

Hospices cantonaux  
Département universitaire de médecine  
et de santé communautaires

Institut universitaire de médecine  
sociale et préventive  
Lausanne

## FUTURE TRENDS IN HUMAN RESOURCES FOR HEALTH CARE: A SCENARIO ANALYSIS

*Nadia Danon-Hersch, Fred Paccaud*

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# 1 INTRODUCTION AND SCOPE OF THIS SCENARIO ANALYSIS

The present contribution aims at describing the future of the health workforce in Switzerland. As growing evidence points towards a probable shortage of health care professionals in the next decades, four scenarios elaborated in a previous work on the evolution of health care<sup>1</sup> are presented with the objective of addressing this specific issue. These scenarios should provide a glimpse of how health systems could possibly react in a context of shortage of health care professionals.

The demography of human resources for health care will be briefly presented in section 2, page 5. Substantial demographic changes expected in the developed countries will be evoked in section 3, page 12.

Regulation of the delivery of health services can be achieved mainly by two interventions. The first targets the number of professionals trained, thus setting the amount and the nature of health services provided. In the present contribution, it will be called the regulation by demography. The second intervention acts directly on the volume and the nature of health care and services delivered by using financial incentives. It will be called the regulation by productivity. The section 4, page 18 addresses the first method, the section 5, page 21 deals with the regulation by productivity.

The first sections of the present contribution focus on important trends in the demography of health care professionals. However, the size and the shape of the health workforce are strongly determined by the nature and organisation of the health system overall. In a close future, health systems in developed countries will have to face major choices; among these, two main axes of change will be briefly reviewed. The first axis is driven by social and economic forces, with two opposite directions of development: strong state regulation at one hand, wide liberalisation of health market at the other hand.<sup>2</sup> The second axis is driven by technological and cultural values, ranging between technological development and scepticism. Drawn on the combination of each orientation, a scenario analysis, presented in section 6, page 23, will describe four extreme, nevertheless possible situations.

This scenario analysis should provide insights of how possible trends could shape the future of human resources for health care. It aims at stimulating open debate and reflection. According to the priorities advocated for each health care system, policymakers could take into account red flags highlighted in this analysis.

## 2 DEMOGRAPHY OF HEALTH CARE PROFESSIONALS

### 2.1 Human resources: a cornerstone in health care

In an era of rising health expenditures in developed countries, the management of human resources is a key issue. Human resources occupy a central position in any health care system<sup>3</sup> and health budgets are mostly allocated to wages. In the WHO European Region, the share of total public health expenditure allocated to salaries in 2000 ranges from 17 % in the Czech Republic to 71 % in Cyprus (68 % in Denmark, 59 % in the Netherlands)<sup>a</sup>.

The health market hires an important proportion of the workforce: in 2001, total health employment as a percentage of overall employment ranged between 1.8 % in Mexico to 10.3 % in Switzerland and Germany.<sup>b</sup> Therefore, the demography of human resources for health care is strongly influenced by the general demography.<sup>4</sup> In 2000, 10.7 % of the Swiss GDP was devoted to health expenditures.<sup>5</sup>

Many methods aim at estimating the supply and demand of health personnel and services.<sup>6</sup> One simple and widespread method is based on a population to workforce ratio. This normative approach is not recommended for planning.<sup>7</sup> It does not take into account the productivity of physicians, neither the evolution of technology, nor the epidemiological changes.

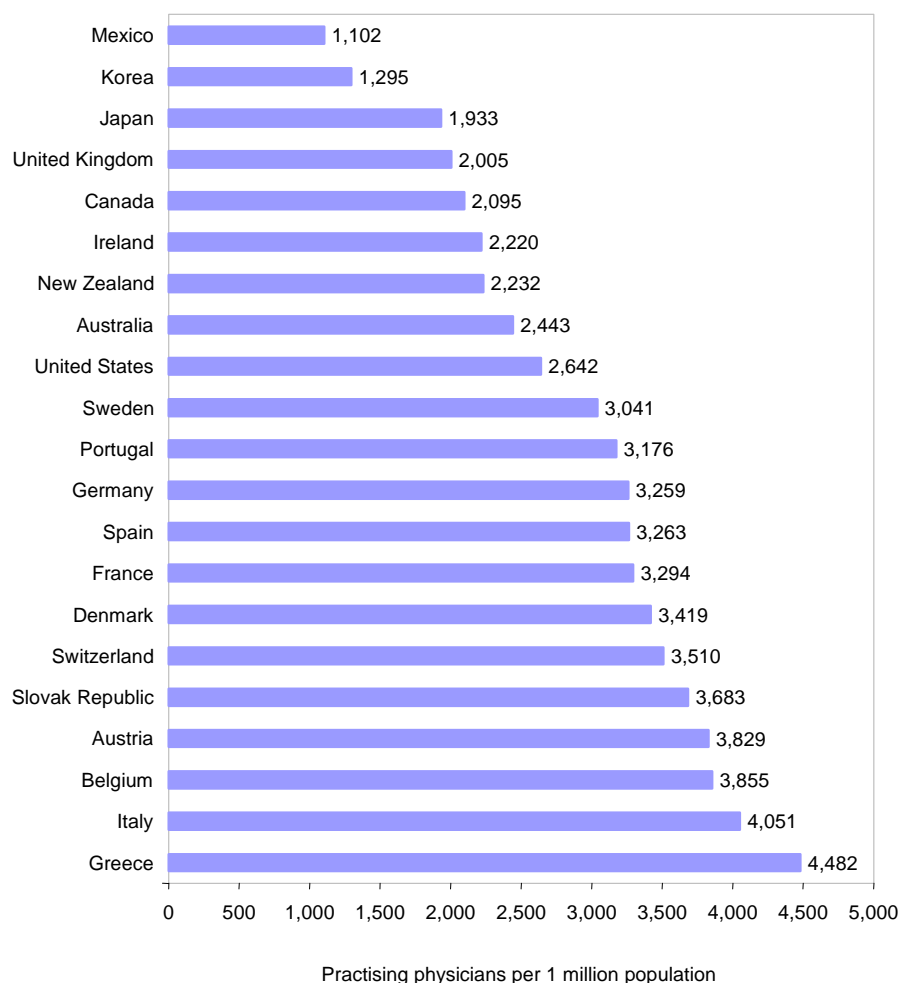
Physician and nurse density varies widely across OECD countries (See Figure 1 and Figure 2).<sup>8</sup>

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<sup>a</sup> Source : <http://hfadb.who.dk/hfa/>. As the data are missing for many countries, there is no reliable average available for EU countries.

<sup>b</sup> Total health employment in Full Time Equivalents as a percentage of overall employment: 8.0 % in Germany, 8.1 % in Switzerland, 1.3 % in Turkey. Source: OECD Health Data (Eco-Santé)

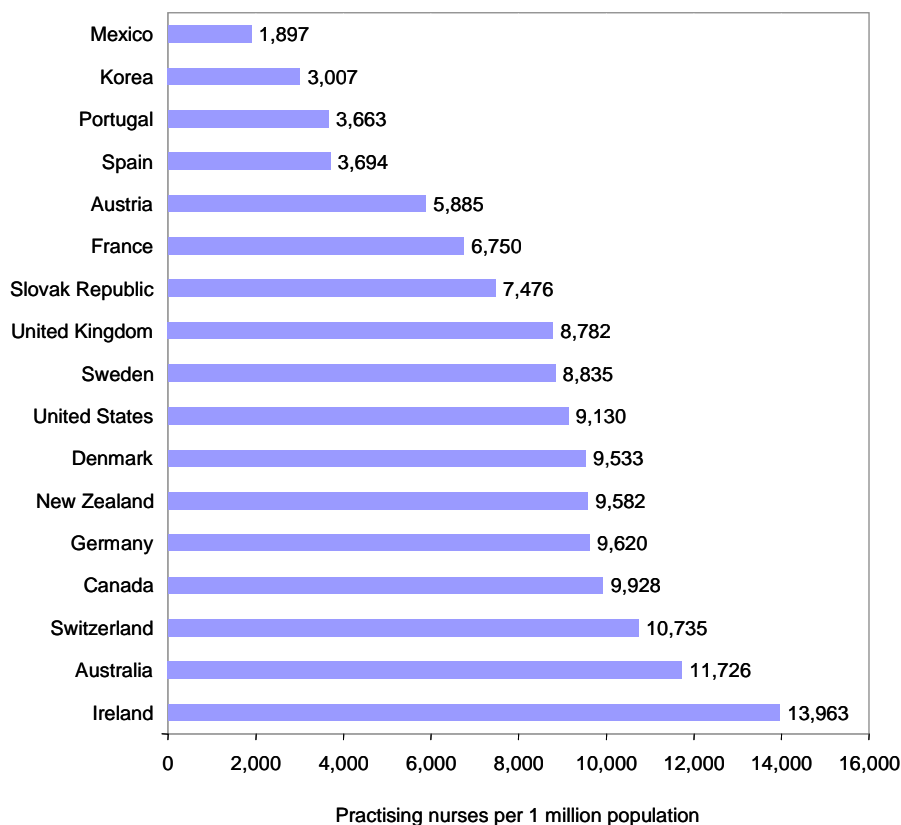
**Figure 1 Physician density, 2000**



- Notes
- Data on British and Mexican physicians do not include physicians practising in the private sector.
  - Data on Greek physicians include some unemployed physicians.
  - Data on Irish physicians refer to physicians entitled to practise rather than actively practising physicians.
  - Data on Korean physicians include physicians practising oriental medicine.
  - Data on Portuguese physicians include some retired physicians.
  - Data on Slovak physicians include dentists.

Source: Simoens S, Hurst J. Matching supply with demand for the services of physicians and nurses. In: Toward high-performing health systems: policy studies. Paris: Organisation for Economic Co-operation and Development; 2004. p. 167-206.

**Figure 2 Nurse density, 2000**



Notes Data on Austrian nurses refer to nurses employed in hospitals; they do not include nurses working in other health facilities.  
 Data on German nurses relate to full-time equivalent nurses (not head-counts).  
 Data on Spanish nurses refer to registered nurses who are employed in the National Health Service.

Source: Simoens S, Hurst J. Matching supply with demand for the services of physicians and nurses. In: *Toward high-performing health systems: policy studies*. Paris: Organisation for Economic Co-operation and Development; 2004. p. 167-206.

## 2.2 Impact on health status

World-wide, various analyses<sup>9</sup> have shown a strong link between the demography of health workers and health outcomes such as mortality rates. Anand and Baernighausen,<sup>10</sup> using cross-country multiple regression analyses on WHO 2004 data-set, concluded that density of human resources for health matter significantly in explaining maternal mortality, infant mortality, and under 5 mortality rates. The analysis suggested that physicians matter most, and that the maternal mortality rate is most responsive to larger numbers of health workers.

A study carried out in Switzerland,<sup>11</sup> with regional comparisons among cantons, concluded that despite important variations in the physician to population ratio, cantons had the same health performance as measured by the rate of avoidable mortality. In contrast, numbers of consultations per capita, as well as health expenditures, were increased in the cantons having a high physician density. These findings were related to a supplier-induced demand.

These studies, addressing two opposite and extreme situations of health care supply, suggest that beyond a cut-off level, the increase in physician density has no significant impact on avoidable mortality.

## 2.3 Shortage versus oversupply

Indicators have been developed by the WHO<sup>12</sup> in order to assess whether a shortage or an oversupply of human resources for health care is to report. They rely mainly on vacancy rates, growth rates of the workforce, unemployment rates, turnover rates, wages, overtime, medical density.

According to the OECD,<sup>8</sup> evidence of shortages of physicians and nurses is common. Only a few OECD countries or areas within countries experience surpluses. In England, physician shortages can be observed in three-month vacancy rates of 4.7 % of all specialist physician posts and 3.3 % of all general practitioner posts in the year to March 2003. In 2000, there were claims of a physician over-supply in Belgium. Some countries (Australia, Canada) may have physician shortages in specific geographical regions such as rural and deprived areas, but have surpluses in affluent metropolitan areas. Shortages may affect certain categories of physicians with specific skills or specialisation.

A Canadian Study<sup>13</sup> taking into account increased needs of the ageing population and the increasing number of women in the medical workforce has reported a decrease of 5.1 % from 1993 to 2000 in the physician-to-inhabitants real ratio. The resulting 2000 ratio equals the 1987 ratio.

The OECD study<sup>8</sup> reports nurses shortages in most OECD countries. The shortage of nurses in Norway was estimated at about 5.4 % of practising nurses in 2001. Unemployment of nurses appears to be marginal or non-existent in most OECD countries, except for Spain that reported an unemployment rate of 7.7 % in 1999.

Nurses shortage is mainly determined by their early drop out from the market, which can be explained by a heavy workload, combined with a lack of social and financial recognition. As many budget restriction policies target the reduction of the size of the personnel, already poor working conditions are further deteriorated, leading to an increased human resources turnover.

These difficult working conditions can be exacerbated by the lack of child-care facilities to support them, while working times are very irregular. Studies about the participation of married nurses to the workforce suggest a negative relationship with the husband's and the foyer's revenue, as well as with the presence of pre-school age children.

More generally, it has been emphasised that the nurses' participation to the health workforce is inversely correlated to the general economic situation: during economically growing periods, more rewarding jobs are selected to the expense of the nursing profession; the shortage of nurses worsens. Increased women participation to the general workforce weakens the nursing workforce, which is an ancient and traditionally feminine profession.<sup>14</sup> During periods of economic crisis, the nurse workforce tends to grow, because it provides safe employment opportunities.

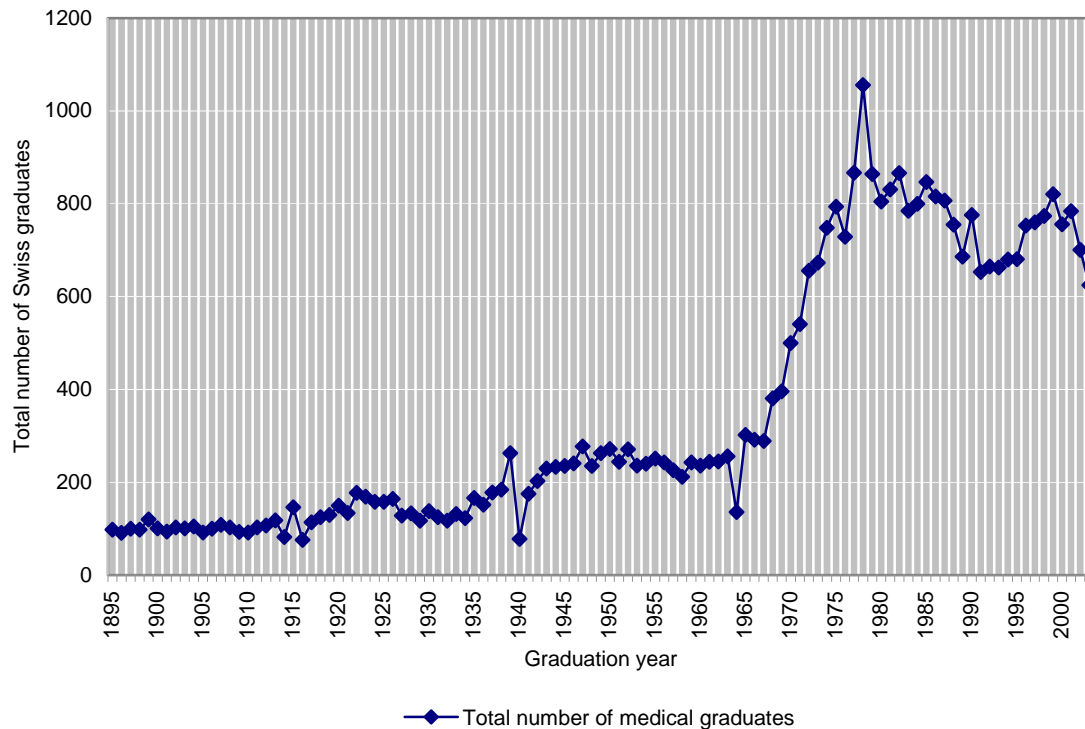
Meanwhile, recruitment of applicants to nursing schools is insufficient: many training places remain unoccupied. The next sub-section will provide an overview of the annual medical graduation rate in Switzerland.



## 2.4 Domestic medical education

Figure 3 displays annual numbers of medical graduates in Switzerland.

**Figure 3** Annual numbers of Swiss medical graduates  
(Source: Swiss Federal Statistical Office)



The number of medical students is subject to many fluctuations, resulting from the wars over Swiss borders and the economic crisis. From 1950 to 1960, the overall population is rapidly growing, while access to medical studies is limited.<sup>15</sup> Fears of a severe medical shortage are expressed in the sixties. Therefore, this period is followed by an important uptake of students, resulting in a tripling of the overall number of students from 1960 to 1970. With a delay due to the length of the study, the rapidly increasing cohort of medical graduates can be observed on the figure in the seventies. During the eighties, it is an oversupply that is feared: the decreasing number of graduates could highlight a containment policy. Since the nineties, the number of applicants for medical studies is slightly decreasing.

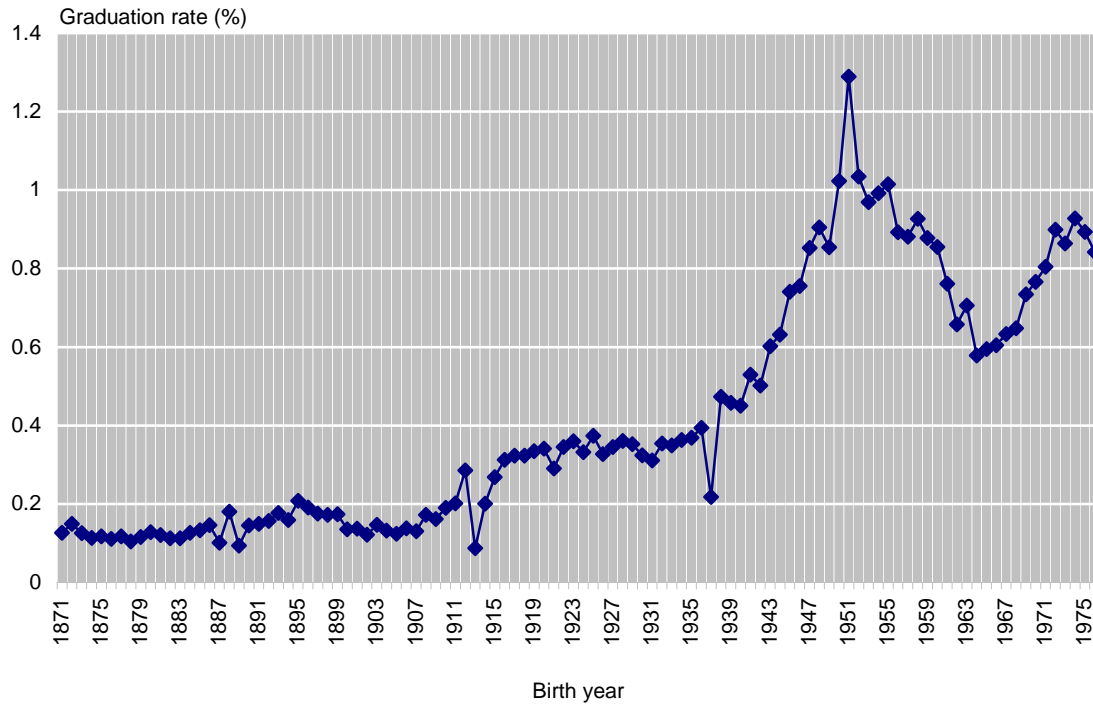
Ever evolving perceptions of medical shortage versus oversupply reflect the difficulty of defining the cut-off point.

As stated earlier, the demography of human resources for health care is strongly influenced by the general demography.

Figure 4 displays the production rate of medical graduates by birth year. It should be emphasised that the number of graduates produced each year can be influenced by various factors, among which the number of seats available, university budgets, ... It does not reflect per se the Swiss youth's motivation to complete this graduation. Moreover, the first two years

of the medical studies are subject to a strong selection (45 % failure at the first year examination in 1990).

**Figure 4** Rate of medical graduates produced by birth cohort in Switzerland (%)  
(Source: Swiss Federal Statistical Office)



**Notes** Since 1977, the median age of medical graduates was most frequently 27 years. Each annual number of graduates has thus been divided by the number of live births reported 27 years earlier.  
The number of graduates in Switzerland includes graduates who were living out of Switzerland before the beginning of their studies.  
The number of live births includes non-Swiss new-borns, born in Switzerland.

Although approximate, the production rate of medical graduates in Switzerland reflects, among other factors, ever changing perceptions of physician oversupply versus shortage and their consequent corrective measures.

As a synthesis, the density of health care professionals varies widely across countries. Evidence of shortages of physicians and nurses is common. It is unlikely that recruitment of students to nursing and medical schools could compensate for these shortages in a short term.

## 2.5 Health workforce shortage: a multidimensional issue

Another dimension should be taken into account in any evaluation of the workforce supply: a shortage of human resources can be absolute or relative. An absolute shortage would refer to an insufficient total number of workers to meet the needs, or to reach a reference level. A relative shortage would mean that absolute numbers of workers are high and acceptable

according to international standards, but that the services they deliver are not adequate: in other words, under specific conditions, the medical needs of the population can be neglected even with an adequate supply of health professionals. Services delivered (but not covered by basic insurance schemes) could include, for instance, aesthetic medicine. Such services would be useful to a small and wealthy part of the population, but would not help reach basic health needs of the general population. In the field of health goods, the development of lifestyle drugs is a similar example.<sup>16</sup> The development of new health products illustrates the increasing trends for health care professionals to shift from the many constraints of public health care systems to the more appealing private sector. Faced with the competition of the private sector offering unlimited opportunities for disappointed health care workers, public health care systems will have to gain attractiveness.

Besides the type and the quality of the services delivered, the quantity of services delivered by a supposedly adequate number of health care professionals could be insufficient to meet the needs of the population. The quantity of curative care provided, whether in working hours or in patient visits should not be overlooked.

Briefly, any estimation of the supply of health care professionals in head-counts should be interpreted carefully. International or regional comparisons of the health workforce supply, expressed in density or in absolute numbers, can be misleading if the quality and the volume of the services provided are not taken into account. The following section addresses important demographic changes that might have an impact on the quality and the volume of services provided.

## 3 DEMOGRAPHIC CHANGES IN THE HEALTH WORKFORCE

The present section reviews important demographic changes to consider when studying the evolution of the health workforce.

### 3.1 Demography of the general population

Rising life expectancy will extend the time of exposure to disease.<sup>17</sup> As life expectancy will increase faster than incapacity-free life expectancy, increased needs of care are expected. Health expenditures are strongly determined by very old ages and disabilities. As a consequence of the ageing process of the population in developed countries and of medical technology progress, the demand for health services will further increase.

Observation of the evolution of the general demography indicates that the active population in Europe is ageing as well. In one decade from now, most of the active population in Switzerland will be above 40 years old.<sup>18</sup> With whatever statistical scenario among the Swiss population,<sup>4</sup> a decrease of more than 40 % of the number of active people aged from 20 to 64 years old for 100 persons aged 65 years old or above is foreseen from 1999 to 2060. In Switzerland, the number of people in working age for each person above 65 year will decrease from 4 in 2003 to 2 in 2035.<sup>19</sup>

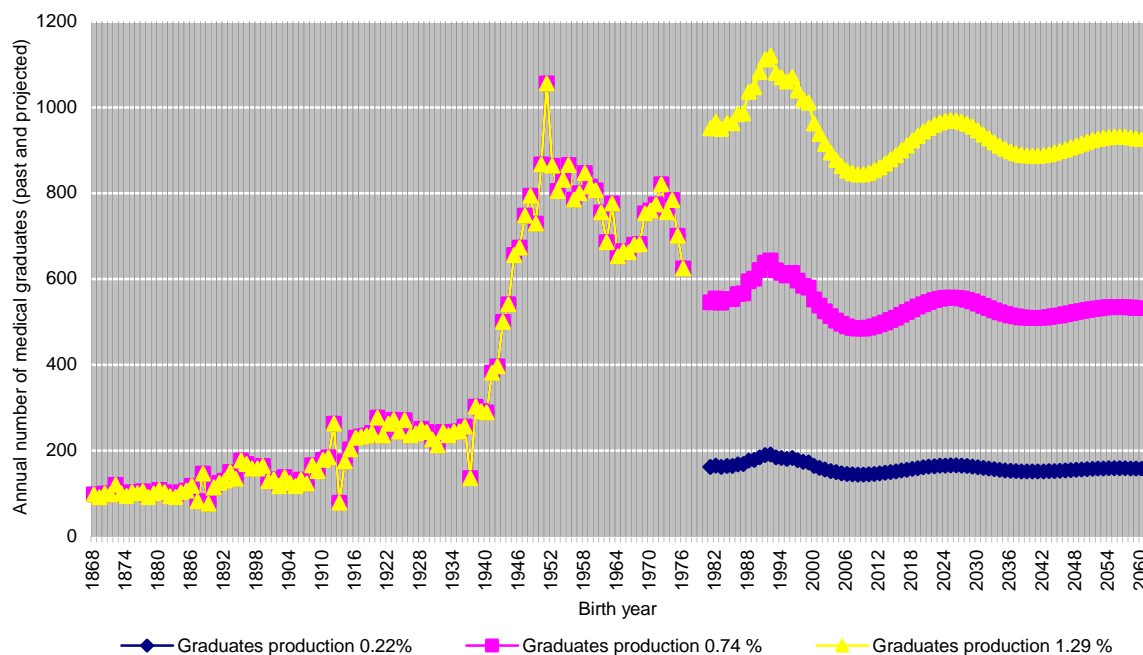
Health care professionals will not be exempted from this phenomenon. The authors of the OECD study<sup>8</sup> have realised projections for a subset of 7-8 countries in order to estimate the impact of continuation of these ageing trends on the physician and nurse density in 2011 and 2021, assuming constant intake of younger professionals: the results of this model suggest that physician and nurse density will decrease in the majority of the countries if no countermeasures are taken. The authors conclude "significant shortages of physicians and nurses are likely to loom in several European countries during the next 20 years, unless countermeasures are taken".

In many European countries, immigration is accounting for a growing proportion of population growth. Section 4 will address the role of immigration in the regulation by the demography of health care professionals.

It is unlikely that an increased entry of students into medical and other health professional schools could compensate for the increased needs. As a result of the declining fertility and mortality, the proportion of young people will be reduced in our future societies. Baby-boomers born in the forties and the sixties will reach advanced ages. Actually, in Switzerland, each new generation is about 30 % less numerous than the generation that has given birth to it. An increasing number of people will never have children. After an important decrease of the birth rate, followed by a reduced number of live births, we reach a stage of decreasing number of women of reproductive age.<sup>20</sup> The further decreasing birth rate will have heavy consequences on the future workforce and the sustainability of our social insurance plans.

Figure 5 provides a gross approximation of the number of graduates projected in Switzerland until 2060. It relies on the number of live births projected in the balanced statistical scenario ("Scénario Tendence") of the Swiss Federal Statistical Office. As regards the "graduates production" per birth rate (See Figure 4), the 1937 minimal rate of 0.22 % is shown, as well as the 1951 maximal rate of 1.29 % and the mean rate of the last 15 years (0.74 %).

**Figure 5** Projected future graduates production according to projected live births  
(Source: Swiss Federal Statistical Office)



**Notes** These numbers are based on the Swiss Federal Statistical Office's projections for the number of live births until 2060 ("Scénario Tendence").

Graduates production rates refer to the 1951 maximum (1.29%), the 1937 minimum (0.22%), (0.09 % in 1913 has not been taken into account) and to the average rate from 1962 to 1976 (birth year of the cohort).

Future numbers of medical graduates in Switzerland are probably comprised between the mean rate of the 15 last years (0.74 %) and the maximal rate (1.29%).

Figure 5 suggests that even with a strong effort to increase the production rate of physicians to the maximal rate, annual numbers of graduates will remain beneath 1000 on a long term. According to this model, the physician production rate is heavily limited by the general demography and the decreasing birth rate. Unless strong countermeasures are taken, any action aiming at relieving physician shortages will be restricted by the general demography.

According to the OECD,<sup>21</sup> fertility rates have declined in most OECD countries to levels that are well below those needed to secure generation replacement. A negative relationship has been shown between fertility and participation to the workforce.<sup>22</sup> International comparisons<sup>19</sup> show that fertility rates are higher in countries with an infrastructure allowing parents and women to combine family and professional lives (Finland, Denmark, Norway). In these "family-friendly" countries, high levels of female participation at the labour market are reported. Countries with a traditional share of roles have a lower fertility rate (Italy, Spain, with the weakest fertility rates world-wide). Among women with different characteristics, higher fertility rates are reported among non-working women, those working part-time, those living in married couples and those coming from ethnic minorities.

The important gap reported between realised and desired fertility indicates that there is still some potential for family development. This gap is attributed mostly to the difficulty of combining professional with familial lives. In this respect, State regulation with familial policy (child care availability) could play a key role.<sup>23</sup> Recent studies indicate that changes in the

institutional context, such as changes in child-care availability and attitudes towards working mothers, might have reduced the incompatibility between child-rearing and the employment of women.<sup>24</sup>

In a society that impairs the combination between family and professional lives, individuals have the choice between the sacrifice of a number of children wished, or the sacrifice of part of their participation to the workforce. Both choices have drawbacks for society. In Switzerland, an increased participation to the workforce is not rewarding for the second earner in the couple.<sup>23</sup> According to this OECD study, an increasing participation of women to the workforce to reach the men's participation in the next 50 years would increase the GDP from 15 % to 20 % in Switzerland and in New Zealand.

Attempts to attract women to the workplace would compete with the increased needs for caring for the elderly. Nowadays, a wide proportion of old and disabled people who are not institutionalised receive informal care from relative, mostly women. As family size has dropped sharply over recent years, the number of children who can care for elderly parents will be sharply reduced over coming decades. With growing mobility, there is no assurance that children will be living with an easy distance to provide help. Moreover, reforms to pension systems are likely to lead to later retirement, further restricting the time available for informal care.<sup>25</sup>

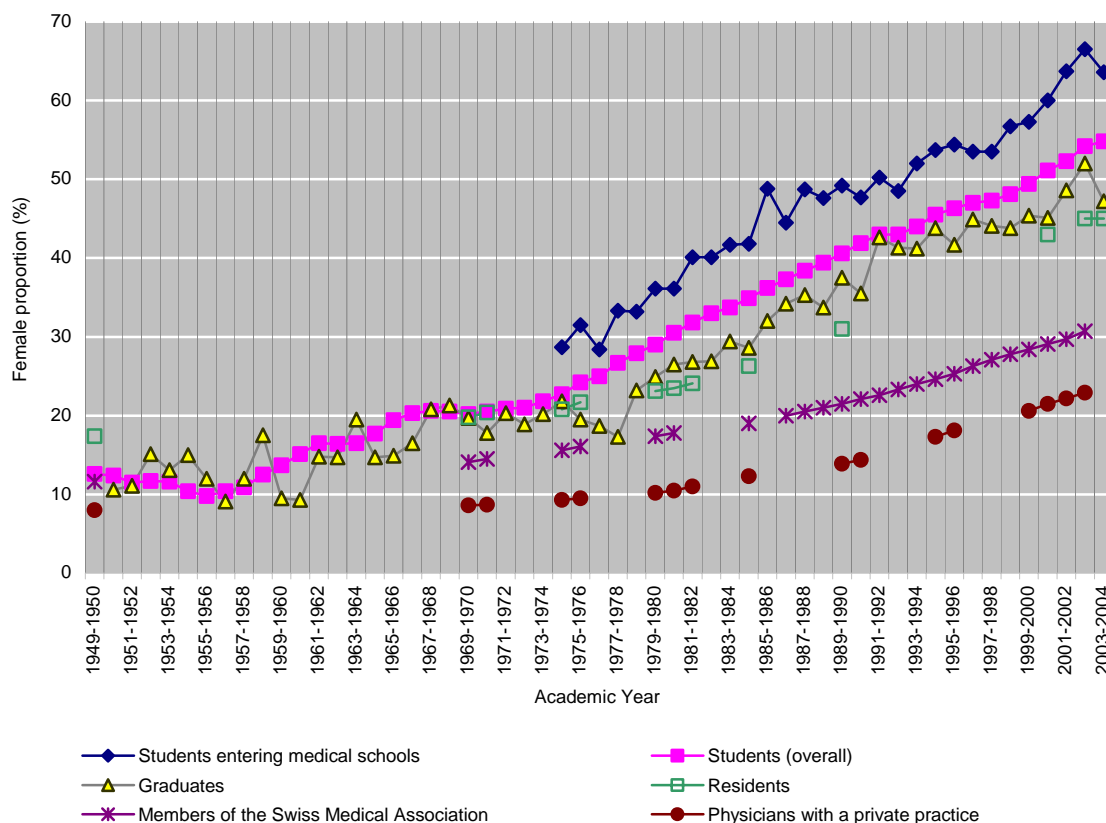
## 3.2 Feminisation of the medical workforce

Feminisation of the medical workforce is not new: this phenomenon has started in the seventies in Switzerland (Figure 6). Since then, the percentage of women among medical students and graduates is rising. In 2002, the women represented 67 % of students entering medical schools in Switzerland. Among medical graduates, gender parity has been reached in 2002.<sup>26</sup> With a gap due to the length of education and training, we notice a feminisation of the medical workforce, nowadays mainly visible among medical residents. In 2002, almost half of the medical residents were women (as members of the Swiss association of residents and consultants<sup>a</sup>), as well as one third of physicians (overall) and almost one quarter of physicians with a private practice.

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<sup>a</sup> Association Suisse des Médecins-Assistants et Chefs de Clinique

**Figure 6 Female participation in the Swiss medical workforce**



**Notes** Time scale: the year means the academic year for medical students. For graduated physicians, the first number is the reference.

These data display students entering medical schools, before the application to the first year examination. Some of these students might have dropped out during this first year or failed at the examination.

Medical residents are counted according to their membership to the Swiss association of residents and consultants (Association Suisse des Médecins-Assistants et Chefs de Clinique).

Members of the Swiss Medical Association (FMH) include non-practising physicians (but still members of this association).

FMH medical statistics include non-members since 2000. Before that year, the FMH registered about 90 % of physicians in Switzerland.

Source: Statistique médicale de la FMH. Bulletin des médecins suisses, (2003; 84), (2001; 82), (1996; 77), (1991; 72), (1981; 62), (1976; 38), (1971; 52). Démographie médicale en Suisse, Gilliland *et al.* OFS, Education et science

Overall, having accessed the medical workforce later, female physicians are younger than their male colleagues. In 2002, the mean age of practising physicians was 47 years for men, 42 years for women. This difference leads us to suggest that feminisation of the medical workforce is still progressing. The maximal feminisation rate may have not been reached yet. As reported in the Swiss Federal Statistical Office census involving all Swiss firms, women overall employment in health reached 72 % in 2001.<sup>5</sup> Part time employment in health reached 45 % in health, a positive correlation having been established with the sex ratio.

Female participation to the physician workforce varies across OECD countries: in 2000, it ranged from 14.3 % in Japan to 48.2 % in the Slovak Republic.<sup>8</sup>

According to the OECD,<sup>8</sup> changes in the extent of female participation can have important consequences for the planning of the supply of health care human resources, given that women health care workers tend to differ from men in how they participate in the workforce.

Many studies<sup>8,13,27</sup> suggest that female physicians tend to work fewer hours than male physicians, particularly during childbearing age. A Canadian survey<sup>13</sup> reports that female physicians work 20 % less than male physicians. A Belgian survey<sup>27</sup> carried out among 2000 physicians reported that female general practitioners in the workforce for 15 to 19 years work 25 % less hours than their male colleagues and have 37 % less visits. Female general practitioners in the workforce for 5 to 9 years, only report a difference of 14 % in working times and of 21 % in the number of visits. The sex difference in working patterns is decreasing among general practitioners, while the difference among specialists is increasing. Swiss surveys<sup>28,29</sup> confirm the sex differences in working patterns.<sup>a</sup>

Female physicians prefer primary care specialities,<sup>13,30,31</sup> are less likely to work in rural areas, are more likely to leave the practice of medicine or practice at low activity levels during child-bearing age, tend to work fewer hours and are more likely to retire early.

Feminisation of the physician workforce should be taken into account in any attempt to plan human resource supply, because of their frequent movements in and out of the market. These movements are influenced by maternal and parental activities, and by the social and economic situation (especially their husband's situation). The important effect of the presence of pre-school age children for explaining the female participation to the workforce should trigger attention to the availability of child-care facilities.

In a context of feminisation of the medical workforce, we can conclude that if the female trend to work fewer hours than their male colleagues persists, more physicians will be needed to supply a given volume of hours of service.

### 3.3 Changing working patterns

Nowadays, important quantitative and qualitative changes are to notice in medical practice. The following quantitative changes have to be mentioned:

- The reduction of the number of hours worked a week, especially among residents. The reduced number of hours worked due to the feminisation of the workforce has been addressed earlier. A possible outcome could be the adaptation of the physician working times to those of the general workforce.

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<sup>a</sup> A survey carried out in 2002 among 866 members of the Medical Society of the Canton de Vaud reported that women were working less hours than their male colleagues: 33.5 % of female physicians reported working times amounting to less than 35 hours, as opposed to 3.8 % of men. While 19 % of men reported working times above 70 hours, 4.7 % of the women reported such a workload. Women also planned retirement at a younger age than men. This survey reported no correlation between age and the number of hours worked.

Another survey led in 2004 by the local primary care association (Association des Médecins Omnipraticiens Vaudois) concluded that out of 370 general practitioners, only 48 % (from 84) women work over 80 %, as opposed to the 91 % of their male colleagues (from 286). The mean percentage of hours worked by female GP was 71%; the mean percentage worked by male colleagues was 92 %.



- An increasing trend towards early retirement.<sup>32</sup> According to the French medical registry (Tableau de l'Ordre National des Médecins),<sup>33</sup> 20 % of retired physicians were younger than 60 years in 2002, 10 % were younger than 50 years. This early retirement trend is even stronger among women: 20 % of female physicians retire before the age of 50, 35 % before the age of 60. In a context of ageing medical workforce in developed countries, early retirement will exacerbate physician shortages. Some countries, like the United Kingdom and Holland, have put in place measures aiming at retaining physicians on the market (higher pay, flexible working patterns).

The following qualitative changes are observed in the medical workforce:

- An increasing proportion of the working time that has to be allocated to administrative work (bills, detailed reports to insurance companies...) as opposed to the time dedicated to care. According to the above mentioned Swiss survey (Canton de Vaud),<sup>28</sup> 20 % of the weekly working time was spent for administrative work or education.
- A potential of diversification of activities: a survey carried out in Belgium<sup>27</sup> (where an oversupply of physicians is claimed), suggests that it is through a diversification of their activities (replacements, night duty, blood taking) that young doctors find their place in the market.
- However, this flexibility is limited by an increasing tendency to specialise. Specialists are thus less available to adapt their practice to the population's needs.

As stated in previous sections, many experts<sup>34</sup> consider that planning the supply of human resources for health care should not be restricted to the number of professionals available, but also take into account the volume of services provided.

Important demographic changes in developed countries are likely to shape the demography of health care professionals, as well as their activity. These changes include the rising share of the population over 65 years old with a correspondent diminution of the active population. Feminisation of the medical workforce is unquestionable. Yet, the impact of the feminisation and ageing trends of the medical workforce on the volume of services delivered is not well known on a long-term basis. Moreover, many changes are reported in the physicians' working patterns. Above described processes ought to be taken into account when planning the supply of health care services. The following sections address regulative mechanisms targeting the demography of health care professionals, and their productivity.

## 4 REGULATING THE DEMOGRAPHY OF HEALTH CARE PROFESSIONALS

### 4.1 Targets of regulation

Regulation of the demography of health care professionals can target three main stages of education and practice:

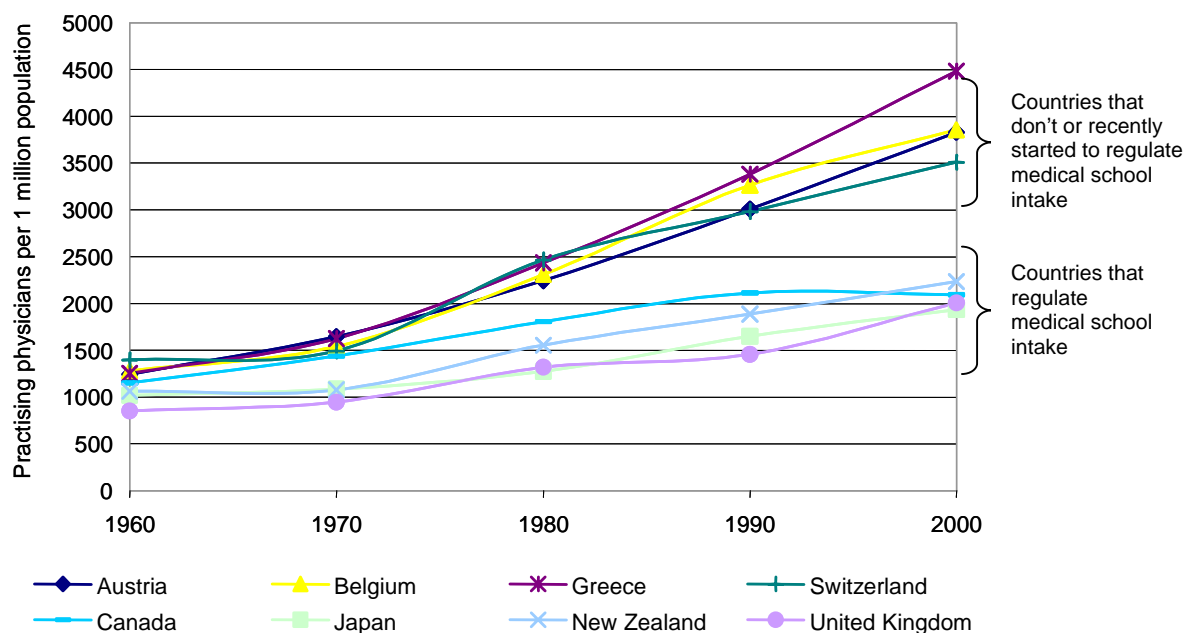
- Entry to medical or nursing schools, with the use of a numerus clausus
- Access to specialisation (including primary care)
- Access to a private practice, or to the right to be reimbursed.

In some systems, regulation happens early and targets mainly entry to school. The United Kingdom, or Quebec are examples. Drawbacks of these systems are linked to the difficulty of prevision, leading to frequent situations of shortage of human resources for health care. Moreover, length of education (especially for physicians) delays the impact of regulative interventions. Measures aiming at correcting imbalances in the physician supply will not be effective before 10 years.

Other regulation systems target later stages of education or restrict access to a private practice and reimbursement: Germany and Belgium are examples.<sup>35</sup> Although impact of these measures is rapid, it often leads to an oversupply of health professionals, determined by an abundant students intake. Highly qualified professionals encounter difficulties in finding their place in the market, which is not optimal in a perspective of human resources management.

Medical demography is higher in countries with an open access to education, like in Austria, Belgium, Greece and Switzerland (Figure 7).<sup>8</sup> Regulation often targets later stages of the process when regional governments rule education, while health is under federal control.

**Figure 7 Examining the impact of planning and market regimes on physician density in selected OECD countries, 1960-2000**



Notes Data for 1960 refer to 1961 for Canada and New Zealand. Data for 1970 refer to 1971 for Belgium and New Zealand.

Data for the United Kingdom do not include physicians practising in the private sector.

Data for Greece include some unemployed physicians.

Source: Simoens S, Hurst J. Matching supply with demand for the services of physicians and nurses. In: Toward high-performing health systems: policy studies. Paris: Organisation for Economic Co-operation and Development; 2004. p. 167-206.

In 2002, the Swiss federal government (Federal Council) introduced a three years limitation of the number of self-employed physicians, nurses and other health professionals in ambulatory care, with an executive power given to cantons (local governments).<sup>36</sup> This limitation will be extended for another three years, until the probable adoption of a new legislation allowing health insurance companies not to reimburse physicians who do not endorse cost and/or quality objectives.<sup>a</sup> Although economical efficiency is the implicit target, a transparent benchmarking tool is not available yet.

## 4.2 The key actor in regulation

In some countries, demography of health professionals is regulated by the State, with the imposition of a *numerus clausus* for access to school, or restrictions to the right to be reimbursed by insurance companies.

In others, the market is supposed to bring a balance between supply and demand.<sup>37</sup> The United States are an example, with Managed Care Organisations, which include Health

<sup>a</sup> Available at <http://www.admin.ch/ch/f/ff/2004/4085.pdf>. If adopted, this new legislation would automatically convert every Swiss insurer into a Preferred Providers Organisation.

Maintenance Organisations and Preferred Provider Organisations. Managed Care Organisations aim at an ever more efficient use of resources and means. In order to reach this objective, many mechanisms have been developed, including the payment method and gate-keeping. These mechanisms will be briefly described in section 5, page 21.

Where intake of physicians is regulated by the market, medical density is higher than in countries where access to education has been strongly controlled by the State.

### 4.3 Workforce imbalances

World-wide, many imbalances are observed in the regional distribution of physicians, as well as in their distribution in the different specialities.<sup>38</sup> Among physicians, there is a frequent unwillingness to settle and practice in rural areas. Policies that provide financial support for practising in rural areas and impose restrictions on practice location appear to be effective in recruiting physicians to rural areas.<sup>39</sup> According to the OECD, the effectiveness of these policies could be further enhanced by supporting occupational opportunities for spouse/partner, education of children and accommodation. Initiatives that offer scholarships to medical students in return for a commitment to practice in a rural area for a number of years seem to be less effective.

In order to secure the supply of health care professionals in a context of chronic shortage, many countries have adopted short-term strategies, consisting in hiring foreign-trained health care professionals.

Some countries rely heavily on immigration to provide an adequate supply of human resources in health care. In 2000, foreign-trained physicians exceeded 20 % of practising physicians in Canada, the United States, England (30 %) and New Zealand (34.5 %). Immigration increases the flexibility and reduces the cost of physician supply in the host country.<sup>8</sup> More than 50 % of recently recruited nurses in the United Kingdom stem from foreign countries.<sup>40</sup> Many international recruitment campaigns have been launched.

Policies to attract health care professionals from abroad raise questions about equity: poorer countries with less capacity and greater health needs see their workforce emigrate after expensive investments in education and training. Because of a severe shortage of physicians in many African countries, auxiliary health workers trained in three years provide most of the medical care.<sup>3</sup>

Therefore, WHO has defined a strategy aiming at helping its member countries to strengthen nurses services, especially in the fields of planning and resource management.<sup>41</sup> Instead of recruiting abroad, countries are encouraged to solve these imbalances locally first, both by enhancing in-country recruitment and by enhancing the retention of health professionals in the market. In this perspective, some countries have adopted ethical recruitment policies.<sup>42</sup>

## 5 REGULATING HUMAN RESOURCES PRODUCTIVITY

As stated earlier, many experts<sup>34</sup> consider that planning the supply of human resources for health care should not be restricted to inputs (numbers of professionals available), but should also take into account the volume of services provided and health outcomes.

Turning to costs, a large share of health expenditure is attributed to physicians because their treatment interventions mobilise many other health care professionals and resources.

The payment method plays an important role in cost management. Main methods include payment by salary, by capitation and by fee-for-service. Some countries have adopted mixed payments.

According to the OECD, the highest shares of GDP spent on health are reported in a group of countries (Switzerland, France, Germany, Belgium, Austria) which combine above-average physician density with fee-for-service payment, as opposed to payment by salary or capitation.<sup>8</sup>

The present section aims at describing the main measures that have an influence on the productivity of physicians, the number of services delivered, and consequently, on costs.<sup>a</sup>

### 5.1 The payment method

Fee-for-service payments increase the quantity of medical services, but reduce rates of referral and the volume of prescriptions as compared to payment by capitation or by salary.<sup>8</sup> Fee-for-service payment systems involving reimbursement by third-party payers without any control on the services delivered (like in Switzerland) can lead to high rates of unnecessary service utilisation and rising expenditures. In systems based on a limitation of the overall expenditure level in an attempt to curb health expenditure (Germany), the quantity of medical services delivered can be increased to compensate for the lower fee levels. The introduction of fee controls can lead to shifts towards areas where fee levels are not limited. In some countries, the workforce tends to shift from the public sector to the more rewarding private sector. The risk that payment by salary could provide an incentive for the selection of low-risk patients is to consider. Little is known about the impact of the payment method on the quality of care. Some countries (the United Kingdom) express growing interest in payment schemes rewarding quality of care (recording smoking status, hypertension, prevention approaches, adoption of high standards of clinical care.). However, many difficulties remain in designing benchmark tools, among which the definition of quality or the selection of reliable indicators. Building a payment system on this basis is not an easy task.

### 5.2 The gate-keeping role of family doctors

Except in emergency situations, patients are to consult their family doctor and to obtain his approval before any specialist visit.

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<sup>a</sup> These measures have been widely developed by Managed Care Organisations in the United States.

### 5.3 Skill mix changes

This term refers to the demarcation of roles and activities among different categories of staff. These changes can include among others the delegation of medical tasks to trained non-physician health care professionals. The delegation of medical tasks to nurses seems to be sure and efficient in primary care.<sup>43</sup> Skill mix changes have been experimented and implemented in several fields, including endoscopy and psychotherapy. These changes have been welcome by physicians paid by capitation or by salary, as opposed to physicians paid by fee-for-service. In some cases, skill mix changes resulted in an increased offer of services instead of a substitution of services. Little evidence is available on the cost effectiveness of the different changes.<sup>44</sup>

In order to further develop the potential provided by skill mix changes, some authors<sup>45</sup> confident in market forces suggest the following approach :

Analyses of the workforce and the unique contributions of several specialities have already been completed. These studies determine the services each speciality provides and the extent to which these services are also provided by other specialists and non-physician practitioners. Specialists, at times, deliver some generalist care, in particular to patients for whom they provide the majority of care.<sup>46</sup> This overlap has stimulated obstetrician-gynaecologists to consider opportunities for expanding their participation in providing more primary care, especially for elderly women.<sup>47</sup> According to these authors, "many procedures are performed by several specialities, which may be able to manage them as well as the speciality most associated with the procedure". They recommend undertaking studies to identify which speciality groups provide care that results in the best outcomes for specific conditions, and that is the most cost-effective. Accordingly, workload could be assigned among specialities. To be complete, the authors suggest that such analyses should account for the role of complementary medical therapies and non-physician providers in caring for these conditions.

In this context, many non-physician health care professionals have been hired to perform initially medical tasks. Nurses have been replaced by nonqualified auxiliary workers. As a consequence, a degradation of the quality of inpatient care has been claimed in the United States.<sup>35</sup>

Payment methods, gate-keeping and skill mix changes are helpful tools for a more efficient use of human resources, especially in a situation of shortage of health care professionals. For an adequate implementation, more comprehensive analyses on the consequences of these mechanisms should be carried out.

## 6 SCENARIO ANALYSIS

The first part of the present contribution has addressed important trends shaping the future of human resources for health care, with a focus on foreseeable shortages of physicians and nurses. However, the size and the shape of the health workforce are strongly determined by the nature and organisation of the health system overall. In the following years, health care systems will be faced with important choices, among which the balance between liberalisation and technology. Options taken in this context will shape the response to the shortage of health care professionals.

This section aims at analysing how the issue of shortage of health care professionals can be addressed by each of four scenarios, which have been elaborated in a previous work on the evolution of health care<sup>1</sup>: these scenarios have been developed within the framework of two main axes of change: the first axis is driven by social and economic forces, with two opposite directions of development: strong state regulation at one hand, wide liberalisation of health market at the other hand. The second axis is driven by technological and cultural values, ranging between technological development and scepticism.

The four scenarios described hereafter aim at describing extreme situations, voluntarily exaggerated: within this framework, providing heavy trends, decision-makers could imagine more balanced and probable situations. Each scenario expresses an attempt to address the issue of the shortage of health care professionals.

### 6.1 First axis: State Regulation versus Market Regulation

One end of the first axis is a reinforcement of State regulation of health. Solidarity and equity are preserved. On the other hand, some goods considered too luxurious are suppressed. The Britain health care system is an example. Public control is tight. Health budget is kept at a low level. Resources are concentrated towards priority needs of the population. For this situation to happen, the State has to remain a key partner in health, as well as in education and communications.

The other end of the first axis is characterised by a massive deregulation of health services. The free market is considered the best regulator of health demand. Health care budget is kept at lowest possible levels thanks to competition. The role of the State is reduced to its minimum. It solely provides health care to the people most in need. Competition between health care providers is likely to lead to an oversupply of health services. In this system, social equity in health care is no longer a key value.

A recent example of the expansion of market regulation is provided by the wide range of public services that have been opened by the World Trade Organisation (WTO) to foreign competition under the liberalisation rules of the general agreement on trade in services (GATS). Commentators have identified several restrictions on public monopolies such as health and education services: "A full market access commitment indirectly obliges a WTO member to dismantle special or exclusive rights granted in its country to any provider of health services for the supply of these services"<sup>2</sup>

## 6.2 Second axis: Optimism versus Scepticism towards Technology

"Unlike other production factors, technology has a potential of development that is unlimited; human capital is limited by population and the time needed for education, natural resources and environment by nature, ...".<sup>19</sup> The second axis is driven by technological and cultural values, ranging between technological development and scepticism. On one end of this axis, technological progress has reached so many goals that it has gained the population's support. The prevention of diseases is well developed, leading to the expansion of early diagnosis. The population pays a heavy price for the introduction of new technology in health care.

On the other extreme end, after many failures, technology meets the population's mistrust. As a consequence, innovation and modern technology are frozen to a *status quo*. The resistance against genetic manipulated food products illustrates this trend.

This context sees the expansion of alternative medicine with the emergence of new professions. As a consequence, education of health care professionals is submitted to various changes.

## 6.3 Scenarios responses to the shortage of health care professionals

The four scenarios described hereafter aim at describing extreme situations, voluntarily exaggerated: within this framework, providing heavy trends, decision-makers could imagine more balanced and probable situations.

Within this general framework, futures of health workforce are likely to follow four different scenarios:

### 6.3.1 Scenario "Technological euphoria in a public health care system"

Education of health care professionals is regulated by the State through measures such as the *numerus clausus*, likely to lead to shortages in most countries.<sup>8,48</sup> Health care managers are hired to plan the services and budgets. In an attempt to efficiently use the health workforce, managers implement many skill mix changes, including the delegation of medical tasks to non-medical health care professionals. As the physician workforce is mainly paid by salary or capitation, they welcome these measures. Health care professionals are organised in powerful corporations to protect their values and to produce guidelines. The chief model in health care and management is evidence-based practice. Skill mix changes become a major issue, with each specific corporation struggling for the recognition of new tasks and responsibilities, according to specific interests related to the consequences on working times, wages or credibility.

Professional education is oriented towards recent technological discoveries<sup>49</sup>. In the selection of health care professionals, technical skills are of most value. Health care professionals are specialised in technical interventions.

Patients have access to a lot of information regarding their treatment. Thanks to technological development, patients are provided with prostheses with a wide range of functions. With the development of technologic assistance means, disabled patients benefit from an improved environment. They can enjoy a larger autonomy in their every day life. However, there is a wide range of care services (for instance, wound care, and moreover, psychotherapy) that



technology is not able to provide in place of human resources. Despite an improved quality of life with the development of technology, the needs for human resources cannot be reduced.

A tension is felt between health managers dealing with a fixed budget and enthusiastic health care professionals in a constant seek of new technologies. For economic reasons, many technologies are not available. Despite improved communication means, the integration of new products and discoveries to the practice is delayed by a heavy State decisional process. The diffusion of new products and services created by modern technologies is strictly controlled by State regulations.

As there is a public will to integrate women into the labour force, kinder-garden are created and a family friendly tax system is introduced. Despite medical progress, there are increased numbers of dependent people. As more women are involved in the workforce, they are less available for informal care. This transfer is worth for highly skilled women, who can efficiently be replaced for informal care. The State is aware of its obligation to take care of the old and invests important parts of its budgets in home care centres. This investment reduces the amount of budget available for new technologies. The conflict between a fixed budget in a context of social equity, and the development of new technologies, is exacerbated. The generation conflict is also present inside research fields, with research in gerontology and chronic diseases competing with research in genetic illnesses, early prevention and treatment of diseases of the youth.

On a long term, the sustainability of investments in technology could be questioned, unless the State delegates some important tasks and authorities related to development of technology to the private sector.

The “inverse” scenario combines the two alternatives directions, i.e.:

### 6.3.2 Scenario “Technological scepticism in a health care system dominated by the free market”

This scenario sees innovation and modern technology frozen to a status quo, as a consequence of the population’s deep mistrust towards technology. However, this is the opportunity for a strong expansion of alternative medicine and the emergence of new professions.

Although access to education in health care is open, professional organisations tend to limit the number of applicants according to the market. However, the emergence of new professions offers almost unlimited opportunities for new candidates willing to work on the health market. The latest, which has become very heterogeneous, is responsible for an oversupply of health workers, in absolute numbers. Despite this apparent absolute oversupply of health workers, there is a severe relative shortage of health care professionals: health professions have been created and developed according to market opportunities, neglecting the population’s basic needs (which are not always economically rewarding).

In such a market, requiring from its workers reactivity and flexibility, the youths are of most value. The market is looking for people with a lot of availability, spatial mobility, and flexibility: workers should be ready to endorse new professions and responsibilities if required. Thus, continued education and training, of varying quality and level, are widely developed.

Skill mix changes are widespread: such measures, implemented by private organisations, are regularly submitted to cost-efficiency analyses. According to the results of these analyses and to budget plans, some skills can be enhanced among a specific staff, other staffs being not

allowed any more to perform certain tasks. Health professionals struggle for the right to perform and bill the more rewarding tasks. Employed by the private sector, which is owning more and more of the health system, they tend to lose their autonomy.<sup>37</sup> In order to remain competitive, the private sector hires at low costs health care professionals trained in the developing world.<sup>3</sup>

More flexible and mobile workers have less time to dedicate to their parents. Care needs for old ages are thus increasing. Consequently, care for the old becomes a market, devoted to those who can afford it. Social differences are exacerbated, especially among the old generation. As no incentive is provided by the State, child-care facilities are affordable for high-income families only. Women engaged in the workforce have to weigh carefully the costs of child rearing. As a consequence, fertility is further decreasing.

There is a vast offer of services, mainly for natural medicine. Health services are oriented towards chronic diseases. Health care networks are scattered and medical practice avoids technical procedures. The offer of services is ever changing, following the latest market opportunities. Investments in prevention are limited to interventions known as efficient on a short-term basis. Evaluation of care is scarce.

Finally, the following scenarios combine each possible alternative direction on the main axes.

### 6.3.3 Scenario "Technological scepticism in a public health care system"

Although education is regulated by professional corporations, the State keeps control over the overall numbers by applying a numerus clausus for all health professionals. Shortages of health care professionals are common because of planning difficulties. Consequently, immigration of health professionals is enhanced. There are many attempts to apply State regulations such as skill mix changes, but these measures are delayed by the opposition of the specific corporations and by the heavy political process. Remunerated mainly by salaries, professionals struggle for the delegation of tasks to other corporations. Health care professionals are organised in powerful corporations. Many different schools coexist, with frequent disagreements on treatments, payments and the recognition of new disciplines.

The offer of services is limited by a fix budget, stemming from tax revenues. Integrated care and services are provided to all citizens. Health care actors work in networks. Health practice avoids the use of technical procedures. Rather than efficacy, security of practice is emphasised. Prevention and health promotion are highly represented. Primary care is well developed and seeks to replace tasks once devoted to specialists. Complementary and alternative approaches in health care are recognised as primary care. As the migrant population is growing, a multicultural approach in health develops and expands.

Attempts to attract women to the labour market compete with the increased needs for caring for the old. Unless this task is delegated to the private sector, an important share of the public budget is allocated to the care of the old. Cost-containment measures are taken, including international recruitment of caregivers. The migrant population is further growing in the workforce, enriching the health system with its own values and skills.

#### 6.3.4 Scenario "Technological euphoria in a health care system dominated by the free market"

Access to education is open. An oversupply of health care professionals is to consider. The inclusion of new professions is ever widening. However, a relative shortage of health care professionals providing services to meet urgent needs of the population is to deplore. Professional organisations tend unsuccessfully to control education in order to restrict the number of professionals on the market. Professionals are selected on the basis of their technical skills mainly. The specialisation trend of the last decades is developing further. However, academic activities, requiring long-term investments, are no longer supported. In such a scenario, health care professionals are organised in trade unions in order to protect their interests. In order to remain effective and in a context of widespread skill mix changes, health professionals are required to improve their education and training (mostly technical) on a continuous process, as long as they will be working. Women willing to engage in the health workforce have to adapt their private lives to the requirements of their jobs. As older workers are considered expensive and less flexible, managers try to replace them by foreign workers. Immigration is enhanced. This policy raises questions about the quality of care.

There is a constant reorganisation of health services around the diffusion of the newest technologies. Products of technology are widely available, for those who can afford it. Technology development is facilitated by improved communications. Society believes in technology and intervention in health. Screening and predictive medicine are valued and widespread. Insurance schemes are adapted to the risks belonging to predictive medicine. In insurance companies as well as on the labour market, competition is oriented towards the selection of the "low-risk" people. Cut-off levels for the "disease" diagnosis have been lowered, thus increasing the number of potential "clients" for treatment.<sup>50</sup>

On the health market, there is a lack of equity between generations, and between countries: low-income countries see their workforce emigrate to better lives in rich countries, after expensive investments for their education and training. Ultimately, the health market could choose the option of moving and settling services and resources (e.g. hospitals) in low-income countries.

In a private health system rewarding an economically efficient behaviour, health workers have incentives to select patients in better health conditions. The State thus supports the less healthy and wealthy layers of society with a minimal set of health and social services. In this context of increased disparity in wealth and social disintegration, the proportion of needy people in the general population is growing. In short, a major drawback inherent to this extreme situation is the exacerbation of inequalities between generations, social layers and countries, with the establishment of strong gradients in access to health care.

## 7 SUMMARY AND CONCLUSION

The present contribution has proposed an overview of future trends of human resources for health care in a current context of widespread shortages and ineffective productivity of physicians and nurses. Prior to moving to specific comments, it is appropriate to make a general consideration on the development of indicators informing policy makers on the health workforce. Important aspects that are to be taken into account when analysing and planning the health workforce are not only head-counts, but also the health care provided, in terms of both quality and quantity. For example, an appropriate supply of health care professionals in absolute numbers could hide a severe shortage in service provision, typically when there is a massive shift of the health workforce to the private sector where health care is addressed to selected services. Therefore, the volume of care provided, gathered number of working hours, patients visits, etc., should be monitored on a regular basis.

From this perspective, two sets of comments can be made. The first one relates to the known future, i.e., the general trend of the health workforce as an inevitable consequence of demography. The second set of comments pertains to the way different socio-economic and ideological environments could shape the response to this shortage.

The first set of comments is related to the grim perspectives on the shortage of health care workforce. Because of the downward trends in fertility, more efforts to recruit more students for nursing and medical schools are unlikely to compensate for these shortages, as shown by Swiss data. Moreover, the attractiveness of health professions could be further jeopardized by the hardness of the working conditions in health care, which is increasing when compared with other professions of the tertiary sector. In order to break this vicious circle, a dynamic improvement of the overall conditions in health care is much needed. One aspect is related to the integration of family life with occupational activities. Overall, a negative relationship has been shown between fertility and workforce: international comparisons suggest that fertility rates are higher when policies are conducive to some sort of integration of family and professional lives (e.g., improving availability of child-care, tax incentives, changing attitudes towards working mothers). In these “family-friendly” countries, high levels of female participation at the labour market are reported, thus partly counterbalancing the effects of the decreasing fertility. On the other hand, attempts to attract women to the workplace will compete with the increased needs of informal care for the elderly, which is expected to grow in the future.

Feminisation is another important aspect of the future trend in health care. Nowadays, a wide feminisation of the medical workforce is currently observed and, according to Swiss data, still in progress. International literature suggests that female physicians prefer primary care specialities, are less likely to work in rural areas, are more likely to leave the practice of medicine or practice at low activity levels during child-bearing age, tend to work fewer hours and are more likely to retire early. Thus, feminisation, without family policies redefining the gender tasks, is likely to decrease the “productivity” of the professional training and to increase the shortage of physicians by reducing the number of active physicians on the health workforce market.

In any case, and regardless of feminisation, working patterns are changing in medical practice. These changes include the reduction of the number of hours worked a week, an increasing trend towards early retirement, an increasing amount of time dedicated to administrative work, a potential of diversification of activities, however limited by an increasing tendency to

specialise. Overall, these changes result in a reduction of the number of working hours devoted to curative care.

A second set of comments pertains to the way the societies will organise a response to this shortage. Regulation of the demography of health care professionals may be applied at early or late stages of education and practice. While early regulation often results in shortages, late regulation is frequently responsible for an oversupply. These imbalances reflect the difficulty of planning. The demography of health care professionals may be regulated by the State, or by the market, which is in this case expected to bring a balance between supply and demand. Where intake of physicians is regulated by the market, medical density is higher than in countries where access to education has been strongly controlled by the State. Worldwide, many imbalances are observed in the regional distribution of physicians, as well as in their distribution in the different specialities. Some countries rely heavily on immigration to provide an adequate supply of human resources in health care. International recruitment campaigns raise questions about equity among countries: these measures further deplete countries that already suffer from poor human capacity.

Turning to regulation by productivity, the payment method, gate-keeping and skill mix changes are helpful tools for a more efficient use of human resources, especially in a situation of shortage of health care professionals. However, as drawbacks have already been identified for each tool, more comprehensive analyses on the consequences of these mechanisms should be carried out. Despite methodological issues, growing interest is expressed in payment schemes rewarding quality of care.

Choosing between these tools will be largely determined by the nature and organisation of the health system overall. In the following years, health care systems will be faced with major choices, among which the balance between liberalisation and technology. The scenario analysis, describing four extreme situations, could help to identify and to point to red flags in each configuration.

These scenarios have been developed within the framework of two main axes of change: the first axis is driven by social and economic forces, with two opposite directions of development: strong state regulation at one hand, wide liberalisation of health market at the other hand. The second axis is driven by technological and cultural values, ranging between technological development and scepticism.

In essence, important mechanisms identified along both axes are the following: in a State-regulated health system, solidarity and equity are preserved, but the many financial and political constraints reduce its reactivity. In a context of massive deregulation of health services, competition between health care providers is likely to lead to an oversupply of health services, with a relative shortage of basic health services and inequitable access to care.

According to achievements provided by technological progress and the population's perceptions, health care systems could be oriented towards an acceleration of the development and diffusion of technology products, or towards a freezing of technology, triggered by a strong mistrust. A context of frozen technology will see the expansion of alternative medicine with the emergence of new professions. As a consequence, education of health care professionals will be submitted to various changes.

Heavy trends underlying these four extreme scenarios have similar chances of materialising in the next decades. The two main axes described will probably shape the future organisation of health systems, as well as the future of its workforce. Accordingly, future trends on quantitative and qualitative aspects of the health workforce could be outlined across countries.

This scenario analysis does not pretend to offer an exhaustive overview of future trends shaping the future of health care professionals. However, it provides a glance of unavoidable choices for health care systems. According to the specific national context, jurisdiction, economic and political situation, each of the orientations described could be followed in a progressive way, or in more brutal shifts. Accordingly, the consequences of these decisions could be more or less mitigated.

Next steps in the analysis would include a thorough review of the conditions allowing for each of the main orientations.

## References

- 1 Paccaud F. Evolution future des services de santé: analyse de quelques tendances plausibles. *Med Hyg* 2000;2319:2117-30.
- 2 Pollock AM, Price D. The public health implications of world trade negotiations on the general agreement on trade in services and public services. *Lancet* 2003;362(9389):1072-5. Available at: URL: PM:14522540.
- 3 Hongoro C, McPake B. How to bridge the gap in human resources for health. *Lancet* 2004;364(9443):1451-6. Available at: URL: PM:15488222.
- 4 Office fédéral de la statistique, editor. Scénarios de l'évolution démographique de la Suisse 2000-2060. Neuchâtel: OFS; 2001. (Bulletin d'information démographique 1 et 2).
- 5 Pochobradsky J, Rossel R. Emplois dans le domaine de la santé: résultats du recensement des entreprises de 2001. Neuchâtel: Office fédéral de la statistique; 2004. (Statistique de la Suisse).
- 6 Hall T, Mejia A. Health manpower planning: principles, methods issues. Geneva: World Health Organization; 1978.
- 7 Australian Medical Workforce Advisory Committee. Medical workforce planning in Australia. *Aust Health Rev* 2000;23(4):8-26.
- 8 Simoens S, Hurst J. Matching supply with demand for the services of physicians and nurses. In: Organisation for Economic Co-operation and Development, editor. *Toward high-performing health systems: policy studies*. Paris: OECD; 2004. p. 167-206.
- 9 Or Z. Exploring the effects of health care on mortality across OECD countries. Paris: Organisation for Economic Co-operation and Development; 2000. (Labour Market and Social Policy Occasional Papers, 46).
- 10 Anand S, Barnighausen T. Human resources and health outcomes: cross-country econometric study. *Lancet* 2004;364(9445):1603-9. Available at: URL: PM:15519630.
- 11 Crivelli L, Domenighetti G. [The physician/population ratio in Switzerland: the impact of its regional variation on mortality, health expenditures and user's satisfaction]. *Cah Sociol Demogr Med* 2003;43(3):397-425. Available at: URL: PM:14669639.
- 12 Zurn P, Dal Poz M, Stilwell B, Adams O. Imbalances in the health workforce: briefing paper. Geneva: World Health Organisation; 2002.
- 13 Chan BTB. Du surplus perçu à la pénurie perçue: l'évolution de la main-d'oeuvre médicale au Canada dans les années 1990. Ottawa: Institut canadien d'information sur la santé; 2002.
- 14 Balthasar H, Rinaldi J. Faire face à la pénurie de personnel infirmier: stratégie et pratique dans le canton de Vaud [Diplôme d'études approfondies en management et analyse des politiques publiques]. Genève: Université de Genève; 2004.

- 15 Gilliand P, Laplanche B, Menthonnex J, Rossini S. Démographie médicale en Suisse: 1900-1990-2020. Lausanne: Réalités sociales; 1991.
- 16 Gilbert D, Walley T, New B. Lifestyle medicines. *BMJ* 2000;321(7272):1341-4. Available at: URL: PM:11090522.
- 17 Gilliand P. [Physician workforce and population aging in Switzerland]. *Cah Sociol Demogr Med* 1999;39(4):289-312. Available at: URL: PM:10782274.
- 18 Groupe de travail de l'Etat-major de prospective de l'administration fédérale, Bureau d'études politiques et sociales. *Le défi démographique: perspectives pour la Suisse*. Berne: Office fédéral de la statistique; 1996.
- 19 Luisier G, Cotter S, Gärtner L. *Chances, risques et défis de l'évolution démographique*. Neuchâtel: Office fédéral de la statistique; 2003. (Bulletin d'information démographique).
- 20 Calot G, Confesson A, Sardon J. *Deux siècles d'histoire démographique suisse: album graphique de la période 1860-2050*. Berne: Office fédéral de la statistique; 1998. (Statistique de la Suisse).
- 21 Sleebos J. *Low fertility rates in OECD countries: facts and policy responses*. Paris: Organisation for Economic Co-operation and Development; 2003. (OECD Social, Employment and Migration Working Papers, 15).
- 22 Engelhardt H, Kögel T, Prskawetz A. *Fertility and female employment reconsidered: a macro-level time series analysis*. Rostock: Max Planck Institute for Demographic Research; 2001. (MPIDR working paper WP 2001-02).
- 23 *Babies and bosses, reconciling work and family life (Vol 3): New-Zealand, Portugal, Switzerland*. Paris: Organisation for Economic Co-operation and Development; 2004.
- 24 Engelhardt H, Kögel T, Prskawetz A. *Fertility and women's employment reconsidered: a macro-level time-series analysis for developed countries, 1960-2000*. *Popul Stud (Camb)* 2004;58(1):109-20. Available at: URL: [PM:15204266](#).
- 25 Bains M, Oxley H. *Ageing-related spending projections on health and long-term care*. In: Organisation for Economic Co-operation and Development, editor. *Towards high-performing health systems: policy studies*. Paris: OECD, Health Policy; 2004. p. 319-31.
- 26 *Examens finals des hautes écoles universitaires 2002*. Neuchâtel: Office fédéral de la statistique; 2003. (Education et science).
- 27 Antoine L, Lorant V, Deliège D. *Charge de travail et "Mal-Emploi" des médecins*. Bruxelles: Ecole de Santé Publique; Université catholique de Louvain; 2001.
- 28 Merrien FX, Buttet AC. *Le médecin vaudois aujourd'hui: une enquête de la Société vaudoise de médecine*. Genève: Médecine et Hygiène; 2002.



- 29 Horn T, Decrey Wick H. Application de la clause du besoin dans le canton de Vaud. *Primary Care* 2005;5(18):414-8. [http://www.primary-care.ch/set\\_suchen.html](http://www.primary-care.ch/set_suchen.html)
- 30 Woodward CA, Hurley J. Comparison of activity level and service intensity of male and female physicians in five fields of medicine in Ontario. *CMAJ* 1995;153(8):1097-106. Available at: URL: PM:7553517.
- 31 Female participation in the Australian medical workforce. Sydney: Australian Medical Workforce Advisory Committee; Australian Institute of Health and Welfare; 1996.
- 32 Mamie C, Meyer P, Crettenand B, Morabia A, Clergue F, Comité de pilotage romand. Evolution prévisible des effectifs médico-infirmiers en anesthésie en Suisse romande. *Med Hyg* 2004;62:2502-6.
- 33 Conseil National de l'Ordre des Médecins, CREDES, editors. Démographie médicale française: situation au 1er janvier 2003. Paris: 2003. (Etude).
- 34 Spycher S. Prévisions et planifications dans le domaine des soins ambulatoires: analyse bibliographique et débats d'experts concernant les prévisions et la planification des effectifs médicaux dans le secteur ambulatoire en Suisse. Neuchâtel: Observatoire suisse de la santé; Bureau d'études de politique du travail et de politique sociale (BASS); 2004. (Document de travail).
- 35 Bourgueil Y, Durr U, de Pourvoirville G, Rocamora-Houzard S. La régulation des professions de santé: études monographiques: Allemagne, Royaume-Uni, Québec, Belgique, Etats-Unis: rapport final. Saint-Maurice: Direction de la recherche, des études, de l'évaluation et des statistiques; 2002. (Série études n° 22).
- 36 Ordonnance du 3 juillet 2002 sur la limitation de l'admission des fournisseurs de prestations à pratiquer à charge de l'assurance-maladie obligatoire (RO 2002 2549). <http://www.admin.ch/ch/f/rs/8/832.103.fr.pdf>
- 37 Grumbach K. Fighting hand to hand over physician workforce policy. *Health Aff (Millwood)* 2002;21(5):13-27. Available at: URL: PM:12224874.
- 38 Bloor K, Maynard A. Planning human resources in health care: towards an economic approach: an international comparative review. Ottawa: Canadian Health Services Research Foundation; 2003.
- 39 Bolduc D, Fortin B, Fournier M. The effect of incentive policies on the practice location of doctors: multinomial probit analysis. *J Labor Econ* 1996;14:703-32.
- 40 Buchan J, Seccombe I. More nurses, working differently ? A review of UK nursing labour market 2002 to 2003. London: Royal College of Nursing; 2003.
- 41 Renforcement des soins infirmiers et obstétricaux: rapport du secrétariat. Geneva: Organisation mondiale de la santé; 2001.

- 42 Medical migration and inequity of health care (editorial). *Lancet* 2000;356(9225):177.
- 43 Venning P, Durie A, Roland M, Roberts C, Leese B. Randomised controlled trial comparing cost effectiveness of general practitioners and nurse practitioners in primary care. *BMJ* 2000;320(7241):1048-53. Available at: URL: PM:10764367.
- 44 Buchan J, Calman L. Skill-mix and policy change in the health workforce: nurses in advanced roles. Paris: Organisation for Economic Co-operation and Development; 2004. (OECD Health Working Papers).
- 45 Jacoby I, Meyer GS. Creating an effective physician workforce marketplace. *JAMA* 1998;280(9):822-4. Available at: URL: PM:9729997.
- 46 Rosenblatt RA, Hart LG, Baldwin LM, Chan L, Schneeweiss R. The generalist role of specialty physicians: is there a hidden system of primary care? *JAMA* 1998;279(17):1364-70. Available at: URL: PM:9582044.
- 47 Jacoby I, Meyer GS, Haffner W, Cheng EY, Potter AL, Pearse WH. Modeling the future workforce of obstetrics and gynecology. *Obstet Gynecol* 1998;92(3):450-6. Available at: URL: PM:9721788.
- 48 Bourgueil Y, Durr U, Rocamora-Houzard S. [Regulating the distribution of health professionals in Germany, Belgium, the United Kingdom, Quebec and the United states: monograph study]. *Cah Sociol Demogr Med* 2001;41(2):195-220. Available at: URL: PM:11490667.
- 49 Jacoby I, Pauker SG. Technology assessment in health care: group process and decision theory. *Isr J Med Sci* 1986;22(3-4):183-90. Available at: URL: PM:3744769.
- 50 Moynihan R, Heath I, Henry D. Selling sickness: the pharmaceutical industry and disease mongering. *BMJ* 2002;324(7342):886-91. Available at: URL: PM:11950740.