1954), many rapid training courses for doctors, pharmacists, nurses and other health workers were carried out. Pharmaceuticals were severely lacking throughout this period and traditional medicines sources from the jungles formed the mainstay of therapeutic agents use. There was limited infrastructure and facilities for health provision and care was provided under basic conditions in underground shelters.

From 1954 to 1975 Vietnam was divided into two parts. North Vietnam developed the primary health care approach and built pharmaceutical factories to produce generic essential medicines. All facilities belonged to the Government. Medicines were distributed from a central site to districts by the state pharmacies. There were no private pharmacies and pharmacy schools. Based on the programmes of medical and pharmacy education in socialist countries, the Department of Education in the Ministry of Health prepared teaching materials which were sent to the medical and pharmacy schools all over the country.

Scale up of health professional training

From 1970, the MOH decided to develop and expand higher education to train health professionals in some of the leading universities in parallel with sending physicians and pharmacists to train abroad.

The pre-service training programme is six years for physicians, five years for pharmacists and two years for pharmacy technicians. From 1975 to 2007 the total number of physicians and pharmacists increased fivefold and threefold respectively (Table 1).

Table 1. The total number of human resource from 1945 to 2003

Name of title	1945	1954	1965	1975	1985	2003
Physicians	51*	59*	790*	8,300*	19,000	45,073
Pharmacists	21*	37*	159*	2,700*	5,600	6,025

**The figures from 1954 to 1975 only represent North Vietnam.*

Data source: Report of the Department Science and Training in the meeting of 50 years of Department.[2]

At present there are seven pharmacy schools in Vietnam. In 2007 a total of 817 pharmacists graduated from five of these universities (Table 2). Two newly established schools of pharmacy had yet to graduate pharmacists.

Table 2. Pharmacy graduates in 2007

Pharmacy school	Graduates
Hanoi Pharmaceutical University	398
Ho Chi Minh city Medical and Pharmacy University	185
Cantho Medical and Pharmacy University	51
Hue University	66
Thainguyen Medical University	117

5.7.2 Key issues

Regulation

On the 14th of June 2005, the Vietnam National Assembly had passed the Drug law, in which not only the regulations on manufacturing, distribution, quality control, inspection of drugs were promulgated, but it also set the policies for the pharmaceutical sector, including pharmacy workforce development.

The regulatory authority issued many regulations, such as: regulation for registration of medicines, pharmaceutical practices, guidelines for Good Practices, Drug and Therapeutic committees in hospitals; new programmes for pharmaceutical institutes and pharmacy schools amongst others.

In the past the government had to concentrate attention on the supply of drugs. Problems of training and continuing education for pharmacists, education of inspectors, and workforce for the rural areas did not receive adequate attention. Now many activities and campaigns in the pharmaceutical field are developed. The campaign against counterfeit drugs, improvement of quality of drugs, introduction of legislation and standards, including Good Pharmacy Practice (GPP) have had the positive effect of the increasing awareness of appropriate medicines use in the community and the responsibility of pharmacists. Although the Vietnam government has overcome the workforce shortage, there are still many challenges affecting workforce planning and development.

Despite efforts, we still face some limitations and problems, such as the availability of some medicines due to high prices, medicine storage conditions, and competence of pharmacists and technicians in hospital pharmacy. All these issues require long-term strategies and investment.

Inequitable pharmacy workforce distribution

The majority of the workforce is concentrated in the urban or in the more socio-economically developed regions whilst at the same time there are workforce shortages in the rural areas. Students that receive scholarships from the government are required to serve in defined regions upon graduation.
Table 3 describes the distribution of the pharmacist workforce across the eight regions in Vietnam.

Table 3. Pharmacist workforce distribution

Region	Pharmacists with post- graduate degrees	Pharmacists with university degrees
1. In the Red-river delta	30	397
2. In the North- East	4	275
3. In the North-West	5	81
4. In the North of middle part of Vietnam	7	201
5. In the South of middle part of Vietnam	4	151
6. In the West plateau	0	74
7. In the Mekong delta	10	338
8. In the Eastern part of South Vietnam	27	389

Data source: Health statistic year book 2007. [1]

When Vietnam began the "DOIMOI" policy for economic reform, government allowed the private sector to open pharmacies. This spurred many people to attend pharmacy schools and training classes, paying mainly out of pocket to cover their education. A number of different kinds of private pharmacies (pharmacies, pharmacy desks, kiosks) were allowed to open, especially in the big cities. The inequitable distribution of human resources resulted – the mountainous and rural regions lack pharmacists, but the urban and rich deltas of rivers are in excess. A significant part of the workforce is concentrated in the industry (about 1/10 of factory workers are pharmacists). Many young pharmacists go to work as drug-representatives for multinational companies. Pharmacy outlets are mainly run as a business and the concept of "Pharmaceutical care" and "patient focused care" was only introduced when the Vietnam Pharmaceutical Association implemented GPP two years ago.

Capacity

There is a shortage of academic faculty in schools of pharmacy, particularly in new schools of pharmacy and in relatively new fields such as social pharmacy, pharmaceutical care and clinical pharmacy. Lack of accessible information resources also has an influence on pharmacy practice as not all pharmacists can read English or access the internet. Research and development in pharmaceutical sciences is weak and there is a need for the development of researchers and local expertise. Capacity building is required to build local resources, information and expertise.

5.7.3 Strategies

To reach the target of 1 pharmacist for 10,000 people as described in The Strategy for Pharmaceutical sector Development up to 2010, the Government allowed the establishment of new pharmacy schools and has set directives for the expansion of existing schools.[3] Table 4 describes the targets set by the Government for the number of pharmacist graduates from each pharmacy school. Most institutions were projected to at least double their 2007 output, bringing the total number of graduates to 2130 by 2009.

Table 4. Number of pharmacist graduates from schools of pharmacy

University	2007 graduates	2008 target	2009 target
Thainguyen Medico-Pharmaceutical institute	0	200	200
Danang University	0	50	50
Hue Medico-Pharmaceutical institute	66	180	180
Thaibinh Medical institute	117	120	120
Hanoi Pharmaceutical college	398	860	860
Cantho Medico-Pharmaceutical institute	51	230	300
HoChiMinh city Medico-Pharmaceutical inst.	185	380	420
Total	**817**	**2,020**	**2,130**

Source: Department Science and Training 2009

Pharmacy workforce development strategies:

1. To overcome the pharmacist shortage in the rural areas, the Government and MOH will:
   - allow pharmacy schools to receive students from underserved provinces and rural areas without a competitive examination.
   - organise work-place based education for workers and technicians from health offices, factories or companies, who are unable to attend academic programs.
   - develop bridging training programmes for pharmacy technicians to train as pharmacists.
   - send volunteer doctors and pharmacists to help and to work for a short period.
   - increase the salaries for pharmacists to work in the countryside or rural areas.
2. Upgrade teaching facilities in government universities: classes, laboratories, teaching instruments, materials.
3. Model workforce needs to strike a balance between the training output and utilisation of cadres in the different sections and areas to avoid oversupply or shortages of pharmacists .
4. Establish projects for the post-graduate training of pharmacists and scientists through government funds or in cooperation with foreign countries/organisations.
5. Implement different measures to encourage Vietnamese pharmacists and scientists from abroad return to Vietnam to invest or open companies, schools or to work.
6. Promote cooperation between pharmacy schools and research centres, hospitals and industry.
7. Carry out the training profitably within government schools, so that it not only covers the fee for training but also enables future investment in education development.

Some provincial government authorities have improved the salaries and working conditions of pharmacists to address shortages. For example, the provinces of Ha Nam and Lao Kai have doubled the salaries for pharmacists to encourage the recruitment and retention of pharmacists.

Barriers to strategy implementation:

- Lack of qualified teachers.
- Government does not bind recently graduated pharmacists to work for a defined period in the rural areas. Pharmacy students mainly pay for their education by themselves, so they are not bound to the government to provide public service.
- Slow development of pharmaceutical care roles, particularly in Ministry of Health and hospital settings where physicians have firmly established patient care roles.
- Limited information and exchange of teaching programmes and experiences with foreign institutes.
- Dispersed management and responsibility for pharmacy workforce development between various stakeholders such as Universities, Ministry of Education, and Ministry of Health. Professional bodies have limited input into strategic development processes.

5.7.4 Lessons learnt

Workforce planning must be based on the requirements of employers (industry, provinces). With the changing roles of pharmacists in the community, it is increasingly important to pay attention to the quality of education.

With the assistance of foreign specialists for concrete problems, progress has to be better achieved. For example: Swedish International Development Agency (SIDA) assisted Vietnam in developing the National Drug Policy and medicines legislations; FIP and the Western Pacific Pharmaceutical Forum and Monash University assisted in Good Pharmacy Practice.

Cooperation between pharmacy training institutions with hospitals (for pharmaceutical care, hospital pharmacy practice), industry (for utilisation of educated students), and research centres (for R&D) is good idea, but must be planned. The exchange of information and teaching experiences between countries can improve the education development process.

Strategies beyond retention are required to address the shortage of pharmacists in mountainous and rural islands. Coordination is necessary between Central government and provincial authorities to incentivise young pharmacists to work in areas of need.

5.7.5 Outcomes and future actions

By 2010 the target of 1 pharmacist per 10,000 population can be reached. Greater attention on quality of education must be paid during this period of workforce expansion and scale up of training. All programs of training in the pharmacy schools shall be revised in correspondence with the current requirements. The Department of Science and Training are currently working on the development of indicators to assess each program.

Future actions required to develop the pharmacy workforce include:

- Increasing government investment in equipment for laboratories, teaching programs;
- Coordinating education development and planning with workforce needs defined by provinces, regulatory bodies and major employers (eg – industry);
- Redressing rural-urban imbalances in workforce distribution;
- Establishing plans for continuing education for pharmacists;
- Developing quality indicators for pharmacy education programs;
- Sending pharmacists abroad for post-graduate training.
- Improving English language skills among pharmacists and access to internet to enhance capacity building and access to information;
- With the cooperation of the Vietnam Pharmaceutical Association, building relationships between pharmacy schools in Vietnam with the International Pharmaceutical Students' Federation, FIP, WPPF and other organisations internationally and within the ASEAN region.

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Part 6. Strengthening the health workforce in crisis countries

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Summary

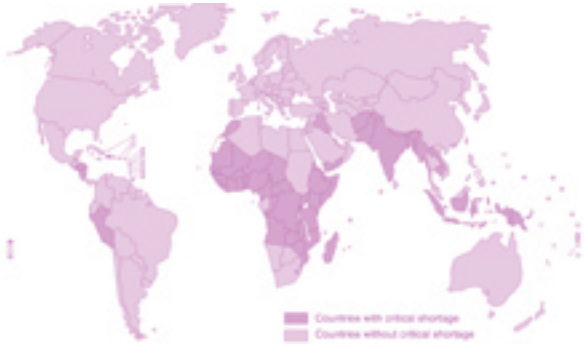
- Health workforce levels and quality are associated with improvements in health outcomes. Fifty-seven countries, 36 of which are in sub-Saharan Africa, have a health workforce crisis. The human resources for health crisis is a threat to the delivery of health services and the attainment of the Millennium Development Goals.
- Many countries lack adequate capacity to train health workers and have poor working conditions, unattractive wages, limited professional development opportunities and inadequate infrastructure for effective performance.
- Healthcare facilities cannot operate without medicines. The availability of both medicines and a pharmacy workforce in adequate numbers with appropriate competencies is crucial to ensuring a well functioning pharmaceutical system.
- Half of all medicines globally are inappropriately prescribed, dispensed or sold to patients. Pharmacy workforce shortages translate into gaps in the management of the pharmaceutical system and the supply chain and pose serious risks to patients.
- Domestic training of the pharmacy workforce, together with appropriate management of recruitment, retention and attrition is required to redress shortages, imbalances and improve performance.
- Countries should develop comprehensive human resource for health plans and strategies based on sound evidence to sustainably address the global health workforce crisis.

6.1 The human resources for health crisis

Human resources for health are essential for health systems. They are the cornerstone and drivers of health systems. [1] Moreover, there is ample evidence that health worker numbers and quality are positively associated with immunization coverage, outreach of primary care, as well as infant, child and maternal survival.[2-4] However, health workers are inequitably distributed throughout the world, with many lower income countries facing a severe health workforce crisis. This crisis in human resources for health is an important impediment to delivering quality health services and reaching all health goals, including the Millennium Development Goals. [5]

The World Health Report 2006 estimated the global health worker shortage to be 4.2 million, including more than 1 million in Sub-Saharan Africa.[6] Overall, 57 countries have been identified with critical shortage, including more than 36 in Sub-Saharan Africa, as depicted in Figure 1.

Figure 1: Countries with critical shortage of health workers



Source: WHO, 2006 [6]

Sub-Saharan Africa is facing the greatest challenges. It has 11 percent of the world's population, yet 24 percent of the global burden of disease and only 3 percent of the world's health workers.[6]

Several factors have contributed to the marked health workforce shortages.[6,7] They include some broad elements like the lack of attention on this issue, economic conditions, and changing disease patterns. More specific factors are also playing a central role, such as the lack of health workers being trained and educated. In addition, poor working conditions, unattractive wages, lack of infrastructure and medical equipment, mediocre management, and absence of

professional development are all factors contributing to the health workforce crisis. These factors can also exacerbate the negative impact of internal or international migration.

6.2 Pharmacy workforce challenges: impact on medicines access and use

The pharmaceutical system forms the back bone of the entire health system as patients do not visit health facilities where there are no medicines. The availability of pharmaceuticals as well as pharmaceutical personnel both in numbers and skills are vital in maintaining a well functional pharmaceutical system. These personnel are responsible for improving access to essential medicines that are safe, effective and used rationally.[8]

Pharmaceutical human resources are utilised at various levels in developing countries:

- Government Ministries of Health for planning and policy;
- Regional/provincial levels for policy implementation;
- Central medical stores for medicines procurement and distribution;
- Health facilities, both public and private for medicines acquisition and dispensing;
- Private pharmacy establishments (industry, wholesale and retail);
- Pharmacy councils and professional associations to develop pharmacy practice;
- Training and research institutions to train a pharmacy workforce and conduction research.

Evidence from countries indicates that there is a shortage of pharmaceutical human resources at each of the above levels where pharmacists are needed. This situation could have undesirable impacts on the roles to be played by pharmacists at each level, thus on the medicines supply system and subsequently on access to medicines and their use.

Medicines worth the equivalent of almost US$1billion were expired at the national medical stores in Uganda and an additional half a million dollars was sought for destruction in May 2008.[9] This could be linked to shortages in pharmaceutical human resource at one or more of the levels mentioned above to undertake adequate quantification of needs and appropriately manage pharmaceuticals.

In Cameroon, the rural areas with a poor economic situation are in short supply of retail pharmacies, leaving some populations without pharmaceutical services, giving room to the proliferation of street vendors of pharmaceuticals from doubtful sources in these areas. The extent of damage caused by this situation has not been evaluated.

WHO supports countries technically and financially to develop, implement and monitor their National Medicines Policies. Working experiences with countries reveal that progress is slow in the implementation of these medicines policies, one of the contributing factors being inadequate supply of pharmaceutical workforce in the Ministries of Health and across the whole pharmaceutical system.

To attain the maximum benefits from the use for medicines, patients must receive the right medicines for their clinical needs in the right doses and for an adequate period of time, and at the lowest cost – this requires the intervention of pharmaceutical personnel along the various levels of the medicines supply system.[10] Unfortunately, it is estimated that half of all pharmaceuticals globally are inappropriately prescribed, dispensed or sold.[11]

In a study carried out in Tanzania in 2002, an average of 76% of drugs dispensed at health facility levels were not adequately labelled.[12] Most of these health facilities do not have pharmacists and this may explain the danger posed by the 24% of drugs inadequately labelled and dispensed. The proportion that was inadequately labelled could be a major concern for patients achieving maximum benefits from their medications.

WHO is currently developing and piloting tools to analyse the pharmacy workforce situation in Nigeria, Ghana, Tanzania, Rwanda and Sudan. It is anticipated that this study will provide insights into the extent of the pharmacy workforce shortages and identify key issues which need to be addressed to strengthen the pharmacy workforce.

6.3 Strategies

Various strategic areas of focus are to be considered when addressing the global health workforce crisis.

Domestic training is an important area to focus on as one of the central objectives of workforce development is to produce sufficient numbers of health workers with the appropriate competencies. Increasing domestic training is one of the most direct means to expand the health workforce. For that purpose, active planning and management of the health workforce production pipeline is required, and in order to be successful, such a strategy has to account for the long education cycles to ensure that health worker training is matched with the population health needs, and that health workers go where they are needed. The case for scaling up the health workforce has been made on numerous occasions.[13]

Another important area of focus consists of making a better use and mobilization of existing workforce skills through a portfolio of policies, such as improving retention of health workers particularly in remote and rural areas, attracting health workers to shortage specialties, developing more efficient skill mix, recruiting health workers who left the profession and improving productivity. [14]

Moreover, limiting health worker attrition is also a key area as unplanned or excessive exits may cause significant losses of health workers.[15] In some regions, worker illness, deaths and migration together constitute an overwhelming exit flow. [6] Strategies to counteract workforce attrition include managing migration, promoting health as a career of choice, and stemming premature retirement, and improving health care access for health workers themselves.

6.4 Remote and rural workforce development

Approximately half of the global population live in rural areas, but these areas are served by only 38% of the total nursing workforce and by less than a quarter of the total physicians' workforce. At the country level, imbalances in the distribution of health workers are even more prominent.[16,17] Availability of well trained and motivated health workers closer to where people live will improve access to needed health services to achieve the health MDGs, and will also contribute to addressing health inequalities and social determinants of health within the framework of renewed primary health care.[6,18,19]

From the current evidence, several approaches have shown some good results in improving the recruitment and retention of health workers in remote and rural areas. These strategies can be grouped into three major categories: education and regulatory interventions, financial interventions, and management, environment and social support interventions.[20]

Studies from developed countries have consistently shown that health professionals from rural backgrounds are more likely to practice in rural areas; clinical rotations in a rural setting may influence medical students' subsequent decision to work in an underserved area; and adapting curricula to include rural health issues improves competencies to work in rural areas and creates more interest to work in these areas.[21]

Some countries have instituted compulsory service requirements in rural areas as a strategy to improve retention, but the effectiveness of this approach has shown to be inconclusive, because the strategy may address imbalances in the short-term, but it may also encounter difficulties in administration and enforcement. [22-25]

Direct financial incentives to practice in rural areas are one of the most frequent strategies that countries have used to address this problem. Experiences from developed countries have shown that rural allowances and other types of financial incentives may encourage rural practice.[26,27] But in developing countries, the issue of long-term sustainability for this type of incentives is of critical importance, because these schemes are usually dependent on external financial support. [28,29]

Very few countries have put in place strategies to comprehensively address the issue of good management, supportive supervision, professional networking, and improving living conditions and local infrastructure. Thailand has a long history of a comprehensive approach to rural retention of doctors, which combines regulatory interventions (compulsory contract of three years of public work after graduation), financial incentives within the context of a rural development programme, educational approaches (rural recruitment and training in rural health facilities, including the development of community medicine), and improving of personnel management.[23] In Mali a programme run by a non-governmental organization placed young doctors in remote and rural areas

through a comprehensive approach that included community medicine education and training, financial incentives, an installation kit, and the establishment of a professional network for rural doctors.[30]

There are however a number of challenges in implementing these strategies. Often times the various schemes are proposed without a baselines study to understand the factors that influence health workers' decisions to come to, stay in or leave remote and rural areas. Sustainability is also a critical element that needs to be considered, both from financial and mid-long perspectives. Many interventions start as pilot experiments in a region or district, often driven by specific donor initiatives, with little capacity for scaling up or for sustaining the interventions for a longer term. Also, the various interventions do not work in isolation, hence the need for a combined or "bundled" approach, that addresses the multiple aspects of education, recruitment, and management. And finally, evaluations of the impact and effectiveness of different strategies are still lacking.

WHO has recently launched a programme of work to increase access to health workers in remote and rural areas through improved retention (http://www.who.int/hrh/migration/expert_meeting/en/index.html). The programme has three strategic pillars: building the evidence base, supporting countries to implement and evaluate effective strategies, and producing evidence-based recommendations to improve health workers retention in remote and rural areas. The consultative process for developing the recommendations is inclusive of academics, policy makers and professional associations' representatives, and it is expected that the recommendations will be launched in 2010.

6.5 Conclusion

Overall, strong national strategies based on both solid technical content and a credible political process, as well as global solidarity, are essential to successfully address the global health workforce crisis.

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Part 7. Actions and directions

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Summary

- Pharmacy workforce planning should aim towards self-sufficiency and be integrated into broader health workforce planning. They should be informed by reliable workforce data, evidence on factors and issues affecting the workforce and comprehensive workforce modelling.
- Actions to develop the pharmacy workforce should focus on developing partnerships, human resource information systems and strategic workforce plans.

Pharmacy workforce planning

There is an urgent need for broad, integrated, strategic international and local leadership and vision for addressing the complex issues surrounding pharmacy workforce planning and policy making. Pharmacy workforce planning and policy making must be integrated with that of other healthcare professionals and aim towards self-sufficiency rather than relying on foreign workers.

In order to model the demand for pharmacists it is very important to define needs based roles for all cadres in the pharmacy workforce in any particular country. Future policy and planning scenarios must also take into account opportunities for pharmacists to adopt new roles that are dependent on having sufficient pharmacists but also on the appropriate skill mix, including pharmacy technicians.

Pharmacy workforce planning must be long term, looking at least 10 to 20 years ahead and with due evaluation of risks to the pharmacy workforce. Modelling of long term future workforce scenarios must at the minimum consider information about workforce supply and attrition, such as census data, information about the number of newly licensed pharmacists (eg – local graduates, foreign pharmacists) as well as the number retiring or leaving the profession. Demand issues should be considered where possible, such as policy propositions, future trends, increasing use of technology, changing patterns of health and disease, changing business models, current patterns of work and preferences including career aspirations and concerns, changing regulatory requirements and the changing economic climate. Modelling should also account for how these differ according to demographic factors.

To inform planning and develop better understanding of workforce levels, demographics, distribution and skill mix – information systems for monitoring the pharmacy workforce at a national level need to be developed. Data could be gathered at a global level to inform strategic dialogues and global policies relating to pharmaceutical systems and human resources for health.

To maintain and expand the future pharmacy workforce, increases in recruitment and retention will be essential as will decreases in attrition where possible, however scaling up the global pharmacy workforce is a complex, multi-factorial responsibility that requires coordinated action. It is important to realise that workforce problems are not specific to pharmacy and that we can look to other healthcare professionals' potential solutions while investigating our own. So far the most widely used methods to scale up the pharmacy workforce were increasing the numbers of pharmacy graduates and pharmacy technicians. To make the most effective use of these increases, changes in other areas need to be planned for such as the increases in pharmacy trained academic faculty required or increases to maintain an appropriate ratio of pharmacy technicians to pharmacists.

In countries seeking to expand enrolment into pharmacy education, maintaining the quality and prestige of the pharmacy profession by retaining high quality applicants is viewed with great importance and therefore measures should be undertaken to expand the applicant pool without compromising on the quality in order to select the best candidates. Need-based pharmacy education should be considered as it is important to ensure relevance and competence of the workforce to provide required pharmaceutical services. The unique perspectives of generations "X" and "Y" should also be factored into the design of the pharmacy curriculum.

In many countries, the lack of an appropriate academic workforce is a major bottleneck in workforce development. Strategies to encourage pharmacists to consider a career in academia should be based on a better understanding of

factors influencing poor retention and recruitment difficulties. In countries where practice is becoming increasingly patient focused, there will be a need for more practice supervisors, tutors and teachers. Career pathways for these teachers must be considered particularly in research lead universities where research based publications are important for university funding.

Retention policies to retain newly trained workforce is also a necessary strategy for workforce development. Regional and rural workforce distribution imbalances require greater investigation to better understand what recruitment and retention strategies encourage pharmacists to work and be retained in such areas.

Action is required at a number of different levels and stakeholders must collaborate with a range of partners including policy makers, pharmacy organisations, pharmacy employers, other health professionals and training institutions in order to model, plan and develop the workforce.

Key recommended actions

- Partnership
  - Professional bodies should work with governments, regulatory bodies, training institutions, unions, employers and other health professional organisations to develop long term projections and solutions for workforce issues in their country.
- Human resource information systems
  - Regularly and systematically collect and collate basic data on the pharmacy workforce (including non pharmacist cadres) according to a defined data set.
  - Data collected about registered pharmacists by regulatory bodies should have basic consistencies and be collated at a national level on a regular basis. Data should be reported to relevant stakeholders.
  - Pharmacists should provide accurate and up to date information to regulatory bodies and notify of any changes in status, for example – migrating abroad, career change, non-practicing.
- Strategic pharmacy workforce plans
  - Develop a strategic pharmacy workforce plan which is informed by evidence, reliable workforce data and comprehensive long-term modelling. Plans should address issues of workforce supply, recruitment, retention, distribution and attrition.
  - Integrate the strategic pharmacy workforce plan into broader health workforce strategic plans or policies.
  - Monitor and evaluate the effectiveness of workforce strategies.

Table 1. Pharmacists and pharmacy technicians

		Density (per 10,000 population)				Pharmacists						Pharmacy technicians		
	Population mid 2008	Pharmacists	Year of data	Pharmacy technicians	Year of data	Total licensed	Total female licensed	Total actively practicing	Total actively practicing and female	Newly licensed	Graduates	Total	Newly licensed	Graduates
Albania	3,241,000	3.15	2007	0.93	2007	1,020	550	1,020	760	73	72	300	17	0
Argentina	39,746,000	5.15	2004	N/A	N/A	20,487	N/A	N/A	N/A	1,397 [2005]	1,397 [2005]	N/A	N/A	N/A
Australia	21,347,000	8.83	2003	N/A	N/A	18853	8,842	14,747	6,916	N/A	1,427 [2008]	N/A	N/A	710 [2006]
Austria	8,352,000	6.30	2008	N/A	N/A	5,263	4,082	5,263	4,082	224	146	N/A	N/A	N/A
Belgium	10,695,000	11.69	2007	N/A	N/A	12,500	8,400	N/A	N/A	N/A	400	N/A	N/A	N/A
Brazil	195,138,000	6.39	2008	0	2008	124,755	88,896	124,755	88,896	8,956	8,956	0	0	0
Canada	33,304,000	9.31	2007	18.02	2007	31,011	18,607	N/A	N/A	N/A	931	60,000	N/A	N/A
Chad	10,111,000	0.04	2009	0.01	2007	44	15	44	15	44	0	6	0	0
Colombia	44,447,000	0.72	2008	N/A	N/A	3,213	N/A	N/A	N/A	220*	220*	N/A	1,200*	1,200*
Costa Rica	4,519,000	6.24	2008	N/A	N/A	2,819	2,029	2,640	1,900	229 [2007]	229 [2007]	N/A	N/A	N/A
Czech Republic	10,428,000	7.14	2007	3.84	2007	7,450	6,192	6,172	5,100	351	304	4,007	300	305
Denmark	5,490,000	7.10	2008	7.29	2008	3.900	2925*	3,900*	2,925*	163	163	4,000	N/A	141[2007]
Ethiopia	79,087,000	0.14	2007	0.19	2008	1,088	231	1,066	219	180 [2008]	296 [2008]	1,523	414	236 [2008]
Finland	5,312,000	5.50	2009	12.08	2009	2,919	2,226*	2,397	1,866*	75	83 [2007]	6,417	372	369[2007]
France	62,046,000	11.69	2008	N/A	N/A	72,509	N/A	72,509	47,598	N/A	2,800* [2007]	N/A	N/A	N/A
Germany	82,170,000	9.14	2007	5.95	2007	75,074	49,177	56,719	36,732	1,774	2,310 [2006]	48,921	2,500*	2,500*
Ghana	23,947,000	0.75	2007	N/A	N/A	1,798	N/A	N/A	N/A	N/A	120	N/A	70	70
Great Britain	61,291,000	7.99	2008	1.17	2008	48,942	27,884	40,455	23,479	2,228 [2007]	2,196 [2007]	7,195	1,966	1,800 [2007]
Hungary	10,034,000	6.48	2007	6.98	2008	6,500	N/A	6,500	N/A	220	220	7,000*	150*	0
Iceland	319,000	12.63	N/A	N/A	N/A	403	254	367	241	18	14	N/A	N/A	N/A
India	1,149,285,000	6.09	2008	N/A	N/A	700,000*	N/A	N/A	N/A	N/A	25,000*	N/A	N/A	N/A
Indonesia	239,945,000	0.71	2009	N/A	N/A	17,000	N/A	N/A	N/A	N/A	3,000 [2007]	N/A	N/A	N/A
Israel	7,482,000	6.68	2008	0	2008	5,000*	N/A	3,500*	N/A	180	180	0	0	0
Italy	59,865,000	10.94	2006	N/A	N/A	65,500*	36,500*	50,000*	27,500*	2,700*	2,700*	N/A	N/A	0
Japan	127,720,000	19.77	2006	N/A	N/A	252,533	153,731	174,218	116,859	9,154* [2007]	9,314[2007]	N/A	N/A	N/A
Jordan	5,849,000	13.83	2007	N/A	N/A	8,087	N/A	N/A	N/A	1,365	N/A	N/A	N/A	
Kenya	37,954,000	0.73	2008	0.61	2009	2,775	N/A	2063	N/A	100 [2007]	70	2,324	N/A	885 [2009]

		Density (per 10,000 population)				Pharmacists						Pharmacy technicians		
	Population mid 2008	Pharmacists	Year of data	Pharmacy technicians	Year of data	Total licensed	Total female licensed	Total actively practicing	Total actively practicing and female	Newly licensed	Graduates	Total	Newly licensed	Graduates
Kuwait	2,669,000	12.99	2009	3.20	2009	3,466	1,002	2,153	N/A	188	46 [2007]	853	42 [2007]	52 [2007]
Mali	12,716,000	0.64	2008	N/A	N/A	816	246	524	N/A	462	50	N/A	N/A	N/A
Malta	412,000	19.88	2005	N/A	N/A	819	504	680	N/A	29 [2007]	29 [2007]	N/A	N/A	12 [2007]
Mexico	107,677,000	5.39	2007	N/A	N/A	58,000	42,000	45,000	N/A	2,800	2,800	N/A	N/A	N/A
Nepal	26,997,000	0.20	2007	N/A	N/A	547	234	250	150	N/A	100	N/A	N/A	N/A
Nigeria	148,071,000	0.46	2007	0.06	2007	6,748	2,067	6,140	1,794	484	299	879	359	399
Pakistan	172,800,000	0.69	2008	2.31	2008	12,000	4,000	7,000	1,500	2,500	2,500	40,000	3,000	3,000
Paraguay	6,230,000	5.14	2007	1.20	2007	3,200	2,500	2,200	1,700	25	25	747	189	189
Portugal	10,621,000	10.46	2007	N/A	N/A	11,112	8,813	10,353	8,211	440	517 [2008]	N/A	N/A	N/A
Republic of Macedonia	2,049,000	7.38	2008	N/A	N/A	1,513	1,210	1,400	1,120	199	100	N/A	N/A	N/A
Republic of Korea	48,607,000	11.76	2007	0	2007	57,176	25,273	31,265	N/A	1,359	1,372	0	0	0
Rwanda	9,609,000	0.21	2008	N/A	N/A	200*	50*	180*	45*	58 [2007]	58 [2007]	N/A	N/A	N/A
Singapore	4,790,000	3.10	2007	N/A	N/A	1,483	1,089	1,349	986	69	84	N/A	N/A	N/A
Spain	46,501,000	13.18	2007	N/A	N/A	61,300	43,015	57,784	41,048	2,254	2,700	N/A	N/A	N/A
Sudan	39,445,000	1.49	2008	0.63	2008	5,890	N/A	4,564	N/A	600	888	2,488	70*	70
Switzerland	7,633,000	8.23	2008	N/A	N/A	6,283	4,324	5,500	3,700	133	133	N/A	N/A	N/A
Syria	19,933,000	7.47	2007	N/A	N/A	14,896	8,938	12,985	N/A	860	860	N/A	207]	191
Tanzania	40,213,000	0.17	2008	0.11	2008	700	245	620	210	100 [2007]	57 [2007]	427	33 [2007]	N/A
Turkey	74,766,000	4.11	2008	9.36	2008	30,725	16,200	27,968	14,000	1,000	900	70,000	N/A	N/A
Uganda	29,194,000	0.10	2008	0.17	2008	300	63	300	63	41	41	500	15	16
Uruguay	3,334,000	3.63	2008	N/A	N/A	1,211	850	859	600	61 [2007]	1,144 [2007]	N/A	N/A	N/A
USA	304,486,000	9.06	2008	14.78	2008	275,876	140,696	236,977	123,344	9,800	10,500	450,000*	N/A	N/A
Vietnam	86,185,000	1.18	2007	N/A	N/A	10,200	6,227	N/A	N/A	817	820	N/A	N/A	2,000
Zimbabwe	13,481,000	0.80	2008	0.38	2008	1,077	445	N/A	N/A	80	45	506	30	30

Notes
N/A – Data not available
* – Estimated data
[year of data] – if different to year of data column

Population data source – Population Reference Bureau 2008. Available at www.prb.org. Accessed 24 April 2009.

Definitions
Pharmacist: A professional who in accordance to the local legal provisions and definitions may provide pharmacy services (in the community, hospital, academia, research, industry etc) in your country.

Pharmacy technician: A person who supports pharmacists in the delivery of pharmacy* services. Also includes qualified assistive personnel such as pharmacy technologists.

Licensed: Registered to provide pharmacy services.
Actively practicing: Active in the provision of pharmacy services in the country.
Newly licensed: New registrant in 2007.

Table 2. Pharmacist and pharmacy technician education

	Pharmacists Education									Pharmacy technicians Education								
	Graduates	Year of data	Total number of schools	Accredited Schools				Period of Training		Graduates	Year of data	Total number of training schools	Accredited Schools				Period of Training	
				Total	Public	Private for profit	Private not-for-profit	Under-graduate (Years)	Internship (Months)				Total	Public	Private for profit	Private not-for-profit	Under-graduate (Years)	Internship (Months)
Albania	72	2007	4	2	1	0	1	5	36	0	N/A	1	0	0	0	0	3	36
Argentina	1397	2005	12	12	9	3	0	4	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Australia	1427	2008	16	16	N/A	N/A	N/A	4	12	710	2006	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	146	2008	3	3	3	0	0	4.5	12	N/A	N/A	N/A	N/A	N/A			N/A	N/A
Belgium	400	2008	8	N/A	N/A	N/A	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	0
Brazil	8956	2008	306	0	0	0	0	4	24	0	N/A	0	0	0	0	0	0	0
Canada	931	2007	10	10	10	0	0	5	6	N/A	N/A	78	13	8	5	N/A	0.7	0
Chad	0	2007	0	0	0	0	0	N/A	N/A	0	2007	0	0	0	0	0	N/A	N/A
Chile	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5 - 6	3 – 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Colombia	220	2008	6	6	4	2	0	4.5	6	1200	2008	N/A	N/A	N/A	N/A	N/A	1.5	6
Costa Rica	229	2007	4	2	1	1	0	4	6	0	2007	0	0	0	0	0	0	0
Croatia	120	2008	1	N/A	N/A	N/A	N/A	5	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	304	2007	2	2	N/A	N/A	N/A	5	24	305	2007	10	9	N/A	N/A	N/A	3	24
Denmark	163	2007	1	N/A	N/A	N/A	N/A	5	0	141	2007	1	N/A	N/A	N/A	N/A	3	0
Egypt	10000*	2008	20	N/A	N/A	N/A	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ethiopia	296	2008	8	0	0	0	0	4	12	236	2008	12	N/A	N/A	N/A	N/A	2	3
Finland	83	2007	2	2	2	0	0	5	6	369	2007	3	3	3	0	0	3	6
France	2800	2007	24	24	24	0	0	6	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	2310	2006	22	N/A	N/A	N/A	N/A	4	12	2500	N/A	91	N/A	N/A	N/A	N/A	2	6
Ghana	120	2007	3	3	2	1	0	4	0	70	2007	N/A	N/A	N/A	N/A	N/A	3	N/A
Great Britain	2196	2007	24	19	N/A	N/A	N/A	4	12	1800	2007	20	5	N/A	N/A	N/A	N/A	N/A
Hungary	220	2007	4	4	4	0	0	5	6	0	N/A	15	15	N/A	N/A	N/A	0	0
Iceland	14	2007	1	1	1	0	0	5	9	N/A	N/A	1	1	1	0	0	0.4	0
India	25,000*	2008	500	N/A	N/A	N/A	N/A	4	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indonesia	3000	2007	63	34	N/A	N/A	N/A	5	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A
Iraq	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	0
Israel	180	2007	2	2	2	0	0	3.5	6	N/A	N/A	0	0	0	0	N/A	0	N/A

	Pharmacists Education									Pharmacy technicians Education								
	Graduates	Year of data	Total number of schools	Accredited Schools				Period of Training		Graduates	Year of data	Total number of training schools	Accredited Schools				Period of Training	
				Total	Public	Private for profit	Private not-for-profit	Under-graduate (Years)	Internship (Months)				Total	Public	Private for profit	Private not-for-profit	Under-graduate (Years)	Internship (Months)
Italy	2700	2006	29	29	29	0	0	5	6	0	2006	0	0	0	0	N/A	N/A	N/A
Japan	9314	2007	74	74	16	0	58	6	5.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jordan	NA	N/A	22	10	2	8	0	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	0
Kenya	100	2007	3	1	1	0	0	4	12	800	2007	17	17	9	8	0	3	7
Kuwait	46	2007	1	1	1	0	0	5	0	52	2007	1	1	1	0	0	2.5	0
Mali	50	2007	1	1	N/A	N/A	N/A	5	12	N/A	N/A	0	0	0	0	0	N/A	N/A
Malta	29	2007	1	1	1	0	0	5	0	12	2007	1	1	1	0	0	2	0
Mexico	2800	2007	50	23	23	0	0	4	6	N/A	N/A	15	0	0	0	0	N/A	N/A
Nepal	100	2007	4	4	4	0	0	4	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	N/A
Nigeria	299	2007	9	9	N/A	N/A	N/A	5	12	399	2007	19	19	N/A	N/A	N/A	3	6
Pakistan	2500	2008	30	28	14	N/A	14	5	6	3000	2008	8	2	0	0	2	2	0
Paraguay	25	2007	4	0	2	2	0	5	6	189	2007	41	0	0	25	0	2	6
Portugal	517	2008	9	6	3	3	0	4.5	6	N/A	N/A	11	N/A	N/A	N/A	N/A	N/A	N/A
R. Macedonia	100	2007	2	2	2	0	0	5	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Republic of Korea	1372	2007	20	20	6	14	0	6	0	0	0	0	0	0	0	0	0	0
Rwanda	58	2007	1	1	1	0	0	5	3	N/A	N/A	0	0	0	0	0	0	0
Serbia	300*	2008	5	4	4	1	0	5	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	6
Singapore	84	2007	1	0	0	0	0	4	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	2700	2007	15	15	12	3	0	5	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2.5
Sudan	888	2008	13	13	6	7	0	5	12	70	N/A	2	2	2	0	0	3	0
Switzerland	133	2008	3	3	3	0	0	5	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A
Syria	860	2007	4	4	4	0	0	5	4.5	191	2007	7	6	6	0	1	2	6
Tanzania	57	2007	2	2	1	0	1	4	12	N/A	N/A	2	2	1	0	1	3	6
Turkey	900	2008	13	13	11	0	2	5	0	N/A	N/A	1	1	1	0	0	2	0
Uganda	41	2008	3	3	2	1	0	4	12	16	2008	1	1	1	0	0	3	0
Uruguay	1144	2007	1	0	1	0	0	5	6	N/A	N/A	2	0	0	1	1	0.5	0.3
USA	10,500	2008	113	113	64	0	49	4	7.5	N/A	N/A	700	125	N/A	N/A	N/A	0	N/A
Vietnam	820	2007	7	7	0	0	0	5	24	2000	2007	25	25	0	10	0	2	24
Zimbabwe	45	2008	1	1	1	0	0	4	12	30	2007/8	2	2	2	0	0	3	N/A

Notes
N/A – Data not available * – Estimated data

Table 3. Pharmacies and pharmacy ownership policies

				Pharmacies and pharmacy departments					Community pharmacy ownership	
	Population mid 2008	Pharmacy density per 10,000 population	Year of data	Total	Hospital	Community	Primary healthcare facilities	Other	Pharmacy ownership	Policies and restrictions.
Albania	3,241,000	2.44	2009	790	43	790	0	0	U	Each pharmacy must employ a pharmacist as its technical director. Can own more than one pharmacy.
Argentina	39,746,000	3.79	2004	15,058	601	14,457	0	0	O	Varies by province. Pharmacists, limited liability companies and partnerships permitted to own pharmacies. Limit one pharmacy per pharmacist. Partners cannot be involved in more than three companies that own pharmacies.
Australia	21,347,000	2.48	2009	5,286	132	4,992	162	0	RP	Varies by state. Western Australia: maximum of 4 pharmacies. New South Wales, Victoria, South Australia, Tasmania, Queensland: maximum of 5 pharmacies. Northern Territory and Australian Capital Territory: Can own more than one.
Austria	8,352,000	1.53	2007	1,276	46	1,230	0	0	RP	Restrictions on number of pharmacies a pharmacist can own.
Belgium	10,695,000	5.01	2007	5,367	200	5,167	0	0	U	Can own more than one pharmacy.
Brazil	195,138,000	4.34	2008	84,648	6,678	71,980	4,368	1,612	U	Can own more than one pharmacy.
Canada	33,304,000	2.74	2008	9,154	1,058	8,096	0	0	O	Varies by province. Alberta, British Colombia, Ontario: restricted to pharmacists or corporation where majority of directors are pharmacists. Quebec, Saskatchewan: pharmacists or physicians. Newfoundland, Manitoba: Nova Scotia: unrestricted ownership.
Chile	16,770,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	U	Can own more than one pharmacy.
Chad	10,111,000	0.04	2009	42*	2*	21*	18*	0	RP	Only pharmacists can own pharmacies. Limit of one pharmacy per pharmacist.
Colombia	44,447,000	4.27	2009	19,000	3,214	450	N/A	15,336	U	A pharmacist or medicine dispenser must be employed as the pharmacy director. Medicine dispensers should have a minimum of 10 years pharmacy experience and have support letters from two physicians or pharmacists.
Costa Rica	4,519,000	2.35	2008	1,062	32	931	131	260	U	Can own more than one pharmacy.
Croatia	4,433,000	2.34	2007	1,038	52	986	0	0	U	Can own more than one pharmacy.
Czech Republic	10,428,000	2.28	2009	2,381	73	2,308	0	0	U	Can own more than one pharmacy.
Denmark	5,490,000	0.62	2007	341	20	321	0	0	RP	A pharmacist can own up to a maximum of four pharmacies.
Egypt	74,946,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RP	Restrictions on number of pharmacies a pharmacist can own.
Ethiopia	79,087,000	0.06	2007	463	143	320	577	2,121	O	Pharmacy should have a licensed pharmacist that is legally and professional responsible. Can own more than one pharmacy.
Finland	5,312,000	1.48	2008	787	N/A	787	N/A	N/A	RP	Pharmacy ownership restricted to pharmacists. Limit of one pharmacy per pharmacist.
France	62,046,000	4.16	2007	25,830	2,668	23,162	0	0	RP	Only pharmacists can own pharmacies. Maximum of one pharmacy per pharmacist owner. Pharmacist owners can only practice in their own pharmacy.
Germany	82,170,000	2.68	2008	22,022	452	21,570	0	0	RP	Restrictions on number of pharmacies a pharmacist can own.

				Pharmacies and pharmacy departments					Community pharmacy ownership	
	Population mid 2008	Pharmacy density per 10,000 population	Year of data	Total	Hospital	Community	Primary healthcare facilities	Other	Pharmacy ownership	Policies and restrictions.
Great Britain	61,291,000	2.12	2008	13,005	280	12,725	N/A	N/A	U	Can own more than one pharmacy.
Hungary	10,034,000	2,50	2009	2,500	140	2,360	0	0	U	Ownership requires permission from the Hungarian Competition Authority. A pharmacist should have part-ownership.
Iceland	319,000	1.91	2009	61*	2*	55*	4*	0	U	Companies cannot hold more than the majority of the market share in order to promote competition.
India	1,149,285,000	4.79	2009	550,000*	N/A	550,000*	N/A	N/A	U	Can own more than one pharmacy.
Indonesia	239,945,000	1.13	2009	27,000	N/A	N/A	N/A	N/A	RP	Restrictions on pharmacy ownership.
Iraq	29,492,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RP	Ownership restricted to pharmacists. Cannot own more than one pharmacy.
Israel	7,482,000	1.80	2009	1,350*	100	1,100	350	20	U	Physicians cannot own pharmacies. Can own more than one pharmacy.
Italy	59,865,000	3.05	2007	18,250	1,000	17,250	0	0	RP	Restrictions on the number of pharmacies a pharmacist can own.
Japan	127,720,000	4.76	2006	60,852	8,900	51,952	N/A	N/A	O	Designated responsible pharmacist must be employed in each pharmacy.
Jordan	5,849,000	3.09	2007	1,806	N/A	N/A	N/A	N/A	U	Pharmacies should employ at least one fulltime pharmacist that is not designated as a responsible pharmacist in any other pharmacy. Pharmacists working in the public sector cannot own private pharmacies but can be a shareholder.
Kenya	37,954,000	0.44	2009	1,700	N/A	1,700	N/A	N/A	O	Ownership restricted to pharmacists and pharmaceutical technologists. Pharmaceutical technologists must have practiced for at least 6 years in order to own a pharmacy.
Kuwait	2,669,000	2.09	2008	559	57	345	81	N/A	O	Only Kuwati pharmacists (pharmacists with a Kuwaiti pharmacist license) may own pharmacies with the exception of pharmacies in supermarkets and private hospitals. Can own more than one pharmacy.
Mali	12,716,000	0.90	2008	1,145	11	834	300	0	RH	Each pharmacy must employ a pharmacist.
Malta	412,000	5.44	2005	224	8	207	5	4	U	Can own more than one pharmacy.
Mexico	107,677,000	2.04	2006	22,000	100	21,900	0	0	U	Can own more than one pharmacy.
Nepal	26,997,000	5.93	2008	16,016	16	16,000	N/A	N/A	O	Pharmacists, those who have completed diploma pharmacy programs and have completed a three month orientation program (run by Department of Drug Administration) can own a pharmacy. Can own more than one pharmacy.
Nigeria	148,071,000	0.17	2007	2,581	21	2,560	N/A	N/A	RP	Ownership restricted to pharmacists. Can own more than one pharmacy.
Pakistan	172,800,000	4.62	2008	80,000	1000	78,000	1,000	0	U	No limitations.
Paraguay	6,230,000	5.14	2007	3,200	50	3,150	0	0	U	No limitations.
Portugal	10,621,000	2.89	2008	3,071	294	2,777	0	0	U	Restrictions on the number of pharmacies that can be owned.
R. of Macedonia	2,049,000	3.90	2008	800	28	772	0	0	U	Can own more than one pharmacy.

	Population mid 2008	Pharmacy density per 10,000 population	Year of data	Pharmacies and pharmacy departments: Total	Hospital	Community	Primary healthcare facilities	Other	Community pharmacy ownership: Pharmacy ownership	Policies and restrictions.
Republic of Korea	48,607,000	4.50	2007	22,000	1,251	20,703	0	0	RP	Restrictions on the number of pharmacies that can be owned.
Rwanda	9,609,000	0.85	2008	815	42	71	510	192	RP	Pharmacy ownership restricted to pharmacists. Limit of one pharmacy per pharmacist.
Serbia	7,354,000	5.44	2009	4,000*	100*	3,100*	0	800*	U	Pharmacies are also owned by the state. Can own more than one pharmacy.
Singapore	4,790,000	0.49	2007	232	51	157	24	0	U	Can own more than one pharmacy.
Spain	46,501,000	4.50	2007	20,941	N/A	20,941	N/A	N/A	RP	Only individual pharmacists can own pharmacies. Limit of one pharmacy per pharmacist.
Sudan	39,445,000	0.90	2008	3,531	257	2,306	802	166	U	Each pharmacy must employ a responsible pharmacist. Can own more than one pharmacy.
Switzerland	7,633,000	7.15	2008	5,458	114	1,712	N/A	3,632	U	A responsible pharmacist must be employed in the pharmacy. Can own more than one pharmacy.
Syria	19,933,000	5.32	2007	10,613	30	10,555	28	0	RP	Pharmacy ownership restricted to pharmacists. Limit of one pharmacy per pharmacist.
Tanzania	40,213,000	0.12	2008	414	N/A	414	N/A	N/A	U	Each pharmacy must be supervised by a pharmacist. A pharmacist cannot supervise more than one pharmacy. Can own more than one pharmacy.
Turkey	74,766,000	3.32	2008	24,819*	700*	24,119	0	0	RP	Pharmacy ownership restricted to pharmacists. Limit of one pharmacy per pharmacist.
Uganda	29,194,000	0.13	2008	400	15	270	18	N/A	U	Each pharmacy should employ a pharmacist as its director. Can own more than one pharmacy.
Uruguay	3,334,000	4.38	2008	1,460	110	1,200	150	0	O	Any person can own a pharmacy provided they are not a doctor, dentist or veterinarian.
USA	304,486,000	2.20	2008	67,016	6,701	46,911	N/A	13,403	U	Nearly all 50 states require a designated pharmacist-in-charge to be employed. Can own more than one pharmacy.
Vietnam	86,185,000	4.52	2007	39,016	1,032	10,200	27,784	0	O	Pharmacists with a University degree or pharmacy technicians with a diploma can own a pharmacy. Individuals can only own one pharmacy each. Companies may own more than one pharmacy. Pharmacy assistants (1 year training) can run pharmacy kiosks owned by the district or village.
Zimbabwe	13,481,000	0.69	2007	928	115	263	550	N/A	RP	Pharmacists must own at least a 51% share of a pharmacy. Can own more than one pharmacy.

Notes
N/A – Data not available
* – Estimated data
RP – Restricted to pharmacists
RH – Restricted to healthcare professionals
U – Unrestricted
O – Other
Population data source – Population Reference Bureau 2008. Available at www.prb.org. Accessed 24 April 2009.

Definitions
Pharmacies: Premises which in accordance to the local legal provisions and definitions may operate as a facility in the provision of pharmacy services in the community or hospital settings.
Pharmacist: A professional who in accordance to the local legal provisions and definitions may provide pharmacy services (in the community, hospital, academia, research, industry etc) in your country.
Pharmacy technician: A person who supports pharmacists in the delivery of pharmacy* services. Also includes qualified assistive personnel such as pharmacy technologists.

Hospital pharmacies/pharmacy departments: Premises which in accordance to the local legal provisions and definitions may operate as a facility in the provision of pharmacy services in the hospital setting.
Community pharmacies: Premises which in accordance to the local legal provisions and definitions may operate as a facility in the provision of pharmacy services in the community settings.
Primary healthcare facilities: Premises which in accordance to the local legal provisions and definitions may operate as a facility in the provision of pharmacy services in primary healthcare facilities such as general practice clinics and poly clinics.

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