HEALTH MANPOWER EMPLOYMENT AND PRODUCTIVITY IN THE PHILIPPINES

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I. Background

The study analyzes two of the major issues which emerged in health manpower planning and development exercises in the Philippines, namely, employment and productivity of specific categories of health manpower in the country's health delivery system. The first issue involves the critical questions of supply of, and needs or requirements for, specific health manpower in the country's health care delivery system. The second issue, meanwhile, emerged because of lack of certain types of health personnel as well as the rapid increase in the cost of medical care. These two issues evolved from the nagging concern over the maldistribution of health personnel and the existence of imbalances between what and how many of specific types of health manpower are needed and available in the country. The study covers only four types of health professionals: physicians, nurses, midwives and dentists.

This study is organized as follows. The next section discusses the supply of health manpower in the country. This includes a discussion of the estimates of actual supply as of 1987, their employment characteristics in terms of employment settings and their regional distribution. An attempt

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to forecast the supply of health manpower up to the year 2000 is made. The study also examines the factors which influence the location decisions of these health workers. Additional issues on supply such as production, utilization and migration are also discussed. The third section focuses on the needs of health manpower with a discussion on how to estimate or project the needs or requirements of health manpower. The fourth section discusses estimation of the needs of health manpower using the different methodologies. These estimates are then compared with supply to identify shortages or surpluses. A discussion of demand for health manpower is presented in Section 5. Although no actual estimation of demand equations are made due to insufficient data, several conceptual and methodological issues are discussed. Section 6 presents various productivity issues. Finally, section 7 concludes the study with some policy recommendations.

II. The Supply of Health Manpower

There have been isolated attempts in the past to make inventories of physicians, nurses, midwives and dentists practicing in the Philippines (Table 1). These attempts have proven to be tedious and difficult to conduct which subsequently resulted in understated and inaccurate counts. For example, in 1970-'71, the Association of Philippine Medical Colleges (APMC) undertook an extensive masterlisting and survey of private and government sector physicians and nurses who were practicing in the country. This effort yielded a masterlist which counted 13,101 physicians and 16,550 nurses (APMC 1971). The report admitted, however, that the figure for nurses was understated as the survey missed out more than two thousand nurses.

In 1973, the Department of Health's National Manpower Survey (NMS) yielded figures for government and private sector health workers which were severely understated since no reports were available for seven major cities in the country. NEDA also tried doing an inventory in 1977. The figures were much higher than those for the early 1970s except for the total number of nurses in the APMC masterlist in 1970 which exceeded the 1977 figure by more than 4,000 nurses.

Professional associations maintain membership rosters but these, too, understate the actual number of health manpower. For example, the Philippine Medical Association (PMA) listed more than 12,000 member-physicians in 1988 but this was believed to represent only two-thirds of the total number of physicians in the country. The Philippine Dental Association (PDA) likewise listed members in 1987 significantly much less than that counted by the Bureau of Dental Services in 1983. Finally, the Philippine Nurses Association (PNA) conducted its survey of nurses in 1980 and 1987. The 1987 survey, however, included only about 23 percent of the total number of nurses in the country that year.

The Professional Regulation Commission (PRC) maintains a registry of health manpower but renewal of license seems a rarity especially among those in the provinces, hence the figures are unrealistically low.

In this connection, an independent count of the four major types of health manpower in the public and private sectors was conducted for the purposes of this study. The results are given in Table 2. The Planning Service of the DOH provided data on filled positions at the DOH. The Department

Table 1

Stock of Health Manpower: 1970s and 1980s

	Early 1970s	Late 1970s	Early 1980s	Late 1980s
PHYSICIANS				
A. GOVERNMENT AND PRIVATE				
APMC Masterlist	13,101 (1970)			
National Manpower Survey	13,102 (1973)			
PMA Membership List	8,891 (1974)		12,408 (1983)	12,215 (1988)
NEDA Inventory	12,901 (1974)	17,123 (1977)		
PRC Registered Professionals			1,284 (1982)	1,597 (1985)
B. GOVERNMENT ONLY				
NEDA Inventory			7,378 (1982)	8,511 (1985)
NURSES				
A. GOVERNMENT AND PRIVATE				
APMC Masterlist	19,288 (1970)			
National Manpower Survey	8,283 (1973)			
NEDA Inventory		14,544 (1977)		
PNA Survey			19,015 (1980)	11,316 (1987)
PRC Registered Professionals			10,285 (1982)	3,276 (1985)
PMA Membership List			14,004 (1982)	16,539 (1986)
MIDWIVES				
A. GOVERNMENT AND PRIVATE				
National Manpower Survey	6,915 (1973)			
NEDA Inventory		11,637 (1977)		
PRC Registered Professionals			3,219 (1982)	2,124 (1985)
B. GOVERNMENT ONLY				
NEDA Inventory			9,470 (1982)	9,793 (1985)
DENTISTS				
A. GOVERNMENT AND PRIVATE				
National Manpower Survey	4,124 (1973)			
PDA Membership List				5,438 (1987)
Bureau of Dental Services			8,278 (1983)	
PRC Registered Professionals			1,062 (1982)	1,516 (1982)

Sources: APMC (Association of Philippine Medical Colleges), Physician and Nurse Manpower Survey Report, 1971
ROP (Republic of the Philippines), Strategy for Actions (Health Sector), 1974-1975
NEDA (National Economic and Development Authority), Social Services Division
Professional Regulations Commission
PMA (Philippine Medical Association) Membership List
PDA (Philippine Dental Association) Membership List
DOH (Department of Health) Bureau of Dental Services
PNA (Philippine Nurses Association) Nurse Manpower Survey, 1980 and 1987

Table 2
Number of Employed Health Manpower by Institution (1987)

	Physicians	Nurses	Midwives	Dentists
Department of Health				
Regional, provincial and city health offices	455	397	118	95
Rural health units	2,086	2,711	10,177	1,019
Hospitals	4,371	6,340	392	312
Total	6,912	9,448	10,687	1,426
Department of Education, Culture, and Sports	123	1,047		577
Local Government Units Hospitals	296	546	136	484
Department of National Defense Hospitals	288	699	231	331
Office of the President Hospitals	40	103	47	
Private Hospitals				
Full-time	8,475	10,570	3,510	
Part-time	2,159	-	-	
Others	N.A	N.A	N.A	5,780 a/
Grand Total	18,293	22,413	14,611	8,598
Professional Associations' Unofficial Estimate of Total No. of Practitioners	18,500	50,000	-	10,000

a/
"Others" include those dentists in private hospitals.

Sources of basic data:
DOH Planning Services
DECS Health and Nutrition Center
Medicare Hospital Accreditation Forms
DOH Bureau of Licensing and Regulation Hospital Statistical Reports.

of Education, Culture and Sports (DECS) also provided data on health manpower employed at its Health and Nutrition Center. The rest of the information was obtained from individual hospital statistical reports submitted to the DOH Bureau of Licensing and Regulation as well as hospital accreditation forms filed with the Medical Care Commission. This count, however, excludes the following: (1) those in private solo or group practice without hospital affiliation; (2) those solely in the teaching profession; (3) those solely in the industrial sector or in voluntary organizations or in charitable associations; and (4) those who are unemployed or who have shifted to other occupations.

The total count for physicians comes close to the approximate total number of practitioners given by the Philippine Medical Association. The small variance between the actual count and the estimated number for physicians means that only a few are engaged solely in activities excluded in the count. Specifically, the relatively large number of physicians working part-time as consultants in private hospitals indicates that these physicans may also be involved in their own private practice, in teaching, or in occupational/industrial health and safety. In the case of dentists, the total figure does not come that close to the approximate total number. This indicates the relatively large number of dentists in solo practice, as can be casually observed. A large discrepancy between the total number of nurses based on our count and the estimated total number of nurses is observed — less than half of the estimated total were included in the count. This suggests that a large number of our nurses are in occupations not included in the count, have shifted occupations, or are unemployed. Undocumented observations reveal that due to the low salaries of nurses in the country, especially those in private clinics, a lot of nurses seek other jobs either on a permanent basis or temporarily while waiting for available jobs abroad. Others even opt to remain unemployed. Finally, the total count of midwives amounted to 14,611, 73.1 percent of whom are with the DOH. No estimated total is available to compare this figure with NEDA but its inventory as of 1985 is not that far, i.e., 9,793.

Table 2 also provides information on the employment setting of the four categories of health manpower considered in the study. Obviously, most of the physicians practicing in the country today are in the private sector. Fifty-eight percent are in private hospitals, either on full-time or part-time basis, 38 percent are with the DOH and the rest are distributed thinly among other government agencies. Similarly, majority of the dentists are in the private sector, mostly doing solo practice. Only 32 percent of them are in the government sector. The situation is slightly different for nurses and midwives. The nurses are mostly with the government sector (53%) with the majority working with the DOH. Relatively few midwives are in the private sector (24%) and about 73 percent are with DOH.

A. *Distribution of Health Manpower*

Regional population to health manpower ratios indicate uneven distribution of health manpower (Table 3). This observation has also been cited in other studies (Sanchez 1986; Salceda and Orais 1989). In general, the regions of Cagayan Valley, Bicol, Western Mindanao and Central Mindanao have much fewer health professionals than the other areas. For instance, in Western Mindanao, there was only one physician per 8,703 persons; one nurse per 8,339 persons; one midwife per 4,371 persons; and one dentist per 28,877 persons in 1987-'88. In contrast and for the same period, Metro Manila had the following ratios for physicians, nurses, midwives and dentists, respectively:

Table 3

Population Per Health Manpower by Region: 1970s and 1980s

	Population Per							
	PHYSICIAN		NURSE		MIDWIFE		DENTIST	
	1970 APMC	1987 PIDS	1970 APMC	1987 PIDS	1973 NMS	1987 PIDS	1973 NMS	1987 PDA
ILOCOS REGION	3,625	2,806	3,233	1,907	4,957	3,222	7,954	15,088
CAGAYAN VALLEY	4,271	4,703	7,250	2,959	6,121	3,408	17,162	19,241
CENTRAL LUZON	2,863	3,812	2,243	3,092	4,008	4,093	7,170	10,718
SOUTHERN TAGALOG	1,539	3,833	4,731	3,655	5,353	4,977	6,397	13,495
METRO MANILA		1,256	521	1,319		4,167		2,533
BICOL REGION	5,133	5,005	5,142	3,437	8,525	4,183	16,247	31,096
WESTERN VISAYAS	4,761	4,673		2,902	5,219	4,526	6,891	39,413
CENTRAL VISAYAS	3,858	2,747	3,106	2,508	5,999	3,991	12,386	32,941
EASTERN VISAYAS	9,564	5,674		3,169	8,158	3,060	14,608	33,433
WESTERN MINDANAO	5,664	8,703		5,725	8,339	4,371	19,764	26,877
NORTHERN MINDANAO	4,173	3,764	5,069	2,575	5,178	3,175	17,930	47,096
SOUTHERN MINDANAO	3,861	4,098		2,829	8,147	4,267	26,138	24,743
CENTRAL MINDANAO	8,441	4,244		3,071	7,082	2,939	28,431	40,029
PHILIPPINES	3,032	3,135	2,216	2,559	5,772	3,926	3,926	

Sources of Basic Data:

APMC, Physician and Nurse Manpower Survey Report, 1971
ROP, Strategy for Actions (Health Sector), 1974-1975
NEDA, Social Services Division
Professional Regulations Commission
PMA Membership List
PDA Membership List
DOH Bureau of Dental Services
DOH Bureau of Licensing and Regulation Hospital Statistical Reports
DOH Planning Services
DECS Health Nutrition Center
PNA Nurse Manpower Survey, 1980 and 1987
Medicare Hospital Accreditation Forms

1:1,256; 1:1,319; 1:4,167; and 1:2533. It is also apparent from the data that in the case of physicians, these same underserved areas experienced increasing ratios over a 17-year period from 1970 to 1987. This observation is very crucial since these areas are also considered the relatively poor and lagging regions in the country.[1] As such, the need for health care by the people in these regions may perhaps be more urgent and cannot be possibly met by the existing stock of physicians available.

The case of nurses is different. Metro Manila significantly lost nurses as shown by the decline in the ratio from 1:521 in 1970 to 1:1,319 in 1987, perhaps due to the massive outflow of nursing graduates to other countries especially the US and Middle East during the 1980s. The trend for dentists is alarming as practically all regions experienced increases in the ratio. Finally, more midwives seem to have been employed by the health sector over the 14-year period as indicated by the declining ratio. This period was marked by the expansion of the government's health delivery program towards the rural areas which necessitated the services of midwives.

This maldistribution of health manpower is highlighted further in Table 4 which compares the health manpower located in the Metro Manila and Southern Tagalog areas with other regions and the corresponding population in these areas. About half of the physicians are in Metro

Manila/Southern Tagalog, although these areas account for only a quarter of the country's population. In the case of dentists, two-thirds of them are also in Metro Manila/Southern Tagalog. Midwives and, to a certain extent nurses, are more dispersed outside the National Capital Region.

In view of this observation, an attempt to identify the factors which account for the geographical distribution of physicians and dentists in the Philippines was done. The literature on locational decisions of health manpower based on the experiences of Western countries suggests that among the factors that affect physician location are physician income in the area, the number of physicians already practicing in the area, per capita income, population and its age composition and educational level, the area's economic activities, the area's cultural and recreational resources, number of hospitals and hospital beds in the area, presence of medical school and training facilities, and type of supportive institutions (Cooper et al. 1972). Studies based on direct responses from physicians indicate that background (place of birth or place where physician spent his youth), location of medical school where he graduated, place of residency (youth), place of residency training, and perceived mobility of residents are also important determinants of a physician's locational decision.

Simple linear functions were estimated to explain the provincial distribution of physicians and dentists using available Philippine data.[2] It is hypothesized that the number of physicians in a province is determined by the following factors: (1) type of province based on gross taxes received (provinces are classified into six categories); (2) provincial population; (3) urbanization rate; (4) population density; (5) presence of medical school; and (6) total number of hospital beds in the province. In the case of dentists, presence of dental school replaces variable (5).

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1. As of 1987, Cagayan Valley, Bicol and Western Mindanao ranked 12th, 11th and 10th in terms of real gross domestic product, respectively.

2. It was not feasible to do the same analysis for other categories of health manpower due to insufficient data.

Table 4

Comparison of Health Manpower in Metro Manila/Southern Tagalog and Elsewhere, and the Corresponding Population: Various Years

	% of Health Manpower		% of Population	
	M. Manila & S. Tagalog	Elsewhere	M. Manila & S. Tagalog	Elsewhere
Physicians				
APMC, 1970	45.9	54.1	23.0	77.0
NMS, 1973	43.4	56.6	23.7	76.3
PMA, 1974	31.7	68.3	24.2	75.8
NEDA, 1974	40.1	59.9	24.2	75.8
NEDA, 1977	39.2	60.8	24.6	75.4
PMA, 1983	46.6	53.4	25.4	74.6
PIDS Study, 1987	32.0	68.0	25.9	74.1
PMA, 1988	42.4	57.6	26.0	74.0
Nurses				
APMC, 1970	51.7	48.3	23.0	77.0
NMS, 1973	25.0	75.0	23.7	76.3
PNA, 1980	42.7	57.3	25.1	74.9
PNA, 1987	40.3	59.7	25.9	74.1
PIDS Study, 1987	34.0	66.0	25.9	74.1
Midwives				
NMS, 1973	25.6	74.4	23.7	76.3
PIDS Study, 1987	22.4	77.6	25.9	74.1
Dentists				
NMS, 1973	35.9	64.1	23.7	76.3
PDA, 1988	65.4	34.6	26.0	74.0

Sources of basic data:

APMC, Physician and Nurse Manpower Survey Report, 1971
ROP, Strategy for Actions (Health Sector), 1974-1975
NEDA, Social Services Division
Professional Regulations Commission
PMA Membership List
PDA Membership List
DOH Bureau of Dental Services
PNA Nurse Manpower Survey, 1980-1987

Tables 5 and 6 show the regression results. Equations 1 to 3 use absolute number of physicians (or dentists) in the province as dependent variable, while Equations 4 and 5 use a rescaled dependent variable (i.e., physicians or dentists per 20,000 population). In general though, rescaling does not improve the regression results.

The regression results in Table 5 obviously show that the number of hospital beds is the strongest determinant of physician location. This seemingly suggests the strong bias of physicians in the Philippines for curative care. This is even perhaps reflective of the still curative-biased nature of our health care delivery system. The presence of a medical school in the province, however, is not a significant determinant; in fact the signs of the coefficients in two of the three equations are counter intuitive. This may perhaps be due to the absence or very limited opportunities for post-graduate training for physicians in medical schools located outside Metro Manila. Although their t-values are low, the type of province, population and urbanization rate all have the expected positive signs suggesting that more physicians tend to practice in provinces with more people, higher urbanization rate, and higher income.

Similar regressions for dentists yielded mixed results (Table 6). Population is a significant determinant of dentists' location in Equation 1 while urbanization rate, population density and the presence of dental school are strong explanatory variables in the other equations. In general, the type of province does not figure significantly in most of the regressions done.

The results of these regression exercises provide some insights as to the nature of location decisions of physicians and dentists in the Philippines as well as the possible appropriate steps to be taken to ease the maldistribution problem. For example, since urbanization, population density, and type of province are all considered in varying degrees of importance by physicians and dentists, appropriate incentives should be provided to those who locate in rural areas, in sparsely populated areas, as well as in poorer provinces. For those in the government, a rural post salary differential can be adopted. Additional allowances can also be provided. For private practitioners settling in underserved areas, tax deductions can be considered.

In the light of the results of the regressions, the policy of dispersing medical schools to the various regions needs to be restudied carefully. Though premised on good intentions, such policy appears to have adverse impact on student quality (MECS n.d.). Besides, the presence of a medical school in the province does not necessarily result in more physician-graduates who stay and practice in the area.

The attraction of hospitals and more hospital beds to physicians merely reflects their clinic-based training. Unless the content of their educational training is recast to highlight community-based practice, physicians will continue to have preference over hospital-based practice.

Table 5

Determinants of the Location of Physicians

	Intercept	Type of Province	Population	Urbanization Rate	Population Density	Presence of Medical School	No. of Hospital Beds	Hospital Beds per 20,000	Adjusted R-squared	F-Value
Equation 1										
No. of Physicians	-25.9081	6.3837	0.0000916			-16.3853	0.0774		0.8196	80.5080
	(-0.271)	(0.329)	(1.439)			(-0.277)	(5.096)			
No. of Physicians	-59.3395	15.5488		0.8720		-9.4727	0.0963		0.8199	80.6820
	(-0.636)	(0.895)		(1.481)		(-0.165)	(15.880)			
No. of Physicians	-43.2204	25.8306			-0.0114	17.0981	0.0962		0.8211	81.3250
	(-0.463)	(1.465)			(-1.626)	(0.316)	(15.941)			
Physicians per 20,000	3.2800	-0.2192		0.0358		-0.8883		0.0373	0.1200	3.3870
	(1.142)	(-0.417)		(1.862)		(-0.533)		(2.131)		
Physicians per 20,000	3.5474	0.2071			-0.0005	0.1606		0.0483	0.1371	3.7810
	(1.243)	(0.394)			(-2.201)	(0.106)		(3.040)		

Table 6

Determinants of the Location of Dentists

	INTERCEPT	TYPE OF PROVINCE	POPULATION	URBANIZATION RATE	POP'N DENSITY	PRESENCE OF DENTAL SCHOOL	ADJUSTED R-SQUARED	F-VALUE
Equation 1								
No. of Dentists	159.8227	-69.1007	0.000397			-118.762	0.8019	87.364
	(1.242)	(-2.961)	(14.580)			(-1.542)		
Equation 2								
No. of Dentists	-33.7796	-0.9284		2.1689		435.8086	0.1584	5.015
	(-0.128)	(-0.020)		(1.841)		(3.184)		
Equation 3								
Dentists per 20,000	0.8195	-0.0571		0.0167		1.1995	0.2239	7.153
	(0.825)	(-0.321)		(3.772)		(2.327)		
Equation 4								
Dentists per 20,000	0.7541	0.0309			0.000695	0.2213	0.4155	16.168
	(0.875)	(0.202)			(6.237)	(0.460)		

B. *Production of Health Manpower*

1. Enrollment, Graduation and Licensure

Trends in enrollment, graduation and licensure of physicians, nurses, midwives and dentists are shown in Table 7. In all the four professions, the opening of new schools or new programs in existing schools led to the dramatic increase in freshmen enrollment and graduates throughout the 1970s and 1980s. The lifting of the moratorium on the creation of new medical schools in 1973 resulted in the rapid increase of medical schools in the country. For example as of 1957, there were only seven medical schools, five of which were in Metro Manila and two in Cebu. By 1975, this number increased to ten, and in a span of 10 years, this number more than doubled to 27 in 1985. As of 1988, there were 25 medical schools operating in the country. Nursing schools likewise multiplied from 88 in 1971 to 129 beginning 1984. The number of dental schools was seven in 1975 but has increased to 16 in 1987. Midwifery schools currently number 113.

For the period 1986-'88, these schools admitted the following number of medical, nursing, dental and midwifery freshmen a year, respectively: 3,361; 16,042; 4,036 and 16,042. For the same period, they graduated 3,126 new physicians a year; 4,897 new nurses a year; 6,062 new midwives a year; and 1,573 new dentists a year.

How efficient is the health manpower educational system in the country? Survival rates of medical and nursing students given in Table 8 are relatively high. For example, almost all medical and nursing freshmen finish their courses with average survival rates of 98.4 percent and 94.7 percent, respectively. This is, however, not true for dental students, with only about 53.7 percent of the dentistry freshmen ever graduating. No empirical study has ever established why the survival rates of dentistry students are low. Admittedly, the period covered in the analysis is too short and it is possible that there are significant lags before a dentistry student graduates. However, the same can be said of medical students, too. Casual interviews with some dental students revealed that a relatively high percentage of dental students drop out on the third year of dental proper. This is the time when students do their internship work which requires the acquisition of individual dental instruments and apparatus and completion of the required number of patients attended to per case. The high expenses involved and the difficulty of getting patients must be strong deterrents in completing the dentistry course.

All graduates in the health profession have to pass a licensure examination before they can practice. For the period 1974 to 1988, the passing rate averaged 75.6 percent for medicine, 70.5 percent for nursing, 65.3 percent for midwifery, and 54.9 percent for dentistry. The proliferation of schools appears to have resulted in lower quality education as indicated by the lower passing rates at the onset of the 1980s and throughout the decade. In fact, the national passing average in the medical board examination has dramatically declined in the 1980s, despite the relatively high performance of graduates from leading medical schools in the country like the University of the Philippines (UP), University of Santo Tomas (UST) and University of the East Ramon Magsaysay Medical School (UERM) (MECS n.d.). The annual average passing rate for medicine declined from 83 percent in 1974-'82 to 66 percent in 1983-'88; nursing, from 85 percent in 1974-'78 to 65 percent in 1979-'87; and midwifery, from 74 percent in 1974-'81 to 52 percent in 1982-'87.

Table 7

Annual Average Number of Freshmen Enrollment, Graduates, Board Examinees, and New Licensees: 1971-1988

	1971-'75	1976-'80	1981-'85	1986-'88
Medicine				
No. of Medical Schools	10 in 1975	12 in 1976 15 in 1977 17 in 1979 19 in 1980	21 in 1981 23 in 1982 27 in 1984 27 in 1985	27 in 1986 26 in 1987 25 in 1988
Annual Average No. of:				
a. Freshmen Enrollment	n.a.	2,517	3,319	3,361
b. Graduates	1,279	1,308	2,369	2,126
c. Board Examinees	1,663	1,459	2,411	3,581
d. New Licensees	4,312	1,099	1,590	2,758
e. % Passed (d/c)	78.9	75.3	65.9	77.0
Nursing				
No. of Nursing Schools	88 in 1971 73 in 1975	81 in 1976 96 in 1977 112 in 1978 126 in 1979 130 in 1980	125 in 1981 121 in 1982 134 in 1983 129 in 1984 128 in 1985	127 in 1986 127 in 1987 126 in 1988
Annual Average No. of:				
a. Freshmen Enrollment	n.a.	n.a.	7,227	16,042
b. Graduates	n.a.	n.a.	3,425	4,897
c. Board Examinees	7,024	16,890	7,888	7,326
d. New Licensees	5,049	10,100	5,395	4,113
e. % Passed (d/c)	39.7	59.8	68.4	56.1
Midwifery				
No. of Midwifery Schools				113 in 1987
Annual Average No. of:				
a. Freshmen Enrollment	n.a.	n.a.	6,463	10,117
b. Graduates	n.a.	n.a.	3,849	6,062
c. Board Examinees	5,303	7,312	4,303	6,460
d. New Licensees	2,104	4,740	2,687	3,058
e. % Passed (d/c)	39.7	64.8	62.4	47.3
Dentistry				
No. of Dentistry Schools	7 from 1971-1975	7 in 1977 9 in 1978 11 in 1979 12 in 1980	13 in 1981 14 in 1982 17 in 1983	16 in 1987
Annual Average No. of:				
a. Freshmen Enrollment	n.a.	n.a.	3,274	4,036
b. Graduates	287	507	1,120	1,573
c. Board Examinees	414	859	2,002	3,226
d. New Licensees	184	462	1,256	1,261
e. % Passed (d/c)	44.4	53.8	62.7	39.1

Sources of basic data:

Sanchez, Fernando (1985)
DECS, individual school reports
Professional Regulations Commission
Association of Philippine Medical Colleges

Table 8

Survival Rates of Physicians, Nurses, and Dentists: Various Years

	FRESHMEN		GRADUATES		SURVIVAL RATE (6%)
PHYSICIANS	1977-78	2,174	1981-82	1,976	90.9
	1978-79	2,458	1982-83	2,332	94.9
	1979-80	2,920	1983-84	2,697	92.4
	1980-81	3,434	1984-85	2,897	84.4
	1981-82	2,579	1985-86	3,449	133.7
		13,565		13,351	98.4
NURSES	1982-83	3,880	1985-86	3,784	97.5
	1983-84	5,291	1986-87	4,897	92.6
		9,171		8,681	94.7
DENTISTS	1982-83	3,044	1985-86	1,727	56.7
	1983-84	3,101	1986-87	1,573	50.7
		6,145		3,300	53.7

Sources of basic data: see Table 5

2. Distribution of Training Facilities and Students

The rapid increase in the number of schools offering undergraduate programs for the training of health manpower was justified by the government's desire to regionally disperse educational institutions so that there should be at least one medical school in a region. This dispersal was meant to increase medical manpower production and improve physician distribution. The medical schools, aware of the maldistribution of physicians, supported the position on the belief that the graduate will not go back to his roots (rural areas) once he has been urbanized (MECS-Task Force to Study Higher Education). Similar trend was followed for nursing, midwifery and to some extent, dentistry schools, resulting in the regional dispersion of training facilities (Table 9). As of 1987, seven medical schools were located in Metro Manila and the rest were distributed among the other regions except for Cagayan Valley and Western Mindanao which did not have any medical school. Majority (22) of these schools are owned by nonstock, nonprofit corporations. Similarly, nursing and midwifery schools are mostly located in the other regions with only 31 out of 92 nursing schools and 15 out of 87 midwifery schools located in the National Capital Region (NCR). In the case of dental schools, concentration in Metro Manila is still evident with eight out of the 17 operating in the National Capital Region.

The dispersion of these schools, however, does not necessarily result in a more even distribution of students across regions. Table 10 shows that except for the three Mindanao regions and Western Visayas, a considerable number of medical students still come from regions outside the school. This may have been brought about by the imposition of the quota system by the Board of Medical Education as well as the desire of medical students to seek admission in already established schools.

3. Cost of Health Manpower Education

Another related issue which has not been given adequate attention is the financing aspect of health manpower education. Remarks suggesting that only the rich can go to medical and dental schools are common. Even the cost of nursing education is said to have gone up significantly. Hardy, Presbitero et al. (1975) conducted a study on the cost of nursing education in selected schools and colleges in the late 1970s. The results showed that expenses among schools are highly uneven; board and lodging expenses almost double the cost of the Bachelor of Science in Nursing (BSN) program; general educational expenses exceed non-educational expenses; and the type of ownership of schools significantly influence the total cost of the nursing program.

Recently, the MECS Task Force to Study Higher Education conducted a survey of tuition and other fees of medical students (Table 11). The study found that the current level of fees among private schools is too low to remain viable. For this reason, solicitations for donations is common. For public medical schools, their survival depends on the large amount of government subsidies they receive. On the part of the students, financing medical education, which completes only after nine years, requires a lot of resources. The figures include only tuition and other fees. Adding the board and lodging cost and other personal expenses would surely bloat the figures. Another set of figures on cost from the Department of Health suggests the same observation (Table 12). The cost of medical

Table 9

Number of Medical, Nursing, Midwifery, and Dentistry Schools by Region: SY 1986-87

	Medicine	Nursing	Midwifery	Dentistry
Ilocos Region	3	13	10	4
Cagayan Valley	0	1	1	0
Central Luzon	1	9	6	0
Southern Tagalog	2	14	21	0
Metro Manila	7	36	14	8
Bicol Region	1	10	15	1
Western Visayas	2	13	7	1
Central Visayas	4	12	6	2
Eastern Visayas	3	2	1	0
Western Mindanao	0	2	8	0
Northern Mindanao	1	6	9	0
Southern Mindanao	1	4	8	1
Central Mindanao	1	4	7	0
PHILIPPINES	26	126	113	17

Source: DECS, individual school reports.

Table 10

Regional Distribution of Students in Medical Schools

	% of Students Within the Region	% of Students Outside the Region
ILOCOS REGION		
1. LN	57.7	42.3
2. VMEI	47.9	52.1
3. SLU	48.0	52.0
CENTRAL LUZON		
AUF	49.6	50.4
SOUTHERN TAGALOG		
1. EAC	26.9	73.1
2. PHCM	54.3	45.7
METRO MANILA		
1. PMCC	67.6	32.4
2. FCM	28.0	72.0
3. PLM	99.5	0.5
4. MCU	96.0	4.0
5. FEU	40.3	59.7
6. UERM	61.9	38.1
7. UST	66.2	33.8
8. UP	74.6	25.4
BICOL REGION		
BCCM	50.6	49.4
WESTERN VISAYAS		
1. IDCM	93.6	6.4
2. WVSC	91.3	8.7
CENTRAL VISAYAS		
1. CDCM	25.4	74.6
2. CIM	48.0	52.0
3. UV	49.1	50.9
4. SWU	33.6	66.4
EASTERN VISAYAS		
1. DWU	24.7	75.3
2. RTR	62.1	37.9
3. UP-IHS	79.6	20.4
NORTHERN MINDANAO		
XU	69.9	30.1
SOUTHERN MINDANAO		
DMSF	79.4	20.6
CENTRAL MINDANAO		
MSU	68.6	31.4

Source: MECS Task Force to Study State Higher Education.

Table 11

Tuition and Other Fees of Medical Students Per Annum: 1984

	Tuition Lab Fees	Other Fees	Total
Private Schools			
Luzon	P 9,000 - P 12,300	P 300 - P 400	P 9,300 - P 12,700
Visayas	P 11,000 - P 11,300	P 500 - P 800	P 11,500 - P 12,100
Mindanao	P 11,790	P 350	P 12,140
Public Schools			
Univ. of the Philippines, Manila	P 9,000	P 845	P 9,845
Western Visayas State College	P 7,000 - P 8,500	P 50	P 7,050 - P 8,550
Mindanao State University	P 1,725	-	P 1,725

Source: MECS Task Force to Study State Higher Education (1984).

Table 12

Cost of Professional Education and Entrance Salary of Selected Health Personnel: 1989

CATEGORY	TOTAL YEARS OF PROFESSIONAL EDUCATION	COST (TUITION ONLY) PRIVATE SCHOOLS	COST (TUITION ONLY) GOVERNMENT SCHOOLS
1. Medical Doctors	9 Years	126,396.00	61,320.00
2. Dentists	5 Years	22,000.00	21,325.00
3. Nurses	4 Years	50,844.00	4,220.00
4. Midwives	2 Years	3,400.00	2,565.00

Source: DOH (in Ornis and Salcedo 1989).

education especially in private schools is fairly high. This is probably one of the reasons why majority of new physicians opt to remain in the private sector and practice in urban centers. The immediate concern is to recoup the huge investment expenditure incurred in the medical school. Also this conforms with the observation made that a lot of medical positions in the DOH remain unfilled for years (Table 13). The relatively low salaries/wages offered by the government do not fit in fairly well in estimating the benefits needed to justify the huge investment made on medical education. The same is true for nursing education.

The total cost of health manpower education is one area that has not been studied carefully. Results of such a study, as well as a parallel study on earnings profiles, can establish whether investment in the education of a health professional is warranted from a social point of view.

C. *Migration of Health Manpower*

A sizable number of the annual production of health manpower in the Philippines find their way out of the country either as permanent residents or as contract workers. The large-scale movement of doctors, nurses and dentists to the United States seem to have been precipitated by the US Immigration Act of 1965, considered the single most important factor causing the health manpower outflow. The other important factor occurred in the late 1970s when the Philippine government allowed the export of manpower to the Middle East in response to the high demand for labor in these countries and the problem of high unemployment in the domestic labor market.

Despite the perceived large magnitude of health manpower migration, there is surprisingly lack of data series and scarcity of studies on this phenomenon. The absence of data, or the noncomparability of existing series, makes health manpower supply projection virtually an impossible task; at best one can only make educated guesses which may not really prove useful for planning and policy formulation purposes. There are few studies which provide inventories of Filipino health professionals abroad and these include those of Ruth (1970), APMC (1971), Mejia et al., (1979), Tullao (1980), Gupta (1972), and Corcuera (1987). The Overseas Employment and Development Board (OEDB), the Bureau of Employment Services (BES) and the Philippine Overseas Employment Administration (POEA) also provide some statistics, albeit scattered and inadequate. All these are shown in Table 14.

Ruth (1970) included the professional, technical, and kindred workers admitted to the US from the Philippines from 1962 to 1967. Within this period, a total of 1,158 Filipino physicians and 793 nurses were admitted to the US or an annual average of 988 and 132, respectively. About 70 percent of the physicians and 72 percent of the nurses were admitted after the 1965 Immigration Act.

APMC (1971) estimated that from 1902 to 1969, 4,970 physicians have permanently migrated to the US and 750 to other countries, making a total of 5,720. Within the same period, about 3,600 were considered temporary migrants.

Mejia et al. (1979) showed that as of 1973, there were around 8,900 physicians in eight Western countries, 8,846 of whom were in the US. Between 1966 and 1972, US-bound immigrants averaged 700 a year while exchange visitors averaged 500 a year.

Table 13

Selected DOH Positions by Occupational Category and Agency: 1989 (% Vacant)

	PHYSICIANS	% Vacant	DENTISTS	% Vacant	NURSES	% Vacant	MIDWIVES	% Vacant
1	871	(12.17)	108	(0.00)	1138	(0.62)	1043	(0.00)
2	523	(16.03)	81	(4.23)	777	(11.97)	654	(2.14)
3	798	(6.02)	110	(5.45)	1041	(5.96)	1007	(1.59)
4	987	(12.46)	156	(1.28)	1310	(3.66)	1128	(0.53)
5	561	(24.42)	82	(4.88)	737	(1.36)	778	(1.16)
6	645	(2.40)	90	(0.00)	962	(0.21)	985	(0.00)
7	596	(6.88)	85	(7.06)	922	(7.27)	872	(1.15)
8	558	(7.17)	92	(0.00)	857	(1.40)	746	(0.27)
9	401	(30.92)	57	(7.02)	582	(8.93)	618	(5.50)
10	505	(8.91)	43	(2.33)	678	(0.15)	776	(0.9)
11	403	(11.41)	106	(5.66)	603	(5.47)	678	(3.98)
12	369	(38.48)	50	(16.00)	464	(12.07)	650	(2.62)
NCR	235	(2.55)	27	(0.00)	176	(0.57)	183	(0.00)
Central Office	181	(28.18)	26	(3.85)	52 13	(25.00)	1	(0.00)
Special Hospitals	1504	(21.88)	52	(1.92)	18 267 1483.33		147	(0.00)
TOTAL	9137	(12.65)	1165	(3.43)	10317 280	(2.71)	10307	(1.38)

Source: Department of Health.

Table 14

Estimates of Annual Average Outflow of Health Manpower: Various Years

	1960s	1970s	1980s
PHYSICIANS			
A. RUTH (1970), PERMANENT IMMIGRANTS TO U.S.	988 (1962-67)		
B. MEJIA ET AL. (1979), PERMANENT IMMIGRANTS TO U.S.	700 (1966-72)		
C. MEJIA ET AL. (1979), EXCHANGE VISITORS TO U.S.	500 (1965-71)		
C. JAMA, EXCHANGE VISITORS TO U.S. INCLUDING RESIDENTS AND INTERNS	3,404 (1962-67)		
D. POEA, CONTRACT WORKERS WORLDWIDE			213 (1987)
NURSES			
A. RUTH (1970), PERMANENT IMMIGRANTS TO U.S.	132 (1962-67)		
B. TULLAO (1980) AND GUPTA (1972), PERMANENT IMMIGRANTS TO U.S. AND CANADA	679 (1960-69)	1,600 (1970-79)	
C. OEDB-BES, JOB PLACEMENTS		1,960 (1975-81)	
D. POEA, CONTRACT WORKERS WORLDWIDE		2,498 (1973-79)	14,210 (1980-87)
MIDWIVES			
A. POEA, CONTRACT WORKERS WORLDWIDE			1,535 (1987)
DENTISTS			
A. POEA, CONTRACT WORKERS WORLDWIDE			26 (1987)

Tullao (1980) and Gupta (1972) provided data on the number of Filipino nurse-immigrants to the US and Canada from 1956 to 1979. The series shows that by 1979, there were 21,033 Filipino nurses in the two countries. The average annual number of immigrants increased from 679 for 1960-'69 to 1,600 from 1970-'79.

In the mid-1970s, contract work became an important reason for migration. Job placement for nurses reported by OEDB and BES averaged 1,960 a year between 1975 and 1981. The series, however, was discontinued following the dissolution of OEDB and the creation of POEA. POEA data for the period 1980-'87 showed that the annual outflow of contract nurses averaged 14,210.

The US and Canada remain as the major destinations of permanent Filipino immigrants. For contract workers however, the Middle East is the major destination (Table 15).

Several reasons are usually given in answer to why health professionals leave the Philippines. Aside from the immigration policies implemented by both the Philippine government and the countries of destination which to a large extent eased the outflow of workers, various individual reasons are also evident. For example, in a survey of 6893 physicians and nurses on their intentions to migrate, only 34 percent had no intentions of migrating and the major sources of dissatisfaction were low material benefits, poor working conditions and lack of government support. Mamot (1981) also cites a study of 309 Filipino surgeons in the US in 1979. Eighty-one percent of those interviewed migrated two years after graduation to obtain training which was not available in the Philippines. Although 23 percent returned to the Philippines after training, all went back to the US for various reasons like difficulty in earning a decent living in the Philippines; difficulty of starting a practice; lack of support from colleagues, hospitals and medical schools, and (among those who went to the rural areas) the inadequacy of hospital facilities.

In the case of contract workers to the Middle East and Africa, Corcuera (1977) found that low average family income in the province, low urbanization rate and scarcity of hospital beds were important factors associated with physician emigration in 1975-'76. However, the study also revealed that physicians who left as contract workers had lower qualifications relative to medical practitioners in the country in general, as indicated by their lower board examination ratings, shorter years of practice (average of 2-3 years) and lack of experience in independent practice.

D. *Projected Supply of Health Manpower*

This section attempts to provide some estimates of the number of health manpower which are and will be available from 1988 to the year 2000. The projection procedure does not approximate anything like what has been done by GMENAC in the United States (McNutt 1981) nor is it based on a sophisticated econometric model where several interacting markets are included in the estimations (Feldstein and Kelman 1970). Specifically, the projection is based on simple assumptions derived from, and constrained by the existing data in the Philippines. The stock of health manpower as of 1987 and the projected supply of health manpower from 1988 to 2000 are given in Tables 16 and 17, respectively.

Table 15

Number of Deployed Health Manpower by Major Geographical Location (As of 1987)

	Physicians	Nurses	Midwives	Dentists
Africa	12	8	0	2
Asia	6	69	3	0
Europe	0	169	16	0
Americas, Oceania & Trust Territories	8	2,970	0	0
Canada	0	45	0	0
U. S. A.	1	2,899	0	0
Others	7	26	0	0
Middle East	187	22,724	1,516	24
Kuwait	2	870	8	0
Libya	27	837	162	1
Oman	35	4,095	42	1
K. of Saudi Arabia	93	17,703	1,249	19
United Arab Emirates	12	1,401	32	2
Others	18	818	23	1
Total	213	25,940	1,535	26

Source of basic data: Philippine Overseas Employment Administration.

Table 16

Estimated Stock of Health Manpower (As of 1987)

	PHYSICIANS	NURSES	MIDWIVES	DENTISTS
Cumulative ever-registered as of end 1987	56237	149852	69930	24218
Retired or dead	99953	10232	3158	3697
Permanently immigrated abroad	27991	40000		11923
Stock	18293	99620	66772	8598
On contract work abroad	213	25940	1535	26
Net stock in the country	18080	73680		8572

The tables were based on the following data and assumptions:

1. Data on the cumulative ever-registered physicians, nurses, midwives and dentists were taken from the Professional Regulation Commission (PRC).

2. A physician is assumed to start service at age 28; a nurse at age 23; and a dentist at age 25. All are assumed to retire at age 65. Hence, a physician, nurse and dentist who passed the licensure examination and entered the service in 1950, 1945, and 1947, respectively are presumed retired in 1987. The same method is applied for years 1988 to 2000.

3. The number of deaths prior to age 65 is computed using death probabilities from the Philippine Life Tables for the general population.

4. The number of new licensees are projected using simple historical trend from 1950 to 1987.

5. The number of health professionals who have permanently immigrated abroad as of 1987 are based on best available estimates or as residuals, i.e., those who cannot be located within the country and are not on contract work abroad are presumed to have permanently immigrated abroad.

Assuming that present trends in production and immigration will continue, the net stock of physicians in the country will grow by an annual average of 3.1 percent; nurses by 3.5 percent; and dentists by 3.7 percent. Hence, by the year 2000, the local supply of physicians is expected to reach 27,950; nurses, 115,721; and dentists, 16,233. It was not possible to include midwives in the forecast because of limited available data.

III. Needs for Health Manpower

Techniques for estimating health manpower needs basically fall into three classifications: (a) model of good service; (b) standard ratios and criteria; and (c) personnel-focused analysis. In the "model of good service" technique, the number and composition of health personnel found in a unit, area or region considered to have a well-functioning health delivery system is used as a basis for staffing similar units, areas or regions. Operationalizing the concept, however, is difficult because of the great variability in the health, demographic, social and cultural practices in different areas.

Health manpower to population ratios are easy to calculate and are, therefore, commonly used. In this technique, actual ratios are compared with internationally or nationally accepted standards. A variation of the technique is to use the highest regional or provincial manpower-to-population ratio as standard for the other regions or provinces to follow.

Personnel-focused techniques originated from the early work of Lee and Jones (1933) who calculated the number of physicians required by the population based on an estimate of the number of physician-hours needed, as determined by professional judgment, to provide medical care to the population. They developed a table of annual expectancy rates for diseases and injuries and asked

leading physicians to determine the amount of services required to diagnose and treat a given illness. The number of hours required to provide care for each illness category is then estimated and translated into physician requirements. Basically, the technique requires either counting the time spent by health personnel in various programs or on specific tasks, hence it is often called task and time utilization method.

The different methodologies discussed above are basically normative in approach. This is necessarily so, because they are used to measure or estimate ideal requirements. Specifically, a surplus or shortage defined in terms of needs is done by comparing the existing number and distribution of health manpower and some pre-determined standard. This paper provides estimates of health manpower requirements based on (a) standard manpower to population ratios and (b) tasks and time utilization of manpower.

A. *Standard Health Manpower to Population Ratios*

Standard health personnel to population ratios have been developed in the Philippines for primary level of health care, medical specialty, school health and occupational health and safety.

1. Primary Level of Health Care

The standard ratios for primary level of health care used by the DOH were developed in 1974, based on an operations research study funded by WHO (Subramanian 1974). It is generally felt, however, that these ratios need to be updated. Two other sets of ratios have been proposed, specifically with regard to midwives who are considered to be the most heavily loaded personnel in the Philippine public health system. One is the 1:3,000 ratio used in the Philippine Public Health Development Project (PHDP III) of the DOH and the other is a proposal which takes explicit account of an area's accessibility and terrain (Mercado 1988).

The 1974 study proposed a staffing pattern for each municipal rural health unit (RHU) consisting of four midwives, one public health nurse, one sanitarian, one physician and one clerk-driver. In terms of staff to population ratios, these translate to:

1: 20,000 for physician, nurse and sanitarian (range: 9,000 to 39,000)
1: 5,000 for midwife (range: 2,250 - 9,750)

There were some qualifications regarding the use of these proposed staffing norms. First, the standard ratios covered only the provision of primary level of health care. Second, the standard ratios did not cover such DOH public health programs as malaria, TB, schistosomiasis and integrated family planning. In places where these public health concerns are significant, the ratios must be appropriately adjusted. Third, the ratios assumed the availability of a vehicle and clerk-driver in the rural health unit, a facility which considerably increases population coverage. Their absence implied that the population covered per health manpower has to be reduced.

The usefulness of these ratios under the present health care delivery system has been questioned, especially that of midwives. In 1979, the DOH redefined the role of the rural health midwife to include primary health care activities (participation in community health care services, giving of actual health services, and referring of cases). However, given this expanded role, the midwife to population ratio of 1:5,000 was never reduced.

In November 1988, a DOH workshop was conducted to review the job descriptions of frontline health workers, assess their actual workloads, and determine their skill requirements for present tasks as well as added responsibilities they may be asked to do in the near future. This was held in connection with the Department of Health's Philippine Health Development Project III. This was held also to answer the need for updated manpower planning parameters which have remained unchanged since 1974.

Table 18 summarizes the estimated number of hours spent by DOH frontline workers in one week. The table clearly shows that while public health nurses and municipal health officers (physicians) work well within the 40-44 hour week, rural health midwives are heavily overloaded. In a week, a typical midwife works for 55 hours, a significant part of which is spent filling in required forms and reports. Even with the anticipated reduction of form-filling activities as a result of improvements being introduced in the DOH health information system, the current patient-care load of rural health midwives is still much more than what can be adequately handled. On average, a rural health midwife provides 34 hours of patient care a week, or 6.8 hours a day, almost an hour more than the prescribed six-hour standard.

To reduce a midwife's workload, a ratio of one midwife to 3,000 population has been proposed. This ratio already takes into account the added responsibilities of the midwife in the special public health programs in malaria, TB and schistosomiasis (which were not included in the 1974 ratios) as well as comprehensive maternal and child care.

Midwife-to-population ratios which take into account an area's accessibility have been proposed by the Cebu Provincial Health Office (Mercado 1988) as follows:

Type of Area	Ratio
A - Easy-Areas: flat terrain with available transport facilities	1:3,000
B - Moderately difficult areas: rough terrain with availabletransportation facilities	1:2,500
C - Difficult areas: mountainous areas with some transportationfacilities	1:2,000
D - Very difficult areas: highly mountainous areas with scarceor no transportation facilities	1:1,150

Mercado does not provide guidelines on how to operationalize the concept. However, available Philippine topographic and demographic data on urban-rural and upland-lowland population make it possible to redefine the types of areas as follows: A - urban lowland; B & C-urban upland and rural lowland; and D - rural upland.

Table 19 summarizes the projected health manpower requirements for 1985-2000 for primary level of health care using the standard DOH-WHO ratios for doctors, nurses, midwives and dentists. For midwives, alternative ratios proposed under the PHDP and by Mercado are also presented. Since these personnel will be based mostly in rural health units they will likely have to be employed by DOH. The results of the exercise indicate that by the year 2000, the primary health care program of the system will be needing 3,762 each for doctors, nurses and dentists. In the case of midwives, the requirements are much higher: 15,048 using the standard ratio 1:5,000; 25,081 using 1:3,000; and 45,852 using the terrain-based approach.

2. Medical Specialty

Requirements for medical specialty are estimated using the following specialist-population ratios recommended by the Philippine Medical Association (PMA):

	One Per
Surgeon	10,000
EENT	15,000
Obstetrician-Gynecologist	20,000
Pediatrician	30,000
Internist	30,000
Anesthesiologist	40,000
Radiologist	60,000
Urologist	60,000
Pathologist	100,000
Dermatologist	100,000
Neurologist	100,000
Psychiatrist	100,000

Using these ratios, the estimated projected requirements for medical specialists are given in Table 20. The requirements appear very demanding as the 1985 figure even already exceeds the stock of physicians in the country as of 1987. By the year 2000, the requirements for specialist, based on the prescribed ratios shall have reached 28,717.

So far, no study has been undertaken to validate these ratios, possibly through actual count of cases handled by specialists. It would seem, however, that the recommended ratios for surgeon, EENT (ears-eyes-nose-throat) and OB-GYN (obstetrician-gynecologist) are high relative to public health doctors. Using these three ratios appears inconsistent with the idea of establishing a hierarchical system predominated by public health physicians and general practioners.

Table 17

Projected Supply of Health Manpower: 1988-2000

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Physicians													
Year-before stock	18,293	19,536	20,936	22,052	22,992	23,556	24,078	24,692	25,274	26,000	26,691	27,671	28,498
Plus: New licensees	1,920	1,945	1,971	1,997	2,023	2,048	2,074	2,100	2,125	2,151	2,177	2,203	2,228
Less: Deaths & retirements	427	295	605	807	1,209	1,276	1,210	1,268	1,149	1,210	947	1,126	2,276
Less: Permanent immigrants	250	250	250	250	250	250	250	250	250	250	250	250	250
Current-year stock	19,536	20,936	22,052	22,992	23,556	24,078	24,692	25,274	26,000	26,691	27,671	28,498	28,200
Less: Contract workers abroad	250	250	250	250	250	250	250	250	250	250	250	250	250
Net stock in the country	19,286	20,688	21,802	22,742	23,306	23,828	24,442	25,024	25,750	26,441	27,421	28,248	27,950
Nurses													
Year-before stock	99,620	102,395	104,834	107,777	110,258	113,564	116,676	120,180	123,857	127,552	130,831	134,314	138,062
Plus: New licensees	4,624	4,796	4,968	5,140	5,312	5,484	5,656	5,828	6,000	6,173	6,345	6,517	6,689
Less: Deaths and retirements	249	757	425	1,059	406	772	552	551	705	1,294	1,262	1,169	1,430
Less: Permanent immigrants	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
Current-year stock	102,395	104,834	107,777	110,258	113,564	116,676	120,180	123,857	127,552	130,831	134,314	138,062	141,721
Less: Contract workers abroad	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000
Net stock in the country	76,395	78,834	81,777	84,258	87,564	90,676	94,180	97,857	101,552	104,831	108,314	112,062	115,721
Dentists													
Year-before stock	8,598	9,084	9,525	10,126	10,506	10,693	10,896	11,069	11,333	12,015	12,764	13,495	14,075
Plus: New licensees	966	983	1,001	1,018	1,036	1,054	1,071	1,089	1,106	1,124	1,142	1,159	1,177
Less: Deaths and retirements	380	442	300	538	749	751	798	725	324	275	311	479	320
Less: Permanent immigrants	100	100	100	100	100	100	100	100	100	100	100	100	100
Current-year stock	9,084	9,525	10,126	10,506	10,693	10,896	11,069	11,333	12,015	12,764	13,495	14,075	14,832
Less: Contract workers abroad	30	30	30	30	30	30	30	30	30	30	30	30	30
Net stock in the country	9,054	9,495	10,096	10,476	10,663	10,866	11,039	11,303	11,985	12,734	13,465	14,045	14,802

Table 18

Estimated Number of Hours in a Week Spent by DOH Frontline Workers (1988)

	Patient Care		Administrative			
	Clinical	Public Health	Supervision	Report Prod'n & Consolid'n	Others	Total
Rural Health Midwife	34.0	-	-	15.0	6.0	55.0
Public Health Nurse	10.0	15.0	0	0	3.0	12.0	40.0
Supervising Public Health Nurse	-		25.0		6.0	9.0	40.0
Rural Health Physician	22.0		15.0	7.0			44.0
District Health Officer	28.0	-	15.0	-		6.0	49.0

Source: Public Health Development Workshop (PHDP) III Workshop (1988).

Table 19

Projected Needs for Health Manpower: Primary Level of Care
(RHU-Based) (1985-2000)

	1985	1990	1995	2000
DOCTORS				
STANDARD RATIO OF 1 : 20,000	2,733.0	3,074.0	3,421.0	3,762.0
NURSES				
STANDARD RATIO OF 1 : 20,000	2,733.0	3,074.0	3,421.0	3,762.0
MIDWIVES				
STANDARD RATIO OF 1: 5,000	10,934.0	12,295.0	13,685.0	15,048.0
RATIO OF 1 : 3,000	18,223.0	20,492.0	22,808.0	25,081.0
TERRAIN-BASED	34,417.0	38,992.0	42,218.0	45,852.0
DENTISTS				
STANDARD RATIO OF 1 : 20,000	2,733.0	3,074.0	3,421.0	3,762.0

Table 20

Projected Requirements for Medical Specialists: 1985-2000

	1985	1990	1995	2000
SURGEONS	5,476	6,148	6,842	7,524
EENT	3,645	4,098	4,562	5,016
OB-GYNE	2,733	3,074	3,421	3,762
PEDIATRICS	1,822	2,049	2,281	2,508
INTERNISTS	1,822	2,049	2,281	2,508
ANESTHESIOLOGISTS	1,367	1,537	1,711	1,881
RADIOLOGISTS	911	1,025	1,140	1,254
UROLOGISTS	911	1,025	1,140	1,254
PATHOLOGISTS	547	615	684	752
DERMATOLOGISTS	547	615	684	752
NEUROLOGISTS	547	615	684	752
PSYCHIATRISTS	547	615	684	752
TOTAL	20,865	23,464	26,115	28,717

3. School Health

The basic guidelines for a functional health program is contained in the "Manual for School Health" issued by the Department of Education, Culture and Sports (DECS) in 1986. In the same year, DECS issued a memorandum which defined the minimum standards of school health centers. The memorandum stipulated the following health manpower per student ratios:

One doctor for 10,000 students
One nurse for 5,000 students
One dentist for 5,000 students

Based on the projected number of elementary, high school and college enrollees, the required number of school health manpower from 1985 to 2000 was estimated and shown in Table 21. By the year 2000, the requirements for health manpower in schools shall have reached the following levels: physicians - 1,017; nurses - 2,034; and dentists - 2,034.

4. Occupational Health and Safety

Article 157, Book 4 of the Philippine Labor Code requires that firms provide the following health personnel within their premises:

	Size of Firm (Number of Employees)		
Health Personnel	51-200	201-300	301 or more
Physician	none	part-time	full-time
Dentist	none	part-time	full-time
Nurse	full-time	full-time	full-time

For the second group of firms, (those employing 201-300), an emergency clinic is required. For the last group, (those employing 301 or more), a dental clinic and an infirmary or emergency hospital with one bed capacity for every 100 employees are further required.

Using the historical trend in the growth of large manufacturing establishments in the country, we derived the corresponding required number of physicians, nurses and dentists for occupational health and safety and these are shown in Table 22. By the year 2000, the requirements for physicians, nurses and dentists for occupational health and safety shall have hit 2,096, 3,659 and 2,096, respectively.

Table 21

Projected Requirements for Health Manpower in Schools
1985-2000

	1985	1990	1995	2000
PHYSICIANS (a)				
STANDARD RATIO OF 1:10,000	832	916	966	1,017
NURSES (b)				
STANDARD RATIO OF 1:5,000	1,665	1,833	1,932	2,034
DENTISTS (c)				
STANDARD RATIO OF 1:5,000	1,665	1,833	1,932	2,034

Sources of basic data:

Elementary school age population derived from National Statistics Office (NSO) projections. Health manpower to pupil ratios set by the DECS Health and Nutrition Center.

Notes:

(a) Current number of physician is 113, or a ratio of 1 : 92,763.
(b) Current number of nurses is 992, or a ratio of 1 : 8,133.
(c) Current number of dentists is 581, or a ratio of 1 : 16,401.

Table 22

Projected Requirements for Physicians, Nurses, and Dentists for Occupational Health and safety in the Manufacturing Sector
1985-2000

	Physicians	Nurses	Dentists
1985	1,331	2,323	1,331
1990	1,586	2,769	1,586
1995	1,841	3,213	1,841
2000	2,096	3,659	2,096

5. Total Requirements Based on Standard Health Manpower to Population Ratios

Using the population figures generated for each major category of health care using standard manpower to population ratios, the total requirements for the four categories of health manpower by the year 2000 are as follows (Table 23):

Physicians	-	35,592
Nurses	-	9,455
Dentists	-	7,892
Midwives	-	a. 15,048
		b. 25,081
		c. 45,852

The projection figures for physicians seem to be extremely high particularly on account of the fairly low ratios prescribed for the specialists. Contrastingly, the requirements for nurses are low. There is obviously an understatement of the requirements for nurses on account of the failure to capture the required nursing services in hospitals and clinics, both in the private and government sectors. The requirement figures for primary health care capture only those in the RHUs, and what is left out is a significantly big group. The same can also be said of dentists, a big group of which has been left out in the estimates. What are included in the projections are those only needed in schools and for occupational health and safety. What is left out is the much more significant group which is needed to provide dental service to the rest of the population.

In the case of midwives, the figures appear fairly reasonable especially when viewed in the context of the expanded role of midwives in health care delivery especially in the rural areas.

B. *Tasks and Time Utilization Method*

The manpower requirements for four types of health services are estimated: outpatient care, maternal and child health, dental health and inpatient care.

For outpatient care, maternal and child health and dental health, the following method was used:

$$M_i = \frac{c_i x f_i x d_i}{FTE_i}$$

where:
- i = physicians, nurse, midwife or dentist
- M = number of required manpower
- c = number of morbid cases
- f = frequency visit
- d = duration of visit
- FTE = full time equivalent

Table 23

Total Requirements for Health Manpower Based on Standard Health Manpower to Population Ratios: 1985-2000

	1985	1990	1995	2000
Physicians	25,761	29,040	32,343	35,592
Nurses	6,721	7,676	8,566	9,455
Dentists	5,729	6,493	7,194	7,892
Midwives				
a.	10,934	12,295	13,685	15,048
b.	18,223	20,492	22,808	25,081
c.	34,417	38,992	42,218	45,852

Note: a, b, and c refer to the different assumptions used in Table 19:
a - Standard Ratio of 1:5,000
b - Ratio of 1:3,000
c - Terrain-based

The assumptions used in the estimations are summarized in Table 24 and are explained below.

In the early 1970s, the National Economic and Development Authority (NEDA) and the DOH typically used 43 percent morbid population in manpower planning exercises. Of this 43 percent, it was assumed that 90 percent would be outpatients while 10 percent would require hospitalization. This implied that 38.7 percent of total population in a given year were expected to seek outpatient consultation while 4.3 percent would be considered inpatients. It has been almost two decades since these assumptions were made but no updates are forthcoming.

The other possible sources of morbidity information include: (a) National Health Surveys; (b) aggregated reports from hospitals, RHUs, BHS and other health points; and (c) special purpose studies.

Three National Health Surveys have already been conducted: one in 1978, another in 1981 and the latest in 1987, data from which are not available yet. There are major differences in the survey methodologies and therefore in the morbidity data generated by the first two surveys and for the purposes of this study, it is virtually impossible to derive aggregate annual number of morbid population from them. Similarly, reports from health providers are severely inadequate since they are not a regular feature of data collecting agencies.

What seems useful so far is the study done by Azurin (1985) on the Philippine hospital system using 1980 data. Statistics from that study indicate that government and private hospitals admitted a total of 2.5 million inpatients and provided service to a total of 10.3 million outpatients (Table 25). The inpatient data implies a ratio to total population of 5.3 percent. In the absence of data on outpatients from RHUs, BHSs and private clinics as well as home consultations made by providers, we consider the assumption that the number of outpatients would at least be the same as that of hospital outpatients. Hence, total outpatients would be 20.6 million in 1980 and the ratio of outpatients to total population would be 43.1 percent.

In the case of outpatient care, the following assumptions were made:

1. Load assignment - The 1981 NHS indicates that about 30.5 percent of all morbid cases were attended to by doctors but this included both outpatients and inpatients. In this study, it is assumed that 20 percent of all outpatient cases are handled by physicians, 20 percent by nurses and 60 percent by midwives.

2. Frequency and duration of consultation - The 1974 Operations research study revealed an average of three outpatient visits with a mean duration of 25 minutes. No information was available as to who attended to the patient during each visit. Azurin (1988) reported that patients made an average of four visits in a government hospital and six visits in a private hospital. Since physicians normally handle the more serious cases, it seems logical that patient visits to them take more time compared to visits made to nurses and midwives. Hence, it is assumed that the duration of physician consultation or treatment is 30 minutes; nurse, 25 minutes; and midwife, 25 minutes.

Table 24

Assumptions for Minimum Requirements for Health Manpower Using Tales and Time Utilization Method

	DOCTOR	NURSE	MIDWIFE	DENTIST
A. Outpatient Care				
1. No. of Cases	Projected population 1985-2000, X Assumed ratio of outpatients to total population (43.1%)			Projected population X Proportion of population to have dental check-ups (67%)
2. Load Assignment	20% of all cases	20% of all cases	60% of all cases	100% of all cases
3. Frequency of consultation	5	4	3	1
4. Duration of Consultation (minutes)	30	25	25	25
5. Full-time equivalent				
a. No. of hours per day devoted to patient care	6	5	4	5
b. No. of days in a year available	255	255	255	255
c. FTE*	1530	1275	1020	1275
B. Maternal and Child Care				
1. No. of cases	Projected no. of births, 1985-2000			-
2. Load assignment	23% of all births	3% of all births	44% of all births	-
3. Frequency of consultation				
a. Prenatal	5	5	5	-
b. Delivery	1	1	1	-
c. Postnatal	3	3	3	-
4. Duration of Consultation				
a. Prenatal	25	25	25	-
b. Delivery	120	120	120	-
c. Postnatal	25	25	25	-
5. Full-time equivalent				
a. No. of hours per day devoted to patient care	6	5	6	-
b. No. of days in a year available	255	255	255	-
c. FTE*	1530	1275	1020	1530
C. Inpatient Care				
1. No. of cases	Projected population, 1985-2000 X Assumed ratio of inpatients to total population (5.3%)		-	-
2. Mean bed stay - 4 days				
3. Hours required per patient per patient day	1	3.3	-	-
4. Full-time equivalent				
a. No. of hours per day devoted to patient care	6	7	-	-
b. No. of days in a year available	255	255	-	-
c. FTE*	1530	1785	-	-

Note: * - FTE: full-time equivalent.

Table 25

Number of Inpatients and Outpatients in Government and Private Hospitals (1985)

	Gov't Hospitals	Private Hospitals	Total
Inpatients			
Admissions	951,740	1,582,651	2,534,391
Newborns	79,593	104,687	184,280
Total	1,031,331	1,687,338	2,718,669
Outpatients			
New	2,225,991	2,131,738	4,357,729
Old	1,384,397	4,590,316	5,974,713
Total	3,610,388	6,722,054	10,332,442
Ratios			
Inpatients/Total Population			5.3%
Outpatients/Total Population			43.1%

Source of basic data: Azurin (1988).

3. Full-time equivalent - This refers to the total number of hours devoted solely to patient care in a year. The DOH uses 272 working days in a year as a planning parameter. However, assuming a 5 1/2-day week, eight official holidays and 12 days sick leave and 12 days personal leave in a year, a health personnel is expected to provide services only in 255 days. Assuming further that the doctor, nurse and midwife provide six, five and four hours to patient care, respectively, then FTE for physician, nurse and midwife are 1,530 hours, 1,275 hours and 1,020 hours, respectively.

For inpatient care, the following assumptions were made:

1. Mean Bed Stay - Using selected hospital statistics for 1980 as shown in Table 26, a mean bed stay of four days is assumed. The data reported an average length of hospitalization of five days and four days for government and private hospitals, respectively.

2. Required Hours for Inpatient Care - The DOH Nursing Administrative Manual requires that each inpatient be provided with 3.3 "general nursing hours" in a span of 24 hours. For physicians, it is assumed that he will provide one hour of care per patient per day.

3. Full-time Equivalent - 255 working days a year is assumed for both physicians and nurses. The physician is expected to devote six hours of patient care per day; the nurse, eight hours.

Similarly, the following were assumed for maternal and child health:

1. Number of Cases and Load Assignment - The projected number of births from 1985 to 2000 is the basis for computing manpower requirements for maternal and child health. In the Philippines, a large proportion of births lack professional health attendance. The 1981 NHS for example reported that only 47.8 percent of births for the period 1979-1981 was attended to by a physician, nurse or midwife. The rest were either attended by a "hilot" (45.5%) or relatives (1.4%). In this study it is assumed that 70 percent of all pregnancies and births would require professional birth attendance, of which 23 percent would be handled by a physician, three percent by a nurse and 44 percent by a midwife. These figures are based on the experience of Central Luzon, an area with a relatively adequate supply of professional health personnel. This procedure is akin to the "model of good service" discussed earlier.

2. Frequency and Duration of Consultation - A mother is expected to make five prenatal and three postnatal visits, each lasting an average of 25 minutes. Time spent by a health professional during delivery is assumed to be 120 minutes.

3. Full-time Equivalent - Six hours of patient care a day for 255 days a year.

Table 26

Total Admissions, Total Discharges, and Total Operations Performed in Government and Private Hospitals: 1985

	Government		Private		Total	
	No.	%	No.	%	No.	%
I. Total Admissions						
Admissions	951,740	92.3	1,582,651	93.8	2,534,391	93.2
Newborns	79,593	7.7	104,687	6.2	184,280	6.8
Total	1,031,331	100.0	1,687,338	100.0	2,718,669	100.0
II. Total Discharges						
Medicine	325,748	35.0	537,237	39.0	862,985	37.4
Surgical, pediatric	27,921	3.0	41,326	3.0	69,247	3.0
Surgical, adult	83,764	9.0	82,652	6.0	166,416	7.2
Obstetrics	83,764	9.0	96,427	7.0	180,191	7.8
Gynecology	37,228	4.0	27,551	2.0	64,779	2.8
Pediatrics	241,984	26.0	427,035	31.0	669,019	30.0
Newborn	74,457	8.0	82,652	6.0	157,109	6.8
Genito-urinary	9,307	1.0	27,551	2.0	36,858	1.6
EENT	9,307	1.0	13,775	1.0	23,082	1.0
Dental	37,228	4.0	13,775	1.0	51,003	2.2
Others	negligible	negligible	27,551	2.0	27,551	1.2
Total	930,708	100.0	1,377,532	100.0	2,308,240	100.0
III. Total Operations Performed						
Major Operations	42,612	14.0	41,009	20.0	83,621	16.7
Minor Operations	261,190	86.0	156,985	79.3	418,175	83.3
Total	303,802	100.0	197,994	100.0	501,796	100.0
IV. Average Length of Hospitalization (Days)	5		4			

Source: Azurin (1988)

Lastly, the assumptions for dental health are:

1. Number of Cases - The 1981 NHS reported that two-thirds of the respondents underwent dental check-up during the year. This proportion is applied to total population to obtain total dental cases which are assumed to be handled all by a dentist.

2. Frequency and Duration of Consultation - An individual is assumed to make one dental visit a year, to last 25 minutes.

3. Full-time Equivalent - A dentist is expected to provide five hours a day to patient care, for 255 days a year.

Results of the projection exercise are given in Table 27. Based on the methodology developed, by the year 2000 the country's health manpower requirements for outpatient care, maternal and child health, dental health and inpatient care are expected to reach 22,423 for physicians; 38,150 for nurses; 26,522 for midwives; and 16,475 for dentists.

Comparing these figures with those obtained using standard health manpower to population ratios reveals wide divergence in the projection figures. However, the divergence seems to corroborate the apparent understatement and overstatement of estimates for nurses and dentists, and physicians, respectively using the standard ratios. This is readily observed from the figures for the year 2000 below:

	Standard Ratios	Task & Time Utilization
Physicians	35,592	23,440
Nurses	9,455	40,184
Dentists	7,892	18,509

C. *Disadvantages in the Use of Needs and Requirements Approach*

The needs and requirements approach to health manpower forecasting, although widely used in a great number of countries, suffers from a number of shortcomings and should therefore not serve as the sole basis of estimating surpluses or shortages, or for forecasting manpower requirements, or for policy prescriptions.

There are a number of basic problems associated with the use of the normative approach as a basis of manpower forecasts. First, it does not consider the changes that may occur in the demand for health manpower services as a result of changes in the income of the population. Nor does it consider price changes or alternative ways that affect the consumption of health services. The approach is essentially prescriptive: it indicates how much health care a population ideally ought to have. In other words, it assumes that the people can actually pay for the medically desired quantity of services and that they actually want such services.

Table 27

Projected Requirements for Health Manpower, by Type of Care: 1985-2000

	1985	1990	1995	2000
Physicians				
Outpatient Care	7,700	8,659	9,638	10,598
Maternal and Child Care	1,338	1,403	1,421	1,399
Inpatient Care	7,575	8,518	9,481	10,426
Total	16,613	18,581	20,540	22,423
Nurses				
Outpatient Care	6,160	6,927	7,710	8,478
Maternal and Child Care	175	183	185	183
Inpatient Care	21,426	24,095	26,818	29,490
Total	27,761	31,205	34,713	38,150
Midwives				
Outpatient Care	17,325	19,483	21,684	23,845
Maternal and Child Care	2,560	2,684	2,719	2,677
Total	19,885	22,167	24,403	26,522
Dentists				
Dental Health	11,970	13,461	14,982	16,475

Second, it does not consider productivity changes that are likely to occur. The development of productivity-enhancing technologies and input substitutions are now being done in the health care market and are likely to continue at an expanded pace. Such changes as greater task delegation from physicians to nurses or auxiliaries and from dentists to dental aides can drastically alter the requirements for physicians and dentists.

Third, it does not consider changes in the overall organization and financing of the health care delivery system and the impact of these changes on health manpower requirements. For example, the establishment of a nationwide health insurance, the introduction of a major public health program or the termination of an existing one, and the privatization of certain government health services can potentially alter manpower requirements.

There are also a number of minor issues related to the use of the ratio technique such as correcting for the age distribution of health manpower and netting out health manpower involved in research, teaching, administration and other activities which do not involve patient care.

IV. Supply and Needs Compared

Table 28 compares the computed requirements for health care to the available stock of physicians, nurses, midwives and dentists for 1985, 1990, 1995 and 2000. The requirement figures are those estimated using a combination of the ratio and the task and time utilization methods. The estimates of the latter method were used to avoid the over- and understatement of figures for the three categories of health manpower. In addition to this, the figures for school health using the standard ratio method were used. For all years covered, the country has an excess of physicians and nurses but will experience deficit in dentist supply. The gap in 1985 may have actually been smaller since the total stock was for the year 1987. Also, if it were feasible to net out the number of physicians who do not actually provide patient care, then the total stock would have been closer to the needs figures. The surplus of physicians and the shortage of dentists, however, are not quite severe. What is disturbing is the continued and expanding number of nurses far in excess of what is needed. This result seems to give credence to the popular observation that the Philippines today is training nurses not for domestic employment, but for the market abroad.

V. Demand for Health Manpower

The previous chapter estimated health manpower requirements based on needs. Basically noneconomic and normative, such an approach has inherent weaknesses as a basis for assessing health manpower requirements. An alternative approach entails estimating health manpower demand functions. The (economic) shortage is the gap between health manpower demand, as estimated by a demand function, and available supply. Economic surpluses or shortages can also be assessed, though not determined, by analyzing the rates of return of various types of manpower or comparing their relative earnings.

In discussing health manpower demand functions, it is useful to start by distinguishing health demand from health need as these relate to health manpower. Demand refers to the sum of the amounts

Table 28

Comparison of Requirements for Health Manpower and Stock 1985-2000

	1985	1990	1995	2000
Physicians				
Outpatient, MCH* and inpatient care	16,613	18,581	20,540	22,423
School health	832	916	966	1,017
Occupational health	1,331	1,586	1,841	2,096
Total needs	18,776	21,083	23,347	25,536
Total stock in country	18,080	21,802	25,024	27,950
Nurses				
Outpatient, MCH* and inpatient care	27,761	31,205	34,713	38,150
School health	1,665	1,833	1,932	2,034
Occupational health	2,323	2,369	3,213	3,659
Total needs	31,749	35,807	39,858	43,843
Total stock in country	73,680	81,777	97,857	115,721
Dentists				
Outpatient, MCH and inpatient care	11,970	13,461	14,982	16,475
School health	1,665	1,833	1,932	2,034
Occupational health	1,331	1,586	1,841	2,096
Total needs	14,966	16,880	18,755	20,605
Total stock in country	8,572	10,096	11,303	14,802

* MCH: maternal and child health

of the various types of health services that the population of a given area will seek and has the means (income) to purchase or access at prevailing prices within a given time period. From this demand, the health manpower required to produce these services can be derived. Need, on the other hand, represents an estimation based on professional judgement and current medical technology of the number of workers or amount of services necessary to provide an optimum standard of health care. Need, therefore, exceeds demand when there are insufficient resources to produce or purchase services in accordance with professionally determined needs (Hall 1981).

The weaknesses of using needs as a basis for estimating health manpower requirements have been discussed in the previous chapter. Health manpower estimation based solely on demand, however, also has its shortcomings especially when applied in less developed countries with substantial populations below the poverty line and therefore with demands which are not apparent. Also, health services in these countries are largely provided by the government, in contrast to the private sector in developed countries. Moreover, the major health problems in Third World countries require preventive rather than curative care while the opposite is the case in Western societies.

On the basis of these differences, Hall (1981) noted that the health needs method is applicable in countries with an active government policy towards the delivery of health services; a dominant public sector with relatively strong control over manpower and the delivery of services; and extensive preventive, public health and specific health programs based on well-established technology. On the other hand, demand estimation is especially applicable in countries with a dominant private sector; a passive government attitude towards the delivery of health services; and relatively minor imbalances in the provision of services to different segments of the population. An approach combining needs assessment and demand estimation seems appropriate for the Philippines where both the government and the private sector are involved in the provision of health care.

Although no actual estimation of a demand function is made basically on account of the unavailability of appropriate data, the discussion which follows tries to explore the different methodologies adopted in other countries in estimating demand for health manpower. The idea here is to provide an initial attempt to find out the appropriate methodologies for the country and the data requirements which the methodology demands.

A. *Health Manpower Demand Functions*

Estimating manpower based on demand functions is an intricate process with substantial information requirements. Illustrative of the efforts in this field are the model on health care provision by Feldstein and Kelman (1970), the model on health service utilization, and approaches using income elasticities.

Feldstein and Kelman developed a framework for an econometric model of the medical care sector which takes explicit account of the demand for health manpower, specifically the services of practicing clinical physicians and professional nurses. The model takes cognizance of the fact that the demand for health manpower is derived from the demand for health care services and facilities. These, in turn, in turn are derived from the demand for treatments by the population. Six health

care institutional settings are included: hospitals (inpatient), nursing homes, outpatient departments, doctors' offices or clinics, home care, and public elementary schools. The respective outputs of these institutions, in addition to physicians and nurses' own incomes and to relative incomes, are then used as explanatory variables.

The Feldstein and Kelman model is designed for advanced countries whose health problems are essentially curative. Applying it to less developed countries entails the inclusion of preventive care activities. As far as can be ascertained, the model has not been empirically applied and tested, even in advanced countries. Its merits lie in its having been able to hypothesize the relationships between manpower services and health care provision and in the process identified the required data for such analysis.

The model takes as its starting point the institutional setting of health care providers. The explanatory variables, therefore, are the outputs of the institutions providing care and the incomes of the providers. An alternative approach is to derive health manpower demand from the population requiring care. Demand is defined in terms of a utilization measure, e.g., number of a person's visit to a physician, nurse or dentist. The explanatory variables then are population characteristics correlated with health service utilization, e.g., income, age, educational attainment, urban or rural residence, and sex.

Baker and Perlman (1967) employed the health service utilization approach in projecting the demand for health practitioners in Taiwan. However, instead of estimating a regression equation, they simply classified the population into various subgroups according to the variables found to be correlated with health manpower utilization. To arrive at future demand, the base year utilization rate for medical, dental and hospital services computed for each population subgroup is multiplied to the projected population for each subgroup. A multivariate analysis done on the Taiwan survey data indicated that income, age and place of residence significantly affect health service utilization but education and sex do not.

A properly designed national health survey should be able to capture health service and health manpower utilization rates of the various population subgroups. The Philippine National Health Surveys, however, cannot provide health manpower utilization rates since (1) the questions are in terms of first consultations made (not frequency of visit) in times of morbidity, and (2) utilization rates are in terms of health facilities, not health manpower. The only exception is the case of dentists.

A third approach in health manpower demand estimation is to determine the income elasticity of health expenditures, which is used to convert the projected rise in income into the amount likely to be spent on health services. Such amount is then converted into manpower requirements using a suitable conversion factor. Using historical data, the following model can be estimated: $H = f(Y)$ and $D = f(H)$ where H = per capita annual national health expenditures; Y = per capita disposable income or GNP; and D = per capita demand for health manpower, defined in terms of employment.

Despite its apparent simplicity, the income elasticities approach is fraught with operational as well as conceptual difficulties. Public health expenditures data are readily available in developing

countries but spending by the private sector health providers are not. The estimation of the magnitude of the private sector in health is already a major activity. Second, empirical estimates of income elasticities in advanced countries indicate that they are quite unstable and range widely. Hall (1981) notes that in the US, elasticity estimates for expenditure on physician services range from 0.2 to 0.7, possibly due to income differences. In developing countries where income differentials are even more pronounced, it is a must that different elasticity estimates be used for different income levels, but this makes income elasticity estimation even more complicated. A third problem has to do with the predominance of the public health system in developing countries. Almost invariably, these systems provide services for free or at subsidized rates, even to those who could otherwise afford the unsubsidized rates. Income elasticity estimates under these circumstances are bound to be biased.

B. *Relative Earnings and Rates of Return Analyses*

To determine whether the demand for one manpower type is in balance with supply, the rates of return of the different occupational categories can be analyzed. Alternatively, their relative earnings can be compared. Although these two methods can be used to assess manpower shortage or surpluses, they cannot be used as basis for estimating requirements.

1. Relative Earnings Analysis

Using relative earnings analysis as framework for determining manpower surpluses or shortages involves the comparison of average earnings across occupations and the rates of increase in earnings over time. Those occupations with rates of increase lower (higher) than the average are considered in surplus (shortage).

Table 29 shows the annual compensation of health professionals, non-health professionals and non-professionals for the period 1960 to 1981, as collected by the Wage and Position Classification Office and later, the Office of the Compensation and Position Classification. Over the 21-year period from 1960 to 1981, the annual compensation of clinic physicians and nurses grew at an annual average rate of 8.4 and 8.6 percent, respectively, lower than the overall inter-occupational average of 9.2 percent, hence indicating an apparent surplus in these two professions. On the other hand, the higher-than-average growth in the yearly compensation of dentists indicate an apparent shortage.

As an approach for assessing manpower surpluses/ shortages, however, relative earnings analysis suffers from the fact that it does not consider differences in the relative costs of entering different occupations. For this reason, analysis of rates of return of the different occupations is deemed more accurate.

2. Rate of Return Analysis

The rate of return analysis takes off from the notion that education or training is an investment. As such, one must be able to compute the costs of that investment, including out-of-pocket cost and opportunity cost of time spent on training, as well as the expected lifetime earnings, properly discounted to their present value (Pascharopoulus 1985). Comparing these profitability ratios across

Table 29

Annual Compensation of Health Professionals, Non-Health Professionals, and Non-Professionals: 1960-1981

	1960	1963	1966	1969	1971	1973	1976	1979	1981	% Average Rate of Increase 1960-1981
Health Professionals										
Clinic Physician	4,532	4,506	7,199	8,064	10,136	10,084	16,955	19,859	24,428	8.4
Dentist	3,097	3,607	5,744	6,689	7,786	7,767	10,923	16,627	21,481	9.7
Nurse	2,158	2,260	2,742	3,013	4,137	4,564	6,458	8,964	12,170	8.6
Non-health Professionals										
Legal Officer	4,140	4,766	6,659	8,326	11,504	13,730	21,707	30,955	36,970	11.0
Corporate Accountant	4,628	5,108	6,295	7,680	9,623	11,936	13,721	20,129	26,060	8.6
Mining Engineer	-	3,918	5,119	5,336	6,518	11,279	18,814	19,015	26,995	10.7
Mechanical Engineer	5,605	4,348	5,644	5,689	6,897	8,709	11,959	15,070	21,889	6.7
Architect	4,985	5,554	6,364	7,558	8,082	9,423	10,416	18,273	22,166	7.4
Chemist	3,254	3,377	4,315	4,587	5,485	6,934	9,778	12,141	17,470	8.3
Agronomist	2,614	3,000	4,070	4,307	5,189	6,442	-	19,341	21,024	10.4
Librarian	2,127	3,616	3,346	4,223	4,356	4,486	6,109	9,077	12,946	9.0
Non-professionals	1,589	1,814	2,081	2,386	3,137	5,128	5,224	7,638	11,134	9.7
Carpenter	1,754	2,273	2,720	3,206	3,769	4,322	5,711	8,667	11,400	9.3
Driver	1,916	2,505	2,592	3,106	3,995	4,160	6,203	8,264	11,690	9.1
Mechanic	2,158	2,282	2,609	3,231	3,790	4,420	-	8,377	12,091	8.6
Plumber	1,897	2,356	3,036	3,573	4,342	4,841	6,156	9,522	12,482	9.4
Clerk	1,332	1,423	1,960	2,051	4,017	4,139	5,833	8,333	12,343	9.5
Security Guard	1,463	1,722	2,557	2,669	2,708	3,259	4,315	6,501	9,528	9.8
Laborer					3,582	3,570	-	7,255	10,626	9.9
Janitor										

Sources: Wage and Portion Clarification Office (WAPCO) and the Office of the Compensation and Position Clarification (OCPC).

different occupational groups indicates which occupation yields the highest rate of return. In a free market economy, the higher the rate of return, the greater is the probability that the occupation in question is in short supply. Hence, further educational investment in that occupation is warranted. In the Philippines, rates of return to tertiary education by field of specialization are presented in ILO (1974) and Arcelo (1979). However, among the health manpower professions, only medical science was included, and only in 1979 (Table 30). The Arcelo study shows that in 1979, medical science had a rate of return of 7.03 percent for those who graduated from private colleges and universities and 5.97 percent for those who graduated from the University of the Philippines. Among non-UP alumni, the Arcelo study indicates that the rate of return for medicine is midway between engineering, law/ foreign service, and physical sciences (highly profitable courses) and education, food/nutrition, commerce/business administration, and the social sciences (less profitable courses). The rate of return for medicine implies that during the late 1970s and early 1980s, the profession did not experience surpluses (as in the case of education and other less profitable fields) nor shortages (as in the case of engineering and other highly profitable fields). This observation runs counter to what the relative earnings approach yielded. Unfortunately, no subsequent rate of return studies have been conducted to permit analysis of trends over time.

The use of rate of return in the analysis of the health manpower market (or for the market of other occupations for that matter) is straightforward; an occupation in surplus is indicated by a relatively low rate of return. This discourages entrants into the occupation so that over time the rate of return rises to the level of other occupations. The opposite case holds for occupations in shortage. The major assumption of this framework of analysis is that there is free entry in all occupations.

There are, however, elements of tertiary education and health systems especially in less developed countries which reduce the applicability of simple rate of return analysis. Chief among these is the fact that tertiary education in state colleges and universities is highly subsidized and the rate of subsidy often varies by field of specialization. In the Philippines, substantial subsidy programs are also being envisioned for private schools. The amount of educational subsidy creates a difference between private and social rates of return.

Secondly, the predominance of the public sector in the health systems of developing countries means that the salary levels of a substantial number of health manpower are administratively (or even politically) determined rather than arrived at by demand and supply forces. In a situation of pervasive wage controls, earnings are not reflective of scarcity values.

Thirdly, the medical and allied health professions in the Philippines as elsewhere is hardly characterized by free entry. Licensure and accreditation boards limit the number of practitioners. It is not clear whether the medical and related boards take into consideration the existing number of health professionals as a deciding factor in the number of examinees they pass.

Lastly, the Philippines has become a large exporter of health manpower. For a large number of those training in the health professions, their relevant rate of return computation is based on their expected earnings abroad, not locally. Hence, even if the rate of return in the Philippines is low (e.g., nursing), this does not signal reduction in enrollment for that profession.

Table 30

Rates of Return to Tertiary Education in the Philippines

	ILO (1974)		Arcelo (1979)		
	Private Rate				
	All Schools	U.P.	U.P.	Private Schools	U.P.
Education	<5	5.5	5.0	4.69	9.53
Home Economics	neg.				
Food, Nutrition and Diet				4.49	12.40
Commerce	9.0	14.0		6.21	11.50
Bus. Adm.	<5	14.0	10.5	6.21	11.50
Agriculture	<5	5.0	<5		14.80
Civil Eng'g.	10.0	15.0	8.0	9.90	23.50
Mech. Eng'g.	8.5	18.0	13.0	9.90	23.50
Chem. Eng'g.	15.0	17.0	10.0	9.90	23.50
Architecture	neg.				
Applied Sciences	8.0				
Physical Sciences	9.0	8.5		8.15	12.20
Bachelor of Arts	7.5	11.0			
Social Sciences				6.76	9.40
Law/Foreign Service		18.0	15.0	8.27	
Medical Science				7.03	5.97

Notes: < = less than
neg. = negative

VI. Health Manpower Productivity

The increasing scarcity of health practitioners and the escalation in health care cost have triggered interest in health manpower productivity. Such interest carries with it a number of questions. How would scarce resources be allocated to satisfy as extensively as possible society's wants? Have cost escalations been accompanied by productivity changes? What are the sources of productivity improvements and what are its obstacles?

While these are important policy questions, health manpower productivity measurement is still in its infancy, and many of the questions cannot yet be definitively answered. In what follows, the conceptual and methodological issues involved in health manpower productivity assessment is first reviewed. Then the sources of productivity growth are surveyed and possible impediments identified. The discussion relies heavily on the experiences of Western countries where health manpower productivity studies have been undertaken.

Briefly, productivity is a measure of the relationship between the output of goods and services and the inputs of resources used to produce them. In the health sector, output can be thought of as the quantity of health services produced and the inputs as consisting of health manpower, capital and medical supplies combined in a set of technological relations. The set of relationships can be presented formally in a production function as follows (Hadley 1974):

$$Q = f(L_1, ..., L_n; K; M; T) \qquad (1)$$

where
- Q = quantity of health services produced
- L_i = various health manpower inputs (e.g., L_1 = physician manhours, L_2 = nurse manhours)
- K = vector of different types of capital inputs such as buildings, office equipment, and beds
- M = vector of other medical inputs such as disposables, laundry and food services, and drugs
- T = technology employed

Measuring manpower productivity involves focusing on the various health manpower inputs. For instance, if L 1 represents the quantity of physician hours, physician productivity can be defined as:

$$\frac{Q}{L_1} = \frac{f(L_1, ..., Ln; K; M; T)}{L_1} \qquad (2)$$

Similarly, the productivity of nurses and other types of health manpower can be defined as follows:

$$Q/L_i = \frac{f(L_1, ..., L_n; K; M; T)}{L_i} \qquad (3)$$

$$i = 2, ..., n$$

Total health manpower productivity can be computed by devising a single index which combines the heterogeneous inputs, e.g., weighing each type of manpower input by its price (wage or salary):

$$P = w_1 L_1 + w_2 L_2 + ... w_n L_n$$

where w = price of the ith input. Manpower productivity ican then be defined as:

$$Q/P = \frac{f(L_1, ..., L_n; K; M; T)}{P} \qquad (4)$$

It must be noted that the production function specified in (1) is very general and does not indicate the nature of the output being produced, how production is organized, and how inputs are combined to produce the output.

A. *Issues in the Definition and Measurement of Health Output*

The definition of productivity as output per unit of input is straightforward. However, in the context of health care and medical practice, the definition of output raises a number of conceptual and empirical issues. The issues are reflective of the characteristics of medical services, the role of the physician in health care, and the incentive structure in different health care settings.

1. Patient Versus Physician Sovereignty

At the very root of the output measurement problem is the question of sovereignty. In most products and services, consumers can be safely assumed to be sovereign, choosing commodity bundles according to their own individual preferences. However, it has been shown that consumers frequently find it difficult to evaluate medical services (Evans 1974) and that a symmetric information provides the potential for supplier-induced demand. By virtue of his superior technical competence and the patient's relative ignorance, a physician acts as a management consultant who counsels his patients on how to achieve good health. At the same time, the physician is also a provider who supplies services used in the production of health. During the health production process, therefore, an agency relationship is created whereby the patient merely delegates managerial responsibility to the physician, a situation which invites demand-creation. Hence, it has been contended that physicians

control demand (Sloan and Feldman 1978). In the extreme, patients can be viewed simply as passive inputs into the production of their own health. The implications of this point of view in the estimation of health output and a health production function are profound.

The other point of view upholds consumer sovereignty in the health production process (Sorkin 1977). The patient plays a central role since it is he who decides to purchase the intermediary products (physician services, hospital services, drugs) and who combines these with other inputs (e.g., housing, nutrition) in the production of health. Physician service is just one of the many inputs and may not be the most crucial.

Because the concept lies at the heart of neoclassical economics, most production function studies in health assume consumer sovereignty. In recent years, however, there has been a growing body of health literature that takes account of the phenomenon of demand creation. Zweifel (1981) proposed incorporating medical ethics in the utility function of physicians so that they obtain disutility from demand creation. Empirically, however, it is difficult to define precisely an ethically correct medical procedure and there are no a priori grounds for believing physicians are less opportunistic than the general population (Coyte 1985). To tackle the latter point, Coyte developed a theory that uses the technique of equalizing differences, i.e., consumers and providers of medical services behave as if they have an implicit contract in which consumers select the same provider when disease is detected. Although asymmetric information is assumed thus providing physicians with possibilities for opportunistic behavior, consumers may monitor physicians to limit their extent of demand creation. These new theories open new avenues for determining physician output, although empirical models incorporating such theories still have to be developed.

2. Health Outcome Versus Medical Treatments

Assuming consumer sovereignty, the generation of health can be thought of as a production-decision process shown in Figure 1 (Sorkin 1977). Given this framework, it is tempting to consider output as the change (improvement or deterioration) in the patient's health due to the medical services provided. This notion requires restating health output as an index of overall health status that incorporates such indicators as mortality and morbidity rates. While it has theoretical appeal, the concept of health output as health outcome is empirically inoperable since there is a vast array of nonmedical inputs that affect health level, e.g., housing, nutrition, personal hygiene, environmental sanitation. The measurement of these variable and the specification of their technical relationship to health is a task impossible at this time.

An alternative approach in measuring output is to focus on the intermediary product (medical services) and to construct an output measure on some index on the volume of services rendered per period. The key assumption of this approach is that increased quantities of health services improve health. In the non-hospital setting, physician visit is a convenient indicator of output. In the hospital setting, output has been measured in alternative ways including patient days, services, treatment of an illness episode, and composite units.

3. Limitations Associated with the Use of Intermediate Output Variables and Prices

While intermediate output variables are useful, it is difficult to generalize on their applicability. First, each variable has different implications and provides different incentives for behavior. For instance, physician reimbursement made on the basis of patient visits rather than illness episodes could lead to the "fractionation" of illness episodes, i.e., the breaking down of a bundle of medical services formerly considered a single unit into a series of separate services, each with its own payment charge. Fractionation indicates an artificial increase in output for the same level of input, i.e., an artificial increase in productivity (Hadley 1974).

Second, the intermediate output variables represent a highly heterogeneous mix of services. While these are useful in the microeconomic analysis of the productivity of specific health manpower types, they become cumbersome in the analysis of aggregate productivity of the health sector or components of that sector. A possible solution is to construct an aggregate output index consisting of the outputs of specific health manpower types, each weighted by the corresponding prices charged. In the health sector, however, prices may not be the appropriate weights because they are often not reflective of resource costs. One reason for this is the loss of consumer sovereignty (discussed above), causing the physician to be the relevant demander of medical service. In such a situation, it is likely that the physician's choices and valuations of medical care differ from those which a fully informed patient might make. Another reason for the difficulty in employing prices as weights is the pervasive presence of insurance payments, a development that exists now in advanced countries and is likely to be followed in countries like the Philippines. In general, the presence of third party payments causes distortions in the set of treatments which providers decide to offer, the prices charged for them, and their utilization by patients.

The use of intermediate output variables and their corresponding prices poses a third problem which has something to do with quality. How can quality levels be incorporated into the analysis of health manpower productivity? It has often been assumed that output prices capture output quality, i.e., a higher-priced product must be of higher quality. While this is true in a competitive market of informed sellers and consumers, such an assumption is hard to maintain in the health sector where there is a lack of adequate competitive structure which insures that prices of goods and services of low-quality would fall while prices of high-quality goods and services rise. Many health services are also priced at cost rather than their relative values to patients. In hospitals, profitable services are frequently overpriced to cross-subsidize unprofitable ones. For these reasons, price may not be a good quality and productivity indicator in health care.

B. *Sources of Manpower Productivity*

Worldwide, the major sources of productivity growth since the 1930s have been the advances in biomedical knowledge and technique and in the development of antibiotics. In industrial countries as well as in the urban centers of developing countries, other major sources of productivity have been the reallocation of physician time from house calls to office/hospital visits and telephone calls, as well as the steady substitution of ancillaries (physician auxilliary, physician assistant, or other support personnel) for physicians. This section discusses potential sources of manpower productivity, namely: labor substitution, capital substitution, and technical and organizational change.

1. Health Manpower Substitution

A substantial body of work has documented the considerable improvement in physician productivity achieved through the greater use of ancillary personnel and task delegation. The studies, however, have been focused on the examination of the role of physician assistants in clinics. Physician assistants, at least in the US setting, are conceived as personnel who will be able to perform medical tasks currently beyond the competence of even an experienced nurse. Production function estimates in the US show that if the average physician (solo practitioner) employed as many as two aides, physician productivity (measured as patient visits per week and office visits per week) would increase by about 26-40 percent, depending on the specialty (Sorkin 1974). Among the specialties, internal medicine and general practice appeared to have the greatest capacity to absorb additional ancillaries, a finding consistent with the popular impression that the less esoteric specialties provide greater opportunities for task delegation (Kehler and Zaretsky 1972).

Possibilities of large-scale manpower substitution and task delegation have profound implications on the delivery of health care and on the demand for and supply of physicians. In advanced countries where much of the research has been undertaken, the issues revolve around (a) consumer attitudes to the extensive employment of physician assistants or the greater delegation of tasks to ancillaries, (b) legal obstacles to task delegation, (c) institutional and managerial constraints, and (d) resource costs engendered by the use of assistants and ancillaries. Many of these issues are also relevant in developing countries where professional health manpower are in short supply.

Consumer resistance has been identified as a major impediment to the introduction of physician assistants and more extensive delegation of tasks to ancillaries. Physicians may not hire as many assistants and ancillaries as possible due to patients' perception of quality deterioration and weakening of doctor-patient relationship. To many consumers, the innovation may appear as "medicine for the poor", low-cost and therefore low-quality. To the extent that physicians are sensitive to these feelings, they may not employ as many assistants or delegate as many tasks to ancillaries as they can. A program of labor substitution in medical care, therefore, can be successful only if it is accompanied by a corresponding program in patient education or, on a more personal level, if it is predicated on the endorsement by the physician to the patient.

Legal obstacles to task delegation in medical care refer chiefly to licensure limits on what tasks assistants and ancillaries are qualified to perform by law. In most countries including the Philippines, laws limit medical practice to licensed physicians. The licensure laws specify the functions involved in medical practice and the tasks which only a physician can do. (Licensure similarly exists for nurses, midwives and dentists). A primary justification for licensure of the medical and allied professions is to protect the public from unqualified practitioners.

While there may be social benefits derived from licensure, it likewise involves social costs. As an effective entry barrier, licensure is universally cited as the cause of the monopolization of the medical profession. Physician licensure also severely restricts upward occupational mobility among paramedics, thereby indirectly resulting in the shortage of this type of health workers. An important social cost of licensure that is frequently overlooked is the inefficiency arising from the constraints

imposed by licensure laws on the distribution of tasks among various types of health manpower (Smith, Reinhardt and Andreano 1979). Licensure laws governing the different types of health manpower are often drafted in isolation of each other. In their design, there is hardly any effort to take account of how tasks among the various health occupations can be optimally allocated. Moreover, licensure laws are not updated frequently enough, if at all, to take account of the rapid technological and organizational improvements which have a positive impact on health care delivery and which may require redefinition of tasks. By necessity, therefore, large-scale employment of physician assistants and task delegation to ancillaries can come only after a thorough review of professional licensing. Critics of licensure laws in the health field even advocate the scrapping of licensure altogether since, in their view, the social benefit of such legislation (i.e., the protection of consumers) rarely matches its social cost (i.e., deterrence to innovation in the delivery of health care and the efficient allocation of health manpower resources).

In the Philippines, the negative impact of the strict enforcement of licensure laws have been felt mostly in the administration of public health programs. Constrained by the limited number of physicians, these programs rely heavily on nurses, midwives and health volunteers. While these health workers can do medical routines usually done by a physician (e.g., intravenous injections, immunization), they are legally prevented from doing them. In the light of manpower resource constraints, there is a need to regularly review the scope of professional practice acts in the light of the changing needs and realities in the health care system (DOH 1989b).

2. Capital Substitution

The critical issue in capital substitution is whether the new type of capital (or the new technology embodied in the new equipment) increases output or reduces cost per medical procedure relative to the prior method. In the wake of the revolution in electronics technology, capital substitution in health care has focused on the possibilities for increased computer-based applications in service delivery. The major areas of computer applications in health care are medical diagnosis, clinical laboratory, screening, patient monitoring, medical record-keeping, automated medical history, and health information systems. Benefits from increased computerization include savings in health personnel time associated with patient diagnosis; reduction in institutional operating costs because of more efficient auditing, cost accounting and interdepartmental coordination; and improvement in the assessment and evaluation of services provided (Hadley 1974).

In the public health systems of developing countries, the large-scale computerization of health information systems and management information systems is being envisioned. Previous manual systems have been shown to eat substantial amount of fieldworkers', coordinators' and managers' time. The inefficiencies associated with such a system have constrained decisionmakers' ability to decide on vital health concerns and to monitor and evaluate national health programs (PHDP III 1989).

The issue of technical feasibility of using computers for diagnostic and health information storage and retrieval purposes is not as critical as the issue of economic feasibility. Highly sophisticated capital equipment are very expensive. So far, however, not much research has been done to assess

their cost-effectiveness, their impact on morbidity and mortality rates, their labor-saving characteristics (critical in a labor-surplus economy), and their management-enhancing features.

In the Philippines, as a result of the rapid rate of importation of sophisticated medical equipment, policymakers are beginning to consider the necessity of drawing up a policy on appropriate medical technology. The need for such policy is dictated by the current lapsided distribution of recently acquired technology (CT scans, MRI) and the high cost of acquisition which is translated into medical cost escalation. A validating mechanism similar to the "Certificate of Need" requirement among US health care providers may be called for (DOH 1989b).

Research on the productivity-increasing potential of noncomputer-based capital also deserves attention. Less developed countries often have to make hard choices whether to hire an additional health worker or to purchase a vehicle as a way of expanding health service coverage. Yet no studies are available on how a rational decision on this and similar problems can be made.

3. Organizational Change

Research on the impact of organizational mode of health service delivery on health manpower productivity has focused on comparing solo versus group practice, and single versus multi-specialty groups. A distinct, though related issue is the effect of reimbursement scheme on physician productivity.

Controlling for specialty and reimbursement scheme, one can compare solo versus group practice. The research interest here is to find out whether physicians are more productive in group rather than solo practice. Examination of productivity differences and economies of scale between the two modes of practice, however, poses conceptual difficulties. Either one assumes solo and group practice have the same production function and then examine economies of scale, or one assumes they have different production functions and then look at productivity differences between modes of practice and within group practices. The same problem occurs in the comparative analysis of single and multi-specialty groups (Hadley 1974). Controlling for reimbursement scheme, one can also compare single versus multi-specialty group practice. One can then compute for economies of scale and in addition, economies of scope.

Notwithstanding conceptual and measurement problems, there has been a plethora of studies comparing solo and group practices. The studies typically employed production functions to estimate productivity differences and cost functions to assess economies of scale. In general, however, the studies failed to provide consistent empirical results on the implicitly assumed economic superiority of group over solo practice (Sorkin 1977). Meanwhile, the issue of whether group practice is more economical in the use of manpower remains unanswered.

A second group of studies has been concerned with the impact of reimbursement scheme on physician productivity. Reimbursement here refers to the way in which the physician is paid. It is classified into: (a) fee-for-service or piecework basis under which the physician is paid for each unit of service performed; (b) salary which is fixed for a specified time period; and (c) capitation under

which the physician is paid in proportion to the number of patients he has agreed to treat over some period of time.

Inherent in the payment scheme is its incentive structure: (a) Under fee-for-service, physician income is a function of the number of services he provides. Hence, he is likely to overprovide his services. The situation is exacerbated if the patient is not responsible for his medical bill. (b) Under capitation, physician income depends on the number of subscribers he enrols and for which he is expected to provide care. Hence,the physician is likely to underprovide services and/or provide services at lower cost, i.e., there is an inherent cost-consciousness under capitation arrangement. It is also in the interest of the physician under capitation to provide preventive measures and to treat cases as early as possible when the costs of treatment are low. (c) Under salaried payment, there are no clear physician incentives to overprovide or underprovide services.

In comparing the three reimbursement schemes, one should take note of the problems associated with output and input measurements and with value judgments. As has been noted, however, in contrast with the two other reimbursement schemes, capitation induces physicians to provide only the necessary services and to produce those services as efficiently as possible. How this cost consciousness translates into greater health manpower productivity still has to be empirically shown and validated.

4. Technical Change

Economists generally assume that technological advances necessarily lead to productivity increases. Hadley (1974), however, cites two reasons why this is not necessarily the case in health care. First, health and disease are adaptive concepts. As better medical techniques are developed, the average complexity and severity of medical diagnoses go up. Increased complexity/severity engenders more intensive resource use. Hence, usual productivity indices may decline as a result of technical change.

Second, innovations are often not subject to market profitability in the medical market. Premium is placed on quality-enhancing technology rather than cost-saving types. Such sophisticated technology often engenders more intensive resource use.

Lastly, while some technological advances such as antibiotics save physician's time, many other advances (such as open heart surgery, improved burn treatment, Pap smears for carcinoma diagnosis) increase doctor-time per patient.

VII. Conclusions and Policy Recommendations

The study mainly focused on two major issues on health manpower: employment and productivity. The first included supply and needs and requirements for specific categories of health manpower, their employment settings and some issues on production and migration. It also attempted to forecast supply and requirements up to the year 2000 and compared these figures to estimate possible surpluses or shortages. Four categories of health manpower were included in the study : physicians, nurses, dentists and midwives. The topic on productivity focused on conceptual and methodological levels. No attempt to estimate productivity levels and changes was made since no data are available to allow such estimation.

The following were the findings of the study:

1. There exists an acute unevenness in the distribution of health manpower in the country and the magnitudes of unevenness are alarming. The scarcity of health manpower, especially physicians, is pronounced especially in lagging and relatively poor regions of the country. The concentration of health professionals particularly physicians and dentists, is evidently found in the Metro Manila and Southern Tagalog area. The case of nurses is, however, different. Metro Manila lost a substantial number of nurses between the 1970s and 1980s because of the massive outflow of nurses to the United States and the Middle East. Midwives are more or less dispersed outside Metro Manila.

2. Results of the regression analysis on location decisions revealed that physicians and dentists have preference to practice in areas where there are more people, higher urbanization rate, more hospital beds (for physicians) and higher income. Evidently, this suggests the persistently strong bias, particularly of physicians, for curative care.

3. In terms of their affiliations, physicians and dentists are mostly in the private sector, with the latter mostly doing private practice. Nurses and midwives are mostly in the government sector, with about 73 percent of the latter employed in the Department of Health (DOH).

4. The dramatic increase in the supply of health manpower in the country especially throughout the 1970s and 1980s seems to have been mainly facilitated by the opening of new schools. Medical schools, for example, increased from seven in 1957 to 27 in 1985. Nursing and dental schools likewise increased significantly from 88 in 1971 to 129 in 1984 and from seven in 1975 to 16 in 1987, respectively. Cohort survival rates of medical and nursing students were found to be high (i.e., on the average, 98.4% and 94.7%, respectively), but for dental students, it was found to be relatively low at 53.4 percent. The main reasons for this were the high expenses involved in acquiring dental equipment and the difficulty in fulfilling patient care requirements especially during the final years of dental proper. Performances in the licensure examinations have been deteriorating. From 1974 to 1988, the passing rate averaged 75.6 percent for medicine, 70.5 percent for nursing, 65.3 percent for midwifery and 54.9 percent for dentistry. The proliferation of schools appears to have resulted in lower quality education as indicated by the lower passing rates at the onset of the 1980s and throughout the

decade. This is clearly manifested by the dramatic decline in the national passing average in the medical board examination in the 1980s, despite the relatively high performance of graduates from leading medical schools in the country like the University of the Philippines, the University of the East and the University of Santo Tomas.

5. In an effort to solve the problem of maldistribution of health manpower, the government decided to allow the establishment of more medical and allied schools throughout the country. The idea was to have at least one medical school in each region of the country. This idea was premised on the belief that the graduate normally does not go back to his roots once he has been "urbanized". However, data showed that the dispersion of these schools do not seem to help at all. A considerable number of medical students still come from other regions outside the school. This may have been brought about by the quota system imposed by the Board of Medical Education as well as the desire of medical students to seek admission in already established schools.

6. Not much work has been undertaken so far in the area of financing. The limited data, however, show that substantial resources are needed to finance medical, dental and nursing education. This is perhaps one of the reasons why majority of new physicians prefer to practice in the private sector and in urban centers. The immediate concern is to recoup the huge investment expenditure incurred in the medical school. This also conforms well with the observation that a good number of medical positions in the Department of Health remain unfilled for years. The relatively low salaries offered by the government do not seem to justify the huge investments made on medical education.

7. A comparison of the available stock of physicians, nurses and dentists for 1985, 1990, 1995 and 2000 with the corresponding estimated requirements using a combination of the health manpower to population ratio and task and time utilization methods, revealed that the country will likely have an excess of physicians and nurses but will experience a deficit in dentist supply. The surplus of physicians and the shortage of dentists do not appear to be quite severe. However, the continued and expanding number of nurses in excess of what is needed is quite disturbing. This observation lends credence to the popular observation that the Philippines today is actually training nurses not for domestic employment but for the market abroad.

8. Several issues have been identified as relevant to the discussion of productivity of health manpower. Most of these issues are conceptual in nature and relate to the definition and measurement of health output. They are also reflective of the characteristics of medical services, the role of the physician in health care and the incentive structure in different health care settings. At the very root of the output measurement problem is the question of sovereignty. In most products and services, consumers can be safely assumed to be sovereign, choosing commodity bundles according to their own individual preferences. However, it has been shown that consumers frequently find it difficult to evaluate medical services and that a symmetric information provides the potential for supplier-induced demand. It is in this context that physicians are said to control demand and that patients are simply passive inputs into the production of their own health. The other point of view, however, contends that the

consumer plays a central role since it is he who decides to purchase the intermediary products (i.e. physician services, hospital services and drugs) and who combines these with other inputs in the production of health.

Another relevant issue is whether to measure health output as health outcome. This involves the change in the patient's overall health status as a result of the medical services provided. However, it is difficult to empirically do this since there is a vast array of nonmedical inputs that affect health level, e.g. housing, nutrition, personal hygiene and environmental sanitation. The alternative approach is to focus on medical services an intermediary input and construct some index on the volume of services rendered per period. The assumption here is that increased quantities of health services improve health. In the non-hospital setting, physician visit is a convenient indicator of output while in the hospital setting, patient days, services, treatment of an illness episode and composite units are used.There are limitations in the use of this approach. Each variable has different implications and provides different incentives for behavior. For example, reimbursement made on the basis of patient visits rather than illness episodes can result in "fractionation" which can indicate an artificial increase in productivity. Also, intermediate output variables represent a highly heterogeneous mix of services and become complicated in the analysis of aggregate productivity of the health sector or components of that sector. The third problem concerns the incorporation of quality in the analysis of health manpower productivity.

9. Three major potential sources of health manpower productivity have been identified in this study namely: labor substitution, capital substitution and technical and organizational change.

The observations from the analysis point to some very critical policy directions:

1. A more serious effort to solve the maldistribution problem should be instituted. Obviously, the dispersal of medical schools and training facilities do not have much impact on distributing the health personnel to areas where it is felt they are most needed. A more potent policy is to upgrade the incentive scheme for those health workers who may be willing and decide to practice in poor, underserved and sparsely populated areas. Perhaps a rural post salary differential or additional allowances can be offered to those in government. For private practitioners, tax deductions can be considered. The Senate bill proposing a Magna Carta for health workers is a positive step towards improving the welfare of health workers.

2. The apparent preference of most health professionals to set up practice in highly urbanized areas has been a result of the kind of training or orientation they receive in medical schools which has always been biased towards curative and clinic-based care. There is, therefore, a need to refocus the orientation of training to highlight community-based practice. Relatedly, there is also a need to upgrade the quality of graduates especially of medical schools. The decline observed in their performances in the board examination reflects the deteriorating quality of either the students admitted in the medical schools or the education they get in these schools. The effort to evaluate the performances of these schools, especially those which were

established more recently and are located in the various regions of the country, should be made on a regular basis and provide the basis for either their closure or further upgrading. This also augurs well with the decision to stop temporarily the establishment of more medical schools in other parts of the country.

3. The expanding number of nurses far in excess of what the health sector requires and their apparent unavailability especially in the rural areas point to very serious policy implications. Evidently, the increase in enrolment in nursing schools is really a response to the expanding job market in the United States and the Middle East. With some upgrading in the incentive scheme for nurses, especially in the government sector, and a more stringent requirement on work in the government before they can be allowed to work abroad , the need for nurses especially in the rural areas may still be met adequately. This can be done especially for schools which receive substantial subsidies from the government. The current thrust of the government in giving more responsibilities to midwives in the absence of nurses ,particularly in the rural health units, is a positive step in expanding the delivery of health care to the rural people. What is needed, however, is the continuous upgrading of the skills of midwives and an improvement in their compensation and other benefits.

4. Productivity is a key element in the current rise in medical costs as well as the seemingly inadequate supply of certain types of health manpower in certain parts of the country. Are the increases in costs justified by increases in health outcomes? Is there a wider access to medical care by the people today? Is the delivery of medical care more efficient with the use of modern technology? Several other questions can be asked, but the key to answering them is the set of information needed to undertake a study on productivity. It is therefore felt that a comprehensive system of collecting and monitoring data needed to construct productivity indices be established. This is very crucial since the results of these studies are only as good as the data that are generated and used in the analyses.

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