

Medical Manpower in Europe by the Year 2000: From Surplus to Deficit?

Florence 1991

Foreword

From the beginning, medical manpower has been one of the dominant items on the PWG agenda. Reports at the end of the 1970s of large-scale medical unemployment in Europe led to the PWG conference on health manpower planning in Maastricht in April 1982, bringing together politicians, planners, and the profession in an attempt to solve this problem. This led to a general interest in planning the future supply of doctors to match the anticipated demand for their services.

The PWG then commissioned a further study of medical manpower in Western Europe which culminated in the congress held in Florence, Italy on 31 October 1991: "Medical Manpower in Europe: From surplus to deficit?". This conference was based on the manpower study conducted by Peter Saugmann Jensen of Denmark in cooperation with the PWG Medical Manpower Subcommittee and the 17 national delegations.

This booklet reviews the results of that conference, which has made it clear that manpower questions are not static and that long term planning, difficult as it may be, is a necessity.

The European medical manpower picture will be a varied one as we enter the new millennium, and the PWG prognosis set forth in this booklet as well as the country by country analysis produced for the conference in Florence can be expected to serve well in this future planning.

Hans-Ueli Würsten,
Coordinating Secretary,
PWG

The myth of future mass unemployment

The physicians "glut" is not going to last forever. It is a myth that Europe will be facing mass unemployment among physicians in the late 1990s and that a progressive worsening of the situation will ensue if a further reduction in intake to medical school is not speedily effected in most European countries.

A major reversal of long-standing trends in medical manpower supply will occur shortly after the year 2000. The number of physicians leaving the active ranks will rise to match, possibly

More females are entering the medical profession

Fraction of workforce

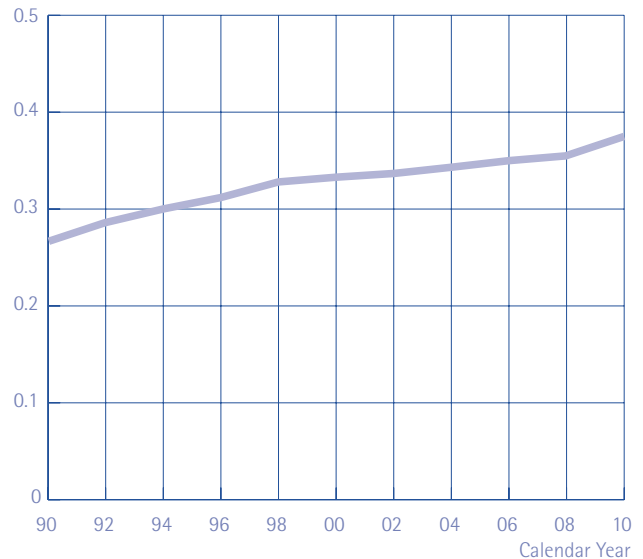


Figure 1. Predicted change in proportion of European women physicians of all European physicians (percent of workforce).

surpass the number of newcomers to the profession. This change will already begin to be felt in the nineties. Therefore, there will be a near balance between supply and demand of physicians in most countries in Western Europe by the turn of the century. Some countries will even experience a shortage of doctors. Countries that currently have full employment of physicians can expect that status to continue. Those countries presently experiencing unemployment can look forward to improved employment conditions, although at varying rates.

These conclusions are the result of a comprehensive investigation of the medical manpower situation in Western Europe carried out under the auspices of the Permanent Working Group of European junior Hospital Doctors (PWG).

The investigation was conducted by Peter Saugmann Jensen (DK) with a number of national collaborators.

The PWG survey provides detailed, specific analyses of 15 individual countries as well as a general overview of the Western

European labor market for physicians.

Some countries will find it necessary to educate more physicians if they want to avoid a shortage. Other countries will likely choose to reduce the number of medical students to hasten full employment of physicians.

Effects of "The big bang"

The supply of physicians in Western Europe will stop growing by the end of the 1990s. This is one of the striking conclusions of the PWG survey.

In the 1960s and early 70s, the number of physicians grew explosively in all of Europe, with the single exception of the United Kingdom. Universities educated and sent out more and more physicians into the labour market each year. This phenomenon has been described in the PLUG study as "the big bang".

After the turn of the Century, we will witness an enormous departure of physicians from the medical labour market as those from "the big bang" period reach retirement age or die in service. Many countries will then experience a decrease in the number of physicians for the first time in history, unless intake to medical schools rise somewhat by the late nineties.

Another consequence of "the big bang" period is the graying of the ranks of physicians. A typical physician around the year 2000 will be a person around 45-50 years old. There will also be an increase in the proportion of female physicians. These changes may affect the way the health care sector is organized.

Graying of the ranks of physicians

Fraction of workforce

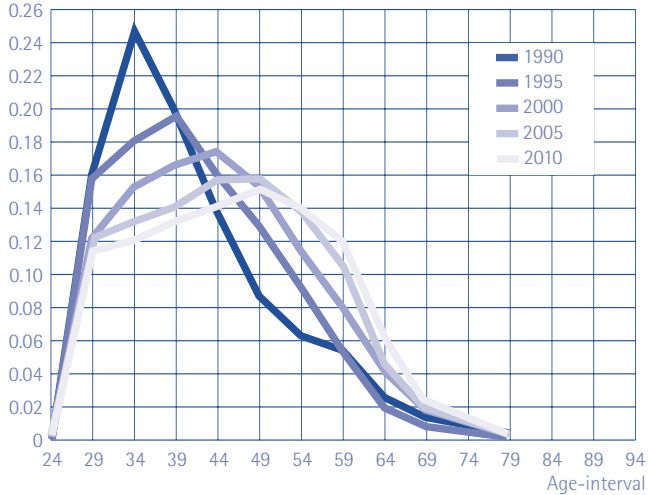
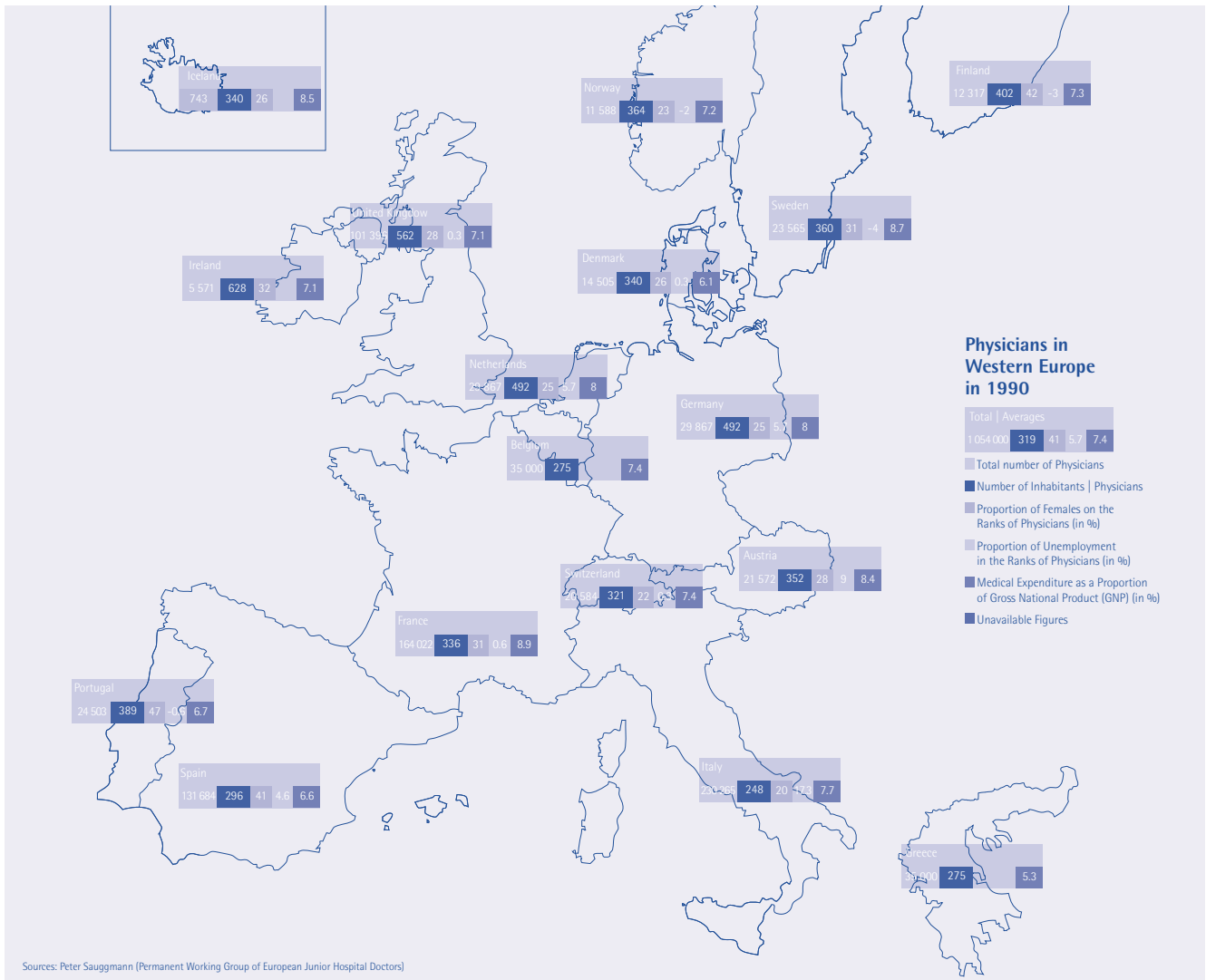


Figure 2. Predicted age distribution of professionally active physicians.

Employment of physicians

Unemployment will probably not appear in those countries that have full employment today. On the other hand, in those countries where it is currently a problem, unemployment will remain



Sources: Peter Sauggmann (Permanent Working Group of European Junior Hospital Doctors)

on the same level or increase in the first half of the 1990s. But in the second half, conditions will also improve there.

At present Europe has 1.05 million active physicians and about 40–60,000 unemployed. Unemployment is a considerable problem in five countries. In 1990, 60% of the unemployed physicians in Europe were Italian, 23% German, 9% Spanish, 2,9% Austrian, and 2,6% Dutch. The physicians in these five countries represent 57% of the total number of physicians in Western Europe.

During the 1990s the number of physicians will grow at an increasingly slower rate. The 1990 growth rate of 2,7% will go down to 1,85% in 1995, which is less than half of the average yearly growth in the 1980s. For the year 2000, the projected growth rate is 0,5%.

To eliminate unemployment it is necessary that the yearly demand for physicians increase by an average of 2,3% each year until the year 2000. In those countries that have the highest unemployment, the average growth in demand must be from 2% to 35% to keep pace with the supply of physicians.

Factors deciding supply and demand for physicians

The ten years it takes to educate a physician gives us the opportunity to project the number of physicians entering the future labour market. We can also project the demographic development among currently practising physicians. We are therefore on reasonably firm ground when we estimate the supply of medical manpower for the next ten years.

However, the possible migration of physicians from eastern

Decrease in number of active physicians

Physicians (mill.)

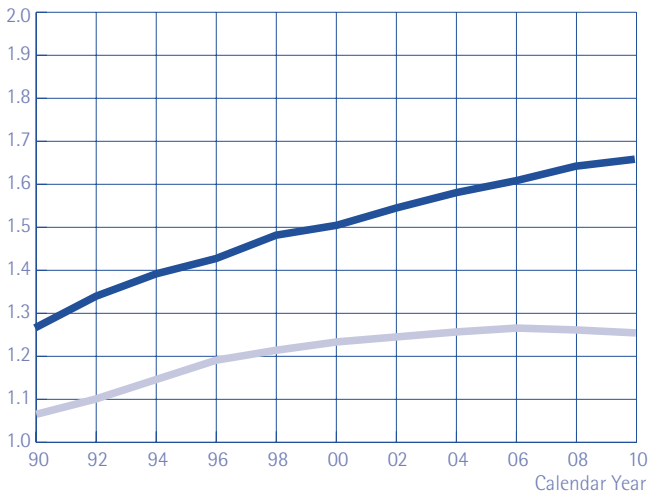


Figure 3. Predicted growth of European physician supply 1990–2010. Upper line: total medical population. Lower line: professionally active medical population.

Europe to western Europe is an unknown factor that can influence the supply. Will the language barrier and the cultural barrier work effective obstacles to migration, as they have in the past reduced migration between the EC countries?

It is also difficult to forecast the demand for medical manpower due to the many factors which have an impact on it. But a generally very safe assumption is that health care expenditure will not grow more slowly than national income (BNP). By implication, one would then expect physician average demand

Decreasing annual growth in supply

Percent annual growth of supply

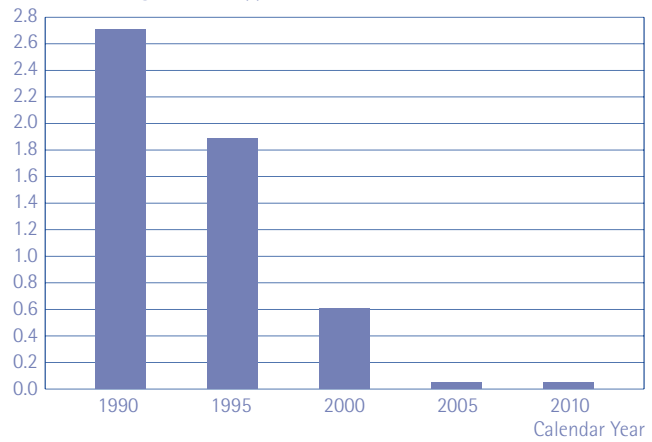


Figure 4. Predicted annual growth rate (percent p.a.) of European medical manpower, selected calendar years within the period 1990–2010.

growth over the long-term to be at least 1–2 percent p.a., which also seems borne out by past experience.

Other factors tend to raise the demand for physicians. For exam-

Physicians in the next 20 years — surplus or deficit

Physicians | surplus or deficit ('000)

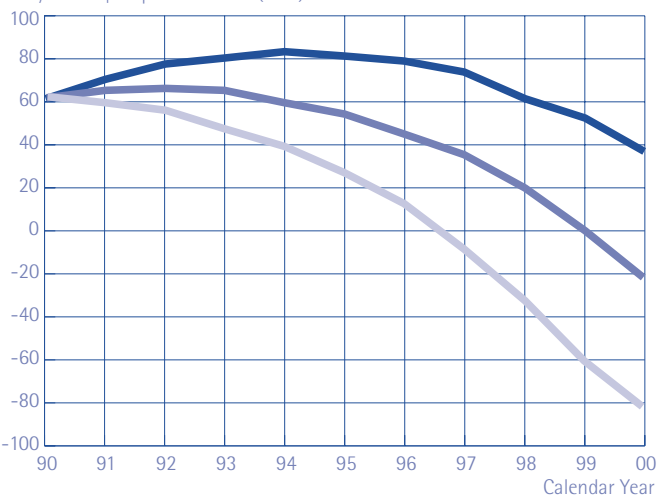


Figure 5. Predicted surplus or deficit of Physicians 1990–2000 on various demand growth assumptions: 2,0% p.a. (upper), 2,5% p.a. (middle) and 3,0% p.a. (lower).

Physicians | surplus or deficit ('000)

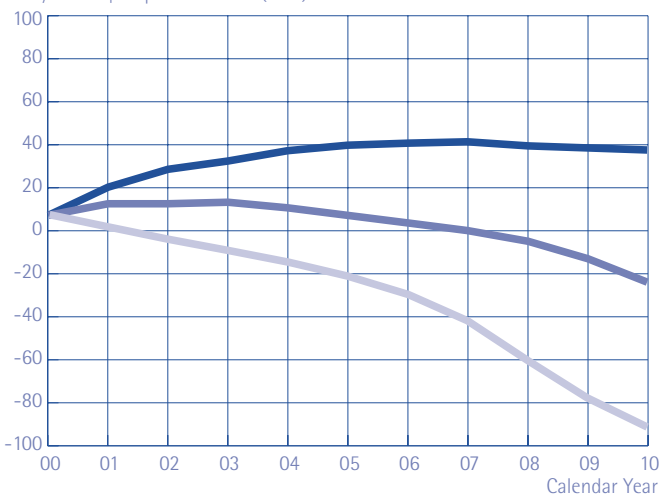


Figure 6. Predicted surplus or deficit of physicians 2000–2010 on various demand growth assumptions: 0,0% p.a. (upper), 0,5% p.a. (middle), and 1,0% p.a. (lower).

ple, employment of physicians is affected by continuing medical advances. Although ongoing innovations in medicine can at times reduce the need for physicians, the general tendency is that innovations create extra jobs for physicians. The net effect is a tendency toward an increased demand for physicians.

Another factor that will increase the demand for medical manpower is the aging of the entire western European population. Some estimates indicate that the growing number of elderly people will add 0.5% to the demand for physicians.

Physicians mobility across border: the Scandinavian and Italian experiences

The realization of the EC internal market is not likely to have any significant effect on mobility across borders in western Europe, according to the PWG-study. The intra-European mobility of physicians is of interest because it affects the supply of doctors in individual countries.

Since the beginning of the 1970s free movement of physicians has been assured in principle by the EC Medical Directives. But the migration we have witnessed has in general been small.

The PWG survey found however that mobility in Scandinavia has been remarkably large, but this mobility is due to specific reasons. Danish physicians would have faced major unemployment in the 1970s and 80s had it not been for mobility within Scandinavia's common labour market. This mobility allowed full employment of Danish physicians within Scandinavia.

The Scandinavian labour market for physicians is closely linked by language and cultural similarities. The connection is strengthened by the fact that Scandinavian hospitals and health care systems function similarly.

In stark contrast to the Scandinavian experience, Italy has been experiencing major unemployment – currently approximately 40,000, although the precise number of unemployed and underemployed doctors is unknown.

Some basic factors behind this situation are:

- unregulated admission to Italian medical schools.
- an already high ratio of physicians to general population, the highest in Europe.
- lack of opportunity for employment in neighbouring countries.
- language and other cultural barriers to migration.

Medical Manpower in Europe: Towards a Balance between Supply and Demand by the Year 2000

Peter Saugmann

Florence 1991

SUMMARY

The aims of this study were (1) to discover how many physicians there are in West Europe, how they are distributed on age and sex, and how many are unemployed (2). To make forecasts of European manpower supply with a particular view to the prospects for supply-demand balance year 2000 (3). To compare countries.

Profession insiders in each of 15 countries reported key national parameters in accordance with a standard format. A computerized supply algorithm which is described was used to establish a 1990–2010 projection of collective West European manpower supply. The same algorithm was used to set up a 1990–2000 prognosis for each country separately. The comprehensive analysis, including main results from the national studies, is reported in this article. The detailed prognostics for each country are being submitted to national journals and may presently be obtained from a data repository in Copenhagen (1).

Presently, we give the comprehensive results of the study.

The European medical workforce comprised (1990) 1.05 million physicians, corresponding to 338 heads of population per physician (nations range 296–628). Women comprised 28% (nations range 1647). 6,1% of the workforce = 64.500 were unemployed (nations range 0–17,3). Of the unemployed, 60% were Italian, 23% German, 9% Spanish, 2,9% Austrian and 2,6% Dutch. Unemployment was thus confined mainly to five countries. Medical manpower will increase in the nineties by an average 1,85% p.a., which is less than half of average annual growth in the eighties. The average demand growth required to consume all unemployment before year 2000 is 2,3% p.a. However in the countries most affected by unemployment it will be 2–3,5% p.a. The growth rate (supply) is sharply declining from 2,7% p.a. (1990) to 1,85% p.a. (1995) and 0,5% p.a. (2000). By the year 2000, the workforce will comprise 1.24 million physicians, 33 percent of whom will be women. The workforce will also display a progressive "seniorisation". Beyond year 2000, supply growth will be almost nil. A profound change in the dynamics of the manpower situation thus will occur, which begins to make itself felt in the latter half of the nineties. The hidden variable which explains these findings is that loss of active manpower due to

death-in-service and retirement increases steeply as the decade draws to an end. This reflects that the large influx to the profession which began in the sixties, is beginning to be converted into an efflux.

The results are interpreted to show that unemployment is unlikely to emerge where it is presently absent. In those countries where unemployment is presently high, the situation will remain unchanged or worsened in the first part of the decade, followed by progressive amelioration of conditions in the latter half.

INTRODUCTION

The present study concludes a comprehensive investigation of the medical manpower situation in Western Europe, carried out under the auspices of the Permanent Working Group of European junior hospital doctors (PWG). The main purpose of that investigation has been to establish an internally consistent manpower data base, and to set up a 10-year manpower prognosis with a particular view to the prospects of balance between physician supply and demand at the European level. This would appear to be what is required to either verify or falsify the opinion, now widespread in medical circles, that Europe

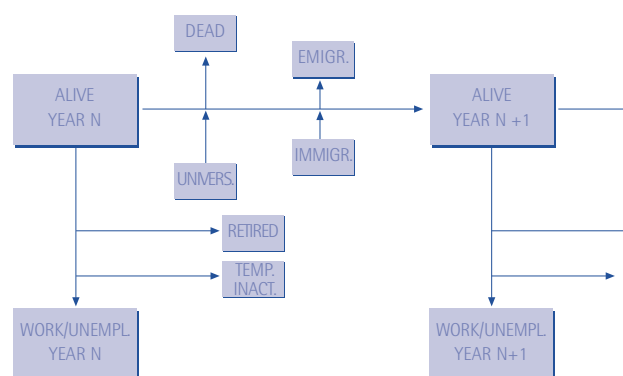


Fig. 1. The supply-algorithm adopted in this study. Alive = Total pop. Work/Unempl. = Workforce.

Table 1. Prospective annual additions to European manpower stock (University output). All entrants assumed to be aged 25–29

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
University Output ¹	45017	43760	41732	39348	38286	34616	33776	33845	31471	31471
Woman fraction	0.47									
Emigration ²	–	–	–	–	–	–	–	–	–	–
Immigration	–	–	–	–	–	–	–	–	–	–

¹ Sum over all countries.

² Assumed negligible.

Note: all "internal" migration between European countries cancel out in the comprehensive prognosis.

* For Greece and Belgium, which did not partake, a sustained annual 1500 (each) was assumed.

will be facing mass unemployment amongst physicians in the nineties, and that a progressive worsening of the situation will ensue if a further reduction in intake to medical school is not speedily effected in most of the countries. However, there are several obstacles to such an undertaking.

It is a recognized problem with cross country studies of health care related issues that data are not readily comparable. This was deplored only recently by the O.E.C.D. which pioneered a very valuable retrospective health data file (2), and inspection of their data illustrates the nature of the problem. For instance, their finding of a surprisingly low number of physicians in Switzerland reflects, as far as we can judge, the fact that this country traditionally only included senior physicians in their statistics, while their findings with Italy presumably reflect that only employees of the National Health Service were reported to them. These examples together with other examples of similar nature serve to illustrate the importance for cross country comparisons of rigidly defined and identical criteria for being included or excluded. However such generally accepted criteria do not currently exist. When it comes to comparing, between countries, future trends in the evolution of manpower supply and demand, the situation is further complicated by the fact that prognostic studies of medical manpower are not done or (as evidenced by the result of a computerized search in literature) not published with a number of European countries. Even where they are found, their method and basic underlying may not always be exactly stated. To overcome such difficulties as stated above, we found it necessary to adopt uniform definitions and to apply the same prognostic algorithm to all countries studied.

METHODS

Data Collecting, and "default" criterium for truth Raw data for the study were obtained from "profession insiders" with good access to manpower data in their respective countries. They were elected representatives of their national associations to the Permanent Working Group, and also practicing physicians. Their task was, as field analysts (and co-authors on national studies), to do a critical review of home data sources, and to compute and recast them in accordance with definitions contained in a written protocol issued Jan. 1990. Information was sought on the total number of live physicians, their age and sex distribution,

mortality rates, retirement and temporary inactivity trends, university in- and output (prospective and retrospective) distributed on age and sex, study duration and completion rates, emi- and immigration trends, and vacancies and un- and underemployment. Data were reported to a single compilation Unit in Copenhagen, where the central analyst would feed them to the computer program to be described below. Various checks on the internal consistency of the data were done, e.g. whether reported age distribution of manpower was consistent with reported outputs from Universities over the last decade. After the first run, the central analyst would often request additional information from the field analyst(s), and the process was repeated until all spots were covered. With countries where only piecemeal information on one or more main parameters could be given in the first run, the central analyst would suggest values or sets of

Table 2. Population description 1990: assumed values for initialising the prognosis

Total Medical Population (TMP), January 1990	1.254 million
Women fraction	–
Professional active Manpower (PAM), January 1990	1.05 million
Women fraction	0.28
Physician unemployment as fraction of PAM	64.500 0.061
Temporary inactivity, fraction	approx. 0.03

Table 3. Assumed age-dependt decrease in compound activity ratio of total medical population (TPM)

Age interval	Men	Women
55–59	0.894	0.835
60–64	0.672	0.577
65–69	0.299	0.183
70–74	0.114	0.023
75–79	0.024	0.002
80–84	0.0	0.0

values based on backwards computation from other data or based on findings from other countries – e.g., mortality rates for doctors. In practice, the field analyst would reject suggestions only in case he or she could produce better values in a new search. The procedure described thus supplied a default criterium for "soft" truth when "hard" truth could not be ascertained.

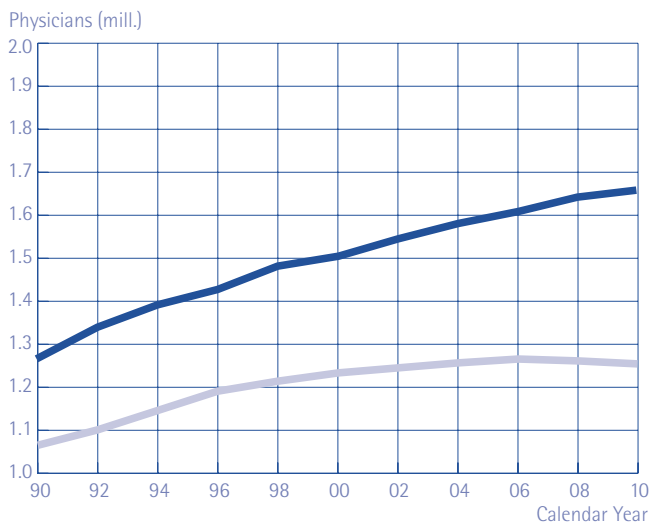


Fig. 2. Predicted growth of European physician supply 1990–2010. Upper line: total medical population (TMP). Lower line: Workforce (PAM).

Standard format definitions

The Total Medical Population (TMP) in a country was defined to include all holders of a University degree in Medicine who were alive and residing in that country by the time, whether professionally active or not, and regardless of their nationality. This count is, by definition, a headcount, thus being directly comparable from country to country. It was broken up on 5-yr. age intervals and on sex. Professionally active manpower (PAM) which we shall refer to in short as the workforce was defined as the "ready supply", i.e. after subtracting, from TMP, those permanently retired and those temporarily retired from the marketplace. Retirement (permanent) trends may reflect compulsory retirement age or optional retirement age. In the latter case, doctors may often choose to retain professionally active status indefinitely, although their working hours decline as a function of age. A compound estimate of age dependent decrease in activity ratio was therefore adopted, estimating average activity of physicians of age $60 + i$ ($i = 0, 5, 10 \dots 30$), expressed as fraction of average activity of physicians of age 50, and broken up on sex. These data were used as nodal points in the fitting of sigmoidal trend curves, whose limiting slopes were estimated from the shape of retirement trend curves in more well

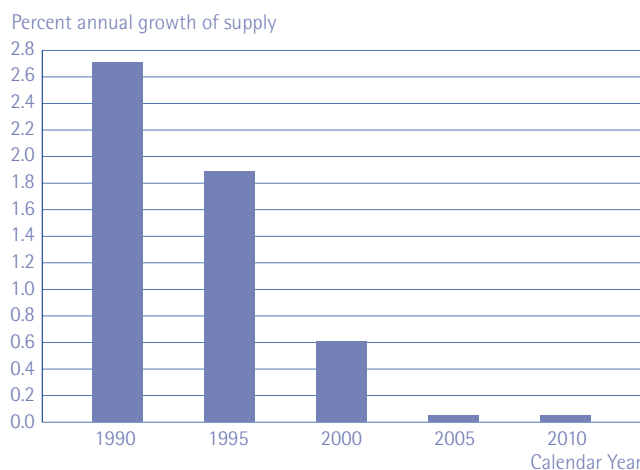


Fig. 3. Predicted annual growth rate (per cent p.a.) of European medical manpower, related to selected calendar years within 1990–2010. Compare fig. 2.

described countries. Point estimates were defined in units of professionally active manpower, cf. below. Temporary absence (TA) was defined, for each sex, as the proportion of all physicians of that sex who, on any date, would be estimated to be on prolonged leave due to, e.g. maternity, draft service, study leave in other country, sabbatical leave, fixed term appointments in other country, e.g. arab peninsula, third world projects, or any other cause, but not including absence due to short term illness or ordinary holidays.

Units of "supply" and "demand"

The supply of physicians in the sense of "ready supply" of professionally active manpower, cf. above, was expressed in units of present average working time physicians in a country (PAT-equivalents). We note that it is possible to comply with this definition even where average working hours are not known, as in the initial state PAT-equivalents simply equal a bead count of the ready supply. Where data are sufficiently detailed, PAT-equivalents may be easily transformed into whole time equivalents. The demand for physicians is expressed also in PAT-equivalents. 1990-demand was estimated by adding supply and number of vacancies, and subtracting number of unemployed physicians. An unemployed physician was defined as any physician who, on a particular time is eligible to work, is actively seeking a medical post and yet does not work as a physician (PWG-definition).

West Europe was defined by us as comprising the seventeen countries which appear in table 4, excluding Luxembourg. Only Belgium and Greece did not participate in the study.

Computer processing of data

Data were analyzed in a DOS-supported spread-sheet with printgraph application (Lotus Symphony), on an Olivetti M211V personal computer adapted with a 2 MB RAM-expansion. An algorithm was designed which takes TMP as the fundamental variable, and calculating $TMP_n \text{ } \Delta \text{ } TMP_{n+1} \text{ } \Delta \text{ } TMP_{n+2} \dots$ ($n =$

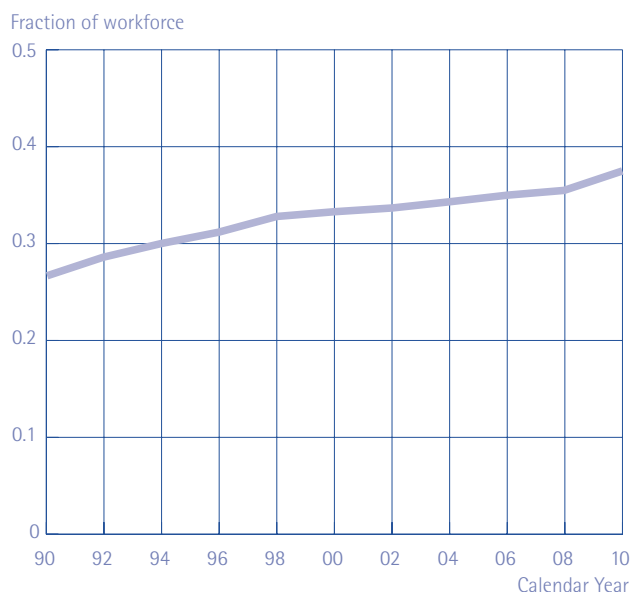


Fig. 4. Predicted change in proportion of European women physicians to all European physicians (per cent of workforce).

calendar year) by adding, at each arrow, expected 1-year input of newly qualified physicians and immigrants, and subtracting calculated mortalities and expected emigrants. Professionally active manpower = workforce was obtained from TMP in a subsequent step, calculating $TPM_n \div PAM_n$; $TPM_{n+1} \div PAM_{n+1}$.. by subtracting, at the arrows, permanently inactive and temporarily inactive persons in accordance with the trends reported. The algorithm has been illustrated in Figure 1. Where the total number of live physicians (i.e., including those retired) could not be given with sufficient accuracy, the algorithm was used to "repair" the stock so as to yield consistency with reported retirement trends and workforce, including age distribution of the latter. This may be regarded as a purely technical thing which does not, of course, affect the calculation of prospective loss due to retirement or death-in-service. All calculations were done on male and female doctors separately, integrating results in the last step.

The algorithm was further branched to yield other desired parameters than the above mentioned, e.g. unemployment ratio forecasts on various demand growth assumptions. The spreadsheet was programmed to yield an instant display, including graphical display, of 12 analytical windows, thus being a handy tool for studying a wide range of possible scenarios.

Mortality Rates

The mortality rates used throughout this study were those established separately for Danish male and female physicians (2), which differed not appreciably from mortality rates in those countries where they were known with some accuracy (Sweden, France, United Kingdom, Netherlands).

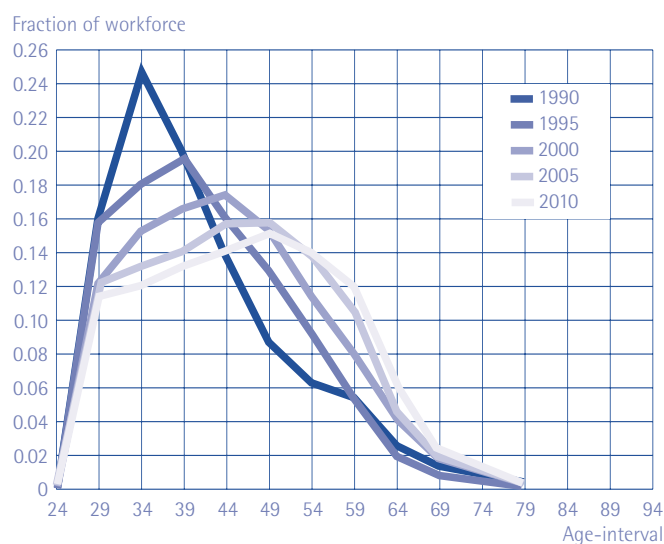


Fig. 5. Predicted distribution of manpower (workforce) on 5-year age intervals 1995, 2000, 2005, 2010 compared with 1990-distribution.

RESULTS AND EXPLANATION

Description of European Medical Manpower 1990

The findings which are pertinent to a description of the collective European stock of physicians as of January, 1990, have been summarized in tables 1-2-3; some of these findings have

been further detailed on individual countries in table 4. These values are all either directly such as they were reported by the field analysts, or such as could be obtained from their data by summing over countries (e.g., university outputs, number of unemployed) or, where relevant, by calculating average values (e.g., on retirement trends). Average values were calculated as weighed arithmetical means, using the size of each country's workforce as weight.

By January 1990, the number of professionally active physicians was 1.05 million. Of these, 294,000 (28%) were women physicians and 64,500 (6.1%) were unemployed physicians (table 2). In order to predict future growth of the medical workforce, it is indispensable to know the annual output from universities/medical schools. Assessment of this parameter was for each country based on knowledge of government targets for student intake or the passing of examination after first year (numerus clausus), and consideration of student intake 1980-89 and graduate output for the same period, the latter making an assessment of study completion rate possible. Table 1 gives the sum total of the expectations on each country and thus represents the expected total annual addition to the European manpower stock, excluding the contribution from a possible positive net immigration factor, which we assume to be negligible. It appears from the table, that the annual addition to the stock is, on these expectations, going to decrease slowly during the present decade. It further appears that the proportion of women graduates to male graduates will be close to unity in the nineties.

The annual addition to the stock will be to a lesser or greater extent counterbalanced by loss of active manpower due to death-in-service or retirement from all causes. The former can be calculated with accuracy once the age distribution of active manpower is known and reliable mortality rates are at hand (as in this study). To calculate the latter, one must know the retirement trends. Table 3 gives the weighed average of the trends that were reported with individual countries.

Based on the information contained in tables 1-2-3, projections of the collective European manpower supply may be obtained by the algorithm described earlier.

Prognosis for manpower supply 1990-2010

In Figure 2, European medical manpower supply has been projected using the data described in the foregoing section as input to the prognosis model (supply algorithm). Both the total stock of live physicians including those retired, and the active workforce, are going to increase further, although it is visible from the slope of the curves, that growth of supply is getting progressively slower during the prognosis period. This is perceptibly more pronounced with the workforce, than with the total stock. By the year 2000, the lower curve (workforce) becomes almost horizontal, indicating complete arrest of growth. In Figure 3, the prospective annual rate of growth of the workforce has been calculated on selected calendar years. The figure displays a rapid decline from 2,8 per cent p.a. in 1990, over 1,85 per cent p.a. in 1995 to less than a half per cent p.a. by the turn of the century. Thereafter, the annual growth rate attains zero value.

The decline in growth rate is so pronounced that it obviously cannot be explained solely by the rather modest decline in the annual addition of fresh physicians which appears from table 1. The proportion of women physicians to all physicians will increase steadily (Figure 4). By the year 2000 just over 1 in 3 physicians will, according to the projection, be female, up from present approximately 1 in 4.

In Figure 5, the projected age-distribution of the workforce is displayed as a function of 5-year intervals in time, and compared with present (1990) age distribution. The curves display a pronounced "right-shift" with time, which reflects progressively decreasing numbers in the lower age intervals, and progressively increasing numbers in the higher age intervals. This might aptly be termed progressive "seniorisation" of the physician stock. The predicted annual loss of professionally active physicians due to either death-in-service or retirement due to all causes appears from Figure 6. This represents, statistically speaking, the number of new opportunities that would be at disposal annually, even at zero demand growth, to those entering the profession from universities or from abroad. A steep increase in this number can be discerned from the mid-nineties onwards. By the year 2000, the figure will be approx. 50 per cent higher, than today, and by the year 2010 it will have reached more than double its present value. This is the "hidden" variable which explains mathematically, together with the more modest expected decrease in university output, the steep decline in annual growth rates observed in Figure 3.

The balance between supply and demand

In Figure 7, the conditions for the emerging equilibrium between supply and demand during the course of the nineties have been analyzed by studying the effect of various demand-growth alternatives (2.0; 2.5 and 3.0 per cent p.a.) against the projection for supply growth which we obtained in this study. The graph displays, as a function of time, the result of the calculation $x = (\text{supply} - \text{demand})$. If $x > 0$, there is an excess of supply over demand, i.e. unemployment. If $x < 0$ there will be unfilled posts (vacancies). If $x = 0$, demand equals supply. There is a present (1990) excess of supply over demand corresponding to just over 62,000 physicians which is reflected at the origin of the curves.

One may conclude from inspection of Figure 7, that, e.g., an average annual 2 per cent demand growth would lead to a moderate rise in the physician surplus (unemployment) before 1995. However thereafter such growth would be sufficient to get unemployment figures down. A 2,5 per cent annual growth in aggregate demand for physicians would initially only suffice to stave off a further rise, but if sustained would consume all unemployment before the end of the decade. The critical growth, i.e. the average annual demand growth which would exactly be enough to achieve balance by the year 2000, appears to be a little less than 2,5 per cent p.a. (2,3%). An important lesson to be taken from Figure 7 is, however, that the effect of a given annual demand growth in bringing down unemployment becomes much more pronounced in the latter half of the nineties than in the first half. Again, this only becomes understandable

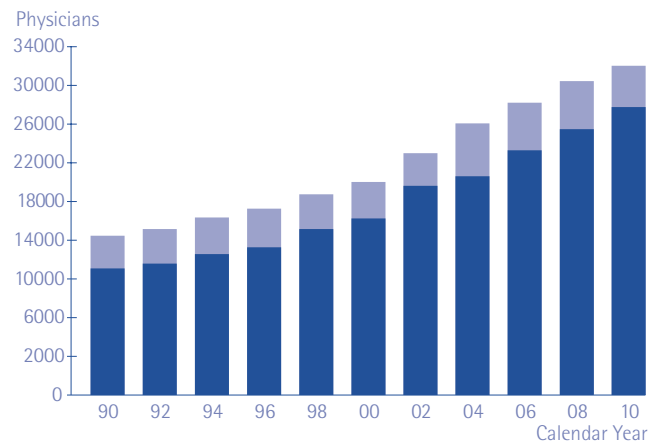


Fig.6. Predicted annual loss of professionally active physicians due to either death-in-service (top bars) or retirement due to all causes (bottom bars).

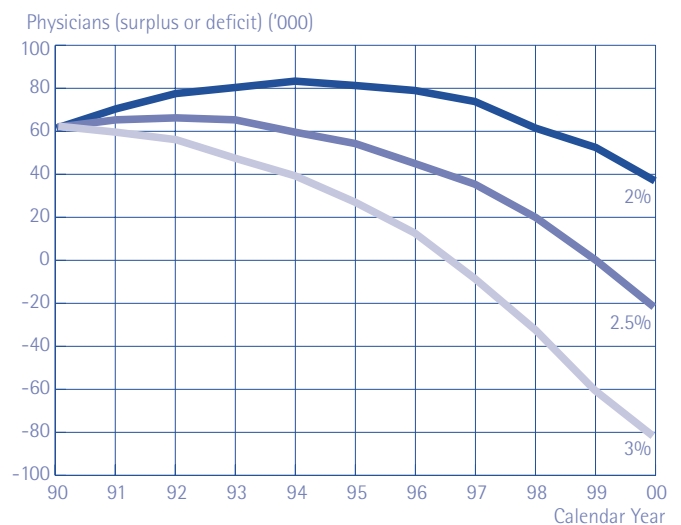


Fig.7. Predicted surplus or deficit of physicians 1990–2000 on various demand growth assumption: 2.0% p.a. (upper), 2.5% p.a. (middle) and 3.0% p.a. (lower).

when the combined effect of the findings reported in table 1 and Figure 6 is taken into consideration.

A further proof that the underlying dynamics of the manpower situation changes profoundly as the century draws to an end may be taken from consideration of Figure 8. The figure illustrates that beyond year 2000, a balance between supply and demand could be maintained at an annual demand growth in the range 0–0.5 per cent p.a. For these calculations the program was fed the assumption of a surplus corresponding to 10,000 physicians by the year 2000, which might be considered arbitrary; however, the principal findings of the figure is very little influenced by the exact size of that surplus. The prediction hinges on the further assumption that university output in the period studied will remain stationary and equal outputs 1997–1999, however again the principal finding that much lower growth rates would be required after year 2000 to absorb a given supply growth, than would be required in the first half of the nineties, would not be altered by a change in that assumption.

A comparison between individual countries

So far, we have treated the European medical manpower as one

collective stock, using weighed means of reported parameters (where relevant) to yield the supply projection. The results are the same or almost the same as would be obtained by first doing the prognostics on each country in isolation, and afterwards calculating weighed means of the projected results,

although the latter would be more tedious. As we did, however, during the course of this study, calculate individual supply projections for the first half of the prognosis period (1990–2000), we were able to verify that the two procedures yield results which differ only insignificantly between them.

Notwithstanding this, there remains to be decided to what extent individual countries differ from each other and from the main trend.

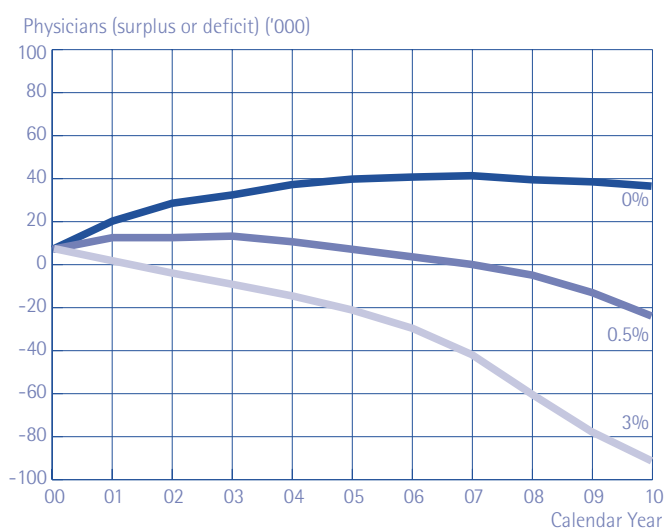


Fig.8. Predicted surplus or deficit of physicians 2000–2010 on various demand growth assumptions: 0.0% p.a. (upper), 0.5% p.a. (middle), and 1.0% p.a. (lower).

PHYSICIAN UNEMPLOYMENT

In table 4 a number of pertinent findings concerning the countries we studied have been summarized. From these findings it is obvious that physician unemployment is extremely unequally distributed amongst the countries, ranging from a modest shortage of physicians in several nordic countries, to the very high unemployment figures in Italy, Germany, Spain, Austria and the Netherlands. These five countries between them account for almost all of the unemployed physicians which has been illustrated in Figure 9. It should be observed, however, that the medical populations in those five countries amount to a combined 57% of the physicians in West Europe, as may also be calculated from table 4.

Table 4. Synopsis of data concerning individual countries

	Manpower ¹	Pop doc ²	Supply Intensity ³	Unemployed ⁴	Critical demand gr. 1990–1999 ⁵
The Nordic Region					
Denmark	14505	340	2.55	0.5	0.9
Finland	12317	402	4.10	-3.0	2.0
Iceland	743	340	5.07	0	2.5
Norway	11588	364	2.69	-2.0	1.0
Sweden	23565	360	3.23	-4.0	1.5
The North-West Region					
Ireland	5571	628	3.05	0	1.0
United Kingdom	101396	562	3.73	0.3	1.0
Netherlands	29867	492	3.61	5.7	2.0
The West Region					
France	164022	336	2.88	0.6	1.5
Belgium	35000 est*	290 est	–	–	–
The Central Region					
Austria	21572	352	4.33	9	3.5
Germany	192480	332	5.49	8	3.5
Switzerland	20584	321	3.67	0.3	2.0
The South Region					
Italy	230265	248	2.46	17.3	3.1
Portugal	24503	389	1.76	-0.6	0.5
Spain	131684	296	3.19	4.6	2.5
Greece	35000 est*	290	–	–	–
All Countries	1.054 mio.	338 (w) ⁶	3.46 (w)	6.1 (w) ⁷	2.3 (w)

¹ Workforce, incl. unemployed physicians.

² Ratio: heads of general population per head of physicians in workforce.

³ Mean annual prospective (1990–2000) addition to stock as per cent of workforce of 1990.

⁴ Expressed as percent of workforce.

⁵ Defined as the average annual demand growth 1990–2000 which would be necessary to consume prospective supply growth as well as existing surplus of manpower by the year 2000.

⁶ "w"= weighed average, using manpower size as weight.

⁷ Observe: negative values (= vacancies) not included in the weighed average.

* Est. on the basis of WHO-and OECD-data for 1987.

CRITICAL PROSPECTIVE DEMAND GROWTH

As might be expected from these findings, the critical demand growth in the nineties – i.e., the demand growth that might just consume all existing unemployment as well as new additions to the stock before the year 2000 – also varies considerably from the weighed average (2,3 per cent p.a.) which was found with the projection of the collective stock (cf. also Figure 10). Thus, in Italy, Germany and Austria the critical demand growth would have to be 3–3.5 per cent p.a. in the nineties, and this conceals the fact that the growth requirement would be higher in the first part of the decade, than in the latter.

SUPPLY INTENSITY

By "supply intensity" we shall understand the annual input of new physicians to a country's manpower stock, expressed as a percentage of the existing stock (it thus depends mainly on student intake to universities). Other things held equal, one would expect countries where unemployment runs high to reduce the supply intensity either through restrictions at the university level or through the market mechanism. However, when prospective average supply intensity for the period 1990–2000 were calculated for those countries and compared with a weighed estimate of supply intensity in all countries studied, the results shown in Figure 11 were found. Excepting the Netherlands, they all displayed higher intensities than the European average.

PHYSICIAN DENSITY

We found that, on average, there were by 1990, 338 heads of general population per head of physician (table 4). However the nations range was wide. A group of low density countries (Ireland, United Kingdom and Netherlands), as well as a group of high density countries (Italy, Spain – probably also Greece and Belgium), could be discerned. The remaining ten countries (The Nordic countries, France, Germany, Switzerland and Portugal) scatter around 350 heads of population per physician. The five countries hit by gross physician unemployment were distributed on all three groups (Figure 10).

WOMEN PHYSICIANS

An increasing proportion of women physicians to all physicians was found with all countries studied. In almost all countries, the

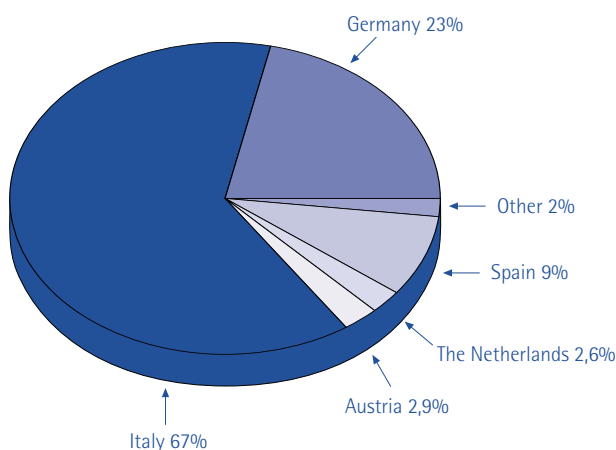


Fig. 9. Distribution of unemployed physicians (1990) according to country.

percentage of women in the workforce attained 25–30 (not shown). The exceptions were Finland, Portugal and Spain, where that percentage was close to 40.

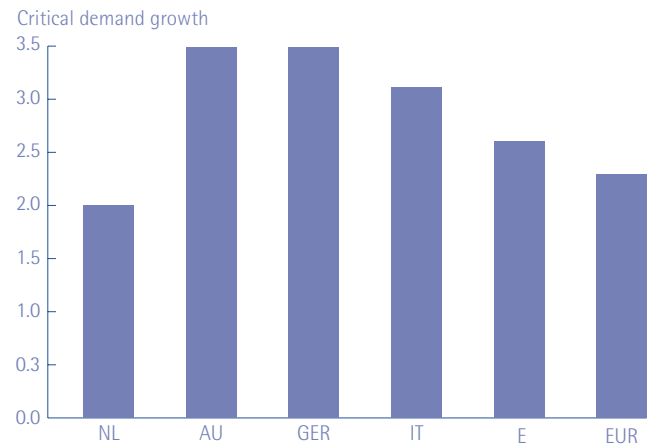


Fig. 10. Prospective critical demand growth in countries affected by unemployment, compared with European weighed average.

AGE DISTRIBUTION OF WORKFORCE

The trends towards increasing "seniorisation" of the workforce, which is shown in Figure 5, were also found in most countries (not shown). The exceptions were Iceland, Ireland and the UK where large fluctuations in student intake have not occurred in the past, and no great reduction is expected in the nineties.

DISCUSSION

Any conclusions to be drawn from our findings would have to take into account the uncertainty which might be attached to the raw data concerning each country. With some countries, e.g. Italy and Spain this uncertainty is probably large on some parameters. With Italy, an age distribution of the workforce had to be estimated on the basis of 5-annual output of laureati 1960–86, and prospective output of physicians on the basis of reported number of students of 32 medical schools. The reason for accepting such estimates is simply that no better estimates seem to be at hand presently. With this exception, however, data concerning the size and coarse age- and sex distribution and approximate number of unemployed physicians should

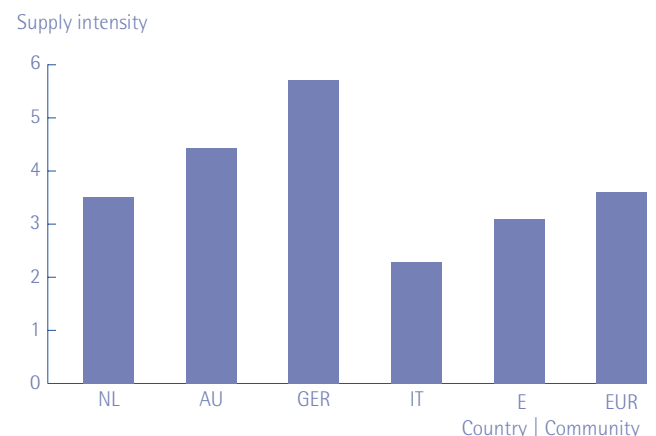


Fig. 11. Prospective annual average 1990–2000 supply intensity in countries affected by unemployment, compared with European weighed average.

probably cause no great concern. They stem in all instances from the single most representative medical association in the country and they are not, to our knowledge, contested to a significant degree at home. Retirement patterns are known with considerable accuracy on publicly employed physicians, but a greater uncertainty would generally attach to retirement of self-employed physicians. However, an error on this estimate cannot alter the shape of the future, which is often overlooked – it can only, so to speak, act to "contract" or "expand" the time axis and probably, as the estimate is accepted by the national association, the magnitude of the error would probably not exceed $\pm 1-2$ years. Finally, errors of estimate would probably not go all in the same direction in different countries.

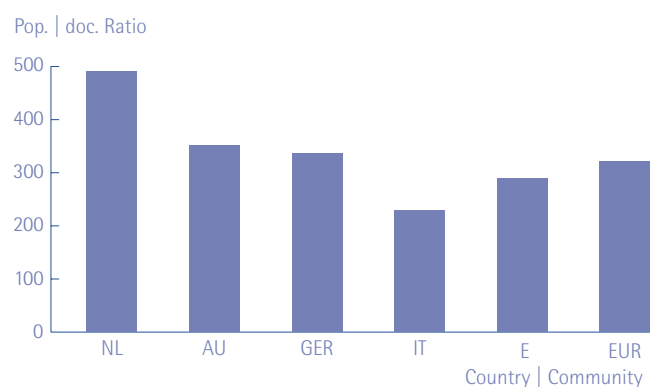


Fig. 12. Population/physician ratio in countries affected by unemployment, compared with European weighed average.

With regard to estimates of future output from medical schools, it should be observed that targets are now operated by governments in all of the fifteen countries which participated in this investigation, which – other things equal – should better the estimate. However to what extent such targets might be circumvented by universities in some countries is probably not yet settled. Notwithstanding this, as we were generally able to obtain the retrospective numbers on student intake 1980–1989, as well as output numbers for that same period which allowed for estimates of past study completion rates to be made, we feel entitled to attach a certain confidence to our assumptions of prospective outputs at least running up to and including 1996–97. Neither can any present or future government decision to alter intake change output in that period, owing to the long production time for a doctor.

With the reservations stated above, we venture the following interpretation of our findings.

REVERSAL OF FUNDAMENTAL TRENDS

The study indicates, that a major reversal of long standing trends on the manpower supply side will occur shortly after year 2000: ever since the second world war, annual input of new physicians has by far exceeded the annual output from the system, meaning manpower has been steadily growing bigger. By the turn of the century, however, annual growth of the European workforce will have dropped to one half per cent by year 2005, and input and output will tend to cancel each other out in the equation. The European medical manpower would

then, probably for the first time in its history, stop growing. This is the lesson to be taken from the findings shown in Figure 2 and Figure 3. Were nothing changed, the workforce would even after that begin to contract. Of course it will never come so far in reality, because university output will probably not remain fixed at the level which we could project for the end of the nineties, but the projection of what will happen on the "no change" assumption serves to reveal the force of an underlying change which is going to be increasingly felt in the second half of the present decade: the rising tide of efflux from the system (Figure 6). We are here witnessing a late effect of the big bang which began when, in the sixties, increasing numbers moved out of university and into the profession's ranks.

Practically all of the countries we studied will discover reversal of trends described above – some a little later, some a little sooner – the notable exception being the United Kingdom where manpower has ever been strictly controlled, and its growth slow.

MORE WOMEN, AND AGEING OF THE PROFESSION

Other basics that were discovered in our investigation were that everywhere the proportion of women physicians is increasing, and almost everywhere the profession is undergoing increasing "seniorisation".

Today, one-in-four physicians is a woman, in ten years that will be one-in-three. Both developments may influence the demand-supply equation. However this was not considered in more detail.

TOWARDS A BALANCE BETWEEN SUPPLY AND DEMAND?

Our study found, that unemployment is very unequally distributed on countries. In none of the five countries found to be affected by gross unemployment (Italy, Germany, Austria, Spain, Netherlands) could a regaining of balance be calculated to occur in the first half of the decade. Nothing can be done, regrettably, to rectify that, owing to the long production time of physicians at the university level. In all but one of them, the finding of a prospective supply intensity well above the average European level clearly indicates that planning and control is lacking efficiency. To achieve balance there by the year 2000, demand growth in the nineties would have to be sustained at close to the levels experienced in the nineties which we think would at best be a very uncertain expectation. To reduce student intake by a further 10–15 per cent 1992–1996 accompanied by a close monitoring of the situation would obviously be a no-risk operation to society, and would seem to be what is required to achieve balance in the course of this decade. In the absence of such further regular' On balance will very probably only be achieved at some point in the time interval 2000–2005, however it is difficult to see what any party could gain from prolonging the agony.

The final observation to be made from our findings would appear to be, that in those ten countries where unemployment is presently not significant, it is likely not going to emerge in the nineties on the existing of assumptions.

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The Prognosis Holds True: same trend as five years ago

Steen Poulsen & Bo Rahbek Christensen

Copenhagen 1996

1. SUMMARY

In an attempt to establish a comprehensive presentation of the medical manpower situation in Europe, the PWG conducted a study in 1991 in which professionals from the field of medicine in seventeen countries were given the task of reporting key parameters on the medical manpower situation in their country according to a standard format. The same procedure has been applied in this update of the previous study.

In 1994, the European medical workforce amounted to 1.148 million physicians, corresponding to 314 patients per active physician (nation range 231–610). Women physicians comprised 31% of that total. 7,56% of the workforce (87.950 physicians) were unemployed (nation range 0–24,4%). Of the unemployed doctors, 67% were Italian, 17% German, 7% Spanish, 3% Austrian and 2% Dutch. Unemployment was mainly confined to these five countries accounting for 96% of unemployed physicians in Europe.

The average demand growth rate required to absorb all unemployed doctors before year 2000 is 2,7% per annum. In the countries most affected by unemployment, the growth rate would have to be between 2,96% and 5.5%.

The supply growth rate (production of physicians) is expected to sharply decline from 1,98% in 1995 to 0,72% in 2000 and 0,09% in 2005. By the turn of the century, the physician workforce will be approximately 1.25 million. The workforce will also show an increasing "seniorisation".

The prognosis established in 1991 has shown to be very accurate and a valid tool. It calculated that the required growth rate should be 2,3% in order to establish equilibrium by the turn of the century. The actual growth rate was approximately 0,2% p.a. from 1990–1994; therefore, a demand growth rate of 2,7% p.a. is needed to secure balance by the year 2000.

2. INTRODUCTION

The present study is an update of the PWG Manpower study conducted under the auspices of the Permanent Working Group of European junior Hospital Doctors in 1991, which was pub-

lished in various national medical journals in 1991 and in a single publication by the PWG the same year. The purpose of this study is primarily to examine whether the model used in 1991 is still applicable and to investigate whether it produced a valid and confident manpower prognosis. Secondly, the PWG wished to update the 1991 study to get a current picture of the manpower situation in Europe.

The main purpose of the 1991 study was to establish an internally consistent manpower database and to set up a 10-year prognosis with a particular view to the prospects of balance between physician supply and demand at European level.

At the beginning of the nineties, the opinion was widespread that to avoid mass unemployment, it was necessary to reduce intake in the medical schools; the intention of the 1991 study was to contribute to the discussion by investigating whether it was realistic to expect mass-unemployment at all.

When initiating a cross country investigation, it is important to be aware of the existing difficulties when comparing the data of healthcare related issues which are not readily comparable. As with the previous study, it is a recognized problem in the literature of manpower studies and planning that data are not readily comparable. Most manpower registers have been produced to serve an administrative or planning purpose. For this reason, even country comparisons between databases can cause problems, and with cross country comparisons the problems only increase. There are different examples of comparisons between different databases. For instance, the certifying body's file may or (more often) may not reveal the extent to which a person is professionally active, or indeed whether he or she is alive.

Professional organizations (scientific societies, medical associations, medical trade unions) may each target only part of the medical population. Even a simple sum may cause problems, because of possible overlap, and the problems of target coverage and policy considerations still remain.

One may also find examples of only the chief physicians being counted, not their postgraduate apprentices, which presumably is left over from ancient guild traditions.

Apart from the above, there is also the problem that prognostic studies of medical manpower being unavailable or unpublished in a number of European countries. When they are found, their method and underlying assumptions often are not specified. Therefore, to overcome such difficulties, it was necessary to harmonize definitions and to apply the same prognostic algorithm for all countries included in the study.

3. METHOD

Data collection and "default" criteria for data. Raw data for the study were obtained from professionals in the field of medicine with good access to manpower data in their respective countries. The contact persons were appointed by the national member associations to the PWG. Their task was as field analyst (and co-authors of the national studies) to critically review national data sources, and to compute and recast them in accordance with definitions contained in a protocol issued in 1994.

Information was sought on the total number of live physicians, their age and sex distribution, mortality rates, retirement and temporary inactivity trends, university input and output (prospective and retrospective) distributed according to age and sex, study duration and completion rates, emigration and immigration trends, and vacancies and both underemployment and underemployment. Data were reported to a single compilation unit in Copenhagen, where central analysts would feed them into the computer program described below.

Various checks on the internal consistency of the data were conducted, e.g. whether reported age distribution of manpower was consistent with reported outputs from universities over the last decade. After the first run, the central analysts would often request additional information from the field analyst(s), and the process was repeated until all areas were covered.

With countries where only piecemeal information on one or more main parameters could be given in the first run, the central analyst would suggest values or sets of values based on backwards computation from other data or based on findings from other countries e.g., mortality rates for doctors. In practice, the field analyst would reject suggestions only in case he or she could produce better values in a new search. Thus, the described procedure supplied a default criterium for 'soft' data when 'hard' data could not be ascertained.

3.1. Standard format definitions

The Total Medical Population (TMP) in a country is defined to include all holders of a university degree in medicine who were alive and residing in that country by the time of data collection, whether professionally active or not, and regardless of their nationality. This count is, by definition, a head count, thus being directly comparable from country to country. It was broken down according to 5-year age intervals and sex.

Professionally Active Manpower (PAM) was defined as the "ready supply", i.e. after subtracting from TMP those permanently or temporarily retired from the labor market.

Retirement (permanent) trends may reflect compulsory retirement age or optional retirement age. In the latter case, doctors may choose to maintain professionally active status indefinitely, although their working hours decline as a function of age. A compound estimate of age-dependent decrease in activity ratio was therefore adopted estimating average activity of physicians of age $60 + i$ ($i = 0, 5, 10 \dots 30$), expressed as a fraction of average activity of physicians of age 50, and divided up by sex. These data were used as nodal points in the fitting of sigmoidal trend curves, whose limiting slopes were estimated from the shape of retirement trend curves in more well described countries. Point estimates were defined in units of professionally active manpower.

Temporary absence (TA) is defined, for each sex, as the proportion of all physicians of that sex who, on any date, would be estimated to be on prolonged leave due to e.g. maternity, military service, study leave in another country, sabbatical leave, fixed term appointments in another country. Temporary absence does not include absence due to short term illness or ordinary holidays.

3.2. Units of "supply" and "demand"

The supply of physicians, in the sense of "ready supply" of professionally active manpower, cf. above, was expressed in units of present average working time of physicians in a country (PAT-equivalents). We are aware that it is possible to comply with this definition even where average working hours are not known, as in the initial state PAT-equivalents simply equal head count of the ready supply. Where data are sufficiently detailed, PAT-equivalents may easily be transformed into full time equivalents. The demand for physicians is also expressed in PAT-equivalents. It was obtained by adding supply and number of vacancies and subtracting number of unemployed physicians. An unemployed physician was defined as any physician who, on a particular date is eligible for work, is actively seeking a medical post and yet is not working as a physician (PWG-definition). Europe was defined to comprise the seventeen countries which appear in table 4. Only Belgium and Greece did not participate in the study. As explained below, the data for France and Italy are estimates based on the 1991 Manpower study.

3.3. Computer processing of data

Data were analyzed in a DOS and WINDOWS-supported spreadsheet with print graph application (Excell 5.0) on a Personal Computer. An algorithm was designed using TMP as the fundamental variable, calculating $TMP-n \mp TMP-n+1 \mp TMP-n+2 \dots$ ($n =$ calendar year) by adding, at each arrow, expected 1-year input of newly qualified physicians and immigration while subtracting those who had died and emigrees. Professionally active Manpower (PAM) was obtained from TMP in a subsequent step, calculating $TMP-n \mp PAM-n$; $TMP-n+1 \mp PAM-n+1$; .. by subtracting, at the arrows, permanently inactive and temporarily inactive persons in accordance with the trends reported.

Where the total number of live physicians (i.e. including retired) could not be given with sufficient accuracy, the algorithm was used to "repair" the stock as to yield consistency with reported

retirement trends and workforce, including age distribution of the latter. This may be regarded as a purely technical thing which does not affect the prospective loss due to retirement or death-in-service.

For France and Italy, for various reasons, it was not possible to obtain new data, so the prospective calculation of the 1991 study has been used as the best alternative.

All calculations were done on male and female doctors separately, integrating results in the last step. The algorithm was further branched to yield other desired parameters than the above-mentioned e.g. unemployment ratio forecasts on various demand growth assumptions.

3.4. Mortality rates

The mortality rates used in this study were those established separately for Danish male and female physicians, which did not differ substantially from mortality rates in those countries where they were known (Sweden, United Kingdom and The Netherlands).

4. RESULTS AND EXPLANATION

4.1. Description of European Medical Manpower 1994

The findings which are pertinent to a description of the collective European stock of physicians as of January 1994 have been summarized in tables 1, 2 and 3; some of these findings have been further detailed on individual countries in table 4.

By January 1994, the number of professionally active physicians was 1.158 million (which includes two new countries Estonia and Lama) of which 34% were women and 87.950 (7,53%) were

a possible net-immigration factor, which we assume to be negligible. It appears from the table that the annual addition to the stock, ceteris paribus, will decrease slowly during the present decade. Further, it is remarkable how well the prediction from the 1991 study is in accordance with the real 1994 increase (In 1991, the expected increase was 38.286 and the real figure is 38.838).

Table 3. Assumed age-dependent decrease in compound activity ratio of total medical population

Age interval	Men	Women
55–59	0.894	0.835
60–64	0.672	0.577
65–69	0.299	0.183
70–74	0.114	0.023
75–79	0.024	0.002
80–84	0.0	0.0

The retirement trends in Europe are similar to the figures from the 1991 study. It is acceptable to use the same figures again because the actual situation probably will show a generally decreasing retirement age. By using the old figures, we probably have a too low retirement frequency and, thereby a marginally higher manpower stock.

Based on the information contained in tables 1, 2, and 3, projections of the collective European manpower supply may be obtained by the algorithm described earlier.

4.2. Prognosis for manpower supply 1994–2004

In figure 2, European medical manpower supply has been projected by using the data described in the previous section as

Table 1. Prospective annual additions to European manpower stock (University output). All entrants assumed to be aged 25–29

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
University output	38.883	37.077	35.796	34.098	32.951	29.313	29.526	26.561	26.194	25.833

Table 2. Population description 1994: assumed values for initialising the prognosis

Total Medical Population (TMP), Women fraction	1.357 million —
Professional active Manpower (PAM), Women fraction	1.148 million 0.31
Physician unemployment as fraction of PAM	87.950 0.075
Temporary inactivity, fraction	0.03

unemployed physicians.

In order to predict future growth of the medical workforce, it is indispensable to know the annual output from universities/medical schools. Assessment of this parameter for each country was based on knowledge of government targets for student intake or the passing of an examination after the first year (numerus clausus). Table 1 gives the total sum of the expectations for each country and thus represents the expected total annual addition to the European Manpower stock, excluding the contribution from

input to the prognosis model. Both the total stock of live physicians including those retired, and the active workforce is going to increase further. However, it is evident from the slope of the curves that the growth of supply is getting progressively slower during the period. Again, it is remarkable how well the prognosis of the 1991 study predicted the actual situation in 1994.

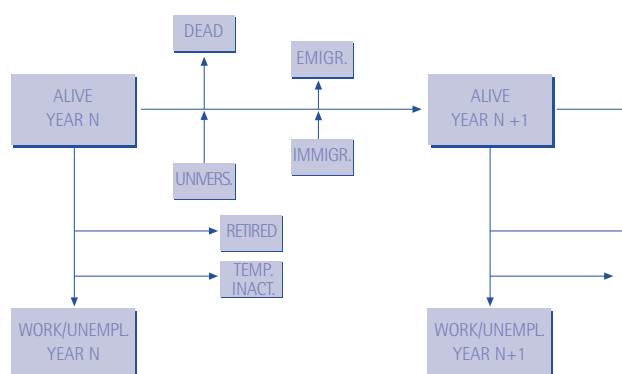


Figure 1. The supply algorithm applied in the PWG Manpower Study.

The manpower curve of the 1991 study predicts that the manpower stock in 1994 will be around 1.14 million, which is absolutely correct calculating the 1994 stock to be 1.148 million. The growth in manpower stock is still expected to be almost zero after the year 2000. The curve gets almost horizontal after year 2000, indicating almost non-growth.

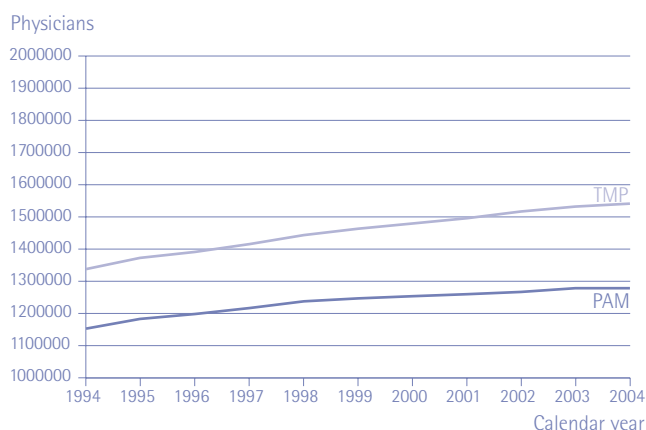


Figure 2. Predicted growth of European physician supply 1994–2004.

In Figure 3, the prospective annual rate of growth of the workforce has been calculated on selected calendar years. The figure displays a rapid decline from 1,98% in 1995 over 0.72 by the turn of the century and 0.09 by the end of the prognosis period. The figures of the 1991 study for the same years were 1,85%, 0,6% and less than 0,1%. Again we must conclude that the 1991 prognosis seems to hold.

The fraction of women physicians will continue to increase from 31% to around 34%.

Figure 4 shows the projected age distribution of the workforce as a function of 5-year intervals in time, compared with the present (1994) distribution. The curves show a pronounced "right" – shift with time, which reflects the progressively decreasing numbers in the lower age categories, and progressively increasing numbers in the higher age categories. This trend can be termed the "seniorisation" of the medical workforce.

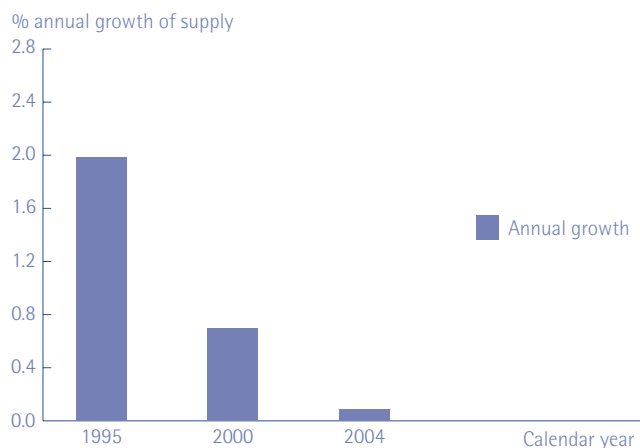


Figure 3. Predicted annual growth rate of European medical manpower related to selected calendar years.

4.3. The balance between supply and demand

In Figure 6, the conditions for an emerging of equilibrium between supply and demand during the nineties have been analyzed by studying the effect of various demand-growth assumptions (1,5; 2; 2,5 and 3% p.a.) against the projection of

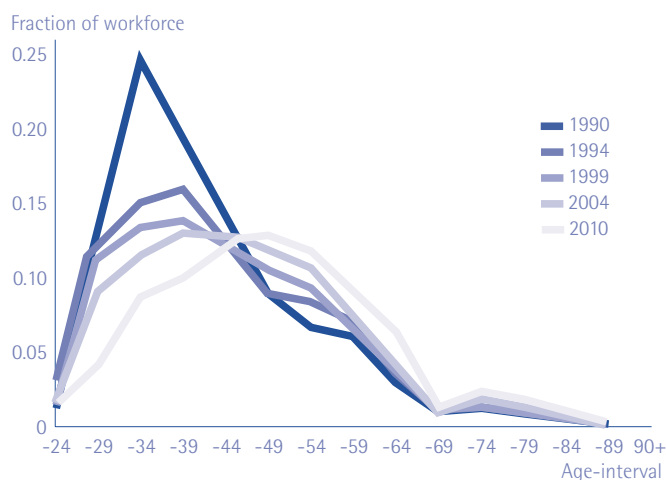


Figure 4. Predicted distribution of manpower on 5-year intervals for 1999, 2004 and 2010 compared with 1990 and 1994 distributions.

supply growth which we obtained in this study. The graph displays, as function of time, the result of the calculation $x = (\text{supply} - \text{demand})$. If $x > 0$, there is an excess of supply over demand, i.e. unemployment. If $x < 0$ there will be unfilled posts (vacancies). If $x = 0$ demand meets supply (equilibrium). There is at present (1994) an excess of supply over demand corresponding to approximately 87.950 physicians which is reflected at the origin of the curves.

With an average growth of 1,5% p.a., unemployment will increase, but after approximately 4 years (1998–1999) will decline. An aggregated demand growth rate of 2% p.a. will immediately diminish the surplus of doctors and will eventually establish balance between demand and supply at the beginning of the next century. The critical growth rate which would establish equilibrium by the year 2000 was, in the 1991 study, calculated to be approximately 2,3%. However, the growth in employment in the period was approximately 2,0%¹ which resulted in an increase of unemployment (the physician surplus increased from 64.500 in 1991 to 87.950 in 1994), which was also predicted would happen if growth was only 2% p.a. If this growth continues, equilibrium will be reached in 2003.

The annual critical demand growth rate necessary to secure equilibrium by the end of the century is increased from the previous study until now. The necessary demand growth rate p.a. has been calculated to be 2,7% p.a., a slight increase from the 2,3% p.a. in the earlier study. This increase is explained by the fact that the actual growth between 1990 and 1994 never reached the necessary level as described above.

¹ The European Commission: Employment in Europe, Luxembourg 1995, p. 60 (graph 49).

4.4. A comparison between individual countries

4.4.1 Physician unemployment

In Table 4, a number of findings concerning the countries included in the study are summarized. Physician unemployment is very unequally distributed amongst the countries studied ranging from shortage and modest unemployment in the Baltic region to relatively high unemployment figures in Germany, Spain, The Netherlands, Austria and Italy. These countries account for almost all unemployed physicians (Figure 7). However, they also account for the major part of physicians in Europe – approximately 62%.

As a result of the very unequal distribution of physician unemployment in Europe, it is interesting to investigate how the situation would develop not including the unemployed Italian physicians (Figure 8).

Figure 8 reveals that an annual critical demand growth of 2,3% will establish equilibrium by the turn of the century.

4.4.2 Critical prospective demand growth

As with unemployment, the critical demand growth (i.e. the demand growth that might consume all existing unemployment as well as new additions to the stock before the end of the investigated period) varies considerably from the weighed average (2,7% p.a.).

In Italy, Finland, Austria and Spain the critical demand growth p.a. would have to be between 2,76% p.a. and 5,5% p.a. for the remainder of the nineties to secure equilibrium by the year 2000, while Sweden, Germany and The Netherlands would all need a critical demand growth under the European weighed average in order to achieve near-balance by the end of the century. Although Germany would require an annual demand growth rate just above the EUR16 demand growth rate (Figure 9).

Table 4. Synopsis of data concerning individual countries

	Manpower	Pop doc ¹	Supply Intensity ²	Unemployed (% or workforce)	Critical demand gr. 1994–2000 ³
The Baltic Nordic region					
Estonia	5.255		1.6	–	-3.3
Latvia	7.992		3.9	–	1.8
Denmark	15.000	358	3.1	- 2.6	0.6
Finland	13.809	368	3.25	2.6	2.76
Norway	10.658	384	2.8	0.1	1.6
sweden	26.153	335	2.6	2.2	1.8
Iceland	811		3.46	0	1.73
The North-West Region					
Ireland	5.858	610	0.9	0	-4.6
United Kingdom	113.136	510	2.46	-0.9	0.08
Netherlands	37.179	414	2.26	4.6	1.5
The West Region					
France (est.)	180.322	321	–	0.5	1.6
Belgium	–	–	–	–	–
The Central Region					
Austria	25.663	313	3.1	8.9	3.6
Germany	285.923	282	2.65	5.2	2.5
Switzerland	24.793	–	5.9	1.3	3.7
The South Region					
Italy (est.)	247.021	231	–	24.5 ⁵	5.5
Portugal	22.621	437	1.4	0	-0.2
Spain	126.017	310	2.8	4.7	2.96
Greece	–	–	–	–	–
All Countries	1.148.211	314 (w)	2.72 (w)⁶	7.56 (w)⁴	2.7 (w) 2.3 (w)⁷

¹ Ratio: heads of general population per head of active physicians.

² Mean annual prospective (1994–2004) addition to stock as percent of workforce 1994.

³ Defined as the average annual demand growth 1994–2000 which would be necessary to consume prospective supply growth as well as existing surplus of manpower by the year 2000.

⁴ Vacancies are not included in the average.

⁵ The Lancet, vol. 346, December 9, 1995. p.1552

⁶ Excluding France and Italy (figures not available).

⁷ Calculating the critical demand growth rate excluding the Italian figures.

Negative values can occur concerning the critical demand growth. When the number of professionally active is declining (Estonia, Ireland and Portugal).

4.4.3 Supply intensity

By "supply intensity" is understood the annual input of new physicians to a country's manpower stock, expressed as percentage of existing stock. *Ceteris paribus*, it is to be expected that countries with high unemployment figures will reduce the supply intensity either through restrictions at university level or market mechanisms.

4.4.4 Physician density

We found the European average doctor-patient ratio by 1994 to be 314. It is possible to identify a set of high density countries: Austria, Germany, Italy and Spain. Low density countries are United Kingdom, Ireland, The Netherlands and Portugal. The rest of the countries vary between 320–400. The density in

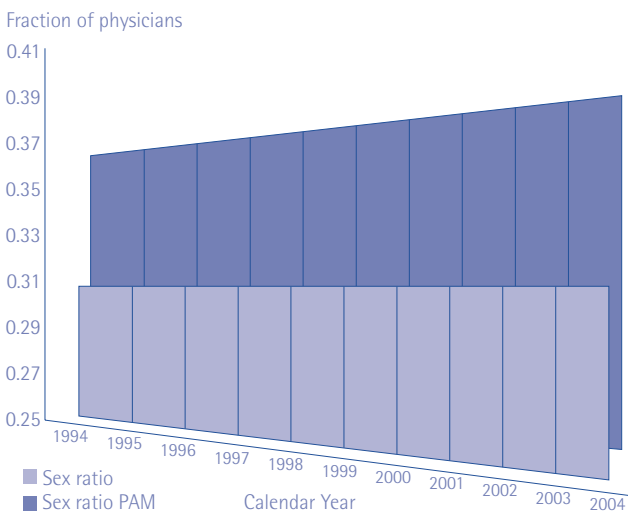


Figure 5. Predicted change in proportion of women physicians to all physicians 1994–2004.

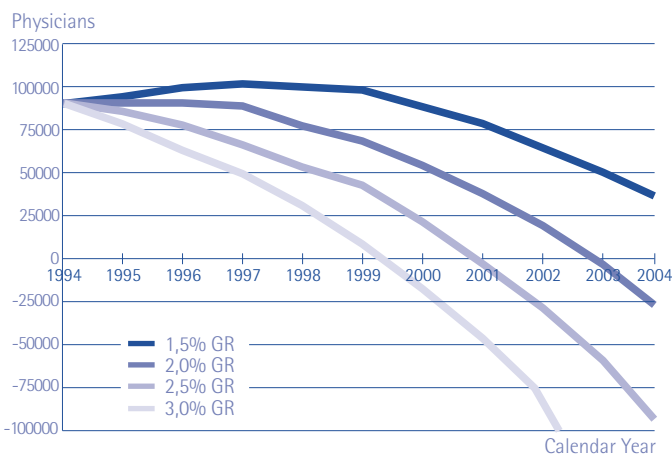


Figure 6. Predicted surplus/deficit of physicians 1994–2004 on various demand growth assumptions.

Germany increased drastically in the period between the previous study and this study. This is due to the relative increase of physicians as a result of the reunification of Germany.

4.4.5 Women physicians

An increasing proportion of women physicians was found in all

countries with the exception of Lama and Estonia which due to former Soviet Union policies and traditions already have a high proportion of women physicians and predictably will experience a decline in their proportion.

In almost all countries the percentage of women in the workforce reached 30–35%, while in some countries the proportion was above 40%, namely Spain and Finland, and in Portugal even above 50%.

5. DISCUSSION

Any conclusions to be drawn from our findings would have to take into account the uncertainty which might be attached to the raw data concerning each country. With some countries, e.g. Italy and France, there is a degree of uncertainty because the data are based on the projections made in the 1991 study. The reason for accepting such estimates is simply that no better estimates were available and it has been shown that the prognosis model is very exact.

In addition to these concerns, the fact that data are missing from Belgium and Greece is, of course, a problem. Their participation would obviously make the results more valid, but on the other hand, all considered, their inclusion would only have a limited effect on the overall picture. The remaining data concerning the size and age and sex distribution of the medical population should not cause any problems. They stem from the single most representative association in the country and the data are not contested to any significant degree at home.

Retirement patterns all over Europe are generally known for the publicly employed physicians. For self employed physicians the trend is more uncertain. In any event, the errors occurring as a result of these uncertainties will be marginal. In some countries,

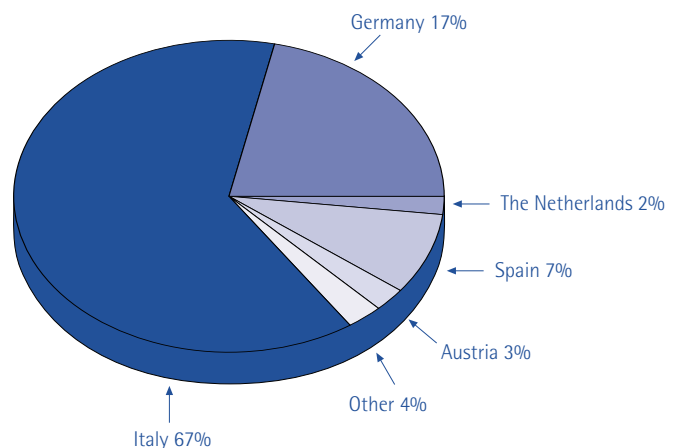


Figure 7. Distribution of physician unemployment according to country 1994.

the most recent trend is that the retirement age is falling and by using the "old" retirement trends, we tend to underestimate the effect of an earlier retirement trend, thereby only expanding the time axis (Reaching equilibrium at a later stage).

In most of the countries involved in this study, the input and output of universities is administered and regulated by the government. It is of course very difficult to be sure that the policies

on the intake and output are not changed, but if policies are changed, the effect will take place at a later stage because of the long production time of a doctor.

5.1. Evaluation of the prognosis model

One of the main purposes of updating the previous PWG manpower study was to investigate the predicted trend of a decline in the supply of physicians and whether it is realistic to expect equilibrium, nearbalance or even a shortage of physicians by the turn of the century. When trying to answer these questions, we would automatically evaluate the prognosis model developed by PWG in 1991. To our satisfaction, it seems that the predictions/projections made in 1991 can be confirmed by the actual figures for 1994.

The growth of the medical manpower stock is very close to the one expected in 1991. The annual growth rates of the manpower stock for the years 1995, 2000 and 2004 are along the lines proposed in 1991. The age distribution is following the "right" – movement predicted in the previous study and finally the curves showing the decrease of the medical manpower surplus and eventually establishing equilibrium. However, it seems that the equilibrium will not be reached by the turn of the century, but has been postponed approximately 3 years. The critical demand growth rate calculated in 1991 was to be 2,3% in order to establish equilibrium by the turn of the century. The actual demand growth rate has been approximately 2%² resulting in an increase of unemployment from 1991–1994, thereafter decreasing, thus postponing equilibrium to 2003 with a continued demand growth rate of 2% p.a. When excluding Italy from the calculation, a continued annual demand growth of 2,3% will secure equilibrium by the end of this century (Figure 8).

² Ibid p. 60

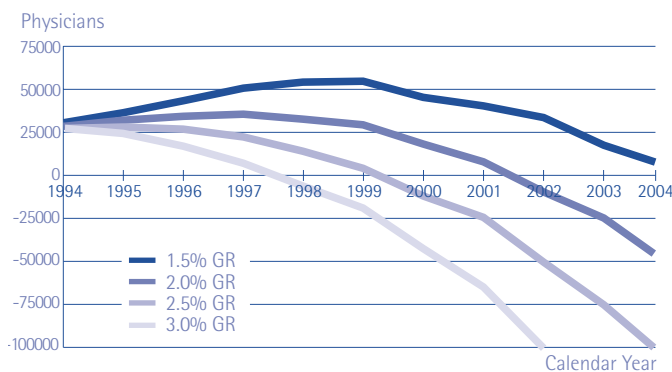


Figure 8. Estimated surplus/deficit of physicians on various demand growth assumptions 1994–2004, excluding the Italian figures.

The conclusion drawn from the study in 1991 seems still to be valid. The trend is that for the first time since World War II, there is a possibility of having equilibrium at the beginning of the next century. The growth of the manpower stock by the end of the prognosis period will be close to zero (0,09%). That a negative growth should occur is highly unlikely because the output from the universities will not remain at the same level. There are countries in which the size of the medical manpower

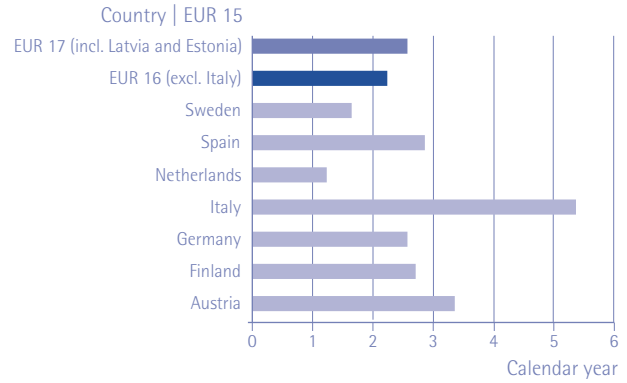


Figure 9. Prospective critical demand growth in countries affected by unemployment (above 2%), compared with European weighed average.

will be reduced in the coming years, ceteris paribus, Portugal, Ireland and Estonia.

The increase of women physicians will continue and be very close to 35% by the end of the investigated period. In every country, there is an increasing trend, except for the two newly included countries Estonia and Lama, where, due to policies and traditions in the former Soviet Union, the fraction of women is above 80%, but falling. Together with the increasing fraction of women, every country is experiencing an "aging" of the medical population.

For each of the countries still suffering from high unemployment rates, reaching equilibrium is still a distant dream. It is the same countries which suffer from mass unemployment in 1994 as in 1991 (Italy, Spain, Austria and Germany) and it will demand high demand growth rates to establish equilibrium within the next ten years. The Netherlands also has a mass unemployment problem, but contrary to the above countries, it seems that an expectable demand growth rate of 1,5% will reduce the problem in the near future. The latter change can be explained by the reduced supply intensity from 1990 to now (from 3.61 to 2.26).

During the recession from 1990–1994, other countries experienced an increase in unemployment (Finland and Sweden), but with a demand growth rate below 2% p.a., it is probable they will restore equilibrium within a short term period.

For countries with a current minor unemployment, it is very unlikely that they will experience a drastic growth in unemployment within the medical profession.

6. CONCLUSION

The previous manpower study concluded that it would be reasonable to expect a reversal of fundamental trends.

1. The supply of physicians would no longer outnumber the exit from the manpower stock. The 1991 study predicted a decline in the growth of the supply of physicians. This prediction has been confirmed by this second study.
2. The expected aging of the medical manpower population has been confirmed by this study.

- 058 3. The previous manpower study recommended countries with gross unemployment to reduce the intake to, medical schools. A reduction has taken place in Germany and The Netherlands resulting in an improved situation where annual demand growth rates below the weighed European average will secure equilibrium by the turn of the century.

Thus the long established trend of oversupply of physicians in Europe is changing and equilibrium can be expected, as predicted by the 1991 study. If a demand growth of 2% p.a. is anticipated to continue, Europe will experience a declining unemployment rate among physicians. If the Italian figures are excluded, it is realistic to expect equilibrium close to the turn of the century.