

Imbalances in the health workforce

Briefing paper

by

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Executive summary

Background

Imbalance in health workforce is an issue regularly addressed by the media, researchers and policy makers. It is a major concern in developed and developing countries, as imbalances might have consequences such as lower quality and productivity of health services, closure of hospitals' ward, increasing wait time, diversion of emergency department patients, reduced number of staff beds, or under-utilization of trained individuals.

Although the issue of imbalance is not new on the public health agenda, various elements contribute to obscure clear policy development. Firstly, many reports of shortages do not firmly establish their existence. Secondly, the notion of shortages is a relative one; what is considered a nursing shortage Europe would most probably be viewed differently from an African perspective. Thirdly, the variety of indicators used to measure imbalances, e.g. vacancy rates, real wage growth, rate of return, doctors to population ratios, might constitute a source of confusion. Finally, imbalances are of different types and their impact on the health care system might vary a lot. In consequence, there is a general need to critically review the imbalance issue.

Objective

The objective of this paper is to contribute to a better understanding of the issues related to imbalance through a critical review of its definition, nature and measurement techniques, as well as the development of an analytical framework.

Imbalance definition

From an **economic perspective**, a skill imbalance occurs when the quantity of a given skill supplied by the work force and the quantity demanded by employers diverge at the existing market conditions. Labour market supplies and demands for occupational skills are continuously fluctuating, and at certain point in time, there will be labour market imbalances. In other words, a shortage/surplus is the result of a disequilibrium between the demand and supply for labour. In contrast, **non-economic definitions** are usually normative one.

Nature of imbalance

One of the key questions regarding imbalances is how long they last. It is possible to differentiate between **dynamic** imbalance and **static** imbalances. In a competitive labour market, we should expect most of imbalances to resolve themselves through time; these are dynamic. In contrast, a **static imbalance** occurs because supply does not increase/decrease, and market equilibrium is therefore not achieved. For instance, wage adjustments may respond slowly to shifts in demand or supply, as a result of institutional and regulatory arrangements, imperfect market competition (monopoly, monopsony) and wage controls policies. Because of the large amount of time required to educate physicians, changes in available supply take a long time to react significantly. Another distinction regarding the nature of imbalance relates to **qualitative** versus **quantitative**. In a tight labour market, employers might not find the ideal candidate, but still recruit someone. Under these conditions, the issue becomes one of the quality of job candidates rather than quantity of people willing and able to do the job.

An analytical framework

In order to better comprehend imbalance in the health workforce, an analytical framework has been developed. This framework emphasizes important features that should be considered when examining imbalance issues and relies on the following elements:

- Main characteristics of the health care services system, from an economic perspective.
- Review of the main institutional actors on the health labour market
- Characteristics of the health labour market such as employment growth, the gender issue, the time lag associated with medical education, the role of professional associations, the potential monopsony power of hospitals, and finally, the impact of donor agencies in developing countries.
- Factors affecting the demand and the supply of health workforce

Human resources development

As a result of the particular characteristics of the health care delivery system and health labour market, market mechanisms alone will not achieve an adequate demand/supply of health personnel from a societal perspective. Hence, in society's best interest, public interventions such as stewardship and human resources planning, can contribute to partially or totally correct for these market failures and facilitate the attainment of an adequate supply/demand of health personnel

Forecasting the future number of health personnel required and developing policies to meet such figures are common to any health care system. Countries' desire to meet population health needs and to avoid social welfare losses resulting from a shortage or an oversupply are factors explaining, to a large extent, the importance attributed to human resources planning in the context of public health policies. The literature differentiates between various approaches to forecasting and plan health personnel requirement such as **needs-based planning**, **personnel-to-population ratios** and **service-targets**.

Many studies have been undertaken to estimate future numbers of health care workers, and in particular physicians. In the United States, a large number of studies predicted substantial surpluses of physicians but diverged regarding the extent. Furthermore, some large surpluses forecasted for the end of the 21st century did not occur as a result of structural changes in the health care system.

Typology of imbalances

To facilitate comparisons between health workforce imbalances, a typology of imbalances is proposed:

- **Profession/specialty imbalances**

Under this category, we consider imbalance in the various health professions, such as doctors or nurses, as well as imbalances within a profession, e.g., shortage of one type of specialist.

- **Geographic imbalances**

Geographic imbalance of health personnel essentially relates to urban-rural and to poor-rich regions disparities.

- **Institutional and services imbalances**

Institutional imbalances relate to difference in health workforce endowment between health care facilities, as well as between services.

- **Public/private imbalances**

The public/private imbalance is associated with differences in human resources allocation between the public and private health care system.

- **Gender imbalances**

Gender imbalances relates to disparities in the female/male representation in the health workforce.

Measurement of imbalances

Although in theory, it should be easy to determine whether a labor imbalance exists or not, in practice, no single empirical measure of health personnel imbalance exists, and various indicators have been used to estimate the incidence and extent of shortages/surpluses. These indicators can be classified in four main categories:

- **Employment indicators:** vacancies, growth of the workforce, occupational unemployment rate, turnover rate
- **Activity indicators:** overtime
- **Monetary indicators:** real wage rate, rate of return
- **Normative population based indicators:** doctor/population ratio, nurse/population ratio, etc.

The above elements do not represent an exhaustive list of indicators. Less common indicators are the use of temporary nursing staff through agency nurses, the number of acceptable applicants per advertised vacancy, higher waiting time and health outcomes.

These indicators will not be reviewed in this study, but further discussion is indicated.

The main advantages and disadvantages of the different indicators are summarized in Table I.

Table 1: Main advantages and disadvantages of shortages/surpluses indicators

Indicators	Main advantages	Main disadvantages
I. Employment indicators		
Vacancies	<ul style="list-style-type: none"> • Easy to measure • Widely used 	<ul style="list-style-type: none"> • It does not capture private practitioners • Budget constraints may "hide" a shortage problem
Growth of the workforce (Comparison of the growth of the workforce with population growth)	<ul style="list-style-type: none"> • It can be applied to any health profession, in any health care system 	<ul style="list-style-type: none"> • It might be difficult to assess whether a workforce growth responds to an initial shortage or not
Occupational unemployment rate (Comparison between a health profession unemployment rate and a reference group)	<ul style="list-style-type: none"> • It can be applied to any health profession, in any health care system 	<ul style="list-style-type: none"> • The occurrence of simultaneous health workforce unemployment and imbalance complicates the interpretation of this indicator
Turnover rates	<ul style="list-style-type: none"> • Easy to measure 	<ul style="list-style-type: none"> • Level of turnover might be influenced by elements not related to imbalances
II. Monetary indicators		
Real wage rate	<ul style="list-style-type: none"> • Easy to measure 	<ul style="list-style-type: none"> • Wage might be influenced by factors not related to imbalances • It is difficult to quantify the shortage/surplus
Rate of return	<ul style="list-style-type: none"> • It is a relatively sophisticated indicator 	<ul style="list-style-type: none"> • Relatively complex to estimate • It is difficult to quantify the shortage/surplus

Indicators	Main advantages	Main disadvantages
III. Activity indicators		
Overtime	<ul style="list-style-type: none"> • It is a sensitive indicator 	<ul style="list-style-type: none"> • It might reflect a deliberate policy
IV. Normative Population based indicator		
Doctor per 10,000 population	<ul style="list-style-type: none"> • It is easy to estimate 	<ul style="list-style-type: none"> • There is a certain degree of subjectivity when establishing a "gold standard"
Nurse per 10,000 population	<ul style="list-style-type: none"> • It allows to quantify imbalances 	

Conclusion

Relying on a single indicator is insufficient to capture the complexity of the imbalance issue. It is suggested that a range of indicators should be considered, to allow for a more accurate measurement of imbalances, and to differentiate between short and long term indicators. In addition, further efforts should be devoted to improve and facilitate the collection of data, and in particular in developing countries.

Introduction

Imbalance in the health workforce is a major challenge for health policy-makers, since human resources—the different kinds of clinical and non-clinical staff who make each individual and public health intervention happen—are the most important of the health system's inputs (WHO, 2000). Imbalance is not a new issue, as nursing shortages were reported in American hospitals as early as 1915 (Friess, 1994). Despite this issue's having been on the public health agenda for many years, it remains a major concern to this day, reported in both developed and developing countries and for most of the health care professions.

Imbalance in the health workforce is regularly addressed by the media, researchers and policy-makers. According to the World Bank (1994), one of the chief problems in Africa that must be overcome if health is to be improved to a satisfactory level is the undersupply of sufficiently trained personnel. Mutizawa-Mangiza (1998) mentions serious staff shortages in all health professions categories in Zimbabwe, including 2000 vacancies for nurses. Shortages of doctors have been reported in Botswana, Guinea Bissau (Egger et al., 2000) and Ghana (Dovlo and Nyonator, 1999), and for nurses in Burundi, Kenya and Mauritania (WHO, 1997).

In Asia, India (WHO, 1997) and Vietnam are considered to have a shortage of nursing personnel. Vietnam experienced a 57% decline in the number of nurses between 1986 and 1996 (World Bank, 1998). But shortages of health care personnel in developing countries are not inevitable. The Philippines is said to have a nursing oversupply (Corcega et al., 2000) whereas Argentina is considered to have an excess of doctors (Dussault, 1999).

The *New York Times* for 12 April 2001 ran the headline: "The nation is currently engulfed in a huge nursing shortage, which is going to get worse". This demonstrates that imbalances in the health workforce are also a significant concern in developed countries.

In the United States of America, numerous press articles and studies report an emerging nursing shortage (United States General Accounting Office, 2001a; Collins, 2001; Fagin, 2001; Levine, 2001; Buerhaus, 1998).

Nursing shortages are also mentioned in the United Kingdom (Buchan, 2001; Buchan 2000) and Canada (ACHHR, 2001). As for doctors, England is said to experience a shortage (Gould, 2001) and Germany an oversupply (WHO, 1999).

Imbalances affect all health professions. Laboratory technicians, nutritionists, physiotherapists and occupational therapists are said to be in short supply in the Caribbean region (IDB/PAHO, 1996). In the United States, a study of the Bureau of Health Professions (2000) found evidence of the emergence of a shortage of pharmacists. Furthermore, a survey conducted in the United States indicated that vacancy rates for imaging technicians and registered nurses in hospitals were well over the 10% mark (First Consulting Group, 2001).

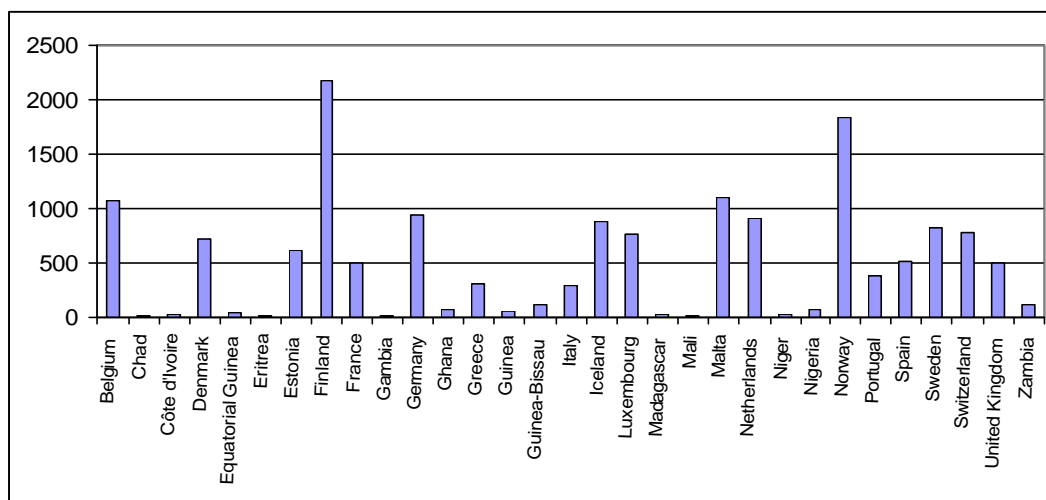
Imbalances can be accentuated by the migration of health personnel. Migration is a particularly important issue in Africa (Dovlo, 1999). Large numbers of health personnel have left African countries altogether in recent years. Emigration of health personnel whose training was financed by the government also means that the government suffers a direct financial loss.

Imbalances, and in particular shortages, are reported to have a number of adverse consequences. In the United States, the impact of the perceived shortage in hospitals is felt at different levels. Approximately 38% of hospitals report emergency-department overcrowding, 25% mention that they have to divert emergency department patients, 23% had to reduce the number of staff beds, and 19% report an increased waiting time for surgery (First Consulting Group, 2001). In Jamaica, budgetary constraints leading to shortages of personnel and equipment led in turn to the closure of hospital wards (IDB/PAHO, 1996). In addition, shortages may lower quality and productivity (Haskel and Holt, 1999). In terms of nursing quality of care, Needleman et al. (2001) estimated that higher nurse:patient ratios were

associated with a 3% to 12% reduction in the rates of outcomes potentially sensitive to nursing (OPSNs), such as urinary tract infections and hospital-acquired pneumonia.

Although imbalance in the health workforce is an important issue for policy-makers, various elements contribute to obscuring policy development. First, many reports of shortages are not borne out by the evidence. Rosenfeld and Moses (1988) show that an overwhelming majority of newspapers, journals, and newsletter articles describing the nursing situation in the United States presume the existence of a shortage. They found that even in those areas where concrete evidence of a shortage was not available, the term “nursing shortage” still appeared. Second, the notion of shortage is a relative one; what is considered a nursing shortage in Europe would probably be viewed differently from an African perspective. Nursing shortages are reported in both Africa and Europe, but the nurse-population ratio is substantially different, as illustrated in Fig. 1.

Figure 1. Nurses per 1,000,000 population in Europe and Africa



Source: WHO data base, 1999

Third, the variety of indicators used to measure imbalances, such as vacancy rates, real wage growth, rate of return and doctor-to-population ratios, might constitute a source of confusion. Finally, imbalances are of different types and their impact on the health care system varies. In consequence, there is a general need to critically review the imbalance issue.

The objective of this paper is to contribute to a better understanding of the issues related to imbalance through a critical review of its definition and nature and techniques to measure it, as well as the development of an analytical framework. Imbalances can be examined from different perspectives—economic, political, sociological, psychological and historical. An exhaustive review of each approach would be beyond the scope of this study. Instead, an economic perspective is adopted, complemented by the contributions of alternative approaches. Since economic analysis represents a useful tool to assist in the determination of policy for better social outcomes, we believe that such an approach could provide valuable elements to policy-makers.

In the **first section** of this paper, the definition and nature of imbalance are considered from a theoretical perspective. A framework to analyse imbalances is then developed in the **second section**. In the first part of this framework, the characteristics of the health services market are presented from an economic perspective. In the second part, a review of the main institutional stakeholders of the health labour market is proposed. Finally, specific features associated with the health labour market and factors affecting the demand and supply for the latter are examined. The issue of projections of the health workforce, an important element to health policy-makers, is examined in the **third section**. In order to facilitate the survey of imbalances, an imbalance typology is proposed in the **fourth section**. In the **fifth section**, the focus is oriented more towards practical issues, that is, the measurement of imbalances. Finally, the **last section**, offers a discussion and recommendations.

1. Imbalances: theoretical issues

In this section, the definition and nature of imbalance are addressed.

1.1 Definition

From an **economic perspective**, a skill imbalance¹ (shortage/surplus) occurs when the quantity of a given skill supplied by the workforce and the quantity demanded by employers diverge at the existing market conditions (Roy et al., 1996). Labour market supplies and demands for occupational skills fluctuate continuously, so at times there will be labour-market imbalances. In other words, a shortage/surplus is the result of a disequilibrium between the demand and supply for labour.

In contrast, **non-economic definitions** are usually normative, i.e. that there is a shortage of labour relative to defined norms (Feldstein, 1999). In the case of health personnel, these definitions are based either on a value judgement—for instance, how much care people should receive—or on a professional determination—such as deciding what is the appropriate number of physicians for the general population.

1.2 Nature of imbalance

In the following, we differentiate between **dynamic** and **static imbalance**, as well as between **qualitative** and **quantitative imbalance**.

1.2.1 Dynamic versus static imbalance

One of the key questions regarding shortages is how long these last: Is the imbalance **temporary** or **permanent**? In a competitive labour market, we should expect most imbalances to resolve over time. Imbalances will tend to disappear faster the greater the reaction speed and also the greater the elasticity of supply (or demand) (Arrow and Capron, 1959). This type of imbalance (shortages or surpluses) is defined as **dynamic**.

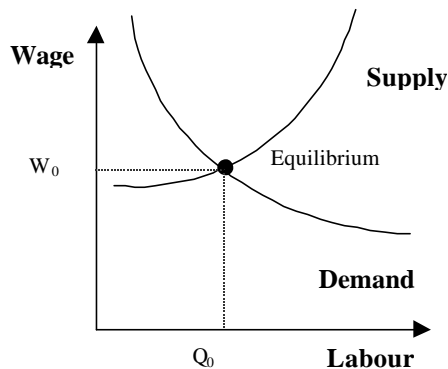
- **Dynamic imbalance**

Figure 2 depicts a classic competitive labour market. As wages increase, more people are willing to be employed, thus the supply curve rises. In contrast, when wages are decreasing, employers are willing to employ more people, thus the demand curve decreases. The point where the aggregated Demand and Supply curves for labour cross each other is the equilibrium, as illustrated in Fig. 2, where W_0 and Q_0 are the wage and labour quantity of equilibrium; at this point, the supply and demand curves are equal and the equilibrium wage clears the market.

In a perfect competitive market, equilibrium is always attained, but in the short term, some disequilibrium can occur, namely shortages or surpluses that market mechanisms correct, allowing equilibrium to be reached again. It should be noted that this notion of equilibrium in a perfect competitive market is rather theoretical and would be difficult to observe in reality. It provides a useful analytical framework, however. The nearest to an ideal market is probably the stock market, in which both sellers and buyers are armed with good knowledge of the world market in shares, which is kept up to date by computer technology (Donaldson & Gerard, 1993).

¹ In this study, we shall consider the terms shortage/surplus as constituting skill imbalance.

Figure 2. Equilibrium

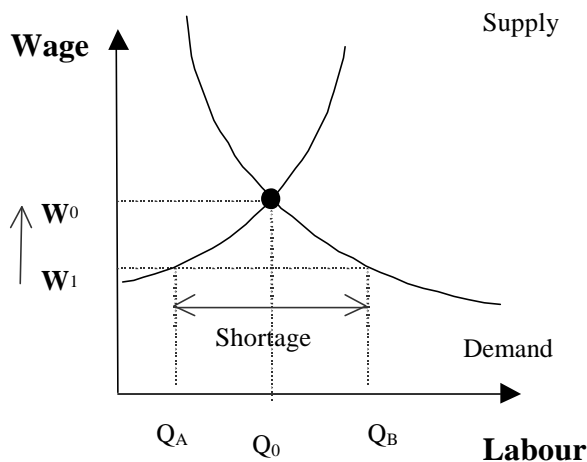


What happens when disequilibrium occurs—that is, a shortage or surplus?

The **first type of imbalance** to be considered is the shortage. At an initial wage rate, W_1 , which is below the equilibrium wage rate indicated by W_0 , as illustrated in Fig. 3, a shortage occurs because the quantity of labour demanded, Q_B , exceeds the supply of labour, Q_A . In a competitive market, the wage rate will increase, with an increase in the supply of labour at the new wage rate, and employers will reduce their demand to Q_0 at the new wage rate level W_0 .

At wage W_0 , the market is in equilibrium. Hence, the shortage is eliminated through market-adjustment mechanisms. Therefore, shortages are assumed to be temporary in a competitive market.

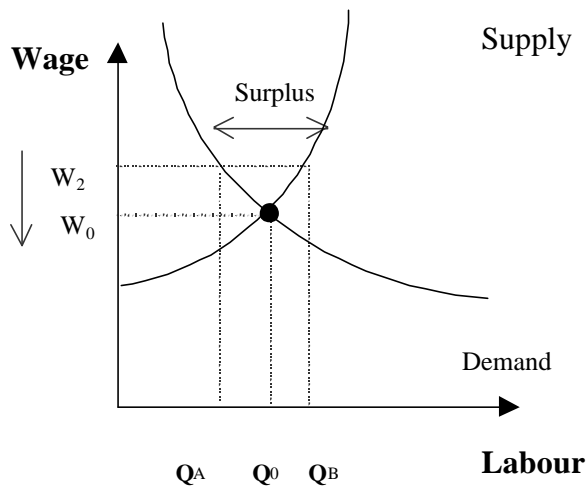
Figure 3. Shortage



An example in which a relatively competitive market has shortages is the market for computing professionals. For instance, in Australia, the demand for computing professionals is escalating with the application of new technology such as multimedia communications, Internet developments, networking/communications and system administration, resulting in an excess demand for specific skills and wage increases (Department of Communications, Information Technology and the Arts, 1998).

The **second type of disequilibrium** to be examined is surplus, presented in Fig. 4. At an initial wage rate W_2 that is above market level, the labour supply is greater than the demand for labour, i.e., $Q_B > Q_A$. This excess of labour supply will lead to a decrease in the wage rate, and equilibrium will be reached at wage rate W_0 and labour quantity Q_0 .

Figure 4. Surplus



The evolution of the unemployment rate in Japan provides an example of a surplus followed by a decrease in wage. After the surge in the rate of unemployment in Japan by the end of the 1990s, there was a decrease in high-wage jobs and an increase in low-wage jobs, resulting in a downward wage adjustment in Japanese companies (Yashiro, 1998).

- **Static imbalance**

In contrast, a **static imbalance** occurs because supply does not increase or decrease; market equilibrium is therefore not achieved. For instance, wage adjustments may respond slowly to shifts in demand or supply as a result of institutional and regulatory arrangements, imperfect market competition (monopoly, monopsony) and wage-control policies. Another example is physicians' education: because of the large amount of time required to educate physicians, changes in available supply take a long time to react significantly (Wennberg, 1993). Lack of information on the state of the various labour markets can also be a factor in the speed of market adjustment. To make proper labour-market decisions, households and firms must be informed of the existing market conditions across markets. They must therefore know what wages are paid and what and where are the job openings and available workers (Roy et al., 1996).

1.2.2 Qualitative versus quantitative imbalance

Qualitative versus **quantitative** imbalance is another distinction. In a tight labour market, employers might not find the ideal candidate, but will still recruit someone. Under these conditions, the issue is the quality of job candidates rather than the quantity of people willing and able to do the job (Veneri, 1999). From the employers' perspective, a shortage of workers exists; from the job-market perspective, the existence of a shortage could be questioned because the jobs are filled. One negative hidden impact of a qualitative shortage is the number of positions that are filled with ineffective individuals (Hare et al., 2000).

2. An analytical framework

In this section, an analytical framework is proposed to foster better comprehension of the characteristics of health workforce imbalances. Since the health workforce is part of the health services market, the analysis first considers the main characteristics of the health services market from an economic perspective. In the second subsection, a review of the main institutional stakeholders is undertaken. Specific features related to the health labour market are examined in the third subsection, including growth in health employment; gender issues; the time lag associated with medical education; the role of professional regulation; the potential monopsony power of hospitals; and finally, the impact of donor agencies in developing countries. In the last subsection, we examine factors affecting the demand and the supply of health workforce.

2.1 Health services market characteristics

From an economic perspective, the health services market is a market, wherein buyers and sellers interact through the market mechanism, resulting in the possibility of exchange. The demand is associated with “buyers” and the supply with “sellers”, and markets can be competitive or noncompetitive.

The health services market is characterized by market failures, i.e. the assumptions for having perfect competition are violated. In the presence of market failures, market mechanisms, from a societal perspective, lead to a nonoptimal demand and/or supply in health services. Most markets are characterized by market failures, but what is unique to the health services market is the extent of these market failures (Donaldson and Gerard, 1993).

In order to achieve the optimal outcomes of a competitive market, the following conditions must be satisfied (Folland et al., 1993):

- There must be sufficient small sellers and buyers of the good or service to eliminate the possibility that any single buyer or seller could influence the price of the good or service.
- The service produced by each seller must be identical to the service produced by other sellers, i.e. the service is homogeneous.
- All resources and inputs must be mobile, i.e. no barriers to entry or to leaving.
- There must be perfect information, i.e. all participants in the economic process must be aware of the costs and prices.
- No externalities: Externalities represent the positive or negative effects that market exchanges have on people who do not participate directly in those exchanges.

But these conditions are not fulfilled, since the health services market experiences the following:

- **Presence of externalities:** Positive externalities result from health services. For example, some people may benefit from other people’s consumption of health care, such as vaccination. Benefit may also arise from knowing that someone else is receiving needed health services, even if this does not impact on one’s own health status (caring externality). As unregulated markets do not account for externalities, such a market may lead, in the case of positive externalities, to underproduction of health care.
- **Imperfect knowledge:** Patients are not always aware of their health status and all the options available to contribute to an improvement in their health. In addition, the patient does not necessarily know how each option could contribute to better health and is not always able to judge

the relative quality of each. A problem related to imperfect knowledge is the **asymmetry of information** between the patient and the provider, or the patient and the insurance.

- **Uncertainty:** There is uncertainty regarding health care use (Arrow, 1963). Health care use cannot be planned in the same way as one's weekly consumption of food. In addition, deterioration in health is often sudden and/or unexpected

As a result of the above market failures, governments respond to such failures through policy intervention. A classical example of public intervention in the presence of a positive externality, e.g. vaccination, is the introduction of a mandatory policy of vaccination.

2.2 Main institutional stakeholders

Many authors discuss the wide range of institutional stakeholders involved in shaping human resources in health (Egger et al., 2000; Brito, 2000; Martinez and Martineau, 1998) reviewed in Table 1.

Table 1. Institutional stakeholders

Institutional stakeholders	Examples from countries studied
The state	Ministry of health Civil Service Health Professions Ministry of Finance Ministry of Education Ministry of Labour Ministry of Planning Judiciary Parliament/politicians
Employers	Central government Semi-public agencies Third party payers/private companies NGO's/churches
Producers	Medical and nursing schools Public health schools Technical colleges Vocational training schemes Third party payers/private organizations
Regulators	Statutory bodies (medical, nursing councils, students groups) Accountability institutions (licensing and accreditation)
Service providers	Health managers at different levels Health and support services personnel
Representative bodies	Professional associations Unions Media
Consumers	Individual service users Consumer groups
External funders	Development banks Multilateral/bilateral aid agencies NGOs

Source: Martinez & Martineau (1998)

Table 1 shows the diversity and the large number of stakeholders involved in the field of health labour, all of whom might have different objectives. The objectives of a union or professional association do not necessarily coincide, for example, with those of a ministry, a hospital manager or the central government. Unions/professional associations seek to increase their members' market power, employment and income (Maceira and Murillo, 2001) whereas the Ministry of Finance will want more budget equilibrium, and will favour measures to limit health care expenditures. The diversity and large number of stakeholders and the likelihood that they might have divergent goals all contribute to the complexity of the health labour.

2.3 Specific features of the health labour market

The health labour market shows specific features. The issues to be considered include the growth of health-related employment, gender, the length of medical education, the role of professional regulation and the impact of hospitals and donor agencies on the health-labour market.

2.3.1 Health employment growth

OECD data indicate an ongoing increase in the numbers employed in the health care sector between 1970 and 1990. On the average, employment in health care as a proportion of total employment rose from 2.8% in 1970 to 5.8 % in 1990 (OECD, 1997). OECD figures also show that the number of physicians has increased quite significantly over the last years. The density of practising physicians per 1,000 inhabitants rose from 1.2 to 1.8 between 1977 and 1999, i.e. an increase of 50%. This trend is relatively similar for countries like New Zealand and the United States, and is even more important for countries like Belgium, France and Switzerland. However, such evolution has not been true worldwide. In some African countries, such as Ghana, Kenya, Mozambique and Rwanda, there has been a worsening trend between 1970 and 1990 in terms of doctor/population ratio (Dovlo and Nyonator, 1999).

The increase in the number employed in health-related work has not been similar for each profession. Shih (1999) examined the growth of selected health professions between 1971 and 1996 in the United States. The health professionals investigated were physicians, dentists, pharmacists, registered nurses and other health practitioners, such as chiropractors, veterinarians, optometrists and podiatrists. Allied health categories were also considered, including dieticians, therapists, medical technologists and technicians; and health service workers.

Table 2 summarizes the annual growth rate of the different categories of health professions.

Table 2. Growth of selected health professions, 1971–1996

	1971–1979	1980–1989	1990–1996
Health practitioners			
Physicians	+ 4.29 %	+ 2.65 %	+ 2.37 %
Pharmacists	+ 4.70 %	+ 7.53 %	+ 2.49 %
Dentists	+ 2.69 %	+ 5.03 %	- 4.27 %
Nurses	+ 5.88 %	+ 1.70 %	+ 2.33 %
Others	+ 6.16 %	+ 5.28 %	+ 3.48%
Allied health professional groups			
Therapists/Dieticians	+ 10.62 %	+ 4.96 %	+ 7.04 %
Technicians	+ 7.24 %	+ 9.37 %	+ 3.44 %
Assistants	+ 3.07 %	+ 0.76 %	+ 1.40 %
All health professions	+ 4.60 %	+ 2.66 %	+ 2.34 %

Source: Shih (1999)

Among the health practitioners, the top two fastest-growing groups in the 1970s were nurses and other health practitioners, whereas it was pharmacists and other health practitioners in the 1980s and 1990s. The groups that had the slowest growth were dentists in the 1970s and 1990s, and nurses in the 1980s. For the three allied health categories, therapists/dieticians had the highest annual growth rate in the 1970s and the 1990s, whereas technologists and technicians had the highest average annual growth rate in the 1980s. The allied health professions increased their share of the health care workforce in the three decades that the study examined. In the 1970s, 58.8% of health professionals were allied health workers, and this percentage rose to 61.3% in the 1990s.

Growth of specialization in graduate medical education and physician practice has also been substantial over the years. Dononi-Lenhoff (2000) found that in the United States, areas of specialization increased from 11 in 1923 to 124 in 2000. New knowledge and technology are undoubtedly fueling this trend, which is having a substantial impact on the physician workforce composition and has resulted in a reduction in general practitioners.

Although there has been a significant growth of health employment in general and in medical specializations, in particular in developed countries, this growth has not been uniform across professions and has contributed to a certain extent to new imbalances, such as shortages of general practitioners and the oversupply of medical specialists (Neufeld, 1995).

2.3.2 Gender issues

In developed countries, the health labour market is characterized by a large presence of women. According to the 1996 *National Sample Survey of Registered Nurses*, women represent around 95% of the total registered nurses in the United States. In developing countries, women form the majority of the nursing workforce. In Sri Lanka, for example, the percentage of women in nursing is estimated at 80% (Standing and Baume, 2001).

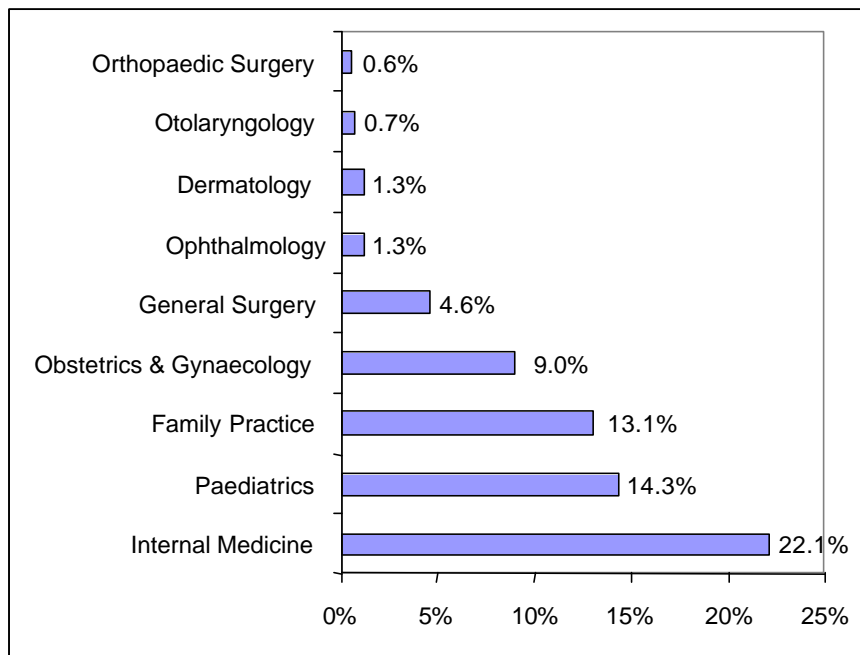
Although men represent a minority in nursing, female nurses experience particular difficulty in asserting a right to take part in decision-making, partly because this is nearly always dominated by male doctors and/or career administrators who assume leadership (Salvage and Heijnen, 1997). Nursing shares the characteristics of other female dominated occupations: low pay, low status, poor working conditions, few prospects for promotion and poor education (Salvage et al., 1993).

Over time, there has been a substantial change regarding the female physician workforce. In the United States, the number of women in medicine increased by 425% between 1970 and 1994, whereas the increase was of 79% for men (Higginbotham, 1998). In developing countries, the composition of the medical profession has also changed. In Mexico, the change has been quite dramatic: Knaul et al. (2000) found that female enrolment in medical schools increased from 11% in 1970 to about 50% in 1998.

Although the number of female medical students has increased over the years, there are still some significant differences between medical specialties, as women continue to enter the fields traditionally related to women and children (American Medical Association, 1991; Cohen et al., 1991).

Figure 5 shows the distribution of female residents entering medical fields in the United States.

Figure 5. Female residents and medical specialty choice



Source : Higginbotham (1998)

Out of the 33,218 women residents in 1996, 58.5% of women entered 1 of 4 areas: (1) internal medicine, 22.1%; (2) paediatrics, 14.3%; (3) family practice, 13.1%; and (4) obstetrics and gynaecology, 9.0%. Specialties such as ophthalmology accounted for only 1.3%, whereas for surgical subspecialties the percentages were: general surgery, 4.6 %; otolaryngology 0.7%; dermatology, 1.3%; and orthopaedic surgery, 0.6% (Higginbotham, 1998). Barriers to entry in these male-dominated fields may include the lack of female role models, the demands of the field (particularly general surgery) and lack of exposure to the field (particularly ophthalmology and otolaryngology).

Furthermore, the increased participation of women in medical fields seems to be accompanied by differences in employment patterns. In Mexico, women physicians are unemployed at a much higher rate than men (Knaul et al., 2000). Walton and Cooksey (2001) found that female pharmacists were more than four times as likely as male pharmacists to work part-time. In Australia, the report *Female participation in the Australian medical workforce* (AMWAC-AIHW, 1996) estimated that, over a lifetime, a female general practitioner is estimated to work 63% of the total hours worked by a male general practitioner, whereas for specialist practice, the proportion is around 75%. In the literature, it has been consistently found that female physicians work fewer hours than their male counterparts (Reamy and Pong, 1998; Hojat et al., 1995; Woodward et al., 1995) .

Practice location and profile also tend to differ between male and female physicians. Generally female physicians are somewhat less likely than their male counterparts to practice in rural areas and tend to concentrate in major urban areas (Williams et al., 1990; American Medical Association, 1991; Kelly and Percales, 1995).

2.3.3 Time lag

In the health care field, the **time lag** between education and practising might be quite substantial. To obtain licensure to practise medicine requires lengthy education and training, and the long lag time between a changed student intake and a change in supply has been noted (Hall, 1998). In other words,

supply adjustment for medical doctors is not immediate, but requires a long period. The introduction of a “*numerus clausus*” for students in medicine, aimed at limiting the number of doctors, is an example of a policy whose impact on the supply of doctors requires years to become evident.

2.3.4 Professional regulation

Regulation of the medical profession has, by tradition, been achieved through a combination of direct government regulation and, to a large extent, through rules adopted by professional associations. Their self-regulatory powers enable them to establish both entry requirements and rules regarding professional conduct (Van den Bergh, 1997).

Barriers to entry to the medical profession can take various forms. Examples include examinations to obtain licensure, the imposition of education requirements and a limit to the number of institutions providing education. In the United States, the approval of medical schools is conducted by the American Medical Association’s (AMA) own Council on Medical Education (Feldstein, 1999). The AMA is a national organization established to represent the collective interest of physicians. Finally, continual increases in training costs for entering physicians, such as lengthening of the training period and higher tuition fees, constitute another barrier to entry.

Such barriers to entry exist in other health professions, such as for dentists. Some argue that these barriers constitute a means to limit entry into the profession, and hence maintain high incomes. Muzondo and Pazderka (1983) established, for Canadian professional licensing restrictions, a relationship between different variables of self-regulation and higher income. Seldon et al (1998) suggest that physicians in the United States have ‘market power’ through such sources as restricting supply and price-fixing. However, the proponents of self-regulation practice claim that these barriers are a means to provide health care of quality and to protect patients from incompetent providers.

The varying degree of homogeneity of the different professional groups may also explain their relative success in maintaining a monopoly of practice. In Iceland for example, one of the factors that contributed to breaking the professional monopoly of pharmacists was internal division within the profession (Morgall and Almarsdottir, 1999). Furthermore, although most countries have a professional nursing association, nurses tend to have limited power to regulate entry to the profession. This could be associated with a large diversity of specialist groups in nursing failing to unite on issues related to professional regulation (Salvage and Heijnen, 1997).

2.3.5 Hospitals' potential monopsony power

A monopsony is a single buyer; the amount of the factor it demands, e.g. labour, will influence the price it has to pay for this factor. In contrast to a competitive market, the monopsony is a price maker and not a price taker. This means that to attract more workers, the monopsonistic employers need to increase the wage rate. When the monopsonist firm seeks to add one unit of labour, it must pay a higher wage than before in order to induce this extra unit of labour to work. But it then must pay all of its employed labour a higher wage.

In other words, the marginal cost of hiring an extra worker is not only the wage paid to the additional unit of labour, but it also includes the extra wages the monopsonistic firm must pay to all other employees. If the monopsonistic firm is willing to hire more nurses at the current wage level, but does not intend to pay higher wages in order to hire more nurses, few of the workforce will be hired relative to the competitive market. Measures such as implementation of a minimum wage represent one example of a policy inciting a monopsony to recruit more employees than under a pure monopsonistic market.

A number of studies have tested whether or not hospitals possess monopsony power with respect to nurses, and the results are contradictory. Sullivan (1989) and Staiger et al. (1999) concluded that hospitals have a substantial degree of monopsony power. In contrast, Hirsch and Schumacher (1995) did not find empirical support for the monopsony model. Nurses' wages were found not to be related to hospital density and to decrease rather than increase with respect to labour market size.

2.3.6 Donors

This final subsection addresses the issue of donors in developing countries. International assistance in sub-Saharan Africa represented during the 1990's approximately 10% of the total health expenditure (World Bank, 1993). The presence of donor agencies may, however, create some distortions in the health sector.

In the case of Mozambique, whereas the policy of employing national professionals by cooperation agencies has met with warm support from national cadres, its effect on the health sector is problematic (Noormohamed, 2000). The prospect of immediate financial gains puts pressure on qualified professionals to leave their posts within the Mozambique National Health Service to take up management or consultant positions. The substantial investment in their training is therefore producing dubious direct returns to the National Health Service. More seriously perhaps, the presence of donor-paid jobs outside the health sector (as programme coordinators, researchers, etc.) is creating pressure on the Ministry of Health itself, exacerbating the imbalances in the National Health Service and creating incentives for trained Mozambicans to leave the public sector.

Ironically then, the donors, who are in this country to support the development of a sustainable health system, are one of the causes of persistent destabilization of the more highly trained ranks.

2.4 Demand and supply of health personnel

Factors affecting the demand and the supply of health personnel are now examined—first, factors having an impact on the demand for the health workforce, then those influencing the supply of health personnel.

2.4.1 The demand for health workforce

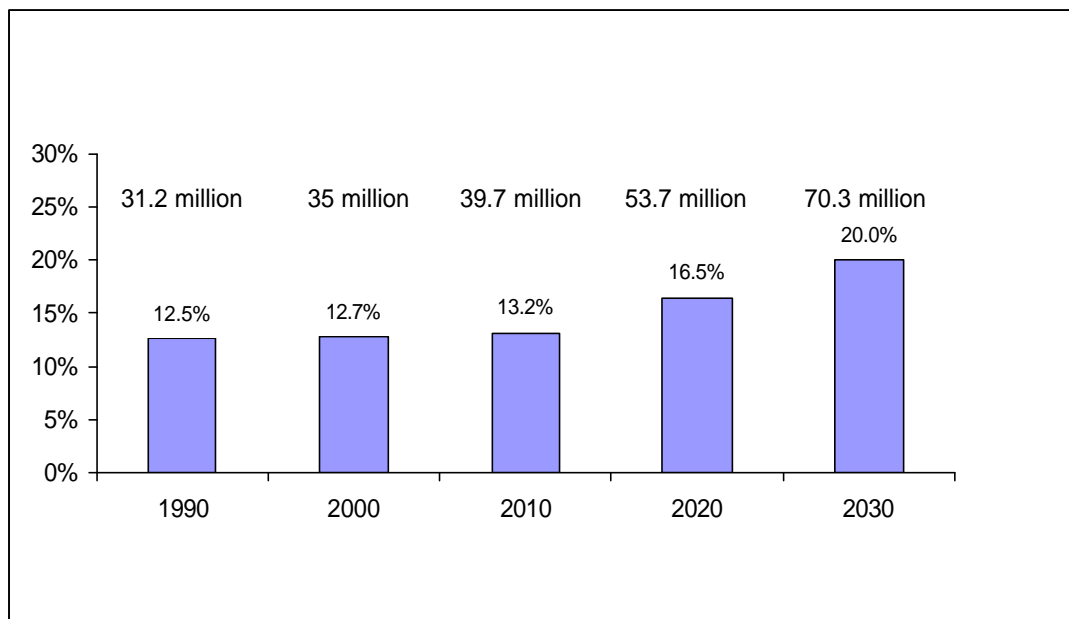
The demand for the health workforce is determined by various elements such as overall environmental factors, the demand for health care and the organization of health care system delivery.

2.4.1.1 Overall environmental factors

Overall environmental factors such as economic, sociodemographic, political and technical elements influence the demand for health personnel. Gross domestic product (GDP) per capita is an economic factor that contributes to the demand for health personnel. Countries with higher GDP per capita are said to spend more on health care than countries with lower income, as demonstrated by cross-sectional studies (Blomqvist and Carter, 1997), and hence would also tend to demand a larger health workforce. In contrast, an economic crisis may lead to a decrease in the demand for health personnel. The economic crisis in the 1990s in the former Soviet Union resulted in labour adjustments in the entire economy, including in the health sector. In consequence, countries such as Kazakhstan, Kyrgyzstan and Lithuania are now oversupplied with specialist doctors and do not have enough general practitioners (Egger et al., 2000).

The age distribution of the population is a **sociodemographic** element that contributes to determining the demand for a health workforce. The ageing of the population, which is a major concern in developed countries, is giving rise to an increase for the demand for health services and health personnel, especially nurses for home care. Furthermore, the older population is expected to continue to grow significantly in the future in developed countries. Figure 6 illustrates for the United States the forecasted growth of the number of persons aged 65 and over, and the percentage of the population aged over 65. It is estimated that the number of elderly people will double by 2030 to 70 million from 35 million in 2000. Furthermore, the proportion of elderly people is expected to increase from 12.7% in 2000 to 20% in 2030. However, the average age increase of the general population has been less than that of the nursing workforce, which will have a significant impact on future health care available. This is discussed later in the document.

Figure 6. Number of persons 65+ , and % of population 65 + in the United States



Source : Data compiled from the U.S. Census Bureau, Population Division and Housing and Household – Economic Statistics Division, 2001

According to the United Nations Population Division, the number of persons age 60 and over is also expected to increase significantly in many developing countries during the next decades. In India, the population aged 60 and over is forecasted to represent around 21% of the population by the year 2050, whereas it was estimated to account for less than 10% in 2000.

General policy decisions might also have an impact on the demand for health personnel, as illustrated with the French example of the introduction of a new regulation regarding workweek hours. The government’s programme to reduce the workweek to a maximum of 35 hours in an attempt both to create hundreds of thousands of new jobs and to achieve greater flexibility in the labour force led unions to demand the creation of more posts in public hospitals. The unions are insisting that the government create an additional 80,000 posts in the public hospitals rather than the 45,000 already agreed on, because of what they say are intolerable pressures on the staff (Barry, 2002).

2.4.1.2. The demand for health care services

The demand for health personnel is in fact a derived demand for health services, and it is therefore important to consider the factors determining the demand for health services.

The main factors determining a patient's demand for health care are **incidence of illness**, i.e. health status; **cultural-demographic** characteristics such as age, sex, marital status and education; and **economic factors** such as income, prices and the value of a patient's time (Feldstein, 1999).

Several studies have attempted to estimate the impact of **economic factors** on the demand for health care. In particular in the United States, studies have attempted to estimate **price** and **income** elasticities of demand for medical services (Manning et al., 1987; Wedig, 1988; Cameron et al., 1988). Measurements of price or income elasticities make it possible to evaluate the impact of a change in price or income on the demand for health care. Most studies reported elasticities in the range between 0.0 and -1.0 , indicating that consumers tend to be responsive to price changes but that the degree of price sensitivity is not very large compared to many other goods and services (Folland et al., 1993). A price elasticity of -1 means that an increase in the price of 10% would reduce the consumption by 10%. For individual **income** elasticities, in most cases the magnitudes are quite small (Folland et al., 1993). This indicates that while health care is a normal good, as demand for it increases with income, the response is relatively small.

Health insurance is closely related to the issue of price elasticities. The RAND Health Insurance Experiment, a controlled experiment, increased knowledge about the effect of different insurance copayments on use of medical services. Insurance copayments ranged from zero to 95%. The RAND study concluded that as the co-insurance rose, overall use and expenditure fell for adults and children combined (Newhouse et al., 1993). These results are of interest when examining the impact of the introduction of a national insurance on the demand for health care.

Another element influencing the demand for health care is the **value of a patient's time**, such as travel time and waiting time. Acton (1976) found that in the United States, elasticity of demand with respect to travel time ranged between -0.6 and -1 , meaning that an 10% increase in the travel time would induce a reduction of 6%–10% in the demand for health care.

In addition to the above elements, there is the impact of the **supplier-induced demand** phenomenon. Supplier-induced demand involves the supplier (e.g. the physician) acting as agent for the consumer (e.g. the patient) bringing about a level of consumption different from that which would have occurred if a fully informed consumer had been able to choose freely. Although there is some supporting empirical evidence of supplier-induced demand, it remains possible to refute it (Parking and Yule, 1984). Constraints imposed by ethics, practice protocols and market forces leave room for considerable discretion on the part of individual doctors, the exercise of which is influenced by, among other things, the amount of time they have available and their views on appropriate levels of income. One should not ignore the impact of patients' expectations in terms of quality and technology on the demand for health care.

2.4.1.3. Health care delivery system

The way a health care delivery system is organized influences the demand for a health workforce. The type of health care providers (hospitals, HMOs, etc.), the modes of financing, the inpatient/outpatient care mix, the level of medical technology, all have an effect on the demand for health personnel. Hirsch et al. (1995) and Roberts et al. (1989), suggest that as a result of changes in the health care delivery system, the demand for qualified nurses rose significantly. The introduction of prospective payment systems such as Diagnosis Related Groups (DRGs) encourages shorter hospital stays, which means that patients in hospitals are sicker and require more skilled nursing care (Carlson et al., 1992).

2.4.2 The supply of human resources for health

To analyse the supply of the health workforce, we shall consider overall environmental factors, the choice of health professional training/education, participation in and exit from the health labour market.

2.4.2.1. Overall environmental factors

The supply of health personnel can be affected by general sociodemographic, economic and political factors. In the following, we shall examine two examples: the ageing and the migration of the health workforce.

An important sociodemographic factor is the ageing of the health workforce, and in particular of nurses, which has serious implications for the future of the nursing labour market. Buerhaus et al. (2000b) identified and assessed the key sources of changes in the distribution and total supply of registered nurses in the United States. They emphasize that between 1983 and 1998 the average age of working registered nurses increased by more than 4 years, from 37.4 to 41.9 years. In contrast, the average age of the United States workforce as a whole increased by less than 2 years during the same period. Furthermore, the proportion of the registered-nurse workforce younger than 30 years decreased from 30.3% to 12.1% during this period.

Implications of a ageing nurse workforce are important. The Institute of Medicine noted that older registered nurses have a reduced capacity to perform certain tasks and warned that the ageing of the workforce presents serious implications for the future (Wunderlich et al., 1996). The analysis of Buerhaus et al. (2000b) suggests that a fundamental shift occurred in the registered-nurse workforce during the last two decades. As opportunities for women—who still constitute a large majority of the nursing workforce—have expanded, the number of young women entering the registered-nurse workforce has declined. The ageing process is expected to continue over the next decade, and to contribute to a shortage of nurses.

The ageing of the nursing workforce is also experienced in other developed countries. such as in the United Kingdom (Buchan,1999). As for developing countries, it is difficult to reach any firm conclusion due to the lack of information.

Migration of health personnel can have a serious impact on the supply of human resources in health, because it may exacerbate health personnel imbalances in “sending countries”. Arango (2000) suggests that migration is an “individual, spontaneous and voluntary act” that is motivated by the perceived net gain of migrating—that is, the gain will offset the tangible and intangible costs of moving. Castles (2000) points out that decisions to migrate are often a family strategy to produce a better income and improve survival chances.

Martinez and Martineau (1998) points out that the reality for many health workers in developing countries is to be “underpaid, poorly motivated and increasingly dissatisfied and sceptical” (p. 346). The relevance of motivation to migration is self-evident. There can be little doubt that for many health workers an improvement in pay and conditions will act as an incentive to stay in the country. Improved pensions, child care, educational opportunities and recognition are also known to be important (Stilwell 2001; Van Lerberghe et al 2000; Mutizwa-Mangiza (1998). In Ghana, it is estimated that only 191 out of the 489 doctors who graduated between 1985 and 1994 were still working in the country in 1997 (Dovlo and Nyongator, 1998). While there is international concern at the increasing outflow of health professionals from developing countries, for individuals and families an improved standard of living through the receipt of remittances (the portion of international migrant

workers' earnings sent back from the country of employment to the country of origin) is likely to be of more direct importance.

2.4.2.2. Education/professional training choice

The availability of a renewed health workforce, as well as the type of profession and specialty chosen by individuals, is a major concern for public health decision-makers. These issues are of particular relevance, especially since the number of younger people, predominantly women, choosing a nursing career is declining in some countries and since in professional training/education, individuals' choices do not always match the absorptive capacity of the market.

In the United States, according to the American Association of Colleges of Nursing (AACN, 2001a), enrolments in entry-level baccalaureate programmes in nursing have declined between 1995 and 2000. During this period, the number of enrollees declined by 21%. Recent data show that for the first time in six years, enrolments increased in autumn 2001 by 3.7% (AACN, 2001b), but it is too early to draw any firm conclusions regarding this change. In contrast, the number of medical students has been relatively stable over the last ten years in the United States (Bureau of Health Professions, 1999). This stabilization trend has also been observed in a developing country, Côte d'Ivoire (Kouassi, 2002).

From an economic perspective, the decision to undertake professional training/education is considered an investment decision. To emphasize the essential similarities of these investments to other kinds of investments, economists refer to them as investment in human capital (Ehrenberg and Smith, 1994). Since investment decisions usually deliver payoffs over time, one must consider the entire stream of costs and benefits. The expected returns on human capital investments are a higher level of earnings, greater job satisfaction over one's lifetime and a greater appreciation of nonmarket activities and interests. The investment expenditures can be divided into three categories: first, out-of-pocket expenses for education (books, tuition, etc.); second, the opportunity costs of forgone earnings during the education investment period; finally, psychic losses resulting from the various difficulties associated with education.

Based on the human capital approach, rate of return on education can be estimated. An average rate of return that is high and rising for a medical profession will attract more individuals to that profession. On the other hand, a lower and decreasing average rate of return will discourage individuals from choosing this profession. Nowak and Preston (2001), using the human capital approach, found that Australian nurses are poorly paid in comparison to other female professionals.

The declining interest in nursing can be partly explained by the expansion of career opportunities in traditionally male-dominated occupations over the last three decades (Staiger et al., 2000) that entail a higher rate of return. The number of young women entering the registered-nurse workforce has declined because many women who would have entered nursing in the past, particularly those with high academic ability, are now entering managerial and professional occupations that used to be traditionally male. In this context, a policy aiming at improving the educational mix for a profession is liable to worsen the situation. The National Advisory Council on Nurse Education and Practice in the United States has recommended the creation of a policy target to achieve a basic nurse workforce in which at least two-thirds of registered nurses hold baccalaureates or higher degrees by 2010. As a result, potential students might find it more attractive to opt for medicine or alternative university education programmes.

Besides the human capital approach, the choice of a profession can also be explained by sociopsychological factors. For instance, individuals may choose a profession because it is highly valued by the society or for family tradition. In the health sector, the satisfaction in caring for people and assisting them to improve their health is an important element that is used by nursing schools in order to attract new enrollees. In the light of this approach, the decline in the number of individuals

choosing nursing as a career might also be explained by the fact that this profession is now less socially valued than before (Dussault et al., 2000; Andrews, 1991).

One should also note that individuals' choices regarding education/professional choice might be constrained by various elements such as "*numerus clausus*" for medical students, "faculty shortages" for nurses, etc. In the United States, more than a third of schools pointed to faculty shortages as a reason for not accepting all qualified applicants into entry-level baccalaureate programmes (Berlin et al., 2001). In contrast, in some countries, unemployment, underemployment or migration of qualified personnel results from their being little or no limitation to access to the health professions, irrespective of the capacity of the market to absorb the trained personnel (Dussault, 1999).

Educational subsidies have often been advocated as a tool to attract more school enrollees. Dusansky et al. (1985, 1986) conducted two studies on the relationship between government policies aimed at increasing the supply of new nurses through the use of various policies, including educational subsidies. Their results suggest that educational subsidies would increase nursing school enrolments. However, training more individuals is not necessarily the answer to a skill shortage. The number of students who successfully complete their study might be low due to a significant attrition rate. The medical student attrition rate varies widely from one country to another. It is estimated at 1.1% in the United States (Barzansky et al., 1999), whereas it reaches more than 30% in Ethiopia (Melesse and Mengistu, 1999). Furthermore, once trained, individuals might leave their original profession and work in another professional area or withdraw from the labour market, and hence, participation in the labour market should be investigated when considering workforce imbalances.

2.4.2.3. Participation in the labour market

The economic theory of the decision to work views the decision as a choice concerning how people spend their time. Individuals face a trade-off between labour and leisure. They decide how much of their time to spend working for pay or participating in leisure activities, the latter refer to activities that are not work-related.

A literature review on the women's workforce undertaken by Killingsworth and Heckman (1986) indicated that women's participation is responsive to changes in the wage rate, unearned income, spouse's wage and having children (particularly of pre-school age).

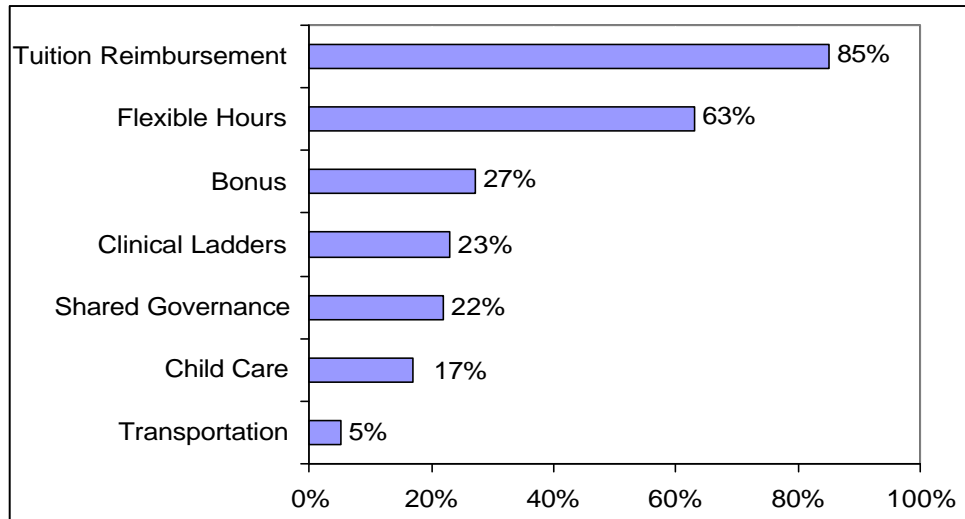
Studies on nurse's labour were also carried out. Link (1992) reviewed labour supply of United States nurses for various years from 1960 to 1988. He found that having children and wage levels influence labour force participation, although responsiveness to wage changes declined considerably over time.

Philips (1995) estimated the nursing supply for Great Britain. Wage and non-labour income were significant determinants of labour participation. The elasticity of the probability of participation with respect to the wage was estimated at 1.4, meaning that a wage increase of 10% would lead to a workforce participation of 14%. Other studies evaluated as well the elasticity of the participation rate with respect to registered-nurse wages. Sullivan (1989) estimated a wage elasticity of supply of 1.26, and Brewer (1994) of 1.46. In contrast, Buerhaus (1991) and Staiger et al. (1999) found lower values. Their estimates were 0.49 and 0.1, respectively. However, Buerhaus (1991) found the elasticity for unmarried nurses to be higher, that is, around 0.89. As shown by these results, studies indicate a positive relationship, although not so strong, between wage and participation rate. The reasons for the differences in the estimates relate to the types of data used, characteristics of the nurses, and the econometric method employed.

In addition to wage raises, hospitals are also using a variety of strategies to recruit new staff. A survey of hospitals in the United States shows that richer benefits, such as health insurance and vacation time, are the most common incentives used. In addition, hospitals may offer other recruitment and retention

benefits that are detailed in Fig. 7, such as tuition reimbursement, flexible hours, signing bonuses based on experience or length of commitment, etc. (American Hospital Association, 2001). Many countries, but particularly developed ones, use such incentives to recruit new staff.

Figure 7. Percentage of United States hospitals offering recruitment and retention incentives



Source : American Hospital Association (2001)

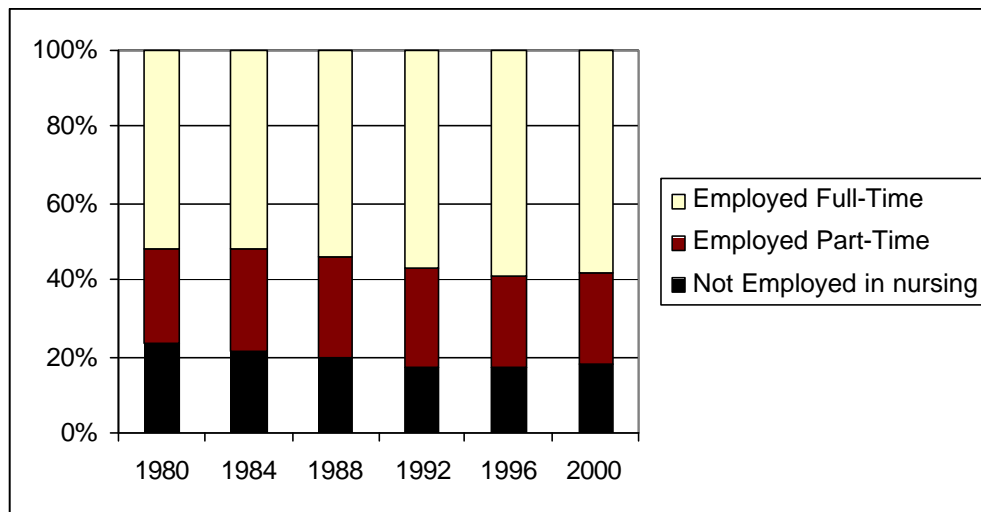
Another aspect of labour supply decision that has been investigated by Philips (1995) is the costs associated with entering the nursing labour market (working costs). The elasticity of participation with respect to changes in working costs was evaluated at -0.67 for all nurses. This suggests that a subsidy leading to a decrease of 10% in these costs would increase the participation of nurses by 6.7%. Different elements such as child-care costs and housework compose these costs.

Increasing the number of trained nurses might not always be the appropriate answer to nursing imbalances, since an adequate number might be trained, but then some nurses might choose other activities. This is illustrated by an Australian study conducted by Sloan and Robertson (1988), who identified that women with nursing qualifications exhibited the highest level of non-participation in the workforce of all qualified professionals and that they tended to have the lowest reported use of qualifications in their own industry.

In the United States, the proportion of registered nurses not employed in nursing has slightly decreased since 1980 and is approximately equal to 20%, as illustrated in Fig. 8, which also shows that the number of nurses working full-time has increased.

Economic factors also play a role in physician's participation to the labour market, as demonstrated by the impact of cost-containment policies in Canada, where most provincial governments have implemented an assortment of controls of health care expenses. Threshold reductions were introduced, so that fees payable to individual physicians were reduced as billing exceeded an agreed threshold. As a consequence, physicians who had billed at the threshold level chose to take leaves of absence rather than receive a level of reimbursement they considered inadequate (Deber and Williams, 2000).

Figure 8. Registered nurses employment



Source : Bureau of Health Professions, 2001

2.4.2.4. Alternative/additional occupation & labour market exit

When health personnel choose an alternative or additional occupation, this has supply consequences. In developing countries, and particularly in Africa, attempts to reform the health care sector have frequently failed to respond to the aspirations of staff concerning remuneration and working conditions. Salaries are often inadequate and may be paid late, and health workers try to solve their financial problems in a variety of ways (Ferrinho et al., 1999). In Angola, the deterioration of the salaries paid to health personnel by the State, breaks in supplies and deterioration of existing facilities led a growing number of health personnel to seek opportunities in the private sector (Fresta et al., 2000). As a result it is rare, in Angola, for a doctor to depend entirely on his public sector activity. Private practice is only one of the many survival strategies that health personnel use to supplement their income and increase their job satisfaction. Teaching, attending training courses, supervision activities, research, trade and agriculture are some of these alternative strategies (Roenen et al., 1997).

Parker and Rickam (1995) examined the economic determinants of the labour-force withdrawal of registered nurses in the United States, i.e. nurses leaving the profession to pursue a non-nursing occupation and employed nurses withdrawing from the labour force. Their results suggest that a significant number of registered nurses withdraw, at least temporarily, from the labour force. Among the significant elements having an influence on the withdrawal decision are the wage rate, other family income, presence of children and full-time/part-time work status. Increasing registered nurses' wages and working full-time is expected to reduce the probability of labour force withdrawal, whereas higher education levels, age and other family income increases the probability of labour-force withdrawal.

In addition to economic determinants, sociopsychological factors such as **job satisfaction** should also be taken into account when examining the issue of labour market exit. There is support in the empirical literature for the existence of job dissatisfaction among nurses, and the link between job dissatisfaction and job exit (Carlson et al., 1992). Prescott and Bowem (1987) found that in the United States the most important factors in nurses' resignation were, in order of importance: workload, staffing, time with patients, flexible scheduling, respect from nursing administration, increasing nursing knowledge, promotion opportunities, work stimulation, salary and decision-making. These studies suggest that salary is just one of the reasons why nurses are quitting. The relative importance

of wage is confirmed by Shields and Ward (2001). Their results suggest that dissatisfaction with promotion and training opportunities has a stronger impact than workload or pay.

Numerous surveys have been undertaken to assess nurse job satisfaction. A recent cross-national study on 43,000 nurses from more than 700 hospitals (United States, Canada, England, Scotland and Germany), by Aiken et al. (2001) shows that the rate of nurses' dissatisfaction with their job ranges from 17% in Germany to 41% in the United States. The percentage of nurses planning to leave their present job varied from 17% in Germany to 39% in England. A survey by the United States Federation of Nurses and Health Professionals (FNHP) showed that half of the currently employed registered nurses who were surveyed had considered leaving the patient-care field for reasons other than retirement over the past two years. Inadequate staffing, heavy workloads and the increased use of overtime are frequently cited as key areas of job dissatisfaction among nurses (FNHP, 2001). While surveys indicate that increased wages might encourage nurses to stay at their job, money is not always cited as the primary reason for job dissatisfaction.

According to the FNHP survey, of those registered nurses responding who have considered leaving the patient care field for reasons other than retirement, 18% wanted more money, versus 56% who were concerned about the stress and physical demands of the job. However, the same study reported that 27% of current registered nurses who responded had cited higher wages or better health care benefits as a way of improving their jobs. Another study indicated that 39% of registered nurses who had been in their current jobs for more than one year were dissatisfied with their total compensation, but 48% were dissatisfied with the level of recognition they received from their employers (The Nursing Executive Center, 2000). These surveys suggest that if wage is not the only factor explaining nursing job exit, it remains an important one.

3. Projection of demand and supply

As a result of the particular characteristics of the health care delivery system and the health labour market, market mechanisms alone will not achieve an adequate demand/supply of health personnel from a societal perspective. Hence, in society's best interest, public interventions such as stewardship and human resources planning can contribute, partially or totally, to correct for these market failures and facilitate the attainment of an adequate supply/demand of health personnel.

Forecasting the future number of needed health personnel and developing policies to meet such figures are common to any health care system. Physicians represent the profession for which more planning effort has been expended to achieve a workforce of appropriate size than for any other health profession. Countries' desire to meet population health needs and to avoid social welfare losses resulting from a shortage or an oversupply are factors explaining, to a large extent, the importance attributed to planning in the context of public health policies.

3.1 Approaches

The literature differentiates between various approaches to forecast and plan health personnel requirements. (O'Brien-Pallas et al., 2001; Dussault, 1999; Adams and Wood, 1993; Green, 1992; Hall and Mejia, 1978).

Needs-based planning: Quantitative methods can be used to determine some health needs. Utilisation can be used as a proxy for patient demand and an indicator of physician requirements. It concentrates on demographic characteristics and utilization patterns in the general population, as well as on market factors that influence service use. Although utilization methods can be pursued with reasonably accessible data, health-needs approaches require detailed data that may not be available for all components of the health care system.

Personnel-to-population ratios: The population is used as a denominator and a normative figure as the numerator, e.g. 4 nurses per 1,000 population. One major issue consists of determining a norm. A norm might often be defined in an arbitrary fashion. Norms are often copied from other countries or from international averages and do not fit the situation of a specific country.

Service targets: This approach is similar to personnel-to-population ratios and pre-sets targets for the production and distribution of human resources, on the basis of more or less rigorous criteria and norms.

The demand-based approach: This approach is highly sensitive to economic capacity and sociocultural factors that shape the perceptions of needs for services.

Extrapolating school admission: This relies on projected admission rates based on current policies of the Ministry of Health/Education corrected for estimated population growth and assumed academic loss rate. The major assumption under this method is that current policies are the correct ones and will remain so.

Benchmarking: This consists of comparing health workforce resources with a benchmark or model in a region, or country.

3.2 Case studies

In the 1960s and the 1970s, there was a consensus that the United States had a shortage of physicians. This sparked aggressive action by the federal government and the states to increase the physician supply. In the mid-1970s, however, some observers began to predict a physician surplus. To help resolve this controversy, the federal government commissioned the Graduate Medical Education National Advisory Committee (GMENAC) study of the physician workforce. GMENAC employed an “adjusted needs-based approach”. This approach employed panels of experts, one in each specialty, to determine how many physicians were needed.

The GMENAC study predicted that by 1990, the United States would have a surplus of 70,000 physicians, and that this surplus would grow to 145,000 by the year 2000 (GMENAC, 1981). It also estimated that there would be shortages in the specialties of adult psychiatry, child psychiatry, preventive medicine and emergency medicine. The GMENAC report was not well received by the medical profession, but it did convince the federal government and the states to discontinue the programmes to increase the physician supply (Vanselow, 1998).

In addition to the GMENAC, the Council on Graduate Medical Education (COGME) has issued many reports since its formation in the 1980s, all of which have predicted a physician surplus. In 1994 COGME predicted an overall surplus of 80,000 by the year 2000, including a specialist surplus of 115,000 and a generalist shortage of 35,000 (COGME, 1994). Much of the data used by the COGME came from a demand-based physician workforce model. Such a model is based on actual utilization of services and projected current utilization patterns in the future, adjusting for various factors such as changes in population size, sociodemographic conditions, and insurance coverage.

Weiner (1994) used an extrapolation technique to predict future adequacy of the United States physician workforce. Assuming that the health care system was moving rapidly towards managed care, his “benchmark” was the utilization of physicians in 20 health-maintenance organizations. Weiner predicted a 163,000 aggregate oversupply of physicians by the year 2000. He estimated that the supply of generalists would be roughly in balance with need, but the specialist supply would exceed the number required by about 66%.

Cooper (1995) assessed the physician supply and demand in the United States for the period extending to 2020. Demand was projected to increase by 18% by 2020, because of both an expansion in beneficial services and a reduction in physician work effort. In his model, expanding beneficial services include increases in specialist care, science and technology, ageing of the population and the death rate, while declining physician work effort arose from changes in the age structure, more female doctors and changes in physician lifestyle leading to reductions in hours worked.

Cooper estimated the national benchmark for physician demand in 1993 as 205 per 100,000 population. Supply was forecast to increase and to result in a surplus of 31,000 physicians (5% of patient-care physicians) in the year 2000, and increasing to 62,000 physicians (8%) in 2010. However, the study emphasizes that physician distribution is not homogeneous and that the number of physicians per capita varies by more than twofold among states.

Based largely on the previous studies, there is a consensus that the United States will experience an oversupply of physicians. But there is less agreement regarding the scope of such physician surplus and how to deal with it. Referring to previous studies predicting significant surpluses, Cooper (1995) notes that such large surpluses have not occurred so far, because of a decrease in physician work effort. Factors such as age, sex and lifestyle contributed to this evolution. As a result of forecasted physician surpluses, various policy recommendations have been formulated. The Institute of Medicine (1996) published a report recommending, among other things, that there be no new medical schools, that existing schools should not increase their class size and that the number of first-year residency positions should be reduced. The Pew Health Professions Commission Report (1995) issued a report recommending more severe steps, such as the closing of some medical schools and tightening the visa process for international medical graduates.

Besides physicians, projections have also been performed for other health professions, for which most studies predict an employment growth. Cooper (2001) examined for the United States the future impact of nonphysician clinicians on physicians. Nonphysician clinicians included nurse practitioners, clinical nurse specialists, certified nurse-midwives, physician assistants and clinicians in chiropractic, acupuncture and naturopathy. It was estimated that by 2005, the number of nonphysician clinicians will substantially rise and equal almost half the number of practising patient-care physicians. This trend is confirmed, to a lesser extent, by Vector Research (1995), who carried out national projections for health care personnel in the United States. Their results for the year 2005 with respect to 1995 show increased needs ranging from 11% to 33% for physician assistants, 12% to 24% for nurse practitioners, and 0% to 12% for certified nurse-midwives.

Regarding nurses, and based on the National Advisory Council on Nurse Education and Practice data (NACNEP), the American Nursing Association projected increases in registered nurses of 22% between 1995 and 2010, and 26% between 1995 and 2020 in the United States. Relatively similar figures were estimated by the United States Bureau of Labour Statistics (2002) projecting that employment of registered nurses is expected to grow faster than average, i.e. 21% to 35% through the year 2008. Even larger growth was anticipated by Salsberg et al. (1998), who predicted an increase of 50% to 75% in the demand for nurse practitioners over the next decade. Although the range of the predicted employment growth varies from one study to another, there is an agreement among those studies that such growth will not be enough to respond to future demand.

This view is not shared by all, however. The Pew Health Professions Commission's 1995 report predicted an oversupply of nurses, as it expects the loss of 200,000 to 300,000 registered-nurse hospital jobs over the next decade due to hospital downsizing, closures and reductions in bed capacity. While the commission also anticipated registered-nurse employment growth in community and ambulatory care settings, it predicted that this growth would be insufficient to offset the loss of hospital jobs if all excess bed capacity were eliminated, resulting in an oversupply of nurses. As a result of the nursing oversupply forecasted by the Pew Health Professions Commission, the latter

recommended a 10% to 20% reduction in the size and number of nursing education programmes. In contrast, predicting a shortage would favour policies aimed at increasing the number of new students.

The policy implications of forecasting either a shortage or a surplus of health care personnel are different, and hence attempts at projections must be rigorous. Furthermore, the role of professional associations in predicting the future supply of doctors should also be considered. Although the scientific quality of such work is well recognized, there might be a conflict of interest for professional associations, since the latter are performing work that might lead to changes for their members.

4. Health workforce imbalances: a typology

This section considers a typology of imbalances, and differentiates between the following:

- **Profession/specialty imbalances**

Under this category, we consider imbalance in the various health professions, such as doctors or nurses, as well as shortages within a profession, e.g. shortage of one type of specialists.

- **Geographical imbalances**

Geographical imbalance of health personnel essentially relates to disparities between urban and rural regions and poor and rich regions.

- **Institutional and services imbalances**

Institutional imbalances relate to differences in health workforce supply between health care facilities, as well as between services.

- **Public/private imbalances**

The public/private imbalance is associated with differences in human resources allocation between the public and private health care system.

- **Gender imbalances**

Gender imbalances relate to disparities in female/male representation in the health workforce.

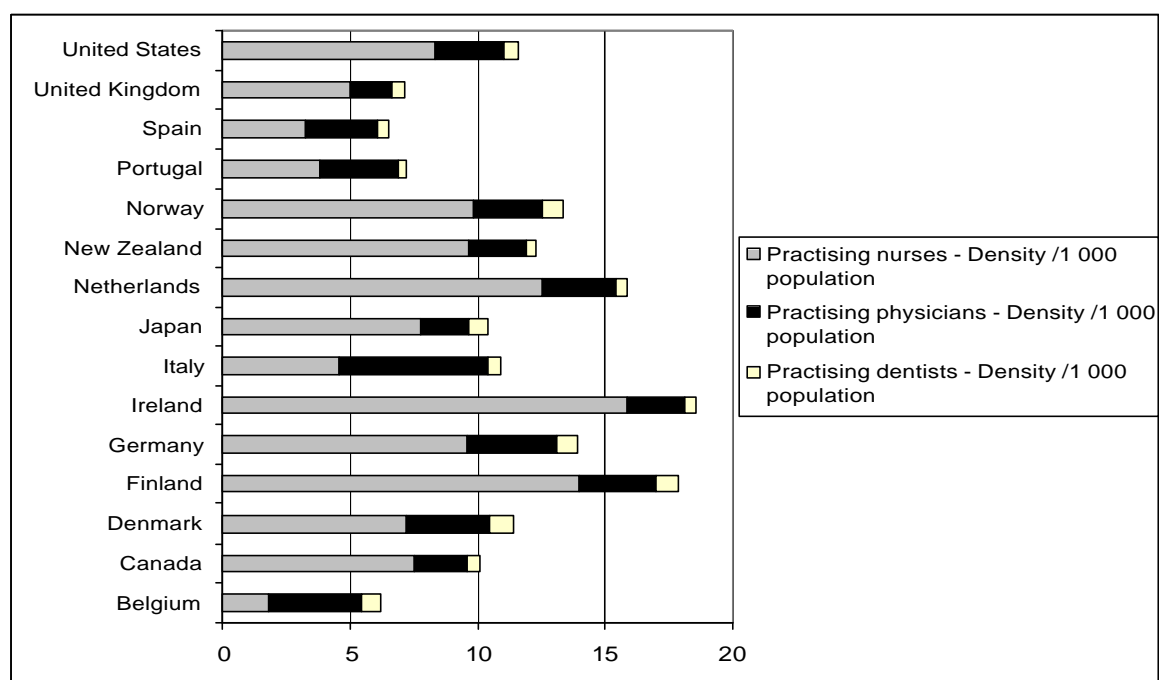
4.1 Profession/specialty imbalances

Imbalances have been reported for almost all health professions, and in particular for nurses. The United States General Accounting Office (2001a) reports a nursing shortage. However, the nursing shortage has not been institution-wide but concentrated in specialty care areas, particularly intensive care units and operating rooms (Buerhaus et al., 2000a). The shortage of registered nurses in intensive care units is explained in part by the sharp decline in the number of younger registered nurses, whom intensive care units have historically attracted. Shortages in operating rooms probably reflect that many registered nurses who work in this setting are reaching the age when they are beginning to reduce their hours worked or are retiring altogether.

Major variations occur in the number of health care workers per capita population and in the skill mix employed across countries, as depicted in Fig. 9.

The nurse/doctor ratio varies widely from one country to another, as shown in Fig. 9. The nurse/doctor skill mix is important and may have consequences for the respective tasks of nurses and doctors (Buchan, 1999). It is also interesting to note that these variations are taking place among countries with a relatively similar economic development level.

Figure 9. Physicians, nurses & dentists per 1000 population in selected OECD countries



Source: OECD Health data, 2000

4.2 Geographical imbalances

Virtually all countries suffer from a geographical maldistribution of human resources for health, and the primary area of concern is usually the physician workforce (Blumenthal, 1994). In both industrialized and developing countries, urban areas almost invariably have a substantially higher concentration of physicians than rural areas.

Understandably, most health care professionals prefer to settle in urban areas, which offer opportunities for professional development, education and other amenities for their families, and attractive employment possibilities. But it is in the rural and remote areas, especially in the developing countries, that most severe public health problems are found.

The geographical maldistribution of doctors has been the object of particular attention. In general there is a higher concentration of general practitioners in the inner suburbs of the metropolitan areas. According to the Australian Medical Workforce Advisory Committee (AMWAC, 1998), the reasons for high concentration of general practitioners in inner city areas are :

- Historical
- Lifestyle-related: access to amenities
- Spouse/husband-related: greater employment opportunities
- Child-related: better access to secondary and tertiary education services
- Professional, family and social ties and professional ambitions.

The geographical distribution of health care personnel is an important issue in many countries. Managua, the capital of Nicaragua, contains one-fifth of the country's population but around half of

the available health personnel (Nigenda and Machado, 2000). In Bangladesh, most of the doctors (35%) and nurses (30%) in health services are located in four metropolitan districts where only 14.5% of the population live (Hossain and Begum, 1998). This concentration pattern is characteristic of developing countries.

In Indonesia the geographical distribution of physicians is a particular concern, since Indonesia's vast size and difficult geography present a tremendous challenge to health service delivery (Chomitz et al., 1998). It is difficult to place doctors in remote islands or mountain or forest locations with few amenities, no opportunities for private practice, and poor communications with the rest of the country.

To improve the geographical distribution of physicians, governments often have used combinations of compulsory service and incentives. So far, there is virtually no country in the world that has solved the problem of a rural/urban imbalance of the physician workforce (Blumenthal, 1994). This does not necessarily mean that policies and programmes designed to reduce the imbalance have had no effect. For example, Thailand has successfully begun to stem the migration of health professionals from rural to urban areas and from public to private facilities with a range of strong financial incentives (Wibulpolprasert, 2002).

4.3 Institutional and services imbalances

Institutional imbalances occur when some health care facilities have too many staff or others are understaffed because of prestige, working conditions, ability to generate additional income, or other situation-specific factors (De Geyndt, 1999).

Institutions such as magnet hospitals, for example, are hospitals characterized by, among other things, adequate to excellent staffing, low turnover, rich nursing skill mix and greater job satisfaction, although there might be a general health personnel shortage. (Gleason-Scott et al., 1999).

Imbalance between the type of health services provided might also arise. In particular, one can consider the issue of curative versus preventive care. Breslow (1990) and other public health experts estimate that most diseases (80%) and accidents are preventable through known methodologies; yet at present there is an imbalance in the funding of medical research, with only 1%-2% going to prevention and 98%-99% spent on curative approaches. This imbalance in funding raises the question of a health workforce imbalance between preventive and curative care.

4.4 Public/private imbalances

In many countries, such as those in Africa, the health care sector is essentially public. In these countries, budget constraints can result in imbalances in the health care system. In Ghana, on the basis of doctor-to-population ratios, the current population of doctors working for the Ministry of Health in particular and in the country as a whole was estimated to be well below the human resources required (Dovlo and Nyongator, 1999). Since public health care systems depend heavily on the budget they are allocated, the issue of budget should be carefully investigated when examining shortages in a public health care system.

Over the last years there has been an expansion of the private health care sector in various parts of the world. As a result, health care personnel are leaving the public sector to join the private sector, exacerbating imbalances in the public sector. Thailand experienced an "internal brain drain" from the public rural district and provincial hospitals to the rapidly growing urban private hospitals (Wibulpolprasert, 1999). In Angola, 75% of doctors working for the Ministry of Health also work in the private sector, and only one in five with official authorization (Fresta, 2000).

4.5 Gender imbalances

In many countries, women still tend to concentrate in the lower-status health occupations and to be a minority among more highly trained professionals and managers (Dussault, 1999). In Bangladesh, the distribution by gender of the health workforce shows that the total proportion of women accounts for little more than one-fifth in health services (Hossain and Begum, 1998). The distribution of women by occupational category is biased in favour of nurses. Women are very poorly represented in other categories, such as dentists, medical assistants, pharmacists, managers/trainers and doctors). The under-representation of women in managerial and decision-making positions might lead to less attention to and poorer understanding of the problems specific to women and the particularities of their utilization patterns (Standing, 1997).

Female general practitioners have been shown to practise differently from males, managing different types of medical conditions, with some differences due to patient mix and patient selectivity, and others inherent in the sex of physician. In some more traditional areas, some women will not seek care for themselves or even for their children because they do not have access to a female provider (Dussault, 1999).

5. Measurement of imbalance

In theory it should be easy to determine whether a labour imbalance exists or not, by simply looking at the demand and supply for labour. If demand exceeds supply, then a shortage exists. In practice, there is a problem in measuring both the demand and the supply (Cohen, 1995). Since no single empirical measure of health personnel imbalance exists, various indicators have been used to estimate the incidence and extent of shortages/surpluses. In the following, these different indicators are reviewed and discussed. These indicators can be classified in four main categories:

- **Employment indicators:** vacancies, growth of the workforce, occupational unemployment rate, turnover rate
- **Activity indicators:** overtime
- **Monetary indicators:** real wage rate, rate of return
- **Normative population-based indicators:** doctor/population ratio, nurse/population ratio, etc.

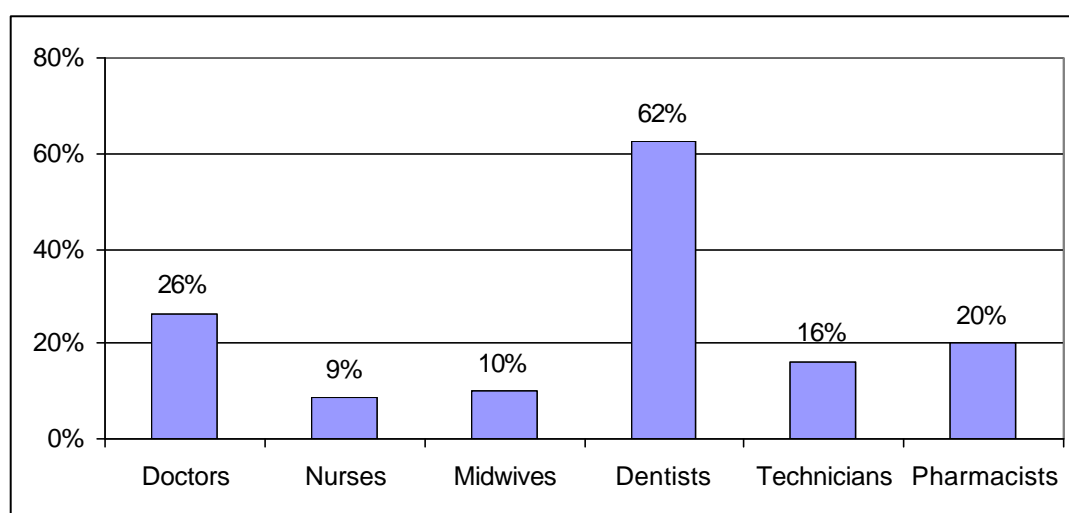
The above elements do not represent an exhaustive list of indicators. Less common indicators include: the use of temporary nursing staff through agency nurses, the number of acceptable applicants per advertised vacancy, higher waiting time and health outcomes. These indicators will not be reviewed in this study, but further consideration is desirable.

5.1 Employment indicators

5.1.1 Vacancies

Vacancy rates and duration have often been used to assess potential imbalances. In Bangladesh the average vacancy rate in the public health care system was estimated at 14% according to a recent survey (Hossain & Begum, 2001). The distribution of the vacancy rate varies widely among the health professions, as described in Fig. 10. Dentists and doctors, with a vacancy rate of 62% and 26% respectively, represent the largest percentage of unfilled positions.

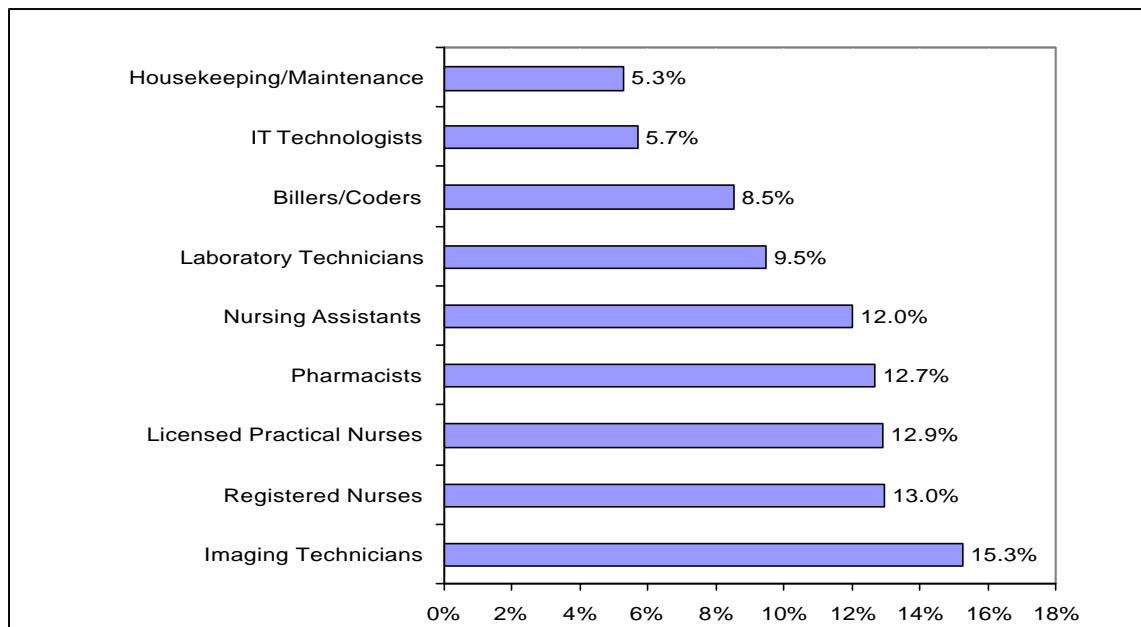
Figure 10. Vacancy rate in the public health services in Bangladesh



Source : Hossain and Begum (2001)

In the United States, a recent national survey undertaken by the First Consulting Group in American hospitals, depicted in Fig. 11, reported the highest vacancy rates for imaging technicians, 15.3%, followed by registered nurses, licensed nurse practitioners and pharmacists, with vacancy rates of 13%, 12.9% and 12.7%, respectively.

Figure 11. Mean vacancy rate in United States hospitals

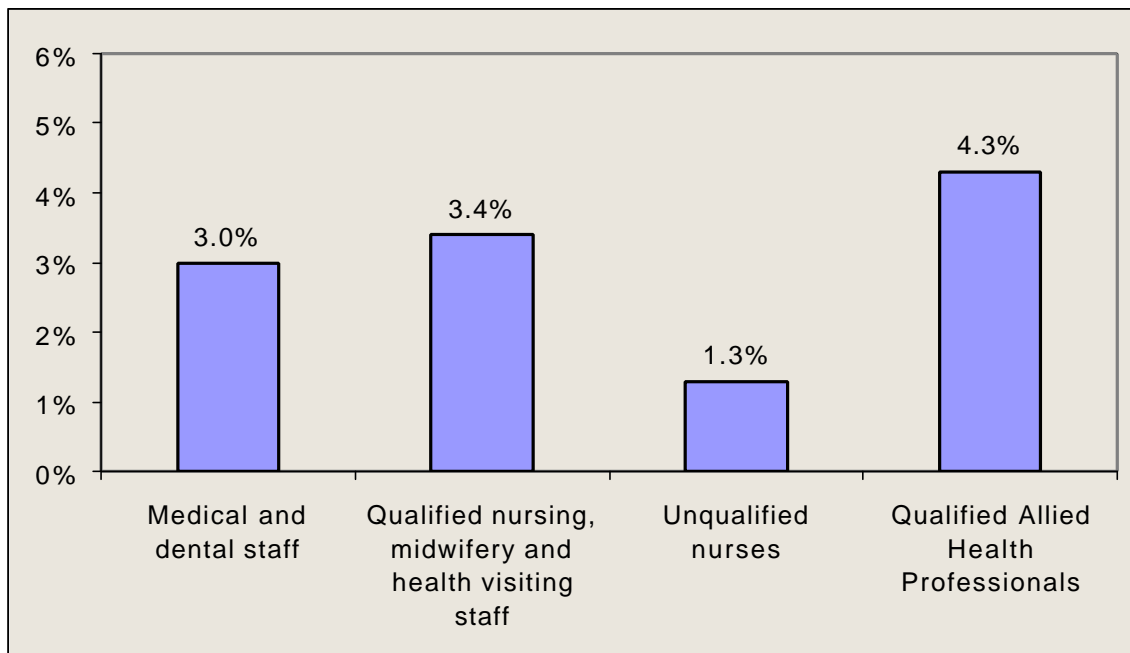


Source : First Consulting Group, 2001

Studies of nurse aides found that in Pennsylvania, USA, over half of private nursing homes and 46% of certified home health care agencies reported staff vacancy rates higher than 10%, whereas 19% of nursing homes and 25% of home health care agencies reported vacancy rates exceeding 20% (Leon et al., 2001; North Carolina Division of Facility Services, 1999).

An alternative measure is the three-month vacancy rate, which represents “hard to fill” posts that health care providers have actively tried to fill for three months or more. In England the Department of Health Vacancies Survey estimated the three-month vacancy rate for qualified nurses at 3.4% in March 2001, which was slightly lower than the vacancy rate in March 2000. The rate was 4.3% for qualified Allied Health Professionals, which was higher than the previous year. The three-month vacancy rate in England is depicted in Fig. 12.

Figure 12. Three-month vacancy rates

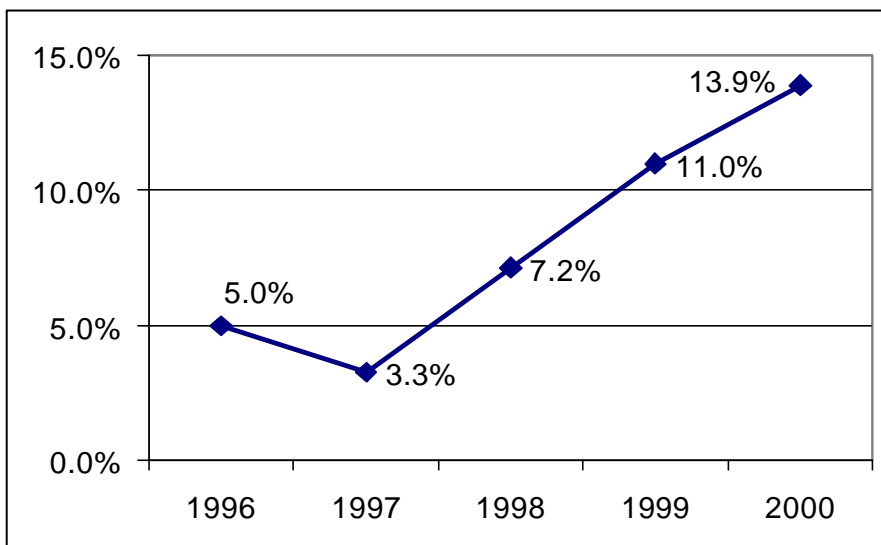


Source : NHS, Department of Health Vacancies Survey, March 2001

One major limitation of the vacancy-rate measure is that there is no single level of vacancies considered to reflect shortages. There is, however, general agreement that an increase over time of the vacancy rate indicates a tight labour market.

Such a trend is depicted in Fig. 13, which represents the vacancies for registered nurses between 1996 and 2000 in hospitals in the State of Maryland, USA.

Figure 13. Vacancy rates for registered nurses in Maryland, 1996–2000



Source: The Association of Maryland Hospitals & Health Systems Hospital Personnel Survey, 2000

Another concern is that vacancy rates may understate the extent of a shortage, since there may be “suppressed vacancies”, i.e. a post is not advertised or maintained on the establishment, because management has no expectation of successful recruitment (Buchan, 2000).

Aiken, (1987) and Curran et al. (1987) also suggest there are reasons to doubt that the vacancy rate actually measures a shortage in the supply of nursing personnel because the base of the measure (i.e. the total budgeted positions) reflects financial constraints that hospital administrators face as well as actual staffing needs. They maintain that the vacancy rate is a function of demand for staff and staffing structure within the hospital, not supply of nurses in the market.

The type of health care system and the health profession under consideration also affect the relevance of the vacancy rate indicator. In a public health system, vacancies can be used to estimate shortages for any health profession. In contrast, in a private-oriented health care system, the vacancy rate does not allow the capture of health professions such as private practitioners, who might represent a substantial share of all physicians.

Despite these limitations, the vacancy rate continues to be the primary piece of evidence used to support the claim of a current shortage in the supply of nurses (Carlson et al., 1992). One of the main reasons is that it is relatively simple to measure vacancies.

5.1.2 Growth of the workforce

Comparing the growth of the health workforce to population growth provides information to assess imbalances. A growth of the workforce well above population growth could indicate that a shortage is being remedied. However, if we were to assume an initial workforce that was adequate or near equilibrium, this would rather suggest an oversupply.

Based on this approach, the Australian Committee of Inquiry into Medical Education and Medical Workforce estimated in 1988 that there was some evidence of an oversupply of general practitioners in some urban areas. Since then, there has been an ongoing growth of more than 40% of full-time equivalent general practitioners between 1985 and 1997, whereas the general population growth during that period was of approximately 18%. It can then be concluded that general practitioners in cities have moved from a position of oversupply in 1985 to a far greater oversupply in 1997.

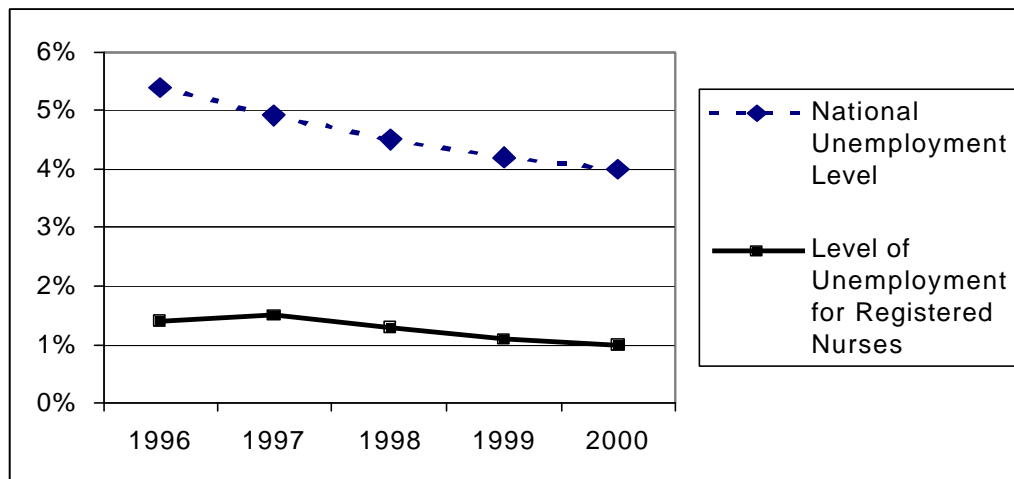
This approach can be applied to any health personnel category, but one of the main difficulties associated with it consists of determining whether health workforce growth responds to an initial shortage or to other factors.

5.1.3 Occupational unemployment rates

Another measure of imbalances is the occupational unemployment rates. An unemployment rate for a specific occupation that is higher than the national unemployment rate would indicate a surplus, whereas a lower one would be associated with a shortage. Nowak (2000) found that in Australia the unemployment of nurses seeking work amounted to just 3% of the nursing labour force, whereas national unemployment rates were then over 10%, suggesting a relatively tight nursing labour market.

In the United States, the level of unemployment for registered nurses over the last years has been systematically below the national unemployment level, as depicted in Fig. 14.

Figure 14. United States national unemployment and unemployment for registered nurses



Source: Bureau of Labour Statistics, 2001 & OECD 2001

Equating health workforce unemployment with oversupply is not necessarily always warranted. In some countries, doctors are unemployed although the country has a low doctor-to-population ratio. Following a decline in demand for health staff in the public health sector, some African countries have begun to experience a paradoxical situation, as illustrated by the following examples. In Côte d'Ivoire, a country with a doctor population of 9 per million in comparison to 276 per million in the United States, unemployment among doctors is a major issue because the public services are unable to absorb new graduates and the private market is underdeveloped and difficult to access by young doctors (CREDES, 1997). In Tanzania, 1,500 doctors and other health school graduates used to be absorbed into public service annually, but this is no longer true. Mozambique also guaranteed public-sector employment to graduates of health training institutions in the past, but has had to cut back the number of trainees in recent years. Benin, Madagascar and Mali now absorb only a fraction of their health school graduates through public employment. In Mali in 1987, the government recruited only four of the country's 60 new physicians, only one of the 35 pharmacy graduates, and 19 of the 85 new nurses (World Bank, 1994).

The entry to medical professions irrespective of the capacity of the market to absorb the trained personnel, budget constraints, a mismatch between the positions offered and the candidates' profiles, are all likely to contribute to this paradoxical situation.

5.1.4 Turnover rates

Rising turnover rates are a challenge facing providers and are often used as an indicator of recruitment/retention difficulties. In the United States, rising rates of turnover have been experienced, particularly in nursing and pharmacy. Turnover among hospital nursing staff rose from 12% in 1996 to 15% in 1999 (the Nursing Executive Center, 2000). Among pharmacy staff, turnover rose from 14.6% to 21.3% between 1998 and 2000 (Hospital & Health Care Compensation Service, 2000a). Turnover is also important among nurse aides in home health care agencies. A 2000 national survey of home care agencies reported a 21% turnover rate for registered nurses (Hospital & Health Care Compensation Service, 2000b). In contrast, data for Scotland indicate, for the last years, a relatively stable turnover rate for nurses estimated at around 8% per year, according to the Scottish Executive payroll statistics.

High rates of turnover may lead to higher provider costs and quality of care problems (United States General Accounting Office, 2001b). Direct provider costs of turnover include recruitment and training

of new staff, overtime, and use of temporary agency staff to fill gaps. Indirect costs associated with turnover include an initial reduction in the efficiency of new staff and a decrease staff morale and group productivity. Although it is straightforward to measure turnover rates, the level of turnover can be influenced by many factors that may not reflect any changes in labour market conditions, job satisfaction or job opportunity (Buchan 2001).

5.2 Activity indicators

- Overtime

Persistent excess working hours can also indicate recruitment difficulties. Overtime is often reported for nurses and doctors. In Australia, average weekly hours worked are much higher for rural practitioners than for metropolitan (Australian Medical Workforce Advisory Committee, 1998). This indicator reflects, to a certain extent, the volume of activity of health care personnel, and is therefore quite sensitive to any changes in the workload.

Promoted by hospital management as a way to staff effectively during an emergency, mandatory overtime² has become instead a means to cover routine personnel shortages in American hospitals. In many hospitals nurses report the existence of a policy that imposes mandatory overtime. Overtime may be from 4 to 16 hours or more (International Council of Nurses, 2001). In the United Kingdom, a national survey of registered nurses carried out by the Institute of Employment Studies in 1999 showed that 59% of the respondents report they work an average of 6.6 excess hours per week, whereas the average was 5.8 hours per week in 1998. Furthermore, overtime might also be caused by bad management or an inappropriate skill mix.

5.3 Monetary indicators

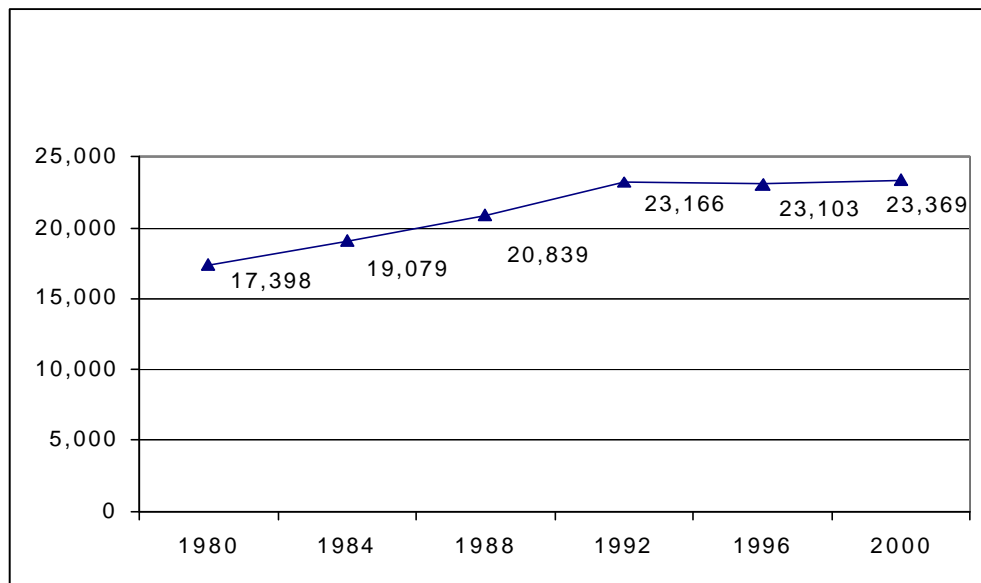
5.3.1 Wage

In a competitive market, a shortage in one profession is expected to give rise to a real wage rate increase relative to other occupations, whereas a surplus would be assumed to result in a fall. In the case of the United States, real wage rate for registered nurses increased substantially during the 1985–1993 period, both absolutely and relative to a control group of female college graduates in alternative occupations (Hirsch and Schumacher, 1995). Thereafter, real wage declined in 1992 through 1996 (Buerhaus, 1998). However, recent data suggest that real wage is again on the rise (United States General Account Services, 2001a).

The evolution of the real earnings for registered nurses that rose from USD 17,398 to USD 23,369 between 1980 and 2000 is depicted in Fig. 15.

² mandatory overtime is obligatory, compulsory or imposed by the employer leaving no choice to the employee

Figure 15. Real earning of registered nurses in the United States, 1980–2000



Source : *The National Sample Survey of Registered Nurses March 2000: Preliminary Findings*

This approach suggests the existence of a nursing shortage in the United States during the 1980s and the beginning of the 1990s, followed by a slight improvement but a looming shortage since the end of the 1990s.

Under this approach, the choice of the reference group is important and should be carefully selected, as demonstrated by Friess (1994). In the United States, the ratio of nurses' salaries to the wages of all female workers declined from 1946 until 1955 and then rose from 1955 until 1969. In contrast, when nurses' wages were compared to those of all workers and of female professional workers, no consistent trend was found, until about 1965 to 1967, when the relative earnings of nurses rose rapidly, suggesting a shortage of nurses in the labour market.

Although the real wage rate approach is appealing, in particular because it is relatively simple to calculate, one of its main limitations is that the existence of an imbalance does not necessarily gives rise to a wage change as a result of regulations, budget constraints and monopsony power. On the other hand, wages could increase in consequence of productivity gains or union bargaining power, and not due to an imbalance.

5.3.2 Rate of return

This approach is based on the **human capital theory** (Becker, 1962), which considers the education of an individual as an investment. Returns to this investment are measured in terms of income obtained as a result of education. When viewing medical education as an investment, the rate of return is calculated by estimating the costs of that investment and the expected higher financial returns achievable as a result of that investment. Normal, above-normal or below-normal profits mean that the rate of return to a medical education is either normal, high or low relative to equivalent investments.

A shortage is indicated by a rate of return above that of an individual who undertook a similar investment, whereas a surplus is characterized by a rate of return below that of a person with a similar investment. In a competitive market, high relative rate of return in the short run would be characterized by an increase in the number of individuals choosing a medical profession, and hence

would lead to normal rates of return. But in a non-competitive market, higher rate of return to education can be maintained over the long run, simultaneously with the need for the available labour to work more hours in order to accommodate demand for its services (Apostolides, 1994).

The rate of return has been estimated for various health professions. Mott and Kreling (1994) examined the status of pharmacist supply in the United States. They found a higher rate of return to pharmacy education and concluded that there was a severe shortage of pharmacists. Burstein and Cromwell (1985) assessed the rate of return for physicians, and their results suggest a shortage of physicians between 1970 and 1980 in the United States. The rate of return of different medical specialties has also been estimated and was found to vary greatly among specialties. Marder et al. (1988) and Drech (1981) found that anaesthesiology and surgical subspecialties had higher rates of return than paediatrics.

As for nurses, Nowack et al. (2001) examined the earnings of female professionals in Australia. They compared the earnings of registered nurses, teachers, social professionals, health professionals and business professionals, and concluded that registered nurses earn significantly less than other female professionals, which would in theory suggest an oversupply of nurses. In the Australian context of a “declared nursing shortage”, this might seem quite paradoxical. However, the potential monopsonistic power of hospitals or the historical undervaluation of women’s work can also explain this result.

The rate of return is a relatively sophisticated indicator and provides valuable information, but it is more difficult to calculate in comparison to most indicators.

5.4 Normative population based indicators

In comparison to other measurements of imbalances, normative population-based indicators such as physician/population ratios or other indicators are less complex and easier to comprehend. Comparing the actual physician/population ratio with a “gold standard“ allows not only to clearly identify an imbalance but also to quantify it. It has to be noted that quantifying the imbalance is not possible with most of the indicators that we have so far reviewed.

In the United States, where federal health personnel programmes have been developed to address the geographical maldistribution of health personnel and other health-related resources (Council on Graduate Medical Education, 1998), eligibility for health personnel programmes is triggered by designating an area as a Health Professional Shortage Area (HPSA). Other federal interventions require designation as a Medically Underserved Area (MUA). These formal designations allow the government to allocate resources made available by relevant federal programmes.

Designation as HPSA requires a ratio of 3,500 people to one full-time equivalent primary care physician. MUA is based on four variables: the primary care physician-to-population ratio, the infant mortality rate, the percentage of the population 65 years of age and older, and the percentage of the population with an income below poverty level.

One general concern regarding this approach relates to the “gold standards” and how they are established. Indeed, “gold standards” represent norms and their definition is often somewhat subjective. In addition, “gold standards” are a rather static measure and do not consider productivity and technological and structural health care changes over time that might occur and that could significantly affect the relationship between health personnel and patients.

In addition, the evolution of a shortage area designation system may sometimes lead to unexpected results. In the United States, the evolution of the HPSA designation has allowed enormous flexibility for entities wishing to obtain this designation, as any area, population group or facility can be designated as HPSA if the requesting entity can demonstrate unusually high needs or such barriers to

access as poverty, language or cultural differences (CGME, 1998). As a result, many HPSAs are located in areas with an adequate number of physicians (Taylor et al., 1993).

5.5 Summary

The main advantages and disadvantages of the different indicators are summarized in Table 3. It should be noted that most of these indicators are also used to assess potential imbalance problems in other domains, such as education or information technology and telecommunication (National Office for the Information Economy, 1998; Hare et al., 2000; Salzman, 2000).

Table 3. Main advantages and disadvantages of shortages/surpluses indicators

Indicators	Main advantages	Main disadvantages
I. Employment indicators		
Vacancies	<ul style="list-style-type: none"> • Easy to measure • Widely used 	<ul style="list-style-type: none"> • It does not capture private practitioners • Budget constraints may "hide" a shortage problem
Growth of the workforce	<ul style="list-style-type: none"> • It can be applied to any health profession, in any health care system 	<ul style="list-style-type: none"> • It might be difficult to assess whether a workforce growth responds to an initial shortage or not
Comparative occupational unemployment rate	<ul style="list-style-type: none"> • It can be applied to any health profession, in any health care system 	<ul style="list-style-type: none"> • The occurrence of simultaneous health workforce unemployment and imbalance complicates the interpretation of this indicator
Turnover rates	<ul style="list-style-type: none"> • Easy to measure 	<ul style="list-style-type: none"> • Level of turnover might be influenced by elements not related to imbalances
II. Monetary indicators		
Real wage rate	<ul style="list-style-type: none"> • Easy to measure 	<ul style="list-style-type: none"> • Wage might be influenced by factors not related to imbalances • It is difficult to quantify the shortage/surplus
Rate of return	<ul style="list-style-type: none"> • It is a relatively sophisticated indicator 	<ul style="list-style-type: none"> • Relatively complex to estimate • It is difficult to quantify the shortage/surplus
III. Activity indicators		
Overtime	<ul style="list-style-type: none"> • It is a sensitive indicator 	<ul style="list-style-type: none"> • It might reflect a deliberate policy
IV. Normative population-based indicator		
Doctor per 10,000 population Nurse per 10,000 population	<ul style="list-style-type: none"> • It is easy to estimate • It allows to quantify imbalances 	<ul style="list-style-type: none"> • There is a certain degree of subjectivity when establishing a "gold standard"

These indicators represent a valuable source of information on imbalances. Measuring imbalances also raises the issue of a within-country comparison of indicators or a comparison between countries. For instance, does the vacancy rate and the rate of return tell us the same thing about nursing shortages? In other words, do they really measure the same thing? Although they might focus on different factors (employment, monetary, activity, population-based), all these indicators aim to estimate the extent of shortages/surpluses. However, these indicators also capture different elements. For instance, an increase in the real wage rate might reflect the power of a nursing union and not a shortage.

Comparison of imbalances between countries always generates great interest from a public health perspective. But such comparisons might be flawed, since countries lack a common definition for the indicators and use different methodologies to assess imbalances. For instance, does a similar nursing vacancy rate between the United States and Zimbabwe mean a similar imbalance problem for both countries?. Since the health care system is so different in both countries, especially in terms of financial resources, the answer is likely to be no. In that context, including other indicators, such as a population-based one, e.g. doctors per 10,000 population, would certainly contribute to fostering a more pertinent comparison.

6. Discussion and concluding remarks

In an attempt to contribute to a better understanding of imbalances in health workforce, this paper has discussed the definition and nature of imbalances in human resources for health, developed an analytical framework, considered projections of health labour forces demand and supply, proposed a typology for health labour imbalances and reviewed different measurements of imbalances.

Although the term “imbalance” is commonly used with respect to the health workforce, it is clear that imbalance in the health workforce encompasses a large range of possible situations and is a complex issue.

Relying on a single indicator is insufficient to capture the complexity of the imbalance issue. Instead, a range of indicators should be considered to allow a more accurate measurement of imbalances. In addition, it also seems pertinent to differentiate between short-term and long-term indicators. To illustrate this approach, some indicators for registered nurses in the United States are presented in Table 4. They represent short-term indicators, i.e. trends over the last 3 to 4 years. A trend, i.e. increase – stability – decrease, is associated with each indicator.

Table 4. Imbalance indicators for registered nurses in the United States

Indicators	USA	
I. Employment indicators	Year 2000 – Short-term trend:	
Vacancies	13 %³	Increase
Yearly growth of the workforce	1.4 %⁴	Increase
Yearly growth of the population	15 %⁵	Increase
Turnover rates	1 %⁶	Decrease
Occupational unemployment rate/unemployment	4 %⁷	Decrease
II. Monetary indicators		
Real wage rate	23'369 USD	Stability
III. Normative population-based indicator		
Nurse per 10,000 population: USA	782/100,000⁸	Decrease
Nurse per 10,000 population: World		

The results presented in Table 4 indicate that the vacancy rate has increased over the last years, to reach approximately 13% in 2001. Simultaneously, the unemployment of registered nurses decreased during the same period to an even larger extent than national unemployment, while the real wage rate

³ First Consulting Group. *The Healthcare workforce shortage and its implications for America's hospitals*. 2001. <http://www.aha.org/workforce/resources/Content/FcgWorkforceReport.pdf>

⁴ Bureau of Health Profession. *The registered nurse population: The national sample survey of registered nurses - March 2000 - Preliminary findings*. Department of Health and Human Resources. Washington D.C., 2001

⁵ The Nursing Executive Center. *The Nurse Perspective: Drivers of nurse job satisfaction and turnover*. Washington, D.C., 2000

⁶ General Accounting Office. *Nursing workforce: Emerging nurse shortage due to multiple factors*, Washington, D.C ,2001a, GAO-01-944

⁷ OECD, *Standardised Unemployment Rates*, Paris, 2001

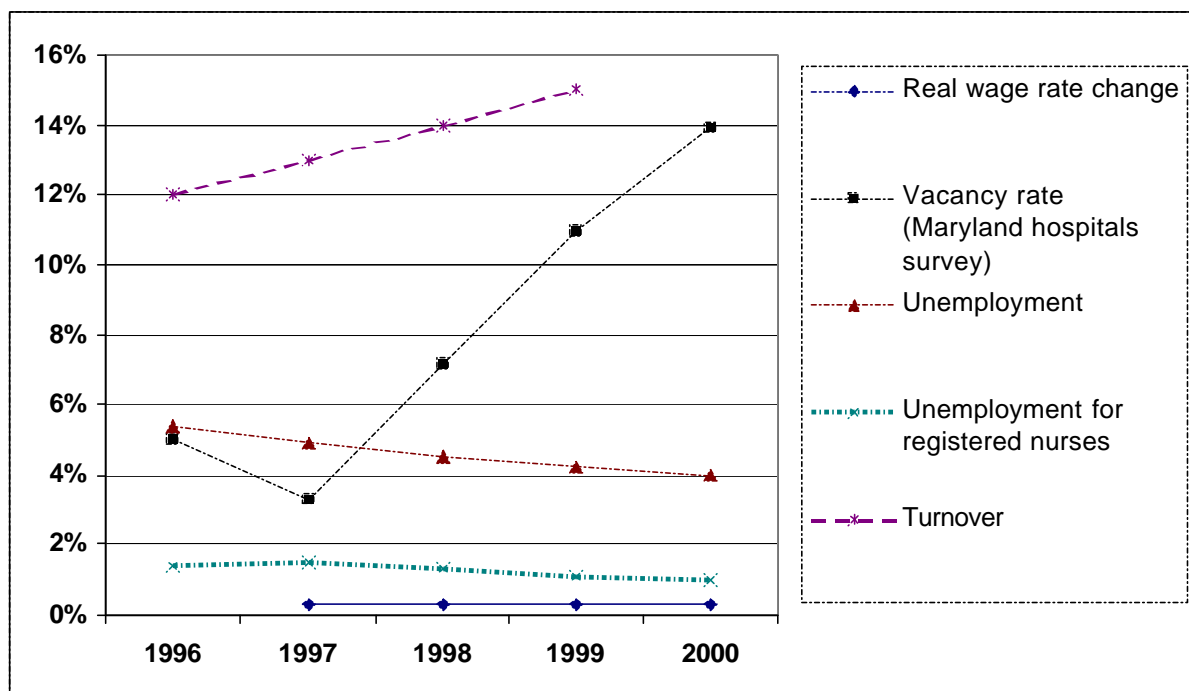
⁸ General Accounting Office. *Nursing workforce: Emerging nurse shortage due to multiple factors*, Washington, D.C ,2001a, GAO-01-944

for nurses remained relatively stable. Turnover rate also rose during this period. Finally, since 1996, the number of nurse per 100,000 population has diminished by 2% to reach a nurse/population ratio of 782/100,000.

Most of these indicators suggest the existence of conditions reflecting a shortage for registered nurses in the United States. One should note that this looming shortage has not yet given rise to a substantial wage increase. Market rigidity regarding wage changes or the use of alternative policies to attract more nurses might explain this phenomenon. However, one should not exclude more substantial increases in nurses' earnings in the near future in the United States.

The evolutions in time of the different indicators are depicted in Fig. 16. The results emphasize the substantial increase in vacancy rate and turnover, while the real earnings rates remain relatively stable.

Figure 16. Evolution of imbalance indicators

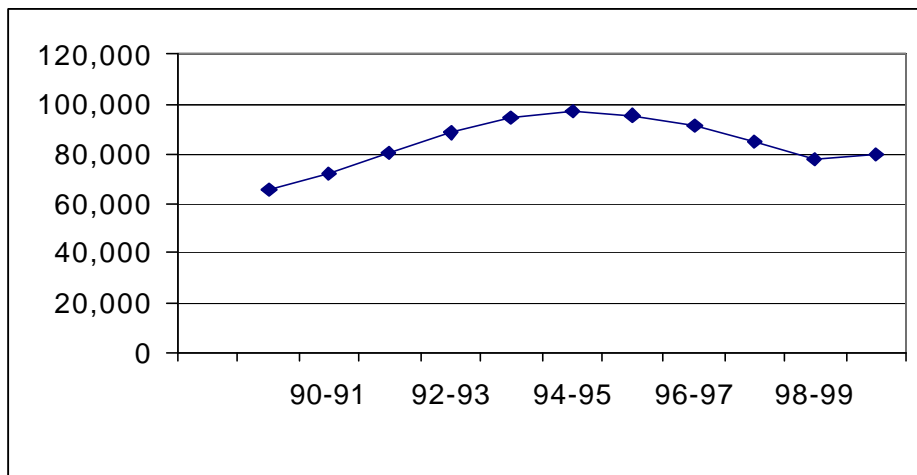


Note: This figure combines data from Figs. 13, 14 and 15 and data from the United States Bureau of Health Professions

In addition, long-term and medium-term indicators are also useful, since they provide indications for the future. Average age at graduation and number of first-year enrolments are examples of indicators providing information on the future health labour market. In the United States the number of graduates from nursing degree programmes has decreased over time, as illustrated in Fig. 17. The consequences of this trend have not been felt immediately but will have an impact soon and, *ceteris paribus*, this trend suggests a future shortage.

This type of analysis provides an example of an approach to assess imbalances, and should be extended to other health professions and countries. This approach would also provide a better basis to undertake comparisons between countries.

Figure 17. Number of graduates from nursing degree programmes, United States



Source : Bureau of Health Professions. *United States Health Workforce Personnel: Factbook*. Health Resources and Service Administration. Department of Health and Human Resources. Washington D.C., 1999

Improving imbalance indicators is important since it contributes to a better health planning policy. In that context, data quality and comparability are critical. Hoffmann (1999) emphasizes that there has been little international discussion on the definition and statistical measurement of an indicator such as vacancies. Furthermore, some countries lack data, organizational structures, technical staff, electronic infrastructure and the financial resources for information technology, as well as the training required to support the collection of information (O'Brien et al., 2000). Indeed, one major limitation of this study is that it focused mainly on developed countries. We believe, however, that our approach is also relevant for developing countries. Further efforts should be devoted to improving and facilitating the collection and analysis of data, in particular regarding imbalances in developing countries, and to develop policy responses adapted to each specific context.

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