

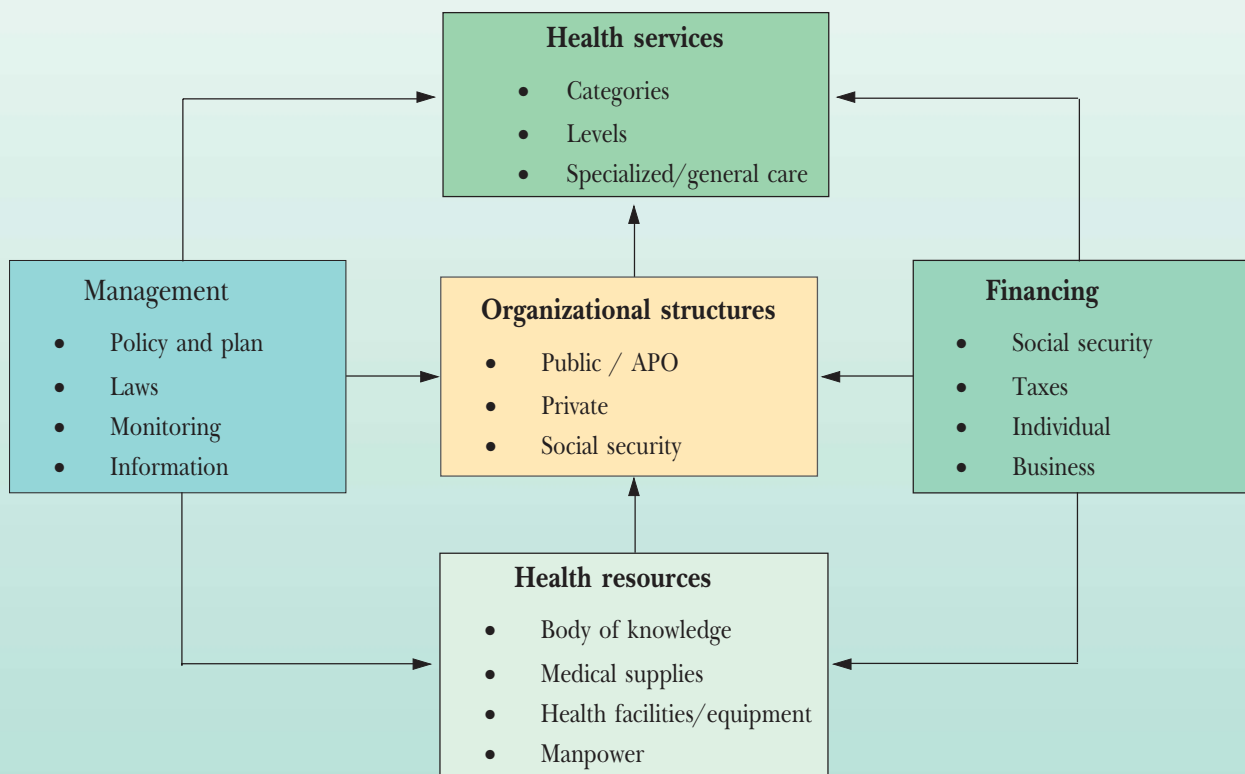
CHAPTER 6

HEALTH SERVICE SYSTEMS IN THAILAND

The health service systems in Thailand have evolved from self-reliance, in the past, by utilizing local wisdom for curative care and health promotion, to the system of modern medical and public health services. In the new health care system, several levels of health care have been organized, beginning with self-care at the family level to higher-level of medical care that has to be rendered by medical specialists. Numerous health personnel in response to various health disciplines have been produced under the new system which also requires the procurement and development of health technologies. There is a clear picture of role designation of “providers” and “recipients”, as well as a more effective health service system. In the pluralistic health service system, the main service provision is managed by the public sector, while the people have to help themselves in a traditional way which has been constantly changing, and the private for-profit and non-profit sectors are also involved. The changes in the budgeting system under the universal healthcare scheme has resulted in the change in the Thai healthcare system so as to make it more convenient to the people to get access to such care.

The components of the health service system include (1) health resources, (2) management, (3) organizational structures, (4) financing, and (5) health services (Figure 6.1) as detailed below:

Figure 6.1 The Structure of Health Service Systems



Note: APO = Autonomous Public Organization

1. Health Resources

Health resources are (1) manpower, (2) health facilities, (3) medical supplies and technologies, and (4) the body of knowledge.

1.1 Health Manpower

At present there are 70 institutions responsible for producing and developing manpower for health in Thailand: 13 under the Ministry of Education (Office of the Higher Education Commission or HEC), 43 under the Ministry of Public Health, three under the Ministry of Defence, one under the Ministry of Interior, and ten in the private sector including the Thai Red Cross Society. For the past few decades the production of health manpower at the degree and auxiliary levels has been accelerated to cope with the needs of society.

Health personnel are both creators and managers of health technologies and then develop service systems so as to make all the people healthy. The proportion of budget for health manpower is the highest, i.e. 60 - 80% of operating costs. Actually, it has been found that health manpower is imbalanced in terms of categories, qualities, quantities and distribution. The information and understanding about health manpower is one of the most important issues in the health service system.

This chapter provides the information about five major categories of health manpower (doctors, dentists, pharmacists, nurses and health centre staff) as follows:

1.1.1 Doctors

(1) Production of Doctors

At present Thailand has 11 medical schools: ten public and one private. Beginning in 2004, there will be another six state-run universities that will be producing medical graduates: Burapha, Mahasarakham, Ubon Ratchathani, Suranaree Technology, Walailuck, and Kasetsart Universities.

Between 1997 and 2003 Thailand could produce 1,300 - 1,500 medical doctors each year (Table 6.1). But in the next ten years (2004 - 2013), more doctors will be urgently produced to meet the needs of the country. On a regular basis, the annual output will be about 1,000 - 1,400 doctors and under the accelerated production programme another 600 doctors or more will be produced. However, the private medical school will maintain its current production level (Table 6.2). Overall, the number of medical graduates has been and will be as shown in Table 6.3.

Table 6.1 Number of Medical Students Admissions in Thailand, 1997-2003

Unit : students

Institution	1997	1998	1999	2000	2001	2002	2003	Total
1. Public sector	1,426	1,382	1,539	1,498	1,501	1,315	1,274	9,935
1.1 HEC	1,152	1,147	1,169	1,132	1,130	959	911	7,600
1.2 MoPH and HEC	150	143	277	272	276	293	301	1,712
1.3 Other agencies	124	92	93	94	95	63	62	623
2. Private sector	102	100	96	97	77	102	100	674
Total	1,528	1,482	1,635	1,595	1,578	1,417	1,374	10,609

Source: Bureau of Policy and Planning, Office of the Higher Education Commission.

- Notes:**
1. The number of medical students actually admitted.
 2. Other agencies include the Phramongkutklo College of Medicine and the Bangkok Metropolitan Administration Medical College at Vajira Hospital.

Table 6.2 Plans for Medical Students Admissions in Thailand, Academic Years 2004-2013

Unit: students

Production agencies	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
I. Regular production plan											
1. Public sector	1,324	1,358	1,338	932	932	932	932	932	932	932	10,564
1.1 HEC	882	882	882	882	882	882	882	882	882	882	8,820
1.2 MoPH and HEC	392	426	426	-	-	-	-	-	-	-	1,244
1.3 Other agencies	50	50	50	50	50	50	50	50	50	50	50
2. Private sector	100	100	100	100	100	100	100	100	100	100	1,000
Total - regular plan	1,424	1,458	1,458	1,032	1,032	1,032	1,032	1,032	1,032	1,032	11,564
II. Increased production plan											
1. Public sector	596	681	721	1,215	1,215	1,250	1,250	1,250	1,250	1,250	10,678
1.1 HEC	426	476	516	584	584	604	604	604	604	604	5,606
1.2 MoPH and HEC	75	75	75	501	501	516	516	516	516	516	3,807
1.3 Other agencies	95	130	130	130	130	130	130	130	130	130	1,265
2. Private sector	-	-	-	-	-	-	-	-	-	-	-
Total - increased production plan	596	681	721	1,215	1,215	1,250	1,250	1,250	1,250	1,250	10,678
Grand Total	2,020	2,139	2,179	2,247	2,247	2,282	2,282	2,282	2,282	2,282	22,242

Source: Bureau of Policy and Planning, Office of the Higher Education Commission.

- Notes:**
1. Data on medical students admissions.
 2. Other agencies include the Phramongkutklo College of Medicine and the Bangkok Metropolitan Administration Medical College at Vajira Hospital.

Table 6.3 Numbers of Actual and Expected Medical Graduates, Academic Years 1997-2006.

Unit : students

Production agencies	No. of graduates										Total
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
1. Public sector	877	1,148	1,177	1,222	1,272	1,504	1,422	1,462	1,422	1,426	12,932
1.1 HEC	852	1,073	1,089	1,124	1,140	1,250	1,206	1,111	1,075	1,074	10,994
1.2 MoPH and HEC	-	-	-	8	31	134	137	263	258	262	1,093
1.3 Other agencies	25	75	88	90	101	120	79	88	89	90	845
2. Private sector	37	30	58	40	66	79	56	91	92	73	622
Total	914	1,178	1,235	1,262	1,338	1,583	1,478	1,553	1,514	1,499	13,554

Source: The Medical Council of Thailand and the Increased Production of Medical Doctors for Rural Residents Project, MoPH.

- Notes:**
1. For academic years 1997-2003, the numbers are those actually graduated and registered with the Medical Council of Thailand.
 2. For 2004-2006, the numbers are estimated based on the graduation rate of 95% of admissions.
 3. Other agencies include the Phramongkutklao College of Medicine and the Bangkok Metropolitan Administration Medical College at Vajira Hospital.

(2) Numbers of Doctors Actually Working and Required

In 2003, in Thailand there were 28,920 medical doctors who were still alive and registered with the Medical Council of Thailand. But according to the 2000 population census, there were actually 22,465 doctors actually practising,¹ a doctor to population ratio of 1:2,750. It has been projected that in 2020, there will be totally 44,028-47,519 doctors,² a doctor to population ratio of 1:1,540, while there will be approximately 44,064-50,359 doctors² (Table 6.4). Therefore, if the doctor production is underway according to the increased production plan and there are more medical schools, there should be no overall storage of doctors in the next 20 years, **but the problem of distribution will still exist.**

¹ Thakasaphon Thammarangsi. A Study on the Different Aspects of Health Personnel Distribution, based on the data from the Population and Housing Census, 2000. International Health Policy Programme, Thailand.

² Nichakorn Sirikanokvilai. Modified population-to-physician ratio method to project future physician requirement in Thailand, HRDJ; 1998, Vol.2, No. 3 : 197-209.

Table 6.4 Estimated Numbers of Practising Medical Doctors, 2000-2020

Year	No. of doctors actually practising		
	Low value	High value	Average
2000	20,263	21,866	21,065
2005	25,526	27,699	26,608
2010	31,855	34,467	33,161
2015	38,217	41,282	39,750
2020	44,028	47,519	45,774

Source: Nichakorn Sirikanokvilai. Modified population-to-physician ratio method to project future physician requirement in Thailand, HRDJ; 1998, Vol. 2, No. 3: 197-209.

(3) Geographical Distribution of Doctors

Most medical doctors are clustered in Bangkok and other provinces in the Central Plains. However, the Bangkok-rural disparities had been steadily better between 1979 (Table 6.5, and Figures 6.2 and 6.3) and 1989. But after 1989 until 1997, the disparities tended to be stable and **became worse** as a result of expansions of private healthcare facilities in provincial cities and Bangkok during the bubble economy. After the economic crisis, the distribution of doctors tends to be better. The proportion of doctors in the private sector is lower than that in the public sector; and the proportion as well as quantities in the MoPH, especially in the rural areas, are higher.

Table 6.5 Distribution of Medical Doctors by Region, 1979 - 2002

Region	No. of doctors and population/doctor ratio												
	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2002
Bangkok Metropolitan	4,069 (1,210)	3,927 (1,362)	4,084 (1,404)	3,966 (1,431)	4,211 (1,418)	5,888 (1,062)	5,832 (958)	6,191 (1,045)	5,582 (999)	7,771 (720)	7,438 (760)	7,504 (760)	7,504 (767)
The Central	814 (11,652)	1,019 (9,407)	1,387 (7,179)	1,521 (7,335)	1,730 (6,663)	2,008 (5,920)	2,227 (5,805)	2,490 (5,180)	3,309 (4,091)	3,100 (4,506)	3,917 (3,653)	4,315 (3,375)	4,135 (3,566)
The North	741 (13,112)	815 (12,075)	934 (10,879)	935 (10,884)	1,264 (8,297)	2,021 (5,331)	1,747 (6,317)	1,822 (6,117)	2,037 (5,844)	2,079 (5,791)	2,494 (4,869)	2,699 (4,488)	2,698 (4,499)
The South	362 (15,641)	447 (13,154)	608 (10,061)	865 (7,684)	908 (7,705)	1,165 (6,306)	1,179 (6,079)	1,274 (6,257)	1,369 (5,591)	1,510 (5,216)	1,659 (4,888)	1,612 (5,127)	1,678 (4,984)
The Northeast	633 (25,713)	723 (23,238)	889 (19,675)	1,209 (14,908)	1,467 (12,694)	1,631 (11,762)	1,818 (10,970)	1,848 (10,851)	1,884 (10,936)	2,109 (9,951)	2,632 (8,116)	2,817 (7,614)	2,972 (7,251)
Disparity between Bangkok's Northeast's population/doctor ratios	1 : 21.3	1 : 17.1	1 : 14.0	1 : 10.4	1 : 8.9	1 : 11.1	1 : 11.4	1 : 10.4	1 : 10.9	1 : 13.8	1 : 10.7	1 : 10.0	1 : 9.5
Total	6,619 (6,956)	6,931 (6,847)	7,902 (6,259)	8,496 (6,083)	9,580 (5,595)	12,713 (4,361)	12,803 (4,426)	13,634 (4,297)	14,181 (4,180)	16,569 (3,649)	18,140 (3,395)	18,947 (3,277)	18,987 (3,295)

Sources: Reports on Health Resources, Bureau of Policy and Strategy, MoPH.

Notes: 1. Figures in () are population to doctor ratios.

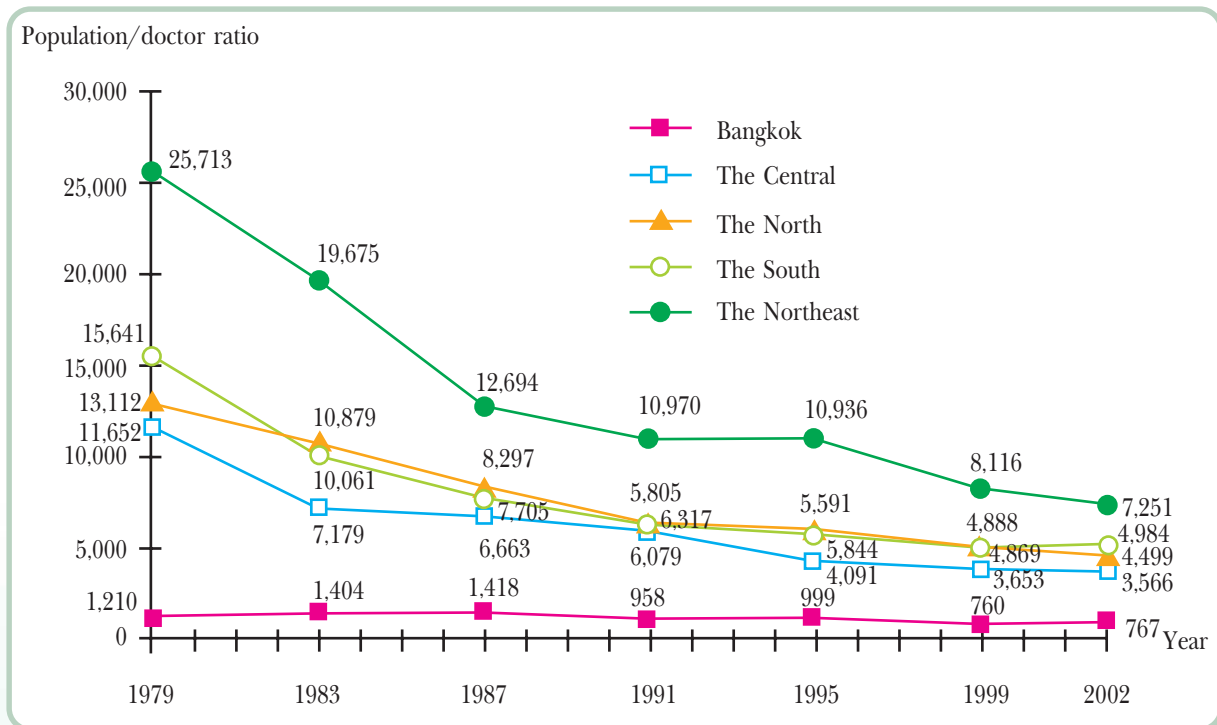
2. Figures from the surveys are estimated to be 20% less than actuality

3. Due to incompleteness of data for 1985, the data for 1984 were used instead.

4. For 2002, data were received from only 65.6% of all health facilities; 44.3% from Bangkok, 60.5% from the Central, 76.7% from the Northeast, 74.9% from the North, and 68.3% from the South.

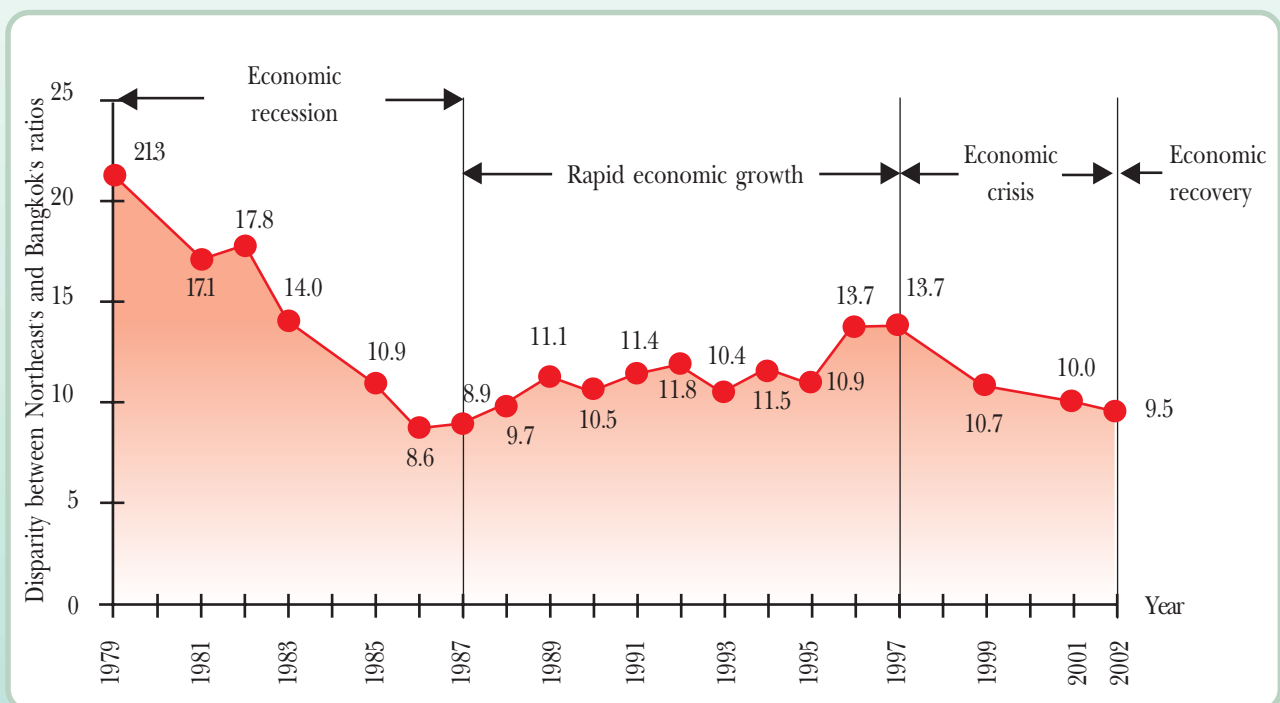
5. For Bangkok in 2002, the 2001 data were used instead.

Figure 6.2 Population to Doctor Ratios by Region, 1979-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Figure 6.3 Disparity between Northeast's and Bangkok's Population/Doctor Ratios, 1979-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

- Notes:
1. For 2002, data were received from only 44.3% from Bangkok and 76.7% from the Northeast.
 2. For Bangkok in 2002, the data for 2001 were used instead.

(4) Distribution of Doctors by Agency

In the past decade, it was found that since 1989 the proportion of doctors in the public sector had been declining while that in private sector had been rising. In addition, the proportion of medical doctors in the public sector (MoPH, other ministries, state enterprises and local authorities) dropped from 93.3% in 1971 to 76.3% in 1995, while that in the private sector rose from 6.7% to 23.7% during the same period.

After the economic crisis, in 2002, the proportion in the public sector rose to 79%, particularly in the MoPH, whereas the proportion in the private sector dropped during the crisis but increased slightly to 21.0% (Table 6.6 and Figure 6.4).

Table 6.6 Number and Proportion of Medical Doctors by Agency, 1971-2002

Year	Number and percentage					
	MoPH	Other ministries	State enterprises	Local adm. agencies	Private sector	Total
1971	1,515 (37.1)	1,832 (44.8)	123 (3.0)	341 (8.3)	274 (6.7)	4,085
1973	1,678 (36.4)	2,039 (44.2)	147 (3.2)	357 (7.7)	386 (8.4)	4,607
1975	1,922 (38.4)	2,068 (41.3)	143 (2.8)	452 (9.0)	420 (8.4)	5,005
1977	2,198 (38.0)	2,575 (44.5)	147 (2.5)	344 (5.9)	526 (9.1)	5,790
1979	2,510 (37.9)	2,768 (41.8)	168 (2.5)	433 (6.5)	740 (11.2)	6,619
1981	2,987 (43.1)	2,667 (38.5)	175 (2.5)	371 (5.3)	731 (10.5)	6,931
1983	3,622 (46.1)	2,806 (35.8)	197 (2.5)	333 (4.2)	890 (11.3)	7,848
1985	4,289 (50.3)	2,630 (30.8)	248 (2.9)	363 (4.3)	1,000 (11.7)	8,530
1987	4,758 (49.7)	3,086 (32.2)	235 (2.5)	407 (4.2)	1,094 (11.4)	9,580
1989	5,396 (42.4)	4,398 (34.6)	640 (5.0)	483 (3.8)	1,796 (14.1)	12,713
1991	5,437 (42.5)	4,100 (32.0)	442 (3.5)	517 (4.0)	2,307 (18.0)	12,803
1993	5,843 (42.8)	4,152 (30.5)	613 (4.5)	484 (3.5)	2,542 (18.6)	13,634

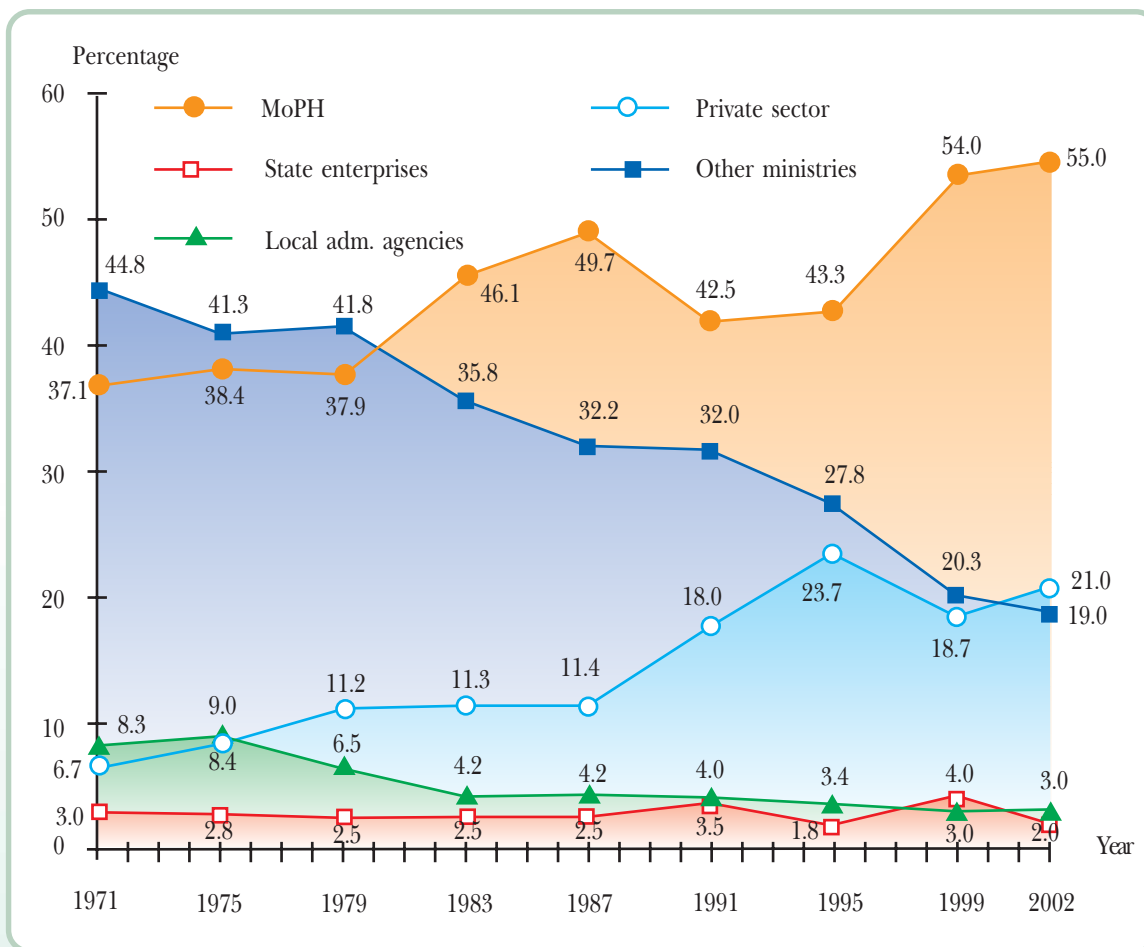
Table 6.6 Number and Proportion of Medical Doctors by Agency, 1971-2002 (Cont.)

Year	Number and percentage					
	MoPH	Other ministries	State enterprises	Local adm. agencies	Private sector	Total
1995	6,134 (43.3)	3,936 (27.8)	259* (1.8)	488 (3.4)	3,364 (23.7)	14,181
1997	8,026 (48.4)	3,873 (23.4)	933 (5.6)	493 (3.0)	3,244 (19.6)	16,569
1999	9,799 (54.0)	3,683 (20.3)	721 (4.0)	534 (3.0)	3,403 (18.7)	18,140
2001	10,068 (53.1)	3,568 (18.8)	384 (2.0)	543 (2.9)	4,384 (23.1)	18,947
2002	10,444 (55.0)	3,613 (19.0)	374 (2.0)	565 (3.0)	3,991 (21.0)	18,987

Sources: Reports on Health Resources, Bureau of Policy and Strategy, MoPH.

- Notes:**
1. Figures in () are in percentage terms.
 2. * For 1995, no data were available for Chulalongkorn Hospital (under the Thai Red Cross Society).
 3. For 2002, data were received from 65.6% of all health facilities nationwide: 62.5% from among public sector facilities and 77.3% from among private sector agencies.
 4. For 2002, the figures for Chulalongkorn Hospital were transferred from “state enterprise and independent agencies” to “other ministries”.
 5. For 2002, the number of doctors under various agencies in Bangkok for 2001 was used instead.

Figure 6.4 Proportion of Medical Doctors by Agency, 1971-2002

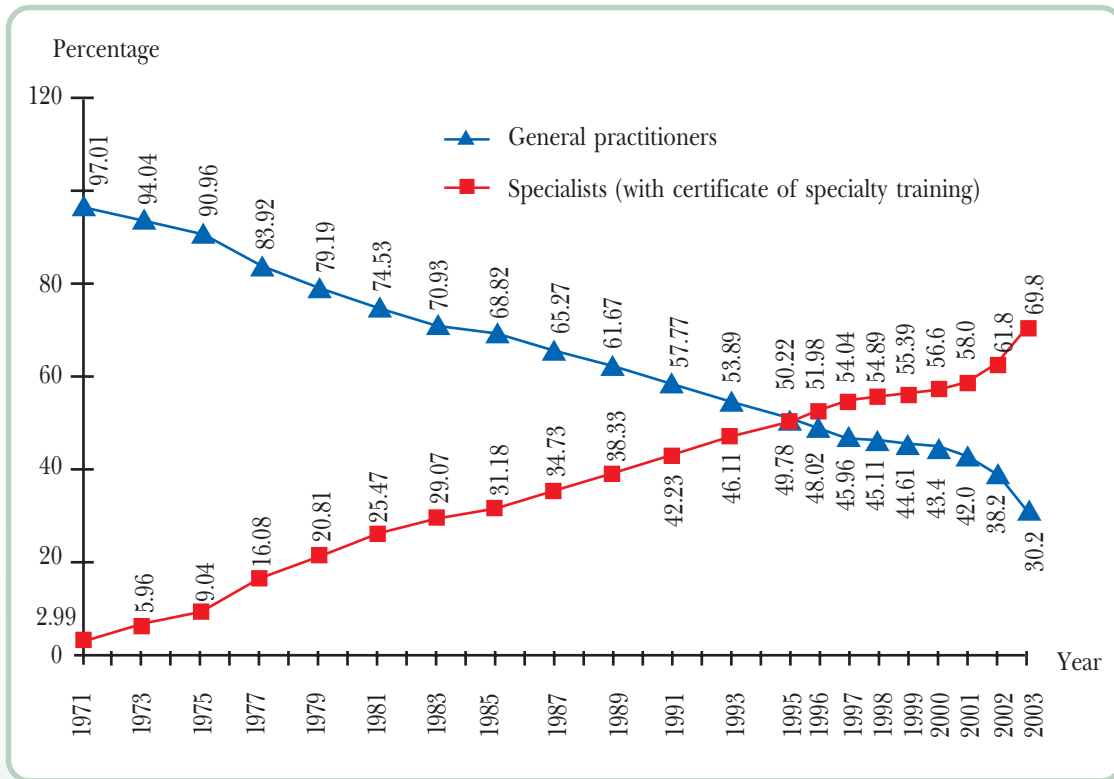


Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

(5) Distribution of Medical Specialists

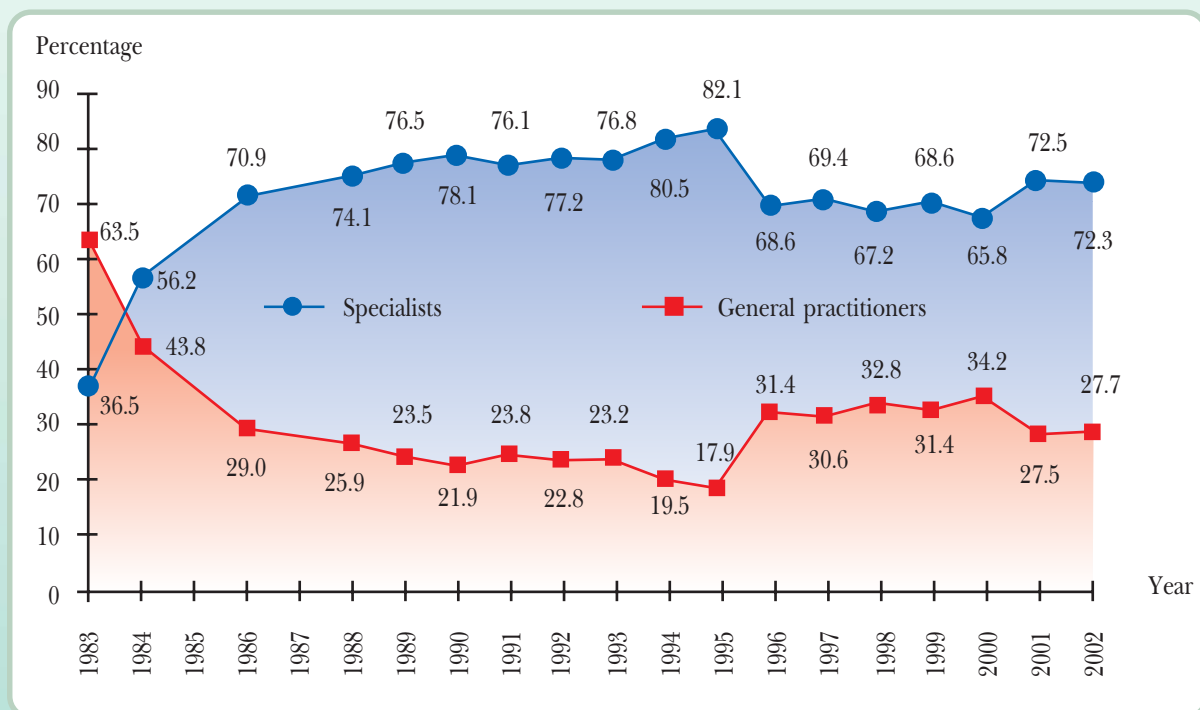
In Thailand, the trends of residency training have been rising steadily. In 2003, the percentage of specialists awarded certificates of specialty training was as high as 69.8% or a total of 21,126 medical doctors (Figure 6.5). In fact, about 72.3% of medical doctors are actually practising as specialists without any specialty certification from the Medical Council of Thailand (Figure 6.6).

Figure 6.5 Proportions of Medical Specialists and General Practitioners, 1971-2003



Sources: The Medical Council of Thailand (medical specialists include only those certified by the Medical Council of Thailand).

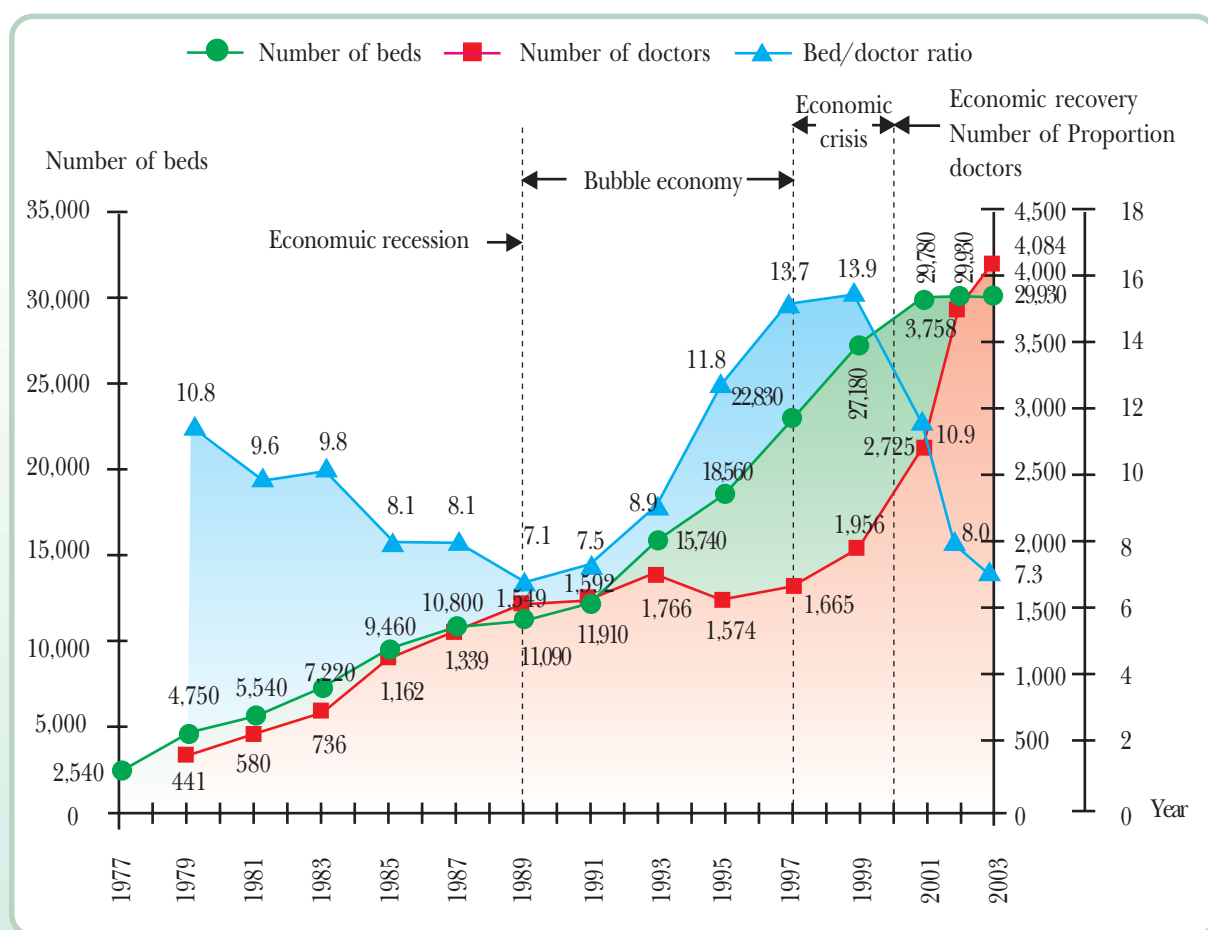
Figure 6.6 Proportions of General Practitioners and Specialists Actually Practising, 1983-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

With regard to the number and percentage of medical doctors lost (in relation to newly graduated ones) of the MoPH, the trends have been found to be rising. During the bubble economy period, whose peak was in 1996 (before the economic crisis began), 21 community hospitals had no physicians at all. After the 1997 crisis, the situation remarkably improved; during the 2001 - 2003 economic recovery period, the loss of MoPH doctors became severe again (Table 6.7), which reflected the distribution of physicians to the district level (Figure 6.7).

Figure 6.7 Numbers of Beds and Doctors at Community Hospitals, 1977-2003



- Sources:**
1. Bureau of Health Service System Development, Department of Health Service Support, MoPH.
 2. Bureau of Central Administration, Office of the Permanent Secretary, MoPH (for doctors at community hospitals in 2001 onwards).

Notes: For 2001 - 2003, there was no survey on doctors actually working at community hospitals. So the data from the official payrolls (Jor 18) were used; the numbers were higher than actuality.

Table 6.7 Number and Proportion of Doctors Loss in Relation to Newly Appointed Doctors, Office of the Permanent Secretary for Public Health, 1994-2003

Fiscal year	No. of doctors						Net loss No. (percent)
	Increase			Decrease (resigned)			
	Newly graduated	Re-appointed	Total	Civil servants	State employees	Total	
1994	526	-	526	42	-	42	42(8.0)
1995	576	-	576	260	-	260	260 (45.1)
1996	568	-	568	344	-	344	344 (60.6)
1997	579	30	609	336	-	336	306 (52.8)
1998	618	93	711	299	-	299	206 (33.3)
1999	830	57	887	204	-	204	147 (17.7)
2000	893	98	991	201	-	201	103 (11.5)
2001	883	82	952	193	83	276	194 (22.0)
2002	878	38	916	401	163	564	526 (59.9)
2003	1,013	39	1,052	287	508	795	756 (74.6)

Sources: Bureau of Central Administration, Office of the Permanent Secretary for Public Health.

* According to the cabinet resolution, since 1999 MoPH has been required to accept the scholarship students in academic year 1999 as state employees under the MoPH, rather than as civil servants.

Note: Parent agencies adjusted their own data for fiscal years 1995-2003.

(6) Doctor's Workloads

Based on the numbers of patients at all levels, doctors at community hospitals have greater workloads than those in urban areas, Bangkok and the private sector (Table 6.8).

Table 6.8 Patient Loads of Doctors, 2002

Health	(1) No. of outpatients	(2) No. of inpatients	(3) Inpatients adjusted*	Total patient loads (1)+ (3)	No. of doctors	Patient loads per doctor	Comparison index
Community hospitals	17,831,867	3,305,860	46,282,040	64,113,907	2,732	23,467.8	2.2
Regional/General hospitals	5,823,778	2,605,672	46,902,096	52,725,874	4,619	11,415.0	1.1
University hospitals	934,774	303,866	5,469,588	6,404,362	2,576	2,486.2	0.2
BMA hospitals	430,098	81,267	1,462,806	1,892,904	543	3,486.0	0.3
Private hospitals	4,025,727	1,535,831	21,501,634	25,527,361	3,572	7,146.5	0.7
Total	29,046,244	7,832,496	121,618,164	150,664,408	14,042	10,729.6	1.0

Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Notes: * In calculating the patient loads, for consistency, the numbers were weighted as follows:

1. For community and private hospitals = number of inpatients times 14.
2. For regional/general, university and BMA hospitals = number of inpatients times 18.
3. For 2002, the number of doctors in Bangkok for 2001 was used instead.

1.1.2 Dentists

(1) Production of Dentists

At present, there are only eight dentistry schools in Thailand, all in the public sector, producing approximately 500 dentists each year (Table 6.9). However, beginning in 2005, an additional 200 dentists will be produced annually (Table 6.10). The numbers of dentists who have graduated and who are expected to graduate are shown in Table 6.11.

Table 6.9 Number of Dentistry Student Admissions, Thailand, Academic Years 1997-2004

Production agency	No. of students								Total
	1997	1998	1999	2000	2001	2002	2003	2004	
HEC	469	478	460	504	486	502	528	528	3,951

Source: Bureau of Policy and Planning, Office of the Higher Education Commission.

Note: The number of students actually admitted.

Table 6.10 Dental Student Admissions Plan, Thailand, Academic Years 2005-2014

Production agency	No. of students										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
1. Regular admission plan, HEC	513	513	513	533	533	533	533	533	533	533	5,270
2. Increased production plan, HEC	200	200	200	200	200	200	200	200	200	200	2,000
Total	713	713	713	733	733	733	733	733	733	733	7,270

Source: Bureau of Policy and Planning, Office of the Higher Education Commission.

Note: Data on dental student admission plan.

Table 6.11 Actual and Expected Numbers of Dental Graduates, Academic Years 1997-2006

Production agency	No. of graduates										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
HEC	318	358	332	349	383	420	423	437	479	462	3,961

Source: The Dental Council, Thailand.

Notes: 1. For academic years 1997 - 2003, the numbers of dentists who graduated and registered with the Dental Council.

2. For academic years 2004 - 2006, 95% of admitted dental students are expected to graduate.

(2) Numbers of Dentists Actually Practising and Required

In 2003, there were 8,178 registered dentists (Dental Council, 2003), of whom 7,828 were actually practising.³ It is projected that in 2015 there will be a total of 10,323 dentists,⁴ whereas approximately 8,924-9,768 dentists are required.⁴ Therefore, the number of dentists will be sufficient or might be excessive in the future (Table 6.12).

³ Report on Dental Health Personnel, 2003. Dental Health Division, Department of Health.

⁴ Duangjai Leksomboon. Supply Projections for Dentists, Thailand (2000 - 2030). HRDJ; 2000. Vol.4, No.2: 94-105.

Table 6.12 Estimated/Projected Number of Dentists Actually Practising and the Population to Dentist Ratio, 2000-2030

Year	Practising dentists	Population to dentist ratio
2000	6,021	10,350
2005	7,651	8,603
2010	9,118	7,625
2015	10,323	7,114
2020	11,354	6,501
2025	12,119	6,276
2030	12,652	6,072

Source: Duangjai Leksomboon. Supply Projectons for Dentists, Thailand (2000-2030). HRDJ; 2000. Vol.4, No.2: 94-105.

(3) Geographical Distribution of Dentists

Most dentists are clustered in Bangkok and the Central Region. The Bangkok-regional disparities have changed in the same pattern as those for medical doctors (Table 6.13 and Figures 6.8-6.9).

According to a survey on dentist distribution in various regions of the country conducted by the Department of Health during 1999 - 2003, the distribution pattern was consistent with that revealed in the reports on health resources. But the population to dentist ratio reported in the DoH Survey was 1.5-2.2 times lower as it had a wider coverage. It was found that the shortage of dentists was most severe in the Northeast; the ratio was 15 times higher than that for Bangkok (Table 6.14).

Table 6.13 Distribution of Dentists by Region, 1979-2002

Region	No. of dentists and population to dentist ratio												
	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2002
Bangkok Metropolitan	705 (6,982)	676 (7,914)	752 (7,624)	797 (7,123)	878 (6,802)	1,085 (5,766)	1,215 (4,599)	1,331 (4,861)	1,077 (5,179)	1,651 (3,389)	1,891 (2,991)	1,788 (3,190)	1,788 (3,218)
The Central	113 (83,938)	152 (63,066)	193 (51,591)	206 (54,155)	257 (44,852)	369 (32,213)	443 (29,181)	526 (24,612)	735 (18,420)	657 (21,263)	818 (17,494)	878 (16,588)	828 (17,810)
The North	108 (89,963)	110 (89,464)	160 (63,506)	168 (60,577)	141 (74,381)	220 (48,969)	268 (41,176)	295 (37,780)	348 (34,208)	398 (30,248)	446 (27,225)	577 (20,993)	681 (17,824)
The South	38 (114,900)	57 (103,158)	61 (100,279)	69 (96,333)	78 (89,696)	179 (41,044)	255 (28,108)	246 (32,406)	298 (25,687)	248 (31,760)	316 (25,663)	414 (19,963)	416 (20,105)
The Northeast	58 (280,655)	83 (202,422)	81 (215,938)	86 (209,581)	114 (163,352)	254 (75,526)	227 (87,858)	388 (51,680)	462 (44,595)	460 (45,622)	555 (38,487)	660 (32,499)	758 (28,432)
Disparity between BKKs and Northeast's population/ dentist ratios	1 : 40.2	1 : 25.6	1 : 28.3	1 : 29.4	1 : 24.0	1 : 13.1	1 : 19.1	1 : 10.6	1 : 8.6	1 : 13.5	1 : 12.9	1 : 10.2	1 : 8.8
Total	1,022 (45,074)	1,078 (44,024)	1,247 (39,662)	1,326 (38,975)	1,468 (36,516)	2,107 (26,315)	2,408 (23,531)	2,786 (21,028)	2,920 (20,301)	3,414 (17,711)	4,026 (15,295)	4,317 (14,384)	4,471 (13,991)

Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Notes: 1. Figures in () are population to dentist ratios.

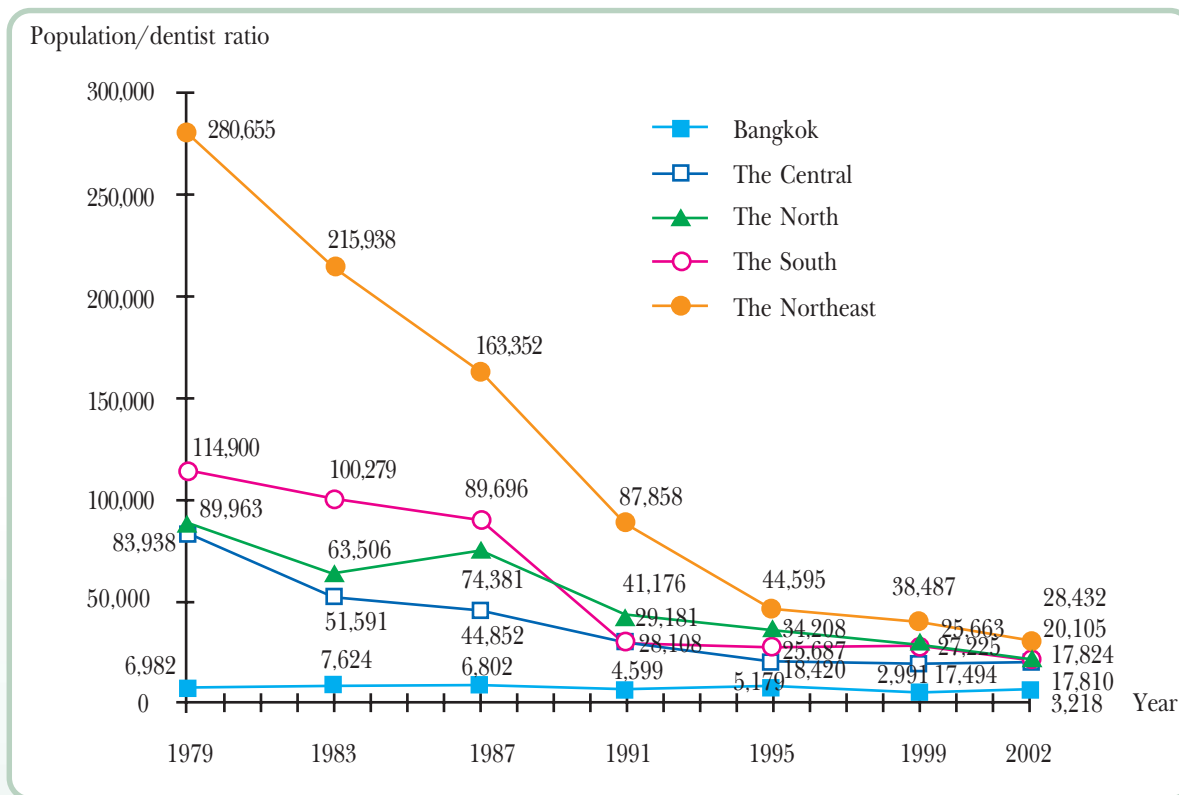
2. Figures from the surveys are estimated to be 40% less than actuality.

3. The data of 1985 were incomplete; the 1984 data were used instead.

4. For 2002, data were received from only 65.6% of all health facilities; 44.3% from Bangkok, 60.5% from the Central, 76.7% from the Northeast, 74.9% from the North, and 68.3% from the South.

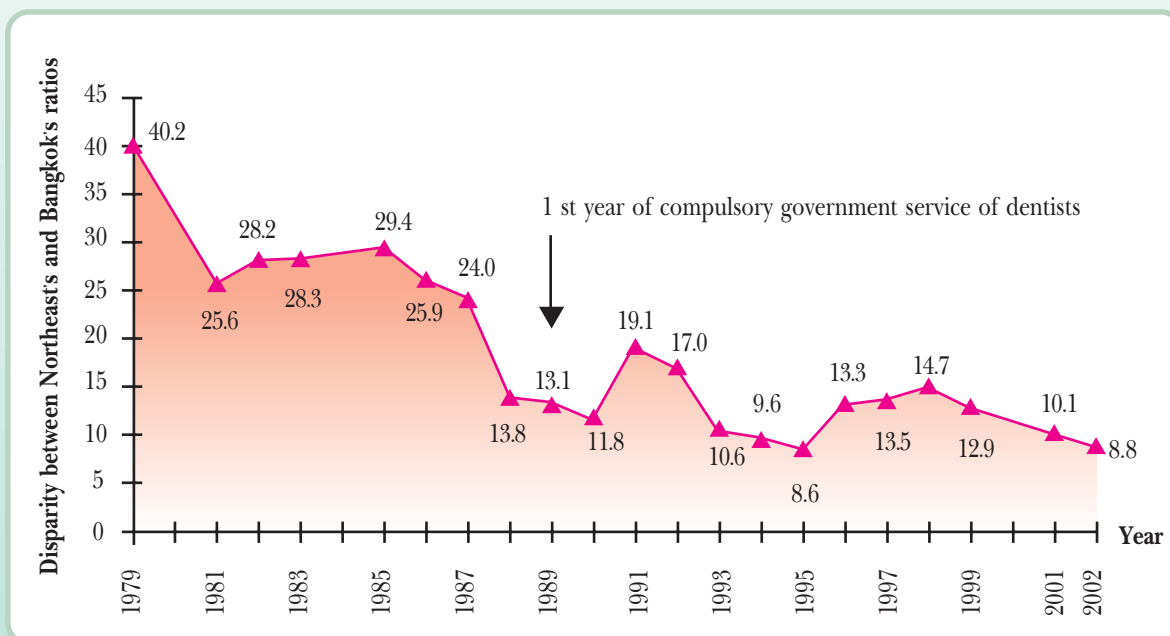
5. For Bangkok in 2002, the 2001 data were used instead.

Figure 6.8 Population to Dentist Ratios by Region, 1979-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Figure 6.9 Disparity between Northeast's and Bangkok's Population/Dentist Ratios, 1979-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

- Notes:
1. For 2002, data were received from only 44.3% of health facilities in Bangkok and 76.7% of health facilities in the Northeast.
 2. For 2002 data for Bangkok were incomplete, the 2001 data were used instead.

Table 6.14 Distribution of Dentists by Region, 1999-2003

Region	No. of dentists and dentist to population ratio				
	1999	2000	2001	2002	2003
Bangkok	3,279 (1:1,722)	3,331 (1:1,690)	3,538 (1:1,605)	3,802 (1:1,506)	3,965 (1:1,458)
The Central Plains	1,110 (1:12,864)	1,191 (1:12,042)	1,256 (1:11,524)	1,277 (1:11,474)	1,318 (1:11,259)
The North	813 (1:14,956)	838 (1:14,468)	892 (1:13,566)	900 (1:13,471)	925 (1:13,137)
The South	551 (1:14,640)	581 (1:14,032)	614 (1:13,383)	600 (1:13,852)	626 (1:13,443)
The Northeast	761 (1:28,005)	854 (1:25,034)	875 (1:24,462)	972 (1:22,112)	994 (1:21,739)
Disparity between Northeast's and Bangkok's ratios	16.3	14.7	15.2	14.7	14.9
Total	6,514 (1:9,436)	6,795 (1:9,074)	7,175 (1:8,624)	7,551 (1:8,252)	7,828 (1:8,022)

Source: Reports on Dental Health Personnel, 1999-2003. Department of Health.

(4) Distribution of Dentists by Agency

In the past decade, after 1987, the proportion of dentists in the public sector (MoPH, other ministries, state enterprises, and local authorities) was declining, whereas that in the private sector was rising. In the private sector the proportion rose from 3.8% in 1971 to 25.4% in 1995, while in the public sector the proportion dropped from 96.2% to 74.6% during the same period (Table 6.15).

After the 1997 economic crisis, the dentist proportion in the public sector increased to 88.4% in 2002 in the MoPH, especially in community hospitals the proportion rising to 99.0%, but dropping slightly to 96.0% in 2003 (Figure 6.10). It is projected that the loss would be down to only 1.06% in 2004 (Figure 6.11).

A survey on dentist distribution by agency conducted by the Department of Health for 1999-2003 revealed the opposite, compared with the those revealed in the MoPH Report on Health Resources. The DoH survey found that, due to the low questionnaire response rate of only 60%, the proportion of dentists in the public sector has declined from 49.0% in 1999 to 46.8% in 2003, while that in the private sector has risen from 51.0% to 53.2% during the same period (Table 6.16).

Table 6.15 Number and Proportion of Dentists by Agency, 1971-2002

Year	Number and percentage					
	MoPH	Other ministries	State enterprises	Local adm. agencies	Private sector	Total
1971	146 (27.5)	296 (55.7)	20 (3.8)	49 (9.2)	20 (3.8)	531
1973	171 (28.7)	327 (54.9)	20 (3.3)	52 (8.7)	26 (4.4)	596
1975	187 (28.7)	337 (51.7)	24 (3.7)	69 (10.6)	35 (5.3)	652
1977	230 (28.2)	416 (51.0)	34 (4.2)	82 (10.1)	53 (6.5)	815
1979	289 (29.5)	513 (52.4)	47 (4.8)	82 (8.4)	47 (4.8)	978
1981	401 (37.9)	420 (39.7)	41 (3.9)	97 (9.2)	98 (9.3)	1,057
1983	469 (37.6)	504 (40.4)	52 (4.2)	97 (7.8)	125 (10.0)	1,247
1985	581 (40.0)	503 (34.7)	79 (5.4)	134 (9.2)	154 (10.6)	1,451
1987	618 (42.1)	484 (33.0)	85 (5.8)	85 (5.8)	196 (13.3)	1,468
1989	852 (40.4)	623 (29.6)	79 (3.7)	143 (6.8)	410 (19.5)	2,107
1991	1,020 (42.4)	612 (25.4)	76 (3.1)	156 (6.5)	544 (22.6)	2,408
1993	1,201 (43.1)	728 (26.1)	76 (2.7)	125 (4.5)	656 (23.5)	2,786
1995	1,420 (48.6)	574 (19.6)	77 (2.6)	108 (3.7)	741 (25.4)	2,920
1997	2,064 (60.5)	658 (19.3)	31 (0.9)	195 (5.7)	466 (13.6)	3,414
1999	2,660 (66.1)	652 (16.2)	63 (1.6)	141 (3.5)	510 (12.6)	4,026
2001	3,014 (69.8)	520 (12.0)	86 (2.0)	133 (3.1)	564 (13.1)	4,317
2002	3,130 (70.0)	578 (12.9)	85 (1.9)	161 (3.6)	517 (11.6)	4,471

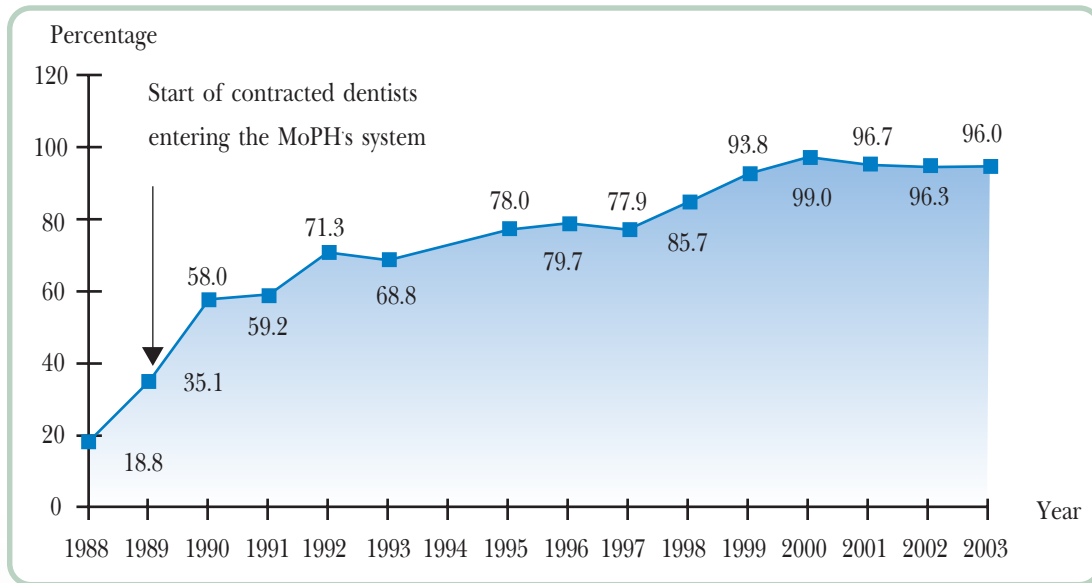
Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Notes: 1. Figures in () are in percentage terms.

2. For 2002, data were received from 65.6% of all health facilities nationwide: 62.5% from among public sector facilities and 77.3% from among private sector agencies.

3. For the 2002 figure of dentists in Bangkok, the 2001 data were used instead.

Figure 6.10 Percentage of Dentist Distribution in Community Hospitals, 1988-2003

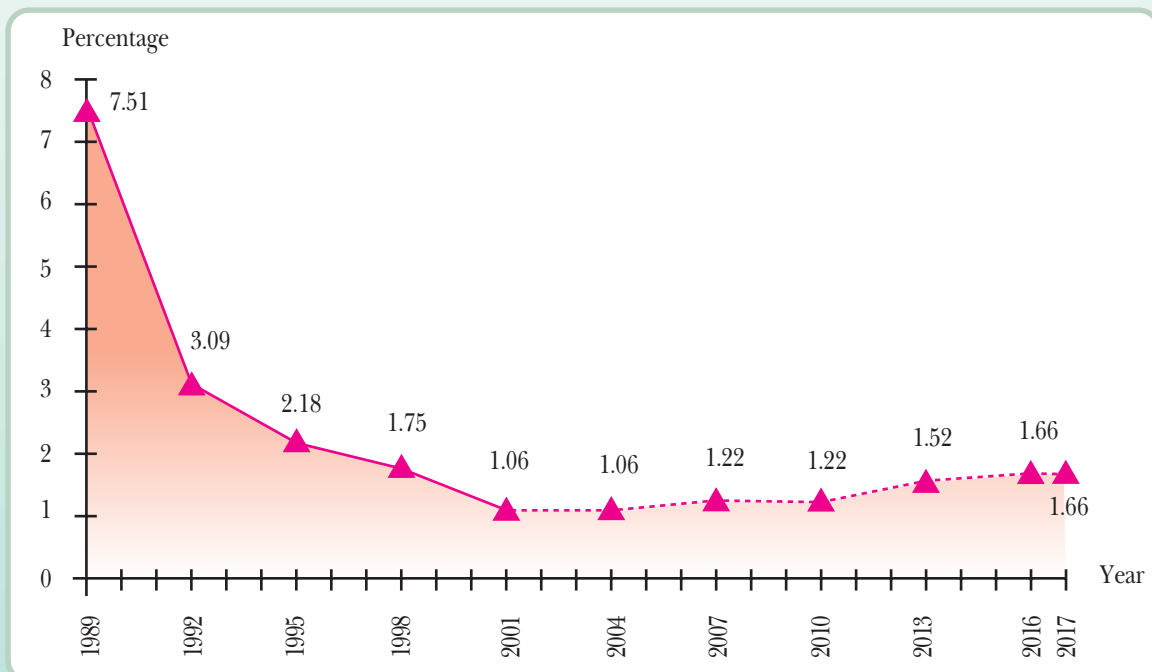


Sources: For 1988-1997, data were derived from Bunyarit Suwannophas et al. Problem Analysis and Improvement in Dentist Distribution Project, 1998.

For 1998 - 2000, data were derived from the Bureau of Health Service System Development, Department of Health Service Support, MoPH.

For 2001 - 2003, data were derived from Sunee Wongkongkathep et al. Problems of Dentist Distribution in Rural Areas, 2003.

Figure 6.11 Percentage of Dentist Loss in Community Hospitals, 1989-2017



Sources: For 1989-1998, data were derived from the Bureau of Health Service System Development, Department of Health Service Support, MoPH.

For 2001-2017, data were derived from Bunyarit Suwannophas. Projection of Dentists in Community Hospitals, 2000.

Table 6.16 Distribution of Dentists by Agency, 1999-2003

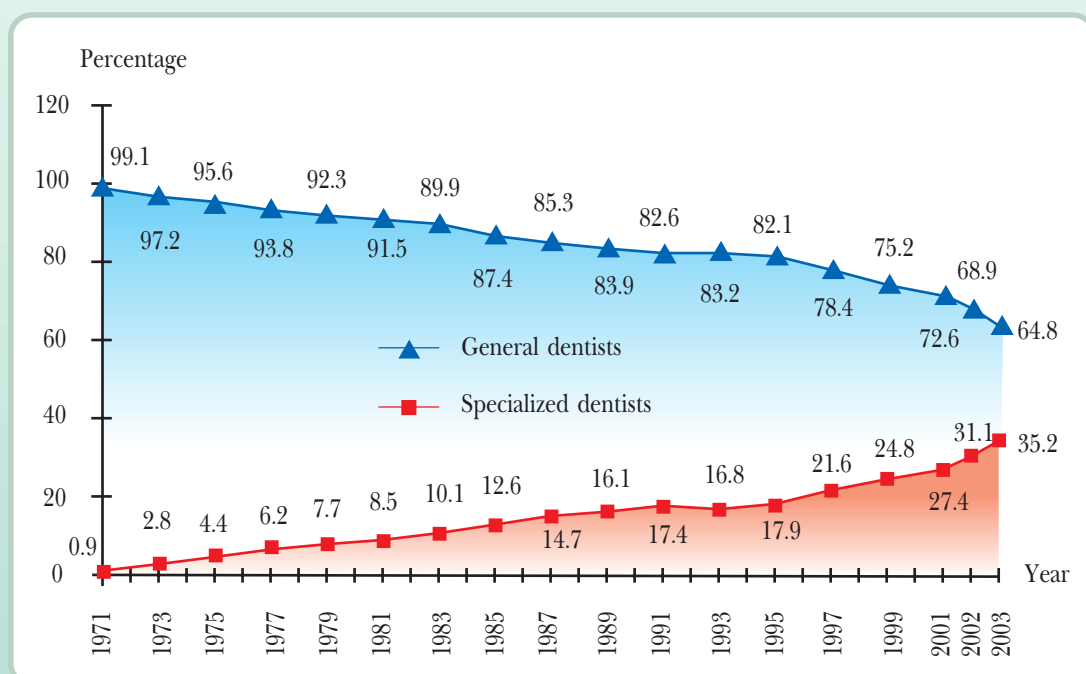
Year	Number and percentage					Total
	MoPH	Other ministries	State enterprises	Local adm. agencies	Private sector	
1999	1,912 (29.3)	1,112 (17.1)	43 (0.7)	126 (1.9)	3,321 (51.0)	6,514
2000	2,095 (30.8)	1,134 (16.7)	48 (0.7)	133 (2.0)	3,385 (49.8)	6,795
2001	2,249 (31.3)	1,089 (15.2)	51 (0.7)	129 (1.8)	3,657 (51.0)	7,175
2002	2,443 (32.4)	1,045 (13.8)	51 (0.7)	129 (1.7)	3,883 (51.4)	7,551
2003	2,452 (31.3)	1,039 (13.3)	52 (0.6)	123 (1.6)	4,162 (53.2)	7,828

Source: Report on Dental Health Personnel, Department of Health.

(5) Distribution of Dental Specialists

It is found that, since 1995, the trends of specialized dental training have been rising. In 2003, the percentage of specialists awarded certificates of specialty training was as high as 35.2% of all dentists (Figure 6.12).

Figure 6.12 Proportions of Specialized Dentists and General Dentists, 1971-2003



Source: Dental Health Division, Department of Health, MoPH, 2003.

1.1.3 Pharmacists

(1) Production of Pharmacists

At present there are 13 institutions producing pharmacists in both public and private sectors in Thailand: 11 public and two private. Beginning in 2004, Burapha University, a state-run university, will also offer its pharmacy degree programme.

Between 1997 and 2006, it has been found that the proportion of pharmacy graduates working in the public sector has slightly risen, but since 2003 there has been a downward trend in the private sector; the annual outputs dropping from 300 to 220 graduates (Table 6.17). The number of pharmacy graduates and their projection in the future are shown in Table 6.18.

Table 6.17 Numbers of Current and Future Pharmacy Students Entrants, Thailand, Academic Years 1997-2006

Production agency	No. of students										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
HEC	1,016	1,055	1,070	1,173	1,219	1,307	1,472	1,582	1,582	1,582	13,058
Private sector	294	294	304	314	290	270	220	220	220	220	2,646
Total	1,310	1,349	1,374	1,487	1,509	1,577	1,692	1,802	1,802	1,802	15,704

Source: Bureau of Policy and Planning, Office of the Higher Education Commission.

- Notes:**
1. For 1997 - 2002, the figures are the numbers of new students actually admitted.
 2. For 2003 - 2006, the numbers are derived from the pharmacy student admission plan.

Table 6.18 Numbers of Actual and Projected Pharmacy Graduates, Academic Years 1997-2006

Production agency	No. of graduates										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
HEC	657	700	807	868	959	965	815	1,114	1,158	1,242	9,285
Private sector	106	176	140	159	262	199	145	298	276	257	2,018
Total	763	876	947	1,027	1,221	1,164	960	1,412	1,434	1,499	11,303

Source: The Pharmacy Council, Thailand.

- Notes:**
1. For 1997 - 2003, numbers of actual pharmacy graduates and registered with the Pharmacy Council.
 2. For 2004 - 2006, the projection is based the assumption that 95% of entrants would actually graduate.

(2) Practice of Pharmacists

In 2003, there were 17,903 registered pharmacists (Pharmacy Council, 2003), but only 13,836⁵ were actually practising. It is projected that in 2015, there would be 25,124 pharmacists⁵ which is lower than the country's demand by approximately 6,915-9,122 individuals.⁵

In the future, the demand for pharmacists would depend on the health service system and the legal requirement for pharmacists being stationed at drugstores. According to the current procedure (without any legal requirement for a pharmacist to be stationed at each drugstore and any hospital/clinic being able to dispense medications), there would be an over-supply of pharmacists in the near future.

(3) Geographical Distribution of Pharmacists

Most pharmacists are clustered in Bangkok and the Central Region. The Bangkok-regional disparities have changed in the same pattern as those for medical doctors and dentists (Table 6.19 and Figures 6.13 and 6.14).

(4) Distribution of Pharmacists by Agency

It was found that, between 1971 and 1985, approximately half (50%) of pharmacists nationwide worked in the private sector in such undertakings as drug manufacturing, imports, and sales, while only 43.0% to 50.9% worked in the public sector. Since the government has imposed the compulsory government service requirement for all new pharmacy graduates, the proportion of pharmacists working in the public sector, especially in the MoPH, has increased to 48.9% in 1995 and to 81.8% in 2002. Such a proportion in the private sector has fallen to 32.2% in 1995 and to only 10.8% in 2002 (Table 6.20 and Figure 6.15).

⁵ Nipa Payanantana. Future Human Resources Balance for Pharmacy and Health Consumer Protection Services in Thailand. HRDJ, 1998, Vol. 2, No. 2: 129-141.

Table 6.19 Distribution of Pharmacists by Region, 1979-2002

Region	No. of pharmacists and population to pharmacist ratio												
	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2002
Bangkok Metropolis	2,136 (2,304)	2,295 (2,331)	2,479 (2,313)	2,762 (2,055)	2,850 (2,095)	2,445 (2,559)	2,608 (2,143)	2,717 (2,381)	2,446 (2,280)	2,847 (1,965)	2,653 (2,132)	2,295 (2,485)	2,295 (2,507)
The Central	142 (66,796)	143 (67,035)	161 (61,845)	175 (63,748)	253 (45,561)	408 (29,134)	500 (25,855)	615 (21,050)	1,728 (7,835)	1,145 (12,201)	1,249 (11,458)	1,426 (10,213)	1,543 (9,557)
The North	28 (202,214)	51 (192,961)	175 (58,063)	188 (54,133)	241 (43,517)	375 (28,729)	443 (24,910)	490 (22,745)	606 (19,644)	757 (15,903)	731 (16,610)	1,093 (11,082)	1,200 (10,115)
The South	118 (82,339)	114 (51,579)	70 (87,386)	74 (89,824)	128 (54,658)	256 (28,699)	339 (21,143)	416 (19,163)	474 (16,149)	507 (15,535)	606 (13,382)	851 (9,712)	874 (9,569)
The Northeast	72 (226,083)	77 (218,195)	105 (166,581)	113 (159,504)	150 (124,147)	341 (56,257)	443 (45,020)	483 (41,515)	613 (33,610)	685 (30,636)	823 (25,954)	1,193 (17,979)	1,438 (14,987)
Disparity between BKK's and Northeast's population/pharmacist ratios	1 : 98.1	1 : 93.6	1 : 72.0	1 : 77.6	1 : 59.3	1 : 22.0	1 : 21.0	1 : 17.4	1 : 14.7	1 : 15.6	1 : 12.2	1 : 7.2	1 : 6.0
Total	2,496 (18,455)	2,603 (18,232)	2,990 (16,541)	3,312 (15,604)	3,622 (14,800)	3,825 (14,496)	4,333 (13,077)	4,721 (12,409)	5,867 (12,409)	5,941 (10,178)	6,062 (10,158)	6,858 (9,054)	7,350 (8,511)

Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Notes: 1. Figures in () are population to pharmacist ratios.

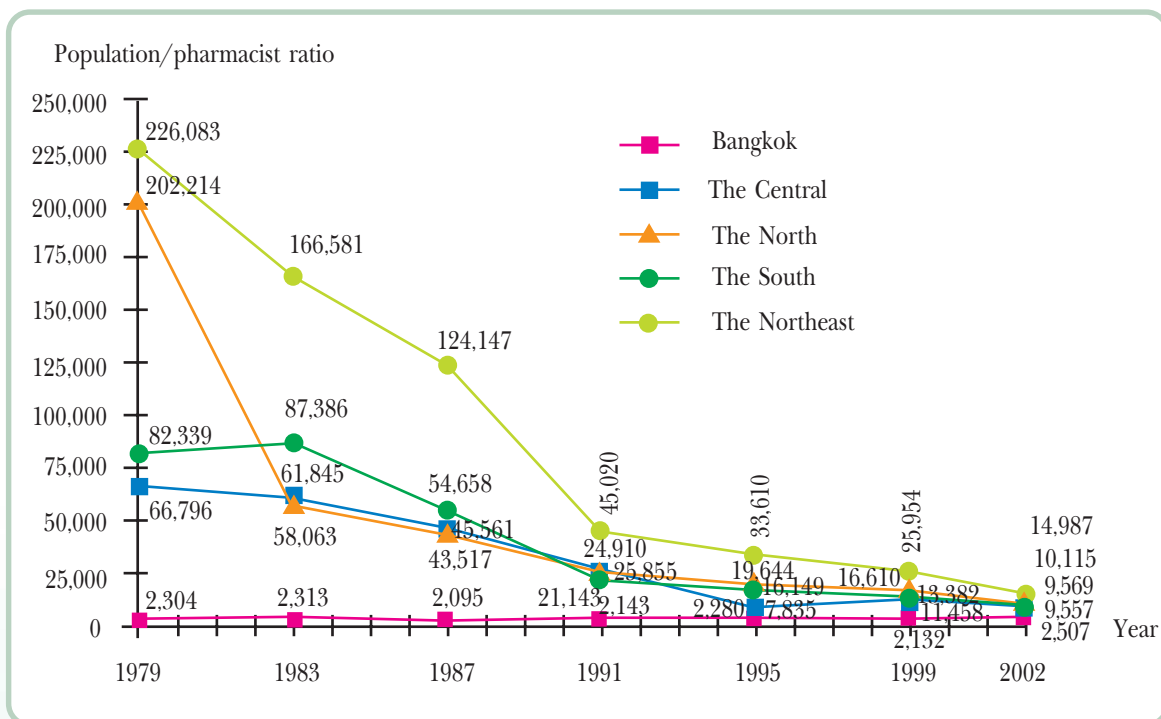
2. Figures from the surveys are estimated to be 50% less than actuality.

3. Due to incompleteness of data for 1985, the data for 1984 were used instead.

4. For 2002, data were received from only 65.6% of all health facilities; 44.3% from Bangkok, 60.5% from the Central, 76.7% from the Northeast, 74.9% from the North, and 68.3% from the South.

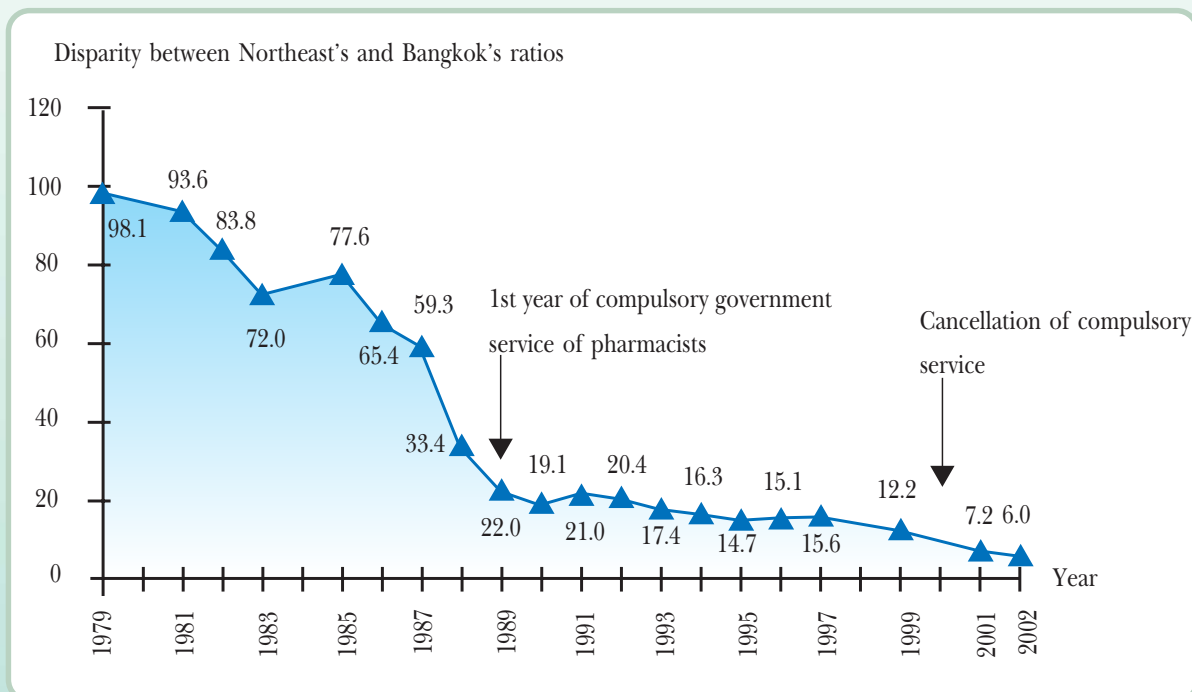
5. For 2002 in Bangkok, the 2001 data were used instead.

Figure 6.13 Population to Pharmacist Ratios by Region, 1979-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Figure 6.14 Disparity between Northeast's and Bangkok's Population/Pharmacist Ratios, 1979-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

- Notes:
1. For 2002, the survey information was received from only 44.3% of health facilities in Bangkok and 76.7% from the Northeast.
 2. For the 2002 data for Bangkok, the 2001 data were used instead.

Table 6.20 Number and Proportion of Pharmacists by Agency, 1971-2002

Year	Number and percentage					
	MoPH	Other ministries	State enterprises	Local adm. agencies	Private sector	Total
1971	298 (18.9)	280 (17.8)	68 (4.3)	32 (2.0)	899 (57.0)	1,577
1973	307 (18.9)	299 (18.4)	73 (4.5)	31 (1.9)	917 (56.4)	1,627
1975	345 (18.0)	366 (19.1)	85 (4.4)	58 (3.0)	1,059 (55.4)	1,913
1977	415 (18.6)	398 (17.8)	105 (4.7)	59 (2.6)	1,259 (56.3)	2,236
1979	569 (22.8)	446 (17.9)	135 (5.4)	73 (2.9)	1,273 (51.0)	2,496
1981	616 (22.9)	419 (15.6)	153 (5.7)	68 (2.5)	1,424 (53.1)	2,680
1983	748 (25.0)	451 (15.1)	175 (5.9)	68 (2.3)	1,548 (51.8)	2,990
1985	1,133 (33.6)	310 (9.2)	216 (6.4)	60 (1.8)	1,657 (49.1)	3,376
1987	1,372 (37.9)	393 (10.8)	236 (6.5)	78 (2.2)	1,543 (42.6)	3,622
1989	1,431 (37.4)	516 (13.5)	238 (6.2)	109 (2.8)	1,531 (40.0)	3,825
1991	1,759 (40.6)	626 (14.4)	240 (5.5)	116 (2.7)	1,592 (36.7)	4,333
1993	2,012 (42.6)	685 (14.5)	253 (5.4)	87 (1.8)	1,684 (35.7)	4,721
1995	2,869 (48.9)	719 (12.3)	284 (4.8)	106 (1.8)	1,889 (32.2)	5,867
1997	3,835 (64.5)	344 (5.8)	344 (5.8)	117 (2.0)	1,301 (21.9)	5,941
1999	4,534 (74.8)	352 (5.8)	101 (1.7)	124 (2.0)	951 (15.7)	6,062
2001	5,465 (79.7)	381 (5.6)	113 (1.6)	115 (1.7)	784 (11.4)	6,858
2002	6,012 (81.8)	286 (3.9)	123 (1.7)	132 (1.8)	797 (10.8)	7,350

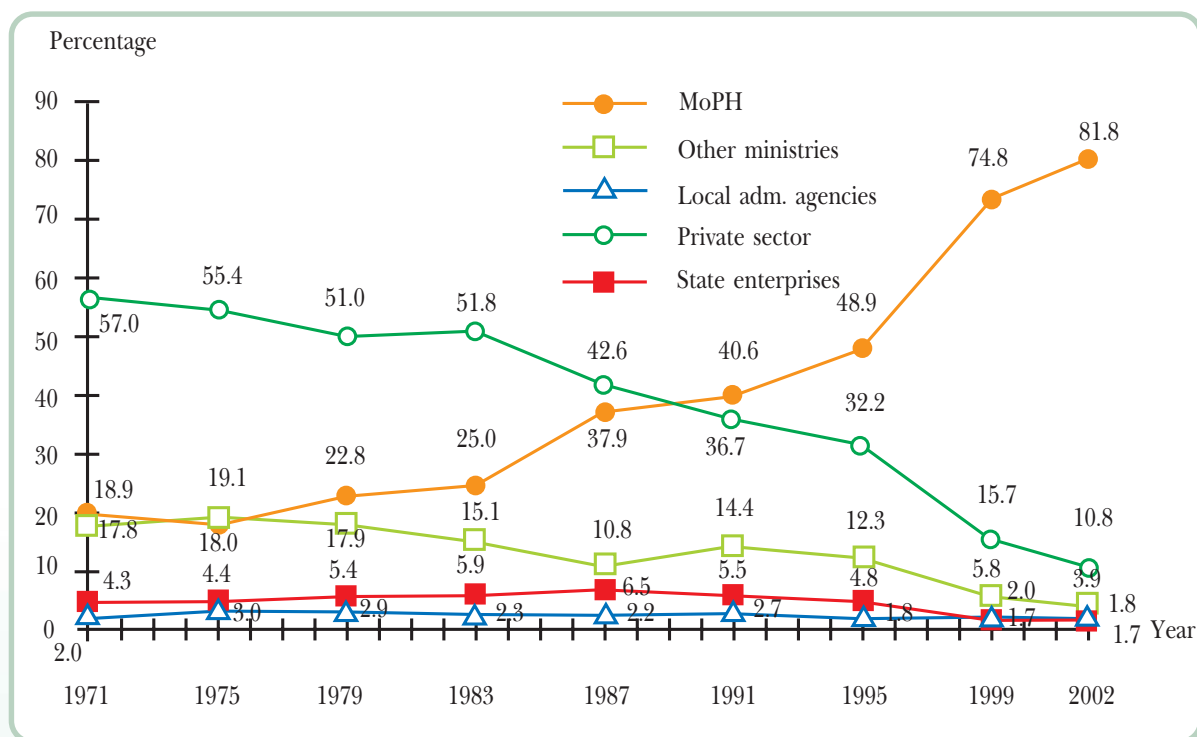
Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Notes: 1. Figures in () are in percentage terms.

2. For 2002, data were received from 65.6% of all health facilities nationwide: 62.5% from among public sector facilities and 77.3% from among private sector agencies.

3. For 2002, the number of pharmacists in Bangkok for 2001 was used instead.

Figure 6.15 Proportion of Pharmacists by Agency, 1971-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

1.1.4 Professional Nurses

(1) Production of Professional Nurses

At present, Thailand has 64 nursing colleges under seven major agencies: 13 under the Ministry of Education, 35 under the MoPH, three under the Ministry of Defence, one under the Royal Thai Police, one under the Thai Red Cross Society and ten in the private sector. Beginning in 2004, another two nursing colleges will be taking student nurses at Kasetsart and Suranaree Technology Universities.

Beginning in 2005, state-run nursing colleges (except for those under the Ministry of Education) will be producing more nurses. The MoPH nursing colleges will be producing 1,000 more nurses each year, in addition to the current output of 1,500 nurses per annum as the current production output is insufficient (Table 6.21). The actual and expected nursing graduates are as shown in Table 6.22.

In 1990, to resolve the shortage problem on a short-term basis, the MoPH began to produce technical nurses. However, in 2000, such a programme was discontinued and since then only professional nurses have been produced. This is to enhance the efficiency of health services.

Table 6.21 Plan on Admissions of Nursing Students in Thailand, Academic Years, 1997-2014

Production agency	No. of entrants														Total					
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010		2011	2012	2013	2014	
1. Public Sector																				
1.1 HEC	1,842	2,020	1,639	1,376	1,353	1,435	1,455	1,725	1,725	1,725	1,725	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	30,305
1.2 MoPH	3,725	3,725	1,500	2,000	2,000	1,700	1,700	1,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	42,850
1.3 Other agencies	564	581	545	528	465	490	490	405	685	685	685	685	685	685	685	685	685	685	685	10,918
2. Private sector	610	610	610	610	610	755	755	875	975	975	975	975	975	975	975	975	975	975	975	15,185
Total	6,741	6,936	4,294	4,514	4,428	4,380	4,400	4,505	5,885	5,885	5,885	5,915	5,915	5,915	5,915	5,915	5,915	5,915	5,915	99,258

Sources: 1. For 1997 - 2003, data were derived from various agencies: MoPH's Phra Boromrajchanok Institute, Office of the Higher Education Commission, other agencies, and private nursing colleges.

2. For 2004 - 2014, data were derived from the Thai Nursing Council.

Notes: 1. Other agencies include Nursing Colleges of the Ministry of Defence, the Thai Red Cross Society, the Bangkok Metropolitan Administration, and the Royal Thai Police.

2. For 2001 - 2004, the Police Nursing College stopped taking new students, but will resume in 2005.

Table 6.22 Numbers of Actual and Expected Professional Nursing Graduates in Academic Years 1997-2006

Production agency	No. of graduates										Total
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
1. Public Sector											
1.1 HEC	1,674	1,808	1,722	2,099	1,511	1,722	1,561	1,285	1,363	1,382	16,127
1.2 MoPH	1,616	1,950	3,726	3,535	3,202	1,499	1,943	1,900	1,615	1,615	22,601
1.3 Other agencies	589	618	580	600	600	469	458	442	466	466	5,288
2. Private sector	321	364	430	507	589	629	768	580	717	717	5,622
Total	4,200	4,740	6,458	6,741	5,902	4,319	4,730	4,207	4,161	4,180	49,638

Sources: The Nursing Council and Phra Boromrajchanok Institute for Health Manpower Development, MoPH.

- Notes:**
1. For 1997 - 2003, the numbers of those who actually graduated.
 2. For 2004 - 2006, the numbers of those expected to graduate, assuming that 95% of the entrants will graduate.
 3. Other agencies include Nursing Colleges of the Ministry of Defence, the Thai Red Cross Society, the Bangkok Metropolitan Administration, and the Royal Thai Police.

(2) Numbers of Professional Nurses Actually Practising and Required

In 2002, there are 113,718 registered professional nurses (The Nursing Council, 2003), but only 76,578-91,602 nurses are actually practising.⁶ It is estimated that in 2015 there will be 120,197-173,321 professional nurses,⁶ whereas there will be a need for 137,997-142,366 professional nurses,⁶ i.e. the supply is close to the demand in the future.

(3) Geographical Distribution of Professional Nurses

Most professional nurses are clustered in Bangkok and the Central Region. Their distribution trends are close to those of medical doctors, dentists, and pharmacists (Table 6.23 and Figures 6.16-6.17).

(4) Distribution of Professional Nurses by Agency

In the past decade, the proportion of professional nurses working in the public sector (MoPH, other ministries, state enterprises, and local administration agencies) dropped from 93.2% in 1971 to 85.8% in 1995. After the economic crisis, such a proportion rose to 89.5% in 1997, whereas that in the private sector dropped to 10.5%. However, upon restructuring of the health service systems after the economic crisis, the proportion of nurses in the private sector has risen to 11.7-12.6% in 1999-2002 (Table 6.24 and Figure 6.18).

⁶ Dr. Wichit Srisuphan. Supply and Requirement Projection of Professional Nurses in Thailand over the Next Two Decades (1995-2015 A.D.). HRDJ: 1998; Vol. 2, No. 3 : 210-220.

Table 6.23 Distribution of Professional Nurses by Region, 1979-2002

Region	No. of nurses and population/nurse ratio												
	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2002
Bangkok metropolis	9,428 (522)	10,826 (494)	11,096 (517)	11,831 (480)	12,982 (460)	14,338 (436)	13,514 (413)	14,979 (432)	16,089 (347)	15,190 (368)	18,543 (305)	19,889 (287)	19,889 (289)
The Central	2,588 (3,665)	2,954 (3,245)	4,580 (2,174)	5,032 (2,217)	6,488 (1,777)	7,368 (1,613)	8,795 (1,470)	10,526 (1,230)	13,240 (1,022)	13,915 (1,004)	16,738 (855)	19,437 (749)	21,545 (684)
The North	2,089 (4,651)	2,548 (3,862)	3,082 (3,297)	3,313 (3,072)	4,234 (2,477)	4,620 (2,332)	6,747 (1,635)	7,823 (1,425)	9,370 (1,270)	10,130 (1,188)	11,882 (1,022)	14,149 (856)	15,456 (785)
The South	1,392 (4,068)	1,415 (4,155)	2,216 (2,760)	2,423 (2,743)	2,962 (2,362)	4,138 (1,775)	4,900 (1,463)	5,694 (1,400)	6,498 (1,178)	7,290 (1,080)	8,332 (973)	10,247 (807)	10,993 (765)
The Northeast	1,715 (9,492)	1,931 (8,701)	2,591 (6,751)	3,420 (5,270)	4,086 (4,557)	5,251 (3,653)	6,729 (2,964)	7,649 (2,621)	9,065 (2,273)	9,841 (2,132)	12,513 (1,707)	14,320 (1,498)	16,860 (1,278)
Disparity between Bangkok's and Northeast's population/nurse ratios	1: 18.2	1: 17.6	1: 13.1	1: 11.0	1: 9.9	1: 8.4	1: 7.2	1: 6.1	1: 6.6	1: 5.8	1: 5.6	1: 5.2	1: 4.4
Total	17,212 (2,676)	19,674 (2,412)	23,565 (2,099)	26,019 (1,986)	30,752 (1,743)	37,515 (1,478)	40,685 (1,255)	46,671 (1,255)	54,262 (1,092)	56,366 (1,073)	68,008 (905)	78,042 (796)	84,683 (739)

Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Notes: 1. Figures in () are population to professional nurse ratios.

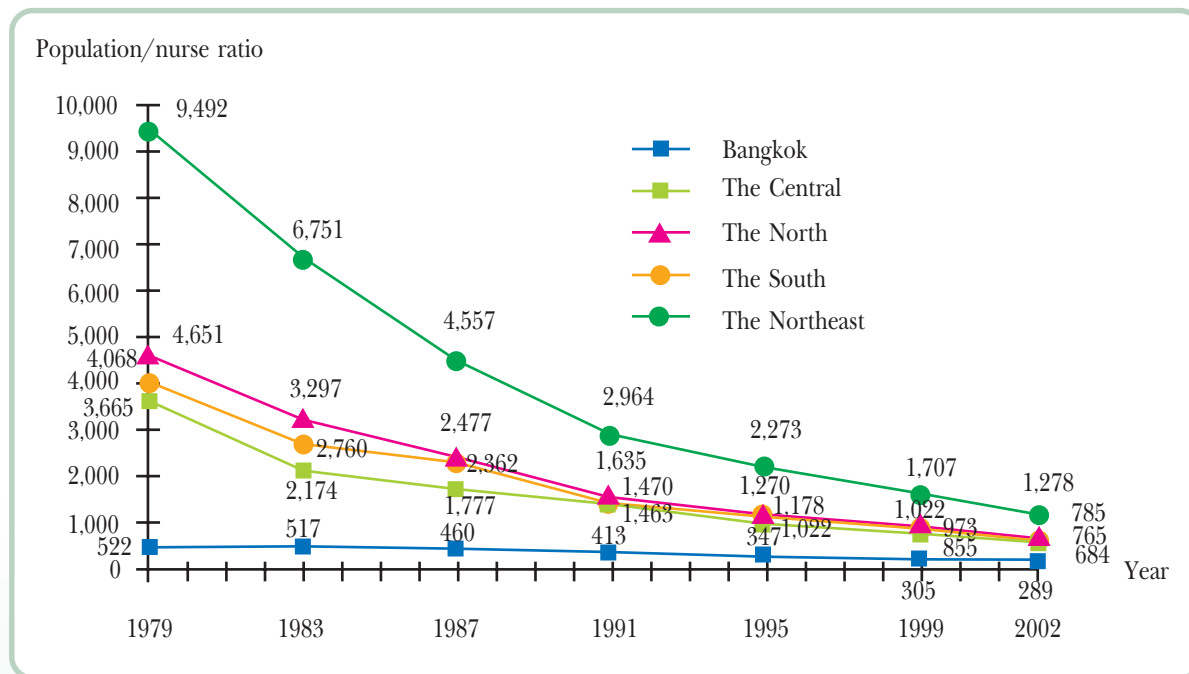
2. Figures from the surveys are estimated to be 50% less than actuality.

3. Due to incompleteness of data for 1985, the data for 1984 were used instead.

4. For 2002, data were received from only 65.6% of all health facilities; 44.3% from Bangkok, 60.5% from the Central, 76.7% from the Northeast, 74.9% from the North, and 68.3% from the South.

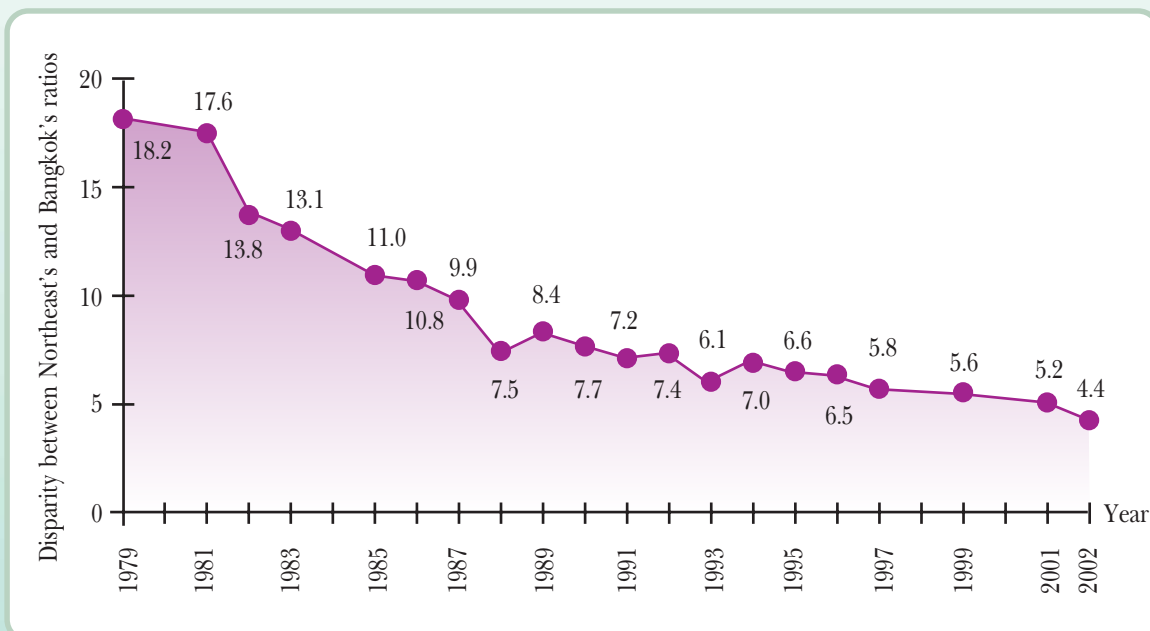
5. For 2002 in Bangkok, the 2001 data were used instead.

Figure 6.16 Population to Professional Nurse Ratios by Region, 1979-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Figure 6.17 Disparity between Northeast's and Bangkok's Population/Nurse Ratios, 1979-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

- Notes:
1. For 2002, the survey information was received from only 44.3% of health facilities in Bangkok and 76.7% from the Northeast.
 2. For 2002, the 2001 data were used instead.

Table 6.24 Number and Proportion of Professional Nurses by Agency, 1971-2002

Year	Number and percentage					
	MoPH	Other ministries	State enterprises	Local adm. agencies	Private sector	Total
1971	4,016 (42.9)	3,720 (39.7)	274 (2.9)	713 (7.6)	637 (6.8)	9,360
1973	4,757 (45.0)	3,708 (35.1)	409 (3.9)	761 (7.2)	927 (8.8)	10,562
1975	6,021 (47.6)	4,203 (33.2)	415 (3.3)	982 (7.7)	1,037 (8.2)	12,658
1977	6,462 (42.4)	5,588 (36.7)	550 (3.6)	1,099 (7.2)	1,532 (10.1)	15,231
1979	7,630 (44.3)	5,544 (32.2)	605 (3.5)	1,638 (9.5)	1,794 (10.4)	17,211
1981	8,526 (43.5)	6,370 (32.5)	680 (3.5)	1,525 (7.8)	2,498 (12.7)	19,599
1983	11,537 (48.9)	6,935 (29.4)	791 (3.4)	1,522 (6.5)	2,780 (11.8)	23,565
1985	16,036 (57.2)	5,462 (19.5)	1,958 (6.9)	1,683 (6.0)	2,880 (10.3)	28,019
1987	16,169 (52.6)	6,797 (22.1)	2,002 (6.5)	2,975 (9.6)	2,809 (9.1)	30,752
1989	19,423 (51.8)	10,849 (28.9)	2,103 (5.6)	2,000 (5.3)	3,140 (8.4)	37,515
1991	23,996 (58.9)	8,540 (20.9)	1,986 (4.9)	2,263 (5.6)	3,900 (9.6)	40,685
1993	28,088 (60.2)	9,117 (19.5)	2,072 (4.4)	2,539 (5.4)	4,855 (10.4)	46,671
1995	32,976 (60.8)	9,148 (16.8)	1,816 (3.3)	2,643 (4.9)	7,679 (14.2)	54,262
1997	37,087 (65.8)	9,099 (16.1)	2,017 (3.6)	2,220 (3.9)	5,943 (10.5)	56,366
1999	44,333 (65.2)	10,247 (15.0)	2,359 (3.5)	2,825 (4.2)	8,244 (12.1)	68,008
2001	51,450 (65.9)	11,240 (14.4)	2,564 (3.3)	2,917 (3.7)	9,871 (12.6)	78,042
2002	57,804 (68.3)	10,934 (12.9)	2,574 (3.0)	3,427 (4.0)	9,944 (11.7)	84,683

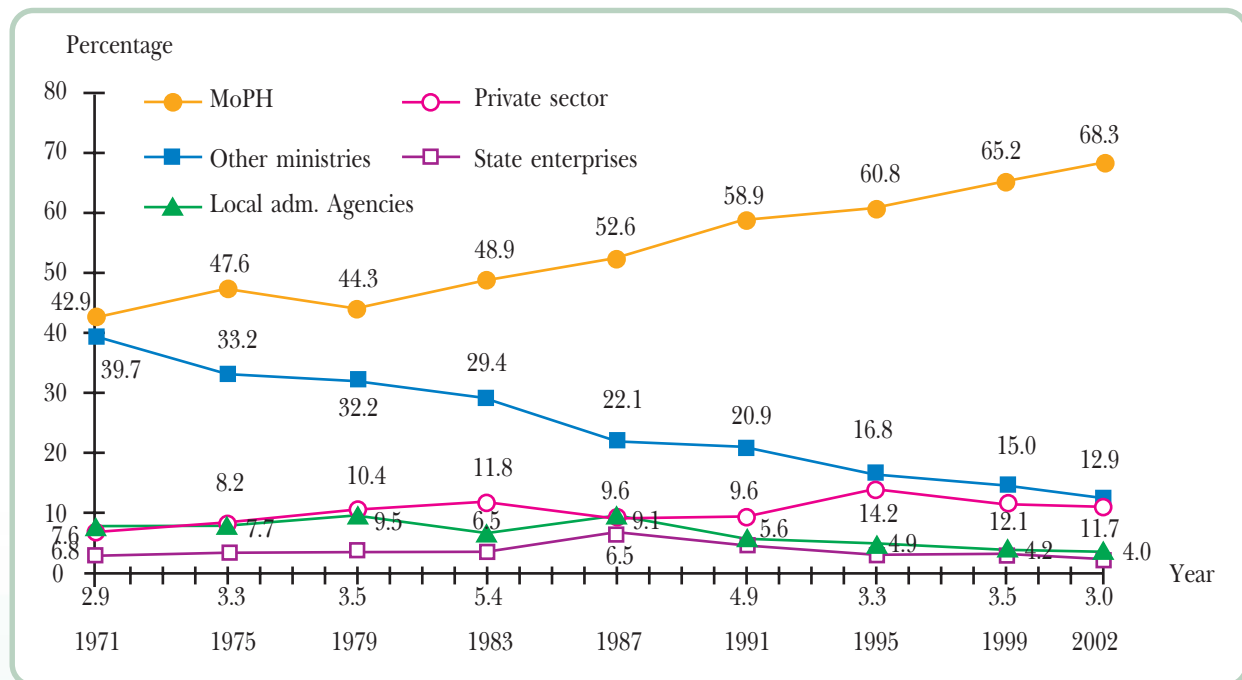
Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Notes: 1. Figures in () are in percentage terms.

2. For 2002, data were received from 65.6% of all health facilities nationwide: 62.5% from among public sector facilities and 77.3% from among private sector agencies.

3. For 2002, the number of professional nurses in Bangkok for 2001 was used instead.

Figure 6.18 Proportion of Professional Nurses by Agency, 1971-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

(5) Professional Nurses' Workloads

Based on the numbers of outpatients, professional nurses in community hospitals and private hospitals have greatest workloads, compared with those in other hospitals located in urban areas and Bangkok (Table 6.25).

Table 6.25 Patient loads of Professional Nurses, 2002

Health facility	(1) No. of outpatients	(2) No. of inpatients	(3) Inpatients adjusted*	Total patientloads (1) + (3)	No. of nurses	Patientload per nurse	Comparison index
Community hospitals	17,831,867	3,305,860	46,282,040	64,113,907	22,744	2,818.9	1.3
Regional/general hospitals	5,823,778	2,605,672	46,902,096	52,725,874	25,083	2,102.1	1.0
University hospitals	934,774	303,866	5,469,588	6,404,362	8,496	753.8	0.3
BMA's hospitals	430,098	81,267	1,462,806	1,892,904	2,917	648.9	0.3
Private hospitals	4,025,727	1,535,831	21,501,634	25,527,361	9,702	2,631.1	1.2
Total	29,046,244	7,832,496	121,618,164	150,664,408	68,942	2,185.4	1.0

Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

- Notes:
- * For comparison purpose, the number of inpatients in each hospital category is adjusted as follows:
 For community and private hospitals = No. of inpatients X 14
 For regional/general hospitals, university and BMA hospitals = No. of inpatients X 18
 - For the number of nurses in 2002 in Bangkok, the 2001 data were used instead.

1.1.5 Health Centre Personnel

(1) Quantity

In 2003, there were 9,765 health centres nationwide with 28,839 health workers (in 2003) or an average of 3.0 workers per centre. In 2015, a total of 56,937 health workers⁷ will be required (one health worker for every 600 population). At present, the MoPH can produce 5,000 health workers per annum, based on the capacity of all seven Sirindhorn Public Health Colleges and 35 Boromrajchonnanee Nursing Colleges. But actually, of this number only about 1,500 are assigned to work at various health centres each year. For several years, professional nurses and dental nurses have been assigned to work at large health centres; and, in the future, doctors will also be assigned to work at health centres located in large communities.

(2) Geographical Distribution of Health Centre Personnel

The trends of health centre personnel to population ratio have risen in all regions and nationwide, i.e. from 1:2,421 in 1987 to 1:1,762 in 2003. Most health workers are normally clustered in the Central Plains and the South, while regional disparities are lowering (Table 6.26).

⁷ Amphon Jindawattana. Report on study of Health Manpower Requirement in the Next Two Decades: the Primary Care Providers in Communities, 1997.

Table 6.26 Number and Ratio of Health Centre Personnel to Population by Region, 1987-2003

Region	Number and worker/population ratio								
	1987	1996	1997	1998	1999	2000	2001	2002	2003
The Central	4,217 (1:1,833)	7,724 (1:1,125)	7,917 (1:1,109)	8,928 (1:1,207)	9,017 (1:1,180)	8,769 (1:1,059)	8,150 (1:1,453)	8,027 (1:1,470)	7,604 (1:1,552)
The North	3,233 (1:2,387)	5,734 (1:1,512)	6,826 (1:1,293)	6,970 (1:1,389)	7,167 (1:1,349)	7,068 (1:1,292)	6,558 (1:1,572)	6,456 (1:1,603)	6,043 (1:1,713)
The South	2,318 (1:2,064)	4,628 (1:1,161)	5,038 (1:1,079)	5,152 (1:1,129)	5,264 (1:1,127)	5,146 (1:1,141)	4,843 (1:1,378)	4,761 (1:1,416)	4,463 (1:1,511)
The Northeast	4,573 (1:3,167)	9,114 (1:1,785)	10,430 (1:1,582)	10,236 (1:1,681)	10,569 (1:1,655)	10,248 (1:1,666)	9,693 (1:1,938)	9,591 (1:1,971)	9,015 (1:2,097)
Disparity between Central's and Northeast's population/ worker ratios	1:1.73	1:1.59	1:1.43	1:1.39	1:1.40	1:1.57	1:1.3	1:1.3	1:1.4
Total	14,341 (1:2,421)	27,200 (1:1,434)	30,211 (1:1,309)	31,286 (1:1,390)	32,017 (1:1,366)	31,231 (1:1,324)	29,244 (1:1,628)	28,835 (1:1,657)	27,125 (1:1,762)

Sources: 1. For 1987 - 2000, data were derived from the Bureau of Health System Development, Department of Health Service Support.

2. For 2001 - 2003, data were derived from the Bureau of Central Administration, MoPH.

Notes: 1. Figure in () are ratios of health centre worker to population outside municipalities and sanitary districts.

2. From FY 1999, data were derived from the payrolls (Jor 18) of health centre staff of the Bureau of Central Administration. Office of the Permanent Secretary, MoPH.

3. Data on population outside municipal areas for 2001 are the data as of 31 Dec, 2001 and data for 2002-2003 are as of 1 Jan 2003, from the Bureau of Registration Administration, Department of Provincial Administration, Ministry of Interior, as calculated by Rujira Taverat of the Bureau of Policy and Strategy, MoPH.

1.2 Health Facilities

1.2.1 Number and Coverage of Health Facilities

1) Health Facilities in the Public Sector (see in Table 6.27)

In Bangkok Metropolis, there are five medical school hospitals, 29 general hospitals, 19 specialized hospitals/institutions, five 10-bed community hospitals (under BMA), and 61 public health centres (with 82 branches, in all BMA districts).

Region level. There are four medical school hospitals, 25 regional hospitals, and 40 specialized hospitals.

Provincial level. There are 70 general hospitals covering all provincial areas (previously there were 67 general hospitals; and now Hua Hin Community Hospital has been upgraded as a general hospital, two other hospitals have been transferred to MoPH, i.e. Chonprathan Hospital of the Agriculture Ministry and the Northeastern Region Infectious Disease Hospital of the MoPH Disease Control Department) and 57 hospitals under various agencies of the Ministry of Defence.

District level. There are 725 community hospitals, covering 91.2% of all districts, two extended OPD or hospital outlets, and 214 municipal health centres.

Tambon (subdistrict) level. There are 9,765 health centres, covering all Tambons; some Tambons have more than one health centre.

Village level. There are 311 community health posts, 66,223 rural community primary health care centres, and 3,108 urban community primary health care centres.

Table 6.27 Number of Health Facilities in the Public Sector, 2003

Administrative level	Health facility	Number	Coverage
Bangkok Metropolis	Medical school hospitals	5	-
	General hospitals	29	-
	- MoPH	5	-
	- Ministry of Interior (excluding BMA)	5	-
	- Ministry of Defence	7	-
	- BMA	8	-
	- State enterprises	4	-
	Specialized hospitals/institutions	19	-
	Public health centres/branches	61/82	All districts in BMA
	10-bed hospitals (BMA)	5	
Regional level and branches	Medical school hospitals	4	
	Regional hospitals	25	

Table 6.27 Number of Health Facilities in the Public Sector, 2003

Administrative level	Health facility	Number	Coverage
	Specialized hospitals:	40	
	- Maternal & child health hospitals	12	
	- Psychiatric hospitals	11	
	- Neurological hospital	1	
	- Leprosy hospital	1	
	- Communicable disease hospital	1	
	- Chest disease hospital	1	
	- Cancer prevention & control centres	6	
	- Drug dependence treatment centres	5	
	- Hearing centre	1	
	- Centre for elderly care	1	
Provincial level (75 provinces)	General hospitals, under MoPH	70	100%
	Military hospitals under the Ministry of Defence	57	
795 districts	Community hospitals (Jan, 2004)	725	91.2%
81 minor-districts	Extended hospitals	2	
	Municipal health centres (Oct, 2003)	214	
7,255 tambons	Health centres (2003)	9,765	100%
72,861 villages	Community health posts	311	
	Community PHC centres (2003)		
	- Rural	66,223	90.9%
	- Urban	3,108	-

- Sources:**
1. Bureau of Policy and Strategy, MoPH.
 2. Bureau of Health Service System Development, Department of Health Service Support, MoPH.
 3. Primary Health Care Division, Department of Health Service Support, MoPH.
 4. Department of Provincial Administration, Ministry of Interior.
 5. Department of Health, Bangkok Metropolitan Administration (BMA).

2) Health Facilities in the Private Sector include:

(2.1) Pharmacies or drugstores: 8,225 modern pharmacies; 4,653 pharmacies selling only packaged drugs; and 2,106 traditional medicine drugstores.

(2.2) Clinics: 14,953 clinics without inpatient beds.

(2.3) Hospitals: 346 private hospitals with inpatient beds, as shown in Table 6.28.

Table 6.28 Private Health Facilities, 2003

Type	Bangkok		Provincial areas		Total
	No.	Percentage	No.	Percentage	
1. Pharmacies					
1.1 Modern pharmacies	3,393	41.3	4,832	58.7	8,225
1.2 Modern pharmacies selling only packed drugs	565	12.1	4,088	87.9	4,653
1.3 Traditional medicine drugstores	420	19.9	1,686	80.1	2,106
Total	4,378	29.2	10,606	70.8	14,984
2. Clinics (without inpatient beds)					
- Modern	2,687	n.a.	n.a.	n.a.	n.a.
- Traditional	413	n.a.	n.a.	n.a.	n.a.
Total	3,100	20.7	11,853	79.3	14,953
3. Private hospitals (with inpatient beds)					
- No. of hospitals	100	28.9	246	71.1	346
- No. of beds	15,227	43.7	19,636	56.3	34,863

Sources: 1. Drug Control Division, Food and Drug Administration, MoPH.

2. Medical Registration Division, Department of Health Service Support, MoPH.

Between 1993 and 2003, the number of clinics (without inpatient beds), especially in provincial areas increased markedly, but dropping in Bangkok Metropolis (Table 6.29 and Figure 6.19). For the number of hospitals, the tendencies are similar to those for clinics (Figure 6.20).

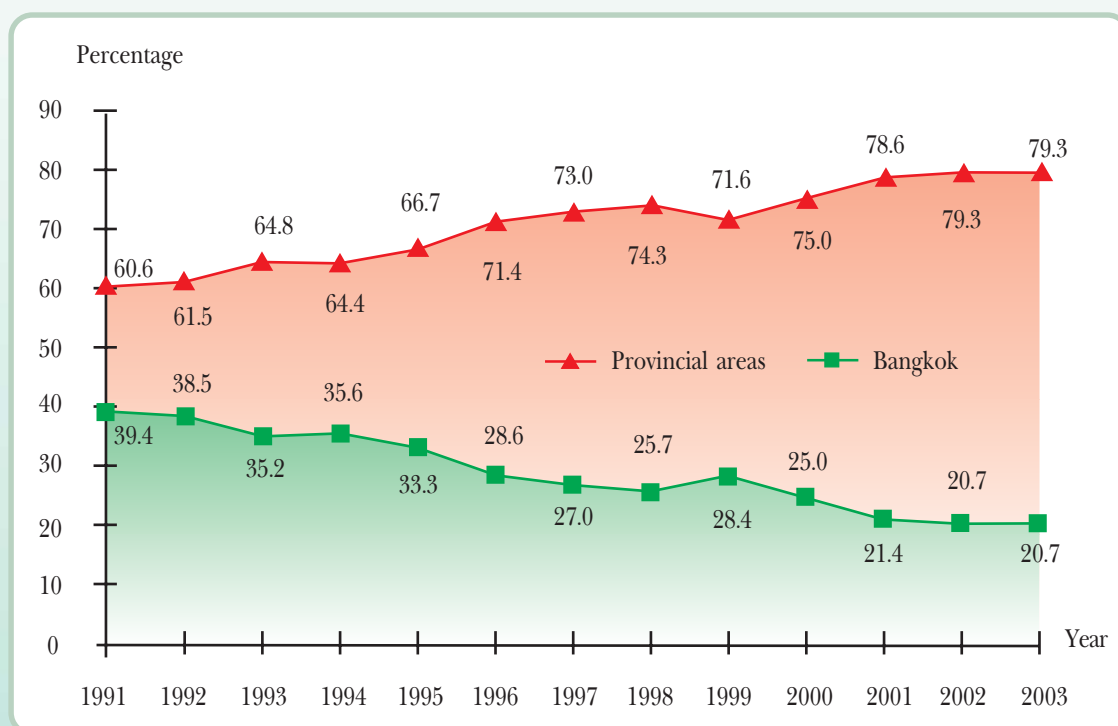
Table 6.29 Number of Health Facilities without Inpatient Beds (Private Clinics), 1991-2003

Region	No. of clinics and percentage (in parentheses)												
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Bangkok	5,625 (39.4)	4,130 (38.5)	3,829 (35.2)	4,247 (35.6)	4,062 (33.3)	3,114 (28.6)	3,087 (27.0)	3,143 (25.7)	3,399 (28.4)	3,552 (25.0)	3,081 (21.4)	3,156 (20.7)	3,100 (20.7)
Provincial areas	8,658 (60.6)	6,592 (61.5)	7,037 (64.8)	7,689 (64.4)	8,122 (66.7)	7,787 (71.4)	8,354 (73.0)	9,063 (74.3)	8,572 (71.6)	10,698 (75.0)	11,322 (78.6)	12,111 (79.3)	11,853 (79.3)
Total	14,283	10,722	10,866	11,936	12,184	10,901	11,441	12,206	11,971	14,250	14,403	15,267	14,953
Change (%)	-	-24.9	+1.3	+9.8	+2.1	-10.5	+4.9	+6.7	-1.9	+19.0	+1.1	+6.0	-2.1

Source: Medical Registration Division, Department of Health Service Support, MoPH.

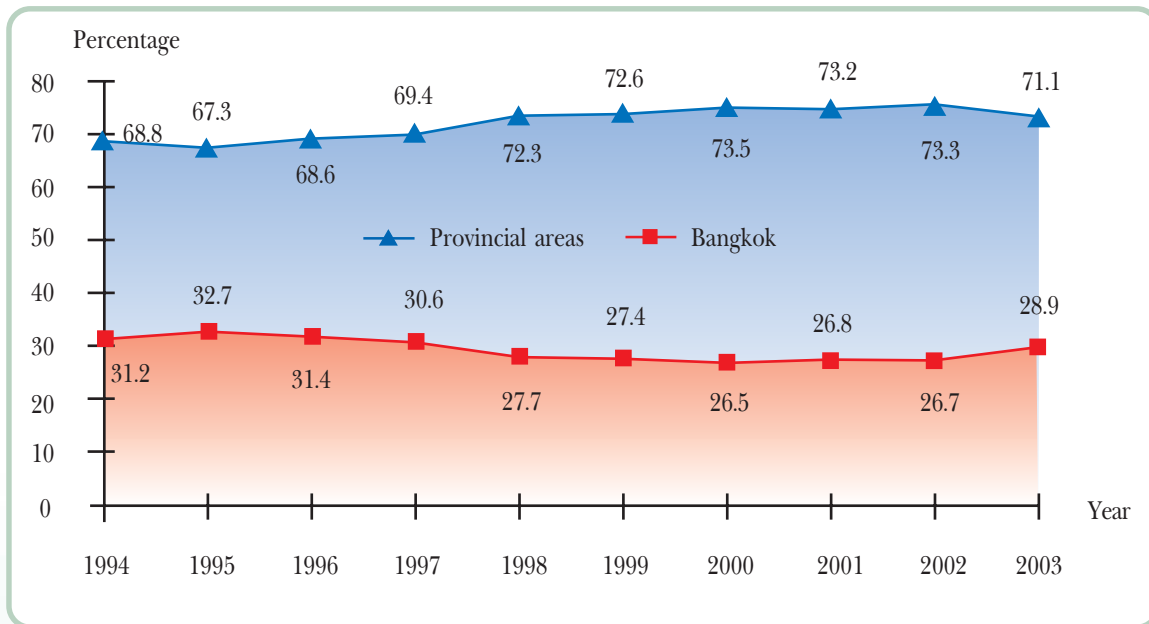
Notes: Figures in () are in percentage terms.

Figure 6.19 Percentage of Clinics in Provincial Areas and Bangkok, 1991-2003



Source: Medical Registration Division, Department of Health Service Support, MoPH.

Figure 6.20 Percentage of Private Hospitals in Provincial Areas and Bangkok, 1994-2003



Source: Medical Registration Division, Department of Health Service Support, MoPH

1.2.2 Distribution of Health Facilities

1) Hospitals

(1.1) Geographical Distribution of Hospitals

The bed/population ratio has risen in the past decade across the country from 1: 752 in 1979 to 1: 462 in 2002. Although most of the hospital beds are clustered in Bangkok and the Central Region, the Bangkok-provincial disparities have been rather stable (Table 6.30 and Figure 6.21).

(1.2) Distribution of Hospitals by Agency

In the public sector, the largest agency is the MoPH with two-thirds of all hospitals and beds across the country. In 2002, 67.7% of hospitals and 64.1% of beds belonged to the MoPH. Of which, over 80% were community hospitals in various districts, and only 5.9% belonged to other ministries. But, as most of non-MoPH health facilities are large hospitals, their overall proportion of beds is as high as 11.3% (Tables 6.31 - 6.32 and Figure 6.23).

With regard to the increase in beds, the MoPH's hospital beds climbs slightly, but its proportion tends to be declining (Figure 6.24). This is because the MoPH has been building more community hospitals, one in each district according to its policy, most of which being 30-bed and 60-bed hospitals (Table 6.33).

Since 1993, the numbers of hospitals and beds have been remarkably increasing, but the number of medical doctors has not increased at all. As a result, the doctor to bed ratio steadily dropped from 1:7.5 in 1991 to 1:15.3 in 1998; however, after the economic crisis the ratio has increased to 1:7.3 in 2003.

In the private sector, the number of private hospitals increased from 23 in 1970 to 473 in 1998, but decreased to 346 in 2003; a fifteen-fold increase, compared with that in 1970, nevertheless. Almost half of the private hospitals (43.1%) have 50 beds or fewer. Only 101 hospitals (29.2%) with over 100 beds participate in the health insurance scheme according to the criteria of the Social Security Act (Tables 6.34 and 6.36). Their distribution varies to the economic potential; therefore, they are mostly in Bangkok and the Central Plains rather than in the Northeast, the North, and the South (Table 6.36). On average, private hospitals in Bangkok have 152 beds each and those in provincial areas have only 80 beds each (Table 6.28).

It is noteworthy that between 1970 and 1989 the proportion of private hospitals was declining, but since 1991 the proportion of beds has been rising more rapidly than that of hospitals. This is a result of a rapid growth in large hospitals, consistent with the rapid economic growth in the past decade together with governments investment promotion privileges (Tables 6.34 and 6.36).

During the economic crisis, the private health services have been obviously affected, the bed-occupancy dropping by 20-30% in large hospitals and by over 50% in small hospitals. Several hospitals reduced the number of service beds, some cut down on the number of staff as well as staff salaries or compensation (Impact of Economic Crisis on Health Manpower Development, 1999). Some were likely to close down their business while applications for building new hospitals were on the decline (Figure 6.22).

Table 6.30 Distribution of Inpatient Beds by Region, 1979-2002

Region	No. of beds and population/bed ratio (in parenthesis)												
	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2002
Bangkok Metropolis	14,585 (337)	17,661 (303)	18,486 (310)	19,376 (293)	24,376 (245)	20,337 (308)	21,704 (257)	24,351 (266)	25,236 (221)	27,327 (205)	28,454 (199)	27,879 (205)	27,879 (206)
The Central	17,481 (543)	20,246 (473)	21,954 (453)	32,018 (348)	24,628 (468)	24,156 (492)	25,519 (506)	27,658 (468)	34,248 (395)	37,386 (374)	38,103 (376)	39,615 (368)	37,721 (391)
The North	9,917 (980)	12,503 (787)	12,751 (797)	12,650 (804)	14,252 (736)	17,520 (615)	16,181 (682)	17,502 (637)	20,943 (568)	25,874 (465)	25,426 (478)	25,570 (474)	24,483 (496)
The South	8,515 (665)	8,521 (690)	10,258 (596)	10,334 (643)	11,153 (627)	11,394 (645)	11,888 (603)	12,936 (616)	14,449 (530)	16,016 (492)	15,944 (509)	16,814 (492)	16,862 (496)
The Northeast	10,776 (1,511)	13,437 (1,250)	14,989 (1,167)	15,294 (1,178)	15,887 (1,172)	16,575 (1,157)	18,560 (1,074)	18,719 (1,071)	23,541 (875)	25,802 (813)	27,376 (780)	27,819 (771)	28,389 (759)
Disparity between Bangkok's and Northeast's population/bed ratios	1 : 4.5	1 : 4.1	1 : 3.8	1 : 4.0	1 : 4.8	1 : 3.8	1 : 4.2	1 : 4.0	1 : 3.9	1 : 4.0	1 : 3.9	1 : 3.8	1 : 3.7
Total	61,274 (752)	72,368 (656)	78,438 (630)	80,438 (642)	87,554 (612)	89,982 (616)	93,852 (604)	101,166 (579)	118,417 (500)	132,405 (457)	135,303 (455)	137,697 (451)	135,334 (462)

Sources: Reports on Health Resources, Bureau of Policy and Strategy, MoPH.

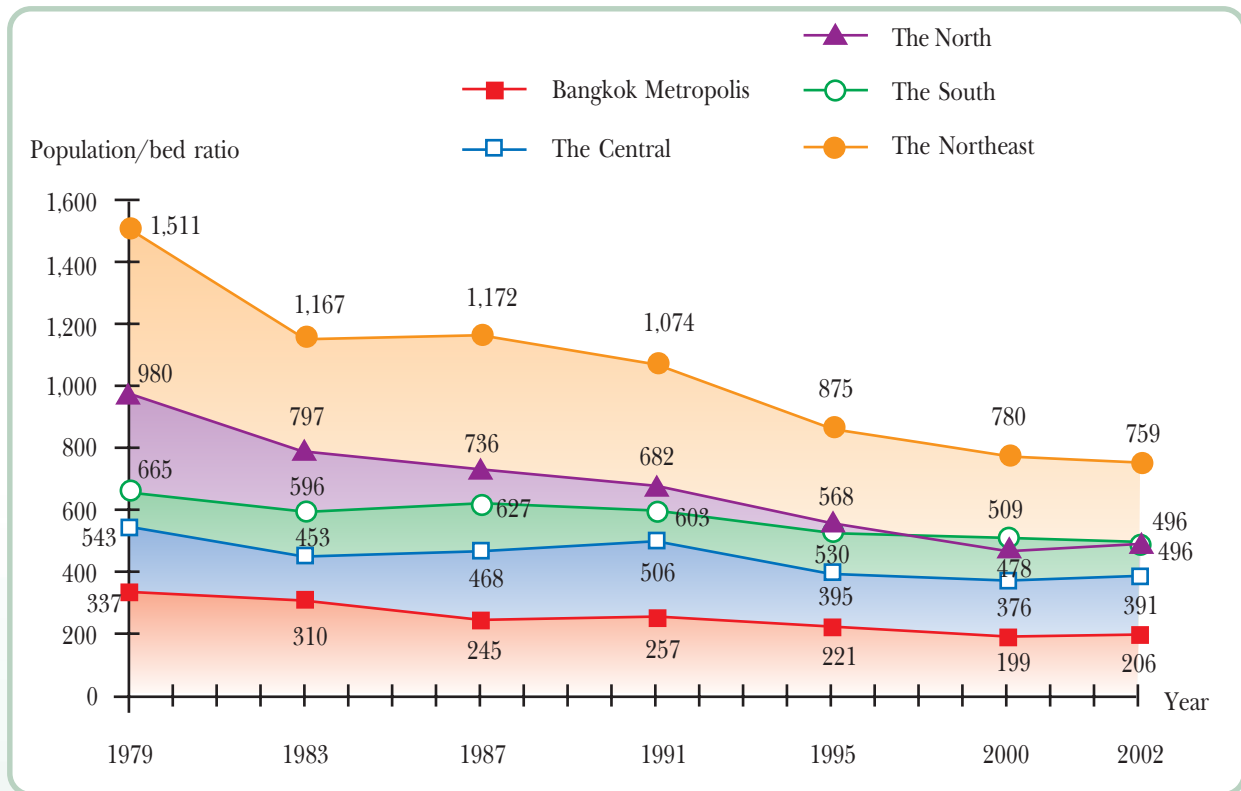
Notes: 1. Figures in () are population to bed ratios.

2. Due to incompleteness of data for 1985, the data for 1984 were used instead.

3. For 2002, data were received from only 65.6% of all health facilities; 44.3% from Bangkok, 60.5% from the Central, 76.7% from the Northeast, 74.9% from the North, and 68.3% from the South.

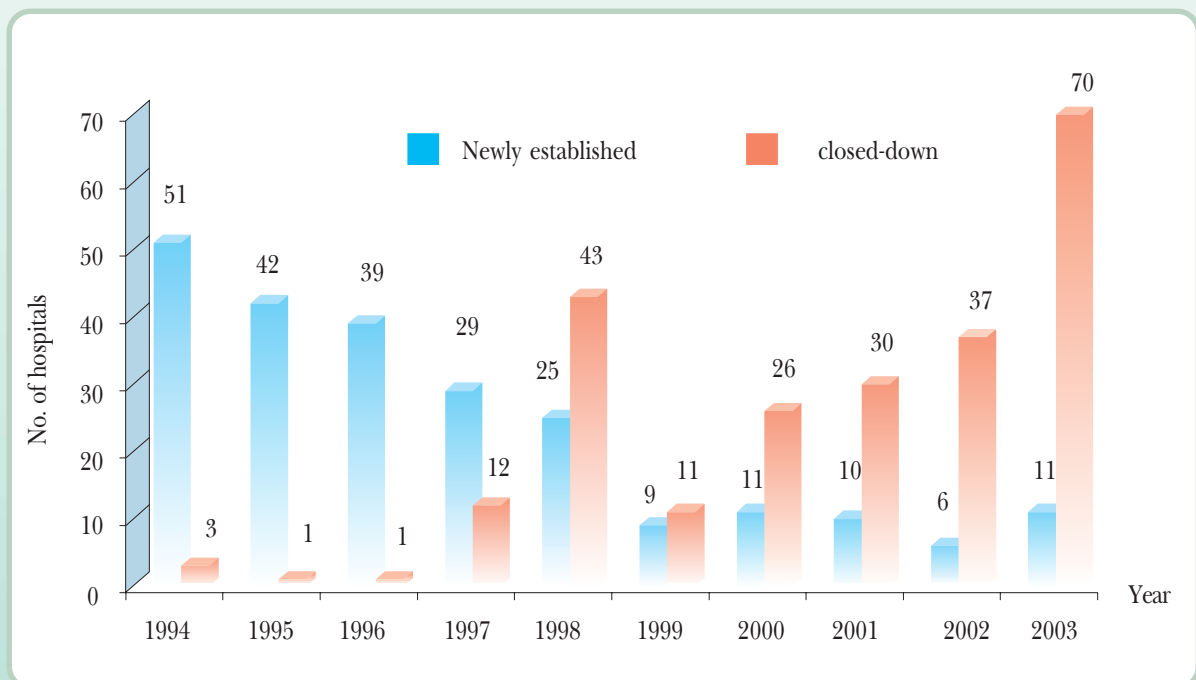
4. For Bangkok in 2002, the 2001 data were used instead

Figure 6.21 Population to Bed Ratios by Region, 1979-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Figure 6.22 Numbers of Newly Established and Closed-down Private Hospitals, 1994-2003



Source: Medical Registration Division, Department of Health Service Support, MoPH.

Table 6.31 Number and Proportion of Hospitals by Agency, 1973-2002

Year	Number and percentage (in parenthesis)					
	MoPH	Other ministries	State enterprises	Local adm. agencies	Private sector	Total
1973	112 (34.6)	65 (20.1)	14 (4.3)	6 (1.8)	127 (39.2)	324
1975	116 (34.7)	64 (19.2)	13 (3.9)	6 (1.8)	135 (40.4)	334
1977	295 (53.2)	68 (12.3)	19 (3.4)	6 (1.1)	167 (30.1)	555
1979	389 (57.9)	66 (9.8)	24 (3.6)	6 (0.9)	186 (27.7)	671
1981	444 (59.4)	64 (8.6)	23 (3.1)	6 (0.8)	210 (28.1)	747
1983	531 (60.4)	67 (7.6)	19 (2.2)	6 (0.7)	256 (29.1)	879
1985	625 (67.4)	58 (6.2)	9 (1.0)	6 (0.6)	229 (24.7)	927
1987	664 (67.5)	66 (6.7)	10 (1.0)	6 (0.6)	237 (24.1)	983
1989	692 (68.4)	64 (6.3)	11 (1.1)	7 (0.7)	237 (23.4)	1,011
1991	718 (67.5)	70 (6.6)	11 (1.0)	8 (0.8)	257 (24.1)	1,064
1993	754 (68.2)	68 (6.1)	12 (1.1)	8 (0.7)	263 (23.8)	1,105
1995	831 (64.9)	73 (5.7)	11 (0.8)	8 (0.7)	357 (27.9)	1,280
1997	845 (64.9)	79 (6.1)	11 (0.8)	8 (0.6)	358 (27.5)	1,301
1999	855 (63.6)	84 (6.2)	21 (1.6)	11 (0.8)	374 (27.8)	1,345
2001	875 (67.4)	79 (6.1)	10 (0.8)	11 (0.8)	323 (24.9)	1,298
2002	877 (67.7)	77 (5.9)	11 (0.8)	12 (0.9)	319 (24.6)	1,296

Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Notes: 1. Figures in () are percentages.

2. Due to incompleteness of data for 1985, the data for 1984 were used instead.

3. For 2002, data were received from 65.6% all health facilities nationwide: 62.5% from among public sector facilities and 77.3% from among private sector agencies.

4. For Bangkok in 2002, the 2001 data were used instead.

Table 6.32 Number and Proportion of Beds by Agency, 1973 - 2002

Year	Number and percentage (in parenthesis)					
	MoPH	Other ministries	State enterprises	Local adm. agencies	Private sector	Total
1973	34,206 (67.5)	11,108 (21.9)	671 (1.3)	918 (1.8)	3,746 (7.4)	50,649
1975	36,201 (66.5)	12,361 (22.7)	591 (1.1)	1,307 (2.4)	3,963 (7.3)	54,423
1977	40,712 (64.3)	14,765 (23.3)	635 (1.0)	1,456 (2.3)	5,785 (9.1)	63,353
1979	44,964 (66.0)	14,672 (21.5)	843 (1.2)	1,387 (2.0)	6,210 (9.1)	68,076
1981	48,442 (66.9)	13,912 (19.2)	956 (1.3)	1,558 (2.1)	7,500 (10.4)	72,368
1983	53,943 (68.8)	13,835 (17.6)	823 (1.0)	1,541 (1.9)	8,296 (10.6)	78,438
1985	56,286 (69.5)	13,773 (17.0)	951 (1.2)	1,687 (2.1)	8,275 (10.2)	80,972
1987	57,766 (65.9)	15,482 (17.7)	2,243 (2.6)	2,089 (2.4)	9,974 (11.4)	87,554
1989	58,927 (65.5)	17,118 (19.0)	2,335 (2.6)	2,057 (2.3)	9,545 (10.6)	89,982
1991	62,250 (66.3)	15,422 (16.4)	2,178 (2.3)	2,152 (2.3)	11,877 (12.6)	93,852
1993	65,558 (64.8)	15,784 (15.6)	2,229 (2.2)	2,232 (2.2)	15,363 (15.2)	101,166
1995	73,191 (61.8)	15,430 (13.0)	2,333 (2.0)	2,165 (1.8)	25,298 (21.4)	118,417
1997	79,818 (60.3)	18,074 (13.6)	2,360 (1.8)	2,208 (1.7)	29,945 (22.6)	132,405
1999	82,085 (60.7)	17,110 (12.6)	2,541 (1.9)	2,360 (1.7)	31,207 (23.1)	135,303
2001	87,753 (63.7)	16,218 (11.8)	2,525 (1.8)	2,245 (1.6)	28,956 (21.0)	137,697
2002	86,761 (64.1)	15,254 (11.3)	2,555 (1.9)	2,267 (1.7)	28,497 (21.0)	135,334

Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

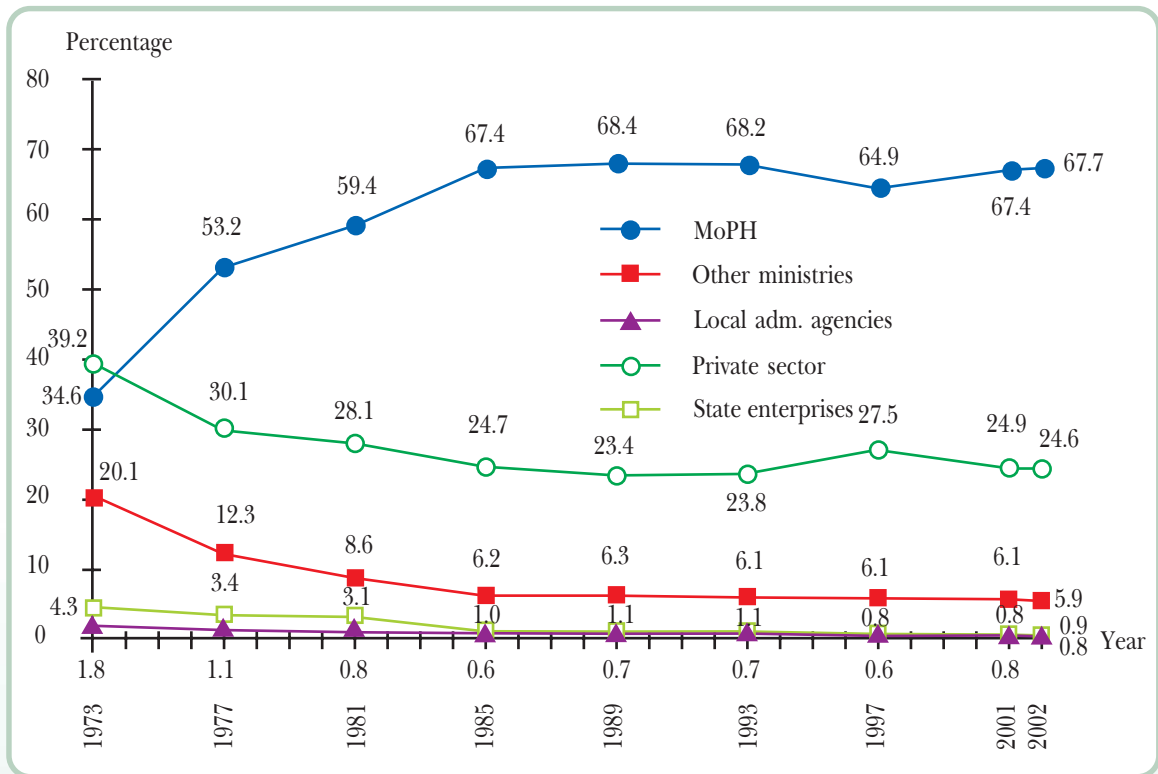
Notes: 1. Figures in () are percentages.

2. Due to incompleteness of data for 1985, the data for 1984 were used instead.

3. For 2002, data were received from 65.6% of all health facilities nationwide: 62.5% from among public sector facilities and 77.3% from among private sector agencies.

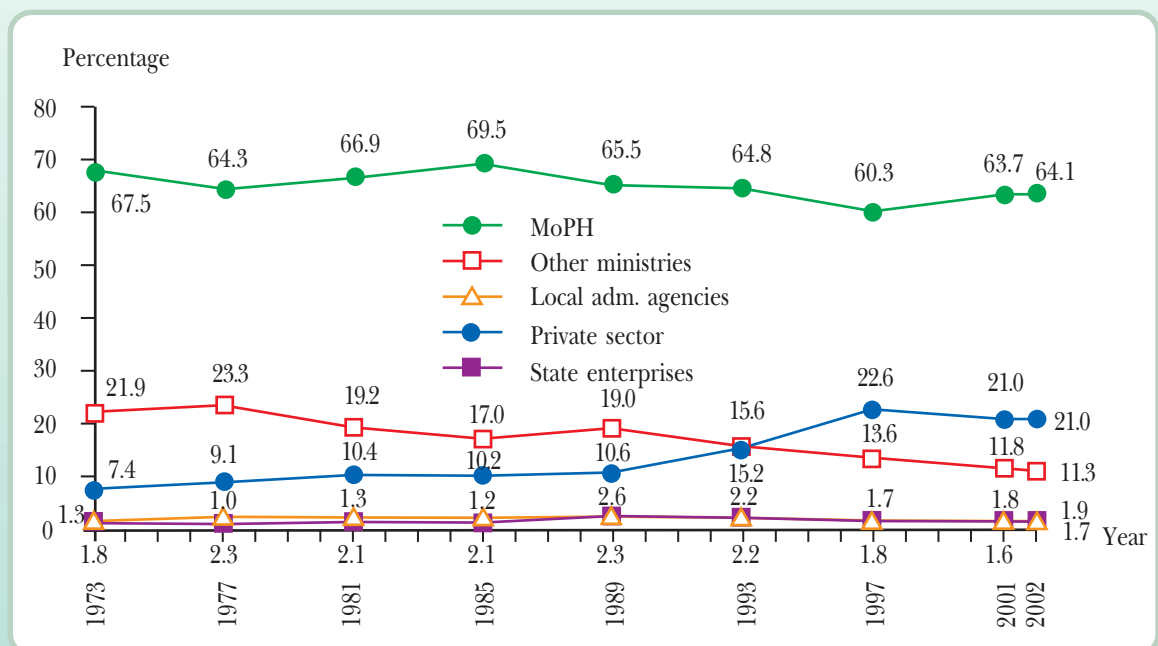
4. For Bangkok in 2002, the 2001 data were used instead.

Figure 6.23 Proportion of Hospitals by Agency, 1973-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Figure 6.24 Proportion of Beds by Agency, 1973-2002



Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

Table 6.33 Numbers of Doctors, Beds and Community Hospitals, 1977-2003

Year	No. of community hospitals							No. of beds	No. of doctors	Doctor/bed ratio	Doctors per community hospital
	10 bed	30 bed	60 bed	90 bed	120 bed	150 bed	Total				
1977	254	-	-	-	-	-	254	2,540	n.a.	n.a.	n.a.
1979	211	72	8	-	-	-	291	4,750	441	1:10.8	1.5
1981	215	83	15	-	-	-	313	5,540	580	1:9.6	1.8
1983	263	97	28	-	-	-	388	7,220	736	1:9.8	1.9
1985	325	109	40	6	-	-	480	9,460	1,162	1:8.1	2.4
1987	376	131	43	7	-	-	557	10,800	1,339	1:8.1	2.4
1989	377	131	46	7	-	-	561	11,090	1,549	1:7.1	2.8
1991	375	140	51	10	-	-	576	11,910	1,592	1:7.5	2.8
1993	344	224	65	12	5	-	650	15,740	1,766	1:8.9	2.7
1995	317	260	87	17	7	-	688	18,560	1,574	1:11.8	2.3
1996	368	302	97	21	7	-	695	20,290	1,653	1:12.3	2.4
1997	219	335	103	37	9	-	703	22,830	1,665	1:13.7	2.4
1998	142	397	112	46	9	-	706	26,830	1,758	1:15.3	2.5
1999	102	422	125	52	11	-	712	27,180	1,956	1:13.9	2.7
2000	96	418	136	52	12	-	714	27,780	2,617	1 : 10.6	3.7
2001	83	410	148	59	18	2	720	29,780	2,725	1 : 10.9	3.8
2002	83	415	148	59	18	2	725	29,930	3,758	1 : 8.0	5.2
2003	83	415	148	59	18	2	725	29,930	4,084	1 : 7.3	5.6

Sources: 1. Bureau of Health Service System Development, Department of Health Service Support, MoPH.

2. Bureau of Central Administration, Office of the Permanent Secretary for Public Health.

Notes: 1. For 1977-2001, data were derived from a survey conducted by the Bureau of Health Service System Development, Department of Health Service Support, MoPH.

2. Data for 2002 were derived from the Bureau of Central Administration, Office of the Permanent Secretary for Public Health, based on the number of civil servants and state employees in the payrolls (Jor 18), which had some limitations, resulting in the number being higher than reality.

Table 6.34 Numbers of Doctors, Beds and Private Hospitals, 1970-2003

Year	No. of doctors (full-time)	No. of beds	No. of hospitals	Doctor/ bed ratio	Doctors per hospital
1970	236	1,780	23	1 : 7.5	10.3
1972	329	2,281	28	1 : 6.9	11.7
1974	387	3,039	38	1 : 7.8	10.2
1976	461	4,239	50	1 : 9.2	9.2
1978	687	6,139	67	1 : 8.9	10.2
1980	781	7,328	87	1 : 9.4	9.0
1982	819	8,066	112	1 : 9.8	7.3
1984	890	8,942	132	1 : 10.0	6.7
1986	892	11,721	177	1 : 13.1	5.0
1988	1,065	13,024	203	1 : 12.2	5.2
1990	1,938	14,175	245	1 : 7.3	7.9
1992	2,552	21,297	335	1 : 8.3	7.6
1994	3,217	25,471	398	1 : 7.9	8.1
1996	3,325	35,052	474	1 : 10.5	7.0
1997	3,244	38,275	491	1 : 11.8	6.6
1998	3,567	40,253	473	1 : 11.3	7.5
1999	3,403	40,852	471	1 : 12.0	7.2
2000	3,920	40,250	456	1 : 10.3	8.6
2001	4,384	39,551	436	1 : 9.0	10.1
2002	3,572	38,370	405	1 : 10.7	8.8
2003	n.a.	34,863	346	n.a.	n.a.

Sources: 1. Medical Registration Division, Department of Health Service Support, MoPH.
2. Bureau of Policy and Strategy, MoPH.

Notes: 1. The number of beds is based on the registration records; but the number of beds actually in service is smaller and the bed-occupancy rate is less than 50%.
2. For 2002, the information was received from 77.3% of all private health facilities.

Table 6.35 Numbers of Hospitals and Beds in the Public and Private Sectors, 2002

Region	No. of hospitals		No. of beds	
	Public	Private	Public	Private
Bangkok Metropolis	45	87	16,868	11,011
The Central	247	106	29,582	8,139
The North	210	56	19,900	4,583
The South	168	32	14,734	2,126
The Northeast	307	38	25,753	2,638
Total	977	319	106,837	28,497

Sources: Reports on Health Resources. Bureau of Policy and Strategy, MoPH.

- Notes:**
1. For 2002, data were received from only 65.6% of all health facilities; 44.3% from Bangkok, 60.5% from the Central, 76.7% from the Northeast, 74.9% from the North, and 68.3% from the South.
 2. For Bangkok in 2002, the 2001 data were used instead

Table 6.36 Numbers of Private Hospitals and Beds Providing General and Specialized Services by Hospital Size, 2003

Region	1 - 10 beds		11 - 25 beds		26 -50 beds		51 - 100 beds		101 - 200 beds		> 200 beds		Total	
	Hospitals	Beds	Hospitals	Beds	Hospitals	Beds	Hospitals	Beds	Hospitals	Beds	Hospitals	Beds	Hospitals	Beds
Bangkok Metropolis	9 (20.5) (9.0)	77 (19.2) (0.5)	4 (23.5) (4.0)	84 (23.0) (0.6)	22 (25.0) (22.0)	820 (24.1) (5.4)	19 (19.8) (19.0)	1,755 (20.2) (11.5)	22 (31.4) (22.0)	3,598 (32.4) (23.6)	24 (77.4) (24.0)	8,893 (81.5) (58.4)	100 (28.9) (100.0)	15,227 (43.7) (100.0)
The Central	16 (36.4) (13.5)	154 (38.3) (1.6)	9 (52.9) (7.6)	182 (49.7) (1.8)	27 (30.7) (22.9)	947 (27.9) (9.6)	39 (40.6) (33.1)	3,513 (40.5) (35.5)	23 (32.9) (19.5)	3,919 (35.3) (39.6)	4 (12.9) (3.4)	1,180 (10.8) (11.9)	118 (34.1) (100.0)	9,895 (28.4) (100.0)
The Northeast	4 (9.1) (9.5)	39 (9.7) (1.2)	- (0.0) (0.0)	- (0.0) (0.0)	17 (19.3) (40.5)	747 (22.0) (23.6)	13 (13.5) (30.9)	1,220 (14.1) (38.6)	7 (10.0) (16.7)	939 (8.5) (29.7)	1 (3.2) (2.4)	214 (2.0) (6.8)	42 (12.1) (100.0)	3,159 (9.1) (100.0)
The North	7 (15.9) (13.7)	70 (17.4) (1.7)	1 (5.9) (2.0)	25 (6.8) (0.6)	12 (13.6) (23.5)	472 (13.9) (11.4)	20 (20.8) (39.2)	1,739 (20.0) (41.9)	9 (12.9) (17.6)	1,224 (11.0) (29.5)	2 (6.5) (3.9)	620 (5.7) (14.9)	51 (14.7) (100.0)	4,150 (11.9) (100.0)
The South	8 (18.2) (22.8)	62 (15.4) (2.5)	3 (17.6) (8.6)	75 (20.5) (3.1)	10 (11.4) (28.6)	413 (12.2) (17.0)	5 (5.2) (14.3)	456 (5.3) (18.8)	9 (12.9) (25.7)	1,426 (12.8) (58.6)	- (0.0) (0.0)	- (0.0) (0.0)	35 (10.1) (100.0)	2,432 (7.0) (100.0)
Whole country	44 (100.0) (12.7)	402 (100.0) (1.2)	17 (100.0) (4.9)	366 (100.0) (1.0)	88 (100.0) (25.4)	3,399 (100.0) (9.7)	96 (100.0) (27.7)	8,683 (100.0) (24.9)	70 (100.0) (20.2)	11,106 (100.0) (31.9)	31 (100.0) (9.0)	10,907 (100.0) (31.3)	346 (100.0) (100.0)	34,863 (100.0) (100.0)

Sources: Medical Registration Division, Department of Health Service Support, MoPH

Notes: Figures in () are percentages: upper ones, column total and lower ones, row total.

2) Health Centres

(2.1) Quantity

Health centres have been built and distributed to cover all Tambons (subdistricts) throughout the country since the last decade. In 2003, there were 9,765 health centres. In the future, more emphasis will be placed on service quality improvement in accordance with socio-economic conditions of each locality and in preparation for the power decentralization to local administration organizations.

(2.2) Geographical Distribution of Health Centres

The trends of health centre to population ratio have been rising in all regions nationwide; the ratio being raised from 1:10,064 in 1979 to 1:4,895 in 2003. Although most health centres are clustered in the Central Region, regional disparities have become lower as shown in Table 6.37 and Figure 6.25.

Table 6.37 Distribution of Health Centres by Region in 1979, 1987 and 1996-2003

Region	No. of health centres and health centre/population ratio									
	1979	1987	1996	1997	1998	1999	2000	2001	2002	2003
The Central	1219 (1:7,781)	1635 (1:4,729)	2377 (1:3,654)	2471 (1:3,554)	2508 (1:4,298)	2523 (1:4,219)	2524 (1:3,681)	2559 (1:4,628)	2559 (1:4,611)	2549 (1:4,629)
The North	914 (1:10,748)	1,616 (1:4,775)	1,965 (1:4,412)	2,151 (1:4,103)	2,203 (1:4,393)	2,225 (1:4,345)	2,231 (1:4,093)	2,210 (1:4,667)	2,216 (1:4,670)	2,220 (1:4,662)
The South	688 (1:8,230)	1,252 (1:3,821)	1,400 (1:3,839)	1,488 (1:3,653)	1,505 (1:3,864)	1,513 (1:3,922)	1,516 (1:3,872)	1,507 (1:4,427)	1,526 (1:4,418)	1,521 (1:4,433)
The Northeast	1,277 (1:12,747)	2,489 (1:5,818)	3,100 (1:5,248)	3,367 (1:4,900)	3,398 (1:5,063)	3,428 (1:5,102)	3,433 (1:4,972)	3,462 (1:5,427)	3,509 (1:5,387)	3,475 (1:5,440)
Disparity between Centrals and Northeast's ratios	1:1.64	1:1.23	1:1.44	1:1.38	1:1.18	1:1.21	1:1.21	1:1.17	1:1.17	1:1.18
Total	4,088 (1:10,064)	6,992 (1:4,964)	8,842 (1:4,411)	9,477 (1:4,173)	9,614 (1:4,522)	9,689 (1:4,514)	9,704 (1:4,262)	9,738 (1:4,890)	9,810 (1:4,872)	9,765 (1:4,895)

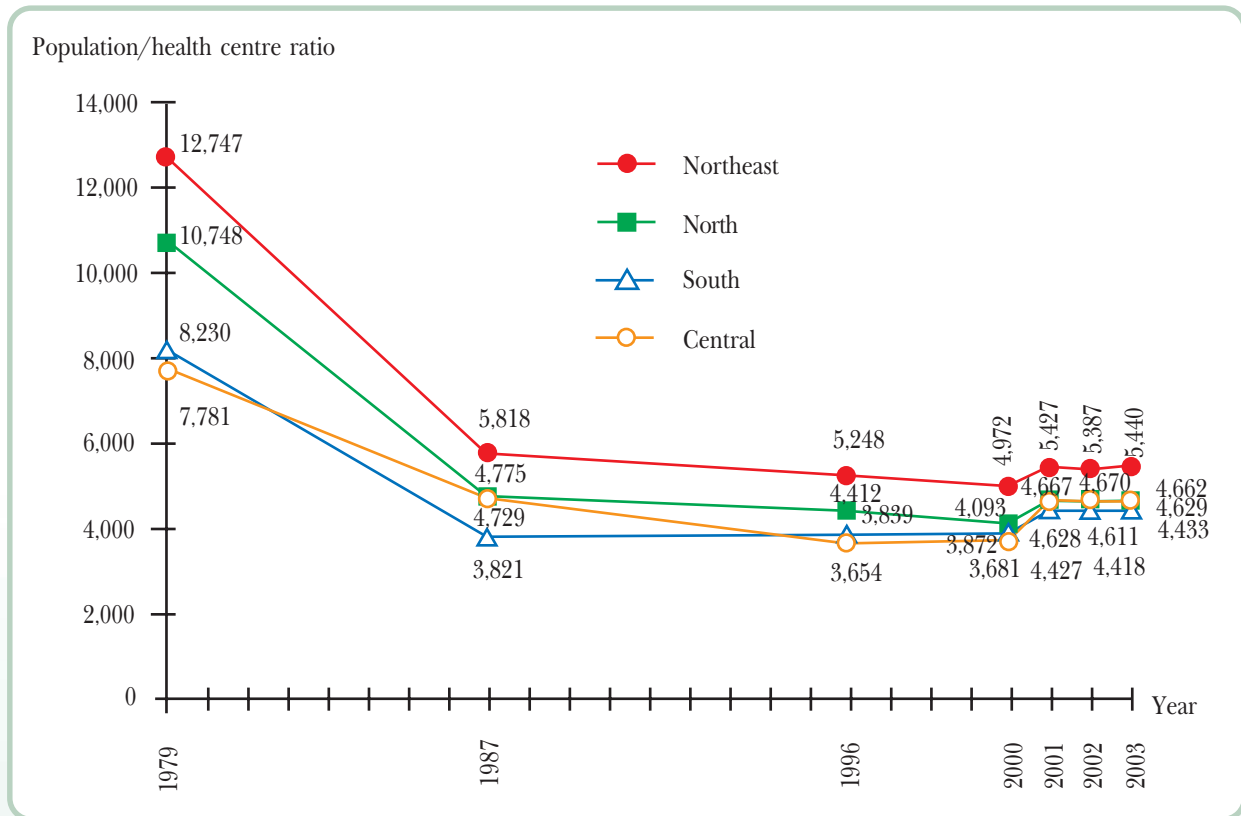
Source: The Bureau of Central Administration, Office of the Permanent Secretary, MoPH, recalculated by Rujira Taverat, Bureau of Policy and Strategy, MoPH

Notes: 1. The figure in () is the ratio of health centre to population outside municipal areas and sanitary districts.

2. Data on population outside municipal areas for 2001-2002 were derived from the Bureau of Registration Administration, Department of Provincial Administration, Ministry of Interior, and recalculated by Rujira Taverat, Bureau of Policy and Strategy, MoPH.

3. For 2003, data on population in 2002 outside municipal areas were derived from the Bureau of Registration Administration, Department of Provincial Administration.

Figure 6.25 Population to Health Centre Ratios by Region, 1979-2003



Sources: 1. Reports on Health Resources. Bureau of Policy and Strategy, MoPH.
 2. Bureau of Central Administration, Office of the Permanent Secretary, MoPH.

3) Pharmacies

The ratio of modern pharmacy (with a pharmacist) to population has been rising for the past 13 years, from 1:15,694 in 1989 to 1:7,739 in 2003. But the ratio of another type of modern pharmacy without pharmacist (selling readily packaged drugs, without a pharmacist) to population and the ratio of traditional pharmacy to population have been declining (Table 6.38).

Nearly half of pharmacies (with pharmacist) are in Bangkok, while more than 80% of pharmacies without pharmacist (selling non-dangerous readily packaged drugs, without a pharmacist) and traditional pharmacies are in provincial areas (Table 6.38).

Table 6.38 Distribution of Drugstores Selling Modern Medicines, Only Readily-packaged Modern Medicines and Traditional Medicines, 1989-2003

Type of drugstore	No. of drugstores and ratio of drugstore to population													
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2000	2001	2002	2003
1. Drugstores: modern medicine														
Bangkok Metropolitan	1,917 (1:3.263)	1,963 (1:3.258)	2,123 (1:2.632)	2,194 (1:2.903)	2,135 (1:3.030)	2,176 (1:2.564)	2,249 (1:2.480)	2,262 (1:2.466)	2,208 (1:2.534)	2,420 (1:2.325)	2,773 (1:2.039)	3,047 (1:1.872)	3,200 (1:1.798)	3,393 (1:1.962)
Provincial areas	1,616 (1:30.440)	1,743 (1:29.654)	1,743 (1:29.302)	1,743 (1:29.484)	2,336 (1:22.309)	2,363 (1:22.487)	2,500 (1:21.480)	2,461 (1:22.028)	2,506 (1:21.896)	2,931 (1:18.046)	3,197 (1:17.492)	3,458 (1:16.307)	3,458 (1:16.426)	4,832 (1:11.796)
Whole Kingdom	3,533 (1:15.694)	3,706 (1:15.202)	3,866 (1:14.656)	3,937 (1:14.671)	4,471 (1:13.103)	4,539 (1:12.936)	4,749 (1:12.482)	4,723 (1:12.659)	4,714 (1:12.827)	5,351 (1:11.429)	5,970 (1:10.315)	6,505 (1:9.546)	6,658 (1:9.395)	8,225 (1:7.739)
2. Drugstores: readily-packed modern medicine														
Bangkok Metropolitan	747 (1:8.375)	926 (1:6.907)	925 (1:6.041)	844 (1:7.547)	793 (1:8.159)	748 (1:7.458)	748 (1:7.456)	710 (1:7.856)	648 (1:8.634)	681 (1:8.262)	638 (1:8.864)	620 (1:9.199)	577 (1:9.973)	565 (1:11.781)
Provincial areas	4,604 (1:10.684)	4,644 (1:10.754)	4,644 (1:10.998)	4,644 (1:11.066)	4,548 (1:11.459)	4,442 (1:11.962)	4,484 (1:11.976)	4,437 (1:12.218)	4,551 (1:12.057)	4,326 (1:12.836)	4,286 (1:13.048)	4,195 (1:13.442)	4,195 (1:13.540)	4,088 (1:13.943)
Whole Kingdom	5,351 (1:10.362)	5,570 (1:10.115)	5,569 (1:10.174)	5,488 (1:10.525)	5,341 (1:10.969)	5,190 (1:11.313)	5,232 (1:11.330)	5,147 (1:11.616)	5,199 (1:11.630)	5,007 (1:12.214)	4,924 (1:12.506)	4,815 (1:12.896)	4,772 (1:13.109)	4,653 (1:13.680)
3. Drugstores: traditional medicine														
Bangkok Metropolitan	535 (1:11.693)	479 (1:13.353)	459 (1:12.174)	436 (1:14.610)	432 (1:14.977)	413 (1:13.507)	445 (1:12.534)	395 (1:14.121)	370 (1:15.121)	398 (1:14.136)	398 (1:14.209)	409 (1:13.944)	412 (1:13.967)	420 (1:15.848)
Provincial areas	1,999 (1:24.607)	1,999 (1:24.984)	1,999 (1:25.550)	1,999 (1:25.708)	1,916 (1:27.200)	1,900 (1:27.967)	1,854 (1:28.965)	1,854 (1:29.240)	1,913 (1:28.683)	1,792 (1:30.987)	1,600 (1:34.952)	1,581 (1:35.668)	1,581 (1:35.927)	1,686 (1:33.807)
Whole Kingdom	2,534 (1:21.881)	2,478 (1:22.736)	2,458 (1:23.052)	2,435 (1:23.721)	2,348 (1:24.951)	2,313 (1:25.358)	2,299 (1:25.784)	2,249 (1:26.584)	2,283 (1:26.485)	2,190 (1:27.925)	1,998 (1:30.820)	1,990 (1:31.203)	1,993 (1:31.387)	2,106 (1:30.226)
4. All categories of drugstores														
Bangkok Metropolitan	3,199 (1:1.956)	3,368 (1:1.899)	3,507 (1:1.593)	3,474 (1:1.834)	3,360 (1:1.925)	3,337 (1:1.672)	3,442 (1:1.620)	3,367 (1:1.657)	3,226 (1:1.734)	3,499 (1:1.608)	3,809 (1:1.485)	4,076 (1:1.399)	4,189 (1:1.374)	4,378 (1:1.520)
Provincial areas	8,219 (1:5.985)	8,386 (1:5.956)	8,386 (1:6.090)	8,386 (1:6.128)	8,800 (1:5.922)	8,705 (1:6.104)	8,838 (1:6.076)	8,752 (1:6.194)	8,970 (1:6.117)	9,049 (1:6.136)	9,083 (1:6.157)	9,234 (1:6.107)	9,234 (1:6.151)	10,606 (1:5.374)
Whole Kingdom	11,418 (1:4.856)	11,754 (1:4.793)	11,893 (1:4.764)	11,860 (1:4.870)	12,160 (1:4.818)	12,042 (1:4.876)	12,280 (1:4.827)	12,119 (1:4.933)	12,196 (1:4.958)	12,548 (1:4.874)	12,892 (1:4.776)	13,310 (1:4.665)	13,423 (1:4.660)	14,984 (1:4.248)

Source: Food and Drug Administration, MoPH

Note: Figures in () are ratios of drugstore to population.

1.3 Medical Supplies and Technology

1.3.1 Medical Supplies

Drugs normally dispensed and consumed in Thailand are mostly (55%) manufactured domestically and the rest (45%) are imported. Between 1988 and 2002, the values of drug consumption rose on average by 12.2% at market prices or 7.7% at the constant price annually. The rate of increase was greater than those of health expenditure and economic growth (Tables 4.4 and 6.39, and Figure 4.11).

During the economic boom period of 1988 to 1996, the values of drug imports rose from 27.7% to 37.1% in relation to overall drug consumption values. After the baht devaluation between 1997 and 2000, coupled with the monopoly of new drugs, the proportion of imported drugs jumped to 40.7-44.3%. Even after the economic crisis, the proportion has steadily risen to 45.1% in 2002. If such a trend prevails, the proportion of imported drugs will be greater than that of domestically produced drugs. However, the universal coverage of health care scheme that employs the capitation payment mechanism has shifted the financial burden to service providers. This kind of system has led to the economization of drug use and a greater use of domestically produced drugs. It is interesting to monitor this change more seriously.

Of the values of domestically produced drugs, 40% are attributable to imported raw materials (over 90% of which are imported); and about 60% of the import values are paid in foreign currencies to overseas drug companies. Thus, of the wholesale value (Table 6.39), 46.27% are paid in foreign currencies. It only raw materials are taken into account (for both locally produced and imported drugs), 96% of such items are imported.

The quality of domestically produced drugs has much improved as a result of the introduction and promotion of Good Manufacturing Practices (GMP). Currently, the proportion of GMP-certified manufacturers has risen to more than 70%, since 1997 (Figure 6.26). In addition to being consumed locally, domestic drugs are exported. Their export values have risen from 480.8 million baht in 1989 to 4,821.9 million baht in 2003 (Figure 6.28).

During 2000, some foreign drug manufacturers are shut down due to the economic crisis and higher labour costs, thereby shifting their production bases to other countries where labour costs are lower, such as Vietnam. As a consequence, the proportion of GMP-certified manufacturers has declined.

In 2003, the MoPH issued a regulation requiring that all drug manufacturers comply with the GMP requirements by 5 June 2004.

Table 6.39 Values of Locally Produced and Imported Drugs (for Human Use), 1983-2002

Year	Wholesale values as reported (current prices)										Estimated consumption values, 2002		Change (%)		Total retail price value as a percentage of health expenditure
	Locally produced drugs					Imported drugs					Wholesale prices	Retail prices	Current prices	Constant prices	
	Values	Percent	Values	Percent	Total (million baht)	Values of exports (million baht)	Values of domestic consumption ⁽¹⁾ (million baht)	Estimates of Value of domestic consumption ⁽²⁾ (wholesale) ⁽²⁾ X 1.675	Estimates of retail prices in-country x 1.8						
1983	3,777.9	65.2	2,012.0	34.8	5,789.9	255.6	5,534.3	9,270.0	16,686.0	18,429.31	33,172.76	-	-	40.52	
1984	5,453.0	76.5	1,673.0	23.5	7,126.0	284.0	6,842.0	11,460.4	20,628.7	22,615.19	40,707.30	+23.6	+22.7	39.49	
1985	6,651.2	73.5	2,393.1	26.5	9,044.3	315.5	8,728.8	14,620.7	26,317.3	28,142.73	50,657.00	+27.6	+24.4	44.41	
1986	4,678.0	71.5	1,864.5	28.5	6,542.5	350.5	6,192.0	10,371.6	18,668.9	19,595.70	35,272.50	-29.1	-30.4	28.26	
1987	5,145.8	68.9	2,325.4	31.1	7,471.2	389.4	7,081.8	11,862.0	21,351.6	21,883.91	39,391.04	+14.4	+11.7	28.73	
1988	6,708.8	72.3	2,571.0	27.7	9,279.8	432.7	8,847.1	14,818.9	26,674.0	26,318.37	47,373.02	+24.9	+20.3	29.65	
1989	8,372.9	71.7	3,307.6	28.3	11,680.5	480.8	11,199.7	18,759.5	33,763.1	31,629.94	56,927.15	+26.6	+20.2	32.13	
1990	8,886.0	72.0	3,449.1	28.0	12,335.1	604.1	11,731.0	19,649.4	35,368.9	31,270.01	56,285.99	+4.8	-1.1	28.23	
1991	9,657.6	69.6	4,216.4	30.4	13,874.0	784.8	13,089.2	21,924.4	39,463.9	32,998.08	59,396.51	+11.6	+5.5	28.43	
1992	10,696.6	69.6	4,682.6	30.4	15,379.2	1,193.5	14,185.7	23,761.0	42,769.8	34,364.44	61,856.00	+8.4	+4.1	27.08	
1993	11,831.0	70.0	5,075.3	30.0	16,906.3	2,855.3	14,051.0	23,535.4	42,363.7	32,929.76	59,273.58	-0.9	-4.2	23.02	
1994	12,969.7	68.1	6,086.6	31.9	19,056.3	1,536.2	17,520.1	29,346.2	52,823.2	39,084.14	70,360.50	+24.7	+18.7	26.41	
1995	15,820.9	63.0	9,276.4	37.0	25,097.3	2,398.5	22,698.8	38,020.5	68,436.9	47,867.02	86,160.63	+29.6	+22.5	30.08	
1996	18,120.4	62.9	10,676.0	37.1	28,796.4	1,784.9	27,011.5	45,244.3	81,439.7	53,808.40	96,855.07	+19.0	+12.4	31.63	
1997	19,608.0	59.3	13,467.1	40.7	33,075.1	2,319.7	30,755.4	51,515.3	92,727.5	58,052.77	104,494.95	+13.9	+7.9	32.88	
1998	16,127.7	53.3	14,146.5	46.7	30,274.2	2,782.3	27,491.9	46,048.9	82,888.1	47,994.63	86,390.41	-10.6	-17.3	30.02	
1999	19,033.9	57.2	14,232.3	42.8	33,266.2	3,014.9	30,251.3	50,670.9	91,207.7	52,647.14	94,764.94	+10.0	+9.7	32.09	
2000	20,935.9	55.7	16,700.4	44.3	37,636.3	3,732.7	33,903.6	56,889.0	102,400.2	58,199.81	104,759.65	+12.3	+10.5	34.16	
2001	23,087.9	53.6	19,967.6	46.4	43,055.5	4,326.9	38,728.6	64,870.4	116,766.7	65,311.70	117,561.03	+14.0	+12.2	36.35	
2002	24,144.6	54.9	19,867.9	45.1	44,012.5	4,115.5	39,897.0	66,827.5	120,289.5	66,827.50	120,289.50	+3.0	+2.3	36.04	
											Avg:15yrs	12.2	7.7	-	

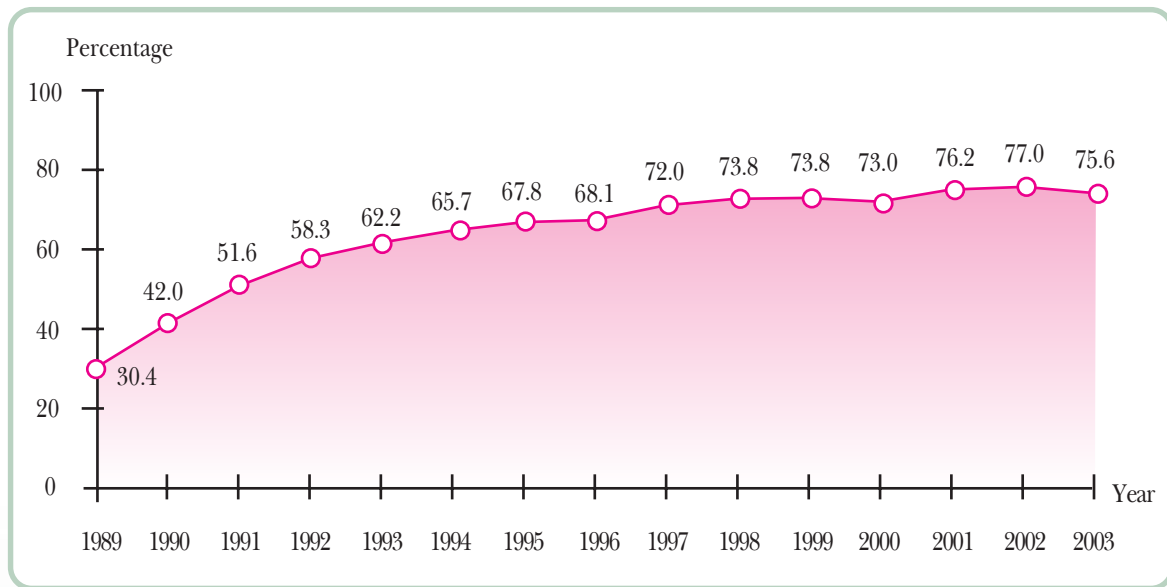
Source: Drug Control Division, Food and Drug Administration, MoPH.

Notes: 1. The estimates are to be deducted by export values (Figure 6.28).

2. The reported figures are about 67.5% lower than actuality (48% underreported); and the reports do not include drugs from GPO, narcotics and psychoactive drugs).

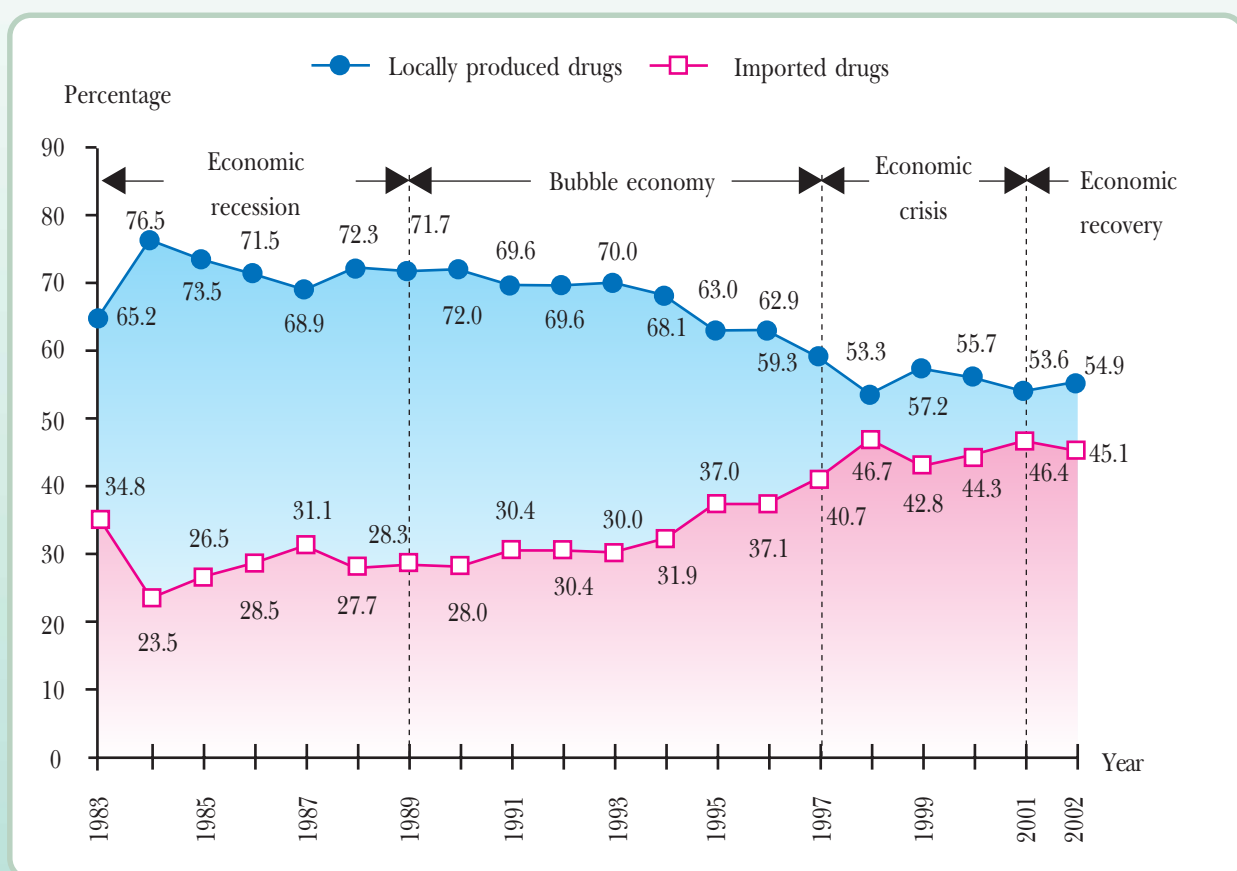
3. Retail values are about 1.8 times as much as wholesale values.

Figure 6.26 Percentage of GMP-Certified Manufacturers, 1989-2003



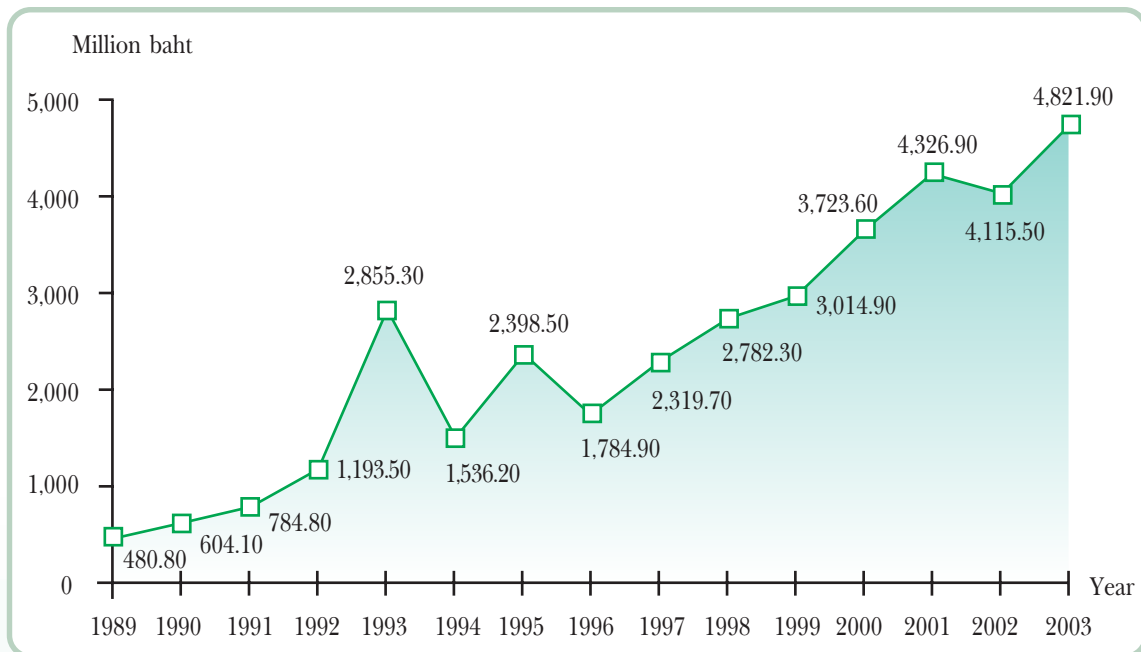
Source: Food and Drug Administration, MoPH.

Figure 6.27 Percentage of Locally Produced and Imported Drugs (for Human Use) 1983-2002



Source: Drug Control Division, Food and Drug Administration, MoPH.

Figure 6.28 Values of Drugs Exported from Thailand (Current Prices), 1989-2003



Source: Food and Drug Administration, MoPH.

Note: Data for 1989-2003 were derived from the Customs Department, Ministry of Finance.

1.3.2 Medical and Health Technology

The development of medical and health technology as well as epidemiological transition has contributed to the use of expensive, high-tech medical equipment in the Thai health system. More complex procedures for diagnostic and curative care have been introduced. Such imports increased considerably during the bubble economy period and discontinued as soon as the economic crisis erupted (for example, in the case of imports and uses of MRI machines in Thailand between 1988 and 2000), but increased again slightly after the crisis was over (Figure 6.29). Most of the medical and health technologies, particularly high-tech medical devices are clustered in large cities, mostly in the private sector except for lithotripters and ultrasound devices which are more abundant in the public sector (Table 6.40).

Table 6.40 Number and Distribution of Important Medical Devices, 2002-2003

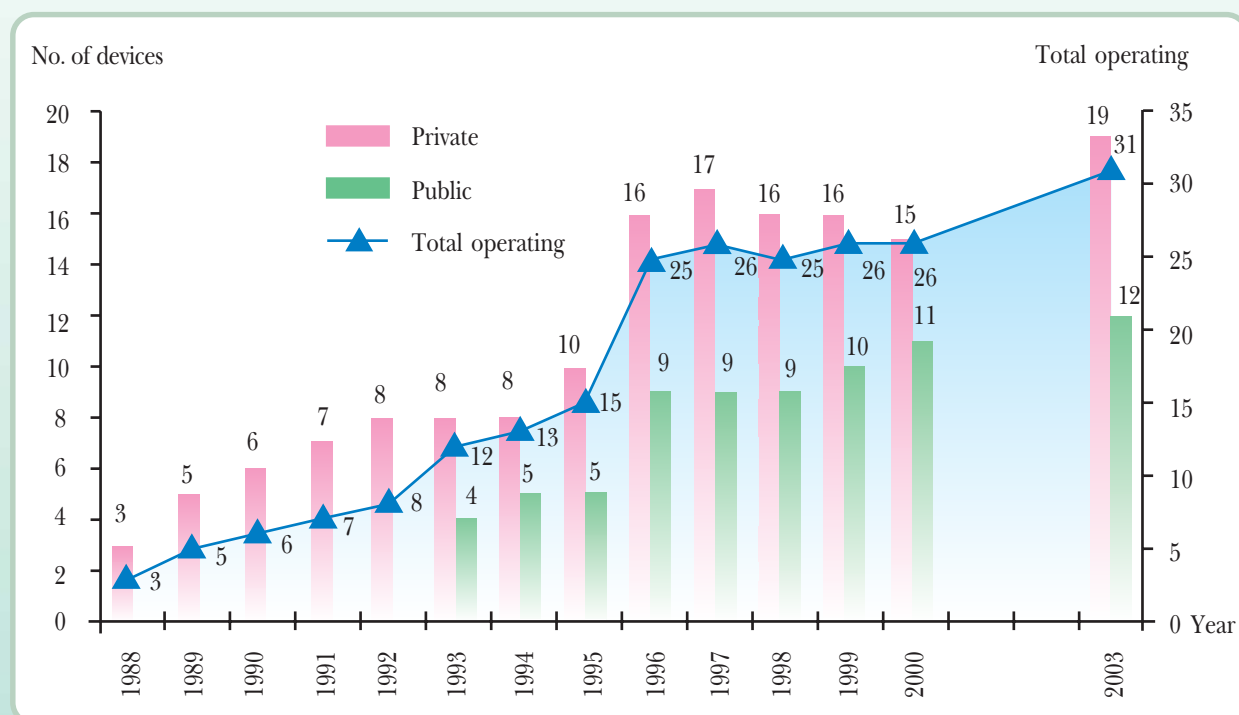
Device	No. of devices			Total by sector		Remarks
	Total	In Bangkok: No. (%)	In provinces: No. (%)	Public	Private	
1. CT scanners ⁽¹⁾	266	89 (33.5)	177 (66.5)	83 (31.2)	183 (68.8)	2003
2. Magnetic resonance imaging (MRI) ⁽¹⁾	31	20 (64.5)	11 (35.5)	12 (38.7)	19 (61.3)	2003
3. Lithotripters ⁽²⁾	75	22 (29.3)	53 (70.7)	55 (73.3)	20 (26.7)	2002
4. Mammogram ⁽¹⁾	113	62 (54.9)	51 (45.1)	45 (39.8)	68 (60.2)	2003
5. Ultrasound ⁽²⁾	1,643	269 (16.4)	1,374 (83.6)	1,271 (77.4)	372 (22.6)	2002

Sources: ⁽¹⁾ Division of Radiology and Medical Devices, Department of Medical Services, 2003.

⁽²⁾ Report on Health Resources. Bureau of Policy and Strategy, MoPH, 2003.

Note: Figures in () are percentages.

Figure 6.29 Number of MRI Devices in the Private and Public Sectors in Thailand, 1998-2003



Sources: Data for 1988-1999 were derived from Piya Hanvoravongchai, 1999.

Data for 2003 were derived from the Radiology and Medical Devices Division, Department of Medical Sciences, MoPH, 2003.

Note: The number for each year is as recorded at the end of the year, except for 2000.

The imported values of medical equipment rose by 12.4% annually between 1991 and 2003. At the beginning of the economic crisis, the imported values were decreasing, but increased as much as 19.2% in 2003, whereas the values of exports have been rising since 1997, by 24.7% during 2002-2003. For 2004, the demand for medical equipment/supplies grows considerably in both domestic and overseas markets. As a result of the economic growth, Thai people have a higher purchasing power and are more interested in health care for themselves, coupled with the government policy on promoting Thailand as the Centre of Excellence in Healthcare of Asia and the rising demand for Thaimedical equipment/supplies from other countries as their prices are not so high, compared with those from other Asian competing countries (Tables 6.41 and 6.42 and Figure 6.30).

Table 6.41 Values of Imported Major Medical Equipment and Supplies in Thailand, 1991-2003 (million baht)

Product	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
HS 9018.90 Other medical equipment and supplies	491.9	705.9	1,292.8	925.2	1,070.7	1,359.1	1,566.7	1,161.2	1,079.0	2,323.7	2,179.1	2,453.0	2,794.4
HS 9018.19 Other electro-diagnostic apparatus	377.9	417.5	718.8	773.9	784.5	873.5	996.2	493.6	542.7	1,402.4	1,051.9	955.7	1,426.2
HS 9019.20 Ozone therapeutic apparatus, etc.	138.6	130.1	195.8	221.7	303.7	303.8	404.0	417.3	188.9	458.6	366.6	306.2	398.3
HS 8419.20 Medical, surgical or laboratory sterilizers	98.4	99.4	180.5	228.5	202.6	301.0	501.9	312.9	146.3	293.3	410.5	335.9	177.7
HS 9018.39 Syringes and needles	113.6	136.0	178.3	312.9	298.8	382.4	388.3	303.3	326.4	416.3	496.8	509.0	647.8
HS 9021.30 Other artificial body parts	119.9	112.2	139.4	187.1	243.6	267.3	284.9	237.1	263.1	309.0	342.1	2.7	-
HS 3701.10 Photographic plates and films for x-rays	137.1	165.7	132.3	140.6	169.7	220.7	224.4	202.0	240.6	222.7	291.9	297.6	322.8
HS 9018.50 Other ophthalmic instruments and appliances	32.6	88.3	105.6	137.9	156.2	209.7	215.4	197.5	136.7	324.2	210.0	301.8	329.8
HS 3006.10 Sterile surgical catgut, similar suture materials	102.9	136.8	134.1	157.7	172.3	186.4	256.1	194.6	244.6	231.8	302.9	290.6	342.7
HS 9018.32 Tubular metal needles and needles for sutures	143.4	174.9	194.9	204.3	193.6	209.5	255.4	193.3	171.4	227.8	262.7	233.1	250.6
HS 9021.19 Other orthopaedic appliances	73.3	88.4	104.8	148.9	209.8	260.6	267.6	190.7	232.8	297.0	354.1	4.8	-
HS 9018.49 Dental instruments and appliances	38.7	51.7	84.5	117.6	138.2	170.4	181.1	182.8	213.0	350.5	386.1	418.9	398.2
HS 9019.10 Mechano-therapy appliances	40.5	58.8	56.9	333.5	403.2	279.5	211.6	141.1	53.8	57.0	74.0	105.7	198.9
HS 3005.90 Wadding, gauze, bandages and similar articles	71.4	100.4	92.1	119.2	138.1	139.3	184.5	138.7	66.2	95.1	111.4	140.6	110.8
HS 9402.90 Medical furniture	41.8	59.9	113.9	165.1	211.3	310.9	290.2	111.1	60.2	65.7	63.4	97.8	91.3
Total	2,022.0	2,526.0	3,724.7	4,168.1	4,696.3	5,474.1	6,198.3	4,477.2	3,965.8	7,707.4	6,903.5	6,453.3	7,489.5
Others	471.2	719.5	670.9	976.0	1,163.9	1,276.7	1,471.8	980.4	1,222.9	2,257.4	1,938.5	2,008.6	2,600.7
Grand total	2,493.2	3,245.5	4,395.6	5,144.1	5,860.2	6,750.8	7,670.1	5,457.6	5,188.7	9,334.8	8,842.0	8,461.9	10,090.2
Growth rate (%)	-	+30.2	+35.4	+17.0	+13.9	+15.2	+13.6	-28.8	-4.9	+79.9	-5.3	-4.3	+19.2

Average growth rate (12-yr): +12.4

Source: Customs Department, Ministry of Finance.

Table 6.42 Values of Thailand's Exported Medical Equipment and Supplies, 1991-2003 (million baht)

Product	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
HS 3005.10 Adhesive dressings and other articles having adhesive layer	8.0	146.8	212.3	238.2	298.1	267.8	344.4	465.9	501.5	590.9	719.5	567.3	682.9
HS 3005.90 Wadding, gauze, cottonwool and similar articles	173.5	308.5	1,365.7	136.5	783.7	23.0	26.3	45.0	107.9	356.4	424.1	548.5	650.9
HS 3006.10 Sterile surgical catgut and similar sterile suture materials	3.5	0.3	1.9	2.2	0.1	1.6	3.2	2.8	2.6	8.7	16.3	4.1	4.6
HS 3006.20 Blood-group testing reagents	-	-	-	-	0.1	0.4	0.3	1.7	0.1	0.2	0.2	0.3	2.8
HS 3006.30 Microbial diagnostic reagents	0.2	-	278.3	0.3	1.1	0.1	0.4	21.0	2.6	2.2	2.5	-	-
HS 3006.40 Dental cements and other dental filling materials	-	-	0.2	-	5.1	-	0.1	1.4	1.4	-	0.006	0.70	0.20
HS 3006.50 First-aid boxes and kits	-	-	2.6	-	-	0.8	0.7	0.2	0.5	1.2	1.3	1.4	1.8
HS 3701.10 Photographic plates and films for x-rays	9.0	281.0	4.8	1.6	0.3	0.4	0.7	2.5	1.1	0.4	0.6	0.4	1.0
HS 3702.10 Non-flat photographic films for x-rays	5.6	5.3	2.2	-	0.2	1.1	-	0.3	0.2	-	-	0.03	0.6
HS 4015.11 Surgical gloves	451.0	780.2	1,927.2	1,045.1	822.2	1,022.0	1,206.3	1,649.0	1,521.3	1,796.4	2,019.9	1,733.5	1,905.9
HS 8419.20 Medical, surgical or laboratory sterilizers	0.9	5.6	2.0	0.3	1.4	7.3	32.8	4.6	6.7	2.3	7.4	12.7	2,757.4
HS 8713.10 Invalid carriages, non-mechanically propelled	0.1	-	-	-	0.2	0.2	-	0.4	0.0	0.8	1.1	1.0	0.2
HS 8713.90 Other invalid carriages	0.1	1.5	14.7	0.2	3.1	1.5	2.7	1.6	0.4	1.1	2.2	0.7	1.4
HS 9001.30 Contact lenses	-	-	0.6	-	-	0.5	8.7	2.8	0.9	3.1	80.0	258.0	208.4
HS 9018.11 Electro-cardiograph machines	1.2	0.5	0.3	-	0.2	0.8	0.2	4.0	0.1	1.7	4.7	4.2	3.0
HS 9018.19 Other electro-diagnostic apparatus	5.1	16.0	13.6	10.2	28.0	40.0	95.0	113.6	118.8	395.2	178.4	295.7	250.9
HS 9018.20 Ultraviolet or infrared ray apparatus	0.1	1.5	4.0	2.0	7.2	3.1	25.6	7.7	0.5	6.8	0.8	8.8	22.7
HS 9018.31 Syringes, with or without needles	60.0	142.0	246.5	240.9	378.3	204.9	228.0	337.3	187.3	248.5	247.0	247.3	246.0
HS 9018.32 Tubular metal needles and needles for sutures	170.6	162.4	180.9	202.8	234.7	250.7	346.5	324.0	211.1	64.5	464.6	405.7	413.0
HS 9018.39 Other types of syringes and needles	-	126.7	11.0	56.3	28.1	20.4	31.1	69.0	65.4	32.7	77.3	93.9	138.8
HS 9018.41 Dental drilling machines	0.2	0.8	-	0.5	-	0.1	0.9	2.4	19.5	3.2	34.9	25.9	67.7
HS 9018.49 Other dental instruments and appliances	0.4	4.3	2.9	0.6	6.3	8.5	13.1	28.7	12.6	8.0	5.7	11.0	11.9

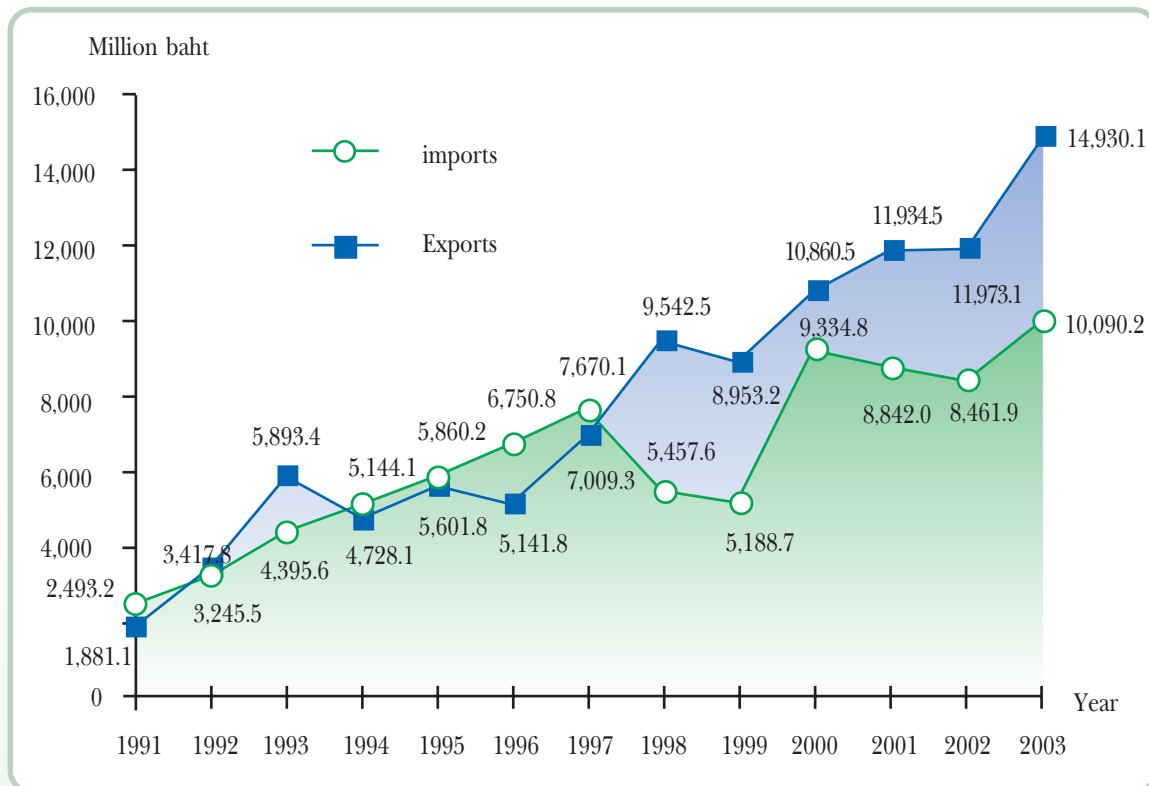
Table 6.42 Values of Thailand's Exported Medical Equipment and Supplies, 1991-2003 (million baht)

Product	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
HS 9018.50 Other ophthalmic instruments and appliances	0.2	0.4	2.2	1.1	3.0	1.5	5.0	2.2	2.8	8.0	6.8	12.8	9.6
HS 9018.90 Other instruments and appliances	722.4	1,190.3	1,906.1	2,415.2	2,622.4	3,007.5	4,206.7	5,993.5	5,819.4	6,605.6	7,121.6	7,239.0	7,131.2
HS 9019.10 Mechano-therapy appliances	97.4	115.2	273.3	296.6	267.9	160.3	258.2	324.1	233.5	239.0	298.8	246.2	153.9
HS 9019.20 Ozone therapy apparatus	32.1	33.0	41.3	53.0	28.0	35.3	51.1	13.3	28.9	67.0	73.8	98.8	63.9
HS 9021.11 Artificial joints	0.8	-	-	-	0.1	-	0.1	0.1	0.1	0.1	0.2	-	-
HS 9021.19 Other orthopaedic appliances	2.7	0.1	0.2	0.3	1.8	1.2	2.8	1.3	3.4	1.2	2.0	-	-
HS 9021.21 Dentures	25.1	54.9	27.7	10.6	6.7	8.0	13.4	19.3	18.3	26.2	44.1	47.8	59.8
HS 9021.29 Dental appliances	0.3	-	4.5	22.8	18.2	20.6	23.0	34.8	26.1	3.9	15.4	39.9	52.5
HS 9021.30 Other artificial body parts	1.7	1.2	0.5	1.6	2.3	0.1	1.3	0.7	1.4	2.0	0.3	-	-
HS 9021.40 Hearing aids	-	0.2	-	-	-	-	0.6	0.2	2.9	1.0	-	0.2	0.02
HS 9021.50 Pacemakers for stimulating heart muscles, excluding parts and accessories	-	-	-	0.1	-	-	-	-	-	-	0.01	-	-
HS 9021.90 Others in section HS 9021	0.5	0.4	0.1	0.3	1.1	1.0	2.3	0.2	5.8	3.9	3.3	8.2	13.5
HS 9022.19 Others in section HS 9022	1.6	9.7	25.1	14.1	10.1	2.6	2.6	3.4	23.6	10.8	12.8	10.1	18.3
HS 9022.21 Apparatus for use in medical radiography or radiotherapy	0.5	0.4	0.1	0.8	1.4	4.3	1.3	-	0.5	2.7	0.1	3.8	0.7
HS 9022.29 Other apparatus for use in radiography or radiotherapy	1.1	-	1.3	3.7	0.1	1.1	-	-	0.2	-	2.0	1.3	0.03
HS 9022.30 X-ray tubes	0.3	1.9	3.1	0.4	2.0	1.7	0.3	3.1	1.2	1.6	0.5	1.8	2.7
HS 9022.90 Others in section HS 9022	1.6	3.2	5.2	2.6	16.2	8.2	14.5	23.4	11.2	30.7	50.7	27.6	36.2
HS 9402.10 Dental chairs	10.2	18.6	23.3	19.2	19.0	20.6	13.1	7.1	4.6	3.7	2.9	9.5	3.1
HS 9402.90 Medical furniture	3.1	4.9	7.7	5.0	3.1	12.6	46.0	30.7	6.8	17.6	10.7	5.0	12.5
Grand total	1,881.1	3,417.8	5,893.4	4,728.1	5,601.8	5,141.8	7,009.3	9,542.5	11,495.2	10,860.5	11,934.5	11,973.1	14,930.1
Growth rate (%)	-	+81.6	+72.4	-19.7	+18.4	-8.2	+36.3	+36.1	-6.2	+21.3	+9.9	+0.3	+24.70

Source: Custom Department, Ministry of Finance.

12-year average growth rate: +18.8

Figure 6.30 Values of Imported and Exported Medical Devices, Thailand, 1991-2003



Source: Tables 6.41 and 6.42.

1.4 Body of Knowledge

There are two types of knowledge in the health system: basic knowledge for use in health service provision and systematic knowledge for service system development.

Regarding the basic knowledge, Thailand has mostly imported this kind of knowledge from Western developed countries; recently, more research activities have been supported within the country with funding from the Thailand Research Fund (TRF) and the National Science and Technology Development Agency (NSTDA).

In particular, the knowledge derived from local wisdom such as medicinal herbs and Thai traditional medicine have just been of interest and seriously developed since the past decade. Such herbal medicines have been found to be efficacious such as **Phaya Yo cream**, **Fa Talai Chon (Andrographis paniculata)**, **Khamin Chan** (curcumin).

Regarding the body of knowledge for health service system development, we have adopted it from the West especially the U.S.A. Thus, our health system follows the Western style (especially the U.S.). However, the government has increasingly realized the importance of developing our own health service system so that it is responsive to Thailand's economic, social and cultural settings, leading to the establishment of the Health Systems Research Institute (HSRI) as an independent organization in 1992.